

EIS 1492

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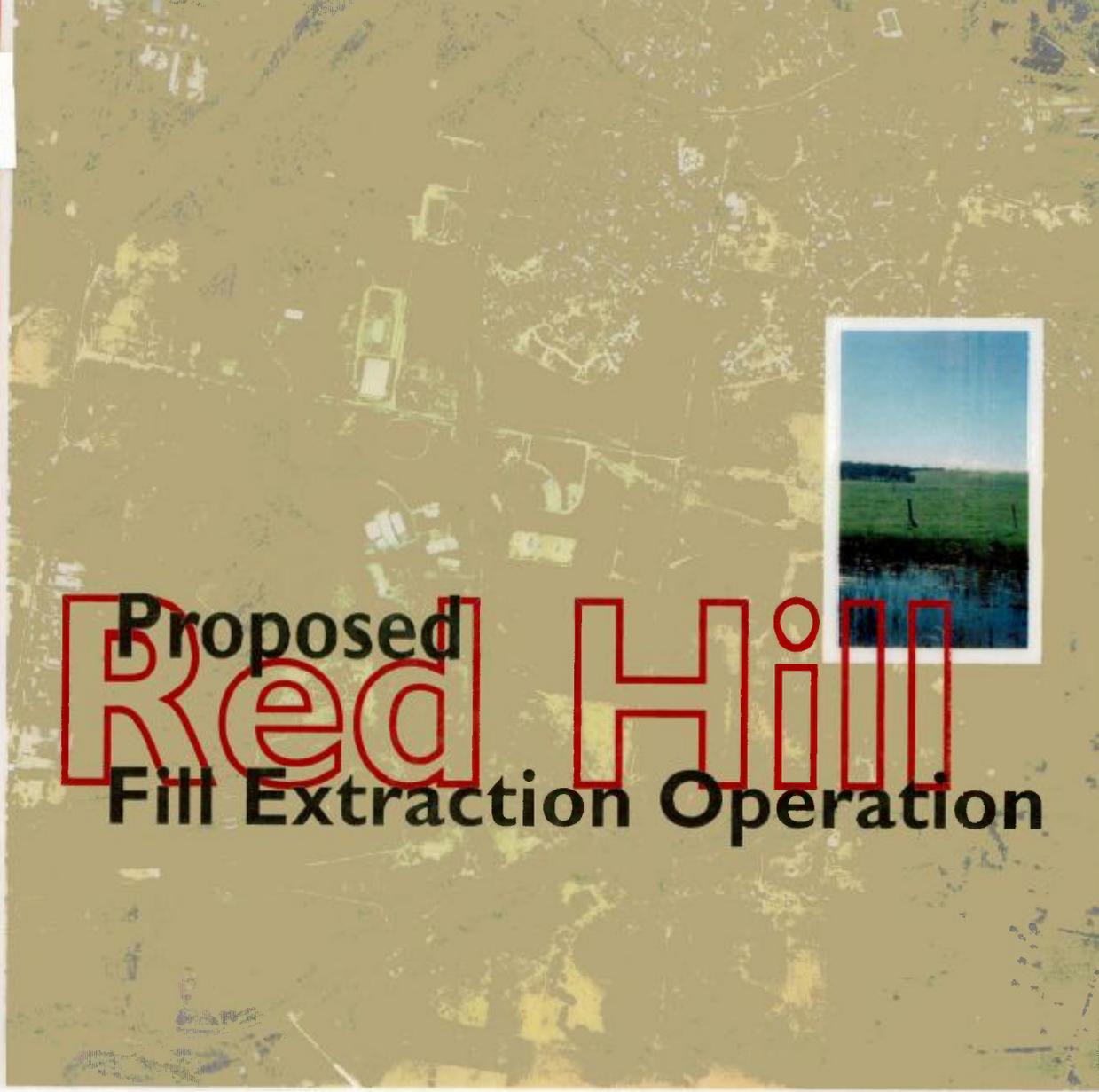
Red Hill fill extraction operation : environmental impact  
statement

NSW DEPT PRIMARY INDUSTRIES



AA068127

R T A



Proposed  
**Red Hill**  
Fill Extraction Operation



Environmental Impact Statement

May 1999

EIS 1492



SINCLAIR KNIGHT MERZ

L98/0388 & L99/0250

**Roads and Traffic Authority**  
May 1999

**Red Hill Fill Extraction Operation**

**Environmental Impact Statement**

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EIS 1492

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*On behalf of the Roads and Traffic Authority, the study team would like to thank the many people who made a contribution to this study, including representatives of State and Local Government agencies, community organisations and individuals. We extend our sincere thanks to all who gave freely of their time and shared their considerable knowledge about the area. Thank you all.*

Form 2

Submission of  
Environmental Impact Statement (EIS)  
prepared under the Environmental Planning and Assessment Act 1979 Section 78A (8)

**EIS prepared by**

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in respect of

**development application**

applicant name Roads and Traffic Authority  
applicant address 211 Bourke Street  
GOULBURN NSW 2580  
land to be developed: address Cnr Riverina Highway and Old Sydney Road  
Albury  
lot no. DP/MPS, vol/ fol etc  
proposed development Lot 922, DP 589483, part of Lot 8, DP584652, Portion 102 Lot 2,  
DP516572, Portion 100 and Portion 11, DP576562

**environmental impact  
statement**

an environmental impact statement (EIS) is attached

**certificate**

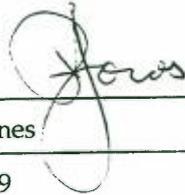
I certify that I have prepared the contents of this Statement and to the best of my knowledge

- it is in accordance with clauses 54A and 55 of the Environmental Planning and Assessment Regulation 1994, and
- it is true in all material particulars and does not, by its presentation or omissions of information, materially mislead.

signature

name

date

  
Ross Jones

25/5/99

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## Guidelines for making a public submission

### How does your submission fit into the EIS process?

Submissions from members of the public, government agencies and interest groups are invited and encouraged in response to this EIS. All submissions will be examined and an assessment report will be prepared by the Albury City Council. The Council will make a decision or determination after consideration of the EIS, public submissions and the assessment report. This process will be undertaken in close cooperation with the Department of Urban Affairs and Planning (DUAP) and other State Government organisations.

### Why write a submission?

A submission is a way for you to provide input into the environmental assessment process for the proposed fill extraction operation. However, it is not recorded as a vote for or against the proposal. It is the content of the issues raised which is important to the process. Submissions can provide information, comment on the proposal and findings, identify any gaps in the assessment, or suggest improvements. The assessment report therefore contributes to the decision making process regarding the proposal.

### What should you include in a submission?

It is useful to the decision making process if you can indicate:

- your interest in the proposal;
- your opinion of the proposal;
- what measures you consider appropriate to improve the proposal;
- any errors or omissions in the information presented in the EIS;
- any further factual information you have (and its source).

Your comments should also cover related facts or topics that you think should be considered. All submissions will be treated as public documents unless explicitly requested to be otherwise. All written submissions will be acknowledged. While form letters are accepted and examined, they will not be acknowledged.

### How should you structure your submission?

You will make the task of analysing your submission easier if you:

- attempt to list points, so that the issues raised are clear;
- refer each point to appropriate sections of the EIS;
- include your name, address and the date;
- ensure your submission is as legible as possible.

### Where should you send your submission?

Submissions should be addressed to:

Albury City Council  
City Planning/Development  
PO Box 323  
ALBURY NSW 2640.

## Executive Summary

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### Introduction and need for the proposal

To continue the significant improvements to the Hume Highway, as part of the National Highway System, the Roads and Traffic Authority (RTA), in partnership with Vicroads and the Federal Department of Transport and Regional Services, is managing the construction of the Albury Wodonga National Highway Project (AWNHP).

Joint approval was given for the inner route in January 1998. The Federal Budget in May 1998 provided funding for the project with an allocation of \$7 million for NSW and \$4 million for Victoria in 1998/99 and indicative funding beyond to enable major construction works to commence in 1999/2000. The NSW and Victorian sections of the works will be undertaken separately, but concurrently, by RTA and Vicroads as a single project, with the point of separation being the northern abutment of the Murray River Bridges. The works in NSW extend for approximately 38km. These works are to be undertaken by the private sector under a single design, construct and maintain (DCM) contract.

The carriageways of the inner route will be constructed at a level similar to the adjacent railway line through the urban area of Albury. This will require substantial embankment construction, particularly across the floodplain, and will involve a considerable amount of earthworks.

Possible sources of suitable fill material were canvassed in the Environmental Impact Statement / Environmental Effects Statement (EIS/ESS). One source considered was the excavation from a hill located east of the eastern end of the airport runway, known as Red Hill. This is in relatively close proximity to the project and has the added community safety benefit of easing the take-off and landing gradient for aircraft accessing the airport.

The EIS/ESS considered the haulage of material from Red Hill to the project along the northern edge of the airport grounds but did not assess the environmental impact of the excavation. The subject of this EIS is assessing the environmental impacts of the excavation. Additionally, the haul road option within the airport grounds is not regarded by Albury City Council (ACC) as safe, as it would contravene air safety regulations. This EIS therefore also considers the construction of the haul road to move materials from Red Hill to the AWNHP construction zone.

The proposed fill extraction site is known as Red Hill and is located approximately 1.25 km east of the Albury Airport runway, within the flight-path, on the corner of the Riverina Highway and Old Sydney Road (Bowna Road). The site has been used previously for grazing purposes, with no previous extraction operations having taken place on the site.

The RTA proposes to undertake the following works:

- extract up to a maximum 2,200,000 m<sup>3</sup> of fill material over a two year period.
- transport the material by truck from the site to the AWNHP construction zone.

The proposed development is located on the south side of Red Hill within Lot 922 of DP 589483 and part of Lot 8 of DP 584652. The land is owned by the Albany-Wodonga Development Corporation (AWDC). The northern side of Red Hill is composed of a mixed box woodland which consists of predominantly eucalyptus species, however the southern end has been cleared for limited grazing. Surrounding landuses include rural residential uses to the north, south, east and west. The Riverina Highway is situated directly south of the site and the Albany Airport is to the west. Also to the west is the Albany Jet Boat Racing Park which is the site of major national jet boat races three times per year. Further to the north of the site are the residential release areas of St Johns Green, St Johns Hill, Corrys Wood and Huntingdale.

The haul road is proposed to run through limited grazing land to the west of the site prior to running adjacent to the Airport along the existing Fallon Street. It then heads north through vacant grazing land that backs onto a number of horse stables associated with the Albany horse racing track. When the haul road crosses Dallingger Road and enters the AWNHP construction zone it is adjacent to residential land.

In general, the impact on surrounding land use by the proposed development is not anticipated to be significant. The proposed activity will be operational over an estimated two year period. Furthermore, sufficient safeguards will be established to confine the impacts to the extraction site and haul route, controlling the degree of the impact on the surrounding environment. Additionally, the construction of the haul road minimises the impacts on local houses, traffic and the safety of horses and handlers

#### *Land Use*

#### **Environmental Impacts**

- to progressively rehabilitate the site with native vegetation (predominantly grasses). This will be undertaken as soon as practicable to return the natural habitat and visual amenity of the site, as well as restrict erosion and sedimentation.
- operate in such a manner to minimise the visual disturbance of the operation and establish procedures to ameliorate any effects of the operation on the natural environment.
- following the extraction campaign, leave the site in a safe and stable manner. No drilling, blasting, crushing or screening of the rock material will be necessary. The principal objectives of the proposed development are as follows:
  - to provide the necessary quantities of fill material for the NSW component of AWNHP;
  - to comply with the expectations of the community and the imperatives of legislation in environmental protection and management.
  - to implement the required environmental safeguards and monitoring programs to achieve an environmentally acceptable fill extraction operation.
  - to undertake the optimal extraction and utilisation of an identified resource.

crossing Dallinger Road to the Albury Racetrack, compared with using smaller trucks on local roads.

The impacts of the proposed operation on each of the major surrounding land areas as follows:

#### Grazing

The extraction process will have little impact on the grazing activities in the region. The site is currently only used for limited grazing. The proposed extraction area is relatively small at 30 ha. There are many alternative grazing areas in the area.

Following fill extraction the site will be returned to grassed pasture and no net loss of grazing land is anticipated.

#### Natural Environment

The impacts of the extraction process on the surrounding natural environment will be minimal as much of the impact will be contained on the site. With less than five eucalypts being felled at the extraction site and 25 for the haul road construction, only minimal loss of disturbed habitat would occur. As most of the area has been cleared for previous grazing activities the impacts of the proposed development on the natural environment are anticipated to be small. This will be minimised further by the implementation of the progressive rehabilitation program proposed.

#### Commercial Activities

The proposed development will have little impact on the commercial activities of Albury. Transport of the fill material via the haul route identified will not significantly interfere with local traffic or any commercial activities. The jet boat races have the potential to be impacted upon, however, access to the facility during the 3 major events per year will be maintained, with haulage activities ceasing on those days.

#### Local Dwellings

The clearing of land for extraction will reduce the visual appeal of Red Hill for a small number of local residents. This, however, would be minimal as the extraction method will use extensive vegetative screening to shield its operation from general view. Noise from plant operation and truck movements will also impact to an extent on local dwellings. Ameliorative measures will be undertaken through the extraction process site to ameliorate the visual and noise impacts from the site.

#### **Noise**

The proposed fill extraction operation at Red Hill has the potential to impact on acoustic amenity as a result of on-site extraction activities and vehicle movements associated with the operation.

#### On-site extraction activities

The impact of noise associated with on-site extraction activities at Red Hill has been assessed against the criteria contained in Chapter 171 of the EPA's Environmental Noise Control Manual, using the ENM model. Noise levels for the proposed extraction

activities were calculated based on a "worst case" scenario. The average day time background ( $L_{A90}$ ) noise levels determined at the nearest residential receiver to the site were approximately 40 dB(A). The  $L_{A10}$  construction noise level, which should not be exceeded at the boundary of the nearest residence to the fill extraction site, would therefore be 45 dB(A) (background + 5 dB(A)).

The results show that operation of excavation equipment at the fill extraction site is likely to exceed the pre-determined noise level objective of 45 dB(A) at each of the nearest residences when works are carried out within approximately 400m of the nearest boundary to the works. The presence of a 3m high earth noise mound located at the boundary of the fill extraction site reduces this distance to approximately 160m at the Heath residence and approximately 250m at other residences adjacent to Old Sydney Road and The Riverina Highway.

The Heath residence may experience  $L_{A10}$  noise levels up to 54 dB(A) when excavation equipment is located approximately 100m from the nearest point of the works. The presence of a 3m high noise mound along the boundary of the site reduces this level to approximately 50 dB(A), which remains above the criterion level by 5 dB(A). Lower noise levels were calculated as the distance between the excavation equipment and the residence increases, and in locations where the earth embankment provides shielding. Similar noise level were calculated at the Old Sydney Road (Bowna Road) residences, however less topographic shielding is expected to be provided at some locations and noise levels may therefore be higher at times. The calculations performed assuming the presence of a 3m high earth mound at the boundary to the site showed that extraction works may exceed the pre-determined noise level objective of 45 dB(A) by up to 3 dB(A) within a distance of approximately 23m of the nearest residential boundary.

Noise levels are likely to be below 50 dB(A) for the majority of the excavation period and when the bulk of excavation equipment is located further than 200-300m from the nearest residence, excavation noise levels are not likely to exceed the criterion level of 45 dB(A). With a 3m high earth noise mound located at the boundary of the site adjacent to the nearest residences, noise levels are likely to be below 45 dB(A) when the bulk of excavation equipment is located further than approximately 250m from the nearest residence to the excavation equipment.

#### Haul road noise

The other potential source of noise associated with the fill extraction operation is that of haulage vehicles. As part of the route options report, it was calculated that using standard haul trucks for on-road use would result in an increase of 145 heavy vehicles per hour for the two year duration of the extraction operation travelling on local roads. This had the potential to significantly increase traffic noise levels on these roads. To overcome this impact, it was recommended in the route options report that a dedicated haul route be constructed for use by 50m<sup>3</sup> capacity haul trucks. This would take the traffic and noise impact off local streets.

Construction of the haul road from the Red Hill site to the AWNHP construction zone has the potential to cause annoyance at the nearest residences on the southern and western sides of the excavation site, and at those located at the southern end of Elizabeth Mitchell Drive, along Corrys Road, and along Dallinger Road.

The results show that noise generated due to construction of the haul road is not likely to exceed the recommended construction noise level of at the nearest residences.

Transport of fill from the Red Hill site to the AWNHP construction zone has the potential to cause noise impacts at residences located near to the proposed haul route. Operation of a dedicated haul route allows the use of large CAT 777 or 769 trucks, which have a carrying capacity of approximately 50m<sup>3</sup>. The results show the maximum noise levels generated by trucks passing the nearest point to the Elizabeth Mitchell Drive residence may reach 60 dB(A). This noise level is an instantaneous level which would be experienced for a short period of time (the order of tens of seconds) as trucks pass by the closest point to the residence on average every 8.5 minutes, assuming trucks are travelling in pairs to and from the AWNHP construction zone.

Due to the fact that the number of truck movements to and from the fill extraction site could vary considerably above or below the estimated average of 14 per hour, quantification of the exact increase in noise levels has not been undertaken in this report. Noise monitoring would be required in order to determine whether noise generated from haul operations are acceptable at the nearest residences. Noise mitigation measures have been proposed and should be included in the Project Environmental Management Plan (EMP).

### ***Climate and Air Quality***

The main air quality impacts associated with the Red Hill project are expected to arise from the generation of airborne dust during the excavation works. Exhaust emissions from excavation equipment and transport vehicles will also occur, however these are expected to be minor.

Dust resulting from the excavation of soil at the proposed Red Hill fill extraction site has the potential to impact on air quality in the immediate area surrounding the site. The most significant sources of dust generation associated with the project will include dozers clearing and stockpiling topsoil and fill, excavators loading the trucks, and general movement of vehicles about the site. Wind blown dust is also likely to be generated from exposed soil during dry and windy conditions. Dust emissions from haul trucks travelling off-site from the Red Hill fill extraction site to the AWNHP construction zone are expected to be minor due to the fact that the trucks will be covered and will travel along the sealed haul road.

The total amount of dust generated at the site over the two year period was estimated assuming a worst case situation where approximately half of the fill extraction site area would be exposed at any one time. It has also been assumed that wind blown dust may be generated approximately half of the time during the two year period. This

A search of the NSW National Parks and Wildlife Service (NPWS) Atlas of NSW Wildlife Flora and Fauna within a 10km radius of the site to ascertain the presence or potential occurrence of any Rare or Threatened Australian Plant (ROTAP) species, or threatened

### ***Flora and Fauna***

To safeguard the quality of the water in the area erosion control works will be installed according to Australian Rainfall and Runoff design standards. Regular inspections of the embankments and sediment control ponds will be made and maintenance works will be carried out as necessary.

The effects of the works are not anticipated to have an impact on the ground water in the area. The volumes of dirty water to be collected at any one time will not be large and the majority of the water will be directed around the site, having a negligible impact on groundwater in the region.

With the incorporation of the sediment control works described in the EIS the quality of water discharged from the site will be satisfactory. The Woolshed Creek is located some 500 m from the site and only clean or treated water will discharge from the site into ephemeral streams prior to discharging to Woolshed Creek.

The proposed extraction site has no permanent water courses, though a number of short, ephemeral water courses exist at the eastern side which either drain to a small dam or into Woolshed Creek. The proposed drainage and sedimentation controls outlined in this EIS will prevent erosion from occurring on the site and will maintain the quality of the water leaving the fill extraction site. The primary objective of the water management controls recommended in this EIS (see **Section 3.6**) is the separation of clean and dirty water systems. To protect water quality leaving the site, clean water will be diverted away from disturbed and rehabilitating areas. Dirty water will be directed to sedimentation ponds for treatment prior to discharge from the site.

The proposed site for extraction is located just south of Red Hill. This area has, in general, a flat to moderate slope, with gradients generally in the order of 3 to 8%. The terrain steepens to the north of the extraction site until it reaches the crest of Red Hill at 220m. There is a small ridge which runs approximately NW-SE across the site originating from Red Hill.

### ***Water Quality Management***

The nearest residences to the fill extraction site are located within approximately 200m of the south and eastern boundaries of the site. Based on the dust emission rate calculated, and the fact that the predominant winds experienced within the area are from the north-west, west and south-west, these residences may experience nuisance dust impacts at some time. In order to minimise the potential dust impacts at each of the nearest residences, proven mitigation measures have been recommended.

estimate is considered to be overly conservative and is likely to over estimate the real impacts.

species listed on the *NSW Threatened Species Conservation Act, 1995* (TSC Act). Other botanical investigations conducted in the general vicinity of the study area were also reviewed.

A broad vegetation survey of the study area was then conducted on 5 November 1998. A series of random quadrants was established within each vegetation community and all plant species observed were recorded and described.

No ROTAP or threatened plant species listed in Schedules 1 or 2 of the TSC Act were recorded in the study area during the field survey, or during previous investigations in the vicinity of the site. Only one species listed as Vulnerable under Schedule 4 of the TSC Act, namely *Amphibromus fluitans*, was recorded within a 10km radius of the site. This species is mostly found in permanent swamps. Given the general lack of habitat in the study area, *Amphibromus fluitans* is not likely to occur on the subject site. An additional 6 ROTAP and/or TSC Act species have been recorded in the Albury region during previous studies, however none of these species are likely to occur on the site, given their habitat preferences and lack of evidence of their presence during the field survey or previous investigations.

The field survey identified two general vegetation communities which occur in the study area. These are:

- Mixed Box Woodland - which consists of woodland patches in the north of the proposed extraction site, directly north of the stable complex on Dallinger Road and along the drainage channel running through the proposed Thurgoona Industrial Estate. Remnant roadside vegetation also exists along the southern and eastern boundaries of the proposed extraction site, and in scattered woodland patches around the Thurgoona Industrial Estate.
- Agricultural grasslands - which cover approximately 75% of the study area throughout the majority of the central and southern portions of the proposed extraction site and throughout the central part of the Thurgoona Industrial Estate site.

Both vegetation communities have been subject to extensive grazing and exist in a modified or degraded state. Three species considered locally or regionally significant were recorded in the remnant woodlands in the north of the proposed extraction site. These include *Acacia dealbata*, *Eucalyptus blakelyi* and *E gonicalyx*. There is no Commonwealth or State legislative protection for these species, however, extraction activities will avoid the woodland areas to the north of the site. The mixed woodland community in which these species occur is widely distributed throughout the Albury region and occurs in the north east in Tumblong State Forest. Due to the small size, isolation and degraded nature of these communities in the study area, they are regarded as possessing little or no conservation significance.

#### Fauna

A search of the NPWS Atlas of NSW Wildlife was undertaken within a 10km radius of the study area to ascertain the presence or potential occurrence of any threatened fauna species listed in the TSC Act. Records from the Birds Australia and the NSW Bird

Atlasers databases were also obtained. Previous studies within the area were reviewed to establish any threatened fauna species which could possibly occur in the study area. A detailed fauna investigation was conducted throughout the study area on 31 October 1998 and 1, 5, 7 and 8 November 1998. Survey techniques included spotlighting, diurnal avifauna surveys, recorded call play-back and intensive habitat searches for reptiles and amphibians.

The three broad fauna habitat types which occur in the study area are:

- Woodlands - occur in the north and along the eastern and southern boundaries of the proposed extraction site and in the north-east and along the drainage channel of the Thurgoona Industrial Estate. These woodlands support some mature hollow bearing trees which provide suitable nesting and roosting resources for some bird and microchiropteran bat species. These remnant patches of vegetation are considered to provide moderate fauna habitat value.
- Grassland - is a characteristic of the majority of the study area and surrounding locality. Cleared pasture is generally of limited value for most native fauna species, given the scarcity of foraging and shelter resources. In general, cleared areas provide foraging resources for the more mobile fauna species (in particular macropods and some bird, microchiropteran bat and reptile species), although the presence of feral cats, domestic dogs and foxes in rural areas restricts the occupation of these habitats by many native fauna.

- Waterways - several dams and a drainage channel occur in the study area which provide potential source of habitat for aquatic and semi-aquatic vertebrate fauna. These waterways in general provide feeding resources, shelter, breeding and foraging sites. However, grazing and agricultural activities has caused a loss of riparian habitat, increased sedimentation and a reduction in water quality, which limits the value of the waterways on the site. Two dams situated in the remnant woodland in the north of the proposed extraction site provide more suitable fauna habitat, due to adjacent resources such as potential perching, nesting and roosting sites.

These habitats have been disturbed to varying degrees through clearing, grazing and general use. A total of 44 vertebrate fauna species were recorded on the site during field investigations. The majority of these were native bird species, with a few mammal and amphibian species. No reptiles were observed. The majority of the species are relatively common, widespread and disturbance-tolerant.

An additional 217 species have been recorded in the Albany region, however these records are from an extensive area, and although many of these species could theoretically occur in the site on occasion, a substantial number will not be present due to the lack of suitable habitats and resources.

No threatened fauna species were recorded in the study area during the fauna investigation, however 5 threatened species have been recorded within a 10km radius of the site. These include:

- ❑ Barking Owl *Ninox connivens*
- ❑ Regent Honeyeater *Zanthomyza phrygia*
- ❑ Grey Falcon *Falco hypoleucus*
- ❑ Brolga *Grus rebicundous*
- ❑ Squirrel Glider *Petaurus norfolcensis*.

A further 7 threatened fauna species are known to occur in the Albury region.

- ❑ Southern Bell Frog *Litoria raniformis*
- ❑ Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*
- ❑ Turquoise Parrot *Neophema pulchella*
- ❑ Bush Stone-curlew *Burhinus grallarius*
- ❑ Blue-billed Duck *Oxyura australis*
- ❑ Freckled Duck *Stitctonetta naevosa*
- ❑ Australasian Bittern *Botaurus poiciloptilus*.

The majority of threatened fauna species are unlikely to be dependent on the habitats or resources present in the study area, and few (if any) threatened species are considered likely to occur on the site, given the disturbed nature of much of the habitat.

Although the habitat requirements of the Regent Honeyeater are present at the site, they are characteristic of much of the woodland typical of the Albury landscape. The site is therefore unlikely to provide a comparatively high percentage of suitable flowering trees for habitat and the removal of a few trees is not considered significant.

The Southern Bell Frog is generally associated with areas of permanent water and is commonly found at the edges of farm dams. However, the frog is considered unlikely to occur in the majority of study area due to the nature and condition of the landscape. The only possible location for this species within the study area are the dams situated within woodland remnants in the north of the proposed excavation site. The extraction operations will avoid these habitats.

No threatened fauna species were recorded in the study area during the fauna investigation. There is no habitat of significance for threatened species, and no evidence for the presence of threatened species on the site or within its vicinity. Even if the threatened fauna species recorded in the Albury area were present at the site on occasion, it is unlikely that the proposed activities would have any adverse impacts on such species.

On this basis, it was considered that a Section 5A assessment of significance for threatened species, under the provisions of the EP&A Act, was not required.

### *Aboriginal Archaeology*

An archaeological study was carried out involving an investigation into the known archaeology of the Albany/Thurgoona region and the site. Two previous archaeological investigations have been conducted within the proposed fill extraction area. Witter (1978) carried out an archaeological survey of the Baranduda and Thurgoona Areas for a report to the AWDC and NSW NPWS. Witter identified three sites within the proposal area. The artefacts found include quartz fragments and cobble choppers (TS-1), a quartz backed blade and quartz fragments a possible cobble hammerstone, a basalt faked axe and one cobble with usewear (TS-2) and a hammerstone and multipurpose hammerstone abrader (TS-3). The significance of these sites was stated as low, with sites being poorly preserved and excavation potential being negligible.

The search of the NPWS register of known sites showed that there are eight sites in the vicinity of the proposed extraction site. Of these sites two are within the development area. Both have been listed as open camp sites and correspond to the locations recorded by Witter (1978) as TS-1 and TS-2.

Crosby (1978), carried out further work on the site including subsurface testing, again for a report to the AWDC. Sub-surface testing was carried out at sites TS-1 and TS-2, as identified by Witter (1978). No additional artefacts were recorded at site TS-1 and it was speculated by Crosby that the quartz previously identified by Witter was naturally occurring. The surface inspection of Site TS-2 revealed a wedge shaped piece of quartz that may have been the result of deliberate flaking. Sub-surface testing at this site revealed no further artefacts.

For the current survey no artefactual material was identified on the ridge/line in areas where Witter (1978) and Crosby (1978) had previously recorded sites and carried out subsurface testing programs, which included excavation of collected material. It is therefore concluded that no evidence of sites TS - 1 and 2 remains. In addition no other artefactual material was found to have eroded from the deposits in these areas.

One isolated artefact (TH-IF-1) and one felled tree which had possible scarring (TH-ST-1) were identified. The isolated artefact was a river pebble located in an area of high disturbance associated with the construction of the nearby dam. It is uncertain whether the stone was brought to the site by Aboriginal people or imported with spoil noted in the area. The scar on the felled tree is only recorded as a "possible" scarred tree (ie the scar is a result of human cultural activity, however not necessarily Aboriginal) as the scar does not have visible axe marks.

The scientific value of both sites has been assessed as low. The felling of the tree has severely compromised the integrity of the site while the disturbed nature of the area where the isolated artefact was found and the uncertainty of its arrival at the sites also reduces its scientific value. As the area in which the artefacts have been found would be directly affected by the proposal the RTA would apply to the NPWS for a Consent to Destroy Permit for both sites. In the case of the scarred tree this would involve removal of the tree to another section of the site or another location. The RTA would discuss the relocation of the tree and management options with the Local Aboriginal Land Council.

(LALC) and NPWS. Should the LALC wish to collect the isolated artefact (TH-IF-1) then they should apply to the NPWS for a Care and Control Permit.

### *European Heritage*

A heritage study was carried out involving an investigation into the known European heritage of the Albury/Thurgoona region and the site.

A search of heritage data bases was conducted to identify known heritage items and places in the Thurgoona area. There were 21 items listed for the Albury Council area, on the Australian Heritage Commission register of the National Estate, however none of these is in the Thurgoona area. Similarly the register of the NSW Heritage Council listed five properties in the Thurgoona district however these are all to the north of the proposed development. The Register of the National Trust also lists five properties in the Thurgoona region, all of which are to the north of the proposed development except for the Mt Pleasant (formerly Mt Pleasant Hotel) which abuts the southern boundary of the proposed fill extraction site.

The heritage schedules compiled by Albury City Council were also searched. Five items were listed which are all located to the north of the proposal. While the Mt Pleasant residence is not currently listed Council indicated that the item had previously been listed and that it had inadvertently been omitted from the current schedule.

The site predication model indicated that remains of early farm building associated with the Mt Pleasant homestead may be found on the site. The entire Mt Pleasant homestead and curtilage, which has been defined as the row of mature trees approximately 30m from the current Riverina Highway and the other three boundaries by an iron fence, is outside the proposed development. No evidence of other structures, wells or bottle dumps were identified. It should also be noted that the brick structure to the east of the main house is not part of the National Trust classification.

Two sections of the Hume and Hovell Walking Track were also found to pass along the boundaries of the proposed development area. Section one passes along the full length of the St Johns Road, which is the western boundary of the fill extraction area. Section two extends to the northern boundary of the site to the summit of Red Hill. The Hume and Hovell trail commences from the Hovell tree at Hovell Tree Park in Albury and follows as closely as practicable the route followed by the explorers during 1824-25.

Mount Pleasant homestead has been listed by the National Trust and is an attractive example of an early building in the Albury area. It has had a functionally varied history and is associated with the general life of the area.

There is no official statement on the heritage significance of the Hume and Hovell Walking Trail by Albury Council as the trail is not yet fifty years old, however an assessment was made based on the NSW Heritage Council Guidelines. These evaluation guidelines include criteria such as creative and technical accomplishment, research potential, rarity and representativeness. The assessment concluded the

Form and line modification will also have a high visual effect in the short term. This is a result of the need to have cutting faces and working stock piles, all of which would summer grass cover.

The colour contrast will be strong creating a high visual effect if it is over a large area. The colour contrast will result from the exposed earth. This will vary in colour from the existing grass greens of the winter and spring grasses and the gold of the cured

not staged with progressive restoration. The scale of the operation is relatively large in relation to the setting of the small hill on which it occurs. It is envisaged that half of the seen area of the hill will be effected by the operation at various times. This will create a strong visual effect if the operation is from various locations below it.

will alter the form and shape of the hill. It will also alter the outline of the hill as it is seen landscape. The planned removal of over two million cubic metres of fill from the site cover and exposure of soil will introduce a strong colour contrast into the existing

The removal of fill from the site will have two visual effects. Firstly, removal of grass

### ***Visual***

Each of these potential hazards have differing severity risks and probabilities. The majority have low probabilities and have been addressed in mitigation measures proposed in this EIS and/or will be addressed in the contractor's O&H&S plan for the operation. Due to the proximity to the Airport and flight paths, airport hazards have been focused on in this EIS.

- bushfire impacts.
- poor erosion and sedimentation controls resulting in erosion and sedimentation;
- excessive dust causing aircraft hazard;
- overload and damage of haul trucks;
- explosion from fuel storage;
- fire from fuel storage;
- leakage from fuel storage;
- collision/s and/or tipping over of plant and equipment;
- collision/s involving haul trucks;

The major hazards inherent in the operation of a fill extraction activity include:

### ***Hazard and Risk***

It is appropriate therefore to take care in planning the extraction to ensure that the trail is adequately protected from this development. Hume and Hovel Walking Trail is of heritage significance despite the fact it does not meet the 50 year age criteria.

create unnatural shapes and lines in the landscape. However in the longer term this effect will not be great as it can have a high degree of compatibility with adjoining landform.

The visual impact of the Proposal is generally not significant. In the short term over the two years of operation there will be some visual impacts. The operations will have a high impact on any residence it is seen from. Generally this is limited to 2-3 houses to the north west of the site and the house adjoining the site. Other houses are screened from view by existing trees within established gardens and roadside planting.

The visual impact on adjoining roads is low to moderate with the minor exception of Fallon Street. However this impact as well as those on houses in the north west can be limited in time by maintaining the western edge as a visual screen to operations to the east.

The visual impact following restoration on all areas will be low as the original grass cover and colours will be restored and ground form will emulate existing land forms in the vicinity of the site. The overall visual impact of the Proposal is therefore thought to be low significance, especially if the visual mitigation strategies can be implemented.

#### ***Traffic Impact Assessment***

The majority of the trips generated will be the large haul trucks. These will result in approximately 15 vehicle movements per hour between the hours of 7am and 6pm weekdays and 8am to 1pm on Saturdays. While this results in a significant increase in traffic, this will all be confined to private haul roads, resulting in a minimising of impacts on local traffic patterns.

A number of haul routes were considered as part of this EIS (**Appendix - D**) with the final route selected to minimise environmental, economic and community impacts. The haul route decided upon is situated off the public road system, so as to minimise disruption for road based vehicles and also to enable large dump trucks to be used. The use of these larger dump trucks means that for a given volume of fill material, there will be a lower number of truck movements.

The haul route commences at the exit from the extraction site and heads west across open ground. It then crosses Elizabeth Mitchell Drive and along Fallon Street. It proceeds along Fallon Street which will be closed to normal road traffic, and then turns north at the western edge of the Jet Boat racing facility. It then proceeds in a north north west direction and then crosses Dallinger Road to the south of the intersection of Corrys Road/Dallinger Road before proceeding west to the construction site.

The haul route will have minimal conflict with road based vehicles, but will need to cross the public road system at two locations as well as provide a possible conflict point with leisure walkers. It is important that at these conflict points, the vehicle movements are controlled to ensure that both construction vehicles and public vehicles can operate in a safe and satisfactory manner.

## Environmental Management

The EIS includes a range of measures which would need to be implemented to ensure that the proposal is constructed and operated with minimal environmental impact. These measures are summarised in **Section 3.16** of this EIS. These and the conditions of consent should be included in the detailed Project Environmental Management Plan (EMP). This would be developed during the detailed design phase of the project and implemented by the operational contractor.

## Justification

The proposed extraction and haulage operations are an essential component of the construction of the AWNHP across the floodplain through the urban area of Albany. This section of the Project requires a substantial amount of fill material for the construction of the embankment generally at the same level as the existing railway line. The proposed extraction site is well located and has a suitable quality and quantity of fill material. The relatively close proximity of the extraction site to the construction site means that the overall cost to transport material will be less and the environmental and community impacts associated with haulage operations will be minimised.

As a consequence of the final lowering of Red Hill, Albany Airport will no longer require special dispensation for its take-off and landing gradient.

The extraction site and haulage route are located in areas which are already highly disturbed. Due to the highly disturbed nature of the area, any environmental, cultural, archaeological or scientific values have been largely lost. A minimal number of trees will require removal and the majority of groundcover is grass species. The immediate extraction site and haulage route currently provides limited habitat potential for native fauna in the area.

Progressive rehabilitation and on-site water management controls will greatly reduce the impact on the visual amenity and water quality of the area. Also, substantial vegetative buffers will be in place to further assist in these areas. Environmental monitoring is also proposed to assess the project's environmental performance and further improve its operation.

Concerns raised during the consultation process have been considered and addressed. The environmental impacts of the development are expected to be minimal with the exception of noise. The mitigation measures that have been proposed in this EIS will negate or minimise most environmental impacts associated with the proposed development.

The central conclusion of this EIS is that the proposed facility should proceed, subject to the implementation of the mitigation measures listed in **Section 3.16** of this EIS.

# 1. Introduction

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## 1.1 Introduction

This Environmental Impact Statement (EIS) accompanies a development application for a proposed fill extraction site for use in the construction of the Albury Wodonga National Highway Project (AWNHP). The proposed site is known as Red Hill and is located approximately 1.25 km east of the Albury Airport runway, within the flight-path, on the corner of the Riverina Highway and Old Sydney Road (Bowna Road). The proposal considers the excavation of material from the site as well as its transport to construction areas for the AWNHP.

The land on which the proposed site is located is currently owned by the Albury-Wodonga Development Corporation (AWDC). It comprises Lot 922 of DP 589483 and part of Lot 8 of DP584652 in the Parish of Albury, County of Goulburn. Its regional location is shown in **Figure 1.1**. The total area of the site is approximately 42 ha.

Between the Airport and Red Hill is an area of low lying grazing land that is subject to ponding. Red Hill itself is a gentle undulation that has been largely cleared for grazing. It is proposed to extract fill from the site, re-contour and rehabilitate so that the site is at a similar elevation to the lower lying land between the Airport and Red Hill. The resource has been estimated at 2,900,000 m<sup>3</sup>.

## 1.2 Project Outline

It is proposed to extract up to approximately 2,200,000 m<sup>3</sup> of material from the Red Hill site at a rate of approximately 1,100,000m<sup>3</sup> per annum. Fill extraction will occur over a two year period at the end of which the site would be restored to grassed paddocks, giving the site a similar appearance to its current state. Fill will be used exclusively for the construction of the AWNHP. The extraction operations would be continuous during the allowable times of operation to enable the resource to be extracted and transported within the construction timeframe for the AWNHP.

The main activities to be undertaken during the extraction site's life include:

- Site operation - comprising clearing of vegetation, stockpiling of topsoil/overburden, winning of material by multiple excavators, loading, truck haulage.
- Haulage of excavated material to the AWNHP construction zone - via a specially constructed haul road for use by high capacity, non-registered off-highway trucks (eg Cat 769 and/or 777). The haul route would involve the construction of a dedicated road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west linking with Fallon Street. It is proposed that Fallon Street (between Elizabeth Mitchell Drive and Dallinger Road) be closed to normal traffic and be dedicated to use by haul vehicles. This would result in the intersection of Fallon Street and Elizabeth Mitchell Drive becoming a level crossing for haul road vehicles. Haul trucks would proceed along Fallon Street to the western edge of the Jet Boat Racing

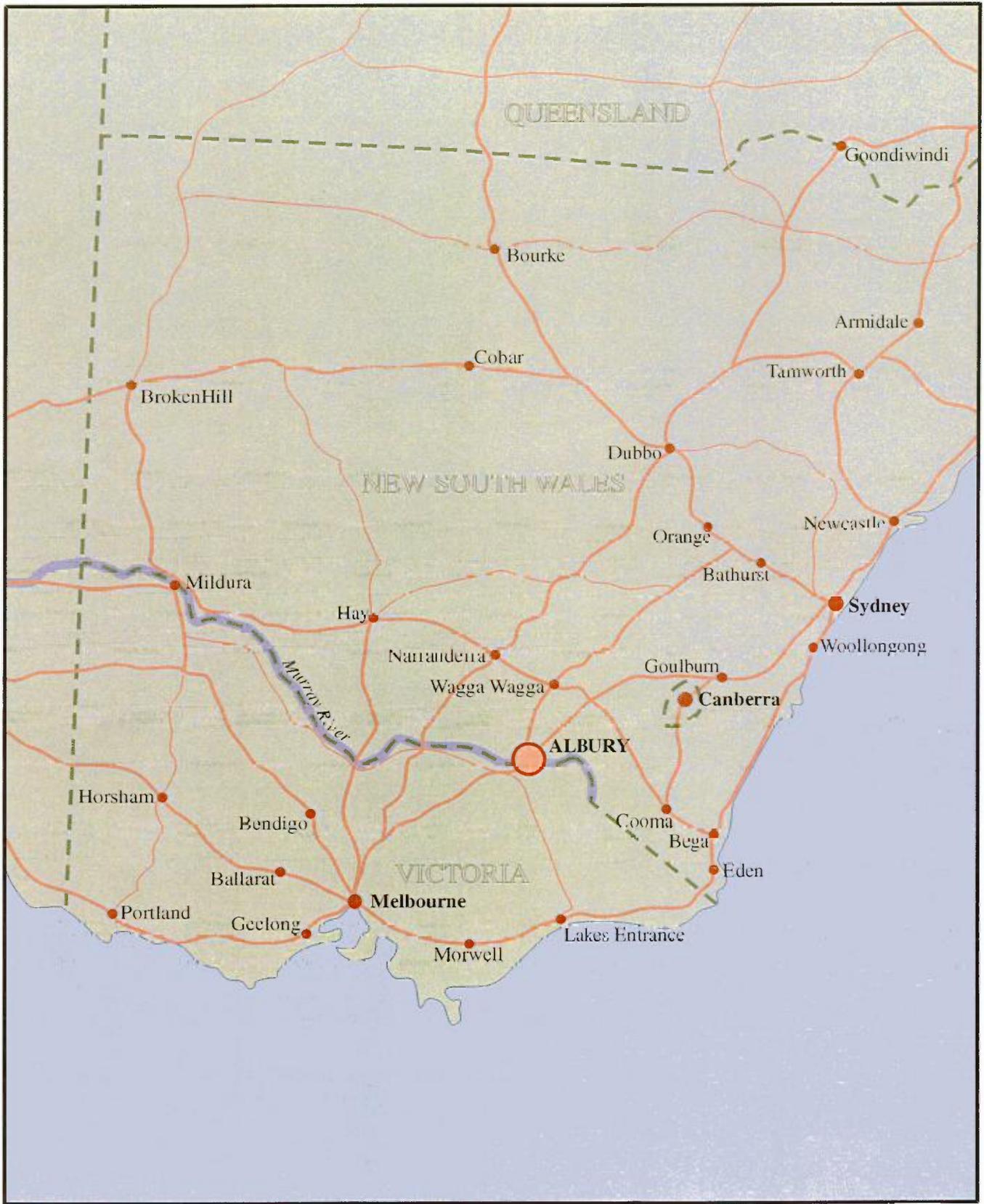


Figure 1.1  
REGIONAL LOCATION

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facility, where they would turn right onto a haul road that is also proposed for construction. This haul road would then head north-north-west, through the cleared grazing land owned by the AWDC. A further level crossing would be required to enable haul trucks to cross Dallinger Road onto RTA land, to the south of the Corrys Road/Dallinger Road intersection. Further minor haul road construction would then be required from Dallinger Road to the construction site.

- ❑ Excavation Site restoration and revegetation - involving progressive rehabilitation to minimise the appearance of site disturbance and ensure a safe and self-sustaining environment remains when the operation is completed.

### 1.3 History of the Project

To continue the significant improvements to the Hume Highway (which forms part of the National Highway System), the Roads and Traffic Authority (RTA), in partnership with Vicroads and the Federal Department of Transport and Regional Services, is managing the construction of the AWNHP.

Joint approval was given for the inner route in January 1998. The Federal Budget in May 1998 provided funding for the project with an allocation of \$7 million for NSW and \$4 million for Victoria for 1998/99 and indicative funding beyond to enable major construction works to commence in 1999/2000. The NSW and Victorian sections of the works will be undertaken separately, but concurrently, by RTA and Vicroads as a single project, with the point of interface being the northern abutment of the Murray River Bridges. The works in NSW extend for approximately 38km. These works are proposed to be undertaken by the private sector under a design, construct and maintain (DCM) contract.

The carriageways of the inner route will be constructed at a level similar to the adjacent railway line through the urban area of Albury. This will require substantial embankment construction, particularly across the floodplain, and will involve considerable earthworks.

Possible sources of suitable fill material were canvassed in the Environmental Impact Statement / Environmental Effects Statement (EIS/ESS). One source considered was the excavation from a hill located east of the eastern end of the airport runway, known as Red Hill. This is in relatively close proximity to the project and has the added community safety benefit of easing the take-off and landing gradient for aircraft using the airport.

The EIS/ESS considered the haulage of material from Red Hill to the project along the northern edge of the airport grounds but did not assess the environmental impact of the excavation. The subject of this EIS is assessing the environmental impacts of the excavation. Additionally, the haul road option within the airport grounds is not regarded by Albury City Council (ACC) as safe, as it would contravene air safety regulations. This

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EIS therefore also considers the construction of the haul road to move materials from Red Hill to the AWNHP construction zone.

## 1.4 Environmental Assessment

### 1.4.1 Statutory Requirements

Within NSW, development approval and environmental assessment procedures are undertaken in accordance with the provisions of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the Environmental Planning and Assessment Regulation, 1994 (the Regulation). The proposed development is classified as a "designated development" under Schedule 3 of the Regulation as it falls within the extractive industries definition. An EIS therefore must be prepared in accordance with the provisions of the Act, associated Regulation, and in accordance with the requirements of the Director-General of the Department of Urban Affairs and Planning (DUAP) as outlined in **Appendix - A**.

Clause 82 of the Regulation lists factors for consideration when assessing likely environmental impact. These factors, and the sections in the EIS where they are addressed, are also shown in **Appendix - A**.

The proposal is subject to the provisions of Part IV of the EP&A Act. As such the Development Application (DA) for this project must be accompanied by the EIS, and requires consent from Albury Council for the project to proceed.

### 1.4.2 Integrated Development

Part IV of the *Environmental Planning and Assessment Act, 1979* has recently undergone substantial revision and amendment, culminating in the *Environmental Planning and Assessment Amendment Act, 1997* (Amendment Act). Under the Amendment Act the proposed fill extraction operation is defined as "integrated development". Section 91(1) of the Amendment Act defines integrated development as:

"development (not being complying development) that, in order to be carried out, requires development consent and one or more of the following approvals:

<i>Fisheries Management Act 1994</i>	s144	aquaculture permit
	s 201	permit to carry out dredging or reclamation work in any waters
	s 205	permit to cut, remove, damage or destroy marine vegetation on public water land or an aquaculture lease or on the foreshore of any such land or lease
<i>Heritage Act 1977</i>	s 58	approval in respect of the doing or carrying out of an act, matter or thing referred to in s 57(1)
<i>Mine Subsidence Compensation Act 1961</i>	s 15	approval to alter or erect improvements within a mine subsidence district or to subdivide land therein
<i>National Parks and Wildlife Act 1974</i>	s 90	consent to knowingly destroy deface or damage or knowingly cause or permit the destruction of defacement of or damage to, a relic or Aboriginal place.

<i>Protection of the Environment Operation Act, 1998</i>	Schd 1	Environmental protection licence required for the extraction operation.
<i>Rivers and Foreshores Improvement Act 1948</i>	Part 3A	permit under Part 3A
<i>Roads Act 1993</i>	s 138	consent to:
	(a)	erect a structure or carry out a work in, or over a public road, or
	(b)	dig up or disturb the surface a public road, or
	(c)	remove or interfere with a structure work or tree on a public road, or
	(d)	pump water into a public road from any land adjoining the road or
	(e)	connect a road (whether public or private) to a classified road
<i>Soil Conservation Act 1938</i>	s 21D	authority authorising the ringbarking cutting down, felling, poisoning or destruction in any other manner or the topping, lopping or removing of any trees on protected land
<i>Waste Minimisation and Management Act 1995</i>	s 44	licence to occupy controlled waste facility
<i>Water Act 1912</i>	s 10	licence to construct and use a work, and to take and use water, if any, conserved or obtained by the work, and to dispose of the water for the sue of occupiers of land
	s 13A	licence to construct a supply work and to take and use water obtained thereby
	s 18F	permit to construct and use a work, and to take and use water, if any, conserved or obtained by the work and to dispose of the water for the use of occupiers of land for any
	s 20B	authority to take water from a river or lake for the purposes of a joint water supply scheme
	s 20CA	authority to construct a supply work and to take an use water conserved or obtained thereby
	s 20L	group licence
	s 116	licence to commence sinking a bore or to enlarge, deepen or alter a bore
	Part 8	approval to construct a controlled work".

The *Protection of the Environment Operations Act 1997* (Operations Act) will be applicable at the time of consent. The Operations Act replaces most of the existing environmental legislation by repealing the:

- Clean Waters Act 1970,*
- Clean Air Act 1961;*
- Pollution Control Act 1970;*
- Noise Control Act 1975;*
- Environmental Offences and Penalties Act, 1989.*

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Under Schedule 1 of the Operations Act the excavation works are “scheduled activities”, being defined as an “extractive industry”, resulting in the activity being regarded as integrated development. An Environmental Protection Licence will be required for the extraction operation prior to any extraction activities commencing. This would regulate all forms of pollution (water, air, noise and waste) and will replace the process of separate pollution control approvals and licences with an integrated system of licensing.

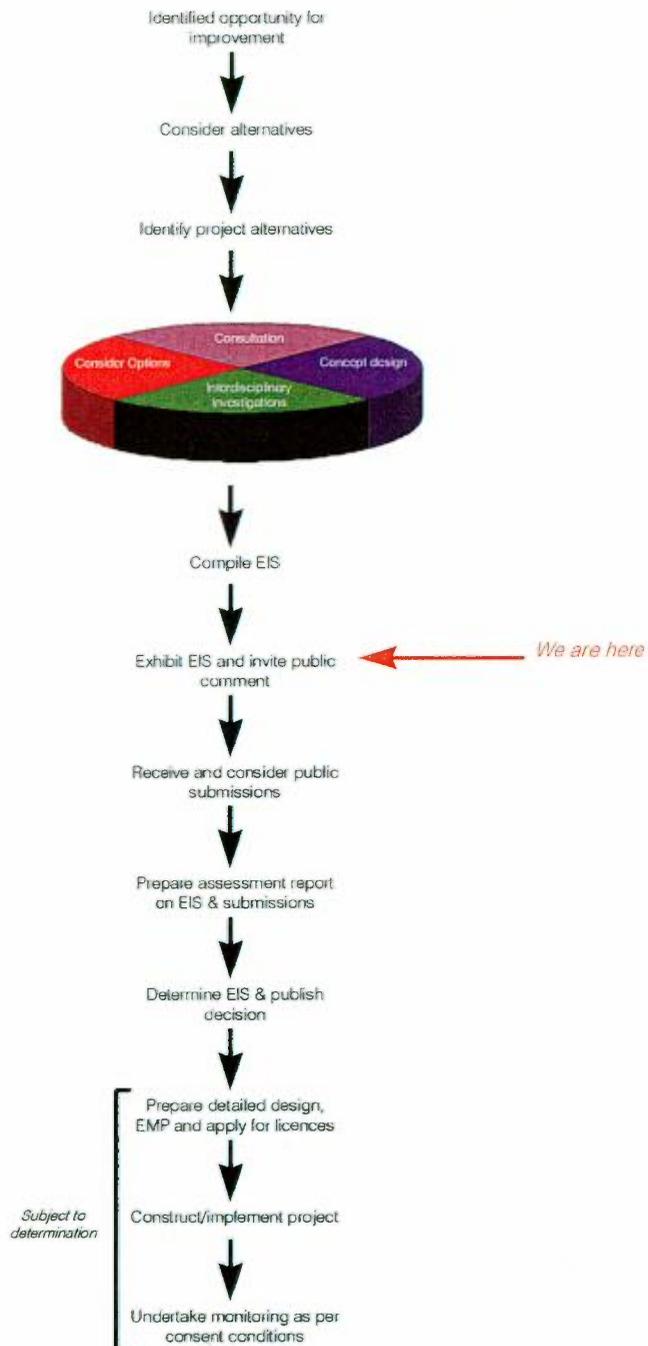
The main reform contained in the Operations Act, which will apply to the excavation operation is the streamlining of the pollution control licensing into a single process integrated with the development consent process under the Assessment Act as described above.

#### **1.4.3 Environmental Assessment Procedures**

The EIS forms one component of the wider environmental impact assessment (EIA) process. This process can be seen in **Figure 1.2**. The purpose of the EIS is to provide information to decision makers on the proposal itself and the potential environmental impacts associated with the proposal. The EIS also provides the same information to the community, government and other interested parties.

The EIA process provides the opportunity for public review and comment and this also forms part of the decision making process. This systematic and integrated review process, resulting in an ultimate decision by Council, provides a balanced approach to impact assessment.

**Figure 1.2: Environmental Impact Assessment Process**



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The EIS also sets out the RTA's environmental management commitments which are to be implemented to ensure that potential environmental impacts are mitigated, and the environment is adequately protected during the construction and operation of the fill extraction site. Preliminary engineering design has been undertaken concurrently with environmental studies. This has enabled environmental guidelines and constraints to be adopted within the overall design in order to achieve an environmentally acceptable development.

Any person may, before the end of the EIS exhibition period, make a written submission in relation to the DA. Council will consider public submissions, other submissions from government agencies as well as any concurrence requirements of authorities such as the EPA, when considering whether or not to grant consent for the DA. Council's decision, together with any conditions of approval, will be forwarded to the Minister for Urban Affairs and Planning for concurrence.

The responsibilities of the proponent (RTA) include:

- identifying a need for the development;
- considering alternatives and identifying a preferred option;
- assessing the likely environmental impacts and identifying mitigative measures;
- presenting the EIS to the consent authority (in this case, Albury City Council) for public exhibition.

The consent authority:

- exhibits the EIS;
- seeks conditions of consent from licensing authorities;
- considers public comments and the EIS and prepares an assessment report recommending one of the following:
  - support for the proposal in the EIS;
  - rejection of the proposal in the EIS;
  - support for the proposal, with modifications.

#### 1.4.4 Scope of the EIS

The EIS has been prepared for the RTA by Sinclair Knight Merz and a number of specialist sub-consultants. The study team is listed in **Appendix - B**. The EIS is structured to provide an initial summary of the proposed development and EIS findings. An assessment of the likely implications of proceeding with the development is then provided. The EIS has been divided into the following structure:

- Executive Summary:** Provides a brief outline of the proposed development and its objectives, the environmental safeguards to be implemented and the resultant impacts likely to arise due to the proposal.

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- ❑ **Section 1 - Introduction:** provides an introduction to the proposal and the EIS including a description of the proposal.
  - ❑ **Section 2 - Description of the Proposed Development:** describes in detail the proposed extraction of fill from the Red Hill site and the options and preferred route for the haulage of material from the site.
  - ❑ **Section 3 - Assessment of Environmental Impacts and Mitigation:** assesses the biophysical, social and economic impacts of the proposal including traffic and transport implications of the proposal. Where necessary safeguards are presented.
  - ❑ **Sections 4 - Project Justification:** discusses the need for carrying out the proposal as based on an assessment of alternative fill extraction sites and the consequences of not proceeding with the proposal. This section also discusses the proposal in terms of ecologically sustainable development.

#### 1.4.5 Scope of the Development Application

The Development Application (DA) accompanying this EIS covers the development as outlined in **Section 2** of this document.

All aspects of the proposed development including fill extraction methods, transportation of the material and infrastructure, as well as the environmental protection measures outlined in this report, form part of the DA.

#### 1.5 Consultations

Consultation was undertaken during the study with Local and State government authorities as well as property owners immediately surrounding the site and haul route. Authorities consulted are listed below.

- ❑ Albury City Council;
- ❑ Hume Shire Council;
- ❑ Albury-Wodonga Development Corporation;
- ❑ Department of Urban Affairs and Planning;
- ❑ Environment Protection Authority;
- ❑ Department of Land and Water Conservation;
- ❑ Department of Mineral Resources;
- ❑ National Parks and Wildlife Service.

All correspondence received is contained in **Appendix - C**.

#### 1.6 Licences and Approvals

If the proposal proceeds, the RTA or its contractor would need to obtain approvals and licences aimed at regulating and monitoring the performance of the proposal both during its construction and operation. These approvals and licences include those administered by the NSW Environment Protection Authority (EPA) in relation to potential air, noise and water pollution, the National Parks and Wildlife Service (NPWS) in relation to potential impacts on Aboriginal archaeological sites, the Department of Land and

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Water Conservation (DLWC) for stream disturbance, water abstraction and native vegetation clearance, and the Heritage Council in relation to impacts to heritage items.

The need for licences or approvals from the EPA is currently specified under the *Pollution Control Act, 1970* which complements the *Clean Waters Act 1970*, *Clean Air Act 1961*, *Noise Control Act 1975* and the *Environmentally Hazardous Chemicals Act 1985*, to control pollutants from the proposal.

It should be noted that the *Protection of the Environment Operations Act, 1997* (PEO Act) is expected to come into effect by 1 July 1999. In December 1997 the NSW Parliament passed the PEO Act as part of the Government's major overhaul of environmental legislation. The PEO Act is part of a package of integrated legislation which also includes the *Contaminated Land Management Act, 1997* and the Amendment Act.

As previously stated the PEO Act replaces most of the existing environmental legislation by repealing the:

- Clean Air Act, 1961*;
- Clean Waters Act, 1970*;
- Pollution Control Act, 1970*;
- Noise Control Act, 1975*;
- Environmental Penalties and Offences Act, 1989*.

The PEO Act contains a number of reforms of existing NSW pollution control legislation, including:

- the repealing and replacing the legislation listed above and by incorporating the major regulatory and enforcement provisions of the *Waste Minimisation and Management Act, 1995* (WMM Act);
- the making of protection of environment policies (PEPs);
- requiring regulatory authorities in certain circumstances to give reasons for decisions and to make available as much information as possible to the public;
- streamlining pollution control licensing into a single process, integrated with the development consent process under the EP&A Act;
- consolidating the regime for the issue of pollution control licences;
- extending to local councils the power to control pollution through the issue of pollution control notices in certain circumstances;
- incorporating the offences and penalties regime of the *Environmental Penalties and Offences Act, 1989*, adding the new offence of failure to notify of pollution incidents (such as spills) and increasing penalties;
- consolidating investigative powers and providing a greater range of sentencing options to deal with environmental offenders;

- 
- ❑ addressing voluntary and mandatory environmental audits and the circumstances in which any such audit may be used in legal proceedings;
  - ❑ introducing economic measures to reduce pollution - ie load based licensing;
  - ❑ addressing criminal liability issues for environmental offences - privilege against self incrimination, vicarious criminal liability and corporate officer liability.

With respect to environmental protection licences the PEO Act's overhaul of the current licensing regimes includes:

- ❑ a move from one year licences to no fixed term - with licences subject to review by the appropriate regulatory authority every 3 years;
- ❑ the concurrent granting of licences with development consent under the EP&A Act;
- ❑ integration of EPA pollution control approvals with EPA pollution control licences into a single environmental protection licence;
- ❑ the consideration of whether the licence applicant is a "fit and proper person", the meaning of which takes into account a range of matters including the applicant's previous record of compliance with environmental legislation and technical competence;
- ❑ the Minister may revoke or suspend a licence if the holder is convicted of a "major pollution offence", defined as attracting a penalty of at least \$250,000 for a corporation or \$120,000 for an individual;
- ❑ the payment of annual licence fees based on actual or anticipated pollution load.

The approvals currently required by either the RTA or its contractor are described below.

- ❑ A licence will be required under section 43(a) and 47 of the *Protection of the Environment Operations Act, 1997* as the fill extraction operation is scheduled as an extractive industry under that act.
- ❑ The *Waste Minimisation and the Management Act, 1995*, is administered by the EPA. The objective of the Act is to achieve a 60% reduction in the volume of waste disposed of in NSW by the end of the year 2000 and establish a waste management hierarchy of avoidance, re-use, recycling and reprocessing and disposal. The Act contains requirements in relation to disposal and transport of waste. The Act would prevent the disposal of waste in a public place without consent from the relevant public authority or on public land without consent of the owner or occupier of that land. The RTA would be required to comply with the requirements of the act in relation to waste management during construction of the proposal.
- ❑ A licence would be required under the *Dangerous Goods Act, 1975* for the construction, operation and maintenance of the 10,000L diesel tank proposed for the site.
- ❑ Approval would be required from the Director-General of the NPWS under section 87(1) of the *National Parks and Wildlife Act, 1974* for a permit to excavate any archaeological sites and relics. Under section 90(2) of the same Act, approvals from

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the Director-General would be required for a Consent to Destroy permit for any identified archaeological sites or remains.

- ❑ The *Native Vegetation Conservation Act 1997* is administered by the DLWC. Under the provisions of Part 2 of the Act, the RTA would need to obtain development consent from the Minister for Land and Water Conservation for clearing. As some felling of trees for the haul road construction will be required, consent will need to be obtained.
- ❑ The *Water Act 1912* is administered by the DLWC. It requires licences to be obtained for extraction of water or realignment of stream beds. For this project, it would apply to any extraction of water for dust control or compaction or stream realignment for culvert installation or bridge construction. A licence is likely to be required for culvert construction associated with the haul road.

## 2. Description of the Proposed Development

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### 2.1 Proposal Outline and Objectives

The proposed development relates to the establishment of a fill extraction operation to supply dedicated fill for the Albury Wodonga National Highway Project (AWNHP). The proposed site is known as Red Hill and is located approximately 1.25 km east of the Albury Airport runway, within the flight-path, on the corner of the Riverina Highway and Old Sydney Road (Bowna Road). The site has been used previously for grazing purposes, with no previous extraction operations having taken place on the site.

The RTA proposes to undertake the following works:

- ❑ extract up to a maximum 2,200,000 m<sup>3</sup> of fill material over a two year period within the area shown on **Figure 2.1**.
- ❑ transport the material by truck from the site to the Albury Wodonga National Highway construction zone.
- ❑ progressively rehabilitate the site with native vegetation (predominantly grasses). This will be undertaken as soon as practicable to return the natural habitat and visual amenity of the site, as well as restrict erosion and sedimentation.
- ❑ operate in such a manner to minimise the visual disturbance of the operation and establish procedures to ameliorate any effects of the operation on the natural environment.
- ❑ following the extraction campaign, leave the site in a safe and stable manner.

It is anticipated that no drilling, blasting, crushing or screening of the rock material will be necessary.

The principal objectives of the proposed development are as follows:

- ❑ to provide the necessary quantities of fill material for the NSW component of AWNHP.
- ❑ to comply with the expectations of the community and the imperatives of legislation in environmental protection and management.
- ❑ to implement the required environmental safeguards and monitoring programs to achieve an environmentally acceptable fill extraction operation.
- ❑ to undertake the optimal extraction and utilisation of an identified resource.

### 2.2 Geology

#### 2.2.1 Regional Geology

The basic geology of the Albury region consists of Palaeozoic bedrock, which forms the highlands, overlain on the plains and major river courses, by unconsolidated Cainozoic riverine sediment (Willis, 1974).

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The bedrock comprises Ordovician sediments, metamorphosed sediments, widespread granite intrusions, later coverings of acid volcanics and some late Devonian sediments. These sediments were laid in sea conditions with some material derived from continental sources. These were subsequently folded and metamorphosed forming slate, phyllite and schist. During the late Ordovician and Silurian, granitic melts, formed by mixing of the earth's mantle and sedimentary pile, crystallised to form the granite and granodiorite bodies which now underlie much of the region (Willis, 1974).

Near Albury the volcanics are overlain by continental sandstones and conglomerates deposited from continental sources during the Late Devonian period. Since that time uplift and erosion have occurred, and deposition has only taken place in the Cenozoic era when gravels, sands and silts were laid down as riverine sediments, along the major river systems of the region (Willis, 1974).

### **2.2.2 Site Geology**

The Red Hill site is identified as a sedimentary deposit within the Coonambidgal Formation and is of recent Quaternary age (Geological Survey of Victoria, 1979). This site is predominantly unconsolidated colluvium which has been formed by slope weathering. Colluvium is generally fine material and at Red Hill it is largely hillwash and scree material. The site is surrounded on the east, south and west by fluviially deposited clays, silts sands and gravels. These are part of the Shepparton formation and were formed in the Pleistocene period. As these areas were formed as part of the early stream development of the Murray River, two main terraces still exist, however these are no longer inundated by floods.

To the north of the site around the Ettamogah area the geology is extruded igneous material of lower Devonian age. The rock at this site is predominantly quartz-feldspar, rhyolite, tuff and micaceous quartzite.

### **2.2.3 Fill extraction Resource and Product**

The construction of the new National Highway alignment through the Albury-Wodonga region requires substantial embankment formation for the carriageways, particularly through the flood plain area. This has resulted in a considerable shortfall in the earthworks balance. The material to be extracted from the Red Hill proposed site will be used as fill for the construction of the National Highway Project. The Red Hill site provides an excellent source of material which is predominantly unconsolidated colluvium. Excavation of the hill is not expected to require blasting or drilling due to the unconsolidated nature of the material. The material will be extracted from the site and transported directly to the AWNHP construction zone for use.

The total fill extraction resource has been estimated at 2,900,000 m<sup>3</sup>. The volume to be extracted however, is only that which is required to meet the needs of the construction of the National Highway project. The site layout has also been constrained by the environmentally sensitive woodland vegetation to the north. The site therefore will not provide an ongoing fill extraction resource after fill extraction for the National Highway project. Extraction of the volume required is expected to take two years.

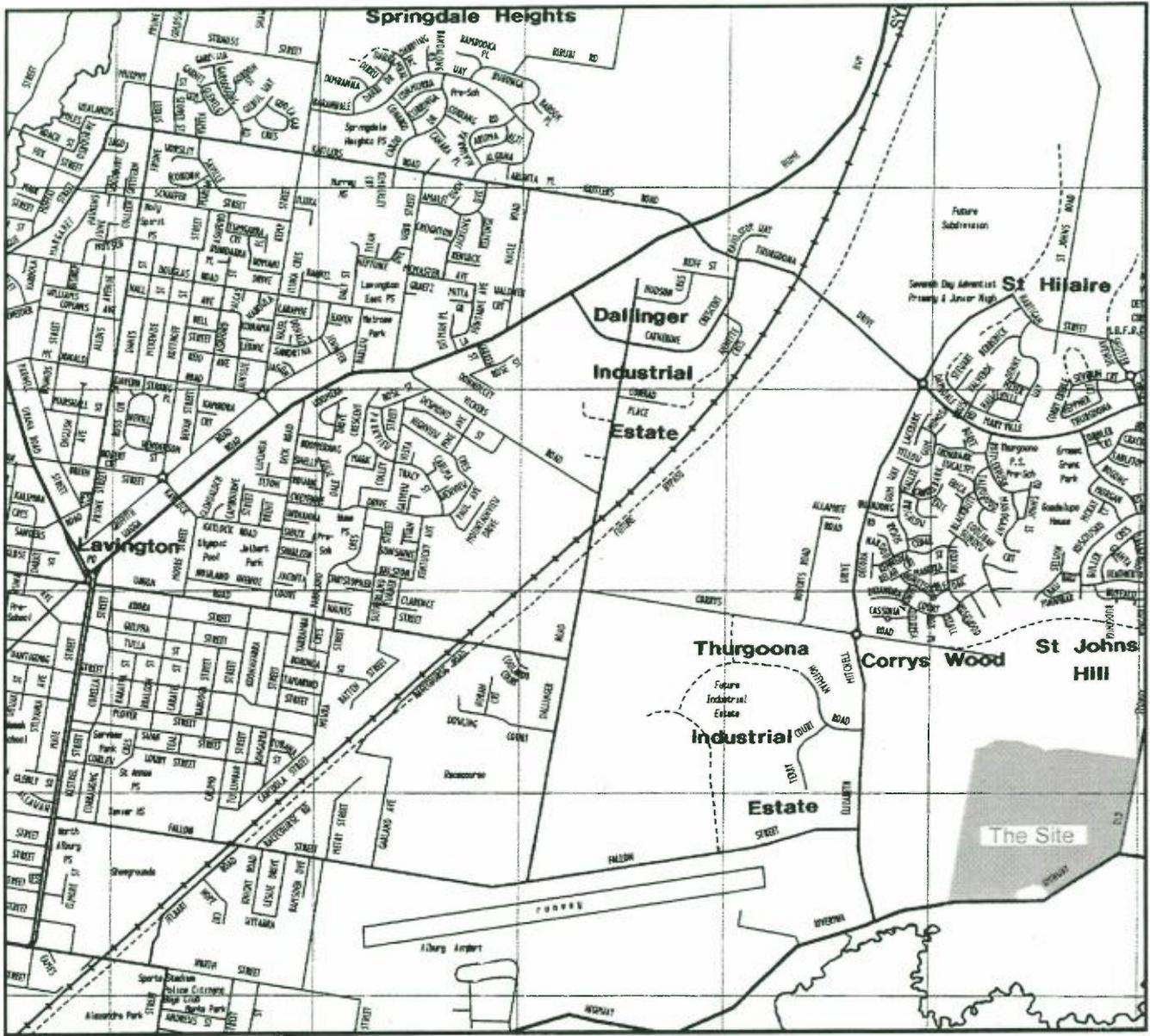


Figure 2.1  
SITE LOCATION MAP

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#### **2.2.4 Material Quality**

The quality of the material for use as fill material is high. The material ranges from dark brown silty clay to fine grained, mottled yellow and red clayey sand with quartz gravel. Assessment of the suitability of the material for use as fill in the AWNHP, conducted by the RTA, concluded that the material was ideal for use, providing adequate fill with little resistance during extraction. This means that material can be ripped, stockpiled and loaded without blasting.

### **2.3 Extraction Operation Development and Design**

#### **2.3.1 Extraction Site Layout**

The proposed extraction site is on Lot 922 DP 589483 and partly on Lot 8 of DP 584652, approximately 1.25 km east of the Albury Airport runway on the corner of the Riverina Highway and Old Sydney Road (Bowna Road). The land has an area of approximately 46 ha. The fill extraction activities are proposed to be conducted on the south-eastern portion of the site as shown in **Figure 2.1**. The area of land to be affected is approximately 30 ha or 65% of the total parcel of land.

Even though the proposed fill extraction operation has relatively high production requirements and will operate continually during the specified operating hours, little infrastructure is required on site. No permanent buildings or facilities will be constructed. On-site infrastructure will consist of a small car park for employees, a small transportable office/crib room, a dry chemical toilet, fill extraction haulage roads and water management structures such as diversion banks, silt retention ponds, spoon drains and silt traps, a bunded 10,000 litre diesel tank and a bunded storage and maintenance area.

#### **2.4 Hours of Operation and Workforce**

Fill extraction and haulage operations will occur over the two year construction period for the AWNHP between May 1999 and May 2001.

The extraction production will be continuous during the specified operating hours for the two year construction period. The total resource required is 2.2 million m<sup>3</sup>, resulting in an average daily extraction of material of approximately 3,990m<sup>3</sup>. This figure is based on 304 operational days per year (365 days less 52 Sundays and 9 Public Holidays), with 52 days per year being Saturdays and 252 weekdays.

Working hours will be:

- Monday to Friday: 7:00am and 6:00pm
- Saturdays: 8:00am and 1:00pm

As mentioned above, no work will be undertaken on Sundays or Public Holidays. These times coincide with the working hours, approved for the AWNHP in the Director General's determination.

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One day, three times per year, all haulage operations may have to cease due to jet boat racing events which are held at the jet boat racing facility located to the north of Fallon Street. Access to the facility is off Fallon Street which is proposed to be closed to local traffic during the extraction period.

The total maximum workforce associated with the extraction and haulage operations will be approximately 30 personnel. This will consist of the following:

- RTA Project Manager, Project Engineer and Site Supervisor;
- Contractor Site Manager;
- 2 bulldozer operators;
- 4 shovel operators;
- 1 front-end loader operator;
- 7 truck drivers;
- 1 water truck driver;
- 1 grader driver;
- 1 roller operator;
- 2 maintenance staff.

## **2.5 Site Services**

No public utilities are expected to service the site. Site communications will rely on cellular phones or a two-way network installed in the office and plant and trucks. Drinking and amenities water will be transported to the site as required. Local suppliers will provide fuel, parts and consumables for extraction and haulage operations.

A transportable office/crib room will be located within the maintenance and storage area. The area will also house the chemical toilet. A 10,000 litre above ground diesel tank will be installed in the on a level concrete platform and bunded to hold 120% of the largest potential spill. Additionally, a bunded concrete storage and maintenance area will also be constructed for servicing plant and equipment when required.

Water for dust suppression will be pumped from the on-site sediment basins. If no water is available on-site, it will be transported to the site from the AWNHP construction zone.

### **2.5.1 Development Schedule**

The process by which materials will be extracted may be separated into three development stages. These are:

- Site Preparation;
- Extraction;
- Rehabilitation.

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### ***Site Preparation Stage***

The site preparation begins with the construction of the water/soil control structures, such as the main sediment basin, spoon drains and silt traps associated with the haul road. The haul road will then be constructed to the area designated for extraction. The road will be of a high quality, suitable for use by heavy vehicles. It will be bitumen sealed to minimise dust impacts.

Only the minimum area necessary to obtain the required quantity of materials will be disturbed. Before any clearing of vegetation can begin, the site manager will inspect the extraction plot area for large, hollow bearing trees. Any existing trees deemed suitable for preservation will be marked and no extraction will occur to within 2 m of their dripline. The site will then be surveyed to define the line of the contour.

The vegetation will be cleared within the surveyed area using a dozer for grasses, undergrowth and tree stumps and a chain saw for trees and large branches. The vegetative debris will be stockpiled downslope along the length of the proposed extraction area. The large pieces of vegetation (ie, logs, stumps, etc) will be either sold as firewood or timber or, if suitable, retained as part of the rehabilitation program.

After the removal of vegetation, the topsoil and ground litter will be removed by dozer and also stockpiled downslope in a windrow formation, between the excavation plot and the vegetation.

Following the removal of topsoil and ground litter, a diversion bank will be dozed upslope of the intended excavation area. This will direct water away from the area of disturbance towards the clean water gullies and/or into a series of small basins along the diversion drain, which will store water for re-use in the revegetation process.

### ***Extraction Stage***

The extraction procedure will follow practices commonly employed in the removal of fill material deposits throughout Australia. In general, it will involve the extraction of material by excavators into heaps for loading onto trucks by face shovels. The trucks will transport the material directly to the AWNHP construction zone. Only short term stockpiling of material is anticipated on site. Due to the high rate of haulage, stockpiles will be kept to a minimum and limited to a maximum of approximately one weeks' production or 21,770m<sup>3</sup>. Water carts will be used for dust suppression when required.

Due to the nature of the resource, no drilling, blasting, crushing or screening is anticipated. The material is suitable for direct use in the AWNHP construction works.

### ***Rehabilitation Stage***

Rehabilitation will occur progressively as areas have been excavated. The procedure for rehabilitating an extraction area is described in detail in **Section 2.8**. In brief, it will involve deep ripping of the area followed by replacement of the topsoil and ground litter, fertilising and placement of a mulch layer created from the stockpiled vegetation/grasses. The area will then be watered to promote vegetation growth. The diversion bank will remain until the surface has been stabilised by vegetation. Once the

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area is stabilised, the diversion bank can be removed and used in other areas or incorporated into the rehabilitated site.

Minimal waste will be generated on site, the majority being general refuse. These will be removed and disposed of at the local landfill. Although not anticipated, minor quantities of non-hazardous waste may be generated on site. These may include oils and greases if site breakdowns occur. These will be collected and disposed of at the Albury landfill site, or at other sites approved by the EPA within the region.

The site is currently fenced with a 3 strand agricultural fence. A gate will be constructed at the haul road entrance at Elizabeth Mitchell Drive. This will be secured by padlock when the plant is idle.

### **2.5.2 Fill extraction Site Preparation**

The fill extraction site preparation will involve establishing the necessary infrastructure for material extraction. This first stage will involve constructing the primary sedimentation basin in the south western corner of the site and the construction of diversion drains around the north and north west of the extraction site. The diversion drains would also incorporate a series of small basins which would hold water for re-use to water re-grassing activities.

This will be followed by the construction of an access road into the site from Elizabeth Mitchell Drive. The work will involve some clearing of what is currently grazing pastures. Where practical, this will be stockpiled for future rehabilitation works. The road construction will have appropriate water management control features to ensure all surface water runoff is controlled and directed to sedimentation traps, with all discharges from these traps occurring under EPA requirements. The haul road pavement will be of high quality, being composed of compacted gravels and bitumen surfacing to restrict erosion and deterioration of the travelling surface and dust impacts. A cattle rack will be constructed at the point of contact between the haul road and the excavation area to minimise dust being transported off site. A gate will be installed at the entrance on Elizabeth Mitchell Drive to secure the property outside of operational periods.

The major water control structures will be constructed during this pre-extraction phase. These consist of the primary bank for diversion of clean water around the proposed extraction area, silt retention dams for the first phase of extraction and minor structures such as spoon drains and silt traps associated with the haulage road. A detailed description of the sedimentation and erosion control features is in **Section 3.6.3**.

A small parking bay will be constructed for employee and other vehicles entering the site along with a maintenance and storage area. A transportable office/crib room will be located within the maintenance and storage area. The area will also house the dry chemical toilet. A 10,000 litre above ground diesel tank will be installed in the maintenance and storage area on a level concrete platform and bunded to hold 120% of the largest potential spill. Although the maintenance and storage area will be used by the dozer and grader during this initial development period, the large excavating

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equipment will not use this area during extraction operations. It is planned that they will park on the area being disturbed by extraction.

### **2.5.3 Extraction Methodology**

The primary objective of the extraction methodology will be to efficiently exploit the fill material source while implementing the necessary measures to safeguard the natural and social environment. The operation will essentially be continuous for the two year AWNHP construction period. The extraction methodology to be implemented has been developed to account for the scope of this operation.

Ripping and stockpiling of topsoil, subsoil and any weathered rock will be undertaken using two excavators. Ripping will be carried out along main drainage line to the sediment basin, tracking back from the basin, north east. Staging will be carried out in accordance with **Figure 2.2**. Each stage will be excavated to its final contour prior to moving onto the next stage.

A “retreat method” of material extraction will be implemented to allow effective, progressive rehabilitation of an area and minimise further disturbance to rehabilitated site. The “retreat method” involves beginning the extraction process at the furthest point from the main haul track in the centre of the site, for each extraction plot. For the first section, this would involve extraction commencing at the high point on the northern edge of section 1, directly below the primary diversion bank. As the extraction of this plot is completed, progressive rehabilitation will trend south back along the contour, rehabilitating all areas including the extraction plot and any minor haul routes that were required for haul trucks to gain access to the stockpiles. Future access would be maintained by a small track to inspect the rehabilitation areas. This access track will be rehabilitated once the extraction plot is considered no longer in need of active supervision and maintenance.

All material will be ripped and pushed by dozers into stockpiles. Face shovels would sit on top of stockpiles and load material directly into the trucks. At least two shovels would load each truck. The loading point would be shifted, as required, to achieve an efficient dozing distance.

Seismic surveys indicate that most of the material is sufficiently weathered to be ripped to the full depth of extraction activities. It is anticipated that no blasting will be required. Topsoil will be stripped to a depth of approximately 300mm and temporarily stockpiled on a designated area for use in rehabilitation works.

Initially, materials extracted from section 1 as shown in **Figure 2.2** will be used to construct an embankment on the southern edge of the site to visually and acoustically block line-of-sight contact with the Heath residence. The embankment will be revegetated as soon as practicable with indigenous grasses and low-growing shrubs. The winning and transporting of the materials used in embankment construction for use at the AWNHP will be the material excavated in the final stage of the project.

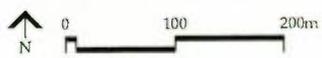
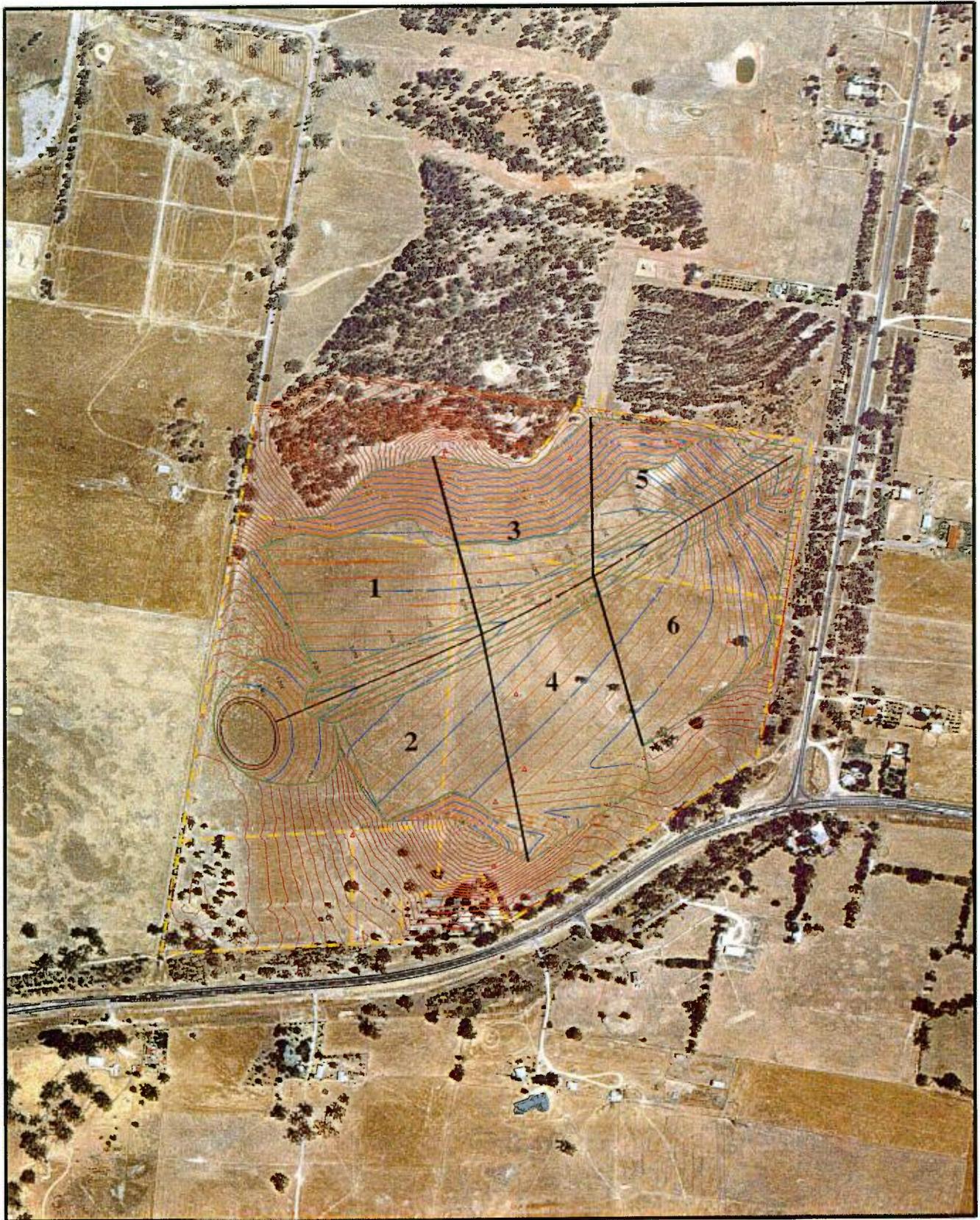


Figure 2.2  
EXTRACTION METHODOLOGY

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The location of each extraction component is to be surveyed to ensure that it conforms to the required contour. This is critical, as by following the contour, it will minimise the visual impact as well as allow any water falling on the extraction strip to be controlled and directed toward the sedimentation pond. Each subsequent extraction plot will be directly adjacent to the one formed in the previous extraction operation.

#### **2.5.4 Fill extraction Production**

The fill extraction production will be a continuous operation, during specified operating hours, for the two year construction period. The total resource required is 2.2 million m<sup>3</sup>, resulting in an average daily (based on an 11 hour day) extraction of material of approximately 3,990m<sup>3</sup>. This figure is based on 304 operational days per year (365 days less 52 Sundays and 9 Public Holidays), with 52 days per year being Saturdays (working hours between 8am and 1pm) and 252 weekdays (working hours between 7am and 6pm).

#### **2.5.5 Equipment**

The equipment to be used on site is as follows:

- 2 crawler bulldozers;
- 4 shovels;
- 1 rubber tyred front-end loader;
- 7 off-highway trucks;
- 1 elevating scraper;
- mulching equipment;
- 2 graders;
- 2 rollers;
- 2 bitumen sprayers (limited to initial haul road construction).

A water-truck will not form part of the permanent fleet but it will be brought to site during dry periods for dust suppression. Light vehicles will be used on site by the site manager and to transport employees.

### **2.6 Transportation and Access**

#### **2.6.1 Haul Road Options**

The extraction of what can be regarded as a significant amount of material means that transport of the material between Red Hill and the AWNHP construction zone becomes an important issue for consideration. The EIS/ESS (GHD, 1995) considered the haulage of material from Red Hill to the construction zone through the airport grounds. This is not a viable option as the construction of a haul road would contravene air safety regulations due to its close proximity to the runway. The RTA therefore engaged Sinclair Knight Merz to prepare a route options study as part of the preparation of this EIS (**Appendix - D**).

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The main issue to consider with the route selection process was whether to use standard on-road trucks, or to utilise larger, unregistered off-highway trucks on a dedicated haul road. Seven primary and two sub-options were assessed in the route options study. Following comment from Albury Council and the AWDC, and on the basis of landuse and environmental constraints, these were refined to three primary options (**Figure 2.3**):

**Option R-2:** was suggested by officers of Albury Council and is for road based haul trucks. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west (approximately 0.7km) . The haul road would be constructed to link with Fallon Street and would be best served by the installation of traffic lights at the intersection of Fallon Street and Elizabeth Mitchell Drive. Haul trucks would proceed along Fallon Street to Dallinger Road (approximately 1.6km) where they would turn right onto Dallinger Road and proceed north to Union Street (approximately 1.1km). Trucks would then turn left on Union Street and proceed west to the construction site access point (approximately 0.5km), where they would then travel south west along the construction zone to the construction zone centroid (approximately 5.4km). This would result in a total one way trip length of 9.3km.

**Option OR-1:** is for larger haul trucks, unable to be registered for use on public roads. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west (approximately 0.7km). The haul road would be constructed to link with Fallon Street. It is proposed that Fallon Street (between Elizabeth Mitchell Drive and Dallinger Road) be closed to normal traffic and be dedicated to use by haul vehicles. This would result in the intersection of Fallon Street and Elizabeth Mitchell Drive becoming a level crossing for haul road vehicles, with appropriate traffic control. Haul trucks would proceed along Fallon Street to the western edge of the Jet Boat Racing facility (approximately 0.8km), where they would turn right onto a haul road to be constructed. This haul road would then head NNW for approximately 1.5km through cleared grazing land owned by the AWDC. A further level crossing would be required to enable haul trucks to cross Dallinger Road onto RTA land, to the south of the Corrys Road/Dallinger Road intersection. Further haul road construction would then be required from Dallinger Road to the construction site (approximately 0.2km). From there trucks would then travel south west along the construction zone to the construction zone centroid (approximately 5.8km). This would result in a total one way trip length of 9.0km.

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It should be noted that modified access arrangements would be required for the Jet Boat Racing facility. Access is currently from Fallon Street. Access could be provided along Fallon Street on the 3 days of events per year. This would require scheduling of haulage so that it does not occur on those days.

***Option R-3:***

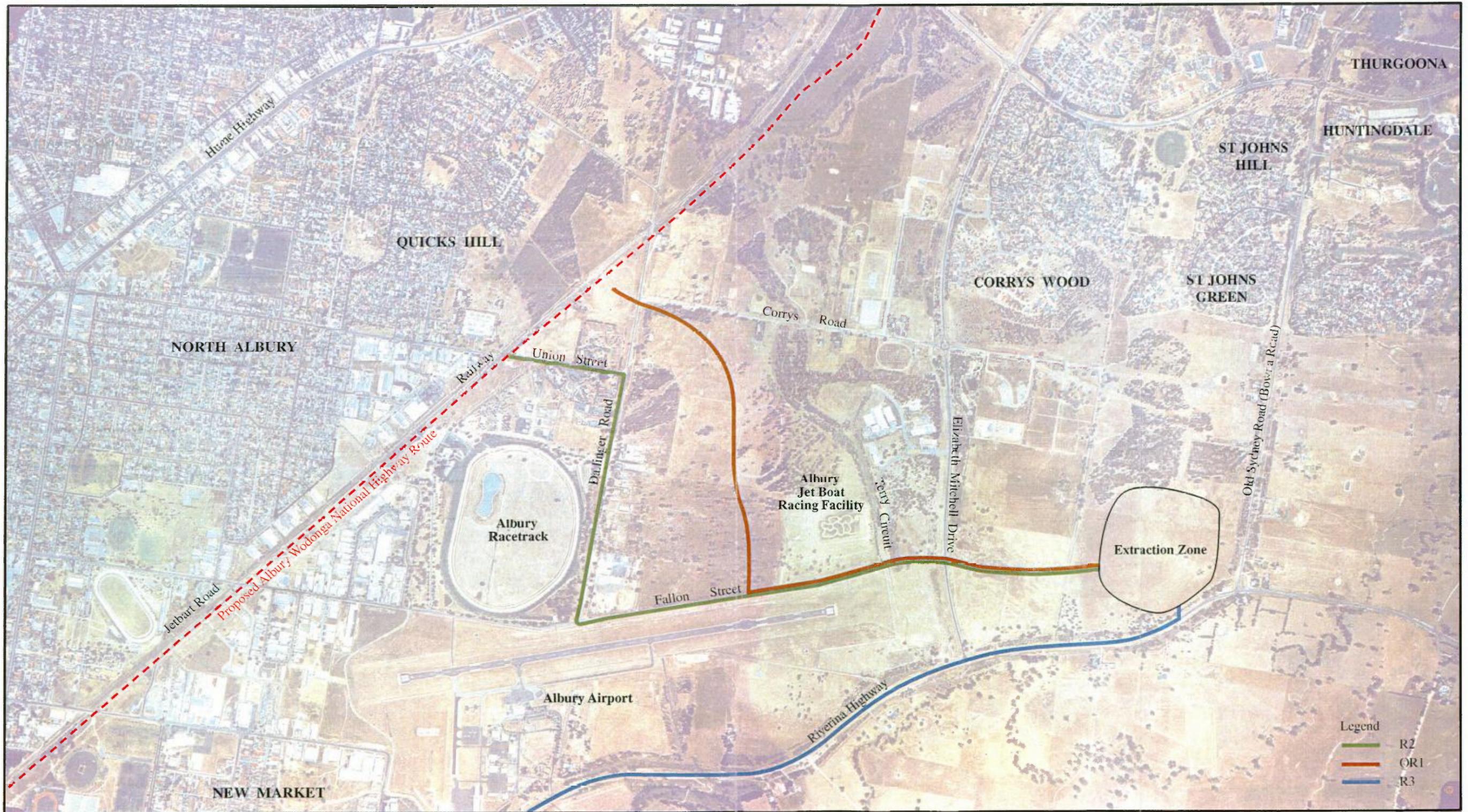
This option utilises the existing Riverina Highway and is for standard haul trucks. It involves the construction of a haul road from the Red Hill excavation site to the Riverina Highway. This intersection would require traffic control arrangements for access onto and off the Riverina Highway. Trucks would haul excavated material south west along the Riverina Highway for approximately 6km, where they would then enter the Highway construction zone and travel a further 2km to the centroid, resulting in a total distance of 8.0km. This option is likely to result in the resumption of one dwelling at Red Hill and noise treatment for approximately 80 residences.

An economic evaluation of the three primary options was subsequently carried out. The analysis used a least cost methodology for comparison as there is no provision for a 'do-nothing' base case; land fill must be extracted from Red Hill and driven to the construction site. The economic evaluation consisted of analysis of the following costs for each option:

- vehicle operation costs;
- road construction costs;
- road rehabilitation costs
- road maintenance costs;
- externality costs (including noise, vibration and carbon emissions); and
- traffic control costs.

**Table 4.1** provides a summary of the economic evaluation results for the three route options.

The most cost effective option is OR-1. Using a 7% discount rate, OR-1 is the least cost option with a total costs of \$19.9 million. This is \$2 million lower than both of the other options. Option OR-1 is the most efficient because the larger capacity of the trucks allows greater volumes to be transported per trip, thus resulting in fewer vehicle kilometres, greater economies of scale and no externality costs. While OR-1 has the highest road construction costs, these costs are more than offset by the reduction in road maintenance costs and subsequent rehabilitation costs. The low maintenance and construction costs, couple with the relatively lower vehicle operating costs of OR-1, make it the most economically efficient option.



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Figure 2.3  
 HAUL ROUTE OPTIONS

**Table 4.1: Evaluation Results**

Year	R2 Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	9,810,240	525,000	-	320,000	400,000	110,000	\$11,165,240
2	9,810,240	-	1,280,000	320,000	-	10,000	\$11,420,240
Undiscounted	19,620,480	525,000	1,280,000	640,000	400,000	120,000	\$22,585,480
7%	\$18,978,689	\$525,000	\$1,196,262	\$619,065	\$400,000	\$119,346	<b>\$21,838,361</b>

Year	OR 1 Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	8,922,144	1,800,000	-	80,000	-	110,000	\$10,912,144
2	8,922,144	-	600,000	80,000	-	10,000	\$9,612,144
Undiscounted	17,844,288	1,800,000	600,000	160,000	-	120,000	\$20,524,288
7%	\$17,260,596	\$1,800,000	\$560,748	\$154,766	\$0	\$119,346	<b>\$19,895,456</b>

Year	Riverina Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	8,374,080	362,500	-	600,000	1,600,000	220,000	\$11,156,580
2	8,374,080	-	2,400,000	600,000	-	20,000	\$11,394,080
Undiscounted	16,748,160	362,500	2,400,000	1,200,000	1,600,000	240,000	\$22,550,660
7%	\$16,200,323	\$362,500	\$2,242,991	\$1,160,748	\$1,600,000	\$238,692	<b>\$21,805,253</b>

### 2.6.2 Preferred Route Option

It was therefore recommended that option OR-1 be the preferred option for assessment in this EIS. This option enables materials to be transported efficiently, while minimising the impacts on the local community.

### 2.6.3 Truck movements

Based on an estimated daily (7am - 6pm) production of 3990m<sup>3</sup> and the truck fleet composition, the peak number of haul trucks leaving the extraction site per day will be 79. The haul trucks are expected to be 50 tonne capacity.

### 2.7 Airport Issues

As previously mentioned, the proposed Red Hill extraction site is located approximately 1.25 km east of the Albury Aerodrome runway, within the flight-path. Due to the height of construction equipment and the potential for dust generation during extraction and haulage operations, there is the potential for proposed operations to create obstacles or restrict the normal take-off and landing of aircraft.

It is for this reason that Albury City Council, the owner of Albury Aerodrome and the body Licensed by the Civil Aviation Safety Authority to manage its operation, has requested that a Method of Works Plan (MOWP) be prepared as part of this EIS (in accordance with Chapter 13, "Directions Relating to Aerodrome Works" of Civil Aviation

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Authority (CAA) "Rules and Practices for Aerodromes", 1991). The purpose of the MOWP is to inform Albury City Council and operators of the Albury Aerodrome of the works proposed and the mitigation measures which will be implemented to ensure there is no disruption to the operation of the Aerodrome. A copy of the draft MOWP is provided in **Appendix - E** and a summary is provided in **Section 3.10.3** of this EIS. It should be noted that this MOWP is in draft form and will need to be refined at the detailed management plan phase. All issues covered in the MOWP will be incorporated in the Project Environmental Management Plan (EMP).

Currently, the height of Red Hill is greater than the obstacle limitation specifications in the vicinity of airports which are prescribed by the CAA in Chapter 10 of "Rules and Practices for Aerodromes" (CAA, 1991). These are largely the same as the International Civil Aviation Organisation (ICAO) specifications (ICAO, 1983). Aircraft taking-off and landing at Albury Airport therefore have a concession to do so at a steeper gradient than that specified by CAA (ie. 2.09% as opposed to the prescribed limit of 1.5% [Figure 2.4] ).

Once extraction has been completed at Red Hill and the site has been re-contoured, flight path obstacle limitation requirements will be met. Therefore, the proposed extraction operations will have the added community safety benefit of easing the take-off and landing gradient for aircraft using the airport.

## 2.8 Fill Extraction Site Rehabilitation

It is the objective of the fill extraction's rehabilitation program to produce an area which is stable, self-sustaining, conforms with the character of the local and regional environment and safe. The final land use proposed for the site is to return the disturbed area to grassed paddocks of a similar type to that which currently occupies the site.

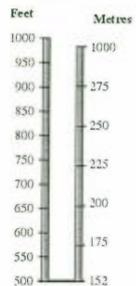
The rehabilitation of areas disturbed by fill extraction will be progressive. This approach has a number of advantages. They include:

- ❑ quicker return of the visual amenity to areas disturbed by extraction
- ❑ regeneration potential of the topsoil is maintained, promoting successful regrowth
- ❑ natural erosion and sedimentation controls of vegetation and ground litter are quickly re-established and will aid water management on the site
- ❑ habitat is returned sooner, reducing the effect of surface disturbance on native fauna.

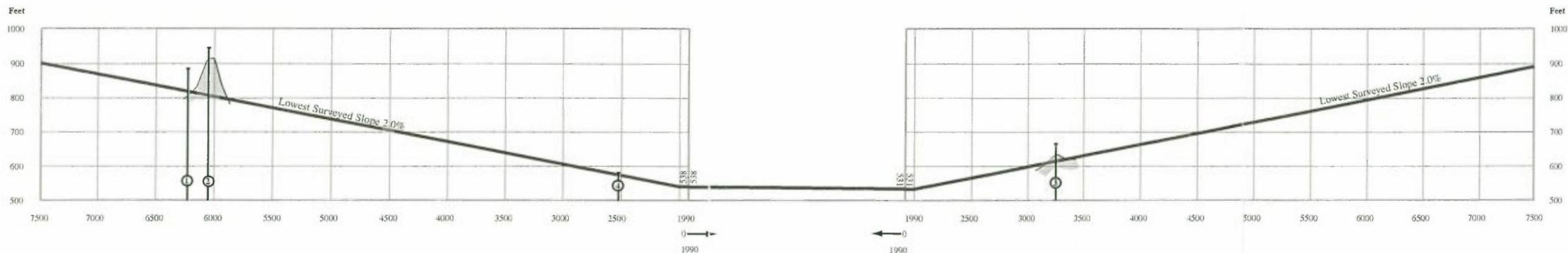
It is proposed that during the site's operation, the minimal area of site consistent with fill volume required will be disturbed. That is, all roads, drains, temporary work areas and any other surface features that will be no longer in use will be progressively rehabilitated using stockpiled topsoil.

The following restoration strategy shall be implemented within the Red Hill fill extraction site to maintain the site's visual and environmental qualities and stability. These general

Dimensions in Metres and Elevation in Feet

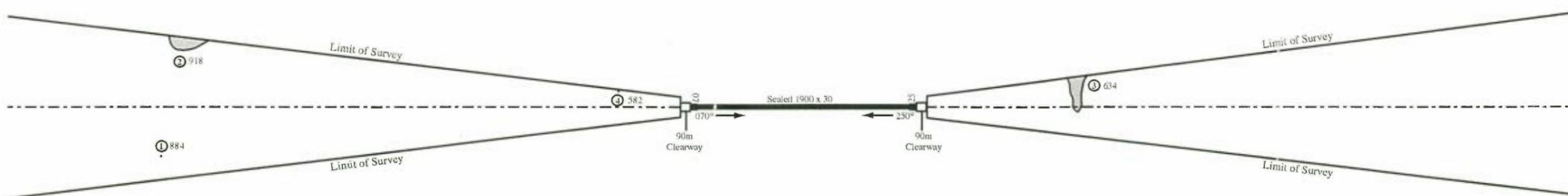


Type A (Operating Limitations)

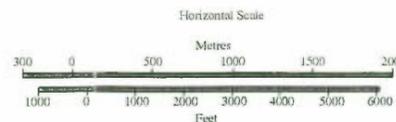


Runway 07-25

RWY 07	Declared Distances	RWY 25
1900	Take-off run available (TORA)	1900
1990	Take-off distance available (TODA)	1990
1900	Accelerate-stop distance available (ASDA)	1900



No.	Description
①	Albury War Memorial (Concrete Pillar)
②	Terrain Penetration
③	Terrain Penetration
④	Distillation Retort



Source: Albury City Council

Figure 2.4 AIRPORT OPERATING LIMITATIONS

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strategies should be further developed in contract documentation and will be incorporated as part of the Project EMP for the site works.

The revegetation/restoration strategy addresses the following issues:

- ❑ Restoration Concept;
- ❑ Soil Erosion and Water Quality Control;
- ❑ Revegetation Strategies;
  - Seed Collection
  - Vegetation Removal
  - Topsoil Management
  - Site Preparation/Ground Reshaping
  - Direct Tree Seeding/Planting details
  - Timing/Staging
  - Maintenance;
- ❑ Monitoring.

### **2.8.1 Restoration Concept**

The restoration concept is to reinstate the original balance between grassland and woodland. Any concepts to extend the woodland would be severely limited by the location of the site on the approach/take-off to the runway at Albury Airport. It is also intended that soil erosion be minimised and water quality of the catchment not be compromised.

The site includes rolling hill slopes that support two vegetation communities, agricultural grassland and mixed box woodland. Grassland covers most of the site with remnant stands of woodland occurring around the edges of the site and in two small stands to the north of the site.

It is intended that the new landforms emulate the existing rounded gentle slopes and that grassland be restored. Native trees and shrubs will be planted only on areas that are considered too steep to be left in a grassland condition for future grazing and any other future land use. This is consistent with existing vegetation conditions and runway approach restrictions. There will also be a planting of fast growing indigenous small trees and shrubs around the homestead adjoining the site to provide environmental protection to this property.

Indigenous species of mixed box woodland would be re-established using direct seeding methods. It is not expected that residual seed in stripped soil will be a significant seed source because of the native vegetation. Supplementary tree planting will be carried out at the edge of the site around the adjacent homestead to provide some measure of visual and dust protection.

Prior to the commencement of fill removal of extraction plots, existing grassland would be cleared. The few trees that are on the area to be excavated would be felled, mulched and stockpiled for later use. Topsoil would then be stripped to prescribed

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depths and stockpiled for later use and respreading onto re-contoured areas. Seed would be collected by the RTA or its representative from existing native vegetation in surrounding areas. The extent of this seed collection (i.e. species, quantities) should be determined to enable adequate cover to be achieved.

Following the completion of excavation, disturbed areas would be re-contoured prior to applying topsoil and in some situations mulch. The surface would then be cultivated to incorporate the mulch prior to seeding of native tree species. These activities would be closely co-ordinated with erosion and sediment control works. Well proven bushland regeneration techniques would be employed and the need for treatments such as smoke treatment of seed to enhance the germination and establishment of native vegetation should be investigated.

### **2.8.2 Site Drainage**

The region is characterised by gently undulating topography, within which several dendritic drainage systems associated with the Murray River system have developed. Drainage in the area is generally to the south toward the Murray River.

The major drainage line in the region surrounding the site is the Murray River, located approximately 3km from the extraction site. No permanent watercourses occur in the immediate vicinity of the study area. However, two ephemeral streams exist in the area, draining from the foothills of Red Hill and the residential suburbs north west of the site.

### **2.8.3 Erosion and Water Quality Control**

The proposal for the fill extraction has the potential to create soil erosion as well as adversely affecting water quality of the adjoining catchment. During the extraction operation, all possible efforts should be made to reduce the potential for soil erosion and the resultant increase in loads of suspended sediment in stormwater runoff.

Erosion and sedimentation controls should be based upon the standards set out in *Soil & Water Management for Urban Development* ( Department of Housing) and two EPA publications, *Management of Urban Stormwater Treatment Techniques* (1997) and the draft Management Plans for Soils and Construction Criteria.

The sediment and erosion strategies have been designed to minimise potential sedimentation and erosion. This includes staged clearing and revegetation of working zones to minimise the area of exposed surfaces as well as use of contour benching on the outer edges of work areas to capture runoff from disturbed areas. Stormwater should be retained within the fill extraction work area within constructed sedimentation ponds. Sediment-laden water should be allowed to settle before being discharged, or will be reused for dust suppression and watering new re-plantings.

A preliminary sediment and erosion control strategy has been developed and is presented in **Figure 2.5** as part of the Restoration Plan. This plan and the principles and guidelines outlined should be further developed as part of the Erosion and

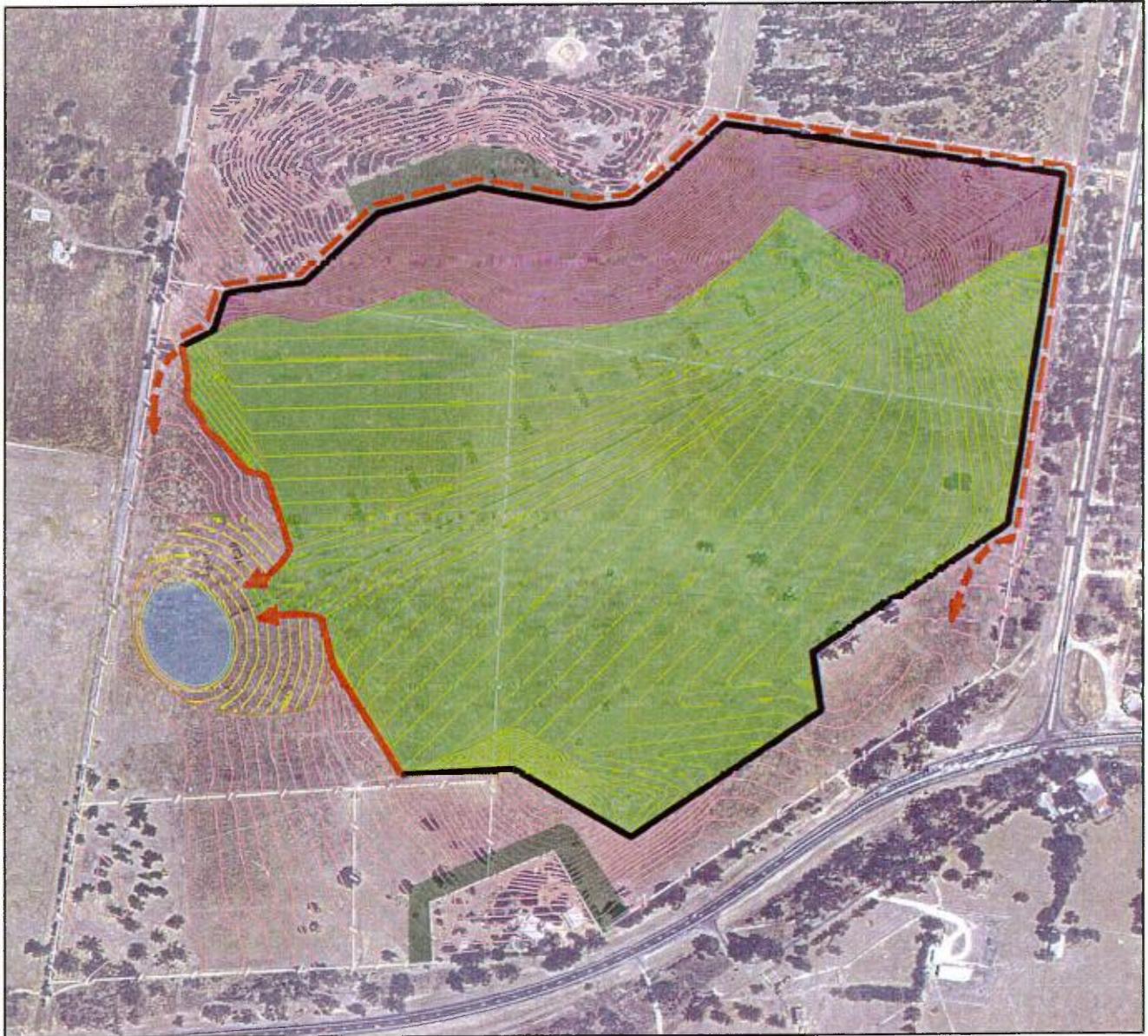


Figure 2.5  
**PRELIMINARY EROSION AND  
 SEDEMENTATION CONTROL STRATEGY  
 AND RESTORATION PLAN**

- Area to be planted with indigenous trees.
- Area to be seeded with grass.
- Sedimentation basin to engineer's design.
- Area to be seeded with indigenous vegetation.
- Grassland and indigenous vegetation to be protected.
- Pick-up drain.
- Diversion Drain.

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Sediment Control Plan (ESCP) which will be an important component of the Project EMP.

### **2.8.3.1 Structural Protection Strategies**

Before extraction activity begins, the following soil and water quality protection strategies should be implemented:

- Complete detailed design of soil erosion and water quality protection elements;
- The outline of the final fill extraction area should be defined on site by accurate survey;
- Diversion drains should be installed outside these areas to ensure that surface runoff from undisturbed areas is separated from all operational areas;
- A silt fence should be placed around those parts of the site, where water discharge is possible. This fence should be complemented by pick-up drains that direct any runoff to a sediment settling pond;
- The silt fence and the pick-up drains around the total operational area, should be complemented by a similar fence and drain placed around each working area, until restoration of that area has been achieved;
- The sediment settling pond should be located to enable all waters discharged from the operational area to pass through it. This would include excavation areas, top soil and mulch stock piles, as well as roadways on the site;
- The appropriate capacity of the pond should be as per standards set by the EPA and DWLC, as per **Section 3.6.3**;

The EPA and/or DWLC may inspect the soil erosion and water quality protection works prior to the commencement of extraction work commencing.

### **2.8.3.2 Operational Protection Strategies**

A range of operational procedures should be undertaken to minimise erosion and impacts on water quality, including:

- Minimise the size of areas that are cleared for fill extraction at any one time;
- Other areas should be left intact, while extraction is completed within each work area;
- Silt trap fencing and a pick up drain should be constructed around each work area prior to construction;
- The location of these measures should also include the topsoil stock pile;
- Alternatively the stockpile can be surrounded by a hay bale barrier;
- Any stockpile that is likely to be left for longer than 3 weeks should be seeded with a temporary grass cover;
- Sediment detention basins should be cleared of sediment if the volume of the basin is reduced by 40%;

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- ❑ All drainage and erosion control elements should be regularly inspected on a fortnightly basis or following rainfall events;
  - ❑ Each work area should be excavated to finished levels prior to work commencing on a new area;
  - ❑ Each work area is to be rehabilitated according to procedures established in **Section 2.8.4** within 7 days of the operations ceasing and final levels being achieved.

#### **2.8.4 Revegetation Strategies**

Successful revegetation of the site depends on a number of operations being successfully implemented. These are outlined below as well as in **Figure 2.5** and should be further developed in the EMP. As much as is possible, indigenous seed and vegetation should be restored on the site. However, in relation to grassland areas, the reality of restoring and maintaining native grassland areas must be considered in terms of future land use at the time of preparing the EMP.

Following extraction of the fill resource, the disturbed area will be deep ripped along the contour to promote water infiltration and retention and root development. The stockpiled topsoil will be returned by spreading it evenly over the disturbed area. Its surface will then be prepared for revegetation by deep contour ripping or "contour furrowing". This will take place to promote the infiltration and retention of moisture and assist root penetration through the soil. It is critical to break up the excavation base as it will have been compacted by machinery. As this soil is expected to have a high gravel/rock content, unless this is suitably loosened, plant growth will be impeded.

##### **2.8.4.1 Vegetation Removal**

Felled trees would be mulched, stockpiled and respread onto reshaped and topsoiled areas that are to be replanted to woodland as they become available. Areas restored to grassland will not be treated in this way. Stockpile sites will not be large as there is limited indigenous vegetation on the site. Stockpile sites will be located within the perimeter of the site, on areas that are to be disturbed.

Mulched vegetation will have limited seed content because of the nature of the material, however it will assist in organic soil conditioning and the reduction of surface erosion due to the binding effects of the mulch. Mulch will be incorporated into the surface by cultivation.

##### **2.8.4.2 Top Soil Management**

Topsoil will be stripped down to a level of at least 300mm. This material will be stored in stockpiles not deeper than 3 metres. The periods of storage should be minimised to reduce the detrimental effects on any beneficial micro-organisms in the soil. Storage period minimisation would be assisted by the phased extraction and rehabilitation of the extraction area.

Topsoil will be stripped and respread onto reshaped areas. Topsoil will be spread evenly over re-contoured areas to a depth of not less than 300mm. Staging of extraction areas will minimise the need for stockpiling.

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Most topsoil will contain exotic grass seed and should not be used in woodland replanting areas. For this purpose a soil stockpile should be established that does not include any soil from the top 150mm of natural ground level as this will contain grass seed. This is important as native seedlings will not be able to compete and introduced weed species can readily kill young germinating native plants.

### **2.8.4.3 Restoration of Indigenous Vegetation**

#### ***A. Seed Collection***

Native seed collection should be undertaken prior to commencement of works. Where possible seed should be collected from adjacent woodland areas.

Seed will be used for both direct seeding of reshaped areas and for nursery propagation of seedlings as required. Direct seed application will be used to bolster seed contained naturally in respread topsoil. This will greatly assist the re-establishment of both local species and genetic strains. Where suitable species of sufficient quantities are unavailable, alternative local seed supply sources would be used.

#### ***B. Site Preparation for woodland areas***

Thorough site preparation should be undertaken to ensure rapid early growth of seedlings. All proposed seeding and tree planting areas should be ripped to a depth of 400 - 500mm. To minimise erosion, ripping will be undertaken on or as close to the contour as possible and the tines should be lifted for approximately 2 m every 50 m to reduce the potential for channelized erosion. Best results will be obtained by ripping when soil is moist and when undertaken immediately prior to sowing (before surface crusting occurs).

#### ***C. Direct Tree Seeding***

A mixture of native trees, shrubs, and grasses should be sown onto re-contoured banks following topdressing and site preparation. The seed mix should be made up of the species that have been identified in the flora assessment of the site and its immediate setting as occurring in the mixed box woodland. These include: *Acacia dealbata*, *Eucalyptus blakelyi*, *Eucalyptus citriodora*, *Eucalyptus goniocalyx*, *Eucalyptus macrorhyncha*, *Eucalyptus melliodora*, *Eucalyptus microcarpa*, *Eucalyptus sideroxylon*, *Eucalyptus viminalis*, *Bromus hordeaceus*, *Cynodon dactylon*.

Seed should be appropriately pre-treated in order to break dormancy restrictions. In addition to traditional methods of treatment, this could include relevant seed species being treated with recently developed "smoke" technology in order to achieve earlier germination, more robust seedlings, wider and more uniform germination, increased germination rates and the germination of difficult species. Subject to sufficient follow up rain, high initial tree/shrub densities can be expected. These high densities will quickly assist in stabilising and screening the site and will result in healthy mature tree stands over time.

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Direct seeded tree stands are dynamic systems which change rapidly over time. High initial tree/shrub densities can be expected. Canopy closure will be rapid. This phenomenon will rapidly stabilise bare areas and protect against erosion compared to tree planted areas. Growth rates between 1 and 2 metres per year can be initially expected for some of the more aggressive trees and shrubs. Monitoring of sown tree stands will enable changes in stand dynamics and the adequacy of species diversity and growth rates to be checked to ensure that appropriate transitions occur.

The native tree and shrub seed mix will be sown at a total combined rate of not less than 8 kg per hectare. Seed should be mixed with Granulock 15 fertiliser at 100 kg per hectare. Tree seed and fertiliser will be broadcast evenly onto top-dressed areas. All seed will be sown onto the surface and will not be buried. Seeding will preferably be conducted in late spring when optimum soil temperatures result in superior germination.

At the end of the seed collection period the number of species and quantities of each species collected will be reviewed. Any shortfall will be discussed with the Principal and other seed supply organised.

#### ***D. Timing / Staging***

Tree seeding will preferably be undertaken in the warmer months when soil temperatures are higher, resulting in superior germination and species diversity. Seeding will be undertaken immediately after ripping and before rain (and surface crusting) occurs. Sowing prior to surface crusting and while a good tilth exists on the soil surface is important in maximising germination and tree establishment. Soil moisture should be maintained during the first year by spray irrigation from a water truck.

#### ***E. Tree Planting***

Tree planting will largely be undertaken where it is desired to increase the dominance of a certain species or where sufficient numbers of a certain species are not present in high enough densities 6 months after sowing. Trees will be grown as tubestock and should be propagated at a local nursery.

A mix planting bed of not less than 5 rows of mixed eucalypt and fast growing acacias should be planted around the house adjacent to the southern boundary of the site.

#### ***F. Maintenance***

Direct seeded trees generally require minimal maintenance and rely on natural rainfall. Initial high tree densities and rapid canopy closure quickly eliminates many weeds. The only maintenance required will include planting of seedlings where changes in species composition are required. No pest control will be required.

To ensure the success of the seeding program, spray watering from a water truck should be carried out as needed during the first year of growth. This will be feasible as

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there is only a small area of tree seeding and planting. In a similar way grassed areas should be watered if exceedingly dry periods threaten the viability of the seeded areas.

### ***G. Monitoring of seeded areas***

Direct seeded stands can initially be very dense with between 5,000 and 10,000 stems per hectare immediately after germination. These high densities will decline as many of the short-lived shrub species decline with time and as the more dominant forest species begin to emerge. Generally, strong Eucalypt emergence above the Acacia canopy after approximately 3 to 4 years can be expected. Minimum initial stem densities of 1,000 stems/ha should be achieved after 12 months.

Monitoring should be aware of these stand dynamics, especially in the first few years after establishment. In addition to monitoring stand density, monitoring should also include parameters such as species composition, organic litter, etc.

Monitoring of grass areas should ensure that adequate soil moisture is maintained and that adequate levels of germination and grass growth is achieved.

### **2.8.5 Grassing**

Following re-contouring of the excavation areas, they will be cultivated and grassed.

#### **2.8.5.1 Grass Seeding**

Areas nominated for grassing may be sown with the following species and rates:

- Fertilizer: Granulock 15 will be applied at 250kg per hectare;
- Couch: 10 kg per hectare;
- Perennial rye : 10 kg per hectare;
- Japanese Millet / Oats: (depending on season) 20 kg per hectare.

#### **2.8.5.2 Timing**

Grass sowing will be undertaken as soon as areas are available. The species mix will be modified according to the season and should be done in consultation with the local DLWC office.

#### **2.8.5.3 Maintenance**

Grassed areas will be spray irrigated to encourage rapid grass cover and stabilisation. Best horticultural practice will generally be applied to maintenance of grassed areas.

#### **2.8.6 Final Site Rehabilitation**

The final site rehabilitation will flow on from the on-going site rehabilitation program. The final areas to be rehabilitated will include all remaining roads, drains, dams, work areas, noise mounds and any other areas which has been disturbed by the proposed development. All sedimentation control structures will remain active and be maintained until vegetation has been well established.

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The rehabilitation of the remaining disturbed areas will involve, in general, a shaping of the area to conform with the surrounding terrain. The area will be deep ripped and topsoil returned to its surface. The surface will be prepared by a light harrowing and application of fertiliser. The area will then be watered to further promote vegetation growth. The sedimentation control dams will be retained to collect surface runoff.

All areas will be monitored to assess the performance of rehabilitation. Where necessary, additional measures such as seeding, fertiliser application and hand plantings will take place to assist regrowth. Monitoring of all areas that have been rehabilitated will continue until the proposed development site is stable and self-sustaining.

During the final rehabilitation process, a site clean-up will occur and evidence of the extraction activities removed. This includes any pipes, machinery and waste that may be present. During this stage it is planned that any road access onto the site will be removed.

The final rehabilitated landform of the site, while being rehabilitated to its previous vegetation type, would look distinctly different than present. The site will take the form of a shallow depression that is easily distinguished from the adjacent undulating hills and floodplains. To minimise any resulting visual impact specific attention would be given to restoration work around the Mt Pleasant Homestead to ensure that an ample screening of trees is provided around the property boundary maintaining a rural outlook.

The final land use proposed for the site at this stage is to return the extraction area to a pastured paddock, similar to that which currently occupies the site. The achievement of this goal through successful rehabilitation should produce an area which is safe, stable, self-sustaining and that conforms with the character of the local and regional environment. This final rehabilitation will ensure that there are no long term impacts to the site.

## **2.9 Haul Route Rehabilitation**

The haul route between the extraction zone and Elizabeth Mitchell Drive will be rehabilitated during the final rehabilitation phase, as described in **Section 2.8.6**. The traffic management measures at the intersection of Fallon Street and Elizabeth Mitchell Drive will be removed and the roadway repaired where necessary. Fallon Street, between Elizabeth Mitchell Drive and where the haul road turns north off Fallon Street, will be re-surfaced and repaired, where necessary.

The haul road between Fallon Street and Dallinger Road will not be rehabilitated. The AWDC has indicated that the road could be utilised for possible future landuse. The road will therefore be left, in good repair under the ownership and management of the AWDC.

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## 2.10 Energy Requirements

The primary energy requirements will be diesel fuels. Based on the equipment presented in **Section 2.5.5** and assuming the maximum extraction of 1.1 million m<sup>3</sup> per annum, the use of diesel has been estimated at approximately 4,950,000 litres per annum.

### 3. Assessment of Environmental Impacts and Mitigation

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#### 3.1 Regional Setting

Albury Wodonga is located between Sydney and Melbourne on the Hume Highway, in the Upper Murray Region. It is downstream of the Great Dividing Range and lies on the border of Victoria and NSW, about 10km west of the Hume Dam.

The region is agriculturally rich due to the expanse of floodplain land from the location of the confluence of the Mitta, Murray and Kiewa Rivers. The Murray River, which acts as the dividing line between Albury and Wodonga, provides irrigation water for the agricultural regions to the north and south and provides water supply to a number of towns and properties.

Albury Wodonga is the main crossing point for road freight, car travel and rail travel/freight between NSW and Victoria. Albury Airport provides air services to and from the region each day from Sydney and Melbourne, as well as from a number of rural centres. Prior to it being established as a crossing point, the Murray floodplain supported a dense population which became increasingly sparse with distance from the River. Since the establishment of the crossing, economic growth and social change in the area has been rapid. Major industries have been established in the area as a result of the strategic location of the area.

Albury Wodonga's history has been closely linked with the development of the Hume Highway. The explorers Hume and Hovell were the first Europeans to visit the region in 1824. *Ad hoc* development of the Great Southern Road occurred as settlers followed the lead of the explorers. Squatters began populating the area in 1835 and by 1838 a small settlement had been established at Albury to provide supplies to the early settlers. 1838 also saw a mail run commence between Port Phillip and Sydney, via the Albury settlement. Between 1855 and 1875, Albury became an active river port, however, this declined rapidly with the establishment of the road connection between Wodonga and Melbourne in 1873 and Albury and Sydney in 1881.

The Albury Wodonga region now supports a population of approximately 90,000. This growth to a major inland regional centre has occurred as a result of the natural and strategic advantages of its location on the major road and rail links between Sydney and Melbourne and also, partly as a result of various government "centres" policies. A series of advanced management and administrative activities has produced clear strategies for the management of future development in the area. The Albury Wodonga Regional Strategy, produced by the Regional Planning Committee, has set the objectives and targets for several decades to come.

Physically, the regional setting of Albury is dominated by the Murray River and the Mountains and Hills of the Black Range. The Murray River runs east-west to the south of Albury, the airport and the site. The flood plain is dominated by the meandering river, oxbow lakes and billabongs. Treed creeklines, the river and other water features create a strong pattern in this area.

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The Mountains of the Black Range are generally to the west of Albury with the foothills and more gentle slopes providing the appropriate non flood areas for the urban development of Albury adjacent to the Murray River. Red Hill is within the gently sloping foothills.

Red Hill is approximately 5km east of the main centre of Albury, located to the south of the outer suburb of Thurgoona. **Figure 1.1** shows the location of the site in its regional setting.

### **3.2 Local Setting**

The local setting of the site at the edge of the Murray River flood plain includes flat secondary flood plain areas as well as gently undulating hills generally above 170 metres above sea level (masl). The Airport, which is located on part of the secondary flood plain, is situated to the west of the site. The remainder of the flood plain supports scattered trees in open grassland. Generally the rolling hills also support scattered trees in open grassland. The creek lines and, to a lesser extent, fence lines and road lines, also support tree groups that help to punctuate the landscape.

A major feature of the landscape in the locality is the major tree planting belts that occur along the roads and in various locations in the landscape, such as significant hill tops. There are a number of landuses that create the character of local landscape settings, including urban residential development, industrial areas, the race track, the air port and rural grazing land. The rural landscape also supports a number of rural homes that are generally close to adjoining roads.

The major roads in the locality are the Hume Highway and the Riverina Highway. Other roads include Old Sydney Road (Bowna Road) which adjoins the site on the east, Elizabeth Mitchell Drive to the west of the site and Fallon Street which runs adjacent to the northern side of the Airport.

The site covers an area of approximately 30 ha. The site generally slopes and drains to the south. Slopes are gentle, generally not exceeding 1:10, with elevations varying from 161masl in the south west corner of the site to 194masl in the central northern part of the site.

The site is dominated by exotic grassland. However a limited number of trees do occur on the southern side of the site, adjacent to the residential property and a small farm dam in the central drainage line.

### **3.3 Land Use and Planning**

#### **3.3.1 Land Use**

The proposed development is located on the south side of Red Hill within Lot 922 of DP 589483 and part of Lot 8 of DP 584652. The land is owned by the Albury-Wodonga Development Corporation. The northern side of Red Hill is composed of a mixed box woodland which consists of predominantly eucalyptus species, however the southern

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end has been cleared for limited grazing. Surrounding landuses include rural residential uses to the north, south, east and west. The Riverina Highway is situated directly south of the site and the Albury Airport is to the west. Also to the west is the Albury Jet Boat Racing Park which is the site of major national jet boat races three times per year. Further to the north of the site are the residential release areas of St Johns Green, St Johns Hill, Corrys Wood and Huntingdale.

The haul road is proposed to run through limited grazing land to the west of the site prior to running adjacent to the Airport along the existing Fallon Street. It then heads north through vacant grazing land that backs onto a number of horse stables associated with the Albury horse racing track. When the haul road crosses Dallinger Road and enters the AWNHP construction zone it lies adjacent to residential land.

### 3.3.2 Land Use Planning

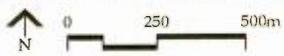
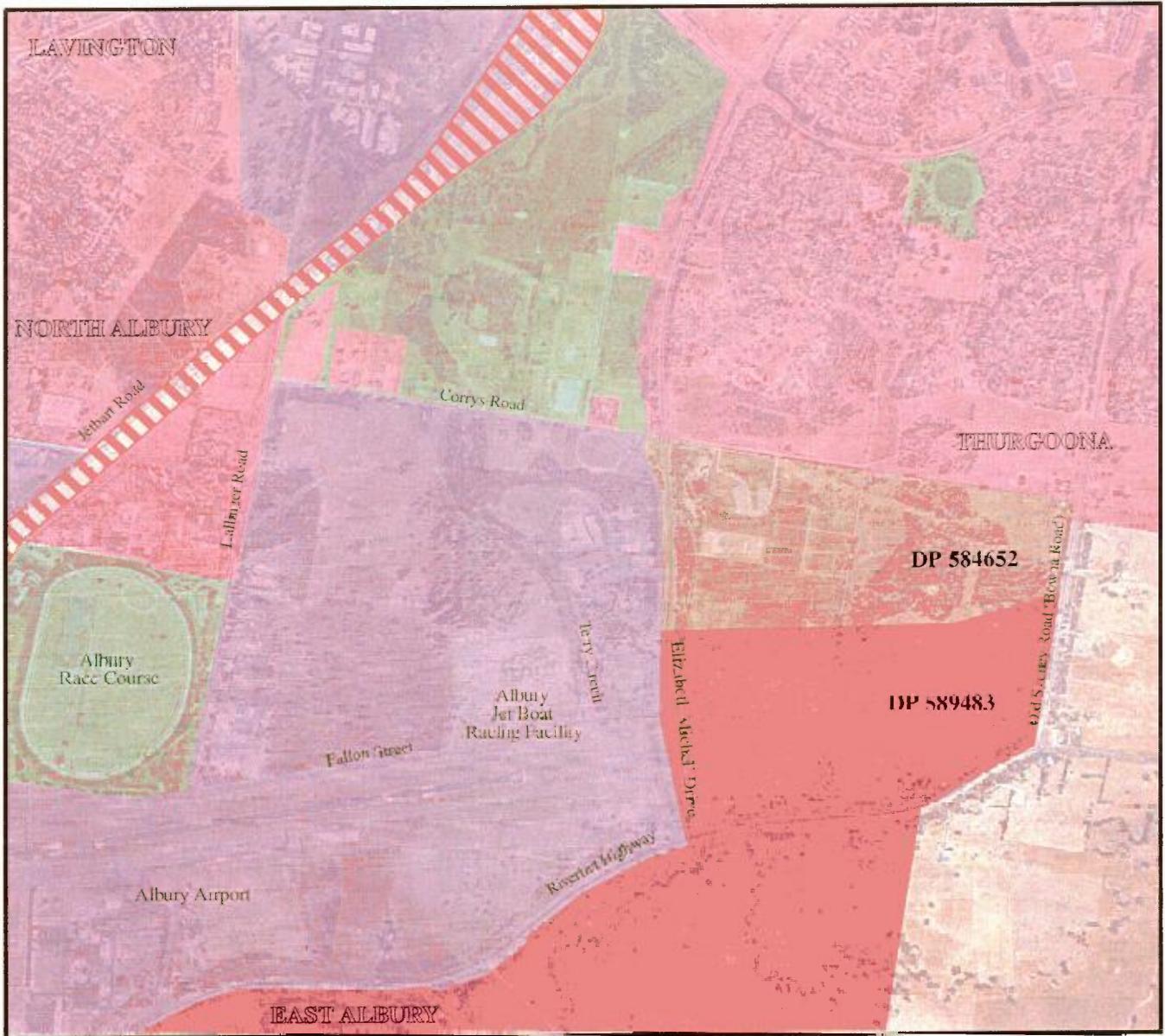
Land Use and development within the study area is governed by the provisions of the *Albury Local Environment Plan 1995* (LEP). Zoning in the vicinity of the proposal is shown in **Figure 3.1**. The majority of the Red Hill area to be directly affected by the proposal is zoned Environment Protection, with a smaller amount being Urban Fringe.

The Environment Protection Zone identifies land located adjacent to the urban area of Albury which forms part of the scenic backdrop or rural setting or is located within or adjacent to the River Murray floodplain. The particular objectives of this Zone, as stated in Division 6, section 34. (2) of the LEP, are to:

- “(a) ensure development maintains and contributes to the rural character of the locality and minimises disturbances to the landscape and scenic qualities of the fringe area, providing a visual contrast to the urban area;*
- (b) ensure that development of the River Murray floodplain, including subdivision and use of land, is compatible with the natural conservation and landscape values of the riverine environment;*
- (c) ensure that development in the fringe area is carried out in a way that is sensitive to land and environmental characteristics;*
- (d) ensure that development does not create unreasonable or uneconomic demands for the provision or extension of services; and*
- (e) provide limited rural living opportunities on land having ready access to the urban area and urban facilities and services.”*

Fourteen matters of consideration are identified in the LEP. Council needs to consider all of these when assessing proposed development in the Environment Protection Zone. Each of the matters of consideration have been addressed in this EIS and referenced in **Appendix - A**.

A segment of land in the northern section of the site is within the Urban Fringe Zone. Land in this Zone has been identified for investigation and possible future use as urban and/or related land uses. The particular objectives of this Zone, as stated in Division 1, section 10. (2) of the LEP, are to:



- Urban Fringe
- Living Area
- Employment Area
- Open Space
- Environment Protection
- Reservation (Proposed Arterial Road)

Figure 3.1  
ALBURY LEP ZONING MAP

- 
- “(a) provide appropriate controls to maintain and enhance the physical characteristics, environmental qualities and scenic qualities of fringe urban lands;*
- (b) permit limited development which is in keeping with the existing character of the locality and compatible with the likely future use of the land for urban or other purposes as determined by Council;*
- (c) ensure that future urban land is not fragmented or developed in such a way as to make urban development more costly or difficult;*
- (d) ensure that development does not create an unreasonable or uneconomic demand for the provision of or extension of public amenities or services; and*
- (e) provide a buffer to the Albury garbage tip.”*

Five matters of consideration are identified in the LEP. Council needs to consider these when assessing proposed development in the Environment Protection Zone. Each of the matters of consideration have been addressed in this EIS and referenced in **Appendix - A**.

The haul road passes through the Environment Protection Zone, the Employment Area Zone and the Living Area Zone. The Employment Area Zone aims to identify land for industrial and related land uses, while the Living Area Zone identifies land for residential and other compatible land uses.

Development for the purposes of fill extraction and haul road is permitted within the above zones with the consent of Council. As stated previously, consent can only be granted when all of the matters of consideration for each zone have been considered. Each of these have been addressed in the EIS and cross referenced in **Appendix - A**.

### **3.3.3 Impacts on Land Use**

In general, the impact on surrounding land use by the proposed development is not anticipated to be significant. The proposed activity will be operational over an estimated two year period. Furthermore, sufficient safeguards will be established to confine the impacts to the extraction site and haul route, controlling the degree of the impact on the surrounding environment. Additionally, the construction of the haul road minimises the impacts on local houses, traffic and the safety of horses and handlers crossing Dalling Road to the Albury Racetrack, compared with using smaller trucks on local roads.

The impacts of the proposed operation on each of the major surrounding land areas as follows:

#### **Grazing**

The extraction process will have little impact on the grazing activities in the region. The site is currently only used for limited grazing. The proposed extraction area is relatively small at 30 ha. There are many alternative grazing areas in the area.

Following fill extraction the site will be returned to grassed pasture and no net loss of grazing land is anticipated.

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### **Natural Environment**

The impacts of the extraction process on the surrounding natural environment will be minimal as much of the impact will be contained on the site. With less than five eucalypts being felled at the extraction site and approximately 20 along the haul route, only minimal loss of habitat would occur. As most of the area has been cleared for previous grazing activities the impacts of the proposed development on the natural environment are anticipated to be small. This will be minimised further by the implementation of the progressive rehabilitation program proposed.

### **Commercial Activities**

The proposed development will have little impact on the commercial activities of Albury. Transport of the fill material via the haul route identified will not significantly interfere with local traffic or any commercial activities. The jet boat races have the potential to be impacted upon, however, access to the facility during the 3 major events per year will be maintained, with haulage activities ceasing on those days.

### **Local Dwellings**

The clearing of land for extraction will reduce the visual appeal of Red Hill for a small number of local residents. This, however, would be minimal as the extraction method will use extensive vegetative screening to shield its operation from general view. Noise from plant operation and truck movements will also impact to an extent on local dwellings. As described in **Section 3.16**, ameliorative measures will be undertaken through the extraction process site to ameliorate the visual and noise impacts from the site.

## **3.4 Noise**

### **3.4.1 Acoustic Environment**

In order to quantify the existing noise environment in the area surrounding the proposed Red Hill fill extraction site, ambient noise monitoring was conducted at two locations. Noise measurements were recorded by installing Environmental Noise Loggers approximately 5m from the nearest facade of residences adjacent to the proposed haul/excavation activities.

Noise monitoring was conducted at the Heath Residence, adjacent to the Red Hill site on the Riverina Highway, between 13–26 November 1998. Noise monitoring was also conducted at 2/50 Dallinger Road, adjacent to the R-2 haul route option, between 13–22 November 1998. The location of these noise monitoring sites, the proposed fill extraction site and haul route and other nearest affected residential premises are shown on **Figure 3.2**.



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Figure 3.2  
NOISE MONITORING LOCATIONS

The noise loggers were set to record LA<sub>eq</sub>, LA<sub>10</sub> and LA<sub>90</sub> noise levels continuously, recording an average value every 15 minutes in accordance with the method outlined in the NSW EPA's Environmental Noise Control Manual (ENCM).

The LA<sub>10</sub> and LA<sub>90</sub> noise levels are levels exceeded for 10% and 90% of the monitoring time respectively. The LA<sub>90</sub> level is commonly referred to as the background noise level. The LA<sub>eq</sub> noise level is the equivalent noise level which contains the same amount of sound energy as the fluctuating levels of noise during the monitoring period. The noise loggers were calibrated before and after the noise measurement periods and drift was determined to be less than ±0.5dB(A).

The results of noise monitoring at the Dallinger Road residence and at the Heath residence, Riverina Highway, have been summarised in **Table 3.1** and **Table 3.2** respectively. The tables show the lowest repeatable noise levels recorded during each day, evening and night-time of the monitoring period. The results have also been presented graphically in **Appendix G**.

**Table 3.1: Ambient Noise Levels - 2/50 Dallinger Road Albury (dB(A))**

Date (Nov 1998)	LA <sub>90</sub>			LA <sub>10</sub>			LA <sub>eq</sub>		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
13-14	41.5	37.0	30.0	61.5	44.5	33.5	58.0	50.0	42.5
14-15	39.0	39.0	30.5	55.0	4.0	35.5	53.0	53.5	35.0
15-16	39.0	38.5	34.5	54.0	51.0	38.0	51.5	52.5	36.5
16-17	42.0	37.0	31.5	58.5	56.0	36.5	55.5	52.0	35.5
17-18	39.0	42.0	31.0	57.0	56.0	33.5	55.0	49.0	32.0
18-19	45.0	40.5	31.0	59.5	50.0	36.0	56.0	50.0	32.0
19-20	40.5	42.5	31.0	58.0	54.0	34.5	58.0	54.0	34.5
20-21	40.0	39.0	32.0	58.0	60.5	36.5	54.5	49.0	35.0
21-22	39.0			56.5			53.5		
Average	40.6	39.4	31.4	57.6	47.0	35.5	55.0	51.3	35.4

The average background (LA<sub>90</sub>) noise levels recorded at the Dallinger Road site were 41 dB(A) during the day time, 39 dB(A) during the evening and approximately 31 dB(A) during the night-time periods.

The major noise sources identified at this location during the site visit on 27 November 1998 were:

- road traffic and trucks travelling along Dallinger Road and entering the Racecourse along Dowling Court;
- aeroplanes travelling to and from Albury Airport;
- bird noise; and
- wind noise in the trees.

**Table 3.2: Ambient Noise Levels - Riverina Highway Albury (dB(A))**

Date (Nov 1998)	LA <sub>90</sub>			LA <sub>10</sub>			LA <sub>eq</sub>		
	Day	Evening	Night *	Day	Evening	Night	Day	Evening	Night
13-14	42	35	27	56	56	40.5	53	52	39.5
14-15	38	39	27	54.5	56	41.5	50	51	39
15-16	33	37.5	31	53	58	36.5	49	54.5	37
16-17	41	38	26.5	55	56	52.5	52	50.5	36.5
17-18	37.5	35.5	24.5	53.5	53	50	52	49	42
18-19	42.5	38	24	55.5	57.5	33	52.5	55	40
19-20	37.5	41	28	54	52.5	39	50.5	51	36.5
20-21	41.5	40	26.5	54.5	53	39	51.5	53	39.5
21-22	39.5	34.5	28	54.5	52	44	52	49.5	41
22-23	39.5	40.5	26.5	54	52	38.5	51	49.5	37
23-24	41.5	43	28.5	54.5	53	35	52	54	40.5
24-25	39.5	42.5	24	53.5	52.5	28	51	48	35.5
25-26	42.5	34.5	26	56.5	54	48.5	52.5	50	42.5
<b>Average</b>	<b>36.8</b>	<b>35.6</b>	<b>24.8</b>	<b>50.6</b>	<b>50.4</b>	<b>37.6</b>	<b>47.8</b>	<b>47.6</b>	<b>36.2</b>

\* The ENCM states that where the existing background noise level is less than 30 dB(A), then 30 dB(A) should be assumed to be the existing background noise level.

The average background (LA<sub>90</sub>) noise levels recorded at the Riverina Highway residence were 40 dB(A) during the day time, 38 dB(A) during the evening and approximately 30 dB(A) during the night-time periods.

The major noise sources identified at this location during the site visit on 27 November 1998 were:

- road traffic travelling along the Riverina Highway;
- aeroplanes travelling to and from Albury Airport;
- bird noise;
- cicada noise; and
- wind noise in the trees.

As part of the *Albury Wodonga Potential National Highway Routes - Environmental Impact Statement (October 1995)* ambient noise monitoring was conducted along Dallinger Road, approximately 100 m north of the intersection with Corrys Road. The noise measurement methodology is similar to that outline above, using Environmental Noise Loggers set to record with noise measurements being undertaken between 8–18 July 1994. The noise monitoring results obtained from this study have been summarised in **Table 3.3**.

**Table 3.3: Ambient Noise Levels - Dallinger Road, 100 m N of Corrys Lane, Albury (dB(A))**

Date (July 1994)	LA <sub>90</sub>			LA <sub>10</sub>			LA <sub>eq</sub>		
	Day	Evening	Night *	Day	Evening	Night	Day	Evening	Night
8-9	45	41	36	57	62	58	54	57	54
9-10	43	35	28	55	59	51	53	54	47
10-11	46	41	30	56	62	56	54	57	51
11-12	44	42	33	57	61	60	55	57	55
12-13	37	41	29	54	62	53	51	57	47
13-14	41	42	33	53	57	55	51	55	51
14-15	37	39	36	54	58	54	52	54	50
15-16	39	43	36	52	57	53	50	54	47
16-17	41	39	28	53	56	49	49	53	47
17-18	40	46	29	54	62	56	51	57	52
<b>Average</b>	<b>37.55</b>	<b>37.18</b>	<b>28.91</b>	<b>49.55</b>	<b>54.18</b>	<b>49.55</b>	<b>47.27</b>	<b>50.45</b>	<b>45.55</b>

\* The ENCM states that where the existing background noise level is less than 30 dB(A), then 30 dB(A) should be assumed to be the existing background noise level.

The average background (LA<sub>90</sub>) noise levels recorded at the Dallinger Road / Corrys Road residence were 41 dB(A) during the day and evening periods, and approximately 32 dB(A) during the night-time periods.

Background noise levels determined at these three residential locations are considered to be representative of the noise environment at the majority of residential dwellings located adjacent to the proposed fill extraction site and haul route. The average day time background (LA<sub>90</sub>) noise level determined at these locations, approximately 40 dB(A), has been used in developing noise criteria for the project.

### 3.4.2 Noise Assessment Criteria

In order to assess the potential impacts of noise associated with the excavation and transport of fill from the Red Hill fill extraction site, noise assessment criteria must be determined.

The Environment Protection Authority (EPA) is responsible for regulating ambient noise in NSW. Noise relating to the excavation and transport of fill from Red Hill to the AWNHP Construction zone has been assessed against the EPA's 1995 publication - Environmental Noise Control Manual (ENCM).

#### Site Excavation

The excavation of fill at Red Hill has the potential to cause annoyance at the nearest residences to the site, located along The Riverina Highway to the south, and Old Sydney Road (Bowna Road) to the east. Due to the fact that the fill extraction site is expected to be operational for two years, and the fact that the operation forms part of the AWNHP, construction noise guidelines are considered appropriate.

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Chapter 171 of the ENCM, titled Noise Control Guideline - Construction Site Noise, states that where there is the likelihood of annoyance due to noise from construction activities, the following restrictions should be applied:

#### Level Restrictions

(i) Construction period of 4 weeks and under:

The LA<sub>10</sub> level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

(ii) Construction period greater than 4 weeks and not exceeding 26 weeks:

The LA<sub>10</sub> level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

The ENCM does not specify construction noise objectives for periods in excess of 26 weeks, however, it is generally regarded that criteria for continuously operating sources be applied. That is, the LA<sub>10</sub> noise level due to construction activities should not exceed the existing background noise level by more than 5 dB(A).

#### Time Restrictions

The time restrictions specified in the ENCM are:

- Monday to Friday, 7 am to 6 pm.
- Saturday: 7 am to 1 pm if inaudible on residential premises, otherwise: 8 am to 1 pm.

Time restrictions specified for the AWNHP by the Director General are:

- Monday to Friday: 7 am - 6 pm
- Saturday: 8 am - 6 pm.

#### Silencing

All possible steps should be taken to silence construction site equipment.

As outlined in **Section 2.4** of this EIS, extraction of fill will take place during weekdays and Saturdays within the working hours listed above. No work is scheduled to take place on Sundays and public holidays.

As outlined in **Section 3.4.1** of this document, the average day time background (LA<sub>90</sub>) noise levels determined at the nearest residential receiver to the site were approximately 40 dB(A). The LA<sub>10</sub> construction noise level, which should not be exceeded at the boundary of the nearest residence to the fill extraction site, is therefore 45 dB(A) (background + 5 dB(A)).

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### **Transport of Fill**

Transport of fill from the Red Hill site to the AWNHP construction zone will occur along a dedicated Haul Road where no public access is permitted. Fill transport from the Red Hill site has the potential to cause annoyance at the nearest residences on the southern and western sides of the excavation site, and at those located at the southern end of Elizabeth Mitchell Drive, along Corrys Road, and along Dallinger Road. The proposed Haul route, showing the location of the nearest residences, is presented in **Figure 2.3**.

Due to the fact that the transport of fill will only occur during daylight hours (7 am-6 pm Mondays to Friday, and 8 am-1 pm Saturdays) and the estimated number of truck movements to and from the site is relatively low compared to traffic flow movements along other new public roads (approximately 14-20 truck movements per hour), road traffic noise criteria are not considered appropriate for this project. The construction noise criteria outlined above for the Site Excavation phase, is therefore considered appropriate for assessing the noise impacts associated with the transport of fill from the Red Hill site to the AWNHP construction zone.

### **Haul Road Construction**

Construction of the haul road from the Red Hill site to the AWNHP construction zone has the potential to cause annoyance at the nearest residences on the southern and western sides of the excavation site, and at those located at the southern end of Elizabeth Mitchell Drive, along Corrys Road, and along Dallinger Road.

Construction of the haul road is expected to be completed within 4 weeks of commencement, and as such, construction noise criteria for a period of 4 weeks and under are applicable to this stage of the works.

As outlined in **Section 3.4.1** of this document, the average day time background ( $LA_{90}$ ) noise levels determined at the nearest residential receivers adjacent to the proposed haul route site were approximately 40 dB(A). The  $LA_{10}$  noise level, which should not be exceeded at the boundary of the nearest residences to the haul road, during the 4 week construction period is therefore 60 dB(A) (background + 20 dB(A)).

### **3.4.3 Noise Emissions**

As outlined in **Section 1.2** of this EIS, activities associated with the Red Hill Project can be categorised into three main areas: Site Preparation, Extraction and Rehabilitation. Transport of fill from the fill extraction site to the AWNHP construction zone would occur concurrently with extraction and rehabilitation activities.

Equipment used during the site preparation stage would typically include dozers to firstly clear and stockpile the existing vegetation and then to remove and stockpile the topsoil and ground litter. A diversion bank would then be dozed up slope of the intended excavation area, re-directing water away from the disturbed area to clean water gullies. Dozers, Graders, compacters and a bitumen tanker would be used in the construction of the haul road during the first 4 weeks of the site preparation.

The extraction stage would involve the use of dozers to heap material into temporary stockpiles. Excavators would follow the dozers and would load the material onto a fleet of approximately 15 haul trucks, which would transport the fill directly to the AWNHP construction zone. No drilling, blasting, crushing or rock screening equipment would be required and no permanent buildings will be constructed on the site.

Water carts would be used for dust suppression on the site when required.

An indicative equipment inventory, including the indicative sound power levels (PWL) for each item, is outlined in **Table 3.4**.

**Table 3.4: Equipment Inventory and Associated PWL (dB)**

Equipment	No. of Items	Frequency (Hz)									
		31	63	125	250	500	1k	2k	4k	8k	Tot. A wt
D6 Dozer	2	75.8	79.9	94.9	96.6	99.4	106.7	106.8	97.9	88.0	110.9
Excavator	4	92.3	97.9	108.3	98.7	96.0	98.0	94.4	88.4	85.4	102.9
Haul Truck	15	109	109	114	117	112	110	107	101	95	115.3
Water Truck	1	114.8	100.7	109.6	109.4	111.6	104.5	103.8	97.1	87.9	111.8

#### 3.4.4 Noise Prediction Methodology

The potential noise impacts associated with operation of the Red Hill fill extraction site have been assessed with respect to site excavation operations, and the transport of fill from the site to the AWNHP construction zone.

The general method of noise prediction for the site excavation is summarised below:

- ❑ identify noise sources associated with the operation of the proposed Red Hill fill extraction project, and determine the typical maximum noise levels generated by each item of excavation equipment;
- ❑ determine the location of the nearest affected residence, considering the potential sources of noise and the location of any barriers. Distances from the noise source to the nearest affected residence and characterise the topography between the source and the receiver would also be determined;
- ❑ attenuate the excavation noise levels to the nearest affected residence using the Environmental Noise Model (ENM). The ENM, developed by RTA Technology, is recognised by the EPA as being a suitable tool for assessing environmental noise from excavation operations such as the proposed Red Hill Project.

The fill extraction operations were assumed to begin in the south-west end of the site and work progressively north-east over the two year period. The potential noise impacts generated due to excavation operations have been predicted in the absence of wind, under neutral atmospheric conditions. This scenario assumes an ambient temperature of 25°C, 50% relative humidity, and 0°C/100m temperature gradient.

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The assessment of noise impacts due to transport of fill from the fill extraction site to the AWNHP construction site has been undertaken using standard noise attenuation algorithms, as outlined in *Australian Standard AS2436 - 1981, Guide to Noise Control on Construction, Demolition and Maintenance Sites*. The noise levels resulting from transport of fill have been predicted at various distances which are considered to be representative of the nearest sensitive receivers adjacent to the haul route.

### **3.4.5 Noise Impact Assessment**

The proposed Red Hill fill extraction project has the potential to impact on acoustic amenity of surrounding residents as a result of both on-site excavation activities and due to trucks transporting fill from the site to the AWNHP construction zone.

Construction of a dedicated haul road during the first 4 weeks of the project would also impact upon nearest residences.

Experience with similar construction projects has shown that  $LA_{10}$  noise levels are typically several decibels lower than  $LA_{MAX}$  noise levels. This being the case, it is not unreasonable to assume that construction noise levels ( $LA_{10}$ ) associated with the project will be approximately 5 dB(A) below the  $LA_{MAX}$  levels predicted using ENM and the method outlined in AS2436-1981.

#### **Construction of the Haul Road**

The impact of noise associated with construction of the haul road have been assessed by undertaking standard noise attenuation calculations, as outlined in AS2436 - 1981.

Construction of the haul road is likely to involve the use of dozers and graders to clear the existing topsoil and prepare the road route. Rollers would be used to compact the road and prepare it for spray sealing. Spray sealing would be undertaken using a bitumen tanker. Sand or small aggregate would be spread over the spray surface and rolled again. Construction is likely to be completed within approximately 4 weeks of commencement.

The results of noise calculations undertaken to determine the likely noise impact experienced at residences situated at various distances from the haul route are presented in **Table 3.5**.

**Table 3.5: Calculated Noise Levels - Construction of Haul Route**

Distance of Residence from Haul Route (m)	LA <sub>MAX</sub> (dB(A))	LA <sub>10</sub> (dB(A))
160	62.8	57.8
240	60.3	55.3
420	55.4	50.4
440	55.0	50.0
490	54.1	49.1
600	53.3	48.3
800	50.8	45.8
1000	48.9	44.9

The noise levels presented in **Table 3.5** assume that a roller, water truck, dozer and grader are operating simultaneously and at full capacity. The noisiest item is assumed to be operating at the closest point to each of the residences, with the remaining items each located approximately 100m away from the receiver. The calculations therefore indicate likely worst case conditions during construction of the haul route.

The results show that noise generated due to construction of the haul road is not likely to exceed the recommended construction noise level of 60 dB(A) at the nearest residences adjacent to the site.

The nearest residence to the haul route, located on Elizabeth Mitchell Drive approximately 160m from the proposed route, may at times experience construction noise levels (LA<sub>10</sub>) of up to 58 dB(A), which is below the recommended criterion level.

The majority of other residences along The Riverina Highway, Corrys Road and Dallinger Road, are located at least 240m away from the haul road route, which may, at times, experience construction noise levels up to approximately 55 dB(A).

Noise attenuation due to the effects of screening from vegetation or earth mounds, which may in some cases break the line of site between the haul route and the nearest residences, have not been included in these calculations and are not anticipated to provide noticeable noise attenuation.

#### **Red Hill Fill Extraction Excavation Activities**

The impact of noise associated with on-site excavation activities at the Red Hill site has been assessed using ENM.

The noise levels predicted at various distances from the fill extraction works to the nearest residences are presented in **Table 3.6**.

**Table 3.6: Calculated Noise Levels - Red Hill Fill Extraction Site**

Nearest Residence	LA <sub>MAX</sub> (dB(A))	LA <sub>10</sub> (dB(A))	LA <sub>10</sub> (dB(A)) With Noise Mound <sup>##</sup>
Heath Residence (Riverina Highway)			
Works @ 100-120 m	59.0	54.0	49.9
Works @ 160-210 m <sup>#</sup>	52.0	48.0	43.9
Works @ ≥450 m <sup>#</sup>	43.1	38.1	35.3
Old Sydney Road			
Works @ 160-220 m	56.8	51.8	47.9
Works @ 320-420 m	47.6	42.6	41.0
Works @ ≥500 m	45.0	40.0	37.0
Old Sydney Road/ Riverina Highway			
Works @ 230-250 m	59.3	54.3	46.3
Works @ 250-400 m	54.3	49.3	43.0
Works @ ≥500 m	48.1	43.1	39.1

<sup>#</sup> Assumes some shielding /obscuration of line of site is provided by the excavation hollow  
<sup>##</sup> Assumes 3 m high earth mound is located along the perimeter of the fill extraction site adjacent to the nearest residences

The noise calculations assumed two main areas of work at any time, each containing two excavators loading fill into one truck and a dozer operating approximately 20 m away from the excavators. The calculations involved all equipment operating simultaneously and at full capacity. This situation is not expected to occur often in reality and is therefore considered to represent worst case impacts.

The results show that operation of excavation equipment at the fill extraction site is likely to exceed the pre-determine noise level objective of 45 dB(A) at each of the nearest residences when works are carried out within approximately 400m of the nearest boundary to the works. The presence of a 3m high earth noise mound located at the boundary of the fill extraction site reduces this distance to approximately 160 m at the Heath residence and approximately 250m at other residences adjacent to Old Sydney Road and The Riverina Highway.

The Heath residence may experience LA<sub>10</sub> noise levels up to 54 dB(A) when excavation equipment is located approximately 100m from the nearest point of the works. The presence of a 3m high noise barrier along the boundary of the site reduces this level to approximately 50 dB(A), which remains above the criterion level by 5 dB(A). Lower noise levels were calculated as the distance between the excavation equipment and the residence increases, and in locations where the earth embankment provides shielding.

Similar noise level were calculated at the Old Sydney Road (Bowna Road) residences, however less topographic shielding is expected to be provided at some locations and noise levels may therefore be higher at times. The calculations performed assuming the presence of a 3m high earth mound at the boundary to the site showed that extraction works may exceed the pre-determined noise level objective of 45 dB(A) by up to 3 dB(A) within a distance of approximately 23m of the nearest residential boundary.

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The calculations show that noise levels at the nearest residences to the excavation site may exceed the pre-determined criterion level by up to 9 dB(A). This exceedance reduces to approximately 5 dB(A) with a 3m high earth noise mound located at the boundary of the site.

Noise levels are likely to be below 50 dB(A) for the majority of the excavation period and when the bulk of excavation equipment is located further than 200-300m from the nearest residence, excavation noise levels are not likely to exceed the criterion level of 45 dB(A). With a 3m high earth noise mound located at the boundary of the site adjacent to the nearest residences, noise levels are likely to be below 45 dB(A) when the bulk of excavation equipment is located further than approximately 250m from the nearest residence to the excavation equipment.

### **Transport of Fill (Truck Movements)**

Transport of fill from the Red Hill site to the AWNHP construction zone has the potential to cause noise impacts at residences located near to the proposed haul route.

Operation of a dedicated haul route allows the use of large off-highway trucks, which have a carrying capacity of approximately 50m<sup>3</sup>. It has been estimated that approximately 44,000 round trips by trucks (with 50m<sup>3</sup> capacity) on dedicated haul roads would be necessary to transport the required 2,200,000m<sup>3</sup> of fill over the two year period. This figure equates to approximately 14 heavy vehicle movements per hour throughout the duration of the 2 year excavation period.<sup>1</sup>

The truck fleet is expected to comprise approximately 7 trucks which would shuttle continuously between Red Hill and the AWNHR construction zone between the hours of 7am - 6pm Monday to Friday, and 8am - 1pm on Saturdays.

As a worst case scenario, it has been assumed that three trucks may be travelling within 200m of one another along the haul road at any one time, with two trucks passing the closest point to the residence. The sound power level for three typical CAT 769 trucks has been attenuated over various distances to the nearest sensitive receivers adjacent to the haul route. The results of heavy vehicle traffic noise levels predicted at these indicative distances are presented in **Table 3.7**.

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<sup>1</sup> Hourly truck movements are based on the assumption that 2.2 million m<sup>3</sup> of material is being hauled by CAT 777 or 769 vehicles having a carrying capacity of approximately 50m<sup>3</sup>. The calculations assume 304 working days per year (taking 52 Sundays and 9 public holidays from 365 days). Of those 304 days, 52 will be Saturdays on which working hours are assumed to be 8 am - 1pm, while 252 days will have working hours from 7 am - 6pm. This results in a total of 6064 working hours over the two year construction period. Off-road vehicle movements would therefore be at a rate of 14 per hour.

**Table 3.7: Calculated Noise Levels - Fill Transport Operations**

Distance of Residence from Haul Route	L <sub>MAX</sub> (dB(A))	L <sub>A10</sub> (dB(A))
160 m	65.8	60.8
240	64.3	59.3
420	60.4	55.4
440	59.0	54.0
490	58.1	53.1
600	56.3	51.3
800	53.8	48.8
1000	51.9	46.9
1200	50.3	45.3

The results show the maximum noise levels generated by trucks passing the nearest point to the Elizabeth Mitchell Drive residence may reach 60 dB(A). This noise level is an instantaneous level which would be experienced for a short period of time (the order of tens of seconds) as trucks pass by the closest point to the residence on average every 3-4 minutes.

Due to the fact that the number of truck movements to and from the fill extraction site could vary considerably above or below the estimated average of 14 per hour, quantification of the exact increase in noise levels has not been undertaken in this report. Noise monitoring would be required in order to determine whether noise generated from haul operations are acceptable at the nearest residences.

### 3.4.6 Noise Mitigation Measures

In order to maintain acceptable noise levels at the nearest residential receivers adjacent to the Red Hill fill extraction site and the haul route, it is recommended that the construction works be staged such that an earth mound be constructed along the southern and eastern perimeters of the fill extraction site. This mound should remain until the final stages of fill extraction and should be a minimum height of 3m above the local ground level outside the boundary of the site.

A noise monitoring program should also be implemented throughout the duration of the excavation works. The monitoring should proceed at the onset of the project, and continue on a quarterly basis throughout the duration of the works. Excavation operations, including the number of items operation and the general areas of operation should also be monitored during this period so that an optimum operational level, in terms of minimal noise impacts, can be determined.

It is further recommended that the Contractor retrofit high grade mufflers and engine louvres to the haul truck fleet and all excavation equipment, and that excavation and transport operations be limited to the hours listed above. Where possible, work methods should be developed to ensure that the bulk of equipment is not located within approximately 200m of the nearest residential receivers for extended periods of time.

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## 3.5 Climate and Air Quality

### 3.5.1 Existing Climatic Conditions

The general climatic conditions influencing the Red Hill site have been characterised using data collected by the Bureau of Meteorology at Albury Airport, approximately 1.5km west of the Red Hill site. General wind field data was also sourced from the AWNHP EIS (1995), and at the Hume Weir, approximately 6km south-east of Red Hill. A review of the climatic conditions influencing the site is presented below.

A summary of temperature, rainfall and humidity data recorded at Albury Airport and the Hume Weir is presented in **Table 3.8**.

#### Temperature

Temperatures experienced at Albury are variable throughout the year. The 9am mean temperatures range between 20.1°C in January to 5.8°C in July. The 3pm mean temperature range is between 25°C in January and February to 11.7°C in July.

Overall, the warmest months of the year are January and February, which receive mean daily maximum temperatures of 30.4°C and 30.5°C respectively. Temperature extremes up to 44.6°C have been recorded during the month of January, however temperatures above 35°C are likely to occur on less than five days per month during the summer and are less likely throughout the remainder of the year.

July is the coolest month, experiencing a mean daily maximum temperature of 12.6°C. Temperatures generally fall below 2.2°C on approximately 51 days throughout the year, typically throughout the months of May to September. Temperatures as low as -4°C and -7°C have been recorded during the months of July and August respectively.

#### Humidity

Humidity varies significantly throughout the year, with morning readings typically being 30% higher than the afternoon readings. Morning relative humidity is highest during the cooler months, ranging from 93% during July, to 63% during December and January. The mean 3pm relative humidity readings are also highest during the cooler months, ranging between 68% in June and July, to 32% in January.

#### Rainfall

Mean annual rainfall recorded at Albury is 755mm, with the highest falls generally occurring in during the winter months. July and August are generally the wettest months of the year, receiving a mean monthly rainfall of 97mm and 87mm respectively, on approximately 15 rain days. The lowest rainfall generally occurs during February and March, receiving 33 and 36mm respectively on approximately 5 rain days.

#### Other Phenomena

Frosts generally occur on an average of 32 days per year, mainly throughout the months of May through to September. Fogs are most commonly recorded during the

winter months on an average of 23 days per year, generally occurring within the months of April to September

### Wind

Winds within the Albury area are typically light, with a high frequency of low wind speeds occurring throughout the year. Wind speed and direction is greatly influenced by the topography of the surrounds which rises from approximately 200 metres above sea level in the study area to an elevation of approximately 400m in the north-west and south-west, and over 600m in the south-east.

The strongest winds are generally from the west to south-west, occurring during the day time hours. Light south-easterly and south-westerly winds associated with topographically induced drainage flows generally occur during the night-time and early morning hours.

Monthly wind roses for Albury Airport and Hume Weir are presented in **Appendix - E**.

**Table 3.8: Climatic Averages - Albury Airport**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Daily Temperature (°C)													
Max.	30.4	30.5	27.2	22.4	17.7	13.7	12.6	14.3	17.0	20.9	24.7	28.3	21.6
Min.	14.9	14.7	12.0	8.4	5.7	3.4	2.6	3.5	5.2	7.6	10.4	13.1	8.5
9 am	20.1	19.2	17.4	13.4	9.7	6.6	5.8	7.4	10.3	13.9	16.0	18.7	13.2
3 pm	28.5	28.5	25.8	21.4	16.7	12.8	11.4	13.4	16.0	19.4	23.1	26.3	20.3
>35°C	5.3	4.5	1.6	0.1	0	0	0	0	0	0	0.9	3.0	15.4
<2.2°C	0	0.1	0	0.6	6.4	11.6	14.9	11.2	5.3	0.9	0.1	0	51.0
Mean Relative Humidity (%)													
9 am	63	66	69	78	90	95	93	89	81	42	71	62	77.4
3 pm	32	34	38	44	59	68	68	60	55	48	42	36	48.7
Monthly Rainfall (mm)													
Mean	61.1	33.1	36.7	52.9	63.6	72.3	96.7	87.1	68.8	74.5	54.1	54.6	755.2
Days	6.8	5.2	8.2	6.4	10.7	73.4	15.7	15.0	12.3	10.1	8.7	7.9	117.4
Phenomena (No. of Days)													
Fog	0	0.1	0.1	0.6	4.6	6.8	6.1	2.5	1.6	0.3	0.1	0	22.8
Frost	0	0	0	0.2	2.5	8.1	10.8	7.6	2.8	0.4	0	0	32.4

### 3.5.2 Existing Air Quality

No long-term air quality monitoring has been undertaken in the vicinity of the proposed Red Hill fill extraction site, however, air quality in the surrounding area is likely to be influenced by the following main features:

- emissions from vehicles travelling along the Riverina Highway and within the local area.
- emissions from a variety of industrial facilities located approximately 3.4km from the site, to the west of Albury Airport;

- ❑ dust emissions generated at the Racecourse and adjacent stable complex, located approximately 2.3km to the west of the site;
- ❑ dust and vehicle emissions from agricultural activities; and
- ❑ natural hydrocarbon and particulate emissions from the surrounding vegetation.

### 3.5.3 Air Quality Assessment Criteria

The main air quality impacts associated with the Red Hill project are expected to arise from the generation of airborne dust during the excavation works. Exhaust emissions from excavation equipment and transport vehicles will also occur, however these are expected to be minor.

In order to assess the potential impacts of dust generated during the operation of the fill extraction site, it is necessary to refer to air quality objectives for dust concentration and deposition. Air quality goals adopted by the NSW Environmental Protection Authority (EPA) relating to ground level concentrations of airborne dust are outlined in **Table 3.9**.

**Table 3.9: Dust Concentration Objectives**

Pollutant	Goal	Averaging Time	Source Agency
TSP	90 µg/m <sup>3</sup>	12 months	NHMRC
PM <sub>10</sub>	50 µg/m <sup>3</sup>	24 hour (5 allowable exceedances per year)	NEPC

TSP: Total Suspended Particulates (diameter < 50µm)  
 PM<sub>10</sub>: Particulate Matter (diameter < 10 µm)  
 NHMRC: National Health and Medical Research Council  
 NEPC: National Environment Protection Council of Australia

With respect to dust deposition levels, the EPA previously considered that residential areas would begin to experience dust related nuisance impacts when annual average dust deposition levels exceed 4g/m<sup>2</sup>/month. Dust impacts would be at unacceptable levels when they reached 10 g/m<sup>2</sup>/month. These levels have been refined, and it is now considered that a perceptible degradation in air quality would occur if dust deposition levels increase by a particular margin in different areas. The allowable increase in fallout levels produced by a certain project will depend on the existing dust fallout levels.

NSW EPA goals for dust deposition levels have been listed in **Table 3.10**.

**Table 3.10: General Criteria for Dust Deposition**

Existing dust level (g/m <sup>2</sup> /month)	Maximum acceptable dust level increase above existing level (g/m <sup>2</sup> /month)	
	Residential Suburban	Other
2	2	2
3	1	2
4	0	1

Existing dust deposition levels have not been measured in the area surrounding the proposed fill extraction site. In terms of the criteria outlined in **Table 3.10**, it is not possible to define a level for dust deposition associated with this project. For this reason the conservative EPA criteria should be adopted, that is the dust deposition level of 4g/m<sup>2</sup>/month should not be exceeded at the nearest residential boundary to the site.

### 3.5.4 Emissions and Impacts

Dust resulting from the excavation of soil at the proposed Red Hill fill extraction site has the potential to impact on air quality in the immediate area surrounding the site. The most significant sources of dust generation associated with the project will include dozers clearing and stockpiling topsoil and fill, excavators loading the trucks, and general movement of vehicles about the site. Wind blown dust is also likely to be generated from exposed soil during dry and windy conditions.

Dust emissions from haul trucks travelling off-site from the Red Hill fill extraction site to the Awnhp construction zone are expected to be minor due to the fact that the trucks will be covered and will travel along the sealed haul road.

An estimate of dust emissions generated during excavation works has been made using emission release parameters developed by the US EPA, as listed in their publication titled, *AP-42 - Compilation of Air Pollutant Emission Factors (Edtn.5 1995)*. The dust emission factors for the various activities have been listed in **Table 3.11**.

**Table 3.11: Dust Emission Release Parameters**

Activity	Emission Factor
Dozer on Soil	17 (kg/hr)
Loading Trucks with Soil	0.025 (kg/tonne)
Wind Blown Dust	0.4 (kg/ha/hr)

The total amount of dust generated at the site over the two year period was estimated assuming a worst case situation where approximately half of the fill extraction site area would be exposed at any one time. It has also been assumed that wind blown dust may be generated approximately half of the time during the two year period. This estimate is considered to be overly conservative and is likely to over estimate the real impacts.

It has also been assumed that dust generated from the 2 dozers operating on the topsoil and fill would only occur during the estimated 6064 working hours during the two year period. The four excavators loading fill into trucks were assumed to load 2,200,000m<sup>3</sup> of fill over the two year period.

Using the emission factors and assumptions described above, an average of approximately 87.1 kg dust/hr may be generated at the site during excavation activities when approximately 136,500m<sup>2</sup> of the site has been disturbed.

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The nearest residences to the fill extraction site are located within approximately 200m of the south and eastern boundaries of the site. Based on the dust emission rate calculated above, and the fact that the predominant winds experienced within the area are from the north-west, west and south-west, these residences may experience nuisance dust impacts at some time.

In order to minimise the potential dust impacts at each of the nearest residences, the following mitigation measures have been recommended.

### **3.5.5 Dust Controls and Safeguards**

Control measures to minimise the generation of dust during excavation are listed below:

- ensure that all loads are covered when transporting fill off site to the AWNHP construction zone;
- install a truck wheel wash facility at the entrance to the site to prevent dirt being deposited on the haul road where the action of other vehicles wheels is likely to resuspend this dust into the air;
- undertake regular watering of disturbed areas, including on-site haulage routes and stockpiles, to prevent the generation of excess dust. Water spraying is extremely important during dry and / or windy weather;
- minimise, as far as possible, the surface area of land exposed at any one time in order to reduce the potential generation of wind blown dust. This would involve progressive revegetation of previously excavated areas;
- undertake continuous air quality (dust) monitoring at a minimum of three nearest residences adjacent to the Red Hill fill extraction site. It is recommended that continuous monitoring of dust deposition and total suspended particulate concentration (TSP) be undertaken at the Heath residence, immediately to the south of the site, the nearest residence located at the intersection of The Riverina Highway and Old Sydney Road, to the south-east of the site, and the nearest residence adjacent to the north-eastern boundary of the fill extraction site. Ideally, the dust monitoring should commence at least 3 months prior to commencement of excavation works. This would establish a baseline of background TSP concentrations and dust deposition levels within the area surrounding the site. The dust monitoring should continue throughout the duration of excavation works in order to monitor the effectiveness of dust control measures and enable further dust mitigation measures to be implemented if necessary.
- develop a dust management plan for the site which allows for the investigation and mitigation of adverse dust impacts which may be experienced at the nearest residences adjacent to the Red Hill fill extraction site.

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### 3.6 Soils, Drainage and Water Quality

#### 3.6.1 Soils

The area consists of fairly thick deposits of transported sediments with some ridges of residual material (Soil Conservation Service 1975).

Six major soil units have been defined on the site:

- Grey Clay
- Brown Clay - Yellow Solonetzic complex
- Yellow Solodic A
- Yellow Solodic B
- Yellow Earth - Yellow Solodic complex
- Red Earth - Red Podzolic complex.

The predominant soils on the site are the Grey and Brown Clays as well as the Yellow Solodics. The B horizons of all these soil types are heavy or medium clay.

These soils are generally suitable for pond construction, have good to moderate topsoil quality and will revegetate well (Soil Conservation Service 1975). The Yellow Solodic soils and Brown Clay to Yellow Solonetzic soils which are predominant on the southern half of the site have a high to moderate erodability, which may need to be considered during fill excavation.

The soils of the area can generally be described as clay underlain by micaceous granite at depths of 2 to 7 metres.

The descriptions of individual clay horizons from the bore hole information provided ranged from dark brown silty clay to fine grained, mottled yellow and red clayey sand with quartz gravel.

Overall the percentage of fines ( $<13.5\mu\text{m}$ ) in the samples over the study area was high and in some cases was greater than 60% on weight basis. This has a significant impact on the sediment control works required for the fill extraction activities, as described in the sections below.

#### 3.6.2 Topography and Drainage

The general topography is characterised by a gently, undulating terrain with isolated, moderate to steeply rising hills. The higher points in the local area are One Tree Hill, Huons Hills and McDonald Hill, all rising over 400 m above sea level. The elevation of the top of the nearby Hume Dam wall is approximately 200m, just above the level of the proposed Red Hill fill extraction site which is between 170m and 190m above sea level. Red Hill is located just to the north of the site with an elevation of approximately 220m.

The major drainage line of the area is Woolshed Creek. This is located within the low lying terrain between Red Hill and the range west of Lake Hume. It has numerous permanent and ephemeral water courses joining its flow which include Seven, Eight and Nine Mile Creeks. The Woolshed Creek water course is approximately 500m from

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the proposed development site, on the opposite side of the Riverina Highway. It continues to flow from this location in a south-westerly direction for 2.5 km where it eventually joins the Murray River just south of the Albury Airport.

The proposed site for extraction is located just south of Red Hill. This area has, in general, a flat to moderate slope, with gradients generally in the order of 3 to 8%. The terrain steepens to the north of the extraction site until it reaches the crest of Red Hill at 220m. There is a small ridge which runs approximately NW-SE across the site originating from Red Hill.

The proposed extraction site has no permanent water courses, though a number of short, ephemeral water courses exist at the eastern side which either drain to a small dam or into Woolshed Creek.

The drainage and sedimentation controls proposed outlined in the section below will prevent erosion from occurring on the site and will maintain the water quality of the water leaving the fill extraction site.

### **3.6.3 Drainage and Sedimentation Control Works**

The primary objective of this water management plan is the separation of clean and dirty water systems. Clean water will be diverted away from disturbed and rehabilitating areas to protect water quality leaving the site and the rehabilitation works. Dirty water will be directed to sedimentation ponds for treatment prior to discharge from the site.

#### *Clean Water Flows*

In order to protect the land within which the fill extraction operation is located, clean water flowing onto the fill extraction operations area will be diverted away from the disturbed area. This will be achieved by the construction of a primary bank at the top of the slope to be excavated. This will ensure that runoff from Red Hill will not erode the fill extraction area while land is disturbed. The primary bank will divert the bulk of run-on water around the site, and direct it towards stabilised gullies which will not be disturbed for the duration of the fill extraction operations. It will be a graded channel bank, designed to convey runoff from a 1 in 10 year storm event in accordance with "Australian Rainfall and Runoff" (1987) standards. This channel will be in place prior to any on-site construction activities and will protect the site downslope from uncontrolled high volume runoff from the hills.

Fill extraction activities will be carried out in six stages. The total area of the fill extraction site to be disturbed is approximately 30 ha, therefore individual campaigns will involve the extraction of areas approximately 5 ha in size. The maximum area to be disturbed at any one time will involve the campaign area currently being worked on as well as the previous area which needs to be re-levelled and rehabilitated. Therefore, the maximum disturbed area at any one time will be approximately 10 ha.

Each extraction area will be further protected from run-on water by a graded bank, constructed above the extraction area. This bank will direct clean run-on water from the undisturbed land above the extraction area, minimising water in the disturbed area and

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preventing sediment movement occurring as a result. Sills will be constructed at the outlet of these banks resulting in the water spilling onto vegetated gully areas in a laminar flow. Once the areas below these banks have been rehabilitated, the banks will be flattened and also rehabilitated, allowing water to flow over the rehabilitated areas.

#### *Dirty Water Flows*

To control run-off generated on the disturbed areas during storm events, sediment will be contained within the sediment control pond constructed at the downstream end of the site. No extraction will occur during wet periods and following the extraction of one area, no additional extraction of that area will occur.

The required sediment pond volume is approximately 5,400 cubic metres with a surface area of 2,900 square metres, depth of 1.86 metres and approximate dimensions of 93 x 31 metres. This has been determined using the methodology contained in the NSW Dept. of Housing "Managing Urban Stormwater, Soils and Construction" handbook, 3<sup>rd</sup> edition, 1998.

The maximum dirty area catchment to be treated by the sediment control ponds will be approximately 10 ha. The area of disturbance will be minimised by only clearing the areas required for active excavation at any one time, and progressive rehabilitation of completed excavations. The project areas will be excavated and rehabilitated progressively, from the north-west corner of the site, alternating from north to south moving towards the ridge that currently crosses the site. This will shield the residential areas on the eastern side of the site for as long as possible.

The main factor affecting the size of the basin using this method is the definition of the soil type. The available soil information indicates that the proportion of particles of less than 13.5µm in size was generally high, or greater than 33%. No information was available on the dispersion percentage of the soils so to be conservative it is assumed that the soils contain a significant proportion of dispersible clay materials, and therefore are defined as Type D soils. The dispersion percentage is a measure of the degree to which the soil will remain suspended and separated from other particles in water. A flocculation agent (eg. gypsum) is needed to settle such materials.

The dispersion percentage is the ratio of dispersed soil particles <0.005 mm compared to the same size fraction of undispersed soil particles expressed as a percentage. This can be determined by testing for the percentage of particles less than 0.002 mm in size and dividing by the percentage of particles between 0.002 mm - 0.02 mm in size.

The actual capacity of the basin is calculated using two zones, the settling zone capacity and the sediment storage zone capacity. The settling zone capacity is dependent on the disturbed catchment area (10 ha), the volumetric runoff coefficient factor (0.5) and the 5 day total rainfall depth which is not exceeded in 75% of rainfall events (19.1 mm), sourced from Table 6.5 of the Soils and Construction handbook. The sediment storage zone capacity is dependent on RUSLE factors including the soil erodibility (K), soil cover (C), soil conservation practices (P), slope gradient (S), slope length (L) and rainfall erosibility (R). Other factors include the proportion of annual

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sediment yield, the disturbed catchment area and the bulk density of the deposited sediment. In this case, the construction period is over 2 years, so the proportion of annual sediment yield equals 2 (ie. 2 years / 12 months) and the bulk density of the sediment is approximately 1.9 t/m<sup>3</sup>. The values adopted for each of the RUSLE factors are as follows:

- K - 0.05 (conservative)
- C - 1
- P - 1.3
- S - 10% (maximum)
- L - 100m
- R - 1100.

Because Type D soils contain a significant level of dispersible materials, it is necessary to dose the captured stormwater with a chemical flocculant, such as gypsum, to aid settling and thereby control the turbidity of discharged stormwater. Such dosing should occur within 24 hours of the conclusion of each storm event and the settling zone should be drained or pumped out 36 to 72 hours later. Dosing rates may be applied to achieve successful flocculation within 24 hours. Appendix E of the NSW Dept. of Housing Soils and Construction handbook (1998) should be referred to in relation to flocculating agents. Collected material will be used in the rehabilitation works.

In the event that such storms are exceeded, there would be significant storm water flows throughout the region and the flow from the site would exit the site via stormwater outlets.

Water collected in the sedimentation traps will be used for dust suppression as required.

Topsoil will be cleared prior to the commencement of extraction works and stockpiled for use in the rehabilitation program. Stockpiles will be located such that any run-off from them during a storm event will be captured by the dirty water sedimentation pond described above.

Road drainage will be provided along the entire haul road and silt traps will be constructed to safeguard against potential off site sedimentation impacts. These silt traps will be maintained for the life of the fill extraction.

All surface run-off within the site will be managed and all points of water discharge within and from the site will be controlled in accordance with the Erosion and Sediment Control Plan.

### **3.6.4 Water Quality Management**

The water quality in the area is currently controlled by the presence of stable vegetative cover in the area and the nature of the terrain which is porous.

With the incorporation of the sediment control works described above the quality of water discharged from the site will be satisfactory. The Woolshed Creek is located

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some 500 m from the site and only clean or treated water will discharge from the site into ephemeral streams prior to discharging to Woolshed Creek.

The trucks and heavy machinery using the site will be limited to those on site during the excavation periods. It is not anticipated that significant amounts of oil will be generated from these operations. Oil and grease changes will occur on-site. In the event of an oil spill, the spill should be contained and absorbent material used to collect it for appropriate disposal.

The effects of the works are not anticipated to have an impact on the ground water in the area. The volumes of dirty water to be collected at any one time will not be large and the majority of the water will be directed around the site, having a negligible impact on groundwater in the region.

To safeguard the quality of the water in the area erosion control works will be installed according to Australian Rainfall and Runoff design standards. Regular inspections of the embankments and sediment control ponds will be made and maintenance works will be carried out as necessary.

### 3.7 Flora and Fauna

Gunninah Environmental Consultants were commissioned to undertake a flora and fauna assessment of the proposed fill extraction project. The aims of the assessment were to:

- identify and describe flora species and vegetation communities present in the study area and assess their conservation significance;
- identify and describe native fauna species and habitats present, or which may occur in the study area, and assess their conservation significance;
- assess the significance of potential impacts arising from the proposal on native flora and fauna; and
- establish environmental management and impact amelioration measures which can be implemented to limit the effects of the proposal on native biota.

The findings of the assessment are summarised below and detailed in **Appendix - H**.

#### 3.7.1 Flora

##### Methods

A search of the NSW National Parks and Wildlife Service (NPWS) Atlas of NSW Wildlife was undertaken within a 10km radius of the site to ascertain the presence or potential occurrence of any Rare or Threatened Australian Plant (ROTAP) species, or threatened species listed on the *NSW Threatened Species Conservation Act, 1995* (TSC Act). Other botanical investigations conducted in the general vicinity of the study area were also reviewed.

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A broad vegetation survey of the study area was then conducted on 5 November 1998. A series of random quadrants was established within each vegetation community and all plant species observed were recorded and described.

### Results

No ROTAP or threatened plant species listed in Schedules 1 or 2 of the TSC Act were recorded in the study area during the field survey, or during previous investigations in the vicinity of the site. Only one species listed as Vulnerable under Schedule 4 of the TSC Act, namely *Amphibromus fluitans*, was recorded within a 10km radius of the site. This species is mostly found in permanent swamps. Given the general lack of habitat in the study area, *Amphibromus fluitans* is not likely to occur on the subject site. An additional 6 ROTAP and/or TSC Act species have been recorded in the Albury region during previous studies, however none of these species are likely to occur on the site, given their habitat preferences and lack of evidence of their presence during the field survey or previous investigations.

The field survey identified two general vegetation communities which occur in the study area. These are:

- Mixed Box Woodland - which consists of woodland patches in the north of the proposed extraction site, directly north of the stable complex on Dallinger Road and along the drainage channel running through the proposed Thurgoona Industrial Estate. Remnant roadside vegetation also exists along the southern and eastern boundaries of the proposed extraction site, and in scattered woodland patches around the Thurgoona Industrial Estate.

The canopy of the mixed box woodland consists of semi-mature and mature trees with the predominant species being *Eucalyptus blakeyi* and *E microcarpa*, with *A citiodora*, *E goniocalyx*, *E macrorhyncha*, *E meliodora*, *E sideroxylon*, *E goniocalyx* and *Acacia dealbata* also occurring.

Groundcover consists of the introduced species *Arctotheca calendula*, *Briza maxima*, *BV minor*, *Bromus milliformis*, *Echium plantagineum*, *Hordeum leporinum* and clover species.

- Agricultural grasslands - which cover approximately 75% of the study area throughout the majority of the central and southern portions of the proposed extraction site and throughout the central part of the Thurgoona Industrial Estate site. The grasslands consist of grasses and herbs with native species including *Cynodon dactylon* and *Rumex brownii*, and introduced species including *Arctotheca calendula*, *Briza maxima*, *Erodium moschatum*, *Echium plantagineum*, *Hordeum leporinum*, *Onopordum acanthium*, *Silybum marlanum*, *Taraxacum officinale* and clover species.

Both vegetation communities have been subject to extensive grazing and exist in a modified or degraded state.



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- |   |                          |   |                                       |
|---|--------------------------|---|---------------------------------------|
|  | Mixed Box Woodland.      | A   | Amphibian play back and spotlighting. |
|  | Grassland.               | R   | Diurnal Reptile Census.               |
| S   | Spotlighting Survey.     | B   | Diurnal Bird Census.                  |
| N   | Nocturnal Bird Callback. |  | Flora survey plots                    |

Figure 3.3  
 FLORA AND FAUNA MAPPING

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Three species considered locally or regionally significant were recorded in the remnant woodlands in the north of the proposed extraction site. These include *Acacia dealbata*, *Eucalyptus blakelyi* and *E gonicalyx*. There is no Commonwealth or State legislative protection for these species, however, extraction activities will avoid the woodland areas to the north of the site. The mixed woodland community in which these species occur is widely distributed throughout the Albury region and occurs in the north east in Tumblong State Forest. Due to the small size, isolation and degraded nature of these communities in the study area, they are regarded as possessing little or no conservation significance.

The haul road route from Fallon Street to Dallinger Road will result in minimal clearing of some remnant vegetation. This is not regarded as a significant impact.

### 3.7.2 Fauna

#### Methods

A search of the NPWS Atlas of NSW Wildlife was undertaken within a 10km radius of the study area to ascertain the presence or potential occurrence of any threatened fauna species listed in the TSC Act. Records from the Birds Australia and the NSW Bird Atlassers databases were also obtained. Previous studies within the area were reviewed to establish any threatened fauna species which could possibly occur in the study area.

A detailed fauna investigation was conducted throughout the study area on 31 October 1998 and 1,5,7 and 8 November 1998. Survey techniques included spotlighting, diurnal avifauna surveys, recorded call play-back and intensive habitat searches for reptiles and amphibians.

#### Results

The three broad fauna habitat types which occur in the study area are:

- ❑ Woodlands - occur in the north and along the eastern and southern boundaries of the proposed extraction site and in the north-east and along the drainage channel of the Thurgoona Industrial Estate. These woodlands support some mature hollow bearing trees which provide suitable nesting and roosting resources for some bird and microchiropteran bat species. These remnant patches of vegetation are considered to provide moderate fauna habitat value.
- ❑ Grassland - is a characteristic of the majority of the study area and surrounding locality. Cleared pasture is generally of limited value for most native fauna species, given the scarcity of foraging and shelter resources. In general, cleared areas provide foraging resources for the more mobile fauna species (in particular macropods and some bird, microchiropteran bat and reptile species), although the presence of feral cats, domestic dogs and foxes in rural areas restricts the occupation of these habitats by many native fauna.
- ❑ Waterways - several dams and a drainage channel occur in the study area which provide potential source of habitat for aquatic and semi-aquatic vertebrate fauna. These waterways in general provide feeding resources, shelter, breeding and foraging sites. However, grazing and agricultural activities has caused a loss of

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riparian habitat, increased sedimentation and a reduction in water quality, which limits the value of the waterways on the site. Two dams situated in the remnant woodland in the north of the proposed extraction site provide more suitable fauna habitat, due to adjacent resources such as potential perching, nesting and roosting sites.

These habitats have been disturbed to varying degrees through clearing, grazing and general use.

A total of 44 vertebrate fauna species were recorded on the site during field investigations. The majority of these were native bird species, with a few mammal and amphibian species. No reptiles were observed. The majority of the species are relatively common, widespread and disturbance-tolerant.

An additional 217 species have been recorded in the Albury region, however these records are from an extensive area, and although many of these species could theoretically occur in the site on occasion, a substantial number will not be present due to the lack of suitable habitats and resources.

No threatened fauna species were recorded in the study area during the fauna investigation, however 5 threatened species have been recorded within a 10km radius of the site. These include:

- Barking Owl *Ninox connivens*
- Regent Honeyeater *Zanthyomyza phrygia*
- Grey Falcon *Falco hypoleucus*
- Brolga *Grus rebicundous*
- Squirrel Glider *Petaurus norfolcensis*.

A further 7 threatened fauna species are known to occur in the Albury region.

- Southern Bell Frog *Litoria raniformis*
- Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris*
- Turquoise Parrot *Neophema pulchella*
- Bush Stone-curlew *Burhinus grallarius*
- Blue-billed Duck *Oxyura australis*
- Freckled Duck *Stitctonetta naevosa*
- Australasian Bittern *Botaurus poiciloptilus*.

The majority of threatened fauna species are unlikely to be dependent on the habits or resources present in the study area, and few (if any) threatened species are considered likely to occur on the site, given the disturbed nature of much of the habitat.

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Although the habitat requirements of the Regent Honeyeater are present at the site, they are characteristic of much of the woodland typical of the Albury landscape. The site is therefore unlikely to provide a comparatively high percentage of suitable flowering trees for habitat and the removal of a few trees is not considered significant.

The Southern Bell Frog is generally associated with areas of permanent water and is commonly found at the edges of farm dams. However, the frog is considered unlikely to occur in the majority of study area due to the nature and condition of the landscape. The only possible location for this species within the study area are the dams situated within woodland remnants in the north of the proposed excavation site. The extraction operations will avoid these habitats. The implementation of environmental management and impact amelioration measures described below will ensure these habitats are not disturbed.

### **3.7.3 Impacts and Safeguards**

#### **Flora**

No threatened plant species listed in Schedules 1 or 2 of the TSC Act were recorded in the study area during the field survey, or during previous investigations in the vicinity of the site. The proposed development is therefore highly unlikely to impact on any threatened flora species.

The construction of the haul road and the extraction activities associated with the proposal will primarily impact on grassland areas, which consist of mostly introduced species. Given the extent of similar grassland areas throughout the Albury region, the relatively small area to be disturbed, and the limited conservation value of the site, there will be no significant impact on grassland vegetation.

The construction of the haul road and extraction activities will involve the removal of some isolated trees, particularly along the area known as Thurgoona Industrial Estate. The alignment of the haul road through this area has been specifically designed to avoid impact on as many native tree species as possible. Due to the isolated nature of the trees, the degraded nature of the area in general, and the extent of similar communities throughout the region, the removal of the isolated individual trees is not considered significant.

#### **Fauna**

No threatened fauna species were recorded in the study area during the fauna investigation. There is no habitat of significance for threatened species, and no evidence for the presence of threatened species on the site or within its vicinity. Even if the threatened fauna species recorded in the Albury area were present at the site on occasion, it is unlikely that the proposed activities would have any adverse impacts on such species.

On this basis, it was considered that a Section 5A assessment of significance for threatened species, under the provisions of the EP&A Act, was not required.

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### **Safeguards**

Although the potential impacts on flora and fauna in the study area are expected to be insignificant, the following safeguards will be adopted ensure the flora and fauna of surrounding areas are protected and preserved during the haul road construction and extraction operations:

- ❑ The least amount of groundcover vegetation and trees necessary to achieve the required purpose shall be cleared. Surveyors flagging tape shall be placed along the clearing boundary prior to the commencement of clearing operations, and no disturbance or clearing will take place beyond those limits;
- ❑ If any native fauna are found injured during the clearing operations, WIRES shall be informed immediately. No clearing operations shall continue before advice is obtained from WIRES;
- ❑ Any flora species listed in the *Noxious Weeds Act, 1993* identified at or in the vicinity of the sites shall be continually suppressed and destroyed in accordance with the Act;
- ❑ Any frogs encountered in dams to be removed should be live-captured and relocated to off-site areas of similar habitat, prior to removal of dams or their use as sediment basins;
- ❑ Following extraction operations, the Red Hill site will be progressively revegetated with locally endemic native grass and shrub species as soon as practical.

### **3.8 Aboriginal Archaeology**

An archaeological study was carried out by Robynne Mills Archaeological and Heritage Services, involving an investigation into the known archaeology of the Albury/Thurgoona region and the site. The study was carried out to identify any sites or potential sites, to assess the significance of any sites and to develop management recommendations for any sites located within the development area. The full report is available in **Appendix - I**.

#### **3.8.1 Local Environment**

Archaeological evidence shows that Albury was a gathering place for Aboriginal groups for a time prior to moving to the high plains in search of the Bogong moths (Jones 1991). The history of Aboriginal occupation of the area is not well documented and there is little information on the Jeithi tribal group who were the original occupants of the region (Tindale 1974). There are also few academic archaeological studies which have been carried out in the region.

#### **3.8.2 Methodology for Archaeological Investigation**

The investigation included searches of the registers of the NPWS, the Native Title Tribune and the Australian Heritage Commission (ACH), as well as for information from previous archaeological investigations within the area. The Albury and District Aboriginal Land Councils (LALC), were also consulted regarding the proposal to identify any issues or concerns in regard to the proposal.

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A predictive model for site type and distribution was developed from a review of current archaeological literature, analysis of locations known sites and an evaluation of the topography of the area.

A field survey was then conducted and involved representatives of the Albury and District LALCs. The survey involved an "on foot" inspection of the entire area, carried out in 10m wide transects. It is estimated that over half the site received effective coverage. A separate field survey was conducted for the haul road route

### 3.8.3 Results

Two archaeological investigations have been conducted within the proposed fill extraction area. Witter (1978) carried out an archaeological survey of the Baranduda and Thurgoona Areas for a report to the AWDC and NSW NPWS. Witter identified three sites within the proposal area. These are marked on **Figure 3.4**. The artefacts found include quartz fragments and cobble choppers (TS-1), a quartz backed blade and quartz fragments a possible cobble hammerstone, a basalt faked axe and one cobble with usewear (TS-2) and a hammerstone and multipurpose hammerstone abrader (TS-3). The significance of these sites was stated as low, with sites being poorly preserved and excavation potential being negligible.

Crosby (1978), carried out further work on the site including subsurface testing, again for a report to the AWDC. Sub-surface testing was carried out at sites TS-1 and TS-2, as identified by Witter (1978). No additional artefacts were recorded at site TS-1 and it was speculated by Crosby that the quartz previously identified by Witter was naturally occurring. The surface inspection of Site TS-2 revealed a wedge shaped piece of quartz that may have been the result of deliberate flaking. Sub-surface testing at this site revealed no further artefacts.

The search of the NPWS register of known sites showed that there are eight sites in the vicinity of the proposed extraction site. Of these sites two are within the development area. Both have been listed as open camp sites and correspond to the locations recorded by Witter (1978), which are marked on **Figure 3.4** as TS-1 and TS-2.

For the current survey no artefactual material was identified on the ridgeline in areas where Witter (1978) and Crosby (1978) had previously recorded sites and carried out subsurface testing programs, which included excavation of collected material. It is therefore concluded that no evidence of sites TS - 1 and 2 remains. In addition no other artefactual material was found to have eroded from the deposits in these areas.

One isolated artefact (TH-IF-1) and one felled tree which had possible scarring (TH-ST-1) were identified. These are marked on **Figure 3.4**. The isolated artefact was a river pebble located in an area of high disturbance associated with the construction of the nearby dam. It is uncertain whether the stone was brought to the site by Aboriginal people or imported with spoil noted in the area. The scar on the felled tree is only



Figure 3.4  
ARCHAEOLOGICAL AND HERITAGE SITES

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recorded as a “possible” scarred tree (ie the scar is a result of human cultural activity , however not necessarily Aboriginal) as the scar does not have visible axe marks.

Survey results and recommendations were discussed at the conclusion of the site investigation with the Albury and District LALCs. A draft summary of these recommendations were sent to the LALCs for consideration.

#### **3.8.4 Significance Assessment and Safeguards**

The scientific value of both sites has been assessed as low. The felling of the tree has severely compromised the integrity of the site while the disturbed nature of the area where the isolated artefact was found and the uncertainty of its arrival at the sites also reduces its scientific value. In general both areas are already highly disturbed and have low scientific significance

As the area in which the artefacts have been found would be directly affected by the proposal the RTA would apply to the NPWS for a Consent to Destroy Permit for both sites. In the case of the scarred tree this would involve removal of the tree to another section of the site or another location. The RTA would discuss the relocation of the tree and management options with the Albury and District LALCs and NPWS. Should the Albury and District LALCs wish to collect the isolated artefact (TH-IF-1) then they should apply to the NPWS for a Care and Control Permit.

No potential archaeological deposits have been identified on the site or along the haul road route, however in the unlikely event that unrecorded archaeological deposits are uncovered during site clearing and fill extraction then work would cease immediately and the regional archaeologist of the NPWS and the Albury and District LALCs would be contacted.

### **3.9 European Heritage**

An heritage study was carried out by Robynne Mills Archaeological and Heritage Services, involving an investigation into the known European heritage of the Albury/Thurgoona region and the site. The study was carried out to identify any sites or potential sites, to assess the significance of any sites and to develop management recommendations for any sites located within the development area. The full report is available in **Appendix - I**.

#### **3.9.1 Local Environment**

The Thurgoona area was first viewed by Hume and Hovell from the top of Table Top Mountain. Their subsequent diary entries described the area as follows “the soil is excellent, a rich loam, thinly wooded and although parched, the grass luxuriant plentiful and the best quality, and with water sufficient either for sheep or horned cattle” Following this encouraging summation of grazing conditions, the first group of squatters arrived in the Thurgoona area in 1835 and identities such as William Wyse, Charles Ebdon and the Mitchell family were associated with the Albury area.

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By 1961 the Thurgoona district had quite a large population including Germans, Irish and English and agricultural activities reflected these different cultural groups. Despite the struggles to make ends meet, by the end of the 1860's Thurgoona sustained two schools and churches and a public house. A post office was provided in 1874 and an orphanage opened in 1882.

Several wineries were established in the Thurgoona district in the 1880's. A visitor to Thurgoona at this time would have seen an area dotted with vineyards, orchards crops and grazing stock.

Bowna Road, the eastern boundary of the proposed fill extraction area, was formerly the Great Southern Road. The route ran through Thurgoona because the area was dotted with permanent water sources including Eight and Nine Mile Creeks and Woolshed Creek from which bullock and horse teams could be watered. For the traveller, the important places along this road were the Farmers Hotel and the Travellers Rest Hotel (now Mount Pleasant Homestead).

The Travellers Rest Hotel is located immediately south of the proposed development and was built by Charles Hopgood in 1854 on his 105 acres property. It was opened on the 12<sup>th</sup> October 1857. In 1862 Hopgood got into financial trouble and the farm and hotel were sold. It remained empty until 1869 when Samuel Harrison opened it again as a public house. Although it appears from licensing records that the property was in a state of disrepair in 1871 when J de Faye took over the hotel later that year, but in 1874 it was once more up for sale.

Early this century, Henry Heath occupied the house and farmed the area. Although the land was bought by the AWDC the existing house continued to be occupied by two of Henry Heaths senior's children Fred and Mable. Miss Mable Heath died in 1985 and Mr Fred Heath still lives at Mount Pleasant Homestead.

### **3.9.2 Methodology for Heritage Investigation**

A search of heritage data bases was conducted to identify known heritage items and places in the Thurgoona area. There were 21 items listed for the Albury Council area, on the Australian Heritage Commission register of the National Estate, however none of these is in the Thurgoona area. Similarly the register of the NSW Heritage Council listed five properties in the Thurgoona district however these are all to the north of the proposed development. The Register of the National Trust also lists five properties in the Thurgoona region, all of which are to the north of the proposed development except for the Mt Pleasant (formerly Mt Pleasant Hotel) which abuts the southern boundary of the proposed fill extraction site.

The heritage schedules compiled by Albury City Council were also searched. Five items were listed which are all located to the north of the proposal. While the Mt Pleasant residence is not currently listed Council indicated that the item had previously listed and that it had inadvertently been omitted from the current schedule.

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The site predication model developed indicated that that remains of early farm building associated with the Mt Pleasant homestead may be found on the site.

### **3.9.3 Results**

The entire Mt Pleasant homestead and curtilage, which has been defined as the row of mature trees approximate 30m from the current Riverina Highway and the other three boundaries by an iron fence, is outside the proposed development. No evidence of other structures, wells, bottle dumps were identified. It should also be noted that the brick structure to the east of the main house is not part of the National Trust classification.

Two sections of the Hume and Hovel Walking Track were also found to pass along the boundaries of the proposed development area as indicated on **Figure 3.4**. Section one passes along the full length of the St Johns Road, which is the western boundary of the fill extraction area. Section two extends to the northern boundary of the site to the summit of Red Hill. The Hume and Hovell trail commences from the Hovell tree at Hovell Tree Park in Albury and follows as closely as practicable the route followed by the explorers during 1824-25. No areas associated with the haul road route were regarded as having significant European heritage value.

### **3.9.4 Significance Assessment and Safeguards**

Mount Pleasant homestead has been listed by the National Trust and is a attractive example of an early building in the Albury area. It has had functional varied history and is associated with the general life of the area.

There is no official statement on the heritage significance of the Hume and Hovell Walking Trail by Albury Council as the trail is not yet fifty years old, however an assessment was made based in the NSW Heritage Council Guidelines. These evaluation guidelines include criteria such as creative and technical accomplishment, research potential, rarity and representativeness. The assessment concluded the Hume and Hovel Walking Trail is of heritage significance despite the fact it does not meet the 50 year age criteria.

It is appropriate therefore to take care in planning the extraction to ensure that the trail is adequately protected from this development.

Mt Pleasant homestead, on the immediate south of the fill extraction area, requires due care to ensure no indirect impacts to the property. A dilapidation survey would be carried out by the contractor prior to commencing any clearing and extraction works. A check during and again at the completion of the project should be made to ensure no impact to the building has occurred through vibration impacts from machinery operating near the building. Appropriate restoration of the building would be made if any damage occurs. Any clearing within 15 m of the northern fenceline would be monitored by a qualified archaeologist to ensure that there are no subsurface wells, bottle dumps etc uncovered that were not previously detected due to the density of vegetation around the site.

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Following the completion of fill extraction from the site restoration of trees around the homestead site would be undertaken to maintain the rural outlook from the property. These restoration works would be discussed with the owner as well as Albury Council and the AWDC.

### **3.10 Hazard and Risk**

Risk management involves the identification, ranking and elimination or reduction of inherent risks in the operation of the process being observed. The assessment in this EIS has been limited to the operational hazards associated with the fill extraction operation.

#### **3.10.1 Identification of hazards**

The major hazards inherent in the operation of a fill extraction activity include:

- collision/s involving haul trucks;
- collision/s and/or tipping over of plant and equipment;
- leakage from fuel storage;
- fire from fuel storage;
- explosion from fuel storage;
- overload and damage of haul trucks;
- excessive dust causing aircraft hazard;
- poor erosion and sedimentation controls resulting in erosion and sedimentation;
- bushfire impacts.

Each of these potential hazards have differing severity risks and probabilities. The majority have low probabilities and have been addressed in mitigation measures proposed in this EIS and/or will be addressed in the contractor's OH&S plan for the operation. Due to the proximity to the Airport and flight paths, airport hazards have been focused on in this EIS.

#### **3.10.2 Airport Safety Constraints**

As discussed in **Section 2.7**, due to the location of Red Hill within the Albury Aerodrome flight path, there is the potential for proposed extraction operations to create obstacles or restrict the normal take-off and landing of aircraft. The height of material extraction plant and equipment, particularly when operating on high areas of Red Hill, may create obstructions which are hazardous to aircraft. In addition, the potential for dust generation during extraction and haulage operations may impair pilot visibility and result in a safety hazard.

For these reasons, Albury City Council, the owner of Albury Aerodrome and the body licensed by the Civil Aviation Safety Authority to operate the aerodrome, requested that a Method of Works Plan (MOWP) be prepared as part of this EIS. The purpose of the MOWP is to inform Albury City Council and operators of the Albury Aerodrome of the

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works proposed and the mitigation measures which will be implemented to ensure there is no disruption to the operation of the Aerodrome.

### **3.10.3 Method of Works Plan**

A copy of the draft MOWP is provided in **Appendix - E**. The draft MOWP has been prepared in accordance with Chapter 13, "Directions Relating to Aerodrome Works" of Civil Aviation Authority (CAA) "Rules and Practices for Aerodromes" (CAA, 1991). These directions are also provided in Appendix 1 of Albury City Council's Aerodrome Manual (Albury City Council, June 1998).

The MOWP provides a detailed description of the work practices proposed, including staging, timing and duration of the works; functional responsibilities; reporting requirements; contact names/numbers; and comprehensive work organisation restrictions and control measures.

The RTA is ultimately responsible for ensuring the sub-contractor(s) engaged to carry-out the fill extraction and transportation operations are provided with a copy of the MOWP and that they conduct all operations in accordance with it.

### **3.10.4 Safeguards and Mitigation Measures**

In the event of any environmental incident, the first priority shall be the safety of all personnel and the community in the immediate vicinity. Following this, further environmental impact shall be prevented/minimised by stabilising the situation and following the appropriate incident management procedures. Relevant RTA and EPA staff shall then be contacted.

Environmental incident response procedures should include the following:

- The identification of responsible staff and relevant external organisations;
- Procedures for the containment, collection and treatment of spills;
- Procedures for carrying out environmental monitoring;
- Evacuation plans;
- The location of emergency equipment;
- A mechanism for carrying out audits following an incident.

Associated with good environmental risk management is:

- Risk assessment to identify areas that are vulnerable to environmental incidents;
- Staff training in emergency response procedures;
- Access to environmental incident response procedures by all relevant staff;
- Efficient lines of communication;
- Management of information to the media, staff, public bodies and the community; adequate spill containment, clean-up, safety and monitoring equipment;

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- ❑ Ongoing auditing of environmental incident response to ensure it is adequate and relevant.

These response procedures shall be detailed in the Contractor's EMP. Work organisation restrictions and control measures imposed on the storage of material, parking of plant, extraction of fill and truck movements are provided in Section 4 of the MOWP (**Appendix - E**). These control measures have been included in relevant safeguard and mitigation measures sections of this EIS and will be detailed in the Project EMP.

### 3.11 Visual Assessment

This visual impact assessment is based on analyses of the following factors:

- ❑ the number of people who will be able to see components of the Proposal, and the distance and duration of their views;
- ❑ the degree of contrast between the components of the Proposal and the surrounding landscape;
- ❑ the nature, extent and timing of rehabilitation and landscape mitigation measures.

The visual impact assessment process involved of the following tasks:

- ❑ a review of the regional landscape context of the Proposal;
- ❑ assessment of the local landscape character of the area surrounding the Proposal;
- ❑ a review of the components and timing of the Proposal, including recommendations to reduce visual impact;
- ❑ assessment of the visual effect of the components of the Proposal;
- ❑ assessment of the visibility of the Proposal;
- ❑ assessment of the visual sensitivity of the areas and localities that view the Proposal including identification of visual sensitivity of these areas;
- ❑ analyses of the visual sensitivity and visual effect to assess the visual impact of the Proposal.

#### ***Visual Sensitivity***

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different use areas. The assessment is based on the number of people affected, landuse, and distance of the viewer from the Proposal.

People using a recreation area for example, will use the surrounding landscape as a part of their leisure experience and will view change to the landscape more critically than for example people viewing the Proposal from an industrial or agricultural working situation. All other things being equal the shorter the viewing time (for example views whilst travelling along a road) the lower the sensitivity, similarly the greater the distance from the Proposal the lower the sensitivity.

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### ***Visual Effect***

The visual effect is the expression of the visual interaction between the Proposal and the existing visual environment. It can also be expressed as the level of visual contrast (ie form, shape, pattern, line, texture and colour) of the Proposal to the setting and background within which it is viewed.

A high visual effect will result if the Proposal has a high visual contrast to the surrounding landscape, and there is little or no natural screening or integration created by vegetation or topography.

A moderate level of visual effect occurs if the Proposal is visible and contrasts with the landscape but is integrated with it to some degree. This will occur if the surrounding vegetation and/or topography provide some measure of visual screening, backgrounding or other forms of visual integration of the Proposal with the existing landscape setting.

A low visual effect occurs if there is minimal contrast and a high level of integration of form, shape, pattern, line, texture or colour values between the Proposal and the existing landscape setting.

### ***Visual Impacts***

The visual impact is determined by consideration of both the visual effect and the visual sensitivity. Various combinations of visual effect and visual sensitivity will result in high, moderate and low overall visual impacts. **Figure 3.5** gives an indication of the results that can be expected from the above analyses.

#### **3.11.1 Existing Visual Setting**

##### ***Regional Setting***

The regional setting of Albury is dominated by the Murray River and the Mountains and Hills of the Black Range. The Murray River runs east-west to the south of Albury, the airport and the site. The flood plain is dominated by the meandering river, oxbow lakes and billabongs. Treed creeklines, the river and other water features create a strong pattern in this area.

The Mountains of the Black Range are generally to the west of Albury with the foothills and more gentle slopes providing the appropriate non flood areas for the urban development of Albury adjacent to the Murray River. Red Hill, of which the site is a part, is within the gently sloping foothills. The other major regional landscape feature is Lake Hume which is to the east of the site.

##### ***Local Setting***

The local setting of the site at the edge of the Murray River flood plain includes flat secondary flood plain areas as well as gently undulating hills generally above 170masl. The airport which is located on part of the secondary flood plain is located to the west of

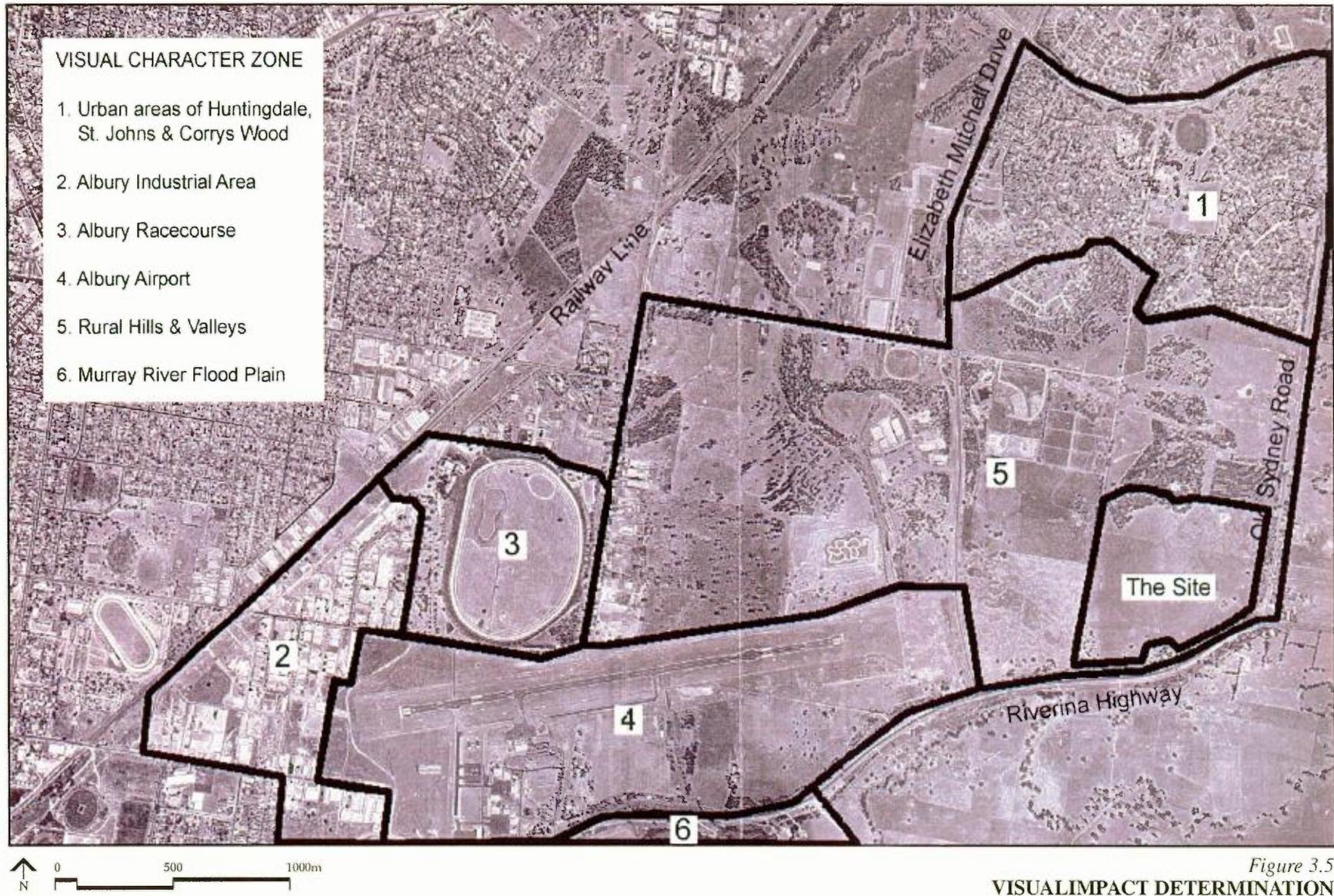


Figure 3.5  
VISUAL IMPACT DETERMINATION

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the site. Its linear patterns are not easily seen due to the flat nature of the terrain. The remainder of the flood plain supports scattered trees in open grassland.

The rolling hills also generally support scattered trees in open grassland. The creek lines and to a lesser extent fence lines and road lines also support tree groups that help to punctuate the landscape.

A major feature of the landscape in the locality is the major tree planting belts that occur along the roads and in various locations in the landscape, such as significant hill tops.

There are a number of landuses that create the character of local landscape settings. This includes urban residential development, industrial areas, the race track, the air port and rural grazing land. The rural landscape also supports a number of rural homes that are generally close to adjoining roads.

The major road in the locality is the Riverina Highway. Other roads include Old Sydney Road that adjoins the site on the east, Elizabeth Drive to the west of the site and Fallon Street which runs adjacent to the northern side of the airport.

### ***The Site***

The site covers an area of approximately 30 ha. It is located in the northern corner of the site. The site generally slopes and drains to the south. Slopes are gentle, generally not exceeding 1:10, with elevations varying from 161masl in the south west corner of the site to 194masl in the central northern part of the site. The site is dominated by exotic grassland. However a limited number of trees do occur on the southern side of the site, adjacent to the residential property and a small farm dam in the central drainage line.

The overall impression of the site is of a gently rolling grassy hill, adjoined on the lower slopes by tree belts, generally along the roadway. The off-site natural forest and tree planting belts on the adjacent Red Hill help to create a backdrop to the site when viewed from most viewing areas to the east, south and west of the site.

### **3.11.2 Visual Effect of the Proposal**

The removal of fill from the site will have two visual effects. Firstly, removal of grass cover and exposure of soil will introduce a strong colour contrast into the existing landscape. The planned removal of over two million cubic metres of fill from the site will alter the form and shape of the hill. It will also alter the outline of the hill as it is seen from various locations below it.

The scale of the operation is relatively large in relation to the setting of the small hill on which it occurs. It is envisaged that half of the seen area of the hill will be effected by the operation at various times. This will create a strong visual effect if the operation is not staged with progressive restoration.

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The colour contrast resulting from the exposed earth will be strong creating a high visual effect if it is over a large area. This will vary in colour from the existing grass greens of the winter and spring grasses and the gold of the cured summer grass cover.

Form and line modification will also have a high visual effect in the short term. This is a result of the need to have cutting faces and working stock piles, all of which would create unnatural shapes and lines in the landscape. However in the longer term this effect will not be great as it can have a high degree of compatibility with adjoining landform.

The Proposal will alter the character of the existing landscape both in the short and long term. However the visual effects will differ through time. In the short term, some high visual effects resulting from land stripping and excavation of material from the site can be expected. The degree of effect could be decreased by reducing the size of any one working area, leaving the larger part of the site in an undisturbed condition or in a restored condition.

The longer term visual effect will be low as grasslands will be restored on landforms that have been reshaped to emulate existing landforms.

### **3.11.3 Visual Interactions**

#### ***General***

The site is viewed from a number of locations (see **Figure 3.6**), generally to the west, south and east of the site. Northern views are restricted by Red Hill and adjoining ridges and spurs. Viewing areas are generally limited to the rural areas around the site.

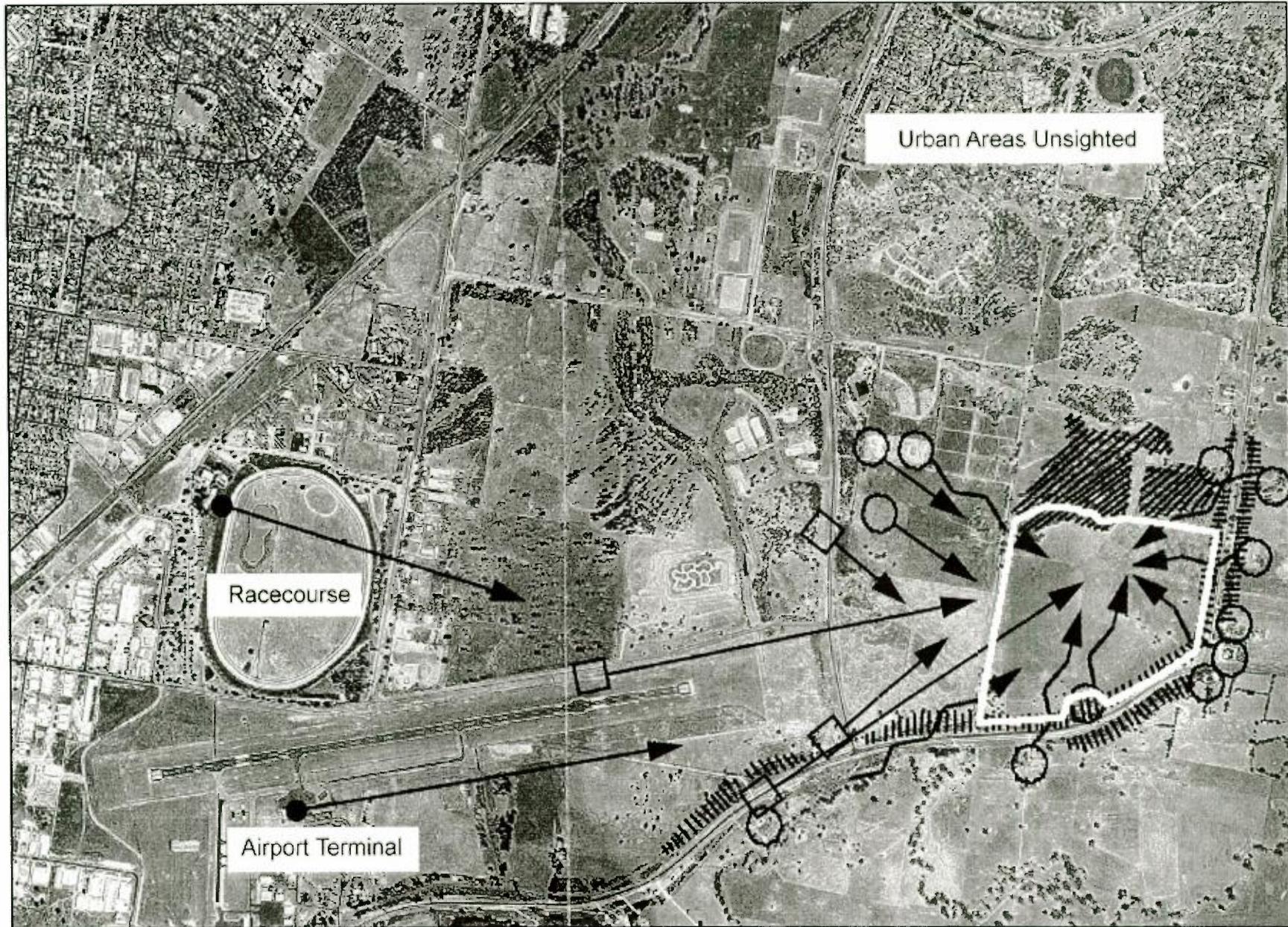
The area is visible to a number of use areas around the site, as outlined below. However views are generally filtered though existing vegetation adjacent to the road edges and or vegetation in private gardens.

Trees along the Riverina Highway and Old Sydney Road are especially significant in filtering views to the site. This vegetation is very effective in screening or filtering views to the east and south. These vegetation is lacking along Elizabeth Mitchell Drive. This allows for long views into the site from this road as well as Fallon Street.

#### ***Urban Residential Areas***

The urban residential areas of Huntingdale, St Johns Hill and Corrys Wood are close to the northern edge of the site (**Figure 3.7**). However the topographic form of Red Hill creates good visual separation between the site and these sensitive urban areas. This separation is further reinforced by existing woodland and plantations of native trees on the hill area and adjacent to the roads.

These areas would have a high sensitivity, however they are unsighted and therefore would have low sensitivity to the Proposal. The Proposal is unseen from this area and therefore there is no impact.



- Residential viewing locations.
- Roadway viewing locations.
- Other viewing opportunities.
- ➔ Unbroken views.
- ➔ Potential filtered views.
- ▨ Significant vegetation screens.

Figure 3.6  
VISUAL INTERACTION

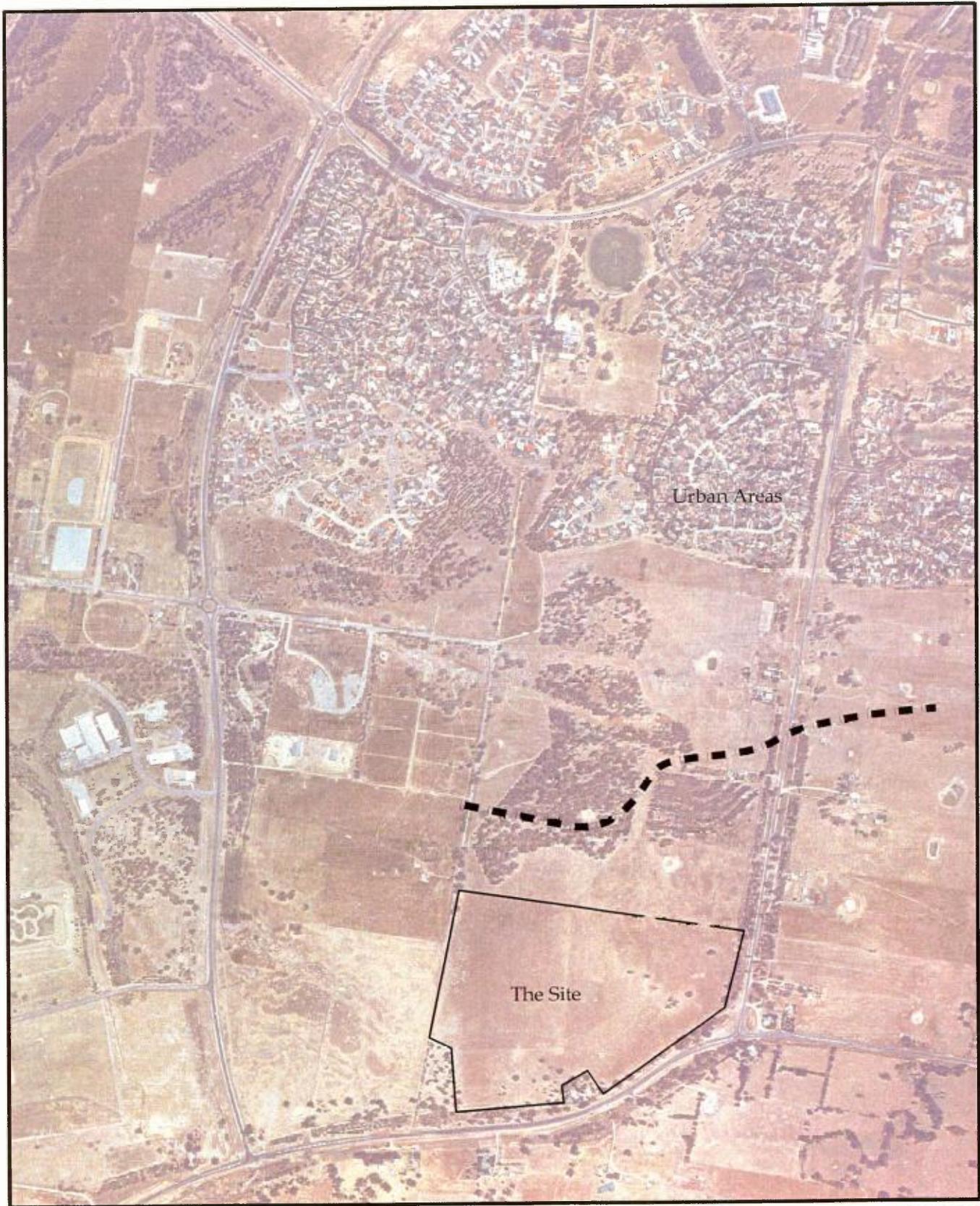


Figure 3.7  
VISUALLY SCREENED URBAN AREAS

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### ***Riverina Highway***

The highway is the main road adjacent to the site. The highway passes in an east west direction along the southern boundary of the site. Views from the road, into the site are possible from various locations along the road in both eastern and western travel directions (see **Figure 3.8**). Generally these views are filtered through planted trees and some indigenous trees occurring on the northern side of the highway.

However there is one location, on the western journey, east of Old Sydney Road that there is a view from the top of a rise over the roadside vegetation directly into the site.

The site is generally only part of a sequential view and is not a focal landscape to the road. This coupled with the general speed of travel renders this use area as having moderate to low sensitivity.

The visual effect of the Proposal on this viewing zone will be low due to the screening and filtering effect of the trees within the road reserve. The visual impact on this viewing area is low.

### ***Elizabeth Mitchell Drive***

Views from this road are extensive for both the north and south journey. Unlike the other roads in the location this road is not flanked by roadside vegetation. This is due to the clearance requirements for the Albury Airport runway immediately to the west of Elizabeth Mitchell Road.

Views are outside the primary zone of vision (60 degrees) along the road. However the Proposal would be clearly visible. Due to clear visibility of the Proposal, the foreground location of the Proposal to the road and the character of viewing, ie speed and viewing angle, the road was ascribed a moderate sensitivity.

The visual effect on this areas will be moderate to high depending in the initial stages, but low following restoration. The visual impact of the Proposal on Elizabeth Mitchell Drive will be moderate to high during the operation of the pit, but will reduce to low following restoration.

### ***Old Sydney Road***

Views from this road are limited. Although the site is immediately adjacent to the road, vegetation belts along the road limit views into the site (see **Figure 3.9**). This is especially so given the angles of view along the road and the speed of travel.

Due to limited views, speed of travel and angle of view create a low visual sensitivity. The visual effect on the road will be moderate to low during the operation and low following restoration.

The visual impact on Old Sydney Road will be low during operation and following restoration.



*Figure 3.8*  
**FILTERED VIEWS OF SITE FROM RIVERINA HIGHWAY**



*Figure 3.9*  
**VISUAL SCREENING ON OLD SYDNEY ROAD**

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### ***Fallon Street***

Views from this road are directly onto the site (see **Figure 3.10**). The site is in a focal position in relation to this road and is not screened or filtered from view by vegetation. The site is in the viewshed of the road for a relatively long period of time for the eastern journey. This is due to the alignment of the road, the extension of which leads directly onto the site to be quarried.

The road is not extensively used, but is the main access to the racetrack. It also provides access to and from industrial areas adjacent to the airport.

The usage of the road would normally result in a low sensitivity, however the view type and time of viewing increases it to a moderate sensitivity.

The initial visual effect on Fallon Street will be high because of the sites focal point position and the long viewing time for the eastern trip along the road. Following restoration this effect will be low. The visual impact will initially be high, however this will reduce to low following restoration.

### ***Adjoining Residence***

There is one rural homestead that is adjacent to the southern boundary of the site. The homestead is surrounded by trees, however views would be available from the north side of the house and back garden into the site and proposed work area (see **Figure 3.11**).

This residence would have a high visual sensitivity to the Proposal. The visual effect of the operation would be high if seen from any part of the house or any entertaining or recreational part of the garden. This visual effect will be reduced to low following restoration.

The visual impact of the Proposal will be high if seen and will reduce to low following restoration.

### ***Residences on the Riverina Highway***

There are a number of houses adjacent to the southern side of the highway adjacent to the site. These potentially look onto the site. Filtered views will be available from various locations such as Driveways, various parts of the front gardens and perhaps some front rooms. However, the development of homestead gardens and the roadside vegetation tends to filter out these views, minimising their potential effect and impact (**Figure 3.12**).



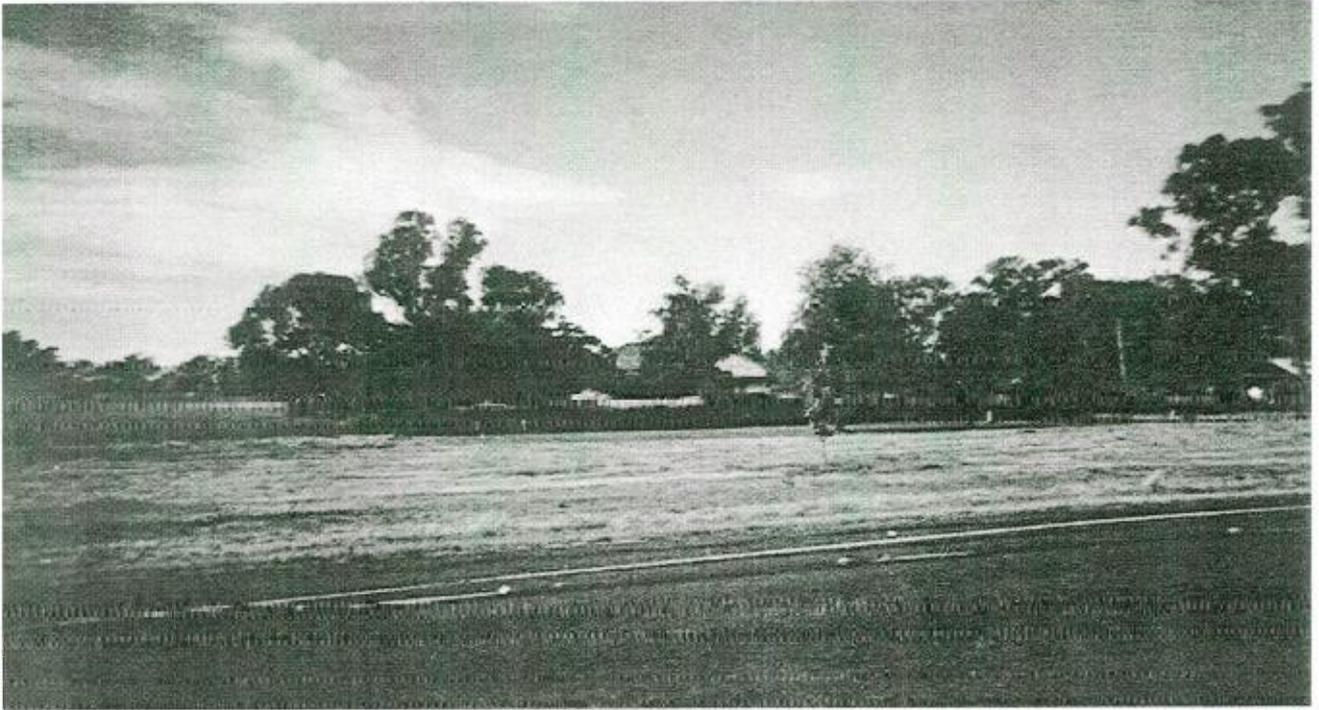
*Figure 3.10*

**VIEWS FROM ELIZABETH MITCHELL DRIVE AND FALLON STREET**



*Figure 3.11*

**VIEW FROM OPERATION TO HEATH RESIDENCE**



*Figure 3.12*  
**SCREENED VIEWS FROM THE RIVERINA HIGHWAY**

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Other houses, east of the intersection with Old Sydney Road are not oriented towards the site. However, there would be potential views from the gardens and approaches. The effectiveness of the road side tree screen was not high in this location, due to a gap in the tree belt. Effectiveness of visual connectivity is due mainly to the visual characteristics at the homestead and gardens.

Views from these houses along the Riverina Highway, is seen, would be highly sensitive, however, these views are generally limited by gardens and roadside vegetation and in some cases house orientation.

The visual effect of the Proposal from these locations is low, due to the screening and filtering effect of garden vegetation and roadside trees as well as plantings. Where such vegetation does not occur the visual effect would be high.

The visual impact on these houses is generally low due to lack of visibility. However, it would be high if the operational areas are visible. Impacts following restoration will be low. The visual sensitivity of these houses would be high to any operation that are seen from the house. The visual effect of the Proposal would be low due to the tree cover along both sides of Old Sydney Road. The visual impact of the Proposal would be low on these houses as long as the operations are not seen.

#### ***Residences on Old Sydney Road***

There are two residences on the eastern side of Old Sydney Road that potentially would have views to the Proposal. The houses are oriented towards the Proposal and it is only intervening vegetation along the roadside that provides a screen to the Proposal.

These tree belts occur on both sides of the road and each is a belt of numerous rows of trees, creating an effective filter and screen. The visual sensitivity of these houses would be high to any operation that are seen from the house. The visual effect of the Proposal would be low due to the tree cover along both sides of Old Sydney Road. The visual impact of the Proposal would be low on these houses as long as the operations are not seen.

#### ***Residences along Elizabeth Mitchell Drive***

A number of houses occur on the eastern side of Elizabeth Mitchell Drive. These houses are relatively new and do not have established gardens. This coupled with lack of tree growth between these properties and the Proposal create a situation of high visibility of the site and the Proposal.

These houses would be highly exposed and have a high sensitivity to the southern part of the proposal. The visual effect of the operations on these houses would be high during operations. Restoration of the site will reduce this visual effect to low. The initial visual impact of The Proposal would be high. This will be reduced to low following restoration.

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### ***Visual Mitigation Strategies***

The visual impact of the Proposal will depend to a large extent on mitigation strategies. In the first instance the visual effect of the operation will be due to the colour contrast created by exposure of raw earth. This is the major visual effect and its quick removal following the completion of the fill extraction will greatly reduce the visual effect of the Proposal.

The second basis for high visual effect is a dramatic change in land form. This will occur during the operation as fill is removed from the site. Restoration will need to create new landforms that emulate the existing landforms of gentle slopes and undulating plains.

The preparation of a final operational plan and final landform plan according to these guidelines will limit the visual impact of the Proposal. These should include:

- At any one time, minimise the area that is exposed and without grass cover;
- Complete the operation in a minimum of six work areas;
- Carry out restoration of landform and re-grassing as soon as an area has been worked;
- Retain the undulating landform;
- Ensure that adjoining vegetation is not damaged; and
- Consider the need for supplementary planting adjacent to the adjoining homestead on the Riverina Highway.

The visual impact of the Proposal is generally not significant. In the short term over the two years of operation there will be some visual impacts. The operations will have a high impact on any residence it is seen from. Generally this is limited to 2-3 houses to the north west of the site and the house adjoining the site. Other houses are screened from view by existing trees within established gardens and roadside planting.

The visual impact on adjoining roads is low to moderate with the minor exception of Fallon Street. However this impact as well as those on houses in the north west can be limited in time by maintaining the western edge as a visual screen to operations to the east.

The visual impact following restoration on all areas will be low as the original grass cover and colours will be restored and ground form will emulate existing land forms in the vicinity of the site. The overall visual impact of the Proposal is therefore thought to be low significance, especially if the visual mitigation strategies can be implemented.

## **3.12 Traffic Impact Assessment**

### **3.12.1 Site Access**

The extraction site will be accessed at the intersection of the proposed haul road and Elizabeth Mitchell Drive. Vehicles accessing the site will include staff vehicles (predominantly cars), water trucks and the 50m<sup>3</sup> capacity haul trucks.

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Light vehicles and water trucks will access the site via Elizabeth Mitchell Drive and turn left or right into the site, depending on their direction along Elizabeth Mitchell Drive when approaching the site. Haul trucks will access the site along Fallon Street (which will be closed to public access between Elizabeth Mitchell Drive and Dallinger Road). The intersection of Fallon Street and Elizabeth Mitchell Drive will be a controlled level crossing.

### 3.12.2 Traffic Generation

The majority of the trips generated will be the large haul trucks. These will result in approximately 14 vehicle movements per hour between the hours of 7am and 6pm weekdays and 8am to 1pm on Saturdays. While this results in a significant increase in traffic, this all be confined to private haul roads, resulting in a minimising of impacts on local traffic patterns. There will be some changes for motorists who use Fallon Street to travel between Albury and the Riverina Highway. With Fallon Street being closed between Dallinger Road and Elizabeth Mitchell Drive, motorists will have to find alternative routes. These could include the use of:

- ❑ North Street (heading east) before turning south onto Drome Street, which then leads onto the Riverina Highway
- ❑ Union Street (heading east), before turning north onto Dallinger Road, then east onto Corrys Road, followed by south onto Elizabeth Mitchell Drive which the leads to the Riverina Highway.

There would be minor delays for motorists using Elizabeth Mitchell Drive and Dallinger Road, north of Union Street, when haul trucks are using the level crossings to cross those roads, but these would be minor delays on roads that are not heavily trafficked.

### 3.12.3 Traffic Impact Assessment and Safeguards

#### Proposed Haulage Route

A number of haul routes were considered as part of this EIS (**Appendix - D**) with the final route decided on to minimise environmental, economic and community impacts. The haul route decided upon is situated off the public road system, so as to minimise disruption for road based vehicles and also to enable large dump trucks to be used. The use of these larger dump trucks means that for a given volume of fill material, there will be a lower number of truck movements.

The haul route commences at the exit from the extraction site and heads west across open ground. It then crosses Elizabeth Mitchell Drive and along Fallon Street. It proceeds along Fallon Street which will be closed to normal road traffic, and then turns north at the western edge of the Jet Boat racing facility. It then proceeds in a north north west direction and then crosses Dallinger Road to the south of the intersection of Corrys Road/Dallinger Road before proceeding west to the construction site.

The haul route will have minimal conflict with road based vehicles, but will need to cross the public road system at two locations as well as provide a possible conflict point with

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leisure walkers. It is important that at these conflict points, the vehicle movements are controlled to ensure that both construction vehicles and public vehicles can operate in a safe and satisfactory manner.

#### **Hovel pedestrian walking track, east of Elizabeth Mitchell Drive**

To ensure safety for the leisure walkers along the pedestrian route, it is important to provide barriers and warning signs. To ensure that pedestrians (and cyclists) know to slow down and/or stop, a pedestrian guard rail will be installed, to show users that the path does not continue straight across the haul road, but that they need to stop and observe vehicle movements. Warning signs should be erected to warn users of the approaching vehicles, with advice to Stop and Look.

Warnings signs should also be placed on the haul road approach to the crossing point, to ensure that truck drivers will slow down and be aware of other, vulnerable users in the area. Whilst the trucks will have priority over the pedestrians, the trucks should slow down as a precaution to ensure that the accident risks are minimised. It is additionally recommended that construction vehicles should have their headlights turned on at all times, to ensure maximum visibility. This will be important during evening work in the winter and times of inclement weather.

#### **Elizabeth Mitchell Drive**

The haul route will cross Elizabeth Mitchell Drive via an at grade crossing. This crossing will create a conflict point between the construction trucks and the vehicles on the public highway and as such needs to be controlled. There are two means of controlling this crossing point and both will require the installation of temporary traffic signals.

The first option will be to install a fully automatic traffic signal controller, which will be vehicle activated. The traffic signals will in the main provide a constant green light for traffic driving along Elizabeth Mitchell Drive and red for the haul route. However, when the controller recognises that a truck is approaching from either direction on the haul route, the signal will change to red for the traffic on Elizabeth Mitchell Drive and a green light will be provided for vehicles on the haul route. These signals would be fully automatic and would only be in operation during haulage work times. Warning signs would be required along Elizabeth Mitchell Drive with a sign to inform road traffic when the temporary traffic lights are operational.

The second option would be to provide a manned signal controlled crossing point at this location. This type of crossing requires a person to be stationed at the crossing point during all working hours. This person will observe vehicles using the haul route and operate the traffic signals manually to stop the traffic flowing along Elizabeth Mitchell Drive to allow the safe crossing of the trucks. This system will require warning signs similar to the automatic traffic signal option.

For both of these above options, a power supply will be required to control these lights, such as a portable generator. The manual crossing has the advantage in that the controller will be able to monitor the power supply and monitor truck movements to minimise disruption to traffic. This will involve timing the signal activation to allow trucks

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to cross without losing momentum and hence minimise crossing time. To ensure accurate operation of these traffic signals, a marker needs to be installed on the haul route to indicate to the traffic signal controller when the lights should be changed. This is important to ensure that the lights are not changed too soon and hence create increased delay for road users. If the automatic control measure is adopted, a fail safe method will need to be installed to ensure that the signals can operate constantly.

From the volume of fill material required for the construction work, it has been calculated that the typical hourly truck movements will be in the region of 160 movements per day ie. 14 truck movements per hour. It is considered that two trucks will be filled at the same time and will thus tend to travel in pairs. With an operation speed of between 35 to 45 km/h and a gross laden weight of approximately 150 tonnes each it is important that safety for road vehicles is maximised. To maximise the efficiency of the haul truck, it is desirable to provide an uncluttered route for these vehicles with minimal stopping and delays.

It is therefore recommended to also install a boom gate to physically reinforce the red stop light for the road vehicles.

The layout for this signal control operation is shown in **Figure 3.13**. Note that the layout is the same for both automatic and manual operation.

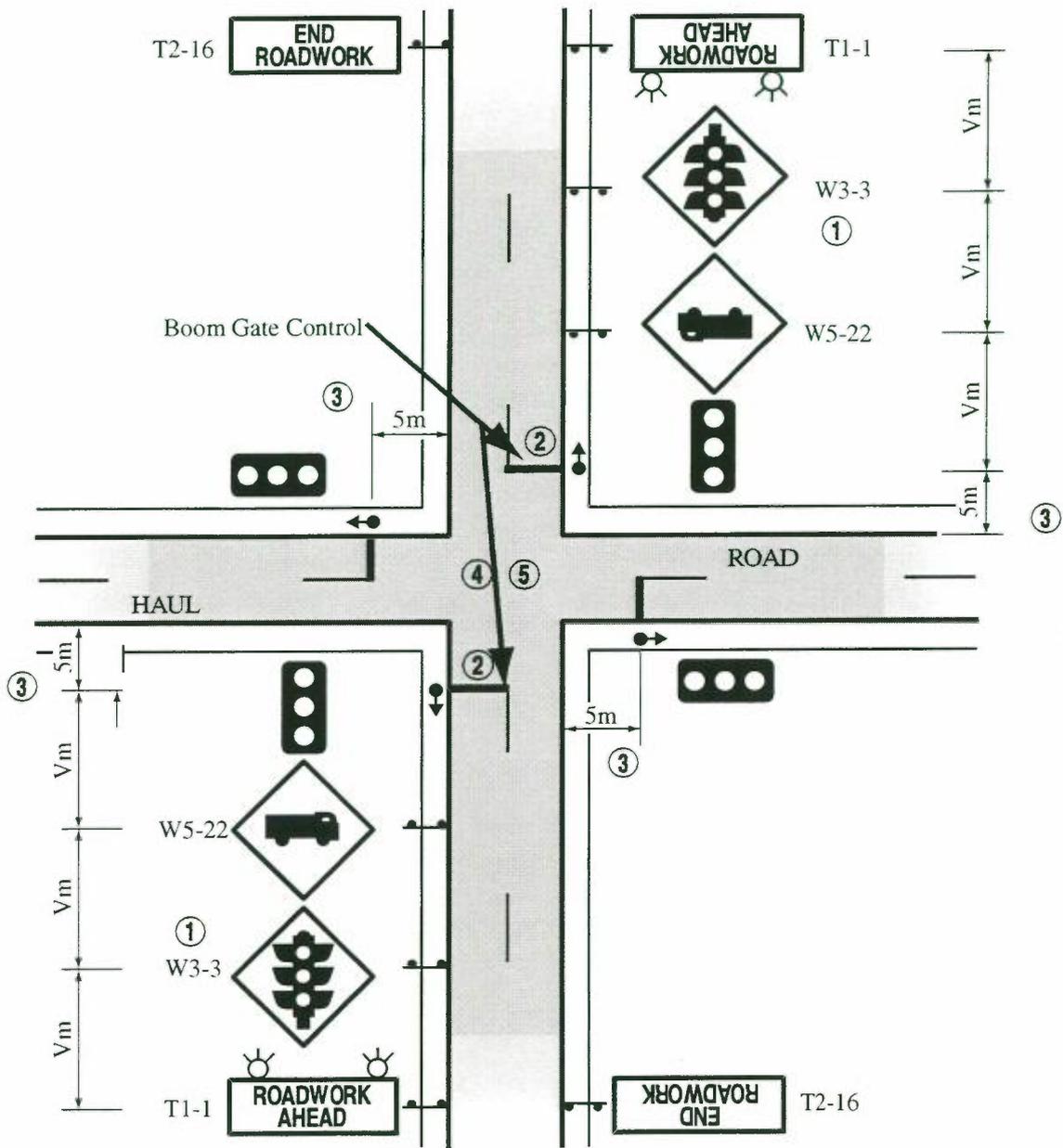
### **Dallinger Road**

The haul route crossing of Dallinger Road will need to be designed to the same standards as the crossing discussed above for the crossing of Elizabeth Mitchell Drive. The number of truck movements will be the same and while the vehicle numbers along Dallinger Road are slightly lower than Elizabeth Mitchell Drive, the same safety standards should be applied to this crossing point.

## **3.13 Solid Waste Management**

The solid waste produced by the proposed development will be limited vegetative remains resulting from clearing the extraction site, human waste within the dry chemical toilet and general refuse resulting from meal breaks. No solid wastes of a toxic nature are anticipated to be produced or stored on site. There may be incidents, however, when machine failure may cause non-hazardous wastes such as a result of oils and greases. Due to the relatively short period on site of equipment, these incidents will be rare. However, should this occur, all non-hazardous waste including materials that have become contaminated will be collected by use of absorbent material and disposed of within a suitable landfill in the area. Waste oils and greases, if produced, will be disposed of in accordance with EPA and Council guidelines.

Following clearing of the limited amount of vegetation, the larger remnant pieces will be removed from site and provisions will be made to sell portions as firewood. Those pieces unsuitable for firewood will be disposed of at the local landfill area. The



**LONG TERM WORK - 2 LANE / 2 WAY - HAUL ROAD CROSSING**

**Note:**

- ① If traffic signals cannot be seen from the W3-3 sign, add W8-5 distance to this sign to highlight the situation.
- ② In daylight, Traffic Controllers with T1-13 & T1-18 signs may be used instead of traffic signals
- ③ Determine the locations for traffic signal posts after advice from a person experienced in traffic signal design.
- ④ If work continues into darkness, the Haul Road crossing should be suitably illuminated.
- ⑤ If highway pavement affected, then use appropriate road signs to highlight the condition.

Source: RTA "Traffic Control at work Sites (1998)"

Figure 3.13  
INTERSECTION CONTROL MEASURES

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vegetative litter remaining on site will be stockpiled in a designated low area of the site and ultimately used for rehabilitation.

Any general refuse produced during the operation will be placed in a suitable container with a heavy lid and the contents will be disposed of at the local landfill area when full.

All fill material extracted will be used for the construction of the embankment associated with the Albury Wodonga National Highway Project. No solid waste will be produced by the extraction process.

### **3.14 Socio-economic Assessment**

#### **3.14.1 Socio-economic Climate**

The proposed fill extraction operation and haul road is located in the eastern section of the Albury municipality. Albury's population is 15,805. It is a major regional centre and transport node. The community has polarised views on the AWNHP and any development associated with it, although there appears to be a growing level of acceptance that the AWNHP is going ahead in 1999. This has changed the focus of opposition to some extent to be intent on minimising the environmental and social impacts of the road construction.

To assess the potential social impacts of the fill extraction operation, some context needs to be established regarding the social make-up of the community to be affected. Error! Reference source not found. and Error! Reference source not found. provide some indication of the make-up of the Albury area. Albury is a growing area with population increasing by 10.4% between 1991 and 1996. This compares with the State population increase of 9.4% within the same period. Some of this population increase has occurred in the relatively new release areas of Thurgoona and St Johns Hill to the north of the proposed fill extraction site.

Most indicators have remained fairly constant over the five year period. There appears to have been a drop in home ownership rates and a decrease in the unemployment rate. The 1996 unemployment rate of 10.7% was a decrease from the 12% in 1991, however, this is still well above the State unemployment rate for 1996 of 8.8%.

#### **3.14.2 Socio-economic Impact Assessment**

In the limited consultation that occurred as part of the preparation of the EIS, the main social issues of concern were the noise and dust impacts on local properties, the use of grazing land for a purpose other than grazing, traffic impacts on local communities (especially the impacts on the racehorse industry if haul trucks were to use Dallinger Road as a main route), property effects and commercial impacts.

**Table 3.12: Industry profile - Albury Wodonga & Australia 1996**

Industry Sector	Albury Wodonga (%)	Australia (%)
Agriculture, forestry, fishing	3.9	4.2
Mining	0.1	1.1
Manufacturing	14.7	12.6
Electricity, gas, water supply	0.8	0.8
Construction	5.6	6.3
Wholesale trade	5.3	5.8
Retail trade	15.4	13.6
Accommodation, cafes & restaurants	5.8	4.7
Transport & storage	3.4	4.3
Communication services	1.2	2.0
Finance & insurance	2.4	3.9
Property and business services	6.5	9.8
Government administration & defence	9.3	4.9
Education	7.7	7.1
Health & community services	10.1	9.5
Cultural & recreational services	1.6	2.3
Personal & other services	3.1	3.6
Non-classifiable economic units	1.2	1.4
Not stated	1.7	2.0
<b>Total</b>	<b>100</b>	<b>100</b>

**Table 3.13: Albury socio-economic profile comparison 1991-1996**

Census variable	Albury 1991	Albury 1996
Aged 15 or more	76%	77%
Australian born	87%	87%
Unemployment rate	12%	10.7%
Same address 5 years ago	51%	52%
Dwelling owned or being purchased	65%	61%
Annual household income <\$25,000	40%	40%

The issues of noise and dust have been addressed in **Sections 3.4 & 3.5**, respectively. The mitigation measures proposed should minimise the impacts of noise and dust on local dwellings. The construction of a dedicated haul road also enables haul traffic to be kept at further distances from noise sensitive receptors along the existing road network. This also minimises the traffic impacts of what would have been a significant increase in heavy vehicle traffic if an on-road solution had of been preferred.

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The use of grazing land will be temporary. The excavation period will be for two years, after which the site will be rehabilitated and returned to use as grazing land. Property values are unlikely to be affected by the proposed development over the long term. The site will be re-contoured, rehabilitated and returned to its original use, minimising the impacts on property values. There may be some decline in property values if adjacent land is sold during the fill extraction operation, however, this is not expected to be significant, as adjacent properties are already affected by aircraft noise and traffic noise from the Riverina Highway.

The proposed development is not expected to impact on commerce in the area as it will not be taking business from existing commercial quarries. The construction of a haul road will minimise the congestion impacts associated with the development, and the flow-on effects these can have on local commerce. Approximately 30 new jobs will be associated with the proposed fill extraction operation. These will be sourced from the local community and are likely to last for the two year construction period.

The proposed fill extraction operation is therefore unlikely to have a significant socio-economic impact on the community.

### **3.15 Cumulative Impacts**

In accordance with clause 82 of the EP&A Regulation 1994, any cumulative environmental effects of the proposal with other existing and likely future activities must be taken into account in determining the potential impacts of the proposal on the environment.

As the proposed development is an ancillary development to the AWNHP, impacts associated with the fill extraction should have been considered as part of the AWNHP EIS/EES. The positive cumulative benefits of the project include:

- a minor increase in the local employment associated with the AWNHP;
- energy savings compared with accessing fill from a site further away from the AWNHP construction zone;
- the use of a new site will not disadvantage local demand for fill from existing quarry resources;
- an end result of a re-surfacing of Fallon Street at no cost to the local community;
- a road constructed to assist the future development of land north of Fallon Street;
- the haulage option chosen has the least cumulative impact on local traffic of any of the options discarded;
- the location of the site is such that fauna habitat and flora associated with the AWNHP will not be further affected.

Negative cumulative impacts include:

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- ❑ for the duration of the extraction and rehabilitation, the development will change the character of the area from rural residential use and appearance to industrial. The rehabilitation program proposed, will however, return the area to its original landuse;
  - ❑ noise associated with the extraction zone and the haul road will contribute to cumulative noise levels already existing due to the airport and existing road traffic.

### **3.16 Summary of Environmental Safeguards, Monitoring and Reporting**

This EIS has identified a number of constraints associated with the proposed development and has formulated a means of ensuring that the impacts are minimised and that all legislative requirements are adhered to. The safeguards proposed are included in the following key areas.

#### **3.16.1 Noise**

The operation of the Red Hill fill extraction site has the potential to impact on the acoustic amenity of residences surrounding the site. The following recommendations have been made in order to minimise the potential noise impacts from excavation and fill transport operations:

- ❑ the Contractor retrofit high grade mufflers and engine louvres to the haul truck fleet and all excavation equipment;
- ❑ construction of earth mounds (approximately 3m high) along the southern and eastern perimeters of the site, adjacent to the nearest residences, should be undertaken;
- ❑ where possible, excavation work methods should be developed to ensure that the bulk of equipment is not located within approximately 200m of the nearest residential receivers for extended periods of time;
- ❑ periodic noise monitoring should be undertaken at the onset of the project and on a quarterly basis in order to determine whether noise generated from excavation and fill transport operations are acceptable at the nearest residential receivers. The noise monitoring should be undertaken during normal working hours (7 am-6 pm Monday to Friday, or 8 am-1 pm Saturday) at a minimum of three nearest sensitive receivers adjacent to the Red Hill fill extraction site, and at a minimum of three nearest receivers to the haul route site. The results of noise monitoring would illustrate the extent to which the pre-determined noise level objectives were being met (or exceeded) and whether or not further noise mitigation measures would be required;
- ❑ Where necessary, noise mitigation measures should be reviewed in order to protect the residential amenity of the nearest sensitive receivers adjacent to the site.

#### **3.16.2 Air Quality**

To minimise the potential impacts on air quality resulting from dust generated due to operation of the Red Hill fill extraction site the following recommendations have been made:

- ❑ ensure that dust from all loads is suppressed when transporting fill off site to the Awnhp construction zone;

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- ❑ install a truck wheel wash facility at the entrance to the site;
  - ❑ undertake regular watering of disturbed areas, including on-site haulage routes and stockpiles, especially during dry and / or windy weather;
  - ❑ minimise, as far as possible, the surface area of land exposed at any one time in order to reduce the potential generation of wind blown dust. This would involve progressive revegetation of previously excavated areas;
  - ❑ undertake continuous air quality (dust) monitoring at a minimum of three nearest residences adjacent to the Red Hill fill extraction site. Monitoring of dust deposition and total suspended particulate matter (TSP) concentrations should be undertaken at the Heath residence, immediately to the south of the site, the nearest residence located at the intersection of the Riverina Highway and Old Sydney Road, to the south-east of the site, and the nearest residence adjacent to the north-eastern boundary of the fill extraction site. Dust monitoring should commence at least 3 months prior to commencement of excavation works and should continue throughout the duration of excavation works. The effectiveness of dust control measures implemented should be periodically reviewed to enable further dust mitigation measures to be implemented where necessary.
  - ❑ develop a dust management plan for the site which allows for the investigation and mitigation of adverse dust impacts which may be experienced at the nearest residences adjacent to the Red Hill fill extraction site.

### 3.16.3 Soils and Water Quality

The operation of the Red Hill fill extraction site has the potential to impact on the soils and water quality in the area. This is an issue that requires sound environmental management due to the proximity of the sensitive Murray River floodplain. The following recommendations have been made in order to minimise the potential soil and water impacts from excavation and fill transport operations:

- ❑ As stated previously, the primary objective of soil and water management is to separate clean and dirty water systems;
- ❑ Clean water will be diverted away from disturbed and rehabilitating areas, by the construction of a primary bank at the top of the slope to be excavated, to protect water quality leaving the site and the rehabilitation works;
- ❑ Fill extraction activities will be carried out in six stages. The total area of the fill extraction site to be disturbed is approximately 30 ha, therefore individual campaigns will involve the extraction of areas approximately 5 ha in size. The maximum area to be disturbed at any one time will involve the campaign area currently being worked on as well as the previous area which needs to be re-levelled and rehabilitated. Therefore, the maximum disturbed area at any one time will be approximately 10 ha.
- ❑ Each extraction area will be further protected from run-on water by a graded bank, constructed above the extraction area. This bank will direct clean run-on water from the undisturbed land above the extraction area, minimising water in the disturbed area and preventing sediment movement occurring as a result. Sills will be constructed at the outlet of these banks resulting in the water spilling onto vegetated

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gully areas in a laminar flow. Once the areas below these banks have been rehabilitated, the banks will be flattened and also rehabilitated, allowing water to flow over the rehabilitated areas;

- ❑ An impervious bund, able to hold 120% of the capacity of the contents of the 10,000L diesel tank, will be constructed around the tank;
- ❑ Dirty water will be directed to sedimentation ponds for treatment prior to discharge from the site;
- ❑ No extraction will occur during wet periods and following the extraction of one area, no additional extraction of that area will occur.
- ❑ The volume of the sediment pond required is approximately 5,400 cubic metres with a surface area of 2,900 square metres, depth of 1.86 metres and approximate dimensions of 93 x 31 metres;
- ❑ The area of disturbance will be minimised by only clearing the areas required for active excavation at any one time, and progressive rehabilitation of completed excavations. The campaign areas will be excavated and rehabilitated progressively, from the north-west corner of the site, alternating from north to south moving towards the ridge that currently crosses the site. This will shield the residential areas on the eastern side of the site for as long as possible;
- ❑ A flocculation agent (eg. gypsum) will be required to settle sediment pond materials.
- ❑ Water collected in the sedimentation traps will be used for dust suppression as required;
- ❑ Topsoil will be cleared prior to the commencement of extraction works and stockpiled for use in the rehabilitation program. Stockpiles will be located such that any run-off from them during a storm event will be captured by the dirty water sedimentation pond described above;
- ❑ Road drainage will be provided along the entire haul road and silt traps will be constructed to safeguard against potential off site sedimentation impacts. These silt traps will be maintained for the life of the fill extraction;
- ❑ All surface run-off within the site will be managed and all points of water discharge within and from the site will be controlled in accordance with the Erosion and Sedimentation Control Plan to be prepared by the contractor;
- ❑ In the event of an oil spill, the spill should be contained and absorbent material used to collect it for appropriate disposal.

#### **3.16.4 Flora and Fauna**

The potential impacts on flora and fauna in the study area are expected to be insignificant. The following safeguards have been recommended to ensure the flora and fauna of surrounding areas are protected and preserved during the haul road construction and extraction operations:

- ❑ The least amount of groundcover vegetation and trees necessary to achieve the required purpose shall be cleared. Surveyors flagging tape shall be placed along the

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clearing boundary prior to the commencement of clearing operations, and no disturbance or clearing will take place beyond those limits;

- If any native fauna are found injured during the clearing operations, WIRES shall be informed immediately. No clearing operations shall continue before advice is obtained from WIRES;
- Any flora species listed in the *Noxious Weeds Act, 1993* identified at or in the vicinity of the sites shall be continually suppressed and destroyed in accordance with the Act;
- Any frogs encountered in dams to be removed should be live-captured and relocated to off-site areas of similar habitat, prior to removal of dams or their use as sediment basins;
- Following extraction operations, the Red Hill site will be progressively revegetated with locally endemic native grass and shrub species as soon as practical.

### **3.16.5 Visual**

The visual impact of the proposed development will depend to a large extent on mitigation strategies. These should include:

- At any one time, minimise the area that is exposed and without grass cover;
- Complete the operation in a minimum of six work areas;
- Carry out restoration of landform and re-grassing as soon as an area has been worked;
- Retain the undulating landform;
- Ensure that adjoining vegetation is not damaged; and
- Consider the need for supplementary planting adjacent to the adjoining homestead on the Riverina Highway.

### **3.16.6 Heritage & Archaeology**

The potential impacts on heritage and archaeology in the study area are expected to be low due to the disturbed nature of the site. The following safeguards have been recommended to ensure the heritage and archaeological items protected and preserved during the haul road construction and extraction operations:

- Apply to the NPWS for a Consent to Destroy permit for both sites identified in **Figure 3.4**;
- Discuss the relocation of the tree and management options with LALCs and NPWS;
- Should the LALCs wish to collect the artefact (TH-IF-1) they should apply for a Care and Control Permit from NPWS;
- In the unlikely event that unrecorded archaeological deposits are uncovered during the site clearing and fill extraction, work would cease immediately and the regional archaeologist from NPWS and the LALC would be contacted;

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- A dilapidation survey shall be carried out on the Mt Pleasant Homestead prior to the commencement of any clearing and/or extraction works;
  - The dilapidation survey will be carried out at the conclusion of the works to assess any damage to the building. If damage has occurred, appropriate restoration would be made;
  - Any clearing of vegetation within 15m of the northern fenceline shall be monitored by a qualified archaeologist to ensure that there are no sub-surface wells etc.

### **3.16.7 Waste Management**

The solid waste produced by the proposed development will be limited vegetative remains resulting from clearing the extraction site, human waste within the dry chemical toilet and general refuse resulting from meal breaks. No solid wastes of a toxic nature are anticipated to be produced or stored on site.

- All non-hazardous waste including materials that have become contaminated will be collected by use of absorbent material and disposed of within a suitable landfill in the area;
- Waste oils and greases, if produced, will be disposed of in accordance with EPA and Council guidelines;
- The vegetative litter remaining on site will stockpiled in a designated low area of the site and ultimately used for rehabilitation;
- Any general refuse produced during the operation will be placed in a suitable container with a heavy lid and the contents will be disposed of at the local landfill area when full.

### **3.16.8 Environmental Reporting**

The data collected as part of the monitoring program will be used to assist in reporting against the Project EMP. The contractor shall prepare an annual environmental report for submission to the RTA. The Contractor will be required to keep records regarding environmental management issues at the site. The reports shall include:

- Results of environmental monitoring;
- Self assessment results;
- Formal audit results;
- Register of non-conformances with EMP, approval/consent conditions and licence conditions;
- Reasons for non-compliance;
- Register of corrective action;
- Correspondence;
- Miscellaneous items (eg complaints).

At the completion of rehabilitation works the RTA Project Manager is to confirm that all the approval and licensing provisions applicable to the project, along with all the

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environmental management provisions in the Project EMP have been satisfactorily complied with.

## 4. Project Justification

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### 4.1 Introduction

It is a requirement in the preparation of an EIS to examine both the necessity for the project and alternative sites and sources. In the case of an extractive operation such as the one proposed, location is fixed by the position of an economic quantity of suitable material. Thus, the examination of alternative sites is limited.

The subsequent sections examine the presence of other sources of similar material and also the consequences of not undertaking the development.

### 4.2 Project Alternatives

A number of alternatives have been considered. They are:

- "no development" option;
- alternative resources outside the proposed Red Hill Site;
- alternative fill extraction plans and extraction methodology.

#### 4.2.1 The "No Development" Option

The consequences of adopting a "no development" option would mean that the construction of the Albury Wodonga National Highway Route, which was approved by the NSW and Victorian State Governments in January 1998, would not be possible across the floodplain through the urban area of Albury. This section of the Route requires substantial embankment construction.

If this section of the AWNHP was not constructed, the following benefits would not be achieved:

- An improved National Highway system;
- Improved/enhanced transport economies;
- Increased road capacity to handle anticipated demand for traffic into the future;
- Annual travel cost savings;
- A reduction in the number of accidents resulting from the existing situation;
- Reduced travel distances and times.

All of the above improvements and savings associated with the construction of the AWNHP would be foregone as a result of a "no development" option on the proposed extraction operations. It is therefore not considered a viable option.

#### 4.2.2 Alternative Material Sources

An assessment of the alternative sources of fill material should take into account the location of the source as well as the quantity of the available material. As mentioned previously, the location is critical. Consequently, alternative locations can only be seriously considered in the immediate locality of the AWNHP. Furthermore, the fill material quality must be suitable for the desired end use. For the material to be suitable

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for embankment construction, it should be inert, durable, of high compressive strength and relatively uniform composition.

Possible sources of suitable fill material were canvassed in EIS/ESS for the Albury Wodonga Potential National Highway Routes (GHD, 1995). Two borrow sites were identified within the area that were capable of meeting fill requirements. The first of these is the existing Brooks Quarry located off Olympic Way at Ettamogah. The Quarry is owned by AWDC. The second identified source of fill material in the area was Red Hill.

Both borrow sites are located in relatively close proximity to the Albury Wodonga Potential National Highway Route. Both may be used during the construction stage of the AWNHP. As both options may be utilised, environmental assessment of the Red Hill Site was required.

#### **4.2.3 Alternative Methods of Extraction**

Detailed attention has been given to the design of the extraction methodology. The extraction methodology, as described in **Section 2.5.3** is the most efficient method of extracting a unconsolidated colluvium resource of this nature given the operating and environmental constraints. The use of a bulldozer, front-end loader and a grader offers maximum equipment flexibility as they are all suitable for undertaking other site works such as shaping of final landform, spreading topsoil and the construction of sedimentation ponds, drains and roads.

The extraction methodology has been largely influenced by the environmental constraints and requirements of the site as well as operating constraints. Examples of these are:

- topsoil and cleared vegetation will be placed adjacent to the extraction strips to allow easy rehabilitation;
- rehabilitation of the site will be progressive, thus maximising the opportunity for successful revegetation of the area.

Although it is believed that the extraction methodology as planned is the best possible means of extracting the fill material, the RTA will monitor the performance of the methodology and instigate improvements as needed to further benefit the operation, the community and the environment.

#### **4.3 Assessment with the Principles of Ecologically Sustainable Development**

Ecologically Sustainable Development (ESD) is a goal to better integrate economic and environmental needs of the community. Generally ESD is development which meets the need of Australians today while conserving our ecosystems for the benefit of future generations. The requirements and obligations of a development to achieve sustainable development is guided by four main principles:

- the precautionary principle;

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- ❑ the provision of inter-generational equity;
  - ❑ the conservation of biological diversity;
  - ❑ improved valuation and pricing of environmental resources.

#### **4.3.1 The Precautionary Principle**

The National Strategy for ESD defines the precautionary principle as a guide so that "where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."

The onus is on the proponent to prevent environmental degradation, despite any lack of full scientific certainty that such measures are required. As part of the environmental assessment process, investigations were undertaken into the existing environment and measures developed to mitigate and monitor the impact and prevent any irreversible damage. The major areas applicable to this are those relating to long term or permanent impacts resulting from the proposed development. These are

- ❑ erosion/soil control;
- ❑ visual impacts;
- ❑ habitat impacts;
- ❑ impacts on heritage items.

For all cases, mitigation measures were identified to control the potential for such impacts. In particular, the potential for soil erosion and visual impacts will be minimised by the implementation of a progressive rehabilitation and revegetation program within the extraction area. The preservation of much of the existing vegetation and the implementation of a progressive tree planting program will also ensure that the heritage significance of the Hovell Walking Trail and the Mt Pleasant homestead are retained.

The proposal is therefore capable of being undertaken in a manner which does not threaten serious or irreversible environmental change.

#### **4.3.2 Inter-generational Equity**

The National Strategy for ESD defines the inter-generational equity objective as - "*to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations...and also to provide for equity within and between generations.*"

Although there is as yet, no clear methodology to integrate such an objective into the decision making process, it is considered that the proposed operation will not have any significant adverse effect on future generations.

The proposal will allow for the productive use of presently under-utilised land. The implementation of "best practice" environmental controls will ensure that the proposal will not significantly affect the surrounding environment and its beneficial use by future generations.

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### **4.3.3 Conservation of Biological Diversity**

The environmental assessment of the proposed development included investigations into the flora and fauna present on site. Based on the findings of the flora and fauna investigations and given the fact that proposed extraction site has been extensively cleared of natural vegetation, it may be concluded that the proposed development will not have any impact on the survival of any species and will therefore not significantly impact the biological diversity or ecological integrity of the natural environment.

### **4.3.4 Improved Valuation and Pricing of Environmental Resources**

Resource use occurs largely in response to market opportunities and pressures. Such resource use may have an adverse impact on those not represented in the market place and these costs may be regarded as "externalised" since the interests of certain sectors are external to those that affect market prices and costs. Examples of externalised costs with respect to the proposed development are potential losses in conservation value and the indirect costs from by-products.

An accepted methodology for dealing adequately with externalised costs and their value has not been determined. Therefore, it is not possible to place an exact value on the external costs and economically assess the project. It may be concluded, however, that through the implementation of the environmental safeguards and controls recommended in this document, the value of the external costs will be minimised. That is, minimal loss in amenity will result through the air, noise, water and visual controls to be implemented. Also, the site will be returned to a similar natural environment as is present.

The relatively low energy requirements and short-term nature of the operation will result in minimal external by-product related costs.

## **4.4 Justification and consequences of not proceeding**

The proposed extraction and haulage operations are an essential component of the construction of the AWNHP across the floodplain through the urban area of Albury. This section of the Route requires a substantial amount of fill material for the construction of the embankment at the same level as the existing railway line.

The proposed extraction site is well located and has a suitable quality and quantity of fill material. The relatively close proximity of the extraction site to the construction site means that the overall cost to transport material will be less and the environmental and community impacts associated with haulage operations will be minimised.

The final lowering of Red Hill will also enable Albury Airport to not require special dispensation for its take-off and landing gradient.

The extraction site and haulage route are located in areas which are already highly disturbed. Due to the highly disturbed nature of the area, any environmental, cultural, archaeological or scientific value of the area has been largely lost. Only a few trees will

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require removal and the majority of groundcover is grass species. The immediate extraction site and haulage route currently provides limited habitat potential for native fauna in the area.

Progressive rehabilitation and on-site water management controls will greatly reduce the impact on the visual amenity and water quality of the area. Also, substantial vegetative buffers will be in place to further assist in these areas. Environmental monitoring is also proposed to assess the project's environmental performance and further improve its operation.

Concerns raised during the consultation process have been considered and addressed. The environmental impacts of the development are expected to be minimal with the exception of noise. The mitigation measures that have been proposed in this EIS will negate or minimise most environmental impacts associated with the proposed development.

The central conclusion of this EIS is that the proposed facility should proceed, subject to the implementation of the mitigation measures listed in **Section 3.16** of this EIS.

## 5. References

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**Appendix - A Matters to be addressed in the EIS**

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Clause 54A of the Environmental Planning and Assessment Amendment Regulation, 1998, Schedule 2 of the Environmental Planning and Assessment Regulation, 1994 and Section 79c of the *Environmental Planning and Assessment Act, 1979*, specify the matters that must be considered in this EIS.

Also, the Director of the Department of Urban Affairs and Planning has forwarded matters to be considered in the preparation of this EIS. Other agencies have also been consulted in accordance with the Director's requirements and their requirements addressed.

The following summary has been prepared to assist people reading this EIS, or wishing to respond to it. It summarises where the issues required for consideration in the Act, the Regulation, the Director's requirements and other authorities are addressed in this EIS.

***Environmental Planning and Assessment Amendment Regulation, 1998 - Clause 54A***

Clause 54A - What must an environmental impact statement contain?

<p>1. The contents of an environmental impact statement must include:</p> <ul style="list-style-type: none"> <li>(a) for development of a kind for which specific guidelines are in force under this clause, the matters referred to in those guidelines, or</li> <li>(b) for any other kind of development: <ul style="list-style-type: none"> <li>i. the matters referred to in general guidelines in force under this clause, or</li> <li>ii. if no such guidelines are in force, the matters referred to in Schedule 2.</li> </ul> </li> </ul>	<p>See following tables</p> <p>n/a</p> <p>See next table</p>
<p>2. For the purposes of this clause, the Director may establish guidelines for the preparation of environmental impact statements, in relation to development generally or in relation to any specific kind of development.</p>	<p>See following tables</p>
<p>3. The Director may vary or revoke any guidelines in force under the clause.</p>	<p>n/a</p>
<p>4. An environmental impact statement prepared in accordance with this clause before the date of which any of the following events occur:</p> <ul style="list-style-type: none"> <li>(a) the amendment of Schedule 2</li> <li>(b) the establishment of new guidelines under this clause,</li> <li>(c) the variation or revocation of existing guidelines under this clause;</li> </ul> <p>is taken to have been prepared in accordance with this clause, for the purposes of any development application made within 3 months after that date, as if the relevant event had not occurred.</p>	<p>n/a</p>

***Environmental Planning and Assessment Amendment Regulation, 1998 - Clause 55***

Clause 55 - Requirements of Director and approval bodies concerning preparation of environmental impact statements?

<p>1. The applicant responsible for preparing an environmental impact statement must consult with the Director and, in completing the statement, must have regard to the Director's requirements:</p> <p>(a) as to the form and content of the statement, and</p> <p>(b) as to making the statement available for public comment.</p>	<p>See following tables and <b>Appendix - C</b>.</p>
<p>2. For the purposes of the consultation, the applicant must give the Director written particulars of:</p> <p>(a) the location, nature and scale of the development, and</p> <p>(b) in the case of a development application for integrated development, the approvals that are required.</p>	<p>See <b>Section 2</b></p> <p>See <b>Section 1.6</b></p>
<p>3. In the case of proposed development that is integrated development the Director must request, in writing, each relevant approval body to provide the Director with that approval body's requirements in relation to the environmental impact statement for the purpose of its decision concerning the general terms of the approval (including whether or not it will grant approval) in relation to the development.</p>	<p>Director's responsibility</p>
<p>4. If an approval body does not provide the Director, in writing, with its requirements within 14 days after receipt of the Director's request under subclause (3):</p> <p>(a) the Director must inform the applicant, and</p> <p>(b) the applicant:</p> <p>(i) must consult with the approval body and obtain its requirements in relation to the environmental impact statement for the purpose of its decision concerning the general terms of the approval (including whether or not it will grant approval) in relation to the development, and</p> <p>(ii) in completing the statement, must have regard to the approval body's requirements.</p>	<p>Director's responsibility</p> <p>n/a</p> <p>See tables below and <b>Appendix - C</b></p>
<p>5. Written notice of the Director's requirements must be given to the applicant within 28 days after the applicant's consultation with the Director is completed or within such further time as is agreed between the Director and the applicant.</p>	<p>See <b>Appendix - C</b></p>
<p>6. Written notice of the Director's requirements must also be given:</p> <p>(a) to the relevant consent authority (unless the Minister or the Director is the consent authority), and</p> <p>(b) to the relevant approval body in the case of proposed development that is integrated development and for which the approval body has</p>	<p>Director's responsibility</p> <p>Director's responsibility</p>

provided the Director with its requirements following the Director's request under subclause (3), at the same time as it is given to the applicant.	
7. If the development application to which the environmental impact statement relates is not made within 2 years after the notice is given, the applicant must consult further with the Director in relation to the preparation of the statement.	n/a
8. The Director may waive the requirement for consultation under this clause in relation to any particular development or any particular class or description of development, other than integrated development.	n/a

***Environmental Planning and Assessment Amendment Regulation, 1998 - Clause 66***

Clause 66 - What additional matters must a consent authority take into consideration in determining and development application?

For the purposes of section 79C(1)(a)(iv) of the Act, the following matters are prescribed as matters to be taken into consideration by a consent authority in determining a development application: (a) the Government Coastal Policy ..... (b) in the case of a development application for the demolition of a building ....	n/a n/a
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***Requirements of Schedule 2 of the Environmental Planning and Assessment Regulation, 1994***

1. Summary of the environmental impact statement	See Executive Summary
2. Statement of objectives of the proposal.	See <b>Section 2.1</b>
3. Analysis of feasible alternatives to carrying out the proposal. (a) Consequences of not carrying out the proposal; and (b) Reasons justifying the carrying out of the proposal.	See <b>Section 4.2</b> See <b>Section 4.2.1</b> See <b>Section 4</b>
4. An analysis of the proposal, including: (a) Full description of the proposal; (b) Description of the environment likely to be affected by the proposal together with a detailed description of those aspects of the environment that are likely to be significantly affected by the proposal; (c) Likely impact on the environment of the proposal having regard to the: (i) the nature and extent of the development or activity; and (ii) the nature and extent of any building or work associated with the development or activity; and (iii) the way in which any such building or work is to be designed, constructed and operated; and (iv) any rehabilitation measures to be development or	See <b>Section 2</b> See <b>Section 3</b>  See <b>Section 2.3</b> See <b>Section 2.3</b> See <b>Section 2.5.2</b> See <b>Section 2.8</b>

activity; and (d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment.	See Sections 3 & 3.16
5. Reasons justifying the carrying out of the proposal in the manner proposed having regard to: <input type="checkbox"/> biophysical considerations <input type="checkbox"/> economic considerations <input type="checkbox"/> social considerations <input type="checkbox"/> the principles of ecologically sustainable development	See Section 4
6. A compilation (in a single section of the EIS) of the mitigation measures to be undertaken to reduce impacts of the proposal.	See Section 3.16
7. A list of any approvals that must be obtained under any other Act or law before the proposal may lawfully be carried out.	See Section 1.6
8. For the purposes of this Schedule, "the principles of ecologically sustainable development" are as follows: (a) The precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. (b) Inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. (c) Conservation of biological diversity and ecological integrity. (d) Improved valuation and pricing of environmental resources.	See Section 4.3.1  See Section 4.3.2  See Section 4.3.3  See Section 4.3.4

Note: The matters to be included in item 4 ( c ) might include such of the following as are relevant to the development or activity;

- a) the likelihood of soil contamination arising from the development or activity;
- b) the impact of the development or activity on flora and fauna;
- c) the likelihood of air, noise or water pollution arising from the development or activity;
- d) the impact of the development or activity on the health of people in the neighbourhood of the development or activity;
- e) any hazards arising from the development or activity;
- f) the impact of the development or activity on traffic in the neighbourhood of the development or activity;
- g) the effect of the development or activity on local climate;
- h) the social and economic impact of the development or activity;
- i) the visual impact of the development or activity on the scenic quality of land in the neighbourhood of the development or activity;
- j) the effect of the development or activity on soil erosion and the silting up of rivers or lakes;
- k) the effect of the development or activity on the cultural and heritage significance of the land.

***Environmental Planning and Assessment Act, 1979 - Section 79C***

<p>1. In determining a development application, a consent authority shall take into consideration such of the following matters as are of relevance to the subject of that development application:</p> <p>(a) the provisions of:</p> <p>(i) any environmental planning instrument,</p> <p>(ii) any draft environmental planning instrument that is or has been placed on exhibition and details of which have been notified to the consent authority, and</p> <p>(iii) any development control plan, and</p> <p>(iv) any matters prescribed by the regulators, that apply to the land to which the development application relates</p> <p>(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.</p> <p>(c) the suitability of the site for the development,</p> <p>(d) any submissions made in accordance with this Act or the regulations,</p> <p>(e) the public interest.</p>	<p>See tables below n/a</p> <p>See tables below See tables below</p> <p>See <b>Section 3</b></p> <p>See <b>Sections 2 &amp; 4.4</b></p> <p>See <b>Section 3</b></p>
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***Director of the Department of Urban Affairs and Planning***

<p>In accordance with clause 55 of the Environmental Planning and Assessment Regulation 1994, issues outlined in the Environment Protection Authority letter (dated 3 October 1998) and the Department of Land and Water Conservation letter (dated 2 October 1998) should be considered in the EIS.</p>	<p>See tables below</p>
<p>Attachment 1 (contained Schedule 2 of the Environmental Planning and Assessment Regulation, 1994), outlines statutory matters that must be included in any EIS under clauses 54 and 54A of the Regulation.</p>	<p>See tables above</p>
<p>Albury City Council should be consulted and any comments Council may have should be addressed during the preparation of the EIS.</p>	<p>See tables below</p>

***Environment Protection Authority***

<p><u>Air Issues:</u> The EIS needs to address:</p> <p><input type="checkbox"/> the impact the proposal will have on the air quality of local airshed. In particular the EIS needs to address the generation of dust from the proposed extraction of fill material, and any associated crushing activity which may occur;</p> <p><input type="checkbox"/> the impact of the activity on the generation of greenhouse gas, and the likely impact of this generation.</p>	<p>See <b>Section 3.5</b></p> <p>See <b>Section 2.10</b></p>
<p><u>Water Issues:</u> <input type="checkbox"/> The EIS needs to address the treatment and disposal of all waste waters generated on site, in particular the treatment of sediment</p>	<p>See <b>Section 3.6</b></p>

laden waste waters and chemically contaminated waste waters.	
<p><u>Noise Issues:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The EIS needs to address the potential noise impacts associated with the proposed development. Reference should be made to the 'EPA Environmental Noise Control Manual (ENCM)' particularly Chapter 19, 20 and 21;</li> <li><input type="checkbox"/> Background (L<sub>90</sub>) noise measurements must be made at the nearest or most effected residential premises;</li> <li><input type="checkbox"/> The EIS should identify any noise impacts from the proposed activity and if necessary provide details of proposed noise control measures;</li> <li><input type="checkbox"/> The EIS should identify and likely impacts from any blasting which may occur, and propose appropriate control measures to ensure that unacceptable amenity impacts do not occur.</li> </ul>	<p>See <b>Section 3.4</b></p> <p>See <b>Section 3.4.1</b></p> <p>See <b>Sections 3.4.5 &amp; 3.4.6</b></p> <p>n/a</p>
<p><u>Waste Issues:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> All waste streams should be identified and method for the reduction, re-cycling, re-use or disposal of waste streams addressed.</li> </ul>	See <b>Section 3.13</b>

#### ***Department of Land and Water Conservation***

Provision of accurate location of the proposed pit.	See Error! Reference source not found.
Scale and nature of the operation, including dimensions of the pit, depth of the excavation, batters to be produced and staging of material to be removed.	See <b>Section 2</b>
The need for an approval under the Water Act is to be addressed.	See <b>Section 1.6</b>
Groundwater depth in the vicinity of the of the excavation is to be identified and any impact on or use of the groundwater is to be discussed.	See <b>Section 3.6.2</b>
The soil type to be excavated is to be identified and a description of its erosive susceptibility addressed.	See <b>Section 3.6</b>
A water and Soil Management Plan is to be produced for the site and can be incorporated into the EIS. This is to detail the management of stormwater runoff, erosion control methods and sediment control methods.	See <b>Sections 2.8.3 &amp; 3.6</b>

#### ***Mineral Resources***

<p>The following issues should be addressed in the EIS:</p> <ol style="list-style-type: none"> <li>1. The amount to be extracted and the method or methods used to determine this amount (eg. drilling, trenching);</li> <li>2. Characteristics of the material to be produced;</li> <li>3. Proposed uses and markets for the material;</li> <li>4. An assessment of the quality of the material and its suitability for the anticipated range of applications;</li> <li>5. Anticipated annual production, staging (if any), and life of the operation.</li> <li>6. Transport routes;</li> <li>7. Disposal of waste products and the location and site of the</li> </ol>	<p>See <b>Section 2</b></p> <p>See <b>Section 2.2.3</b></p> <p>See <b>Section 2</b></p> <p>See <b>Section 2.2.4</b></p> <p>See <b>Section 2</b></p> <p>See <b>Section 2.6</b></p> <p>See <b>Sections 2.3.1</b></p>
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<p>stockpiles;</p> <p>8. Assessment of noise, vibration, dust and visual impacts, and proposed measures to minimise these impacts;</p> <p>9. Justification for the proposal in terms of local and, if appropriate, regional context.</p>	<p><b>&amp; 3.16.7</b> See <b>Sections 3.4, 3.5, 3.11 &amp; 3.16</b> See <b>Section 4</b></p>
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### ***National Parks & Wildlife Service***

It is recommended that an archaeological survey of the proposed excavation site be carried out by a qualified archaeologist and that a report detailing the results of the survey be incorporated within the EIS.	See <b>Section 3.8</b>
Vegetation within the study area needs to be checked for signs of animal activity and use such as scratch marks from Squirrel Gliders, or owl pellets, and identification of habitat trees from Regent Honeyeaters.	See <b>Section 3.7</b>
It is advised that the likely impact of the proposed works on threatened flora, fauna and ecological communities are considered by carrying out the 8-part test of significance under section 5A of the EP&A Act. Any threatened species that are known or likely to occur in the vicinity of the proposal should be considered in the 8-part test.	See <b>Section 3.7</b>
It is recommended that the Atlas of NSW Wildlife is utilised to identify records of flora and fauna in the area.	See <b>Section 3.7</b>
The EIS needs to examine potential direct and indirect impacts and devise controls to protect against detrimental impacts. These include: <ol style="list-style-type: none"> <li>1. fire management;</li> <li>2. the effects of increasing traffic into the area;</li> <li>3. increased noise and dust;</li> <li>4. removal of habitat through clearing;</li> <li>5. possible introduction and spread of pest species</li> </ol>	<p>See <b>Section 3.16</b></p> <p>See <b>Section 2.8</b> See <b>Section 2.6</b> See <b>Sections 3.4 &amp; 3.5</b> See <b>Section 3.7</b> See <b>Section 2.8</b></p>
The EIS should consider the possible impacts on the Murray River and its tributaries through management prescriptions for erosion and sedimentation, runoff and the effects of flood event.	See <b>Section 3.6</b>

### ***Albury City Council***

Soil and water management plan, accounting for existing drainage paths both at the location of the excavation and along the haulage routes in accordance with EPA and DLWC requirements;	See <b>Section 3.6</b>
Method of Works Plans as prescribed under the Civil Aviation Regulations. The plan must ensure the minimisation of impacts on the operation of Albury Airport (eg. impact of dust on aviation).	See <b>Appendix - E</b>
Potential of dust nuisance to surrounding land uses and methods of dust suppression.	See <b>Section 3.5.5</b>
Provision for sedimentation traps.	See <b>Section 3.6</b>
Designation of haul roads and analysis of traffic impacts (including more details on the traffic volume and the time and duration that	See <b>Section 2.6</b>

construction vehicles will be operating within the residential areas.	
The use of any Council roads should be assessed in detail prior to any construction being undertaken. All Council roads must be reinstated to an equivalent standard upon completion of works.	See <b>Section 2.6</b>
Traffic Management Plan (include a discussion on the control of construction traffic, its interaction and impact on the street network and traffic safety).	See <b>Section 2.6</b>
Detailed rehabilitation plan (including methods of rectification and reinstatement of disturbed areas, final contours, plant species and timeframe).	See <b>Section 2.8</b>
Assessment of noise levels and impacts (include detailed noise contours).	See <b>Section 3.4</b>
Hours of operation.	See <b>Section 2.4</b>
Prepare a timeframe for proposed works and rehabilitation.	See <b>Section 2.8</b>

***Albury Local Environmental Plan 1995 (as amended)***

*Urban Fringe Zone - Matters for Consideration*

*"Despite any other provision of this Division, Council must not grant consent to development of land within the urban fringe zone unless it has made an assessment of:"*

(a) the physical characteristics of the land, including slope, aspect, topography, land capability, drainage, vegetation and landscape attributes	See <b>Section 2</b>
(b) the implications of the development on the future pattern of land use, including likely future road networks in the locality	Site will be returned to original use
(c) the relationship of the development to the existing and likely future urban use of land in the locality	Use is short term with site returned to original use
(d) the availability of an adequate reticulated water supply	n/a
(e) the availability of facilities for the removal or disposal of sewage effluent and wastes, including, where necessary and appropriate, the ability of the land to accommodate on-site disposal	See <b>Section 3.13</b>
(f) the availability of other public utility services and social facilities, having regard to the likely demand for those services or facilities and the cost of their provision	n/a
(g) the siting and design of any buildings, structures or works proposed	See <b>Section 2.3.1</b>
(h) the need for all weather vehicular access to the development	sealed haul road is being proposed
(i) the risk from flooding, bushfire, or other natural hazard, and the adequacy of any measures proposed for the prevention or mitigation of risk	See <b>Section 3.10</b>
(j) the demand for development of the land	It is understood that alternative development of the land in the near future is unlikely
(k) the availability of land elsewhere within the City of Albury, and	No other suitable

whether the development could be located on such land.	sites with the same level of fill material were located
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***Albury Local Environmental Plan 1995 (as amended)***

***Environment Protection Zone - Matters for Consideration***

*"Despite any other provision of this Division, Council must not grant consent to development of land within the Environment Protection Zone unless it has made an assessment of:"*

(a) the impact of the development on the natural scenic backdrops of the City area or the rural character of the land	See <b>Section 3.11</b>
(b) the effect of the development on the River Murray floodplain and other natural drainage systems and any measures to control stormwater run-off, soil sedimentation and erosion	See <b>Section 3.6</b>
(c) the availability of an adequate reticulated water supply and, where such a supply is unavailable, the source and capacity of any alternate water supply intended to service the needs of the development	See <b>Section 2.5</b>
(d) the availability of facilities for the removal or disposal of sewage effluent and wastes, including, where necessary and appropriate, the ability of the land to accommodate on-site disposal	See <b>Section 3.13</b>
(e) the availability of other public utility services and social facilities, having regard to the likely demand for those services or facilities and the cost of their provision	n/a
(f) the standard and capacity of public roads serving the land	No public roads will be serving the land
(g) the need for all weather vehicular access to the development	See <b>Section 2.6</b>
(h) the impact of any proposed land clearing or surface modification on the physical and visual environment and any measures proposed for protection of the environment, site rehabilitation or reforestation	See <b>Sections 2.5.2 &amp; 2.8</b>
(i) the need for retention or reinstatement of vegetation to protect the physical and visual environment and to reduce the risk of soil erosion	See <b>Section 2.8</b>
(j) the risk from flooding, bushfire, or other natural hazard, and the adequacy of any measures proposed for the prevention or mitigation of risk	See <b>Section 3.10</b>
(k) the physical characteristics of the land, including slope, aspect, topography and land capability attributes as related to the intensity of development	See <b>Section 3.6</b>
(l) the siting and design of any buildings, structures or works proposed	See <b>Section 2.3.1</b>
(m) whether any environmental resources, including riparian and floodplain ecosystems, will be jeopardised by the development	See <b>Section 3.6</b>
(n) the nature of other land in the locality	See <b>Section 3.3</b>

**Appendix - B Study Team**

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This Environmental Impact Statement was prepared for the RTA by Sinclair Knight Merz and a team of specialist sub-consultants. The following personnel contributed to the study:

***RTA (Goulburn Office)***

Wayne Donaldson

Senior Project Manager

***Sinclair Knight Merz***

Ken Robinson

Project Director

Ross Jones

Project Manager

Jennifer Bradford

Environmental Scientist

Sara Malin

Environmental Scientist

Karen Clark

Environmental Scientist

Damien Collins

Environmental Engineer

Bruce Fishburn

Civil Engineer

Paul Wait

Economist

Sean Morgan

Traffic Engineer

Jasen Taiaroa

Design Draftsman

Rosalynd Dare

MOSS/CADD

Graphics

***EDAW Consultants***

Jon van Pelt

Visual and Landscape

***Robynne Mills Archaeological & Heritage Services***

Robynne Mills

Heritage & Archaeology

***Navin Officer***

Kerry Navin

Heritage & Archaeology

***Gunninah Consultants***

Adam Gietzelt

Flora/fauna

Dominic Fanning

Nick Holmes

Scott Hartvigsen

Shaun Huguenin

Mandy Taylor

## Appendix - C Agency Correspondence

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New South Wales Government  
Department of Urban Affairs and Planning

Mr Ross Jones  
Sinclair Knight Merz  
100 Christie Street  
ST LEONARDS NSW 1590

Chris Ritchie

Contact:

S98/01200/Pt1

Our Reference:

Your Reference:

**Modification to the Proposed Extraction of Fill,  
Lot 922 DP 589483 Wirlinga, Albury**

Dear Mr Jones,

I am writing in response to your letter of 2 February 1998 seeking consultation with the Director-General for any additional requirements for the preparation of an environmental impact statement (EIS) for the above development in light of its proposed modification.

I understand that from the information that you have provided, the proposal has been modified to allow the extraction of 2.2 million cubic metres of material and not 750,000 cubic metres as originally intended.

Apart from the requirements outlined in our previous letter of 19 October 1998, the Director-General has no specific additional requirements for the modified proposal. As you previously identified that a permit or approval may be required from the Environment Protection Authority (EPA) and the Department of Land and Water Conservation (DLWC), the proposal is likely to be "integrated development". Subsequently, the Department also consulted with the EPA and DLWC to determine whether they had any additional requirements. The additional requirements of these agencies have been attached and are to be considered in the preparation of the EIS.

Please contact Chris Ritchie on (02) 9391 2085 if you require any further information.

Yours sincerely,

  
Geoff Noonan  
Director

**Development and Infrastructure Assessment**  
As Delegate for the Director-General

20 February 1998

Governor Macquarie Tower  
1 Farrer Place, Sydney 2000  
GPO Box 3927, Sydney 2001

Telephone: (02) 9391 2000  
Facsimile: (02) 9391 2111



Director  
Development and Infrastructure  
Department of Urban Affairs and Planning  
Box 3927 GPO  
SYDNEY NSW 2001

Our Reference: 240862A1

Your Reference:

Environment  
Protection  
Authority  
New South Wales

4th Floor  
553 Kiewa Street  
PO Box 544  
Albury NSW 2640

Telephone (060) 41 4963  
Facsimile (060) 41 4973

Attention: Chris Ritchie

Dear Sir

**RE: PROPOSED EXTRACTION OF FILL, LOT 922 DP 589483 WIRLINGA, ALBURY**

Reference is made to your facsimile and attachment dated 18 February 1999, outlining an increase in the proposed volume to be extracted from 750,000 m<sup>3</sup> to 2,200,000 m<sup>3</sup>. This represents a three-fold increase from what was already a significant extractive proposal.

In the EIS for the Albury-Wodonga Potential National Highway Routes, it is noted that the specific environmental effects associated with importing large quantities of select fill was not addressed in detail. The proposed volume of selected fill to be extracted from this site alone and incorporated into the Internal Relief Route is now more than double the total quantity of fill to be obtained from all borrow sites along the whole length of the Internal Relief Route, as detailed in the Albury – Wodonga National Highway EIS.

For this reason it is considered that the EIS for the extractive proposal must address both:

- the environmental impacts at the extractive site;
- and the environmental impacts associated with transporting the material to where it will be used in the Internal Relief Route.

**1. Impact at the Extractive Site**

Reference should be made to our earlier correspondence on this matter. Additional issues are:

- The remediation of the site should be addressed in detail.
- If blasting is now required, demonstrate clearly how compliance with the EPA's blasting guidelines will be achieved. Details should also be provided on the likely scheduling of blasting over the life of the extractive site.

**2. Off-site Impacts**

Potential exists for significant impacts to occur along the haulage corridors. This will occur both along haulage paths from the extraction site to the Internal Relief Route, and also along the Internal Relief Route corridor. For example, if large quantities of material are to

be transported to South Albury or Murray Floodplain, then residents East Albury and in the vicinity of Scots School could be subjected to continuous haulage traffic for up to two years. Of particular concern are the dust and noise impacts.

Noise:

The haulage activities along all corridors will need to comply with current EPA guidelines, as contained in Chapters 19 to 21 of the Environmental Noise Control Manual. The EIS must contain specific detail on:

- Predicted daily truck movements at selected locations for the duration of the project;
- Predicted noise levels along the haulage corridors, both in absolute terms and relative to background;
- Hours of operation;
- Haulage road construction and maintenance as it relates controlling noise;
- Details of noise control measures (such as barriers), including when they will be installed and the extent of control to be achieved;
- Location of stopping points along the corridor, and how noise from exhaust brakes and acceleration will be controlled.

Dust:

The dust emission from the haul roads and from the haul vehicles must be controlled to comply with EPA dust emission guidelines. The EIS must contain details on:

- Haul road surfaces, and specifically how the dust will be control. Details are also required on the additional measures that will be implemented in the event that higher than predicted or unacceptable dust impacts occur;
- The specific measures that will be required to control of dust from haulage vehicles;
- A prediction of the likely dust impacts. (This can be based on the monitoring results from other road construction activities.)

Other matter

- Details should be provided on the size and location of any areas that will be required for the disposal of unsuitable in situ material.

If you have any further queries, please contact Mr M Enright on (02) 6041 4963.

Yours sincerely



David Cook  
Head Regional Operations Unit, Murray  
for **Director-General**

17/2/99

**ATTENTION:****Chris Ritchie  
Department of Urban Affairs  
and Planning**LAND & WATER  
CONSERVATION**FROM:****Bronwyn Hetherington  
DLWC - Albury  
Phone: 0260 416 777  
Fax: 0260 218405**

22 February 1999

Dear Chris,

**Re: Proposed Extraction of Fill, Lot 922 DP 589483, Wirlinga, ALBURY**

Thank-you for providing us with the changes regarding the amount of material to be extracted at the above mentioned property. Our previous requirements are still of relevance but the following should be added:

1. Reason for the expansion of material required (750 000 cubic metres to 2.2 million cubic metres)
2. Discussion of alternative sites or the use of a number of sites to accumulate the material required. It should be demonstrated why the proposed site is the chosen location including both advantages and disadvantages of the site.
3. Impact of moving this amount of material with regard to the landscape including changes in runoff, groundwater infiltration, soil and slope stability
4. A rehabilitation plan is to be incorporated into the EIS

Hope this is of assistance. Please call me if necessary on the above number.

Yours sincerely

# New South Wales Government Department of Urban Affairs and Planning

.....

Mr Kenneth Robinson  
Sinclair Knight Merz  
100 Christie Street  
ST LEONARDS NSW 1590

Contact: Chris Ritchie  
Our Reference: S98/01200/Pt1  
Your Reference:

## Proposed Extraction of Fill, Lot 922 DP 589483 Wirlinga, Albury

Dear Mr Robinson,

Thank you for your letter of 11 September 1998 seeking consultation with the Director-General for the preparation of an environmental impact statement (EIS) for the above development.

Under clause 55 of the *Environmental Planning and Assessment Regulation 1994* (the Regulation), the EIS should consider the issues that have been outlined in the attached letters from the Department of Land and Water Conservation (dated 2 October 1998) and the Environment Protection Authority (dated 3 October 1998).

Attachment No. 1 outlines the statutory matters that must be included in any EIS under clauses 54 and 54A of the Regulation.

The Department's EIS Guideline '**Extractive Industries - Quarries**' contains the type of information most likely to be relevant to your proposed development. Not all the matters it contains may be appropriate for consideration in your EIS; equally, it is not exhaustive. The Guideline is available for purchase from the Department's Information Centre, 1 Farrer Place, Sydney or by calling (02) 9391 2222.

You should consult with Albury City Council and take into account any comments Council may have in the preparation of the EIS. The EIS should also address other issues that emerge from consultations with relevant local, State and Commonwealth government authorities, service providers and community groups.

As you have identified that a permit or approval may be required from some agencies if development consent is granted, the proposal is likely to be "integrated development". Consequently, 2 copies of the EIS and supporting documents should also be submitted with each of the relevant approval bodies (including a fee of \$250) at the same time that you lodge them with the Council.

Please contact Chris Ritchie on (02) 9391 2085 if you require any further information regarding the Director-General's requirements for the EIS.

Yours sincerely,

  
David Mutton 19/10/98  
Acting Director  
**Development and Infrastructure Assessment**  
As Delegate for the Director-General

Governor Macquarie Tower  
1 Farrer Place, Sydney 2000  
Box 3927 GPO, Sydney 2001

Telephone: (02) 9391 2000  
Facsimile: (02) 9391 2111

# DEPARTMENT OF URBAN AFFAIRS AND PLANNING

## Attachment No. 1

### STATUTORY REQUIREMENTS FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT UNDER PART 4 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

In accordance with the *Environmental Planning and Assessment Act 1979* (the Act), an environmental impact statement (EIS) must meet the following requirements.

#### *Content of EIS*

Pursuant to Schedule 2 and clause 54A of the *Environmental Planning and Assessment Regulation 1994* (the Regulation), an EIS must include:

1. A summary of the environmental impact statement.
2. A statement of the objectives of the development or activity.
3. An analysis of any feasible alternatives to the carrying out of the development or activity, having regard to its objectives, including:
  - (a) the consequences of not carrying out the development or activity; and
  - (b) the reasons justifying the carrying out of the development or activity.
4. An analysis of the development or activity, including:
  - (a) a full description of the development or activity; and
  - (b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected; and
  - (c) the likely impact on the environment of the development or activity, having regard to:
    - (i) the nature and extent of the development or activity; and
    - (ii) the nature and extent of any building or work associated with the development or activity; and
    - (iii) the way in which any such building or work is to be designed, constructed and operated; and
    - (iv) any rehabilitation measures to be undertaken in connection with the development or activity; and
  - (d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment.
5. The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development.
6. A compilation, (in a single section of the environmental impact statement) of the measures referred to in item 4(d).
7. A list of any approvals that must be obtained under any other Act or law before the development or activity may lawfully be carried out.
8. For the purposes of Schedule 2, the principles of **ecologically sustainable development** are as follows:
  - (a) The precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
  - (b) Inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
  - (c) Conservation of biological diversity and ecological integrity.
  - (d) Improved valuation and pricing of environmental resources.

#### Note

The matters to be included in item (4)(c) might include such of the following as are relevant to the development or activity:

- (a) the likelihood of soil contamination arising from the development or activity;
- (b) the impact of the development or activity on flora and fauna;

- (c) the likelihood of air, noise or water pollution arising from the development or activity;
- (d) the impact of the development or activity on the health of people in the neighbourhood of the development or activity;
- (e) any hazards arising from the development or activity;
- (f) the impact of the development or activity on traffic in the neighbourhood of the development or activity;
- (g) the effect of the development or activity on local climate;
- (h) the social and economic impact of the development or activity;
- (i) the visual impact of the development or activity on the scenic quality of land in the neighbourhood of the development or activity;
- (j) the effect of the development or activity on soil erosion and the silting up of rivers or lakes;
- (k) the effect of the development or activity on the cultural and heritage significance of the land.

An environmental impact statement referred to in Section 78A(8) of the Act shall be prepared in written form and shall be accompanied by a copy of Form 2 of the Regulation signed by the person who has prepared it.

Procedures for public exhibition of the EIS are set down in clauses 57 to 61 of the Regulation.

Attention is also drawn to clause 115 of the Regulation regarding false or misleading statements in EISs.

Note

If the development application to which the EIS relates is not exhibited within 2 years from the date of issue of the Director-General's requirements, under clause 55(7) of the Regulation the proponent is required to reconsult with the Director-General.

-- ♦ --



Environment  
Protection  
Authority  
New South Wales

4th Floor  
553 Kiewa Street  
PO Box 544  
Albury NSW 2640

Telephone (060) 41 4963  
Facsimile (060) 41 4973

Mr David Mutton  
Acting Director Development and Infrastructure  
Department of Urban Affairs and Planning  
Box 3927 GPO  
SYDNEY NSW 2001

Our Reference: 240862A1

Your Reference: Attention Paul Fredman

Dear Mr Mutton

RE: PROPOSED EXTRACTION OF FILL, LOT 922, DP 589483 WIRLINGA, CITY OF ALBURY

I refer to your request for the Environment Protection Authority's (EPA) requirements for the environmental impact statement (EIS) in regard to the above proposal received by the EPA on 28 September 1998.

The EPA has considered the details of the proposal as provided by the Department of Urban Affairs and Planning and has identified the information it requires to issue its general terms of approval below.

- **Air issues**

The EIS needs to address the impact the proposal will have on the air quality of local airshed. In particular the EIS needs to address the generation of dust from the proposed extraction of fill material, and any associated crushing activity which may occur.

The EIS also needs to address the impact of the activity on the generation of greenhouse gas, and the likely impact of this generation.

- **Water issues**

The EIS needs to address the treatment and disposal of all waste waters generated on site. In particular the EIS needs to address the treatment of sediment laden waste waters and chemically contaminated waste waters.

- **Noise issues**

The EIS needs to address the potential noise impacts associated with the proposed development.

*K. Clabba*  
12 OCT 1998  
*ledt*  
*508/01200 120.*

In assessing the potential noise impacts associated with the proposed development reference should be made to the 'EPA Environmental Noise Control Manual (ENCM)' particularly Chapter 19 – Noise Quality Objectives, Chapter 20 – Planning Noise Control and Chapter 21 Recommended Outdoor Background Noise Levels.

Background (L90) noise measurements must be made at the nearest or most effected residential premises.

The EIS should identify any noise impacts from the proposed activity and if necessary provide details of proposed noise control measures.

The EIS should identify and likely impacts from any blasting which may occur, and propose appropriate control measures to ensure that unacceptable amenity impacts do not occur.

- **Waste issues**

All waste streams should be identified and method for the reduction, re-cycling, re-use or disposal of waste streams addressed.

Based upon the information provided to the EPA, the applicant will require a pollution control approval and a pollution control licence as the proposed activity is scheduled under, both the Clean Air Act and the Noise Control Act.

The applicant will need to make separate applications to the EPA to obtain this approval and licence.

The EPA requests that the applicant provide 3 copies of the DA/EIS when lodging its application with the EPA. These documents should be lodged at the EPA's Murray Regional Office, Level 4 544 Kiewa Street Albury NSW. If you have any queries regarding this matter please contact either myself or Mark Enright on 02 6041 4963.

Yours sincerely



3/10/98  
David Cook  
Acting Regional Manager Murray  
for Director-General  
cc Sinclair Knight Merz.



Department of Urban Affairs and Planning  
1 Farrer Place  
Box 3927 GPO  
SYDNEY NSW 2001

Contact Name:  
Our Reference: B.Hetherington

2nd October 1998

Dear Sir / Madam,

**Re: Proposed Extraction of Fill for Albury Internal Relief Route**

A number of issues will be required to be addressed in the Environmental Impact Statement for the above mentioned development. They are as follows:

*Accurate location of the proposed pit.*

This will need to be provided by means of a large scaled map accurately pinpointing the pit and showing the boundary limits of the extraction. The map is to show contour lines, surrounding roads and any development (houses, industry etc) within the vicinity.

Two maps have been provided with the request for information but each shows a different study site. It is presumed that one is the extraction site and the other is the disposal site. This will need to be clarified in the EIS by the use of accurate maps.

*Scale and Nature of the Operation*

Scale and nature of the operation is to be detailed including dimensions of the pit, depth of the excavation, batters to be produced and staging of material to be removed.

*Water Act Approval*

The need for an approval under the Water Act is to be addressed - is it proposed to access groundwater for washdown?

*Groundwater*

Groundwater depth in the vicinity is to be identified and any impact on or use of the groundwater is to be discussed.

*Soil Type*

The soil type to be excavated is to be identified and a description of its erosive susceptibility addressed.

*Water and Soil Management Plan*

A Water and Soil Management Plan is to be produced for the site and can be incorporated into the EIS. This is to detail the management of stormwater runoff, erosion control methods and sediment control methods.

*R. de Silva*

*7/10*

*898/00200-CR.*  
**7 OCT 1998**  
*VHS*

If you require any further information please contact me on 0260 416777.

Yours sincerely

Bronwyn Hetherington  
Catchment Planning Officer

File No.	S 98	61200	001
ACT. OFFICER	D Mutton		
MARKING	C Ritchie		
LOCATION	MAHB.		



Kenneth Robinson  
Project Manager  
Sinclair Knight Mertz  
PO Box 164  
St Leonards NSW 1590

NSW DEPARTMENT OF MINERAL RESOURCES  
Minerals and Energy House, 29-57 Christie Street  
(P.O. Box 536), St Leonards, NSW 2065, Australia  
Phone (02) 9901 8888 - Fax (02) 9901 8777  
DX 3324 St Leonards

Our Ref: L98/0388  
Your Ref: IN02260.300:DMR\_L1

Dear Sir,

Re: REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENT  
PROPOSED EXTRACTION OF FILL-ALBURY NSW

I refer to your letter of 11<sup>th</sup> September, 1998 seeking this Department's requirements for an environmental impact statement (EIS) to be prepared for the above proposal.

Fill material is not a prescribed mineral under the Mining Act, 1992. Therefore, the Department of Mineral Resources has no statutory authority over the extraction of this commodity, apart from its role under the Mines Inspection Act, 1901 (as amended) with respect to safe operation of mines and quarries.

Notwithstanding the above, this Department is the principal government authority responsible for assessing the State's resources of construction materials and for advising State and local government on their planning and management.

The following issues should be addressed in the environmental impact statement:

1. The amount to be extracted and the method or methods used to determine this amount (e.g. drilling, trenching).
2. Characteristics of the material to be produced.
3. Proposed uses and markets for the material.
4. An assessment of the quality of the material and its suitability for the anticipated range of applications.
5. Anticipated annual production, staging (if any), and life of the operation.
6. Transport routes.
7. Disposal of waste products and the location and size of stockpiles.
8. Assessment of noise, vibration, dust and visual impacts, and proposed measures to minimise these impacts.
9. Justification for the proposal in terms of local and, if appropriate, regional context.

If you have any queries on these matters please contact Mr Jyrki Pienmunne of the Geological Survey on (02) 9901 8369.

As the operation will be a mine under the Mines Inspection Act, it is requested that you contact Mr Chris Prophy, Regional Inspector of Mines on (02) 6926 4513 or 015 293 446 for possible further requirements.

Yours faithfully,



S.R. Lishmund  
for **Director-General**

16/10/98



Kenneth Robinson  
Sinclair Knights Merz  
PO Box 164  
St Leonards NSW 1590

NSW  
NATIONAL  
PARKS AND  
WILDLIFE  
SERVICE

Our reference:  
Your reference: ZF0/FK/sn98/242  
IN02260.300:NPWS\_L1

14 October 1998

Dear Sir,

**RE: Proposed Extraction of fill - Albury NSW**

Reference is made to your letter of 11 September 1998 in which you consult with the National Parks and Wildlife Service (NPWS) on the above proposal. Thank you for the opportunity to comment, in future all correspondence on planning issues should be addressed to;

Environmental Planning Manager  
NPWS  
PO Box 2115  
Queanbeyan NSW 2620

Tel: (02) 6298 9701 Fax: (02) 6299 4281

The NPWS has an interest in the potential impacts of the proposed development on the following:

- areas of potential Aboriginal, archaeological and cultural heritage significance;
- areas of potential habitat value for threatened species and communities; and,
- areas of native vegetation & natural heritage value including wildlife corridors.

Given that the proposal is within an environmental protection zone and near the Murrumbidgee River the presence of the above attributes should be investigated by detailed surveys to determine significance.

Cultural Heritage

The NPWS has noted records for open camp sites and scar trees nearby. Since the site is within an environmental protection zone and near the Murray River there is a great potential for more sites and artefacts to be located on the proposal site. As there are known Aboriginal sites located within 5 km from site and major ground disturbances are proposed, the NPWS recommends that an archaeological survey of the proposed excavation site be carried out by a qualified archaeologist and that a report detailing the results of the survey should be incorporated within the EIS. NPWS has available the 'Aboriginal Cultural Heritage Standards and Guidelines Kit' for a fee of \$70.00. A list of consultant archaeologists can be provided by the NPWS. You are advised to contact David Major,

Southern Zone  
6 Rutledge Street  
Queanbeyan NSW  
2620 Australia  
PO Box 2115  
Queanbeyan 2620  
Fax: (02) 6299 4281  
Tel: (02) 6298 9700

Head Office  
43 Bridge Street  
Hurstville NSW  
Australia  
PO Box 1967  
Hurstville 2220  
Fax: (02) 9585 6555  
Tel: (02) 9585 6444

Australian-made 100% recycled paper

Manager Cultural Heritage Unit (Southern) on (02) 6298 9736 regarding cultural assessment requirements for the proposal. NPWS supports consultation with the local Aboriginal Community and the Albury Wadonga Local Aboriginal Land Council is the contact for this area, their phone number is 02 6025 7075.

NPWS also maintains an Aboriginal Sites Register on known Aboriginal sites. Material from this database is available upon written application and the receipt of the appropriate fee. Information on this service may be obtained by contacting Data Licensing Officer, Cultural Heritage Services Division, NPWS, PO Box 1967, Hurstville NSW 2220 or on (02) 9585-6471.

The proponent should be reminded that all Aboriginal relics in New South Wales are protected under Section 90 of the *National Parks and Wildlife Act 1974 (NP&W Act)*, which makes it an offence to knowingly damage, disturb, deface or destroy an Aboriginal relic or site without first obtaining the written consent of the Director-General of the National Parks and Wildlife Service. If a site is discovered the Manager Cultural Heritage Unit (Southern) should be contacted immediately on telephone (02) 6298 9736.

#### Flora and Fauna Issues

The NPWS has noted records for Barking Owl, Squirrel Gliders and Regent Honeyeaters. The vegetation needs to be checked for signs of animal activity and use such as scratch marks from Squirrel Gliders, or owl pellets, and identification of habitat trees for Regent Honeyeaters. At present there is a National Recovery Plan in place for the Regent Honeyeater. This species may be affected by any clearing that may occur with this area particularly as the recovery plan specifically identifies the clearing of box woodlands as a major threat to the ongoing viability of these species. The landscape has been so modified by extensive clearing that conservation of even very small remnants has become increasingly important.

The NPWS advises that you need to consider the likely impact of the proposed works on threatened flora, fauna and ecological communities by carrying out the 8-part test of significance under section 5A of the *Environmental Planning & Assessment Act 1979*. To satisfactorily address the 8-part test, mapping of the location and description of all native fauna habitats and plant species that are within the area proposed to be impacted and which are likely to be of local, regional or state significance is recommended. Any threatened species that are known or likely to occur in the vicinity of the proposal should be considered in the 8-part test.

The "Atlas of NSW Wildlife" maintained by NPWS identifies registered site records of fauna and flora species in NSW, including threatened species. It is recommended that this information is obtained for the site as it will assist with your assessment, particularly the 8-part test. Information from this database is available upon written application and the receipt of the appropriate fee. Information on this service may be obtained by contacting the Data Licensing Officer Susan Ayallew, Geographical Information Systems Division, NPWS, PO Box 1967, Hurstville NSW 2220, or by phoning (02) 9585 6684.

#### Management prescriptions

The EIS needs to examine potential direct and indirect impacts and devise controls to protect against detrimental impacts. Some of the controls that are to be implemented in the management plan of the quarry and addressed in the EIS are: fire management, the effects of increasing traffic into the area, increased noise and dust, removal of habitat through clearing, and possible introduction and spread of pest species. The activity will also have to consider the possible impacts on the Murray River and its tributaries through management prescriptions for erosion and sedimentation, runoff and the effects of a flood event.

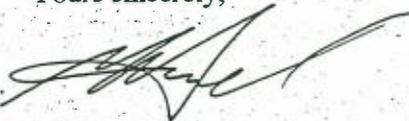
Recommendations

Issues that need to be addressed in the EIS for the extraction of fill quarry are;

- The 8 part test of significance for threatened species will need to be included in the flora and fauna study. This should include all areas proposed for disturbance including all infrastructure that will support the extraction site.
- Management Controls include; fire management, erosion and sedimentation, the effects of increasing traffic into the area, increased noise and dust, removal of habitat, and possible introduction and spread of pest species.
- An archaeological survey needs to be conducted by an appropriately qualified archaeologist or Aboriginal representative.

If you have any questions concerning this matter, please contact Frances Knight, Environmental Planning Officer, on (02) 6298 9711.

Yours sincerely,



Michael Hood  
Manager, Environmental Planning,  
Southern Zone

REFERENCE: G460.1-2, G455.9 CPD DL:gw

CONTACT: Mr T Newland

YOUR REF: IN02260.300:ACC\_L1



**ALBURY**  
City of Excellence

13 October 1998

Mr Kenneth Robinson  
Project Manager  
Sinclair Knight Merz  
PO Box 164  
ST LEONARDS NSW 1590

Dear Mr Robinson

**SUBJECT: EIS FOR THE PROPOSED EXTRACTION OF FILL  
FROM RED HILL, ALBURY NSW**

I refer to your correspondence dated 11 September 1998 and thank you for the opportunity to provide an input into the 'Red Hill' EIS.

I have outlined below a list of matters that should be addressed by the EIS:

1. Soil and water management plan, accounting for existing drainage paths both at the location of the excavation and along the haulage routes in accordance with Environment Protection Authority and Department of Land and Water Conservation requirements.
2. Method of Works Plans as prescribed under the Civil Aviation Regulations. The plan must ensure the minimisation of impacts on the operation of Albury Airport (eg impact of dust on aviation).
3. Potential of dust nuisance to surrounding land uses and methods of dust suppression.
4. Provision for sedimentation traps.
5. Designation of haul roads and analysis of traffic impacts (including more details on the traffic volume and the time and duration that construction vehicles will be operating within the residential areas.
6. The use of any Council roads should be assessed in detail prior to any construction being undertaken. All Council roads must be reinstated to an equivalent standard upon the completion of works.
7. Traffic Management Plan (include a discussion on the control of construction traffic, its interaction and impact on the street network and traffic safety).
8. Detailed rehabilitation plan (including methods of rectification and reinstatement of disturbed areas, final contours, plant species and timeframe).
9. Assessment of noise levels and impacts (include detailed noise contours).
10. Hours of operation.
11. Prepare a timeframe for proposed works and rehabilitation.

With respect to the possible haulage route indicated on the map attached to your correspondence, Council is not satisfied that this would minimise the potential impacts on the operation of Albury Airport. Council's preferred transport route would utilise Elizabeth Mitchell Drive and Corrys Road to reach the construction site, as indicated in the attached figure.

..12

**Sinclair Knight Merz**

**13 October 1998**

In respect of the proposed rezoning, Council's requirements for the local environmental study have been transmitted by facsimile to Jenny Bradford of your office on 9 October 1998. It would be appreciated if you could notify Council of any items that may fall beyond the scope of the 'Red Hill' EIS.

As requested, the relevant development application forms and fee schedules are attached. I have also attached a copy of Albury Local Environmental Plan 1995 and Albury Development Control Plan for your information.

Should you require any further information or input from Council, please do not hesitate to contact Council's Strategic Planner, Mr Tony Newland, on (02) 6023 8145.

Yours sincerely



L G Tomich

**Director**

**City Planning and Development**

Encl: Map indicating Council's preferred haulage route  
Development Application forms  
Schedule of Fees  
Local Environmental Plan

## Appendix - D Route Options Study

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**Roads and Traffic Authority**  
**May 1999**

**Environmental Impact Statement  
for Excavation of Fill Material  
From Red Hill for Construction of  
the Albury Wodonga National  
Highway Project**

**Route Options Study**

Final

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**SINCLAIR KNIGHT MERZ**

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## Document History and Status

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## 1. Introduction

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The Roads and Traffic Authority (RTA), in partnership with Vicroads and the Federal Department of Transport and Regional Development, is managing the NSW component of the construction of the Albury Wodonga National Highway Route.

Joint approval was given for the inner route in January 1998. The Federal Budget in May 1998 provided funding for the project with an allocation of \$7million for NSW and \$4million for Victoria. This enables major construction works to commence in 1999/2000. The NSW and Victorian sections of the works will be undertaken separately, but concurrently, by RTA and Vicroads as a single project, with the project divided at the northern abutment of the Murray River Bridges.

The works in NSW extend for approximately 38km. They are to be undertaken by the private sector under a single design, construct and maintain (DCM) contract.

The carriageways of the inner route will be constructed at a level similar to the adjacent railway line through the urban area of Albury. This will require substantial embankment construction, particularly across the floodplain, and will involve borrowing approximately 2.2 million m<sup>3</sup> of fill material from outside the corridor.

Possible sources of suitable fill material were canvassed in the Environmental Impact Statement / Environmental Effects Statement (EIS/ESS). One source considered was a hill located east of the eastern end of the airport runway, known as Red Hill. This is in relatively close proximity to the project and has the added community safety benefit of easing the take-off and landing gradient for aircraft using the airport.

The EIS/ESS considered the haulage of material from Red Hill to the project through the airport grounds but did not assess the environmental impact of the excavation. A separate EIS is being prepared by Sinclair Knight Merz (SKM) on the excavation works. This route options study (ROS) will provide information for that EIS. While the EIS assessed the haulage of material from Red Hill, the RTA intends to provide a haulage link with the least environmental, economic and community impacts.

### 1.1 Route Options Study

The ROS summarises the study approach, the stakeholder consultation and the preliminary environmental investigations which have led to the identification of a number of possible routes for the haulage of material from Red Hill to the construction zones. These have been assessed by SKM staff and a preferred route developed.

---

This ROS forms part of the overall EIS for the extraction works. More comprehensive environmental impact assessment of the preferred route will be undertaken as part of that assessment.

## 1.2 Study Area Overview

The study area is located to the east of the CBD and main residential areas of Albury. It is east of the main rail line. This rail link essentially severs the established residential areas on the west of the rail line from the industrial and rural residential uses on the eastern side. The area is bounded by Albury Airport to the south, Bowna Road to the East, and the rail line to the North and West. The area is predominantly flat, low lying land, with undulations toward Red Hill to the East and an elevated area around the intersection of Dallinger Road and Union Street to the North. The area has been largely cleared but still contains some stands of disturbed eucalypts.

Red Hill itself is located to the east of the Airport, but is within the flight path. Between the Airport and Red Hill is an area of low lying grazing land that is subject to inundation. This area would be the location of a constructed haul road, common to all of the potential options.

The area of land to the North of the airport is characterised by industrial and rural residential uses, with some residential properties. The majority of the rural residential lots are associated with the horse racing track and associated stables. Albury Council also operates a capital works depot in the area immediately North of the Airport. A jet boat racing facility is also in operation to the North of the Airport; access is from Fallon Street. Access to the facility is off Fallon Street. Approximately three times per year, jet boat racing events are held which attract crowds of up to 20,000 people for each event.

Roads in the study area that could be used for haulage purposes are two lane and in varying states or repair. Fallon Street has been re-surfaced within the last five years and is the only road within the area with a speed limit greater than 60km/hr.

## 1.3 Route Options Process

The primary purpose of the route options process was to assess the possible route options for on-road, off-road and other transport modes and to recommend a preferred option taking into account environmental, economic and social factors.

The objectives of the route options process was to:

- 
- develop potential routes for the proposed haulage of excavation materials from Red Hill;
  - identify constraints to various routes through consultations with stakeholders, and through site investigation;
  - propose a preferred route for consideration by the RTA.

#### **1.4 Study Approach**

There were essentially three phases in the route selection process. These included:

- consultation with key stakeholders including Albury Council and the Albury Wodonga Development Corporation (AWDC);
- constraint mapping and cost estimates;
- route selection and ranking.

## 2. Stakeholder Consultation

### 2.1 Preliminary Route Options

Prior to stakeholder consultation commencing, a SKM Think Tank was held to develop preliminary routes to stimulate discussion with key stakeholders. They were developed to cater for on-road and off-road transport. These are both valid options, with on-road options making use of standard haul trucks registered for road use. Off-road options would make use of larger vehicles that would not be registered for access on public roads. This option would result in fewer trips, but would utilise larger vehicles and require a separate haul road/s to be constructed. Over the two year construction period, on-road options would result in 880,000 heavy vehicle trips on local roads or the Riverina Highway. The off-road option would result in 88,000 trips on dedicated haul roads<sup>1</sup>. To make these figures more easily understood, they have been converted to hourly traffic movements<sup>2</sup>. The on-road options would result in an increase in heavy vehicle traffic of approximately 145 trucks per hour for the two year construction period. The options are described below and can be seen in **Figure 2.1**.

**Table 2.1: Preliminary Route Options**

Option ID	Description
R-1	Option R-1 is for standard road based haul trucks. It would involve the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west. Trucks exiting the site would be turning right onto Elizabeth Mitchell Drive and would be best served by the installation of traffic signals. To avoid conflict with traffic turning left from Fallon Street onto Elizabeth Mitchell Drive, the proposed intersection would be located so as to form a cross-road with Fallon Street. Once trucks had turned right onto Elizabeth Mitchell Drive, they would proceed North to Corrys Road where they would turn left and proceed west along Corrys Road until reaching the intersection at Dallinger Road. Trucks would then be required to turn left onto Dallinger Road and proceed South before turning right onto Union Street where access would be provided to the construction site.
R-1a	Option R-1a is the same as option R-1 up to the intersection of Corrys Road and Dallinger Road. This intersection could be regulated by traffic signals, with haul vehicles proceeding straight ahead from Corrys Road to land that is currently owned by the RTA. Access to Dallinger Road would be required on that land and a haul road from there to the construction site. (This would avoid the residential properties on Dallinger Road and Union Street)
R-2	Option R-2 was suggested by Officers from Albury Council and is for road based haul trucks. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west. The haul road would be constructed to link with Fallon Street and would be best served by the installation of traffic signals at the intersection of Fallon Street and Elizabeth Mitchell Drive. Haul trucks would proceed along Fallon Street to Dallinger Road where they would turn right onto Dallinger Road and proceed North to Union Street. Trucks would then turn left on Union Street and proceed west to the construction

<sup>1</sup> The figures are based on 2.2 million m<sup>3</sup> of material being hauled. Standard haul trucks have a carrying capacity of approximately 5m<sup>3</sup> while large CAT 777 or 769 vehicles have a carrying capacity of approximately 50m<sup>3</sup>.

<sup>2</sup> Hourly truck movements are based on the assumptions in footnote no. 1 and 304 working days per year (taking 52 Sundays and 9 public holidays from 365 days). Of those 304, 52 will be Saturdays on which working hours are assumed to be 8am - 1pm, while 252 days will have working hours from 7am - 6pm. This results in a total of 6064 working hours over the two year construction period. Using the same assumptions, off-road vehicle movements would be at a rate of 14 per hour.



	site access point.
R-2a	Option R-2a is the same as option R-2 up to the intersection of Dallinger Road and Union Street. Instead of turning left onto Union Street, trucks would continue North on Dallinger Road to an access point onto RTA land on the opposite side of Dallinger Road from Corrys Road. Traffic signals would need to be installed at this access point to enable trucks returning to Red Hill to turn right onto Dallinger Road. It should be noted that vehicles heading South on Dallinger Road encounter Stop signs at Union Street, where Union Street traffic has priority.
R-3	Option R-3 was suggested late in the route selection process. It involves the haulage of materials from Red Hill south west along the Riverina Highway to the construction zone. It would require the construction of a small haul road from the excavation site to the Highway where traffic signals would need to be installed to ensure safe access onto the Highway. The road based vehicles would then turn right onto the Highway and proceed directly to the construction zone. Trucks returning to Red Hill would also follow the Riverina Highway and perform a left turn into the extraction site.
OR-1	Option OR-1 is for larger haul trucks, unable to be registered for public road access. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west. The haul road would be constructed to link with Fallon Street. It is proposed that Fallon Street (between Elizabeth Mitchell Drive and Dallinger Road) be closed to normal traffic and be dedicated to use by haul vehicles. This would result in the intersection of Fallon Street and Elizabeth Mitchell Drive becoming a level crossing for haul road vehicles. Haul trucks would proceed along Fallon Street to the western edge of the Jet Boat Racing facility, where they would turn right onto a haul road that would need to be constructed. This haul road would then head NNW through cleared grazing land owned by the AWDC. A further level crossing would be required to enable haul trucks to cross Dallinger Road onto RTA land, to the south of the Corrys Road/Dallinger Road intersection. Further haul road construction would then be required from Dallinger Road to the construction site. It should be noted that alternative access arrangements would be required for the Jet Boat Racing facility. Access is currently from Fallon Street. Access could be provided along Fallon Street on the 3 days of events, but this would require scheduling of haulage to not occur on those days. Alternatively access could be provided Terry Circuit to the east by construction an access road from the end of Terry Circuit across the drainage canal to the eastern side of the Jet Boat Racing facility.
OR-2	OR-2 is similar to OR-1 except the point at which the haul road veers North off Fallon Street is further to the west. It essentially runs along the eastern boundary of the properties along Dallinger Road. OR-2 then crosses Dallinger Road at the same point as OR-1.
OR-3	Option OR-3 is for larger haul trucks, unable to be registered for public road access. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west. The haul road would be constructed to link with Fallon Street. Fallon Street would be closed to local traffic between Elizabeth Mitchell Drive and Dallinger Road. Trucks would proceed west along Fallon Street until reaching an area adjacent to the Council Capital Works Depot on the corner of Fallon Street and Dallinger Roads. From there, the haul road would veer onto Airport land and proceed along the Northern boundary of the Airport, remaining as close as possible to the Northern fenceline. It would then turn South and follow the fenceline of the Kain Tissue Factory, before turning west and following the drainage canal to Jetbart Road. Due to the tight land constraints, this option may require some industrial property resumption.
RS-1	Option RS-1 involves the construction of a rail siding from Red Hill to the construction site following a similar route to OR-1 or OR-2, except it would run adjacent to and to the North of Fallon Street. It would also involve the construction of load/unload facilities at both ends of the rail siding. It would involve level crossings at Elizabeth Mitchell Drive and Dallinger Road.

It should be noted that for OR-1 and OR-2 that if the closing of Fallon Street was unacceptable to the community/Council, a haul road could be constructed on the northern side of Fallon Street from Elizabeth Mitchell Drive. However, this would be in low lying land and require partial resumption of land on the Jet Boat Racing facility site.

These options were discussed with representatives from Albury Council and the AWDC at separate stakeholder meetings.

## 2.2 Albury Council

A meeting was held with Albury Council representatives on 13 November 1998 to discuss the route options. The following is a summary of their comments:

**Table 2.2: Albury Council Route Option Comments**

Option ID	Comments
R-1	While viewing this as a valid road based option, Council representatives were concerned about the impact of trucks passing residences on Corrys Road, some of which were quite new. This area is likely to see some growth in new housing development over the life of the project, with increased truck numbers likely to affect property values. Of the on-road options, this was the least favoured.
R-1a	The same comments apply for R-1. Council representatives viewed this option as better than R-1 because it did not affect residents in Union Street. They did note that there may be "some issues" with passing under the transmission lines at the intersection of Corrys Road and Dallinger Road.
R-2	This option was originally recommended by Council and is still seen as Council's preferred on-road option, provided some compensation was given for the repair of roads after haulage works were completed.
R-2a	Council viewed R-2 and R-2a as equivalent in standing as long as the transmission lines corridor did not impede the access and haul road on RTA land to the West of Dallinger Road.
R-3	This option was not discussed with Council, although a general statement was made that options that impinged on resident's amenity would not be supported.
OR-1	Council representatives acknowledged the economic advantages of using larger vehicles to haul materials. They did not have any problems with the level crossing concept as long as they were regulated with traffic signals. Council's preference was to utilise Fallon Street, rather than constructing a haul road adjacent to and to the North of Fallon Street. OR-1 was the favoured option because it was furthest away from noise sensitive receptors and because of the economic advantages of being able to use larger vehicles.
OR-2	The same comments apply for OR-1, except that this option was closer to residences along Dallinger Road, creating a greater potential for noise impact. Even taking this into account, OR-2 was the second most favoured option.
OR-3	Council representatives were adamant that this option was not acceptable. Their view was that there was too much risk associated with haul activities on Airport land. The Civil Aviation Regulation specified that an area of 150m either side of the runway's centre-line be kept clear for emergency landing purposes. It would be very difficult to fit a two lane haul road for oversized vehicles in the area adjacent to the runway. The haul road would also need to cross an emergency access road, which must be kept clear at all times. Council representatives made it very clear that this option would have little chance of getting approved.
RS-1	The rail siding option was also discussed with Council representatives. This was not regarded as a viable option as it followed the same routes as the two most favoured road options but required multiple handling of materials with load/unload requirements.

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### 2.3 Albury Wodonga Development Corporation

The AWDC is a major landowner in the Albury Wodonga area. Red Hill and the majority of land required for the various haul road options is owned by the AWDC. For this reason, it was consulted on 13 November 1998 regarding the options outlined in Section 2.1 of this ROS. The following is a summary of their comments:

**Table 2.3: AWDC Route Option Comments**

Option ID	Comments
R-1	The AWDC had no definite opinions on any of the on-road options, other than they thought the R-2a option was the most direct.
R-1a	See comments for R-1.
R-2	See comments for R-1.
R-2a	See comments for R-1.
R-3	This options was not discussed with the AWDC.
OR-1	The AWDC was positive about both OR-1 and OR-2 as long as there was some form of compensation for the utilisation of AWDC land. There was an indication that the land was proposed to be developed during the duration of the haulage works, so some form of compensation to allow the land to remain sterile would have to be negotiated with the RTA. Because OR-1 essentially severed the AWDC land down the middle, they preferred OR-2 over OR-1, but this preference was not strong.
OR-2	See comments on OR-1.
OR-3	AWDC had no strong opinions on this option. It did indicate that this option was unlikely to meet with Council approval as Airport safety was a very high priority. This option could compromise safety standards.
RS-1	This option was not favoured by the AWDC. Its opinion was similar to Council's in that it followed the same routes as the two most favoured road options but required multiple handling of materials with load/unload requirements. Also, there was little potential for the re-use of the rail siding after the haulage activities were complete. There may be some use for the road in a sub-division scheme.

As a result of these stakeholder meetings, and the likely difficulties in construction, options OR-3 and RS-1 were discarded.

### 3. Constraints

#### 3.1 Statutory Planning

Development approvals and environmental planning and assessment procedures are undertaken in accordance with the *Environmental Planning and Assessment Act, 1979*, the *Environmental Planning and Assessment Amendment Act, 1997*, the Environmental Planning and Assessment Regulation, 1994 (as amended) and the Environmental Planning and Assessment Amendment Regulation, 1998.

The proposed haul routes are located within the Albury City Council Local Government Area. The relevant planning instrument is the Albury Local Environmental Plan 1995 (as amended) (LEP). The land proposed for the haul route options falls into three landuse zones, as defined by the LEP. These include the following:

**Table 3.1: Landuse zones**

Zone	Comment
Environment Protection Zone	The land on which Red Hill is located and then west to, and including, Elizabeth Mitchell Drive is zoned "Environment Protection Zone". This zone is defined under Part 3, Division 6 of the LEP. The main objective of this zone is the identification and protection of land adjacent to the Albury urban area which forms a part of the scenic backdrop or rural setting or is located within or adjacent to the River Murray floodplain. As with all zones defined in the LEP, there are no developments that are classified as prohibited. However, this also results in all developments requiring Council consent.
Employment Area Zone	The area owned by AWDC, North of Fallon Street, South of Corrys Road and between the Western boundary of the Jet Boat Racing facility and East of, and including, Dallinger Road is zoned "Employment Area Zone" under Part 3, Division 4 of the LEP. This zone also includes the Airport and much of the surrounding industrial area to the railway. The principal objective of the zone is to identify land for industrial and related land uses. The haul route is not prohibited in this zone, but requires Council consent.
Living Area Zone	The area of land north of the racecourse and bounded to the West and North by the railway and to the East by Dallinger Road (Dallinger Road, North of the racecourse is also included in this zone) is part of the "Living Area Zone" as defined under Part 3, Division 2 of the LEP. The principal objective of the zone is to identify land for residential and other compatible uses. The haul route is not prohibited within this zone, but requires Council consent.

Part 4 of the LEP also defines "Miscellaneous Provisions" which requires Council consent for:

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□ Tree Preservation

*"... A person must not poison, ringbark, cut down, lop, chop, injure or wilfully destroy a tree on any land to which this plan [LEP] applies if the tree:*

- (a) is greater than 4.5m high; and*
- (b) has a girth greater than 0.45m at a height of 1m from the ground; and*
- (c) has a branch spread greater than 3m, without the consent of Council."*

□ Roads

- "(1) A person must not construct a road which has access to an existing public road or a proposed road, except with the consent of Council.*
- (2) Council must not, without the approval of the RTA, cause to be aligned or realigned any road that is a classified road.*
- (3) .....*"

In summary, the statutory planning controls constrain the proposed haul routes only in that they require Council consent.

### 3.2 Land Use & Environment

The land between Red Hill and to the East of Elizabeth Mitchell Drive is common to all route options. This is currently used for grazing purposes. The haul route should not impact greatly on this use as long as the route is fenced to prevent grazing livestock from accessing the haul route.

Due to the proximity to the Airport, Council would require a Method of Works Plan (MOWP) to be submitted and approved prior to the commencement of any construction works. The works will have to comply with the Civil Aviation Safety Authority's (CASA) "Directions Relating to Aerodrome Works" from CASA's "Rules and Practices for Aerodromes".

**Table 3.2: Land use & Environment constraints**

Option ID	Constraints
R-1	As discussed previously, the main land use constraints for this route are the new residential dwellings (current and proposed) located adjacent to Corrys Road. Increases in heavy vehicles are likely to affect the amenity of residents who have bought properties on a road not currently subject to such traffic. This route would also affect residences on Union Street and Coolaroo Avenue as trucks would still use Union Street to access the construction zone.
R-1a	The comments are the same for R-2 except that the residents on Union Street and Coolaroo Avenue will not be affected by this option.
R-2	The main constraint the this option holds is the proximity of increased heavy vehicles to residential and other noise sensitive locations along Dallinger Road and Union Street. There are approximately 13 residences that would be affected by increased traffic noise on Dallinger Road and a further 5 residences that would be affected on Union Street and Coolaroo Avenue. Additionally, there is the potential for limitations for times of use of this route due to the racecourse and associated stables. Race horses and young horses in training are crossing Dallinger Road constantly between the hours of 6am and 9am, Monday to Saturday. This has the potential to result in safety impacts from collision of haul trucks with horses and/or safety risks for handlers of startled horses.
R-2a	The comments are the same for R-1 except that the residents on Union Street and Coolaroo Avenue will not be affected by this option.
R-3	The main issues with this route are substantial increases in heavy vehicle traffic and associated traffic noise. This option would pass by the most residences of all options. Noise amelioration would be required for residences along the Riverina Highway, as it is anticipated that traffic noise levels would increase substantially. Traffic impacts would also occur with the large increase in traffic generally, with the majority of the increase being in heavy vehicle traffic.
OR-1	The closing of Fallon Street to public traffic represents a land use constraint with this option. The last Council traffic survey of the use of Fallon Street between Dallinger Road and Elizabeth Mitchell Drive (July 1998) indicated a combined direction average 24 hour traffic count of 1197 vehicles. These vehicles would need to change their route. The closure of a public road such as Fallon Street is also likely to result in protest from the "Save Our City" community group. Access to the Jet Boat Racing facility is a land use issue needing resolution. Three times per year, approximately 20,000 people attend events at the site. For this route to be viable, access would have to be granted along Fallon Street on those three days of the year or alternative access would have to be provided via Hoffman Road and Terry Circuit. The land owned by the AWDC to the North of Fallon Street between Dallinger Road and the western boundary of the Jet Boat Racing facility is low lying land used for grazing. Some vegetation clearing would be required along with some roadbase filling. The other main landuse constraint is construction within a transmission line easement where the haul road would cross Dallinger Road and onto RTA owned land adjacent to the construction zone.
OR-2	The landuse constraints for OR-2 are similar to OR-1, except that OR-2 would border the rear of residences and horse stables. The proximity is likely to result in greater noise impact that would be the case with OR-1.

Following assessment of landuse and environment constraints, the following three options were regarded as viable, and warranting an economic assessment. These included:

- R-2/2a;
- R-3
- OR-1.

R-1 and R-1a were discarded due to opposition from the Council and the AWDC having just released land for residential uses. Property and noise impacts were regarded as prohibitive.

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OR-2 was discarded as it did not offer any benefits over OR-1 and was likely to result in a greater noise impact on residences and stables along Dallinger Road.

### 3.3 Costs

An economic evaluation of the remaining options was carried out as part of the route options study. The purpose of this evaluation was to determine the most economically efficient means for transporting land fill from the Red Hill excavation site to the bypass construction site.

The analysis has used a least cost methodology for comparison as there is no provision for a 'do-nothing' base case; land fill must be extracted from Red Hill and driven to the construction site. The options assessed have been described previously in this report but are re-stated below for clarification:

#### R2

This option was suggested by Albury Council and is for road based haul trucks. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west (approximately 0.7km). The haul road would be constructed to link with Fallon Street and would be best served by the installation of traffic lights at the intersection of Fallon Street and Elizabeth Mitchell Drive. Haul trucks would proceed along Fallon Street to Dallinger Road (approximately 1.6km) where they would turn right onto Dallinger Road and proceed north to Union Street (approximately 1.1km). Trucks would then turn left on Union Street and proceed west to the construction site access point (approximately 0.5km), where they would then travel south west along the construction zone to the construction zone centroid (approximately 5.4km). This would result in a total one way trip length of 9.3km.

#### OR-1

This option is for larger haul trucks, unable to be registered for public road access. It involves the construction of a haul road from the Red Hill excavation site to Elizabeth Mitchell Drive to the west (approximately 0.7km). The haul road would be constructed to link with Fallon Street. It is proposed that Fallon Street (between Elizabeth Mitchell Drive and Dallinger Road) be closed to normal traffic and be dedicated to use by haul vehicles. This would result in the intersection of Fallon Street and Elizabeth Mitchell Drive becoming a level crossing for haul road vehicles, with appropriate traffic signalling. Haul trucks would proceed along Fallon Street to the western edge of the Jet Boat Racing facility (approximately 0.8km), where they would turn right onto a haul road that would need to be constructed. This haul road would then head NNW through cleared grazing land owned by the AWDC (approximately 1.5km). A further level crossing would be required to enable haul trucks to cross Dallinger Road onto RTA land, to the south of the Corrys Road/Dallinger Road intersection. Further haul road construction would then

be required from Dallinger Road to the construction site (approximately 0.2km. From there trucks would then travel south west along the construction zone to the construction zone centroid (approximately 5.8km). This would result in a total one way trip length of 9.0km

### R-3

This option utilises the existing Riverina Highway and is for standard haul trucks. It would require traffic control arrangements for access onto and off the Riverina Highway. It is also likely to result in the resumption of one dwelling at Red Hill and noise treatment for approximately 80 residences. Trucks would haul excavated material south west along the Riverina Highway for approximately 6km, where it would then enter the construction zone and travel a further 2km to the centroid.

### Capital Costs

Capital costs consist of road construction, road rehabilitation and road resurfacing costs, and traffic control measures.

Road works, for the purposes of this evaluation, are defined as:

- resurfacing - light resurfacing work, no major structural work required;
- refurbishment - some significant structural damage, and resurfacing required; and
- construction - the construction of a line haul road capable of withstanding the stresses required for heavy trucks.

Cost figures for the various road capital costs utilise a per kilometre cost. Traffic control signals utilise a per unit cost. The cost parameters used are detailed in Table 3.3.

**Table 3.3: Construction costs**

Construction Type	Unit Cost
Resurfacing	\$400 000/km
Refurbishment	\$750 000/km
Construction	\$750 000/km
Traffic Signals	\$100 000/set

Source: RTA Goulburn

Table 3.4 details the capital cost kilometres and traffic signalling requirements associated with each option.

**Table 3.4: Option kilometres requiring capital expenditure**

Option	Resurfacing	Refurbishment	Construction	No. of Traffic Signals
R2	3.2	0	0.7	1
OR-1	0	0.8	2.4	1
R-3	6	0	0.35	2

Table 3.5 details the total capital costs associated with each option.

**Table 3.5: Construction costs**

Cost	R2	OR-1	R-3
Rehabilitation <sup>(1)</sup>	\$1 280 000	\$600 000	\$2 400 000
Construction	\$525 000	\$1 800 000	\$362 500 <sup>(2)</sup>
Traffic Signalling	\$100 000	\$100 000	\$200 000
<b>Total</b>	<b>\$1 905 000</b>	<b>\$2 500 000</b>	<b>\$2 962 500</b>

(1) Rehabilitation is the sum of resurfacing and refurbishment

(2) Note this includes \$100 000 for the resumption of one property.

### Vehicle Operating Costs

Vehicle operating costs are measured on a cubic metre per kilometre basis. This cost per cubic metre kilometre has been multiplied by the truck capacity and journey length to obtain a cost per vehicle kilometre (VKM). Financial data for truck haulage rates were obtained from the RTA and Roche Brothers. The unit costs were reduced by 10% to derive economic costs, taking account of the likely impact of taxes.

In addition, there are a different number of stops on each journey for the different options, for which costs are incurred -a figure of 55.2 cents per stop, based on RTA figures, has been adopted per stop for each of the options.

Annual operating costs are obtained by the following equation:

$$\text{Cost} = (\text{Cost per VKM} \times \text{Kilometres Round Trip} \times \text{Annual Trips}) + (\text{Number of Stops} \times \text{Cost per Stop} \times \text{Annual Trips})$$

Table 3.6 details the vehicle operating costs for each option.

**Table 3.6: Vehicle operating costs**

Vehicle Operating	R-2	OR-1	R-3
Quantity to be	2200000	2200000	2200000
Truck Capacity	5	50	5
Number of Round	440000	44000	440000
Number of Years	2	2	2
Annual Trips	220000	22000	220000
Cost per Cubic Metre KM	0.432 <sup>(1)</sup>	0.45 <sup>(2)</sup>	0.432 <sup>(1)</sup>
Cost per VKM	2.16	22.5	2.16
Number of Stops	8	1	4
Cost Per Stop	0.552	0.552	0.552
Kilometres Round Trip	18.6	18	16.6
<b>Annual Vehicle Operating</b>	<b>\$9 810 240</b>	<b>\$8 922 144</b>	<b>\$8 374 080</b>

Source: <sup>(1)</sup>RTA Haulage Rates  
<sup>(2)</sup>Roche Brothers Pty Ltd

### Traffic Control Maintenance Costs

Traffic control costs represent the cost to each option associated with traffic signalling and diversion requirements. Option R-2 would require the installation of traffic lights at the intersection of Fallon Street and Elizabeth Mitchell Drive. The Riverina Option would require traffic control arrangements for access and egress from the highway. Maintenance costs are \$10 000 for each set of traffic lights each year.

Table 5 details the traffic control costs associated with each option.

**Table 5: Annual Traffic Control Maintenance Costs**

Option	Cost
R2	\$10 000
OR-1	\$10 000
R-3	\$20 000

### Externality Costs

Externality costs associated with the options include noise vibration and carbon emissions. While these costs are usually measured on a per kilometre basis, the standard measures are based on system averages. However, the houses affected by the relevant options, will be subject to greater impacts on amenity than standard network averages and thus a proxy of \$20,000 per affected house has been adopted. This cost is intended to reflect the costs associated with insulation, window glazing and airconditioning etc for each house affected by the development options.

Table 6 details the externality costs associated with each option.

**Table 6: Externality Costs**

Option	NO. Of Houses Affected	Total Cost
R2	20	\$400 000
OR-1	0	\$0
R-3	80	\$1 600 000

### Evaluation Results

The evaluation results use a 7% discount rate. Table 7 details the evaluation results.

**Table 7: Evaluation Results**

Year	R2 Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	9,810,240	525,000	-	320,000	400,000	110,000	\$11,165,240
2	9,810,240	-	1,280,000	320,000	-	10,000	\$11,420,240
Undiscounted	19,620,480	525,000	1,280,000	640,000	400,000	120,000	\$22,585,480
7%	\$18,978,689	\$525,000	\$1,196,262	\$619,065	\$400,000	\$119,346	<b>\$21,838,361</b>

Year	OR 1 Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	8,922,144	1,800,000	-	80,000	-	110,000	\$10,912,144
2	8,922,144	-	600,000	80,000	-	10,000	\$9,612,144
Undiscounted	17,844,288	1,800,000	600,000	160,000	-	120,000	\$20,524,288
7%	\$17,260,596	\$1,800,000	\$560,748	\$154,766	\$0	\$119,346	<b>\$19,895,456</b>

Year	Riverina Costs						Totals
	Vehicle Operating	Road Construction	Road Rehabilitation	Road Maintenance	Externality	Traffic Control	
1	8,374,080	362,500	-	600,000	1,600,000	220,000	\$11,156,580
2	8,374,080	-	2,400,000	600,000	-	20,000	\$11,394,080
Undiscounted	16,748,160	362,500	2,400,000	1,200,000	1,600,000	240,000	\$22,550,660
7%	\$16,200,323	\$362,500	\$2,242,991	\$1,160,748	\$1,600,000	\$238,692	<b>\$21,805,253</b>

### Conclusions

The most economically efficient option is OR-1. Using a 7% discount rate, OR-1 is the least cost option with a total costs of \$19.9 million. This is \$2 million lower than both of the other options. Option OR-1 is the most efficient because the larger capacity of the trucks allows greater volumes to be transported per trip, thus resulting in fewer vehicle kilometres, greater economies of scale and no externality costs. While OR-1 has the highest

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road construction costs, these costs are more than offset by the reduction in road maintenance costs and subsequent rehabilitation costs. The low maintenance and construction costs, couple with the relatively lower vehicle operating costs of OR-1, make it the most economically efficient option.

## 4. Recommendation

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It is recommended that option OR-1 be the preferred option for further assessment in the EIS. This option enables materials to be transported efficiently, while minimising the impacts on the local community. Of the two off-road options OR-1 is the furthest away from noise sensitive receptors such as residences and stables on Dallinger Road.

Regarding the impacts on the jet boat facility, it is recommended that trucks do not run on the days when the races occur.

**Appendix - E    Method of Works Plan**

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**Albury City Council**  
May 1999

**Excavation of Fill Material From  
Red Hill for Construction of the  
Albury Wodonga National  
Highway Project**

**Method of Working  
Albury Aerodrome, Albury**

Sinclair Knight Merz Pty. Ltd.  
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100 Christie Street  
PO Box 164  
St Leonards NSW  
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**SINCLAIR KNIGHT MERZ**

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## 1. Introduction

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This Method of Working Plan (MOWP) forms part of an Environmental Impact Statement (EIS) which will accompany a development application for a proposed fill extraction site for use in the construction of the Albury Wodonga National Highway Route (AWNHR). The proposed site is known as Red Hill and is located approximately 1.25 km east of the Albury Airport runway, within the flight-path, on the corner of the Riverina Highway and Bowna Road.

The proposed activities include the excavation of material from the site as well as its transport to construction areas associated with the Albury Wodonga National Highway Route. The location of the Red Hill extraction site and the AWNHR in relation to the Albury Aerodrome are indicated in **Figure 1.1**.

The purpose of this MOWP is to inform Albury City Council and operators of the Albury Aerodrome of the works proposed and the mitigation measures which will be implemented to ensure there is no disruption to the operation of the Aerodrome.

The MOWP has been prepared in accordance with Chapter 13, "Directions Relating to Aerodrome Works" of Civil Aviation Authority (CAA) "Rules and Practices for Aerodromes" (CAA, 1991). These directions are also provided in Appendix 1 of Albury City Council's Aerodrome Manual (Albury City Council, June 1998).

### 1.1 Authority

Albury City Council is the owner of Albury Aerodrome and the body Licensed by the Civil Aviation Safety Authority to operate the aerodrome.

The Roads and Traffic Authority (RTA) is ultimately responsible for the coordination of the fill extraction and transportation operations. The RTA has sub-contracted *{insert sub-contractor(s) name}* to carry-out the fill extraction and transportation operations.

*{insert sub-contractor(s) name}* will be provided with a copy of this MOWP and will be required to conduct operations and implement all mitigation measures in accordance with it.



Figure 2.1  
SITE LOCATION MAP

## 2. Works Information

---

### 2.1 Purpose of Works

The primary purpose of the fill excavation operations is to provide embankment material required for the construction of the AWNHR. Approximately 2,200,000 m<sup>3</sup> of fill material is required for the construction of an embankment across the floodplain adjacent to the railway line through the urban area of Albury.

Red Hill is relatively close to the AWNHR and, once extracted, will have the added community safety benefit of easing the take-off and landing gradient for aircraft accessing the airport.

### 2.2 Description and Staging of Works

The work will involve the extraction of approximately 2,200,000 m<sup>3</sup> of material from the Red Hill Site at a rate of approximately 1,100,000m<sup>3</sup> per annum. Following fill extraction works, the site would be restored to grassed paddocks, giving the site a similar appearance to its current state. Fill will be used exclusively for the construction of the AWNHR. The extraction operations would be continuous during the allowable times of operation to enable the resource to be extracted and transported within the construction timeframe for the AWNHR.

The process by which materials will be extracted may be separated into three development stages. These are:

- Site Preparation;
- Extraction and haulage;
- Rehabilitation.

A diagram illustrating the development stages is shown in **Figure 2.1**. The main activities to be undertaken during each stage is provided below:

- Site Preparation:
- clearing of minimal vegetation at the extraction site and along the haulage route;
  - stockpiling of vegetative debris downslope and along the length of the proposed extraction area;
  - removal and stockpiling of topsoil downslope and along the length of the proposed extraction area in a windrow formation;
  - construction of a diversion bank upslope of the intended excavation area;
  - installation of additional erosion and sedimentation control structures in the vicinity of the extraction site and along the haul road routes. Control structures will include spoon drains and silt traps;



Figure 2.1  
EXTRACTION METHODOLOGY

- construction of three haulage roads:
  1. from the Red Hill excavation site heading west to Elizabeth Mitchell Drive and linking with Fallon Road
  2. from the northern side of Fallon Road, heading North-North-West through cleared grazing land owned by the AWDC and linking with Dallinger Road just to the south of Corry Road
  3. from Dallinger Road heading north west to the AWNHR construction site

All haul roads will be of a high quality, suitable for use by heavy vehicles. They will be bitumen sealed to minimise dust impacts;

Fill Extraction and Haulage:

- construction of two level crossing intersections at:
  1. Fallon Road and Elizabeth Mitchell Drive
  2. the Dallinger Road crossing;
- winning of material by multiple excavators (no drilling, blasting, crushing or screening will be undertaken);
- watering site to reduce dust;
- stockpiling of overburden;
- loading material into 50m<sup>3</sup> capacity non-registered haulage trucks (eg Cat 769 and/or 777);
- haulage of excavated material to the AWNHP construction zone via haulage roads. Trucks will leave the extraction fill site, head west along haulage road to Elizabeth Mitchell Drive intersection, continue west along Fallon Road, turn right onto haulage road heading north-north-west until they reach the Dallinger Road intersection. Trucks would then proceed to the construction zone in a north west direction;
- following the dumping of fill material, trucks will then return to the extraction site via the same route;

Excavation Site Restoration and Revegetation:

- progressive rehabilitation to minimise the appearance of site disturbance and ensure a safe and self-sustaining environment remains when the operation is completed;
- deep ripping of extraction area to be rehabilitated;
- replacement of the topsoil and ground litter, fertilising and placement of a mulch layer created from the stockpiled vegetation;
- regular watering to promote vegetation growth.

---

### 2.3 Plant and equipment

The plant and equipment to be used on site is as follows:

- 2 crawler bulldozers;
- 4 shovels;
- 1 rubber tyred front-end loader;
- 7 off-highway trucks;
- 1 elevating scraper;
- mulching equipment;
- 2 graders;
- 2 rollers;
- 2 bitumen sprayers (limited to initial haul road construction).

A water-truck will not form part of the permanent fleet but it will be brought to site during dry periods for dust suppression. Light vehicles will be used on site by the site manager and to transport employees.

### 2.4 Duration and Timing of Works

Fill extraction and haulage operations will occur over a two year period between approximately *{insert commencement date}* and *{insert completion date}*.

The quarry production will be a continuous operation for the two year construction period. The total resource required is 2.2 million m<sup>3</sup>, resulting in an average daily extraction of material of approximately 3,990m<sup>3</sup>. This figure is based on 304 operational days per year (365 days less 52 Sundays and 9 Public Holidays), with 52 days per year being Saturdays and 252 weekdays.

Working hours will be:

- Monday to Friday: 7:00am and 6:00pm
- Saturdays: 8:00am and 1:00pm

As mentioned above, no work will be undertaken on Sundays or Public Holidays.

One day, three times per year all haulage operations may have to cease due to jet boat racing events which are held at the jet boat racing facility located to the north of Fallon Road. Access to the facility is off Fallon Road.

### **3. Restrictions to Aircraft Operations**

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The implementation of the restrictions on the works organisation outlined in Section 4 of this MOWP will ensure that there will be not restrictions to aircraft operations as a result of the extraction and haulage works.

## 4. Restrictions to Work Organisation

---

### 4.1 General

This project involves plant, equipment and personnel working in relatively close proximity to Albury Aerodrome. In order to ensure that the project works do not jeopardise the safety of the aircraft operations, it is essential that the work organisation restrictions and control measures imposed are complied with in all respects.

Work organisation restrictions and control measures imposed on the storage of material, parking of plant, extraction of fill and truck movements are provided below. Particular attention will be paid to minimising dust and coordinating truck movements.

### 4.2 Storage of Material

- Vegetation, topsoil, overburden, and fill material stockpiles will be located on a low area of the site to ensure no obstruction to the flight path;
- Stockpiling of materials will only be permitted in the area nominated by the RTA Site Engineer and the Albury Aerodrome Representative;
- Designated stockpile areas will be clearly signposted.

### 4.3 Parking of Plant

- The parking area for plant and equipment will be located on a low area of the site to ensure no obstruction to the flight path;
- Parking of plant and equipment will only be permitted in the area nominated by the RTA Site Engineer and the Albury Aerodrome Representative;
- Designated parking areas will be clearly signposted.

### 4.4 Extraction site

- The extraction site is currently fenced with a 3 strand agricultural fence. No extraction operations will be allowed beyond this fence;
- A gate will be constructed at the haul road entrance. This will be secured by padlock when the site is unused.

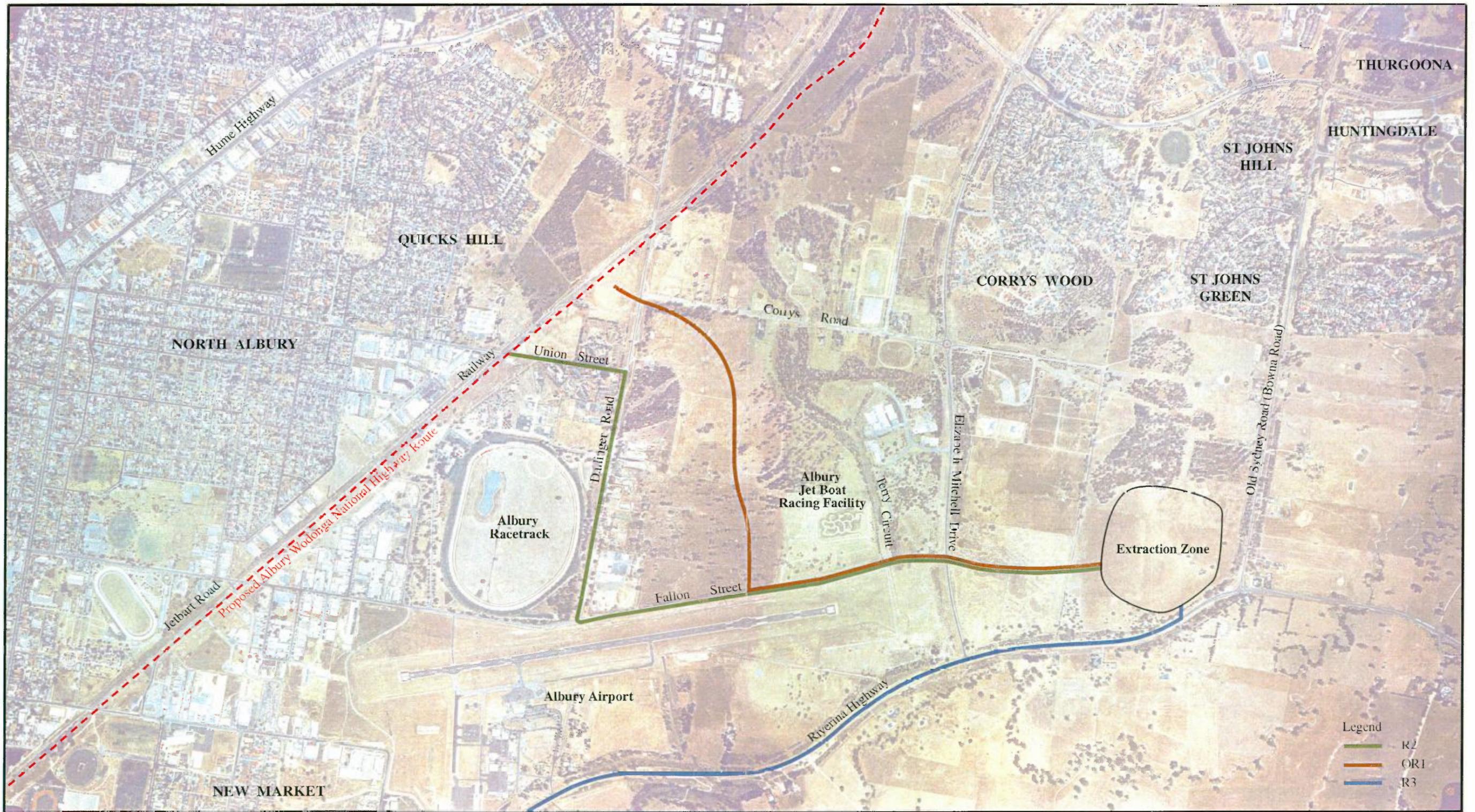
### 4.5 Extraction Operations

- At the commencement of extraction operations all plant or equipment utilised on site will have a maximum height of 4.5m;
- No extraction operations will be undertaken outside designated working hours (ie. 7:00am and 6:00pm Monday to Friday and 8:00am and 1:00pm Saturdays);
- No work on Sundays or public holidays, or night work shall be undertaken;

- 
- Dust generating activities (ie. clearing) will be avoided or minimised during dry and windy conditions;
  - All disturbed areas shall be stabilised as soon as practical to prevent or minimise wind blown dust;
  - All unsealed trafficable areas shall be kept sufficiently damp to minimise wind blown or traffic generated dust emissions;
  - Water carts shall be employed to adequately dampen roads, stockpiles, work areas and exposed soils to prevent the emissions of dust from the site;
  - Cleared vegetation, garbage and other combustible waste material shall not be burnt on site.

#### 4.6 Haulage Operations

- Flashing orange lights will be fitted to all haulage trucks and plant;
- All haulage trucks will utilise the designated haulage route. Loaded haulage trucks will leave the extraction site via the designated exit on the western side of the site, travel west along the haulage road until they reach Elizabeth Mitchell Drive. Trucks will then cross Elizabeth Mitchell Drive and head west along Fallon Road, turn right onto the haulage road which runs north-north-west through AWDC land. Trucks would then travel across Dalling Drive and head in a north-west direction along a haulage road until they reach the construction site. The designated haulage route is illustrated in **Figure 4.1**.
- The haulage route will be clearly signposted to direct drivers;
- All haul roads will be of a high quality, suitable for use by heavy vehicles. They will be bitumen sealed to minimise dust impacts;
- All trucks and equipment used on site shall be maintained in an efficient condition and operated in a proper and efficient manner in accordance with Section 19A and 19B of the *Clean Air Act, 1961*;
- Trucks transporting material from the site shall be covered immediately after loading at the Norbrick site to prevent wind blown dust emissions and spillages. The tailgates of all trucks transporting spoil material will be securely fixed prior to loading and immediately after unloading;
- No haulage operations will be undertaken outside designated working hours (ie. 7:00am and 6:00pm Monday to Friday and 8:00am and 1:00pm Saturdays);
- No work on Sundays or public holidays, or night work shall be undertaken.



No.13247 17.2.99  
 0 500 1km

Figure 4.1  
 HAUL ROUTE OPTIONS

## 5. Administration

---

The Roads and Traffic Authority (RTA) are ultimately responsible for the coordination of the fill extraction and transportation operations. The RTA have sub-contracted *{insert sub-contractor(s) name}* to carry-out the fill extraction and transportation operations.

*{insert sub-contractor(s) name}* will be provided with a copy of this MOWP and will be required to conduct operations and implement all mitigation measures in accordance with it.

The following functional responsibilities that will apply to this project are illustrated in **Figure 5.1**.

### ***RTA Project Manager***

- approve this MOWP;
- ensure that all RTA staff are trained in relation to the MOWP prior to the commencement of on-site operations;
- ensure that independent audits of the on-site activities are undertaken to determine compliance with this MOWP;
- liaison with Albury City Council officers when required.

### ***RTA Project Engineer***

- Report directly to the RTA Project Manager on all matters relating to this MOWP;
- Ensure that all extraction and haulage operations are being undertaken in accordance with this MOWP and relevant design standards.

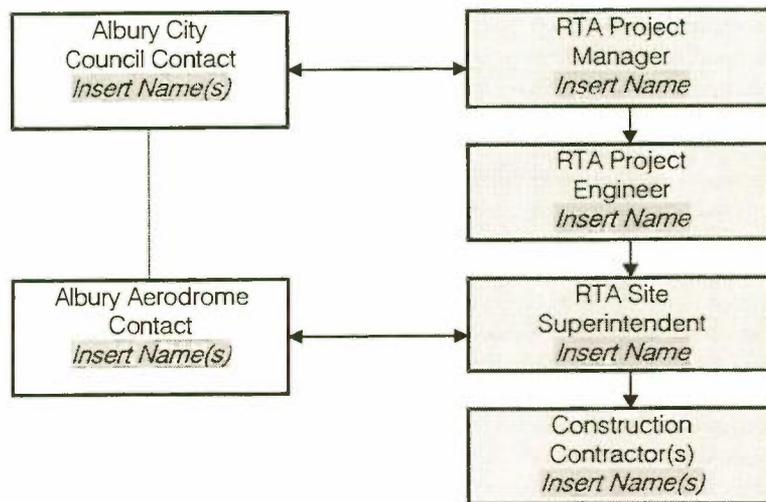
### ***RTA Site Superintendent***

- Report directly to the RTA Project Engineer on all matters relating to this MOWP;
- Day-to-day liaison with representatives from Albury Aerodrome;
- Ensure that the extraction/transportation Contractor(s) are operating in accordance with this MOWP on a day-to-day basis;
- Report any incidents, non-conformance and/or complaints to the RTA Project Engineer;
- notify the extraction/transportation Contractor(s) in writing if any non-conformances are identified;
- follow-up corrective action in relation to the above.

### ***Extraction/Transportation Contractor(s)***

- Implementation of this MOWP;
- Ensure that all staff are trained in relation to the MOWP prior to the commencement of on-site operations;
- Complete all corrective action requests given by the RTA Site Superintendent;
- Report any incidents, non-conformance and/or complaints to the RTA's Site Superintendent;

- Self assessment responsibilities in relation to this MOWP.



**Figure 5.1**  
**Functional Responsibilities**

Contact numbers for each of the personnel listed above are provided in **Table 5.1**.

**Table 5.1: Contacts**

Position	Name	Work Phone	Home Phone / Mobile	Fax
RTA Project Manager	<i>Insert name</i>	<i>Insert number</i>	<i>Insert number</i>	<i>Insert number</i>
RTA Project Engineer	<i>Insert name</i>	<i>Insert number</i>	<i>Insert number</i>	<i>Insert number</i>
RTA Site Superintendent	<i>Insert name</i>	<i>Insert number</i>	<i>Insert number</i>	<i>Insert number</i>
Construction Contractor's Project Manager	<i>Insert name</i>	<i>Insert number</i>	<i>Insert number</i>	<i>Insert number</i>

## 6. Drawings

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{to be inserted by excavation contractor}

## 7. Distribution List

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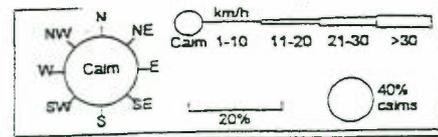
{to be inserted by excavation contractor}

**Appendix - F    Wind Roses - Albury Airport**

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# Wind Roses using available data between 1983 and 1998 for ALBURY AIRPORT

Site Number 072146 • Locality: ALBURY • Opened Jan 1973 • Still Open  
 Latitude 36°04'10"S • Longitude 146°57'20"E • Elevation 165m



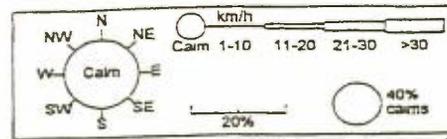
9 am January	438 observations	9 am February	406 observations	9 am March	447 observations
9 am April	440 observations	9 am May	447 observations	9 am June	469 observations
9 am July	484 observations	9 am August	474 observations	9 am September	457 observations
9 am October	478 observations	9 am November	445 observations	9 am December	464 observations



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 Contact us by fax on 02 9296 1567, or by email on reqnsw@bom.gov.au  
 We have taken all due care but cannot provide any warranty nor accept any liability for this information.

# Wind Roses using available data between 1983 and 1998 for ALBURY AIRPORT

Site Number 072146 • Locality: ALBURY • Opened Jan 1973 • Still Open  
 Latitude 36°04'10"S • Longitude 146°57'20"E • Elevation 165m



3 pm January	442 observations	3 pm February	393 observations	3 pm March	412 observations
3 pm April	406 observations	3 pm May	425 observations	3 pm June	450 observations
3 pm July	462 observations	3 pm August	456 observations	3 pm September	451 observations
3 pm October	461 observations	3 pm November	438 observations	3 pm December	454 observations

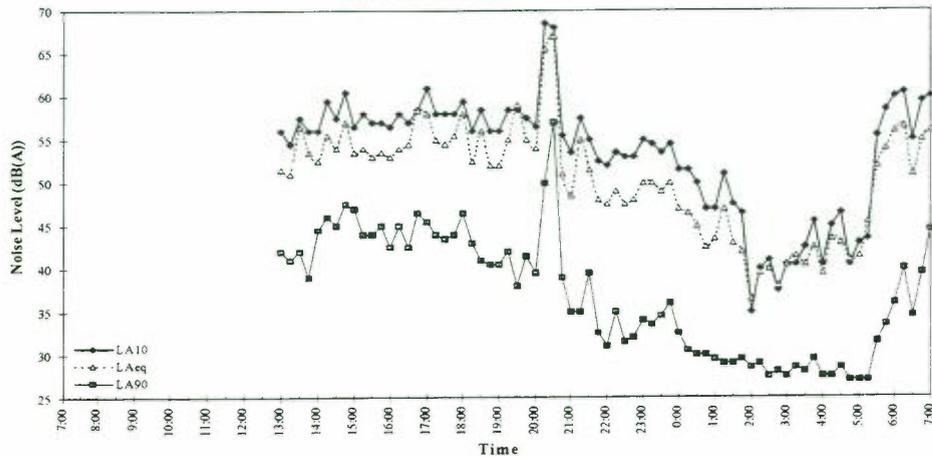


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 Contact us by fax on 02 9296 1567, or by email on reqnsw@bom.gov.au  
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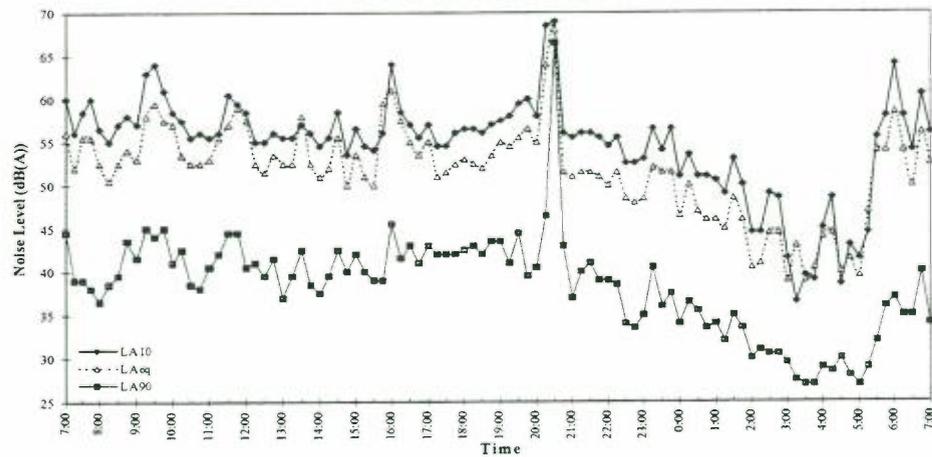
## Appendix - G Noise Monitoring Results

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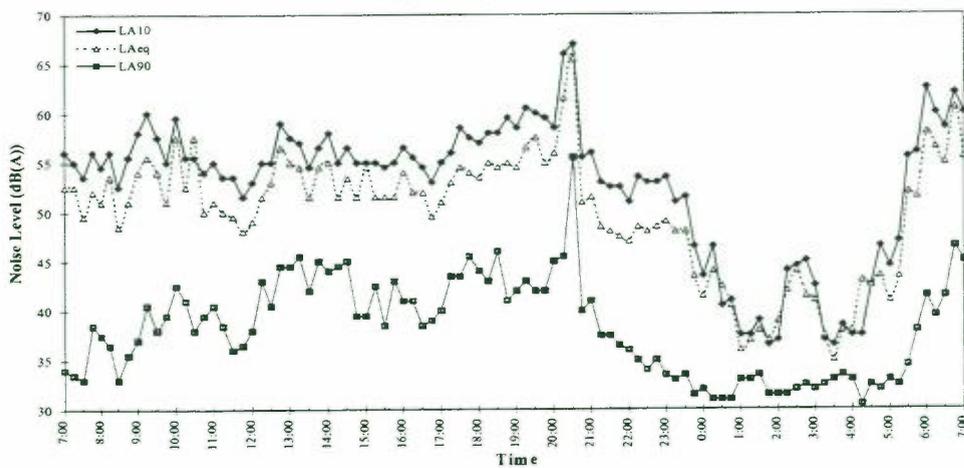
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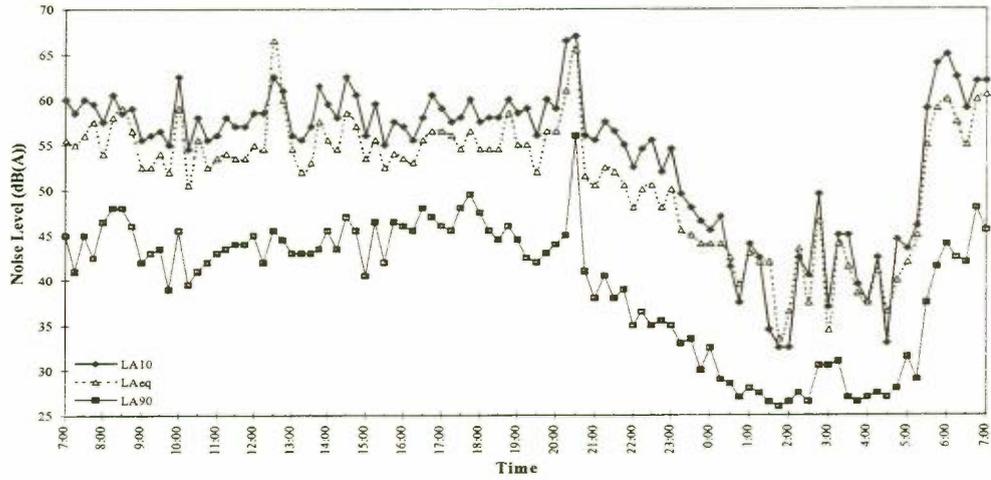
Heath Residence - Riverina Highway Albury  
Saturday 14 - Sunday 15 November 1998



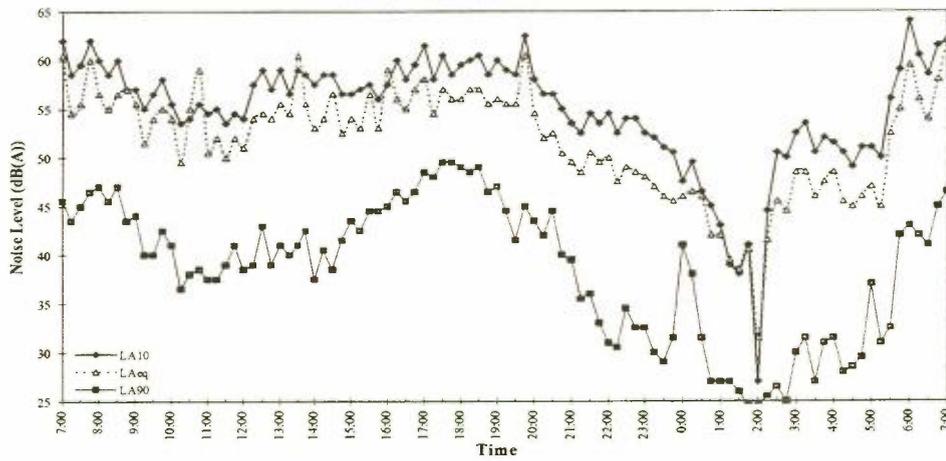
Heath Residence - Riverina Highway Albury  
Sunday 15 - Monday 16 November 1998



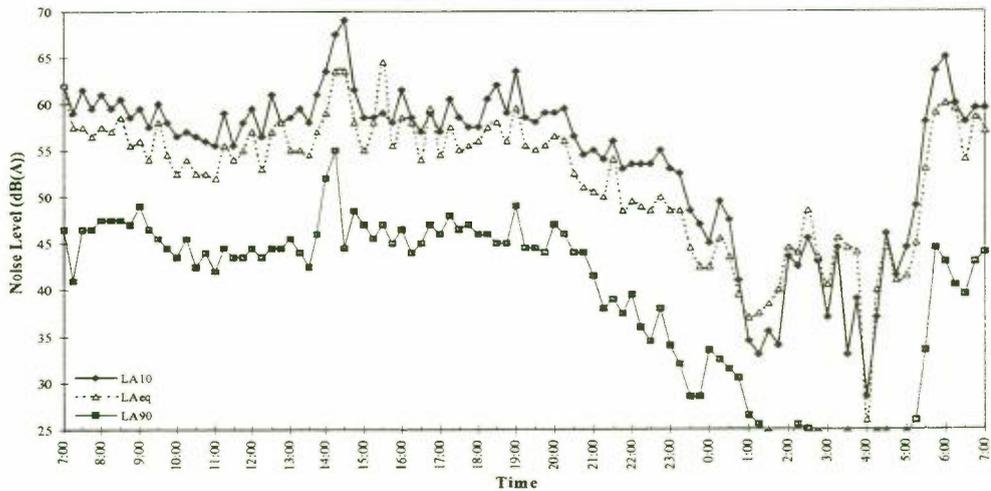
Heath Residence - Riverina Highway Albury  
Monday 16 - Tuesday 17 November 1998



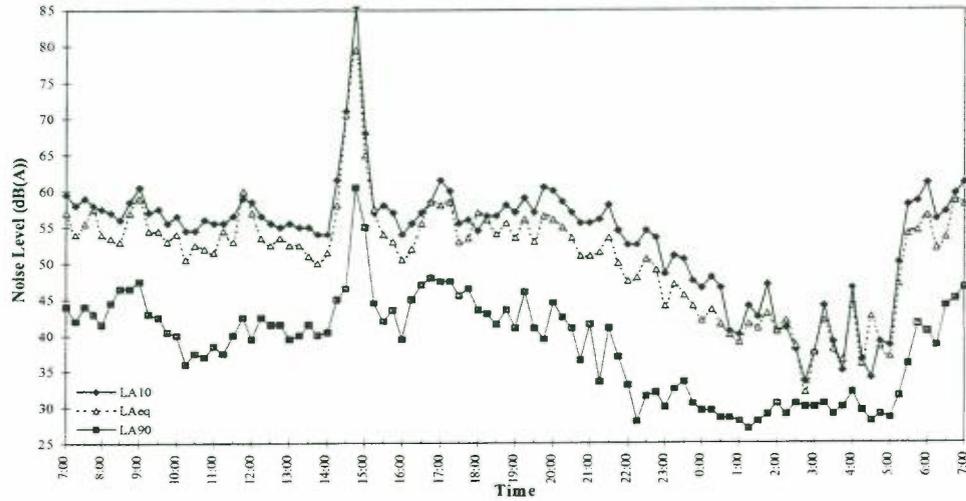
Heath Residence - Riverina Highway Albury  
Tuesday 17 - Wednesday 18 November 1998



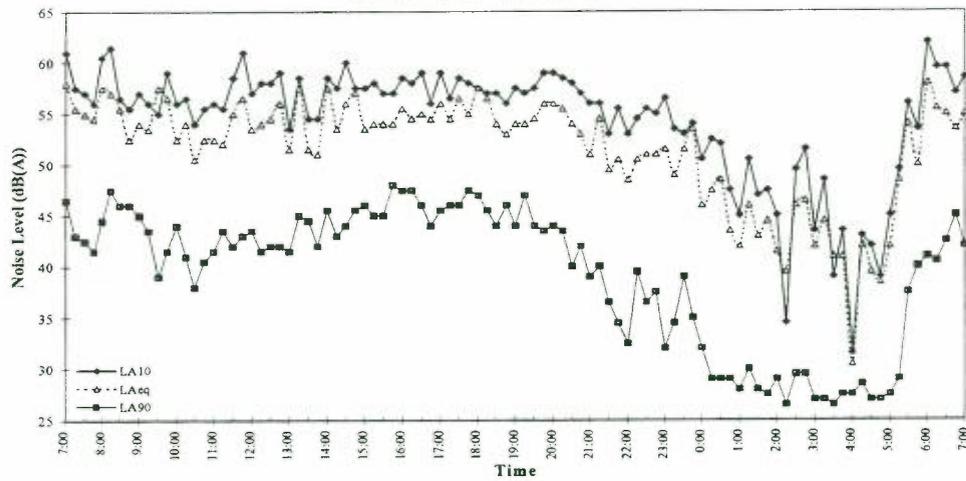
Heath Residence - Riverina Highway Albury  
Wednesday 18 - Thursday 19 November 1998



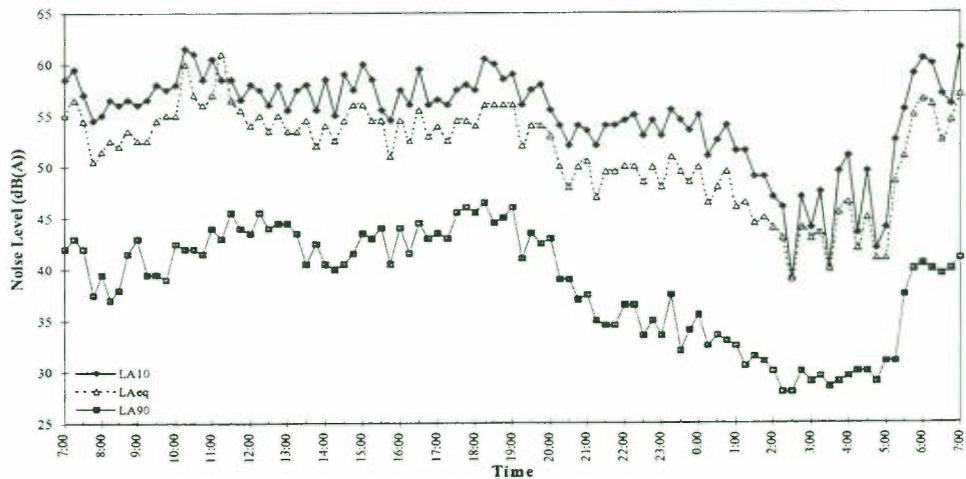
Heath Residence - Riverina Highway Albury  
Thursday 19 - Friday 20 November 1998



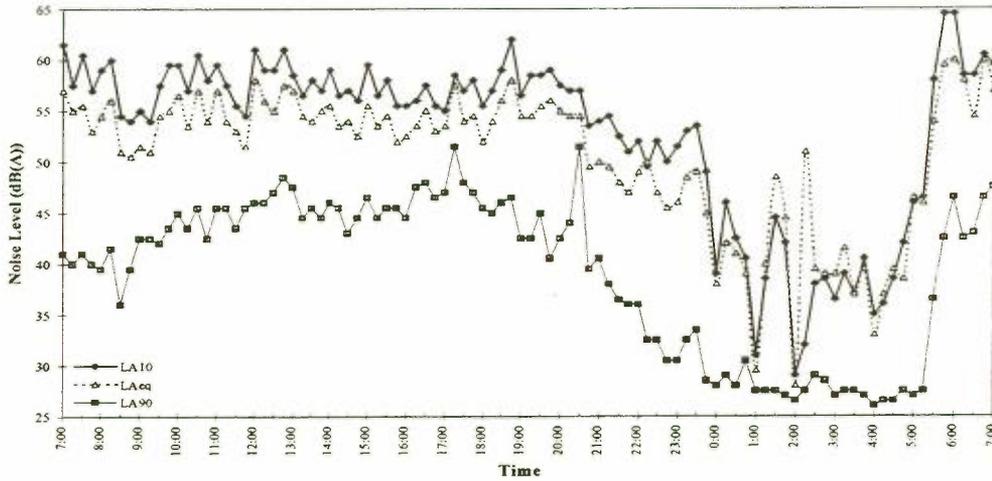
Heath Residence - Riverina Highway Albury  
Friday 20 - Saturday 21 November 1998



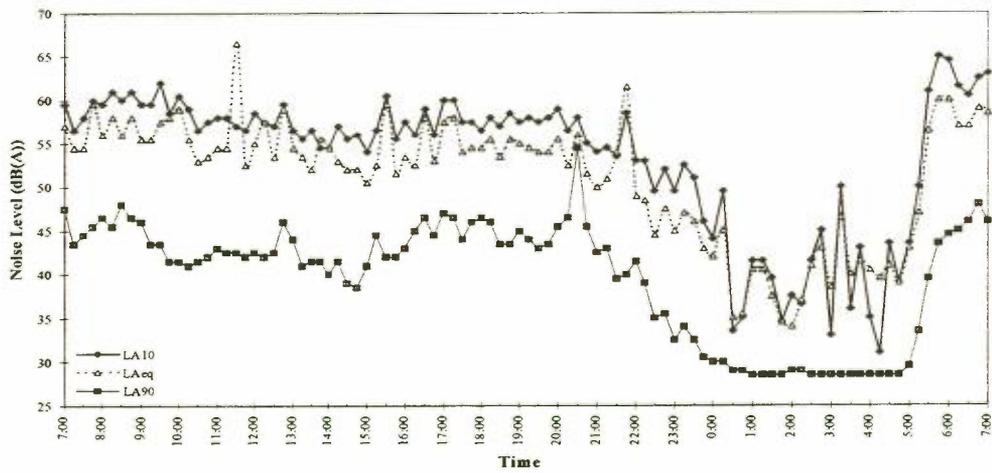
Heath Residence - Riverina Highway Albury  
Saturday 21 - Sunday 22 November 1998



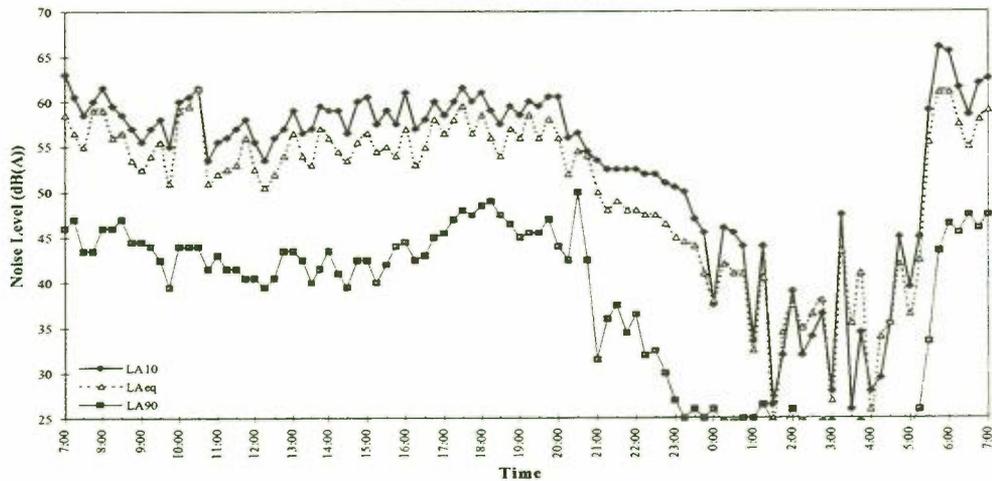
Heath Residence - Riverina Highway Albury  
 Sunday 22 - Monday 23 November 1998



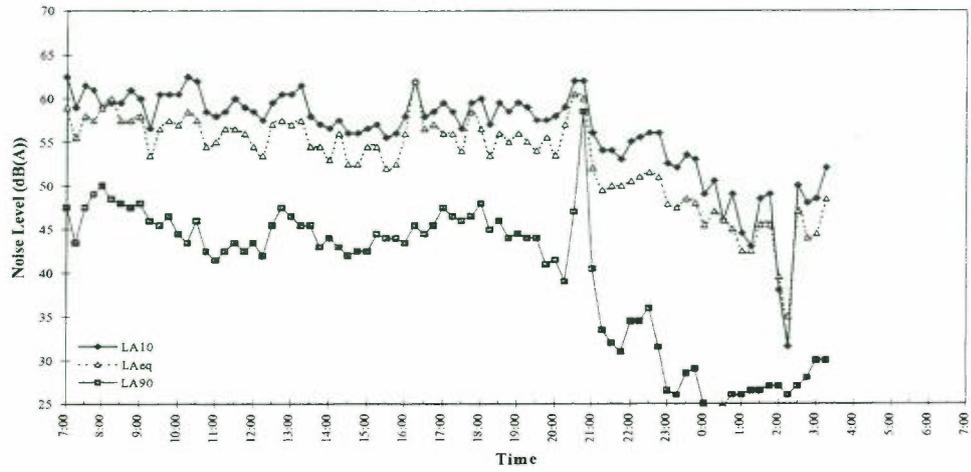
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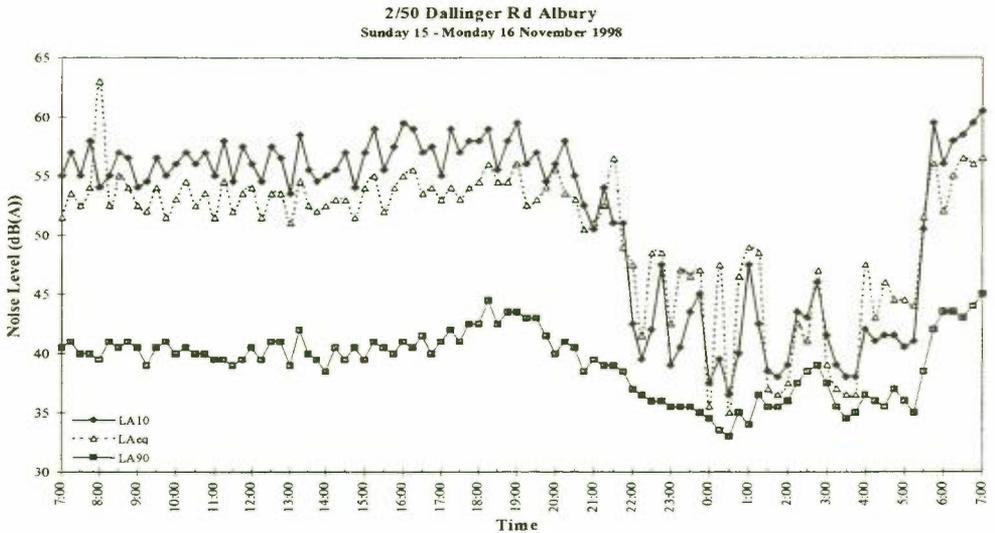
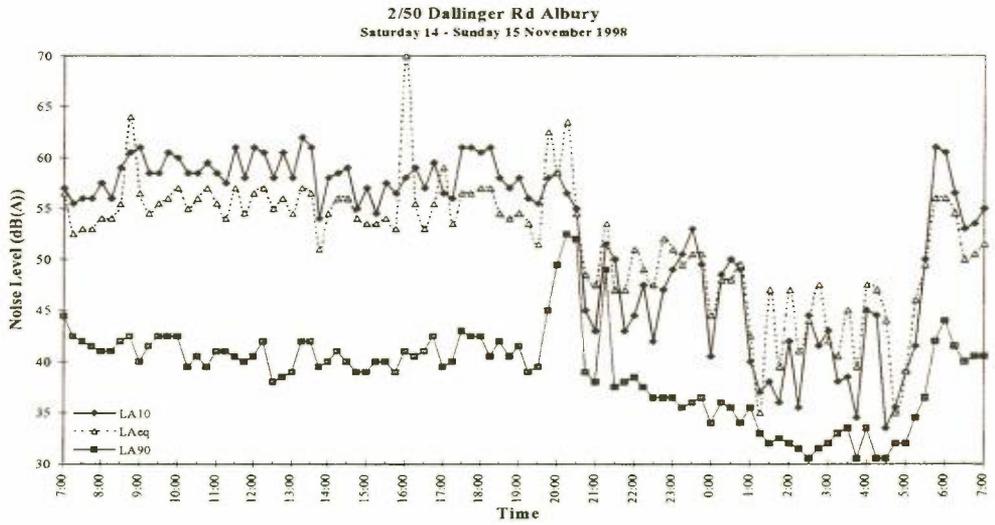
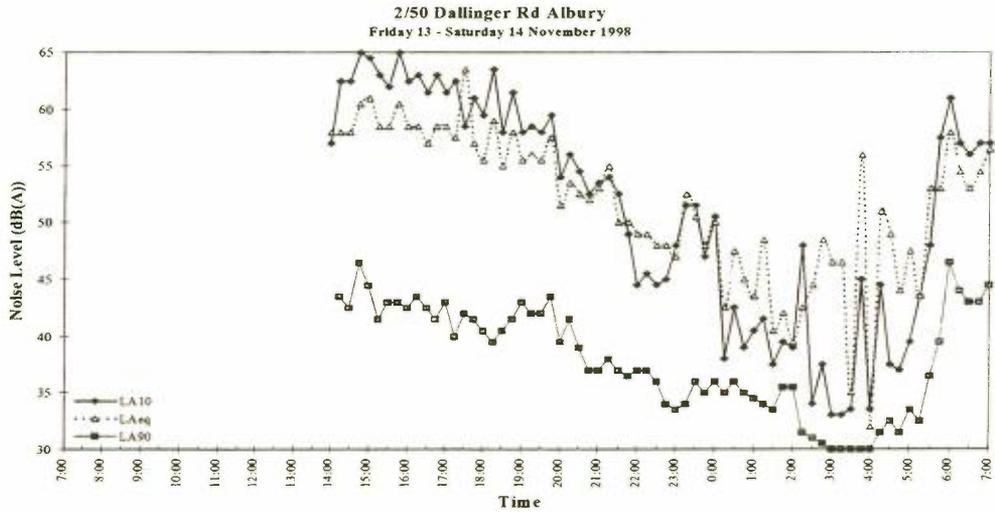


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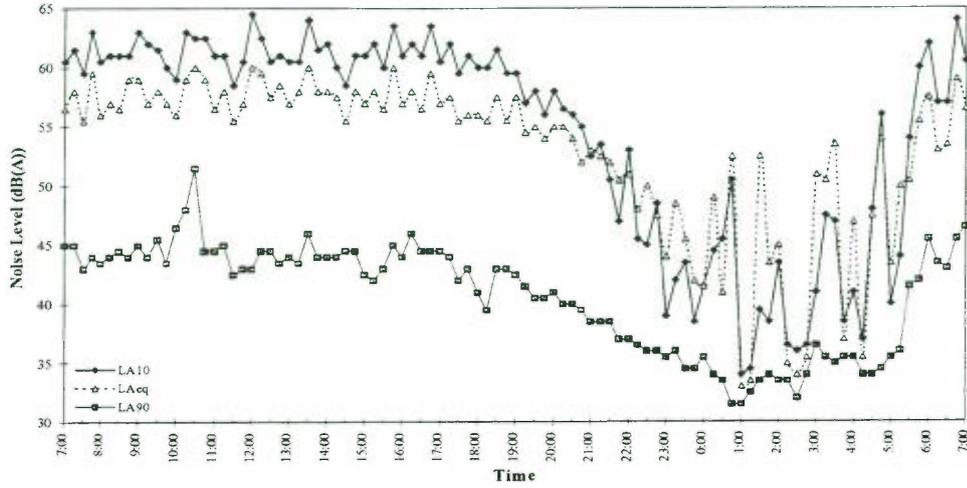


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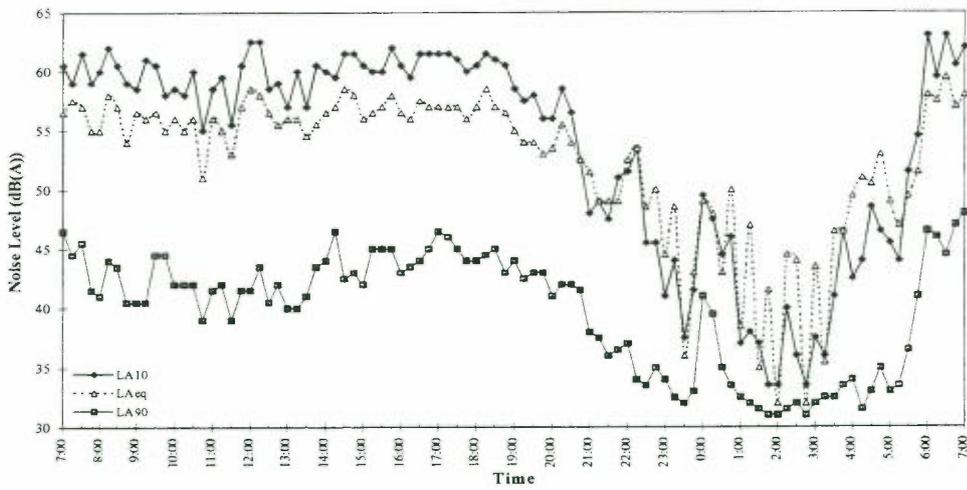




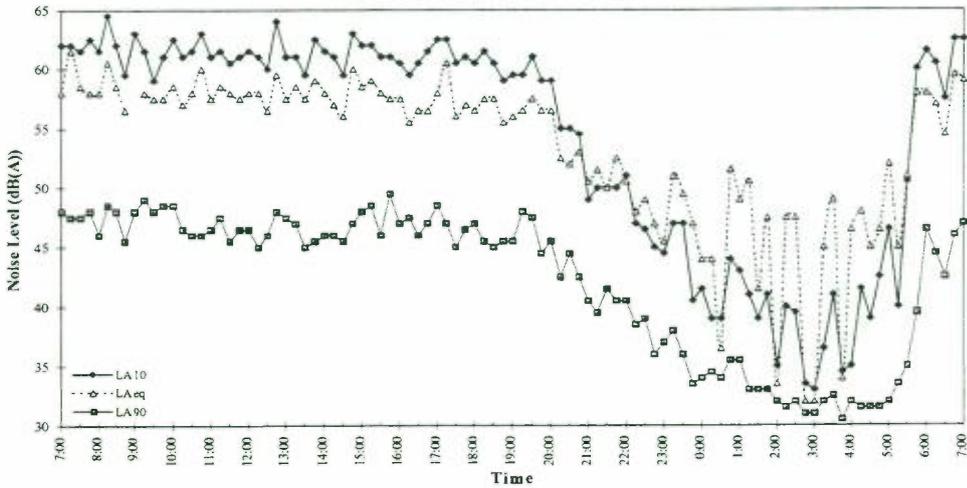
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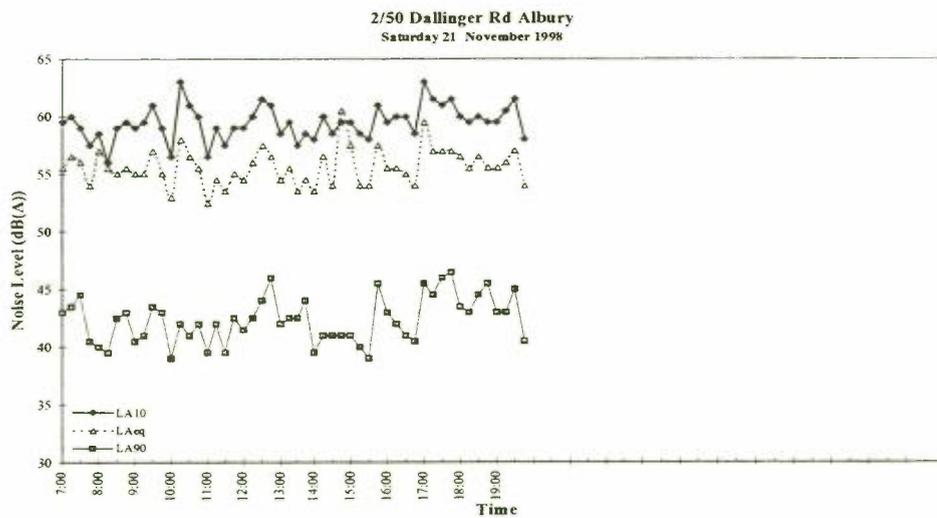
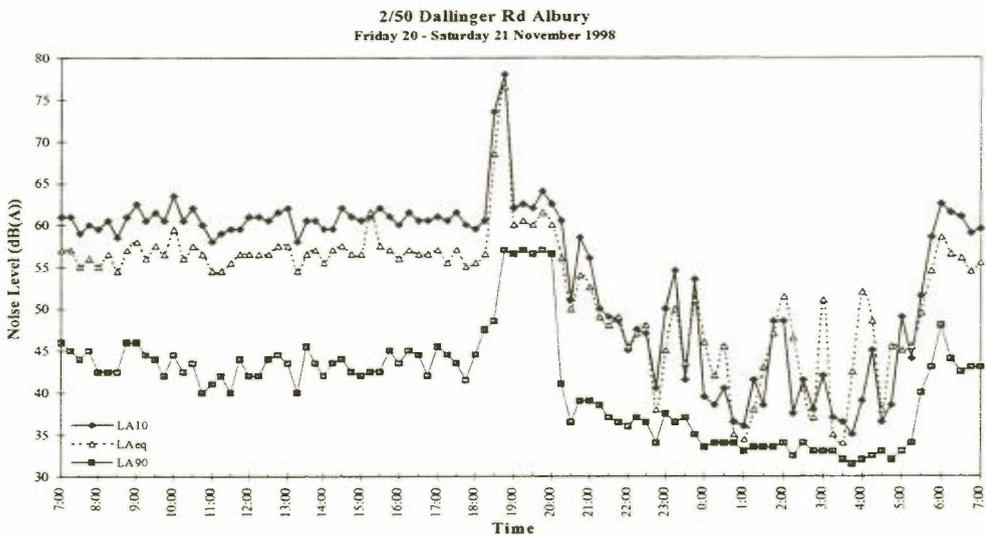
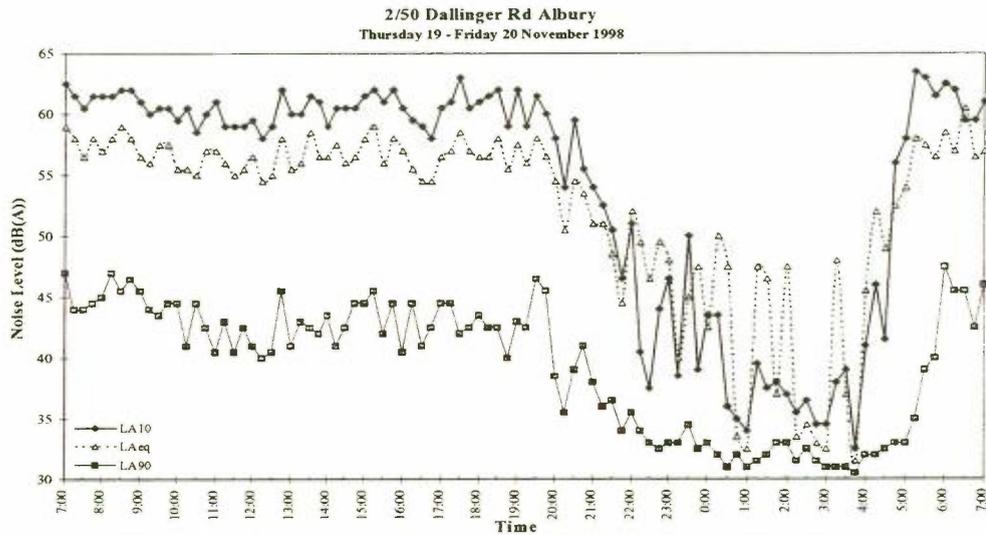


2/50 Dallinger Rd Albury  
Tuesday 17 - Wednesday 18 November 1998



2/50 Dallinger Rd Albury  
Wednesday 18 - Thursday 19 November 1998





## Appendix - H Specialist Flora and Fauna Study

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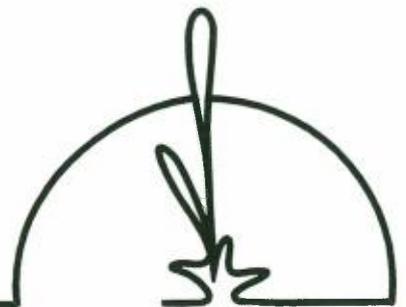
PROPOSED EXTRACTION of FILL and HAUL ROAD  
ALBURY, NSW

NATIONAL HIGHWAY LINK

FLORA & FAUNA ASSESSMENT

May 1999

Gunninah Environmental Consultants



PROPOSED EXTRACTION of FILL and HAUL ROAD  
ALBURY, NSW

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**PROPOSED EXTRACTION of FILL and HAUL ROAD  
ALBURY**

**FLORA & FAUNA ASSESSMENT**

**MAY 1999**

**1 INTRODUCTION**

A flora and fauna investigation has been undertaken on land owned by the Albury Wodonga Development Corporation at Albury, to assess the potential impacts of the proposed extraction of fill and associated activities (including haulage) on native flora and fauna.

The proposed extraction site is situated south of Red Hill and east of Albury Airport, and is bounded by Corrys Road to the north, Bowna Road to the east, and the Riverina Highway to the south (Figure 1). It is estimated that 750000 cubic metres of material will be extracted from the site, to provide fill for the new inner route alignment of the Albury Wodonga link of the National Highway. The area of the site proposed for excavation consists almost entirely of open grasslands, with a small area of woodland also present (Figure 1).

In addition to the extraction site, a haul road is required for the transportation of the material to the construction site. The road is proposed to run from the extraction zone west along Fallon Road for 400m, and thence in a 12m wide corridor north through a cleared paddock, joining the intersection of Corrys Road and Dallinger Road (Figure 1). The 'subject site' for this report comprises both the proposed extraction site and the haul road route.

The aims of this investigation are:

- to identify and describe flora species and vegetation communities present on the subject site and assess their conservation significance;
- to identify and describe native fauna species and habitats which are present, or which may occur on the subject site, and assess their conservation significance;
- to assess the significance of potential impacts arising from the proposal on native flora and fauna; and
- to establish environmental management and impact amelioration measures which can be implemented to limit the effects of the proposal on native biota.

**2 METHODS**

**2.1 Flora**

Vegetation surveys of the subject site were conducted in November 1998 and May 1999. Over the proposed extraction site a series of random quadrats was established within each vegetation community present, and all vascular plant species observed were documented and described according to the nomenclature of Harden (1990, 1991, 1992, 1993). The 'Random Meander' technique (Cropper 1993) was employed along the length of the proposed road corridor. Stands of native vegetation were surveyed and assessed according to the main vegetation types identified. The overstorey, understorey and groundcover species were documented and described according to the nomenclature of Harden (1990, 1991, 1992, 1993).

A search of the NSW National Parks & Wildlife Service (NP&WS) Atlas of NSW Wildlife was undertaken within a 10km radius of the subject site<sup>1</sup> (dated the 27th of October 1998 and the 3rd of May 1999), to ascertain the presence or potential occurrence of any Rare Or

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<sup>1</sup> As the State Border is located less than 10km to the south and east of the subject site, the 10km search does not include data south of the NSW border on the Albury 1:100 000 Topographic Map Sheet.



**Figure 1** Location of proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway.

Threatened Australian Plants - ROTAP (Briggs & Leigh 1996) or threatened plant species listed on the *NSW Threatened Species Conservation Act 1995* (TSC Act).

Species of national, state and regional conservation significance have been discussed by reference to Briggs & Leigh (1996), the *TSC Act*, and Lord (1992) respectively.

Due to the duration of the study and the time of year during which the investigations were undertaken, some short-lived herbaceous species may not have been recorded due to the absence of vegetative material.

The vegetation communities have been recorded and described according to GECon (1995, 1996a, 1996b). Other botanical investigations conducted in the general vicinity (GECon 1995, 1996a, 1996b; Kinhill Metcalf & Eddy 1994) were reviewed for information regarding the flora in this locality and in the surrounding area. These references were checked for descriptions of similar vegetation types, and for records of threatened plant species which could possibly occur on the subject site.

## 2.2 Fauna

A detailed fauna investigation was conducted throughout the subject site and in the vicinity on the 31st of October, the 1st, 5th, 7th, 8th and 9th of November 1998, and the 15th and 16th of May 1999.

Specific survey techniques used included spotlighting surveys, diurnal avifauna surveys, recorded call play-back and intensive habitat searches for reptiles and amphibians. Further details of survey techniques and weather conditions during field investigations are provided in Appendix 3.

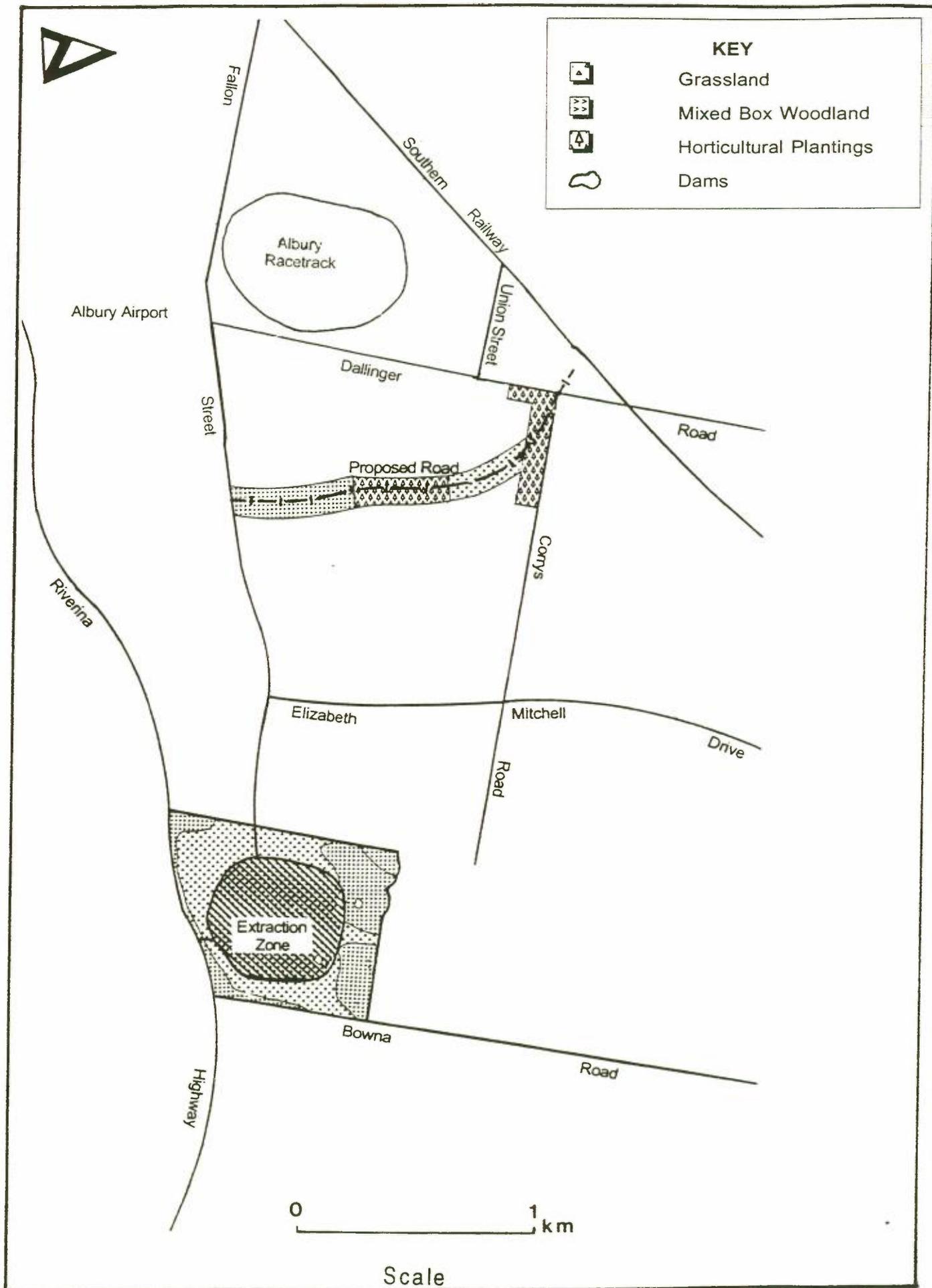
Particular attention was paid during field investigations to the possible presence of threatened fauna known from the region, and to features or resources which could be of potential significance for native fauna.

A search of the NP&WS Atlas of NSW Wildlife was undertaken within a 10km radius of the subject site (dated 27th of October 1998 and the 3rd of May 1999), to ascertain the presence or potential occurrence of threatened fauna species listed on the *TSC Act*. Records from the Birds Australia (26th of October 1998) and NSW Bird Atlassers (4th of November 1998) databases were also obtained to provide a more comprehensive list of bird species within the region.

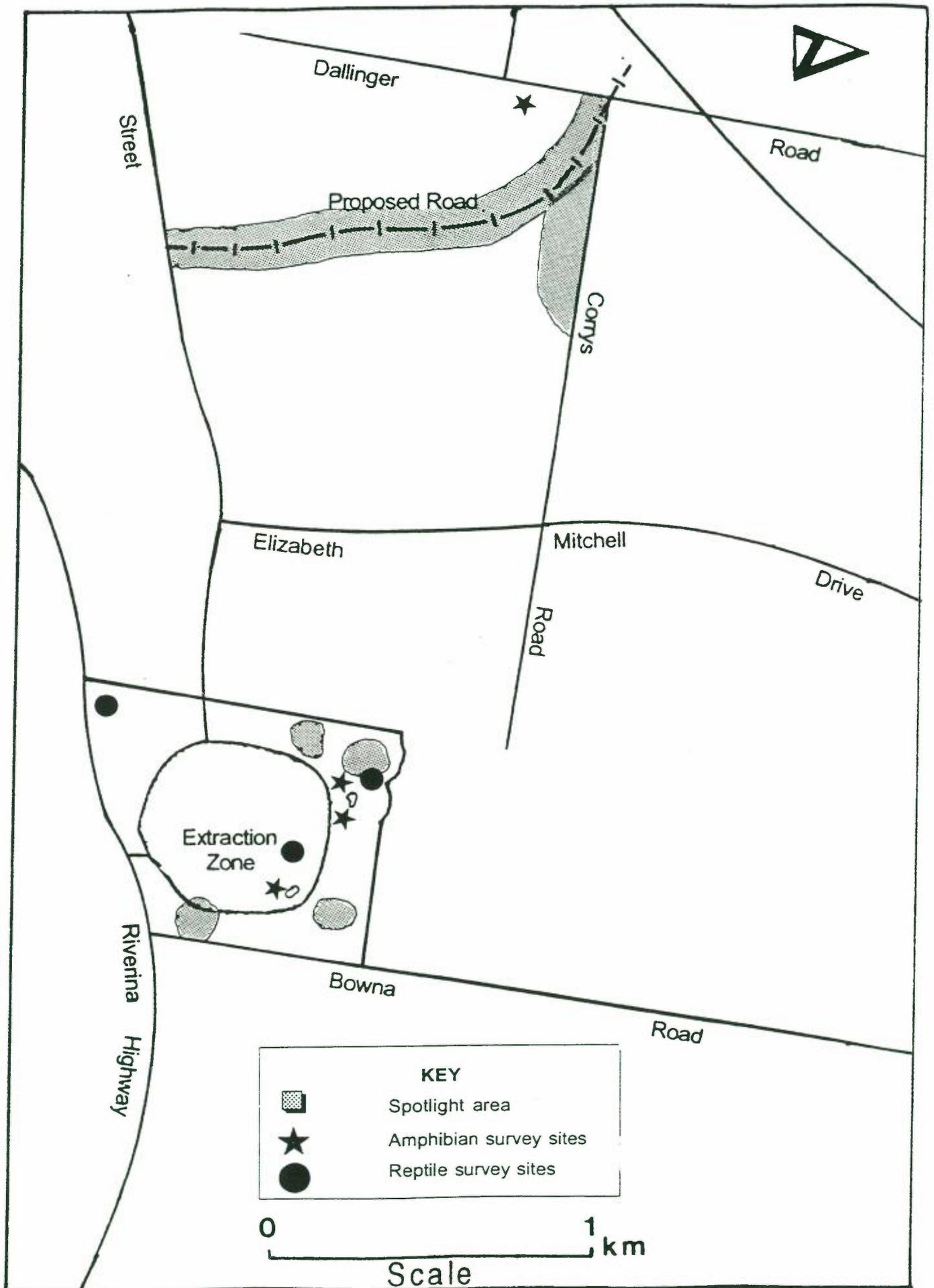
Previous studies within the area (GECon 1995, 1996a, 1996b; Kinhill Metcalf & Eddy 1994) were also reviewed to establish any threatened fauna species which could possibly occur on the subject site.

## 3 VEGETATION of the SUBJECT SITE

There are three general vegetation communities which occur over the subject site - cleared/pastoral (grasslands), remnant Mixed Box Woodland and horticultural plantations (Figure 2). Grasslands cover approximately three quarters of the extraction zone site, with the remaining area covered by Mixed Box Woodland. This consists of remnant roadside vegetation and woodland patches in the north of site. The road corridor passes mainly through grasslands, although there are patches of remnant Mixed Box Woodland in the southern portion of the corridor and horticultural plantings in the north and the central portions of the corridor (Figure 2). Both the Mixed Box Woodland and the cleared/pastoral vegetation communities have been subjected to extensive grazing over a long period, and exist in a modified or degraded state. The areas of horticultural plantings have been subjected to extensive weed invasion.



**Figure 2** Vegetation communities on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway.



**Figure 3** Fauna survey locations on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway.

### 3.1 Vegetation Communities

#### 3.1.1 Mixed Box Woodland

##### *Distribution*

Two dense patches are present in the northeast and northwest corners of the extraction zone site, and roadside vegetation along the site's eastern and southern margins. A scattered patch is located in the southern portion of the road corridor.

##### *Structure and Floristics*

The canopy consists of semi-mature and mature trees to a height of 19m in the extraction zone, and 25m along the road corridor. The predominant species are *Eucalyptus blakelyi* and *E microcarpa*, with *E citiodora*, *E goniocalyx*, *E macrorhyncha*, *E meliodora*, *E sideroxylon*, *E goniocalyx* and *Acacia dealbata* also occurring.

There is no understorey present along the road corridor.

The groundcover is characterised by the introduced species *Arctotheca calendula*, *Briza maxima*, *B minor*, *Bromus molliformis*, *Echium plantagineum*, *Hordeum leporinum* and clover species.

#### 3.1.2 Grasslands

##### *Distribution*

The majority of the central and southern portions of the extraction zone site and the central portion of the road corridor are characterised by grasslands.

##### *Structure and Floristics*

Grasses and herbs to a height of approximately 0.5m, consisting of the native species *Cynodon dactylon* and *Rumex brownii*, and introduced species *Arctotheca calendula*, *Briza maxima*, *Erodium moschatum*, *Echium plantagineum*, *Hordeum leporinum*, *Onopordum acanthium*, *Silybum marlanum*, *Taraxacum officinale* and clover species.

#### 3.1.1 Horticultural Plantings

##### *Distribution*

Horticultural plantings are located in the northern portion of the road corridor, along Corry's Road, and a patch in the central portion.

##### *Structure and Floristics*

The canopy consists of mature specimens to a height of 25m, spaced 8-9m apart. The predominant species are *E microcarpa*, *E albens* and *E sideroxylon*. No understorey is present.

Very little groundcover exists within this community, and where it does exist the majority of plants are introduced species such as *Arctotheca calendula*, *Briza maxima*, *Erodium moschatum*, *Hordeum leporinum* and *Taraxacum officinale*.

### 3.2 Conservation Significance of Vegetation

#### 3.2.1 Plant Species

- Species of National/State Significance

No ROTAP or threatened plant species listed in Schedules 1 or 2 of the TSC Act were recorded on the subject site during the current study, or during previous investigations (GECon 1995, 1996a) in the vicinity of the site.

Only one ROTAP or threatened plant species is recorded on the NP&WS database within 10km of the subject site - *Amphibromus fluitans*, which is listed as Vulnerable under Schedule 2 of the TSC Act. This species is a stoloniferous or sometimes rhizomatous

perennial which grows to around 0.8m in height and is mostly found in permanent swamps (Harden 1993). Given the lack of suitable habitat for *Amphibromus fluitans*, it is not likely to occur on the subject site.

An additional six ROTAP and/or TSC Act species have been recorded in the Albury region during previous studies (Table 1). However, none of these species are likely to occur on the site, given their habitat preferences, the condition of the site, and the lack of evidence for their presence during the current and previous investigations.

**TABLE 1** ROTAP or threatened (TSC Act) flora species recorded in the Albury region.

SPECIES	ROTAP code	TSC Act	Habitat #	Likely to occur on site*
<i>Acacia constablei</i>	2V-	V	in low shrubland on rhyolite or granite-derived soils	No
<i>Amphibromus fluitans</i>		V	permanent swamps	No
<i>Brachycome gracilis</i>	3RCa		on rocks in dry areas	No
<i>Brachycome muelleroides</i>	3VCa	V	damp areas, on margins of claypans	No
<i>Brasenia schreberi</i>	3V		shallow freshwater lagoons or backwaters	Unlikely
<i>Hierochloa submutica</i>	3RC-		at altitude above tree lines, in moist sites on high alpine herbfields and near margins of bogs	No
<i>Swainsona recta</i>	2V	E	on stony hillsides in grassland or open woodland	Unlikely

# Habitat descriptions from Harden (1991, 1992, 1993, 1994)

\* based on habitat analysis, known distribution and/or date of last record

**TABLE 2** Conservation status codes for Rare Or Threatened Australian Plants (Briggs & Leigh 1996).

<b>Distribution Category</b>	
1	Known by only one collection only.
2	Species with a geographic range of less than 100 km.
3	Species with a geographic range of greater than 100 km.
<b>Conservation Status</b>	
X	<b>Presumed extinct:</b> not collected or otherwise verified over the past 50 years.
E	<b>Endangered:</b> taxon in serious risk of disappearing from the wild within 10-20 years if present land use and other threats continue to operate.
V	<b>Vulnerable:</b> not currently endangered; at risk of disappearing from the wild state within 20-50 years.
R	<b>Rare:</b> but not currently endangered or vulnerable.
K	<b>Poorly Known:</b> taxon that is suspected, but not definitely known, to belong to one of the above categories. At present, accurate field distribution information is inadequate.
C	<b>Reserved:</b> has at least one population within a National Park, Conservation Reserve, or area dedicated for the protection of flora.
<b>Size-class of all Reserved Populations</b>	
a	1000 plants or more are known to occur within a conservation reserve(s).
i	less than 1000 plants are known to occur within a conserved reserve(s).
-	reserved population size is not accurately known.
t	Total known population reserved;
+	Overseas occurrence (included if the taxon has a natural occurrence overseas).

- Species of Regional Significance

Three species considered locally or regionally significant (GECon 1995, 1996a, 1996b; Lord 1992), were recorded on the subject site, being *Acacia dealbata*, *Eucalyptus blakelyi* and *E gonicalyx*. These species were recorded in the remnant woodlands in the north of the subject site, and *E blakelyi* was also recorded in the southern portion of the road corridor.

There is no Commonwealth or State legislative protection for these species. However, given that the vast majority of the woodland and mature vegetation is to be retained under the proposal, and environmental management and impact amelioration measures prescribed in this report to mitigate impacts on retained vegetation, there will be no significant adverse impact on regionally significant species.

### 3.2.2 Vegetation Communities

Mixed Box Woodland is not of national or state conservation significance, and is not listed under the *TSC Act*. This community is generally considered of regional significance (GECon 1995; Calder 1993), due to inadequate conservation (GECon 1995, 1996a, 1996b; Prober & Thiele 1993) and extensive clearance (an estimated 70-95%) associated with cereal growing (GECon 1995; Sivertsen 1993).

Mixed Box Woodland is widely distributed throughout the Albury region and occurs to the northeast in Tumblong State Forest (GECon 1995, 1996a). Due to the small size, isolation and degraded nature of this community on the subject site, the vegetation which will or may be affected by the project is of little or no conservation significance. In any case, remnant woodland on the site will be retained, and environmental management measures will be implemented to avoid adverse impacts on this community. No other vegetation communities of conservation value occur on the site.

## 4 FAUNA

### 4.1 Fauna Habitats

The three broad fauna habitat types which occur in the subject site are woodlands, grasslands and dams. These habitats have been disturbed to varying degrees through previous and ongoing clearing, grazing and general use.

#### 4.1.1 Woodlands

Remnant woodlands occur in the north and along the eastern and southern boundaries of the extraction zone site and in the southern portion of the road corridor, although the woodland in the latter area is very sparse. These areas support some mature hollow-bearing trees which provide suitable nesting and roosting resources for some bird, arboreal mammals and microchiropteran bat species. Due to previous and ongoing grazing, however, these remnants do not support a native shrub understorey, and therefore provide very little value for ground-dwelling mammals and reptiles.

Despite the degraded nature of these woodland communities, the fact that the majority of the surrounding landscape has been cleared for agriculture or urban use renders remnant patches of vegetation, such as those on the subject site, of moderate value as fauna habitat.

Patches of horticultural plantings of woodlands occur along the road corridor, which includes a number of native tree species. These areas are of little value to fauna, as they lack hollows and structural diversity, although they may be utilised by avifauna when moving between patches of remnant vegetation.

#### 4.1.2 Grasslands

Grasslands characterise much of the subject site and surrounding locality. Cleared pasture is generally of limited value for most native fauna species, given the scarcity of foraging and

shelter resources. Grassland on the subject site lacks structural and floristic diversity, having been cleared of most trees and understorey, and is comprised mostly of introduced grasses.

In general, cleared areas provide foraging resources for the more mobile fauna species (in particular macropods and some bird, microchiropteran bat and reptile species), although the presence of feral cats, domestic dogs and foxes in rural areas restricts the occupation of these habitats by many native fauna. Some birds (such as the Masked Lapwing, Crested Pigeon, Australian Magpie and Ibis) utilise grasslands as foraging habitat, and a variety of reptiles are known to occur in these habitats on occasion. However the absence of substantial groundcover and debris (such as rocks, shrubs, fallen logs *etc*) limits the value of these areas for most reptile species. Several microchiropteran bat species are known to forage in the ecotone area between grassland and woodland stands, as well as generally over vegetation.

#### 4.1.3 Dams

Three dams occur on the subject site (in the extraction zone) which provide a potential source of habitat for aquatic and semi-aquatic vertebrate fauna. Dams, in general, provide feeding resources such as invertebrates, and organic matter, as well as shelter, breeding and foraging sites amongst adjacent logs, vegetative debris and overhanging foliage. However, grazing and agricultural activities cause a loss of riparian habitats, increased sedimentation and a reduction in water quality, which limits the value of the dams on the subject site.

Two species of duck were observed in the dam situated within the grassland area, but no amphibian species were recorded. The two dams situated in the remnant woodland in the northern portion of the site provided more suitable fauna habitat, due to adjacent resources such as potential perching, nesting and roosting sites, and are utilised by amphibians, birds and bats.

## 4.2 Fauna of the Subject Site

A total of 55 vertebrate fauna species were recorded on the subject site during field investigations in November 1998 and May 1999. These species are typical of agricultural landscapes, which comprise a mosaic of open woodland remnants, pasture/grassland and riparian habitats. The majority of these species are relatively common, widespread and disturbance-tolerant.

An additional 205 species have been recorded in the Albury region (GECon 1995, 1996a, 1996b; Kinhill Metcalf Eddy 1994; Birds Australia 1998; NSW Bird Atlasers 1998; NP&WS Atlas of NSW Wildlife). These records are from an extensive area and although many of the more wide-ranging and mobile species could theoretically occur on the subject site on occasion, the vast majority will not be present due to a lack of suitable habitats and resources, and the absence of habitat corridors.

### *Birds*

38 native bird species and 2 introduced species were recorded on the subject site. A review of previous studies and databases (Birds Australia; NP&WS Atlas of NSW Wildlife; NSW Bird Atlasers) within the area provided a far more extensive list of bird species within the Albury region (Appendix 2). These records cover a broad geographic area, and whilst many of these additional birds could theoretically occur on the subject site on occasion, a substantial number will not occur due to a lack of suitable habitats and resources.

The bird species recorded on the subject site and within its vicinity generally fall into three broad guilds.

The first guild includes a number of smaller passerine birds, such as the Superb Fairy-wren and Grey Fantail, which typically prefer dense shrubs for shelter and protection.

The second guild present on site includes more aggressive and/or disturbance-tolerant species, such as the Australian Magpie, Galah, Red-rumped Parrot, Willie Wagtail, and the introduced Common Starling. These species are able to utilise gardens, grasslands and remnant trees and shrubs in largely cleared areas. A number of species are considered "edge specialists" (NP&WS 1997), including the Eastern Rosella, Noisy Minor and Magpie-lark and often occur at the ecotone of forests and cleared areas (such as agricultural and urban environments).

The third guild represented on site includes those species associated with waterbodies, such as the Little Black Cormorant, Sacred Ibis, Australian Wood Duck and Pacific Black Duck. It is unlikely that these and other potential species would be dependent on the limited resources available on the subject site, however, as they are more likely to utilise more extensive waterbodies in the locality, such as the Murray River and its floodplain, and the Hume Reservoir.

A total of 8 threatened bird species listed under the *TSC Act* were recorded in previous studies in the region, but there was no evidence of these species on the subject site or in the vicinity. Although several species have the potential to occur on occasion, they are considered highly unlikely to be dependent on the resources present on the subject site, given the highly disturbed nature of the habitats present. These species are discussed further in Section 4.3.

### *Mammals*

Three native mammal species were recorded during field surveys on the subject site, and an additional thirteen species have been recorded in the region during previous investigations (GECon 1995, 1996a, 1996b; NP&WS Wildlife Atlas).

Evidence for only one native terrestrial mammal on the site was obtained, being a scat of the Eastern Grey Kangaroo. This species is likely to utilise the subject site on occasion for grazing.

Only one arboreal mammal species (the Common Brushtail Possum) was recorded on the subject site during the current investigation, or during previous investigations in the vicinity of the site (GECon 1996a), despite intensive spotlighting surveys and habitat searches. The Common Ringtail Possum, Sugar Glider and threatened Squirrel Glider are also known from the general area (GECon 1995, 1996a, 1996b), and could potentially occur in the woodland habitat of the subject site on occasion. However, the presence of few trees with suitable large hollows, and the absence of a dense shrub understorey within these remnants, renders the subject site of little value for these arboreal species.

The White-striped Mastiff-bat was recorded in both November and May on the subject site, and other microchiropteran bat species were observed but not identified to species level. Four microchiropteran bat species have been recorded in the vicinity of the subject site, including the Lesser Long-eared Bat, Chocolate Wattled Bat, Large Forest Bat and Little Forest Bat. These species could potentially utilise the site on occasion as part of a wider foraging habitat. Given the highly mobile nature of microchiropteran bats, and that the proposal will primarily disturb grassland areas and associated scattered trees which do not provide suitable nesting and roosting habitat (such as tree-hollows, caves and other structures), more detailed bat surveys were not considered necessary for this assessment. Furthermore, it is unlikely there would be any adverse impacts on these or other microchiropteran bat species which could potentially occur.

Only one threatened mammal species listed on the *TSC Act* (the Squirrel Glider), has been recorded within 10km of the subject site (NP&WS Atlas of NSW Wildlife). This species is discussed in further detail in Section 4.3.

A number of introduced mammals were recorded on the subject site during the current field surveys, including cattle, horses, Brown Hare, fox, dog and cat. The presence of these species reflects the highly modified nature of the site, and substantially decreases its value for native fauna habitat.

## Reptiles

No reptile species were recorded on the subject site during field investigations, despite dedicated searches through all potential habitats, and favourable weather conditions. The absence of a reptile assemblage can probably be explained in part by the disturbed nature of much of the subject site, which has been cleared of most understorey vegetation, rocks and ground debris, and which consequently provides very limited shelter and resources for most reptile species. No reptile species were recorded in the vicinity of the subject site during previous investigations, although a number of reptile species are known from the general area, including a variety of skinks, the Eastern Blue-tongue Lizard, Eastern Brown Snake, Red-bellied Black Snake and Eastern Tiger Snake. These species may occur on the subject site on occasion, although the site does not contain habitat of any significance.

No threatened reptile species have been recorded during any field investigations in the vicinity, and none are likely to occur on the site.

## Amphibians

Five amphibian species (Peron's Tree-frog, Sudell's Frog, Spotted Grass Frog, Eastern Sign-bearing Froglet and Tyler's Toadlet) were recorded in the ponds located within remnant vegetation in the north of the site, and other species known to the region (such as the Common Eastern Froglet and Spotted Grass Frog) have the potential to occur on occasion. No amphibian species were recorded in the dam located in the grassland area of the extraction zone, however, probably due to its disturbed nature and lack of shelter resources.

One threatened amphibian species (the Southern Bell Frog) is known to occur in the Albury region (NP&WS Wildlife Atlas; GHD 1977), and is discussed further in Section 4.3.

### 4.3 Fauna of Conservation Significance

In New South Wales, threatened fauna species are defined as those listed on Schedules 1 and 2 of the *TSC Act*. Threatened species include those which are considered of conservation concern because of restricted distributions or habitat requirements, significant population or distributional range declines and where threats to a species' survival still prevail.

No threatened fauna species were recorded on the subject site during the current fauna investigations, although six threatened species have been recorded within 10km of the site (NP&WS Atlas of NSW Wildlife 1999), and a further three are known to occur in the Albury region (GECon 1995, 1996a, 1996b). These species are considered in more detail below, although the subject site is not considered of particular importance to any of these animals, given the nature and condition of the habitats present.

Threatened fauna species are highly unlikely to be dependent on the habitats or resources present within the subject site, and few (if any) threatened species are considered likely to occur on the site, given the highly disturbed nature of the landscape.

#### 4.3.1 Threatened fauna recorded within 10km of the subject site

##### *Barking Owl*

The Barking Owl *Ninox connivens* is characteristic of open eucalypt woodland (Lindsey 1992), and prefers isolated remnants and riverine forest (Hollands 1991). This species requires roomy tree-hollows for nesting and feeds upon birds, mammals and nocturnal insects (Lindsey 1992).

The Barking Owl is widely distributed throughout Australia, with populations in the Kimberleys, southwest and eastern Australia, although it is considered rare in the southeast (Hollands 1991).

Given the lack of resources for the Barking Owl within the subject site, the lack of evidence for its presence, and the retention of remnant woodland, it is not "likely" that there would

be any "significant effect" on this species as a result of the proposal, even if it did occur on the subject site on occasion.

#### *Regent Honeyeater*

The Regent Honeyeater *Xanthomyza phrygia* is relatively widely distributed in the dry forests and woodlands of southeastern Australia, where it is generally sparse and considered to be declining as a result of habitat destruction (Garnett 1992a, 1992b). This species has been investigated by the Australian NP&WS (now Environment Australia), and its total population is estimated to number only about one thousand individuals (Garnett 1992b).

The habitat requirements of the Regent Honeyeater include eucalypt woodland and open forest, wooded parts of agricultural land and some urban areas, and possibly riparian forests characterised by the River Oak *Casuarina cunninghamiana* in NSW (Garnett 1992b). The principle food resources for the Regent Honeyeater include nectar and insects, and the species depends on vigorously flowering eucalypt species, including *Eucalyptus sideroxylon*, *E albens*, *E melliodora*, *E leucoxylon* and *E polyanthemos*. The Regent Honeyeater has also been recorded feeding on *Eucalyptus robusta* and *E viminalis*, as well as a number of other eucalypt species (Garnett 1992a, 1992b). Features of sites occupied or utilised by this species are the presence of large trees, a high percentage of flowering trees and a tall shrub layer (Garnett 1992b).

Although the subject site contains many of the Honeyeater's feed tree species, they are rare within the remnant vegetation and there is no shrub layer. Furthermore, *E melliodora* and *E sideroxylon* are characteristic of much of the remnant woodland typical of the Albury landscape. On this basis the site is not likely to provide notable resources (a high percentage of suitable flowering trees or nesting habitat) for the Regent Honeyeater, and even if this species did occur on the subject site on occasion, there will be no effect on its required resources under the proposal, given that essentially all the remnant woodland is to be retained and that activities are largely to be confined to grassland areas.

#### *Grey Falcon*

The Grey Falcon *Falco hypoleucus* is most common in arid inland areas of Australia, and is widespread in the Northern Territory and the Pilbara and Kimberley regions of Western Australia. It is sparsely distributed in the Murray-Darling Basin and northwest of NSW, and is rare in Victoria and South Australia (Marchant & Higgins 1993).

The Grey Falcon utilises a range of open country and woodland habitats (Marchant & Higgins 1993) including tropical to cool temperate arid desert, tussock grassland (*Astrelba*), Spinifex (*Triodia*) grassland and shrublands (eg Bluebush).

This species usually nests in tall eucalypts near or adjacent to watercourses, and roosts in live trees and stags. The Grey Falcon feeds almost exclusively on birds, particularly graminivorous parrots and pigeons (Marchant & Higgins 1993) and very occasionally on small mammals, insects and reptiles (Marchant & Higgins 1993). Breeding occurs mainly within the arid zone (Marchant & Higgins 1993).

Given the lack of preferred resources for the Grey Falcon on the subject site, it is unlikely that the site provides any significant habitat for the species. It is not "likely" any "significant effect" will be imposed on the Grey Falcon as a result of the proposal.

#### *Brolga*

The Brolga *Grus rubicundus* is generally widespread and abundant in northern and eastern Australia, but in NSW it is mostly confined to the far north and central southern regions (Marchant & Higgins 1993).

The habitat of the Brolga consists primarily of terrestrial wetlands including swamps, shallow lagoons, saltmarsh floodwaters, as well as grassland and croplands (Marchant & Higgins 1993). In southeast Australia, the Brolga generally utilises shallow freshwater

marshes or meadows during its breeding season (July to December), where common species include *Carex* spp, *Juncus* spp, *Poa* spp, *Glyceria australis*, *Eleocharis* spp, *Eucalyptus camaldulensis* and/or *Muehlenbeckia cunninghamii*. In the non-breeding season (late December to May), this species utilises deep permanent freshwater marshes and littoral zones, and forages near fields of crop stubble, pastures and potatoes (Marchant & Higgins 1993).

The subject site lacks the majority of habitat types utilised by the Brolga, and given the disturbed and degraded nature of the waterbodies present, and location of more suitable resources to the west, south and east (*ie* the Murray River wetland areas and Hume Reservoir), it is highly unlikely that this species occurs on the site, even on occasion.

#### *Squirrel Glider*

The Squirrel Glider *Petaurus norfolcensis* occurs from central Victoria to northeastern Queensland, where it inhabits dry sclerophyll forest and woodland (GECon 1998). This species relies on medium-sized tree-hollows for shelter and nesting (GECon 1998), and often on riparian open forest (Menkhorst *et al* 1988). Given the lack of suitable habitat and tree-hollows within the subject site, the retention of essentially all the woodland on the site, and that the last record of this species in the area is from 1954 (NP&WS Atlas of NSW Wildlife), it is highly unlikely that the Squirrel Glider occurs within the subject site, or will be affected by the proposed extraction operations.

#### 4.3.2 Other Threatened Fauna

##### *Southern Bell Frog*

The Southern Bell Frog *Litoria raniformis* is a threatened amphibian species known to occur in the Albury region (NP&WS Wildlife Atlas; GHD 1977). It is generally associated with areas of permanent water and is commonly found in vegetation within or at the edges of reservoirs, farm dams and swamps or under nearby debris (Cogger 1992; Tyler 1992). No evidence of the Southern Bell Frog was obtained from the subject site, and it has not been recorded during previous studies in the site vicinity or general area (GECon 1995, 1996a, 1996b). The Southern Bell Frog is considered unlikely to occur in the subject site, given the nature and condition of the landscape. The only possible habitat for this species involves the artificial dams situated within woodland remnants in the north of site, and there will be no disturbance to this area under the proposal.

##### *Yellow-bellied Sheathtail Bat*

The Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris* has been recorded in riparian habitats along the Murray and Murrumbidgee Rivers and their tributaries (GECon 1996a). This species inhabits eucalypt forest, where it roosts in tree-hollows and forages above the canopy for insects (Richards 1995). The remnant woodlands within the subject site provide limited foraging, roosting and nesting resources for the Yellow-bellied Sheathtail Bat and other species of microchiropteran bats. However, there will be little or no disturbance of these resources as a result of the proposed extraction operations. Even if the Yellow-bellied Sheathtail Bat occurs on the subject site on occasion, it is not "*likely*" that this species would be subjected to "*a significant effect*" or any relevant adverse impacts as a result of the proposal.

##### *Turquoise Parrot*

The Turquoise Parrot *Neophema pulchella* has been recorded within the general region (Birds Australia & NSWBA databases). This species inhabits eucalypt woodland adjoining clearings, as well as wooded hills and ridges, and timbered creeklines and farmland habitats (Blakers *et al* 1984). No evidence for the presence of the Turquoise Parrot was obtained during the current or previous investigations in the vicinity of the subject site. Although the Turquoise Parrot could theoretically occur on the subject site on occasion, the habitats and vegetation communities present are not considered of critical importance for

this species, given their extensive distribution throughout the region and limited extent on the site. Furthermore, any resources of potential use to this species will be retained.

#### *Bush Stone-curlew*

The Bush Stone-curlew *Burhinus grallarius* has been recorded in the general region (GECon 1995a; Birds Australia & NSWBA databases), and could theoretically occur on the subject site. This species generally inhabits "lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland" with substantial levels of ground debris which provides food resources and shelter (Marchant & Higgins 1993). The Bush Stone-curlew was not recorded during the current investigation or other studies in the vicinity, and it is considered unlikely to occur on the subject site, given the scarcity of ground cover and the presence of feral predators such as the Red Fox, Cat and Dog. The likelihood of any adverse impacts on this species (even if it did occur) is considered extremely low, due to its highly mobile nature, lack of suitable habitat within the site (particularly in areas proposed for disturbance), and widespread distribution of more suitable habitat throughout the region.

#### *Blue-billed Duck*

The Blue-billed Duck *Oxyura australis* occurs mainly in the lower Murray-Darling basin and in southwestern Australia, and occasionally in southern Queensland and Tasmania. This species inhabits deep, permanent freshwater lakes, lagoons and swamps, preferably with extensive reed beds (Lindsey 1992). The subject site contains no suitable habitat for the Blue-billed Duck, and this species is not expected to occur on the site, even on occasion.

#### *Freckled Duck*

The Freckled Duck *Stictonetta naevosa* occurs occasionally over most of Australia, but most commonly breeds in the lower Murray-Darling basin, in the channel country surrounding Lake Eyre, and in the far southwest of Western Australia. It inhabits cumbungi, lignum or melaleuca swamps, usually of large extent, and also lakes and floodwaters (Lindsey 1992). The subject site contains no suitable habitat for the Freckled Duck, and this species is not expected to occur on the site, even on occasion, given the range of more suitable habitat in the locality (such as the Murray River and Hume Reservoir).

#### *Australasian Bittern*

The Australasian Bittern *Botaurus poiciloptilus* (also known as the Brown Bittern) occurs in southeastern and far southwestern Australia, and is common in the wetlands of the Murray-Darling basin. This species inhabits cool to warm temperate wetlands with dense reed beds, and feeds on frogs, small reptiles, yabbies and small fish (Lindsey 1992). The subject site contains no suitable habitat and a lack of potential food resources for the Australasian Bittern, and this species is not expected to occur on the site, even on occasion.

## **5 POTENTIAL IMPACTS of the PROPOSED ACTIVITIES**

### **5.1 Impacts on Native Fauna and their Habitat**

Vegetation clearance for residential subdivision, grazing and other agricultural activities throughout much of the locality has resulted in the removal of native vegetation and fauna habitat. Fauna habitats which are present on the subject site are widespread throughout the region, and the proposed extraction operations and transportation of fill will involve modification or destruction of only a very small proportion of this (already degraded and fragmented) habitat in the general region.

Disturbances associated with the proposal will be almost entirely limited to previously cleared grassland areas. The more important areas of fauna habitat within the site (the disturbed woodland stands) are located adjacent to the extraction zone. The stands of

vegetation in the north and along the site's eastern and southern boundaries are to be essentially retained, and will not be significantly affected by the extraction operations. The majority of fauna species which may utilise the grassland habitats are highly mobile, and would therefore readily avoid such disturbances.

The dam situated in the open grassland area of the extraction zone will either be used as a sediment basin or removed during the proposed works. This dam provides habitat of little or no value for amphibians (no species were recorded during the field investigations). The amphibian species recorded during the survey were located in dams within the remnant woodland vegetation in the north of the site, where more suitable habitat is present, and there will be no disturbance to these waterbodies under the proposal.

The proposed haul road corridor passes through previously cleared grassland, which is of very little (if any) value for native fauna. Species observed in this area of the site were highly mobile, wide-ranging and disturbance-tolerant species that are common in modified areas. Whilst some remnant vegetation and horticultural plantings of native species occur close to the corridor, these areas will be avoided, limiting the potential impacts on native fauna using these disturbed resources.

The site does not form part of any significant conservation resource or corridor for fauna movement within the locality, and it does not provide habitat of any significance for threatened species. Given the above considerations, the imposition of any adverse impacts on native fauna or threatened species is considered highly unlikely.

## **5.2 Impacts on Vegetation**

Excavation and road construction associated with the proposal will be limited almost entirely to grassland areas, which consist mostly of introduced species. Given the extent of similar grassland areas throughout the Albury region, the small area to be disturbed, and the extremely limited conservation value of the site, there will be no significant impact on grassland vegetation. Remnant vegetation along the boundaries and in the northern portion of the extraction site will remain intact, and the proposal therefore is unlikely to have any adverse impacts on native woodlands.

Extraction activities and road construction will involve soil disturbance, which has the potential to generate sediment discharge and dust. These activities could affect the stands of remnant vegetation and water quality in their associated dams, and impact amelioration measures are described in the following section which should mitigate any potential adverse effects on vegetation and aquatic habitat.

## **5.3 Site Rehabilitation**

A rehabilitation plan is being prepared for the site, which is intended to restore the grasslands to their existing condition. Consequently, no long-term adverse environmental impacts are likely to result from the proposal.

## **6 ENVIRONMENTAL MANAGEMENT and IMPACT AMELIORATION**

Notwithstanding the minimal likelihood of adverse impacts on the natural environment, a range of mitigative measures and environmental management protocols are recommended to be implemented as part of the proposal, to protect the natural environment and any native flora or fauna, or their habitats within the site. Relevant 'best practice' measures will include:

- the clearance of and/or damage to native vegetation should be minimised wherever possible;
- any infrastructure required for the proposed operations should be positioned to avoid native vegetation. In particular, mature hollow-bearing trees, dams and patches of woodland should be avoided;

- as the proposal has the potential to generate dust, appropriate dust suppression measures (such as watering exposed surfaces and/or mulching) should be implemented, where required, to protect water bodies and adjacent stands of vegetation, particularly in the northern portion of the site;
- any noxious weed material encountered during clearing should be destroyed and/or removed from the site using appropriate methods;
- any stormwater discharge points are to be located in appropriate areas which avoid disturbance to retained woodland vegetation;
- any water flows or drainage involved with excavation activities should be controlled within existing or appropriately bunded drainage lines or diversion channels, so as to avoid any areas of retained vegetation;
- sediment and erosion control structures (which conform with the relevant Environment Protection Authority/Department of Land & Water Conservation guidelines) should be installed and appropriately maintained downslope of any exposed areas or soil stockpiles, where there is a risk of sediment discharge into waterbodies or areas of retained vegetation. Sediment control devices may include temporary sediment ponds, silt fences or any other approved structures;
- following excavation operations, exposed soil surfaces should be stabilised as soon as possible (either by mulching, covering or replanting) to avoid the potential for erosion;
- wastes associated with the proposal should be appropriately managed to prevent the discharge of pollutants into adjacent ponds and areas of native vegetation;
- an Environmental Management Plan should be prepared prior to any construction activities, to document all management and impact amelioration measures, and to provide response protocols for problems which may arise; and
- locally endemic plant species should be incorporated into any rehabilitation programs, where possible, to provide habitat features for native fauna.

## 7 SIGNIFICANCE of IMPACTS on FLORA and FAUNA

As discussed in Sections 4 and 5 of this report, the subject site is of very limited habitat value for native flora and fauna, and the area to be disturbed under the proposal is almost entirely limited to previously modified grasslands. Furthermore, environmental management and impact amelioration measures are prescribed in Section 6 to mitigate any potential impacts which could possibly result. On this basis, the proposal is not likely to impose any adverse impacts on native flora or fauna.

There is no habitat of significance for any threatened flora or fauna species, and no evidence for the presence of threatened species on the subject site or in its vicinity. Even if individuals of the threatened species recorded in the Albury area were present at the site on occasion, it is not "*likely*" that the proposed activities would impose "*a significant effect*" on any such species. Given the nature and condition of the subject site, the lack of any resources or habitat features of relevance for any threatened species, and the small area to be affected by the proposed extraction and haulage operation, it is considered that a formal (written) Section 5A Assessment of Significance for threatened species is not required. The potential for "*a significant effect*" to be imposed on threatened biota and their habitats has, however, been assessed pursuant to the factors contained in s.5A of the EP&A Act. No "*significant effect*" is "*likely*", and a Species Impact Statement is not required.

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PROPOSED EXTRACTION of FILL and HAUL ROAD  
ALBURY

FLORA & FAUNA ASSESSMENT

APPENDIX 1

Flora Species Recorded on the Subject Site

## KEY

\* introduced species

STATUS	SCIENTIFIC NAME	COMMON NAME
	<b>MAGNOLIOPSIDA: MONOCOTYLEDONS</b>	
	<b>Iridaceae</b>	
*	<i>Romulea</i> spp	Onion Grass
	<b>Juncaceae</b>	
*	<i>Juncus acutus</i>	Sharp Rush
	<b>Poaceae</b>	
*	<i>Briza maxima</i>	Blowfly Grass
*	<i>Briza minor</i>	Shivery Grass
*	<i>Bromus hordaeceus</i>	Brome
*	<i>Chloris truncata</i>	Windmill Grass
*	<i>Cynodon dactylon</i>	Couch Grass
*	<i>Eragrostis</i> spp	Love Grass
*	<i>Festuca elatior</i>	Tall Fescue
*	<i>Hordeum leporinum</i>	Barley Grass
	<b>MAGNOLIOPSIDA: DICOTYLEDONS</b>	
	<b>Asteraceae</b>	
*	<i>Arctotheca calendula</i>	Capeweed
*	<i>Aster subulatus</i>	Bushy Starwort
*	<i>Hypochoeris radicata</i>	Cat's ear
*	<i>Onopordum acanthium</i>	Scotch Thistle
*	<i>Silybum marianum</i>	Variegated Thistle
*	<i>Taraxacum officinale</i>	Dandelion
	<b>Boraginaceae</b>	
*	<i>Echium plantagineum</i>	Paterson's curse
	<b>Clusiaceae</b>	
*	<i>Hypericum perforatum</i>	St John's Wort
	<b>Fabaceae: Faboideae</b>	
*	<i>Trifolium</i> sp	-
	<b>Fabaceae: Mimosoideae</b>	
	<i>Acacia baileyana</i>	Cootamundra Wattle
	<i>Acacia dealbata</i>	Silver Wattle
	<b>Gernaniaceae</b>	
*	<i>Erodium moschatum</i>	Musky Crowfoot
	<b>Myrtaceae</b>	
	<i>Eucalyptus albens</i>	White Box
	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
	<i>Eucalyptus camaldulensis</i>	River Red Gum
	<i>Eucalyptus citriodora</i>	Lemon-scented Gum
	<i>Eucalyptus goniocalyx</i>	Long-leaved Box
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus mannifera</i>	Brittle Gum
	<i>Eucalyptus microcarpa</i>	Grey Box
	<i>Eucalyptus polyanthemus</i>	Red Box
	<i>Eucalyptus sideroxylon</i>	Red Ironbark
	<i>Eucalyptus viminalis</i>	Rough-barked Manna Gum
	<b>Polygonaceae</b>	
*	<i>Rumex brownii</i>	Swamp Dock

# PROPOSED EXTRACTION of FILL and HAUL ROAD ALBURY

## FLORA & FAUNA ASSESSMENT

### APPENDIX 2

#### Fauna Species Recorded on the Subject Site and in the Albury Region

#### KEY

\* Introduced species.

Schedule species as listed in the *NSW Threatened Species Conservation Act 1995*.

E Endangered  
V Vulnerable

- A** Species recorded on the subject site during current field investigations (November 1998 & May 1999)
- B** Species recorded in the vicinity of the subject site during previous investigations (Gunninah. 1996. Albury Hume 132KV Transmission Line Proposed Deviation. Flora and Fauna Assessment)
- C** Species recorded in the Albury region during previous investigations
- 1 Gunninah. 1995. The Hume Highway Albury-Wodonga Bypass. Flora and Fauna Reports (species recorded in inner route option)
- 2 Gunninah. 1995. The Hume Highway Albury-Wodonga Bypass. Flora and Fauna Reports (species recorded in outer route option)
- 3 Kinhill Metcalf Eddy. 1994. Albury Sewage Augmentation. Reclamation & Reuse Project. EIS
- D** Birds Australia and/or NSW Bird Atlassers records for the 10-minute grid centred on 36°05'S 146°55'E, or recorded within 10km of the subject site on the NSW NP&WS Wildlife Atlas (April 1999)

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**APPENDIX 2**

Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
	<b>Phasianidae</b>					
	Stubble Quail	<i>Coturnix pectoralis</i>			3	×
	Brown Quail	<i>Coturnix ypsilophora</i>				×
	King Quail	<i>Coturnix chinensis</i>				×
	<b>Anatidae</b>					
V	Plumed Whistling-Duck	<i>Dendrocygna eytoni</i>				×
	Blue-billed Duck	<i>Oxyura australis</i>				×
	Musk Duck	<i>Biziura lobata</i>				×
V	Freckled Duck	<i>Stictonetta naevosa</i>				×
	Australian Shelduck	<i>Tadorna tadornoides</i>				×
	Australian Wood Duck	<i>Chenonetta jubata</i>	×	×	1, 2, 3	×
	Mallard	<i>Anas platyrhynchos</i>			1, 2	×
	Pacific Black Duck	<i>Anas superciliosa</i>	×		1, 2, 3	×
	Australasian Shoveler	<i>Anas rhynchotis</i>			3	×
	Grey Teal	<i>Anas gracilis</i>			1, 3	×
	Chestnut Teal	<i>Anas castanea</i>				×
	Pink-eared Duck	<i>Malacorhynchus membranaceus</i>				×
	Hardhead	<i>Aythya australis</i>			2	×
	Black Swan	<i>Cygnus atratus</i>			1, 2, 3	×
	<b>Podicipedidae</b>					
	Australasian Grebe	<i>Tachybaptus novaehollandiae</i>			1, 3	×
	Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>			1	×
	Great Crested Grebe	<i>Podiceps cristatus</i>			3	×
	<b>Anhingidae</b>					
	Darter	<i>Anhinga melanogaster</i>			1, 2, 3	×
	<b>Phalacrocoracidae</b>					
	Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>			2, 3	×
	Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>				×
	Pied Cormorant	<i>Phalacrocorax varius</i>		×	2, 3	×
	Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	×		1, 2, 3	×
	Great Cormorant	<i>Phalacrocorax carbo</i>			2, 3	×
	<b>Pelecanidae</b>					
	Australian Pelican	<i>Pelecanus conspicillatus</i>			2, 3	×
	<b>Ardeidae</b>					
	White-faced Heron	<i>Egretta novaehollandiae</i>		×	1, 2, 3	×
	Little Egret	<i>Egretta garzetta</i>				×
	White-necked Heron	<i>Ardea pacifica</i>		×	2, 3	×
	Great Egret	<i>Ardea alba</i>			2, 3	×
	Intermediate Egret	<i>Ardea intermedia</i>		×	3	×
	Cattle Egret	<i>Ardea ibis</i>			1	×
	Nankeen Night Heron	<i>Nycticorax caledonicus</i>			3	×
	Little Bittern	<i>Ixobrychus minutus</i>				×
V	Australasian Bittern	<i>Botaurus poiciloptilus</i>			3	×
	<b>Threskiornithidae</b>					
	Glossy Ibis	<i>Plegadis falcinellus</i>			2	×
	Australian White Ibis	<i>Threskiornis molucca</i>	×			×
	Straw-necked Ibis	<i>Threskiornis spinicollis</i>		×	3	×
	Royal Spoonbill	<i>Platalea regia</i>			3	×
	Yellow-billed Spoonbill	<i>Platalea flavipes</i>			1, 2, 3	×
	<b>Accipitridae</b>					
	Black-shouldered Kite	<i>Elanus axillaris</i>			1, 3	×
	Black Kite	<i>Milvus migrans</i>				×
	Whistling Kite	<i>Haliastur sphenurus</i>			1, 3	×
	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>				×
	Brown Goshawk	<i>Accipiter fasciatus</i>				×
	Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>				×
	Wedge-tailed Eagle	<i>Aquila audax</i>			3	×
	Little Eagle	<i>Hieraaetus morphnoides</i>				×
	Spotted Harrier	<i>Circus assimilis</i>				×

**APPENDIX 2 contd** Fauna species recorded on the proposed site of extraction of fill and access road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
	Swamp Harrier	<i>Circus approximans</i>				X
	<b>Falconidae</b>					
V	Brown Falcon	<i>Falco berigora</i>	X		2,3	X
	Australian Hobby	<i>Falco longipennis</i>				X
	Grey Falcon	<i>Falco hypoleucos</i>				X
	Black Falcon	<i>Falco subniger</i>				X
	Peregrine Falcon	<i>Falco peregrinus</i>				X
	Nankeen Kestrel	<i>Falco cenchroides</i>			1,3	X
	<b>Rallidae</b>					
	Buff-banded Rail	<i>Gallirallus philippensis</i>				X
	Purple Swamphen	<i>Porphyrio porphyrio</i>			2,3	X
	Dusky Moorhen	<i>Gallinula tenebrosa</i>			2,3	X
	Black-tailed Native-hen	<i>Gallinula ventralis</i>				X
	Eurasian Coot	<i>Fulica atra</i>			1,2,3	X
	<b>Turnicidae</b>					
	Little Button-quail	<i>Turnix velox</i>				X
	Painted Button-quail	<i>Turnix varia</i>			3	X
	<b>Scolopacidae</b>					
	Latham's Snipe	<i>Gallinago hardwickii</i>			1	X
	Wood Sandpiper	<i>Tringa glareola</i>				X
	Common Sandpiper	<i>Actitis hypoleucos</i>				X
	<b>Burhinidae</b>					
E	Bush Stone-curlew	<i>Burhinus grallarius</i>			2	X
	<b>Recurvirostridae</b>					
	Black-winged Stilt	<i>Himantopus himantopus</i>				X
	<b>Charadriidae</b>					
	Red-kneed Dotterel	<i>Erythrogonys cinctus</i>				X
	Masked Lapwing	<i>Vanellus miles</i>			1,2,3	X
	Black-fronted Dotterel	<i>Elseyaornis melanops</i>				X
	<b>Laridae</b>					
	Silver Gull	<i>Larus novaehollandiae</i>				X
	Whiskered Tern	<i>Chlidonias hybrida</i>				X
	<b>Columbidae</b>					
*	Rock Dove	<i>Columba livia</i>			3	X
*	Spotted Turtle-Dove	<i>Streptopelia chinensis</i>			1	X
	Common Bronzewing	<i>Phaps chalcoptera</i>			1	X
	Crested Pigeon	<i>Ocyphaps lophotes</i>	X	X	1,3	X
	Diamond Dove	<i>Geopelia cuneata</i>				X
	Peaceful Dove	<i>Geopelia placida</i>			1,2,3	X
	<b>Cacatuidae</b>					
	Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>				X
	Galah	<i>Cacatua roseicapilla</i>	X	X	1,2,3	X
	Little Corella	<i>Cacatua sanguinea</i>				X
	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	X		1,2,3	X
	<b>Psittacidae</b>					
	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>				X
	Musk Lorikeet	<i>Glossopsitta concinna</i>				X
	Little Lorikeet	<i>Glossopsitta pusilla</i>			3	X
	Australian King-Parrot	<i>Alisterus scapularis</i>				X
	Cockatiel	<i>Nymphicus hollandicus</i>				X
	Budgerigar	<i>Melopsittacus undulatus</i>				X
	Crimson Rosella	<i>Platycercus elegans</i>	X	X	2,3	X
	Eastern Rosella	<i>Platycercus eximius</i>	X	X	1,2,3	X
	Red-rumped Parrot	<i>Psephotus haematonotus</i>	X	X	1,2,3	X
V	Turquoise Parrot	<i>Neophema pulchella</i>				X
	<b>Cuculidae</b>					
	Pallid Cuckoo	<i>Cuculus pallidus</i>				X
	Brush Cuckoo	<i>Cuculus variolosus</i>				X

**APPENDIX 2 contd** Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
V	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>			3	×
	Black-eared Cuckoo	<i>Chrysococcyx osculans</i>				×
	Shining Bronze-Cuckoo	<i>Chrysococcyx lucidus</i>			3	×
	Horsfield's Cuckoo	<i>Chrysococcyx basalis</i>			1,2,3	×
	<b>Strigidae</b>					
	Southern Boobook	<i>Ninox novaeseelandiae</i>			2,3	×
	Barking Owl	<i>Ninox connivens</i>				×
	<b>Tytonidae</b>					
	Barn Owl	<i>Tyto alba</i>				×
	<b>Podargidae</b>					
	Tawny Frogmouth	<i>Podargus strigoides</i>			2	×
	<b>Aegothelidae</b>					
	Australian Owlet-nightjar	<i>Aegotheles cristatus</i>				×
	<b>Apodidae</b>					
	White-throated Needletail	<i>Hirundapus caudacutus</i>				×
	Fork-tailed Swift	<i>Apus pacificus</i>				×
	<b>Alcedinidae</b>					
	Azure Kingfisher	<i>Alcedo azurea</i>			3	×
	<b>Halcyonidae</b>					
	Kookaburra	<i>Dacelo novaeguineae</i>	×		1,2,3	×
Red-backed Kingfisher	<i>Todiramphus pyrrhopygia</i>				×	
Sacred Kingfisher	<i>Todiramphus sanctus</i>			1,3	×	
<b>Meropidae</b>						
Rainbow Bee-eater	<i>Merops ornatus</i>	×		1,2,3	×	
<b>Coraciidae</b>						
Dollarbird	<i>Eurystomus orientalis</i>			3	×	
<b>Climacteridae</b>						
White-throated Treecreeper	<i>Cormobates leucophaeus</i>			1,3	×	
Brown Treecreeper	<i>Climacteris picumnus</i>			2,3	×	
<b>Maluridae</b>						
Superb Fairy-wren	<i>Malurus cyaneus</i>	×		1,3	×	
<b>Pardalotidae</b>						
Spotted Pardalote	<i>Pardalotus punctatus</i>			1,2,3	×	
Yellow-rumped Pardalote	<i>Pardalotus xanthopygus</i>				×	
Striated Pardalote	<i>Pardalotus striatus</i>	×		1,2,3	×	
White-browed Scrubwren	<i>Sericornis frontalis</i>			2	×	
Speckled Warbler	<i>Chthonicola sagittata</i>			3	×	
Weebill	<i>Smicronis brevirostris</i>			3	×	
Western Gerygone	<i>Gerygone fusca</i>			3	×	
White-throated Gerygone	<i>Gerygone olivacea</i>		×	2,3	×	
Brown Thornbill	<i>Acanthiza pusilla</i>	×		1,2,3	×	
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>			1,3	×	
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>			2,3	×	
Yellow Thornbill	<i>Acanthiza nana</i>		×		×	
Striated Thornbill	<i>Acanthiza lineata</i>			3	×	
Southern Whiteface	<i>Aphelocephala leucopsis</i>			3	×	
<b>Meliphagidae</b>						
Red Wattlebird	<i>Anthochaera carunculata</i>	×	×	2	×	
Noisy Friarbird	<i>Philemon corniculatus</i>	×		1,2	×	
Little Friarbird	<i>Philemon citreogularis</i>			1,3	×	
Regent Honeyeater	<i>Xanthomyza phrygia</i>				×	
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>				×	
Noisy Minor	<i>Manorina melanocephala</i>	×	×	1,2,3	×	
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>			1	×	
White-eared Honeyeater	<i>Lichenostomus leucotis</i>				×	
Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>				×	
Fuscous Honeyeater	<i>Lichenostomus fuscus</i>			2	×	

**APPENDIX 2 contd** Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
	White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	×	×	1,2,3	×
	Black-chinned Honeyeater	<i>Melithreptus gularis</i>				×
	Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>				×
	White-naped Honeyeater	<i>Melithreptus lunatus</i>				×
	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>				×
	White-fronted Chat	<i>Epthianura albifrons</i>				×
	<b>Petroicidae</b>					
	Rose Robin	<i>Petroica rosea</i>				×
	Flame Robin	<i>Petroica phoenicea</i>	×			×
	Scarlet Robin	<i>Petroica multicolor</i>				×
	Red-capped Robin	<i>Petroica goodenovii</i>			2,3	×
	Hooded Robin	<i>Melanodryas cucullata</i>				×
	Eastern Yellow Robin	<i>Eopsaltria australis</i>				×
	Jacky Winter	<i>Microeca fascinans</i>	×			×
	<b>Pomatostomidae</b>					
	Grey-crowned Babbler	<i>Pomatostomus temporalis</i>				×
	White-browed Babbler	<i>Pomatostomus superciliosus</i>			3	×
	<b>Cinclosomatidae</b>					
	Eastern Whipbird	<i>Psophodes olivaceus</i>				×
	<b>Neosittidae</b>					
	Varied Sittella	<i>Daphoenositta chrysoptera</i>				×
	<b>Pachycephalidae</b>					
	Crested Shrike-tit	<i>Falcunculus frontatus</i>	×		1,3	×
	Golden Whistler	<i>Pachycephala pectoralis</i>				×
	Rufous Whistler	<i>Pachycephala rufiventris</i>	×	×	1,3	×
	Grey Shrike-thrush	<i>Colluricincla harmonica</i>	×		1,2,3	×
	<b>Dicruridae</b>					
	Leaden Flycatcher	<i>Myiagra rubecula</i>				×
	Satin Flycatcher	<i>Myiagra cyanoleuca</i>				×
	Restless Flycatcher	<i>Myiagra inquieta</i>			1,2,3	×
	Magpie-lark	<i>Grallina cyanoleuca</i>	×		1,2,3	×
	Rufous Fantail	<i>Rhipidura rufifrons</i>				×
	Grey Fantail	<i>Rhipidura fuliginosa</i>	×	×	1,2,3	×
	Willie Wagtail	<i>Rhipidura leucophrys</i>	×	×	1,2,3	×
	<b>Campephagidae</b>					
	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	×	×	1,2,3	×
	White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>				×
	White-winged Triller	<i>Lalage sueurii</i>				×
	Cicadabird	<i>Coracina tenuirostris</i>	×			×
	<b>Oriolidae</b>					
	Olive-backed Oriole	<i>Oriolus sagittatus</i>				×
	<b>Artamidae</b>					
	White-breasted Woodswallow	<i>Artamus leucorhynchus</i>				×
	Masked Woodswallow	<i>Artamus personatus</i>				×
	White-browed Woodswallow	<i>Artamus superciliosus</i>				×
	Dusky Woodswallow	<i>Artamus cyanopterus</i>			1,2,3	×
	Grey Butcherbird	<i>Cracticus torquatus</i>				×
	Australian Magpie	<i>Gymnorhina tibicen</i>	×	×	1,2,3	×
	Pied Currawong	<i>Strepera graculina</i>	×			×
	Grey Currawong	<i>Strepera versicolor</i>				×
	<b>Corvidae</b>					
	Australian Raven	<i>Corvus coronoides</i>	×	×	1,2,3	×
	Little Raven	<i>Corvus mellori</i>				×
	<b>Corcoracidae</b>					
	White-winged Chough	<i>Corcorax melanorhamphos</i>	×	×	1,2	×
	<b>Alaudidae</b>					
	Singing Bushlark	<i>Mirafra javanica</i>			3	×

**APPENDIX 2 contd** Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
	<b>Motacillidae</b>					
	Richard's Pipit	<i>Anthus novaeseelandiae</i>			2,3	×
	<b>Passeridae</b>					
*	House Sparrow	<i>Passer domesticus</i>	×		2,3	×
*	Tree Sparrow	<i>Passer montanus</i>			3	×
	Zebra Finch	<i>Taeniopygia guttata</i>				×
	Double-barred Finch	<i>Taeniopygia bichenovii</i>				×
	Red-browed Finch	<i>Neochmia temporalis</i>	×			×
	Diamond Firetail	<i>Stagonopleura guttata</i>			1,3	×
	<b>Fringillidae</b>					
*	European Goldfinch	<i>Carduelis carduelis</i>	×	×	1,3	×
*	European Greenfinch	<i>Carduelis chloris</i>				×
	<b>Dicaeidae</b>					
	Mistletoebird	<i>Dicaeum hirundinaceum</i>			1,3	×
	<b>Hirundinidae</b>					
	White-backed Swallow	<i>Cheramoeca leucosternus</i>				×
	Welcome Swallow	<i>Hirundo neoxena</i>	×		1,2,3	×
	Tree Martin	<i>Hirundo nigricans</i>			1,2,3	×
	Fairy Martin	<i>Hirundo ariel</i>			1,2,3	×
	<b>Pycnonotidae</b>					
*	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>				×
	<b>Sylviidae</b>					
	Clamorous Reed-Warbler	<i>Acrocephalus stentoreus</i>			2,3	
	Little Grassbird	<i>Megalurus gramineus</i>			2,3	×
	Golden-headed Cisticola	<i>Cisticola exilis</i>			3	×
	Rufous Songlark	<i>Cincloramphus mathewsi</i>	×		1,3	×
	Brown Songlark	<i>Cincloramphus cruralis</i>	×		2	×
	<b>Zosteropidae</b>					
	Silvereye	<i>Zosterops lateralis</i>			3	×
	<b>Muscicapidae</b>					
*	Common Blackbird	<i>Turdus merula</i>			1,3	×
	<b>Sturnidae</b>					
*	Common Starling	<i>Sturnus vulgaris</i>	×	×	1,2	×
	<b>AMPHIBIANS</b>					
	<b>Myobatrachidae</b>					
	Fletcher's Frog	<i>Limnodynastes fletcheri</i>			2	
	Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>			1,3	
	Giant Banjo Frog	<i>Limnodynastes interioris</i>			3	
	Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>	×		1,2,3	
	Sudell's Frog	<i>Neobatrachus sudelli</i>	×			
	Bibron's Toadlet	<i>Pseudophryne bibronii</i>			1	
	Eastern Sign-bearing Froglet	<i>Crinia parinsignifera</i>	×		1,2,3	
	Common Eastern Froglet	<i>Crinia signifera</i>			1,2,3	
	Sloane's Froglet	<i>Crinia sloanei</i>			2,3	
	Smooth Toadlet	<i>Uperoleia laevigata</i>			3	
	Tyler's Toadlet	<i>Uperoleia tyleri</i>	×			
	<b>Hylidae</b>					
	Brown Tree-frog	<i>Litoria ewingii</i>			1,2	
	Eastern Dwarf Tree-frog	<i>Litoria fallax</i>			1,2	
	Victorian Frog	<i>Litoria paraewingi</i>			1	
	Peron's Tree-frog	<i>Litoria peronii</i>	×		1,2,3	
	Verreaux's Tree Frog	<i>Litoria verreauxii</i>			1,2	

**APPENDIX 2 contd** Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
	<b>REPTILES</b>					
	<b>Chelidae</b>					
	Eastern Snake-necked Turtle	<i>Chelodina longicollis</i>			1	
	<b>Gekkonidae</b>					
	Marbled Gecko	<i>Christinus marmoratus</i>			2	
	<b>Scincidae</b>					
	Southern Rainbow Skink	<i>Carlia tetradactyla</i>			2	
	Robust Ctenotus	<i>Ctenotus robustus</i>			2	
	Copper-tailed Skink	<i>Ctenotus taeniolatus</i>			2	
	Tree Skink	<i>Egernia striolata</i>			2,3	
	Red-throated Skink	<i>Pseudemoia platynota</i>			1,2	
	Southern Water Skink	<i>Eulamprus heatwolei</i>			1,3	
	Cool-temperate Water-skink	<i>Eulamprus tympanum</i>			1	
	Dark Garden Skink	<i>Lampropholis delicata</i>			1	
	Pale Garden Skink	<i>Lampropholis guichenoti</i>			1	
	Eastern Blue-tongue Lizard	<i>Tiliqua scincoides</i>			2,3	
	<b>Elapidae</b>					
	Eastern Tiger Snake	<i>Notechis scutatus</i>			3	
	Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>			1,3	
	Eastern Brown Snake	<i>Pseudonaja textilis</i>			1,2	
	<b>MAMMALS</b>					
	<b>Tachyglossidae</b>					
	Common Brushtail Possum	<i>Trichosurus vulpecula</i>	×		1,2,3	
	<b>Dasyuridae</b>					
	Yellow-footed Antechinus	<i>Antechinus flavipes</i>			2,3	
	<b>Petauridae</b>					
V	Sugar Glider	<i>Petaurus breviceps</i>			1,2,3	
	Squirrel Glider	<i>Petaurus norfolcensis</i>				×
	<b>Pseudocheiridae</b>					
	Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>			1,2,3	
	<b>Macropodidae</b>					
	Eastern Grey Kangaroo	<i>Macropus giganteus</i>	×		3	
	<b>Vespertilionidae</b>					
	Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>		×		
	Chocolate Wattled Bat	<i>Chalinolobus morio</i>		×	3	
	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>			1,2,3	
	Large Forest Bat	<i>Vespadelus darlingtoni</i>		×	1,3	
	Southern Forest Bat	<i>Vespadelus regulus</i>			1,2,3	
	Little Forest Bat	<i>Vespadelus vulturnus</i>		×	1,3	
	Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>			2	
	Little Broad-nosed Bat	<i>Scotorepens greyii</i>			3	
	<b>Molossidae</b>					
	White-striped Mastiff-bat	<i>Tadarida australis</i>	×		2	
	Little Free-tail Bat	<i>Mormopterus loriae</i>			2	
	Little Mastiff-bat	<i>Mormopterus planiceps</i>			3	
	<b>Muridae</b>					
	Bush Rat	<i>Rattus fuscipes</i>			2	
	<b>Introduced Mammals</b>					
*	Cattle	<i>Bos taurus</i>	×			
*	Dog	<i>Canis familiaris</i>	×			
*	Red Fox	<i>Vulpes vulpes</i>	×	×	3	
*	Brown Hare	<i>Lepus capensis</i>	×		3	

**APPENDIX 2 contd** Fauna species recorded on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway and within the Albury region.

Status	Common Name	Scientific Name	A	B	C	D
*	European Rabbit	<i>Oryctolagus cuniculus</i>			3	
*	House Mouse	<i>Mus musculus</i>			2,3	
*	Horse	<i>Equus caballus</i>	×			
*	Cat	<i>Felis catus</i>	×			

PROPOSED EXTRACTION of FILL and HAUL ROAD  
ALBURY

FLORA & FAUNA ASSESSMENT

APPENDIX 3

Fauna and Flora Survey Methods and Weather Conditions

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## 1 GENERAL SURVEY TECHNIQUES

General surveys were conducted across the subject site from the 31st October to the 9th November 1998 and from the 15th to the 16th May 1999, involving:

- identification and assessment of the nature and condition of habitats and specific resource features present;
- dedicated searches for indirect evidence of fauna (*ie* scats, feathers, fur, tracks, dens, nests, scratches, owl whitewash *etc*);
- visual and aural detection of birds at a variety of specific locations around the site, with opportunistic records maintained;
- specific reptile searches involving scratching and disturbance of leaf litter and other ground debris, with opportunistic records being maintained at all times; and
- diurnal amphibian searches in areas of potential habitat, with opportunistic records maintained.

## 2 SPECIFIC SURVEY TECHNIQUES

Specific survey techniques were employed to enable detection of the more cryptic and difficult to locate fauna species, including nocturnal fauna. The locations of these techniques are illustrated on Figure 3 of the main Flora & Fauna Assessment Report.

### 2.1 Spotlighting

Foot-based spotlighting surveys were conducted across the subject site during the investigations to target arboreal mammals, amphibians and other nocturnal fauna. Fauna species were detected both visually and aurally.

Table 1 Spotlighting effort applied to the subject site

Investigations	Date	Person-hours
GECon (November 1998)	31/10/98, 7/11/98,	4
GECon (May 1999)	9/11/98 15/5/99 & 16/1/99	5

#### *Fauna Identified*

Black-faced Cuckoo Shrike  
Common Brushtail Possum  
White-striped Mastiff Bat  
Horse  
Brown Hare  
Fox  
Cat

### 2.2 Bird Survey

Birds were detected by visual and aural means at various locations around the site from 31/10/98 to the 9/11/98 and from the 15/5/99 to the 16/5/99.

Forty-one species of birds were detected.

Nocturnal owl playback calls (consisting of 2 x 2-minute playback followed by 3 minutes of listening), were conducted on the 8/11/98 and 9/11/98. Spotlighting was also undertaken to assist in identification of species. One response was received from the Southern Boobook Owl.

**APPENDIX 3**

Fauna survey methods, effort and results employed by GECon on the proposed site of fill extraction and haul road for the Albury-Wodonga link of the National Highway.

**2.3 Reptile Survey**

Diurnal herpetological censusing occurred in areas of potential suitable habitat over 2 days at three sites during early afternoon for a total of 2 person-hours. Opportunistic observations also recorded.

*No fauna identified.*

**2.4 Amphibian Surveys**

Amphibian playback calls (consisting of a 2 minute playback period for species likely to occur in the region) were conducted at 4 sites of potential habitat. Additionally, spotlighting and searches were undertaken at these sites. Opportunistic observations were also recorded.

*Fauna Identified*

Peron's Tree frog  
Common Spadefoot Toad  
Plain's Froglet  
Spotted Grass Frog  
Tyler's Toadlet

**2.5 Scat Analysis**

Several scats were identified on the subject site.

*Species Identified*

Eastern Grey Kangaroo  
Brown Hare  
Cattle

**3 WEATHER CONDITIONS**

Table 2 Weather conditions recorded during the GECon field surveys at Albury.

<b>Date</b>	<b>Weather</b>
31/10/98	Clear, cool, light breeze
5/11/98	Some cloud, mild, light breeze
7/11/98	Cloudy, cool to mild, some wind.
8/11/98	Clear, cool, no breeze
9/11/98	Clear, cool, no breeze
15/11/99	Cloudy, cool, no breeze
16/5/99	Cloudy, cool, slight breeze

**Appendix - I Specialist Heritage and Archaeology Study**

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**A Heritage Assessment  
of the proposed RTA  
fill extraction site at  
Thurgoona, Albury.**

**Commissioned by SKM  
for the RTA**

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## Executive Summary

Sinclair Knight Merz commissioned Robynne Mills, archaeological consultant, to conduct a heritage assessment of the proposed fill extraction site at Thurgoona, east of Albury. The heritage assessment was designed to identify potential impacts of the proposed development on Aboriginal relics ('relics' as defined by the New South Wales National Parks and Wildlife Act 1974) and non-indigenous heritage items as defined by the NSW Heritage Act and the Environmental Planning and Assessment Acts of 1975 and 1979 respectively.

The proposed fill extraction site is located within the Albury and District Local Aboriginal Land Council (LALC) area. The field assessment was carried out on Monday 23<sup>rd</sup> December, 1998. LALC were represented in the field by Mr John David. A *statement of Involvement in the field survey* is included as Appendix 5.

This report provides details of local environmental observations relevant to the archaeological sensitivity of the study area. It identifies all known archaeological sites in the vicinity of the study area as recorded in the site registers of the Australian Heritage Commission, NSW Heritage Council, NSW National Trust, NSW National Parks and Wildlife Service (NPWS) and the Heritage Schedules of Albury City Council. Survey methods and significance assessments are in accordance with NPWS and Heritage Council guidelines. Where appropriate, the report recommends site management options to minimise impact on areas of heritage sensitivity and items within the study area.

This survey identified two indigenous heritage sites: one (1) scarred tree site (TH-ST-1) and one isolated artefact (TH-IF-1). No evidence of sites previously identified in the area by Witter (1979) was located.

Two (2) non-indigenous heritage items were identified immediately outside the proposed development boundaries: the original Mount Pleasant Hotel, now a private residence and a section of the Hume and Hovel walking trail along St Johns Road.

This survey concludes that there is no objection on archaeological grounds to the project proceeding as proposed, provided recommendations in Section 9 of this report are implemented. These recommendations are made on the basis of the National Parks and Wildlife Act of 1974 (as amended), whereby it is illegal to damage, deface or destroy an Aboriginal relic without the written permission of the Director.

**Addendum:** A survey of the haul road to the quarry site from Fallon Road to the junction of Dallinger and Corry Roads was conducted by Navin Officer in May 1999 and is included in this report as Appendix 10. No Aboriginal sites or areas of potential archaeological deposit (PADs) were identified in this survey.

## **1. Details of the Development Proposal and Consultancy Brief.**

### **1.1 Development Proposal**

The Roads and Traffic Authority (RTA) proposes to extract fill from the site for the new inner route alignment of the Albury Wodonga link to the National Highway. The fill will be transported directly to the highway by a route to the north of the airport runway. This survey assessed the extraction site only (Map 1).

### **1.2 Consultancy Brief**

The consultant was commissioned to:

- consult with the Albury and District LALC prior to the survey, to identify any areas of special significance to the Aboriginal community eg sacred or ceremonial areas and identify issues of community concern.
- arrange for a LALC representative to participate in the field work to ensure that the Aboriginal community was included in all discussions relating to the significance, protection and management of relics and archaeologically sensitive areas identified in the survey.
- examine the proposed development site for evidence of indigenous and non-indigenous heritage items, sites and places which could be impacted, either directly or indirectly by the proposed development.
- assess the significance of heritage sites/items/places recorded and make recommendations for the protection and management of these items.
- prepare a report on the heritage investigation which meets the requirements of the NPWS and the NSW Heritage Council.

### **1.3 Impacts**

The development area has been cleared and heavily grazed. The central knoll area (Sketch 3) is devoid of all native vegetation and is sparsely covered with sown grasses and weeds. To the east and west of this spur there are several lightly timbered areas containing old growth trees. The northern area is covered with regrowth timber.

## **2. Aboriginal Consultation**

The survey area is located within the area administered by the Albury and District Local Aboriginal Land Council (LALC). LALC were supplied with maps of the proposed development for their consideration and the consultant requested that details of the development be discussed by the local Aboriginal Community and the consultant informed of any issues or concerns raised with regard to the proposed development. The Aboriginal Community did not identify any issues of concern (Appendix 5). LALC participated in the field survey and at the conclusion of the survey details of survey results and recommendations were discussed. A summary of these recommendations was drafted for consideration by the LALC at the next meeting of their respective Cultural Heritage Committees. The LALC were advised that they would be provided with a copy of the final report.

### **3. Study Area.**

#### **3.1 Location**

The proposed fill extraction site is located at Thurgoona, an outer suburb of Albury Wodonga (Map 1). The development site covers an area approximately 600m x 600m which is bounded by the Riverina Highway to the south, St Johns Road to the west and Bowna Road (now known as Old Sydney Road) to the east. The northern boundary is approximately 600m north from Riverina Highway, south of the existing tree line. The development site is approximately 2.5km north of the Murray River and 600m north of Eight Mile Creek.

#### **3.2 Environmental Observations.**

The development area is composed of a long low ridge which extends across the development area for approximately 600m in a north-south direction (Photo 5). This ridge rises steeply from the surrounding area. Soils associated with the ridge are coarse, reddish gravels/clay. Soils in the remainder of the area are fine, light grey loams.

The Albury Wodonga region is located at the junction of the foothills of the Great Dividing Range and the Western Plains. The Murray River flows through Albury from east to west. Its flood plain covers an area approximately 4-5km wide on either side and is composed of quaternary alluvial deposits of clay, sand, sandy clay and gravels. During major floods the area is entirely inundated. (Upcher and Smith 1994).

Pleistocene alluvial terraces separate the flood plain from the Jindera Hills and Table Top Mountain areas which rise over 400m. These highland areas are composed of Ordovician schists and granite and the lower slopes are covered with colluvium (Ferguson 1992). Quartz, volcanic rock and river pebbles are the most readily available stone types available to Aboriginal people for the manufacture of stone tools and these varieties predominate the stone assemblages in the Albury district (Upcher and Smith 1994).

In the past the river and its fertile flood plain offered its Aboriginal inhabitants an abundant supply of food and raw materials not immediately available in adjacent areas. Land animals include kangaroos, possums, native rats and mice, lizards and snakes and in some places koalas, wombats, bandicoots and gliders. Local rivers and streams support 20 species of native fish as well as turtle, frogs and yabbies. Native birds, particularly water birds are common in the area. The lagoon, swamps and river banks supported river red gum forests, black box and coolabah trees, as well as swamp communities including nardoo, rushes, reeds, sedges and swamp lilies.

Now however, much of the area has been cleared of native vegetation except for isolated trees which have been retained as shade trees for stock. Replanting of native trees has been undertaken in the northern area (Photo 5).

## 4. Archaeological Context.

### 4.1 National Parks and Wildlife Sites Register

A search of the National Parks and Wildlife Service (NPWS) register of known sites showed that there are eight (8) sites in the vicinity of the proposed development. Of these two sites are within the development area.

NPWS Site Name	Site type	Approximate Location
#60-3-0001 Thurgoona 1	Open camp site	within the development area
#60-3-0002 Thurgoona 2	Open camp site	within the development area
#60-3-0003 Thurgoona 3	Open camp site	200m north of proposed development
#60-3-0011 One tree hill	Scarred tree	
#60-3-0013 Galloway Park	Scarred tree	
#60-3-0014 Galloway Park	Scarred tree	
#60-3-0015 Galloway Park	Scarred tree	
#60-3-0016 Galloway Park	Scarred tree	

### 4.2 Existing Archaeological Information

Albury or 'Bungambrawatha" as the Aborigines named it, was a meeting or gathering place for a number of Aboriginal groups or clans prior to their summer forays into the high plains in search of the Bogong moths (Jones 1991). The history of the Aboriginal occupation of the Albury district is not well documented and information concerning the Jeithi tribal group who, according to Tindale (1974) were the original occupants of the region, is completely lacking (Upcher and Smith 1994).

Few academic studies have been carried out in the Albury Region. The majority of surveys have been carried out in association with development applications and Environmental Impact Assessments. The most recent archaeological survey conducted in the Albury area was by Mills 1996 which assessed the route of the proposed upgrade and re-location of the Albury-Hume 132kV transmission lines. This survey located no indigenous heritage sites but identified a creekline and wetland area 300m west of Kerrs Rd as an area of potential archaeological deposit (PAD). Subsequent sub-surface testing of the PAD area was carried out by Winston Gregson and no sites were located (Phil Boot NPWS, pers com.) Kelton 1996 surveyed a section of the Riverina Highway to the east of the current development site for a proposed upgrade of the highway. This survey did not locate any sites but identified one saddle area as a PAD. Sub-surface testing was subsequently carried out by Kelton. No definite artefacts were located during the testing although, Kelton did identify two stone fragments as possible manuports/ artefacts.

Huys (1995) conducted a survey at Howlong, approximately 24km west of Albury and adjacent to the Murray River. Visibility was described in this survey as poor, however Huys predicted that open camp sites and scarred trees were the most likely site types to be located in the area. The open camp sites he predicted were most likely to occur on elevated alluvial terraces and scarred trees could be expected to occur along the Murray River flood plain wherever old growth timber remained. Huys summarised a range of archaeological investigations which had been carried out in the broader Albury-Wodonga region. These include Bowdler 1976, McIntyre 1977, Djekic 1978, Witter 1978, Crosby 1979, Presland 1980, Gunn 1983, Ferguson 1992, Upcher and Smith 1992, 1994 and Paton 1994.

Simmons (1988) identified 3 scarred trees approximately 2kms south west (VAS 8225-0070) of the present study area. Rhodes (1992) re-recorded a scarred tree on the Victorian side of the river (VAS 8225-039). Ferguson (1992) recorded 11 surface scatters and 12 isolated artefacts. Upcher and Smith (1992) recorded 14 open camp sites and 1 scarred tree at Maryvale, to the north of the present survey area. Upcher and Smith (1994) recorded 8 open camp sites and 3 isolated finds in the Howlong area north-west of Albury. All reports note that quartz was the dominant stone material and that open sites were generally confined to the alluvial terraces.

Paton (1994) conducted an assessment of archaeological heritage for the Albury City Council sewerage treatment works and water reclamation project. The study was located in two land systems; Bagnalls Range Lagoon within the Murray River floodplain to the west of Albury and the Nursery Valley area, a small, elevated basin overlooking the Murray River floodplain. Paton recorded a total of ten (10) Aboriginal archaeological sites and three (3) isolated artefacts. Five (5) open campsites and one isolated artefact were recorded in the Nursery Valley area and five (5) open campsites and two (2) isolated artefacts within the floodplain area. As was the case in Witter's survey area, the predominant stone material recorded by Paton at all sites was quartz.

### **4.3 Previous archaeological investigations within the proposed development area**

Two archaeological investigations have been conducted within the proposed fill extraction area. These were a survey by Witter (1978) and Crosby (1978). These investigations are summarised below.

#### **4.3.1 Witter**

Witter identified three sites within the proposed development area in a survey carried out in 1978 for the Albury Wodonga Development Corporation (Map 2).

- 60-3-0001 Thurgoona 1
- 60-3-0002 Thurgoona 2
- 60-3-0003 Thurgoona 3

This survey is detailed in a report entitled "An archaeological survey of the Baranduda and Thurgoona Areas" (NPWS Catalogue No: 1463). Following are excerpts from that report with regard to these sites:

#### **Artefact description (Witter 1978 p:25)**

- 60-3-0001 (TS-1) Results 6 quartz cores, 2 possible quartz core fragments, 2 cobble choppers with possible end pitting.
- 60-3-0002 (TS-2). Results: 1 quartz backed blade, 3 quartz cores, 1 quartz flake, 1 possible cobble hammerstone with pitted ends and possible groove; 1 basalt flaked axe/chopper; 1 cobble with usewear along one edge.
- 60-3-0003 (TS-3) Results: large waterworn cobble with pitted ends (Hammerstone) and an elongated cobble with a smooth side and pitted ends (multipurpose tool Hammerstone/abrader)

**Significance Statements:** (Witter 1978 as recorded in Table (no number in appendices of this report))

Site no.	Type	Preservation	Excavation potential	Research potential	Statistical potential	Public interest potential
TS-1 60-3-0001	lithic	poor	negligible	representative	poor	minimal
TS-2 60-2-0002	lithic	poor	negligible	representative	poor	minimal
TS-3 60-3-0003	ground stone	poor	nil	representative	poor	minimal

#### 4.3.2. Crosby's survey and sub-surface testing

##### A. Aboriginal Heritage

In 1978 Crosby carried out a sub-surface testing program at two sites identified by Witter within the proposed development area #60-3-0001 (TS-1) and #60-3-0002 (TS-2).

##### Excavation of Sites #60-3-0001 and #60-3-0002 (Crosby p:15):

###### Site #60-3-0001 (TS-1):

- A further surface survey was conducted in the vicinity of the recorded site. No additional artefacts were recorded.
- A 1m square test pit was excavated at this site to a depth of 30cm. It is stated that sieving conditions were difficult due to the damp condition of the soil.
- **Results:** "The very small size of rounded quartz pebbles raised problems of the distribution of pebbles and cobbles. The little pebbles are too small to have been used as tools or cores for flake production and there seems little reason for Aborigines to have brought them to the site, therefore if any explanation for their natural occurrence on the site can be advanced then the status of the other finds as artefacts must be closely examined. As the surface collections are not available to me these questions must remain unresolved".

My interpretation of the above statement is that:

- (i) the quartz identified in the excavation is most likely to be naturally occurring. In his report Witter shows a distribution of quartz material present at the site (Map 2)
- (ii) it would appear that the surface artefacts were collected as they were not on site for inspection.

###### Site #60-3-0002 (TS-2):

- A surface survey of this area was conducted, however visibility is described as poor. One piece of glassy quartz 9mm long and wedge shaped was recorded and is described as possibly the result of deliberate flaking as the material differs from the milky white quartz of surface pebbles.
- one 50cm square pit was excavated to a depth of 28cm
- 2 small quartz pebbles and 1 piece of red coloured rock with mica flecks and a number of irregular pebbles similar to those occurring in TS-1 were recovered from spit 1.

### Recommendations made by Crosby 1978 p:18

- Further periodic surface collections on the sites at times when they are de-vegetated could be interesting, but a century of regular ploughing to which they have been subjected suggests that most structural evidence will have been destroyed. The stratigraphy also suggests that the material was originally located in the top soil of the ridge and has been gradually brought to the surface and concentrated there. It is possible that TS-1 is largely a downhill wash of the material from TS-2.

### B. European Heritage

During her survey Crosby identified 2 European sites on the southern boundary of the proposed development site. These sites were labelled as TH4 and TH4A respectively (Map 2)

#### Site Description: (Crosby 1978 p:14)

- Mount Pleasant Homestead TH-4 (Photo 6)
- Mount Pleasant woolshed TH-4A. (Photo 7)

In her report Crosby describes the homestead as follows: Mount Pleasant Homestead was constructed as a public house in 1859 and so far as the owners now know, it has not been structurally altered inside or out, except to re-roof over the original shingles. Crosby recommended that every effort should be made to have the site listed by the National Trust and a condition imposed on any future owner barring structural alterations to the building. An adjacent brick building (TH 4A) was converted to a woolshed by adding verandahs and a lean-to to the original stables.

Heritage check of the National Trust Records shows that these buildings were subsequently assessed by the National Trust. Mount Pleasant was listed and classified. The adjacent building was not considered to be of heritage significance and was not listed.

### 4.4 Development of a predictive model for site type and distribution within the proposed study area.

From an assessment of previous archaeological studies undertaken in the area, it was predicted that the likely site types to occur within the present study area would be:

**open camp sites:** open camp sites containing stone artefacts are likely to be located on elevated alluvial terraces and creekbank area. These sites are most likely to be associated with reliable water supplies ie perennial streams, springs or soaks. Because of the extensive flooding which takes place along the Murray River and its tributaries, sites are most likely to occur outside the areas of inundation. It is anticipated that the most common stone material within these open camp sites will be quartz and that the size and density of these scatters will vary with distance from major water sources (ie the largest sites with the highest densities of artefacts will be found adjacent to permanent water sources).

**hearth sites:** although there is no mention of hearth sites associated with open sites in the study area, it is possible that hearth material may be present in association with open sites. In a recent survey of the Murray and Lindsay Rivers, Victoria (Kelton and Mills in preparation) hearth material was recorded in association with open sites.

**scarred trees:** these sites may occur over all landform units but the occurrence of scarred trees is determined by the degree of clearing of old growth trees which has taken place and the nature of farming activities which have taken place in individual survey areas. However a majority of scarred trees have been located in association with major water sources.

**isolated artefacts:** these may be found across the survey area. These artefacts can indicate movement of Aboriginal people through the area or they may indicate areas where sub-surface archaeological deposit may be present.

## **5. Field Survey Methods**

### **5.1 Pre-field Survey Investigation**

Initial investigations carried out prior to commencement of the field survey included archival searches of the NPWS site data base, and the Register of the National Estate, Canberra.

#### **5.1.1 Archival searches**

There were two Aboriginal sites identified within the proposed development site listed on the NPWS data base (Map 2).

### **5.2 Pre-Field Survey Assessment**

Prior to the commencement of the field survey, a desk top study of the survey area landform and archaeological land systems was conducted. As a result of this assessment, a site prediction model was developed (Section 4.5) in conjunction with a strategy for survey area coverage (Section 5.4).

### **5.3 Landscape Classification**

Within the proposed fill extraction area, there are three micro-landform units. These include an ephemeral water course, gently undulating hill slopes and a raised spurline (Sketch 3). Archaeological land systems correspond to these landform units.

### **5.4 Field Survey Strategy**

A **'total coverage' survey strategy** was adopted for the total development site. This involved six on-foot transects approximately 15m wide along the entire route.

### **5.5 Field Recording Methods**

The field survey was conducted using the Liverpool 1:25,000 topographic map sheet and maps and aerial photographs of the proposed development supplied by the RTA. Where sites were present, site details, landform and environmental conditions relating to the detectability of sites were recorded on data sheets developed for the survey. Where appropriate, copies of site/artefact recording forms are provided and copies of NPWS site forms with relevant field notes attached. Photographs were taken of all sites and PADs.

## 5.6 Surface visibility

Surface visibility within an archaeological context generally refers to the degree of impediments on the surface which might obstruct surface observation of archaeological material. The main factor to affect visibility is vegetation cover, although features such as rock outcrops and other natural or man-made obstructions on the landscape can also affect surface visibility. Surface visibility can be expressed as a percentage of the surface which is visible (Bonhomme 1986:11). **Table 1** provides a basis for surface visibility assessment.

**Table 1: Surface Visibility Criteria**

a	Nil soil visibility	0-5%
b	Occasional glimpses of bare ground	5-10%
c	Frequent patches of bare ground	20-50%
d	Approximately 50% bare surface	50-70%
e	>70% bare surface	75-100%

Surface visibility varied within and between landform areas and these differences are shown in Table 2. The high level of previous disturbance to the area increased surface visibility, but in the hill slope landscape unit visibility was low which allowed only a limited level of archaeological assessment of this unit. Visibility in all other landscape units varied from 10-60%.

## 5.7 Field Survey Methods and Coverage Data

The total "on foot" coverage of the entire area was carried out in 10m wide transects. The total area surveyed has been assessed from development plans and aerial photographs supplied by the RTA as approximately 600m x 600m or 36 ha. 'Effective coverage' of the areas surveyed has been calculated from a total coverage strategy and is set out in Table 2.

**Table 2: Effective Coverage**

Landform Unit	Sample unit Dim. (LxB approx)	Sample Unit area	Coverage method	% vis.	Effective Coverage	% area effect surveyed
gentle hill slopes	650m x 250m	15 ha	100% foot	40%	6ha	16.5
ephemeral watercourse	80m x 20m	0.2ha	100% on foot	60%	0.12	0.3
spurline crest and slopes	600m x 350m	21 ha	100% on foot	70%	14.7	40.6
<b>Totals</b>		<b>36ha</b>	<b>100% on foot</b>		<b>20.82</b>	<b>57.4</b>

Site detectability varied over the survey area and was determined by factors such as surface visibility (see Table 1), geomorphology and the type of sites present. The measurement of site detectability is difficult given the range of factors which may influence site detection, some of which are mentioned above. Effective coverage assessment can be determined by the interpreted accuracy of a field investigation (Witter 1990pers com). For the current study,

a method of coverage analysis where effective coverage can be reasonably accurately calculated, was adapted from Boot (1996) pers com. where the following applies:

#### **Survey Coverage Assessment formula**

$L \times W \times \% \text{ of visible ground surface} = \text{effective survey coverage}$

where L is the length of the of the survey area/unit/transect in metres, W is the width of the survey unit/area/transect in metres. **Therefore** the total survey area was approximately 36ha of which 20.82 ha or 57.4% were effectively surveyed.

### **5.8 Surface Exposure**

Surface exposure of archaeological sites is linked with visibility but should not be confused with surface visibility, in that exposure usually refers to the results or the effects of geomorphic processes on archaeological deposits. For example, a level of exposure of archaeological materials may occur due to wind, rain or other erosive agents. The major factor in site detectability in this area was erosion due to heavy grazing.

## **6. Survey Results and Discussion**

No artefactual material was identified on the ridge line in areas where Witter and Crosby had recorded sites and carried out sub-surface testing programs. As discussed in Section 4.3, the density of artefacts at these sites was low and all visible and excavated artefacts were collected. Therefore it has been concluded that no evidence of sites #60-3-0001 and #60-3-0002 remains. No additional artefactual material has been eroded from deposit in these areas. Visibility along the crest of the ridge line was in excess of 60%. No quartz material was identified on the ridge during this survey, even in areas from which core samples had been taken. The ridge line had been heavily eroded by clearance and grazing.

One (1) site TH-ST-1 and one isolated find TH-IF-1 were identified during this survey. The isolated hammerstone/manuport is within the development area, however it is unlikely that any additional artefactual material will be located in the vicinity of this isolated find.

### **6.1 Site TH-ST-1**

This scar was identified approximately 500mm above original ground level on the trunk of a felled eucalypt tree with a circumference of 2500mm (Map 2, Sketch 1, Photos 1, 2 ). The tree is located approximately 50m north of the Riverina Highway to the west of Old Sydney Rd (GPS 498776E/6008768N). The scar is in fair condition, elongated in shape and measures 800mm x 210mm. There were no axe marks visible but the scar has been assessed by the criteria outlined in Section 7.1 of this report as being a "possible" scarred tree (ie the scar is obviously a result of human cultural activity, however not necessarily Aboriginal. The shape of scar resembles the shape of more definite Aboriginal scarring and although the scar does not have axe marks visible, the height of the scar is consistent with a height which is considered favourable for the easy and comfortable removal of bark).

### **6.2 TH-IF-1**

This isolated artefact was located approximately 32m north west of site TH-ST-1 (Map 2, Sketch 1, Photos 3, 4). The artefact/manuport is a river pebble measuring 235mm x 130mm x 48mm and was located in an area of high disturbance associated with the construction of a dam and the presence of broken brick pieces. There is no doubt that this item is a manuport however the method of its arrival at the site is debatable. It is possible that the stone was brought to the site by Aboriginal people, a conclusion supported to some degree by the close proximity of the scarred tree. However it is also possible that the stone was imported

with spoil noted in the area. There was minimal abrasion to both ends of the of the stone, however there was no clear evidence of impact points associated with this abrasion. There was also an area of slight abrasion on one flat surface. There was no area of potential archaeological deposit (PAD) identified in association with this artefact.

## **7. Significance assessment**

### **7.1 Scarred tree criteria for assessment**

Aboriginal scars can be found on a range of tree species however in this survey they were most prominent on old growth, grey box trees. Scars can occur on trees for a number of reasons, not all relating to human cultural activity. Where scars have been produced as a result of human cultural activity this activity is not necessarily Aboriginal in origin. Scars can occur as a result of a number of causes eg animals rubbing against the tree, bird attack, fire, flooding, fencing, survey markers to name some of the more obvious impacts. It is thought that all scars recorded in this report have been produced by human cultural activity although not necessarily Aboriginal cultural activity. In the case of scarred trees recorded during this study, three categories of origin assessment have been used. These are:

#### **1. "Possible" Aboriginal Scarred Trees**

This category includes all scars which are obviously a result of human cultural activity, however not necessarily Aboriginal. While the shape of scars in this category is generally irregular, the shape often resembles the shape of more definite Aboriginal scarring. These scars do not have axe marks visible, and quite often the height of the scar is inconsistent with a height which is considered favourable for the easy and comfortable removal of bark.

#### **2. "Probable" Aboriginal Scarred trees**

These scars are more easily identified because they have regular scar shapes and patterns which are often repeated within the region, and often, although not necessarily, they have axe marks. These axe marks need not necessarily resemble or be consistent with observed 'normal' bark/cambium removal in the region. Scars in this category fit with parameters which would be considered easy and comfortable for bark removal. These scars may be found in association with scars of a more definite Aboriginal origin.

#### **3. "Definite" Aboriginal Scarred trees.**

These scars fit the regular shape patterns of the area and can often be immediately identified as having been used as shields, coolamons etc. Scars in this category may or may not display axe marks, but where axe marks do occur, they conform to normal bark/cambium removal patterns for the region. The height of the scar fits the easy and comfortable bark removal range. Generally the observer should have no doubt from an informed, experienced viewpoint, that the scar is of Aboriginal origin.

NB Scars should not be assessed, other than in a broad sense, on the shape of outer bark re-growth shape. Regrowth patterns can be extremely misleading in determining use. Scar shapes displayed by bark regrowth patterns can assist in vaguely identifying scar dimensions, allowing for estimated regrowth over the original scar (Kelton 1995 pers com.)

## 7.2 NPWS Criteria for Scientific assessment of indigenous sites.

A statement of scientific and educational significance has been prepared for site TH-ST-1 and TH-IF-1 identified during this survey. The assessment of an individual site's significance is determined by a number of criteria, which in their broadest terms and under NPWS guidelines include consideration of a site's scientific and educational value as well as giving consideration to the value of a site to the Aboriginal community.

**Scientific Significance:** requires an assessment of the site's integrity, preservation, contents, location, uniqueness, representativeness and potential for future scientific research.

**Educational Value/Public significance:** assesses the potential of the site as an educational resource. It is important to acknowledge that this potential will not be the same for all groups which will include: educational institutions, general public and Aboriginal communities.

**Aboriginal Value:** The Aboriginal community places a range of values on sites. Aboriginal values can often vary from those held by the non-Aboriginal community. In some instances, the archaeological significance of a site is considered by an Aboriginal community to be a secondary consideration when assessing a site's significance. The Aboriginal community may place a greater emphasis on the socio-cultural significance of a site, or upon its educational value, (particularly for teaching community members about the lifestyles of their ancestors) and the value of a site in providing a 'link' with living community members and their ancestors. It appears that in many cases, Aboriginal communities tend to place far greater significance on sites relating to contemporary Aboriginal Heritage and historic events, for example mission sites and fringe camp sites. However the reverence for burial or sacred sites is never compromised.

## 7.3 Significance assessment and discussion.

### 7.3.1 Site TH-ST-1

#### **Scientific Value:**

The integrity of this site has been severely compromised by the felling of the tree. However the scar itself remains relatively undamaged. The location of the site was in accordance with the predictive model for site location in this landform unit (ie old growth trees in the vicinity of a permanent water source). Of the eight known sites in the area, 5 are scarred trees, therefore this site type is relatively common to the area. The site has been assessed as having low scientific significance.

#### **Educational Value:**

This site is a fair example of this site type and as such has potential as an educative resource to the general community.

#### **Aboriginal Community Value:**

All sites are valued by the Aboriginal Community. Statements as to the relative value of this site for the Aboriginal community has been assessed by the LALC in their report (Appendix 5)

### 7.3.2 Isolated artefact TH-IF-1

The scientific significance of this isolated find has been assessed as low because of the disturbed condition of the area in which it was located and the doubt as to how it was brought to the site (ie Aboriginal manuport or introduced in spoil from an unknown source).

## 8. Non-indigenous Heritage Assessment

### 8.1 Archival Research and results

A review of the heritage registers and schedules of the following heritage bodies was carried out.

#### 8.1.1 Australian Heritage Commission Canberra

The Australian Heritage Commission maintains the Register of the National Estate. This register lists both indigenous and non-indigenous heritage sites and is organised by both Local Government Area and Locality. Places on this list are classified as:

“Indicative Places”: not on the register, but identified as important

“Interim Places”: currently being evaluated for inclusion on the Register

“Registered Places”: listed

*There are 21 items listed for the Albury City Council area. None of these is in the Thurgoona area.*

#### 8.1.2 Register of the NSW Heritage Council.

The Heritage Council of NSW includes on its list only items under Conservation Instruments. These Instruments are Interim Conservation Orders (ICO's) and Permanent Conservation Orders (PCO's). These lists are organised by Local Government Area.

*There are five properties listed in the Thurgoona District these include: Guadalupe House, St Johns Road, Thurgoona, Noorla residence, St John Road, Thurgoona, St Hillaire Residence, St Johns Road, Thurgoona, Farm Building Ruins, Old Sydney Road, Thurgoona and St Johns Anglican Church, Old Sydney Road, Thurgoona. All these properties are to the north of the proposed development.*

#### 8.1.3 Register of the National Trust

The National Trust of Australia (NSW) is a non-government, community organisation which promotes the conservation of both built and natural heritage. The Trust maintains a register of landscapes, townscapes, buildings, industrial sites, cemeteries and other items or places which the Trust determines have heritage significance and are worthy of conservation. Items listed in the Trust's Register are said to be “classified”. The listing of a place in the Trust's Register has no legal force, however the Trust does encourage owners of listed places to respect their heritage significance. The Trust often helps local councils in the preparation of Local Environmental Plans and encourages local councils to refer development applications affecting properties listed on the Register for advice and comment by the Trust's Architectural Advisory Committee.

*There are five items listed on the National Trust Register in the Thurgoona area. These include: Mt Pleasant (formerly hotel), St Hillaire, St Johns Orphanage Group, Guadalupe House (formerly St Johns Orphanage) and a house opposite Guadalupe house. With the exception of Mt Pleasant, all properties are to the north of the development area. Mt Pleasant abuts the southern boundary of the proposed development.*

#### 8.1.4 Heritage Schedules of Albury City Council

The heritage schedules compiled by Albury City Council were examined. Under the NSW Environmental Planning and Assessment Act (1979) local Councils and the Department of Urban Affairs and Planning (DUAP) prepare local and regional environmental planning instruments (LEPs and REPs), to give statutory force to planning controls. These plans incorporate provisions for the conservation and management of archaeological sites and Heritage items. Albury City Council heritage schedules list a total of 5 items listed in the Thurgoona area. These include:

- 00216 *Guadalupe House, St Johns Road, Thurgoona (north of the current development)*
- 00217 *Noorfa residence, St John Road, Thurgoona, (north of the current development)*
- 00218 *St Hillaire Residence, St Johns Road, Thurgoona (north of the current development)*
- 00219 *Farm Building Ruins, Old Sydney Road, Thurgoona, (north of the current development)*
- 00220 *St Johns Anglican Church, Old Sydney Road, Thurgoona (north of the current development)*

Although the Mount Pleasant Hotel (now a private residence) is not currently listed on the Albury City Council Heritage schedules, discussions with Planning Department representatives at the council confirmed that the item was known to the heritage officer and had been previously listed and had inadvertently been omitted from the current schedules.

#### 8.2 Historical Background of the Thurgoona Area

Archaeological evidence confirms the presence of Aboriginal people in the Thurgoona area in prehistoric times. There is debate as to the meaning of "Thurgoona" and two suggested meanings are "a rocky ridge" that crossed the Murray River near the Mitchell homestead of Galloway Park and another, "emu droppings".

The Thurgoona area was first viewed from the Table Top Mountain by Hume and Hovell. Their subsequent journey through the area was described in diaries as follows "the soil is excellent, a rich loam, thinly wooded and although parched, the grass luxuriant, plentiful and the best quality, and with water sufficient either for sheep or horned cattle". Following this encouraging summation of grazing conditions, the first group of squatters arrived in the Thurgoona area in 1835 and identities such as William Wyse, Charles Ebden and the Mitchell family were associated with the Albury area.

By 1861 the Thurgoona district had quite a large population including Germans, Irish and English and agricultural activities reflect these different cultural groups. Despite the struggle to make ends meet, by the end of the 1860's, Thurgoona sustained 2 schools and churches, and a public house. A post office was provided in 1874 and an orphanage opened in 1882.

Several wineries were established in the Thurgoona district in the 1880's. A visitor to Thurgoona at this time would have seen an area dotted with vineyards, orchards, crops and grazing stock.

Bowna Road, the eastern boundary of the current development area was formerly the Great Southern Road. The route ran through Thurgoona because the area was dotted with permanent water sources including Eight and Nine Mile Creeks and Woolshed Creek from which the bullock and horse teams could be watered. For the traveller, the important places

along this road were the Farmers Home Hotel and the Travellers Rest Hotel (now Mount Pleasant Homestead).

The Travellers Rest Hotel is located immediately south of the proposed development and was built by Charles Hopgood in 1854 on his 105 acre property. It was opened on the 12<sup>th</sup> October, 1857. In 1862 Hopgood got into financial trouble and the farm and hotel were sold. It remained empty until 1869 when Samuel Harrison opened it again as a public house. Although it appears from licensing records that the property was in a state of disrepair in 1971, J.de Faye took over the hotel later that year, but in 1874 it was once more up for sale.

Early this century, Henry Heath occupied the house and farmed the area. Although the land was bought by the Albury Wodonga Development Corporation, the house continued to be occupied by two of Henry Heath senior's children, Fred and Mabel. Miss Mabel Heath died in 1985 and Mr Fred Heath still lives at Mount Pleasant.

### 8.3 Site Prediction Model

A model for the site type and distribution patterns for heritage items in the survey area was developed from a review of the records of the National Trust and Albury City Council. It was considered that the following heritage items and places may be located within the survey area: remains of early farm buildings associated with Mount Pleasant Homestead.

### 8.4 Field Investigations

The survey for indigenous and non-indigenous sites was carried out concurrently (see Section 5 of this report for details)

#### Survey Methods and Strategies

This survey was designed to:

- identify areas of possible heritage significance within the study area
- make a brief assessment of the heritage significance of sites where possible.
- recommend additional investigation if required.

### 8.5 Results of non-indigenous heritage survey.

- The archival search confirmed that Mt Pleasant Homestead has been classified by the National Trust. The classification does not include the brick structure to the east of the main house. The curtilage of the property has been determined as the row of mature trees approximately 30m from the current Riverina Highway and the other three boundaries by an iron fence which surrounds the property. The entire property and curtilage therefore is outside the current proposed development. No evidence of structures, wells, bottle dumps etc associated with the structure were identified in this survey. However vegetation cover was dense in the boundary areas (Map 2, Photos 6, 7, Appendix 9).
- Two sections of the Hume and Hovell Walking Trail pass along the boundaries of the proposed development area (Map 3). Section one passes along the full length of St John's Road which is the western boundary and section two extends along the northern boundary of the site to the summit of Red Hill. The Hume and Hovell Walking Trail commences at the Hovell Tree which is located at Hovell Tree Park, Albury. The tree attained its name from the inscription engraved on the tree by William Hovell in 1824, when he and his fellow explorer, Hamilton Hume, became the first Europeans to visit the area. The Hume and Hovell walking track follows as closely as practical the route followed by the explorers in the spring and summer of 1824-25. Other sections of this extensive walking trail extend from Gunning through Yass, Wee Jasper, Tumbarumba, Holbrook to Albury.

## **8.6 Significance statements for Mount Pleasant Homestead and adjoining brick building and the Hume and Hovell walking trail.**

### **8.6.1 Mount Pleasant Homestead, statement from National Trust.**

Mount Pleasant has been classified by the National Trust on the 14-12-87, subject to amendment of site plan.

Reason for listing: Mt Pleasant is an attractive example of an early building in the Albury area. It has had both an association with many prominent local identifies and, through its varied functional history, with the general life of the area.

The brick shed to the east of the main property has been assessed by National Trust as of "little interest". The curtilage is bounded to the south by the hedge and on all other sides by an iron fence.

### **8.6.2 Hume and Hovell Walking Trail.**

There is no official Albury City Council statement of Heritage significance for this walking trail which is not fifty years old and is therefore outside the guidelines of the Heritage Act as stated, However an assessment of the trail using NSW Heritage Council guidelines has been made:

### **NSW State Heritage Inventory Evaluation Criteria for Heritage Items recorded during archaeological surveys**

To be classified as a heritage item, the item or place must meet :

At least one the Nature Criteria (1-5) *AND* Meet at least one of the Comparative Criteria (6-7) *AND* Retain the integrity of its attributes.

#### **A. Nature of Significance Criteria- Type**

##### **Criterion 1: Evolution and Associated (Historic)**

- Association with Hume and Hovel, the first European explorers in the area.

##### **Criterion 2: Creative and Technical Accomplishment**

- This walking trail is one of a limited number of extensive walking trails in NSW and relies on the co-operation of many Government and local bodies including Albury-Wodonga Development Corporation, Albury City Council, Hume Shire Council, Department of Land and water, Department of Conservation, NPWS, DUAP, Land Care, Local Community groups..

##### **Criterion 3: Community Esteem (Social)**

- Broad community involvement.

##### **Criterion 4: Research Potential (Scientific)**

- Guide to the development of other such long distance walking trails

##### **Criterion 5: Other**

- Stimulated an interest and awareness of the conservation of the environmental diversity along the route (ie educational)

## **B. Comparative Significance Criteria**

### **Criterion 6: Rarity**

- A limited number of long distance walking trails existing within NSW make this a rare resource.

### **Criterion 7: Representativeness**

- A limited resource which gives both Albury-Wodonga and visitors a chance to utilise a walking rail which provides access to a variety of environmental areas with associated heritage interest.

### **Assessment:**

This assessment concludes the Hume and Hovel Walking Trail is of heritage significance despite the fact that it does not meet the 50 year heritage criteria.

## **9. Site Management Recommendations for both indigenous and non-indigenous heritage sites identified by the survey.**

The RTA, as a developer, has an obligation under the National Parks and Wildlife Act 1974, the NSW Heritage Act 1975 and the EP& A Act 1979, to determine if their proposed development will impact upon indigenous and non-indigenous heritage and where required, implement recommended management actions. The following recommendations have been developed to minimise the potential impact of the development on indigenous and non-indigenous heritage items and places and ensure that the proposed development is accommodated within a management framework endorsed by NPWS and the NSW Heritage Office and which includes consultation with the local community and Albury and District LALC.

### **Recommendation 1**

Site TH-ST-1 appears to be outside the area of direct impact from the proposed fill extraction development. If this is the case the following management strategies should be undertaken to ensure that the site is not subject to indirect impact from the development.

#### **Recommendation 1.1**

Prior to commencement of work at the site, the RTA should notify the Albury and District LALC of the proposed starting date for works so that a representative of the LALC can be present while the following strategies are carried out.

#### **Recommendation 1.2**

Site TH-ST-1 should be flagged to allow for a buffer zone of at least 15m around the site. This flagging should be left in place until all work at the site has been completed.

### **Recommendation 2:**

If Site TH-ST-1 is to be impacted by the proposed fill extraction, then the following management procedures should be implemented.

**Recommendation 2.1:**

RTA should apply to the NPWS for a Consent to Destroy the site which in this case would potentially involve the removal of the tree section to another section of the development area and/or another location.

**Recommendation 2.2**

RTA should hold discussions with representatives of the Albury and District LALC to determine the LALC position on the removal or relocation of the tree and discuss management options with the LALC and representatives of NPWS.

**Recommendation 3:**

If the location of TH-IF-1 is within the impact of the proposed fill extraction then the following management options should be implemented.

**Recommendation 3.1:**

The RTA should apply to NPWS for the issue of a Consent to Destroy Permit for TH-IF-1. As no PAD area was identified in the vicinity of this isolated artefact, no further archaeological investigation is recommended.

**Recommendation 3.2**

Should the Albury and District LALC wish to collect TH-IF-1, they should apply to the NPWS for a Care and Control Permit. This collection should take place prior to work commencing. RTA should advise the Albury LALC 14 working days prior to the commencement of work in the area so that the LALC have time to collect the artefact.

**Recommendation 4**

The Hume and Hovell Walking Trail is immediately adjacent to the western and northern boundaries of the proposed fill extraction site. Care should be taken to ensure that this trail is adequately screened from this development. This could be done by planting or other management strategies

**Recommendation 4.1**

Management strategies which ensure that there will be no indirect visual impact on the walking trail route should be discussed by the RTA, Albury City Council and Albury-Wodonga Development Corporation in co-operation with interested local community groups.

**Recommendation 5**

The transfer of fill from the site to the Airport access route as currently planned will cross the Hume and Hovell Walking Trail. To ensure that there will be no physical and/or visual impact to the trail it is recommended that the RTA hold discussions with Albury City Council, Albury-Wodonga Development Corporation and interested local community groups. This would ensure that an adequate management strategy for access to the trail during construction and restoration of the trail on completion of the project is developed and implemented.

### **Recommendation 6**

Mt Pleasant homestead is located to the immediate south of the proposed development site. Although the homestead and curtilage as designated by the National Trust is outside the area of direct impact, it is recommended that due care be taken prior to and during fill extraction to ensure that there are no indirect impacts to the property. Management strategies for this property should be discussed by the RTA, Albury City Council, Albury Wodonga Development Corporation and representatives of the National Trust.

#### **Recommendation 6.1**

If clearance for the proposed fill extraction is to be carried out within a 15m distance of the northern fence line of Mt Pleasant, it is recommended that vegetation from this area be removed under the supervision of a qualified archaeologist to ensure that there are no sub-surface wells, bottle dumps etc which were not detected in the National Trust assessment of the property and the current survey due to the density of the vegetation cover.

#### **Recommendation 6.2**

At the conclusion of extraction work on the site, it is recommended that the RTA provide a visual screening of trees to maintain the rural vistas associated with the homestead site. This environmental restoration should be discussed with the current property owner and representatives of the Albury City Council and Albury Wodonga Development Corporation.

## **10. Legal Requirements and Obligations**

All non-indigenous heritage items are protected by the NSW Heritage Act (1975 and the EP & A Act (1979). All indigenous relics (sites and objects), other than those made for sale, are protected under the New South Wales National Parks and Wildlife Act 1967 (amended 1974). Archaeological sites are a non renewable resource, valued for the information they can provide on the lifestyles of people in the past, and are also valued by local communities who maintain cultural links with the past through these sites and places.

It is illegal to damage or destroy a site or relic without the prior consent of the Director of NSW NPWS and/or DUAP. Any such disturbance requires a permit from the Director. The NPW Act requires that relics recovered under such a permit come under the custody of the Australian Museum in Sydney or the LALC if an application has been made by that group for a Care and Control Permit.

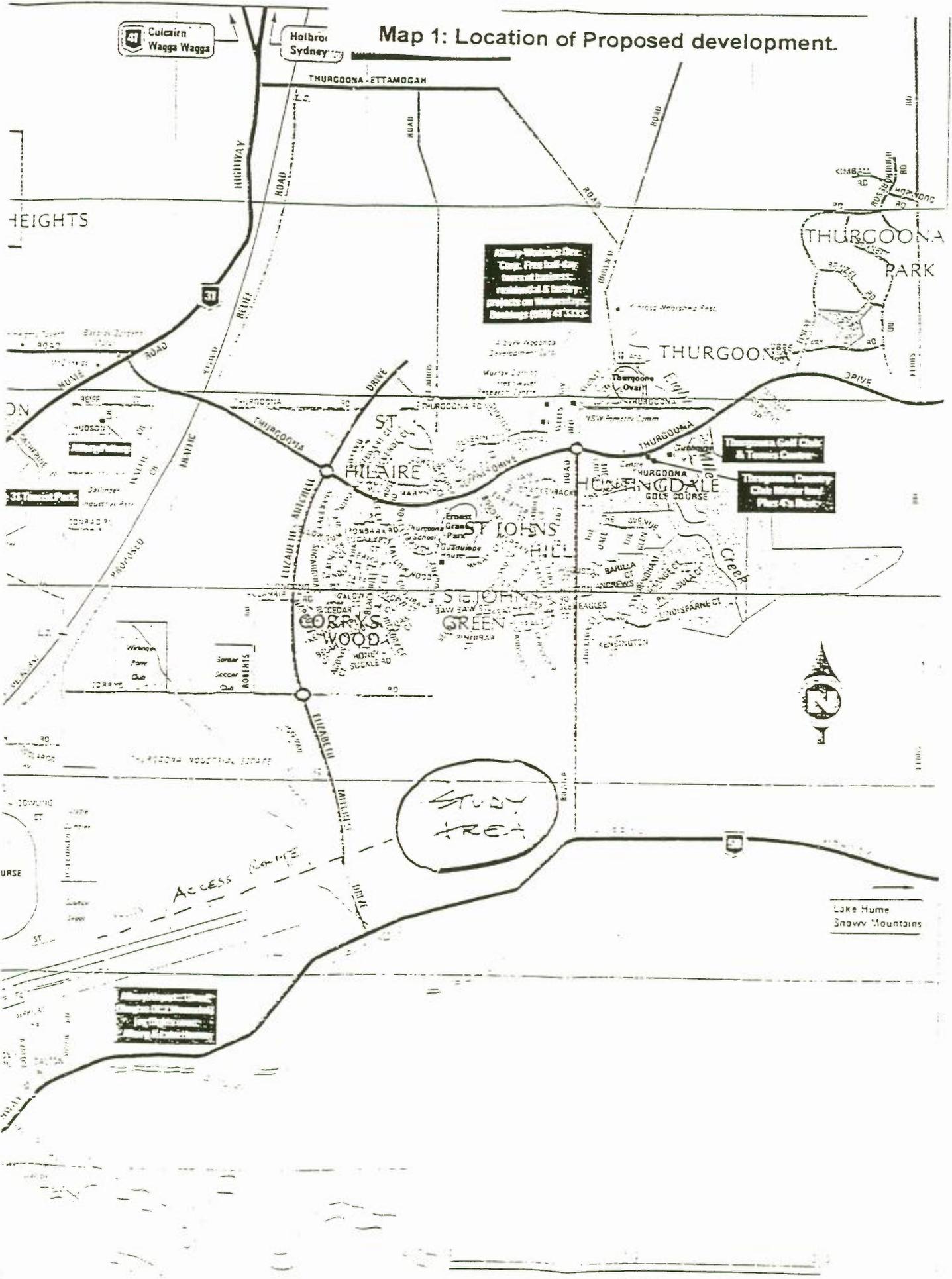
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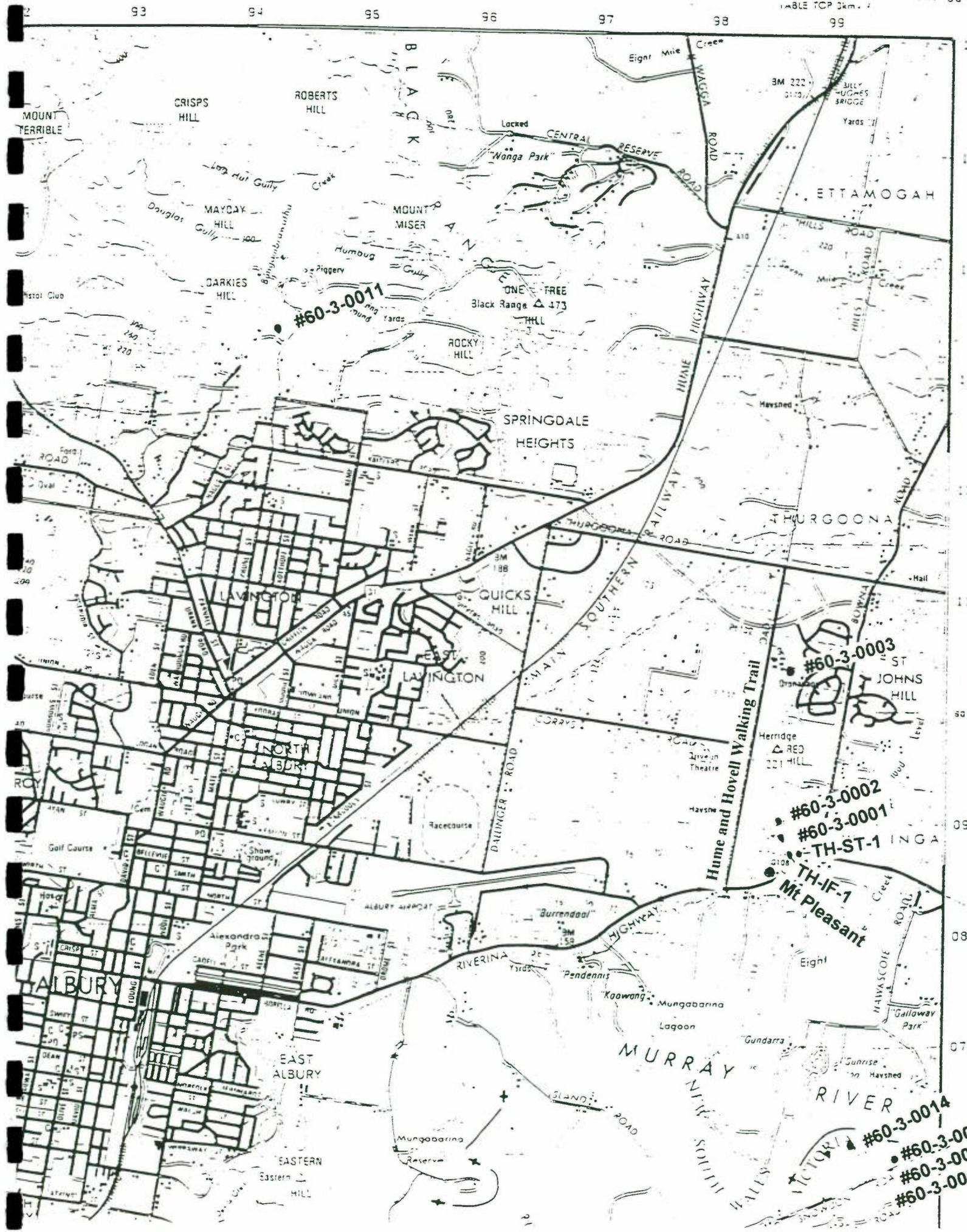
## Appendix 1: Maps

Map 1: Location of Proposed development.



**Map 2: Location of known indigenous sites in the vicinity of the development and Sites TH-ST-1, TH-IF-1 and Mount Pleasant Homestead**

GUNDAGAI 169km 147°00'00"  
 TABLE TCP Dkm. 7



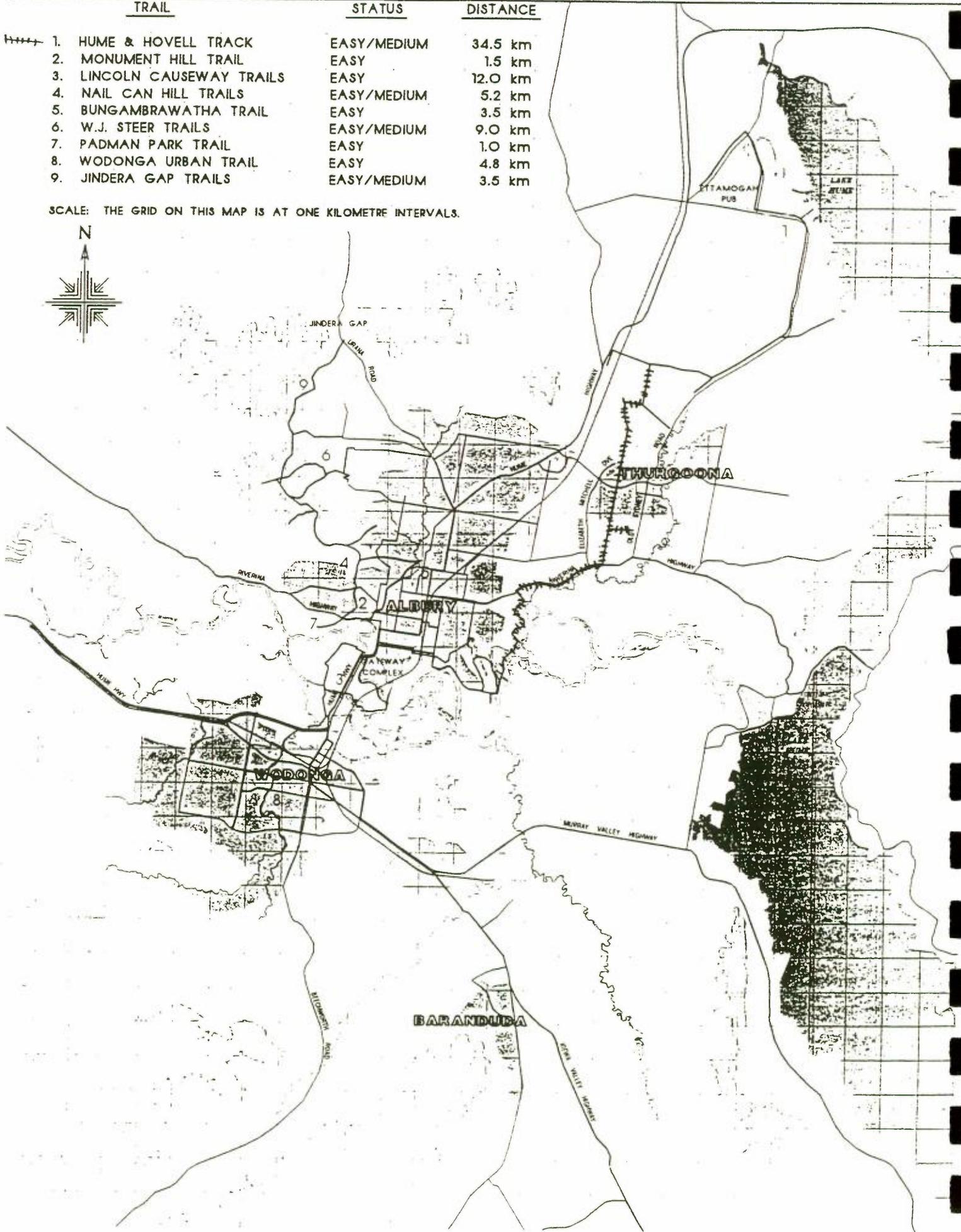


### Map 3: Hume and Hovell Walking Trail

# TRAIL SYSTEM

TRAIL	STATUS	DISTANCE
1. HUME & HOVELL TRACK	EASY/MEDIUM	34.5 km
2. MONUMENT HILL TRAIL	EASY	1.5 km
3. LINCOLN CAUSEWAY TRAILS	EASY	12.0 km
4. NAIL CAN HILL TRAILS	EASY/MEDIUM	5.2 km
5. BUNGAMBRAWATHA TRAIL	EASY	3.5 km
6. W.J. STEER TRAILS	EASY/MEDIUM	9.0 km
7. PADMAN PARK TRAIL	EASY	1.0 km
8. WODONGA URBAN TRAIL	EASY	4.8 km
9. JINDERA GAP TRAILS	EASY/MEDIUM	3.5 km

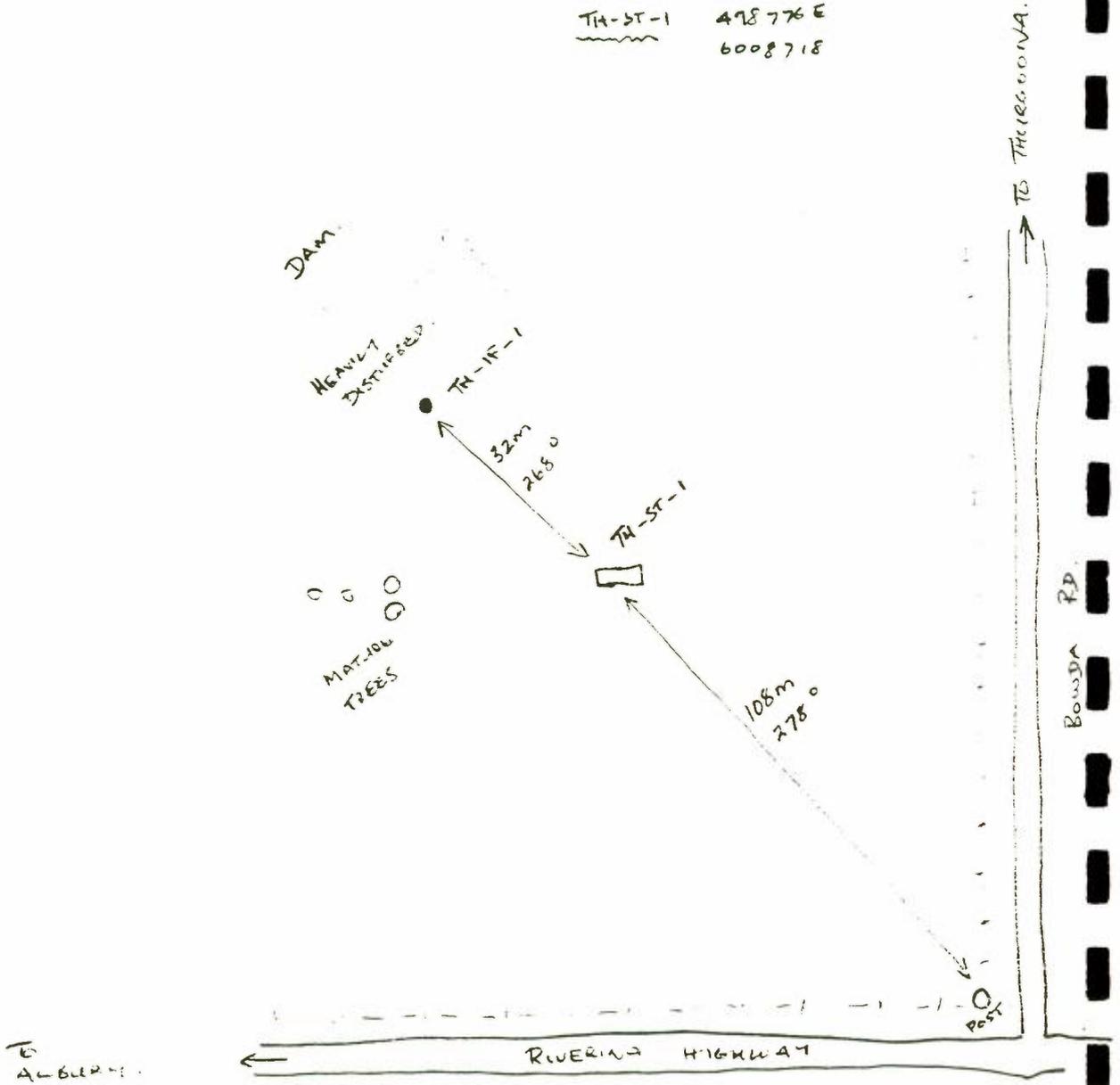
SCALE: THE GRID ON THIS MAP IS AT ONE KILOMETRE INTERVALS.



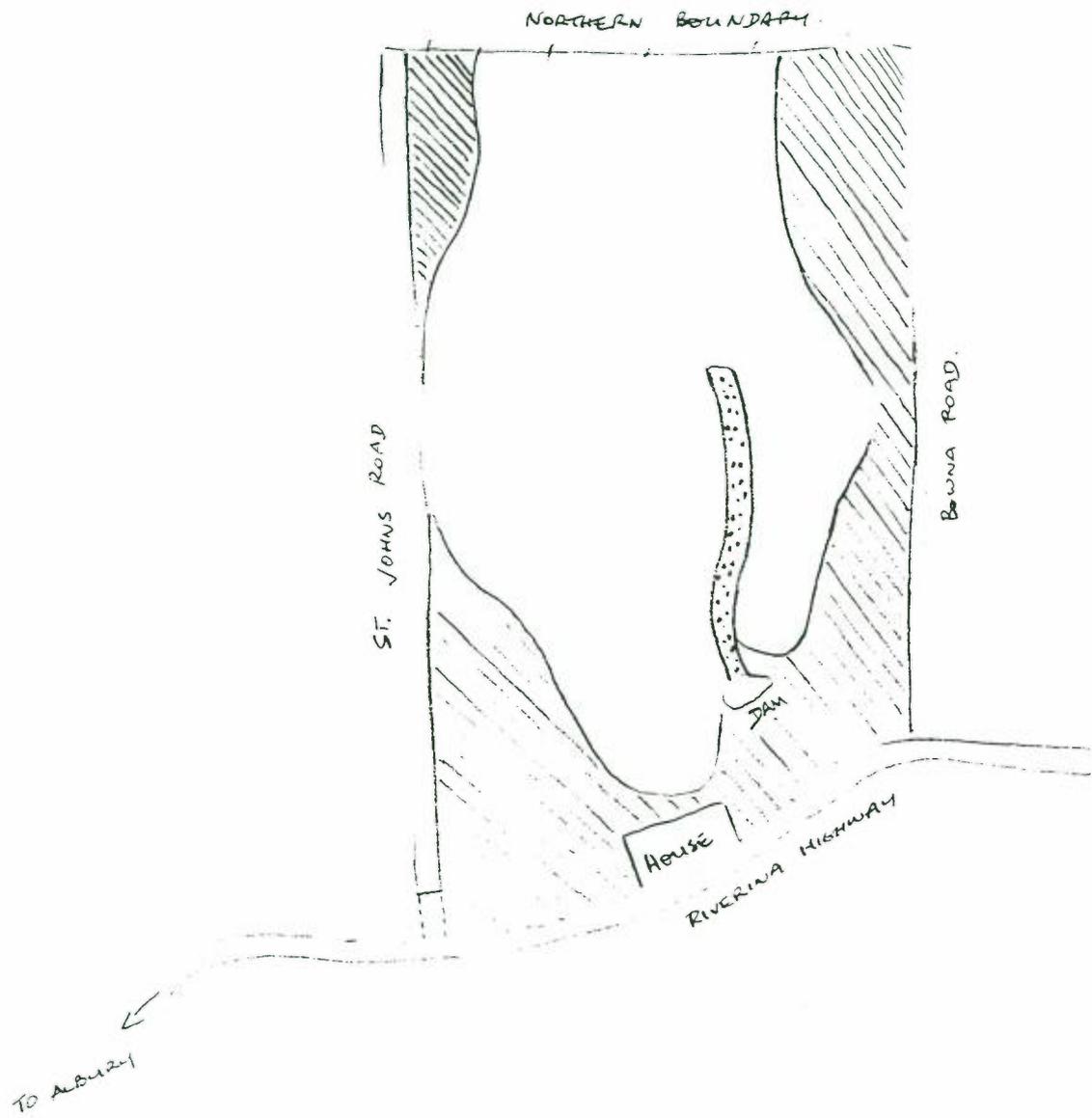
**Appendix 3: Sketches**

Sketch 1: Site TH-ST-1 and TH-IF-1

TH-ST-1 498 776 E  
6008718



Sketch 2: Landform units within the survey area



Key	
	spur line crest and slopes
	ephemeral water course
	gentle hill slopes

**Appendix 4: Photographs**

Photo 1: Location of Site TH-ST-1



Photo 2: Scar TH-ST-1

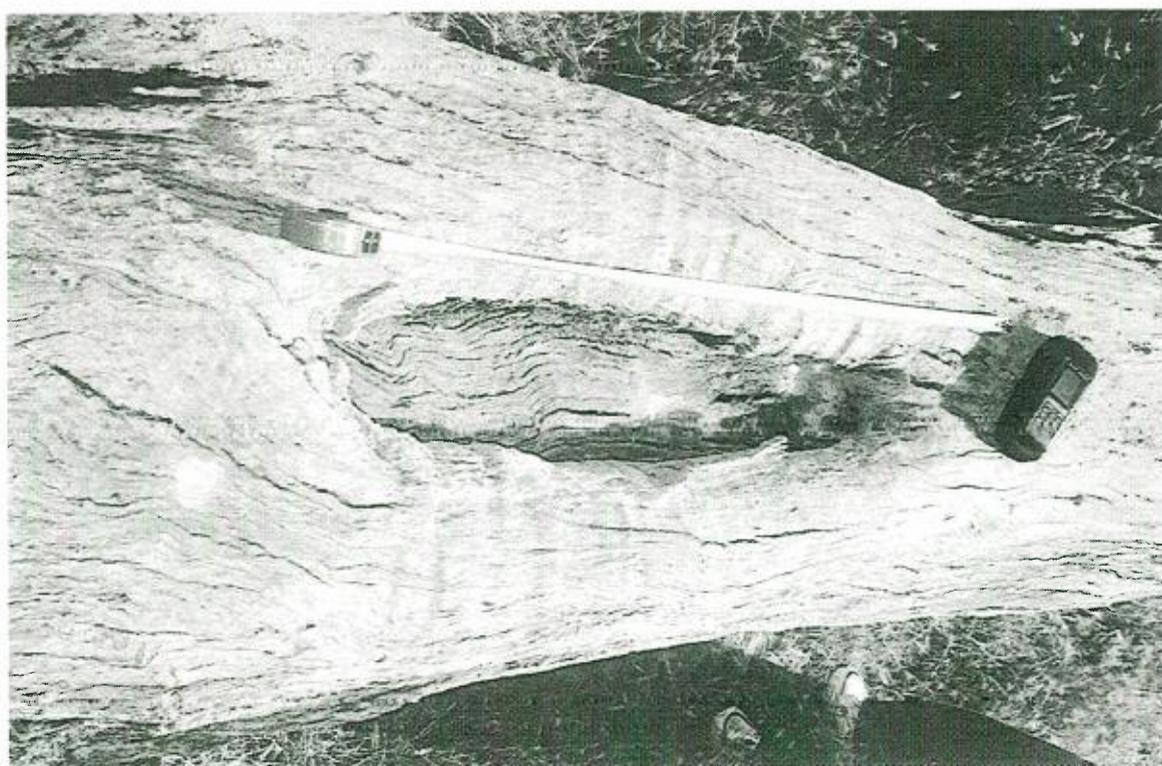


Photo 3: Location of Site TH-IF-1



Photo 4: TH-IF-1

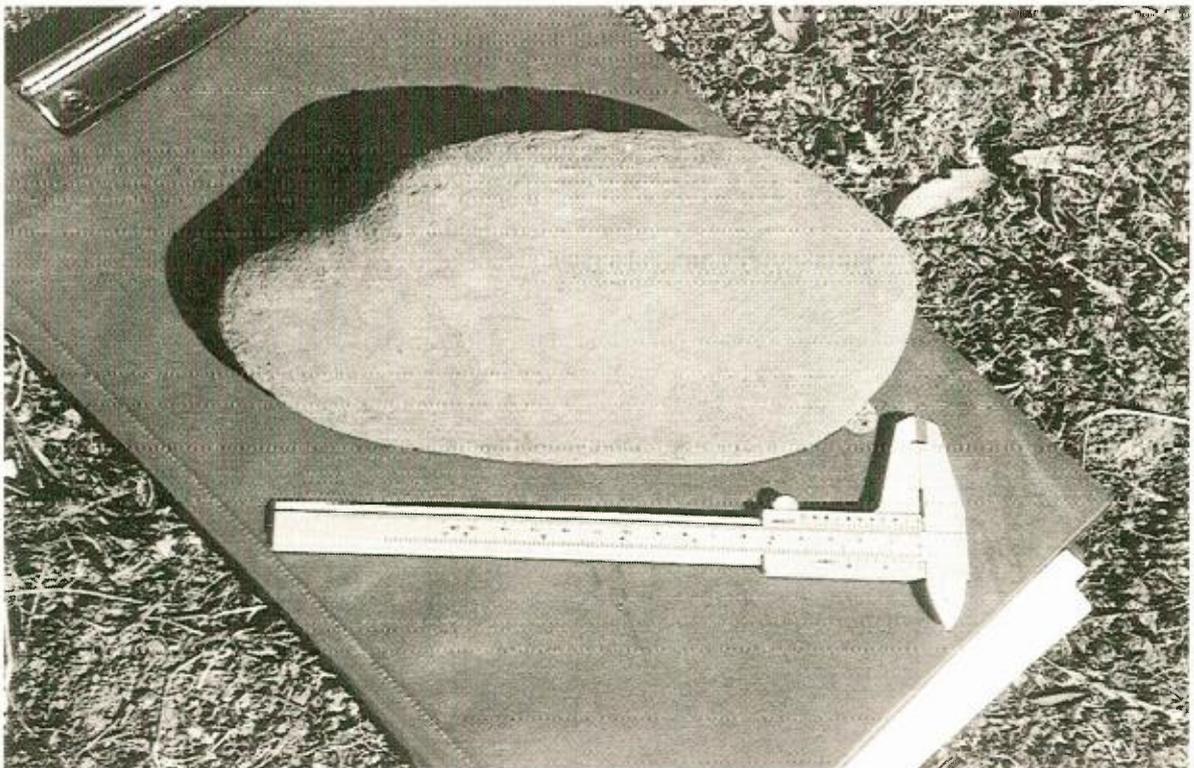


Photo 5: Extraction site looking north



**Photo 3: Mt Pleasant Homestead**



**Photo 7: Brick structure east of the homestead**



**Appendix 5:**

**Correspondence and statement from Albury LALC.**

# FAX

**Robynne Mills**  
**Archaeological and Heritage Services**  
**60 Watkin Street**  
**Newtown 2042**  
**Ph: (02) 95171413**  
**Fax: (02) 95179860**

\*\*\*\*\*

To: Albury LALC  
Attention: Jason Clark  
Date: 29<sup>th</sup> October, 1998

\*\*\*\*\*

**Message: Re survey at Albury on Monday 2<sup>nd</sup> Nov.**

Jason,

When I was carrying out my research for the survey on Monday, I discovered that the area had been surveyed twice before by Dan Witter and Eleanor Crosby.

I have contacted the NPWS office in Queanbeyan about the status of these previous surveys. If they decide that additional investigation is necessary, I will contact you for another survey date.

My apologies for any inconvenience this may have caused you.

Regards,



Regards

Robynne.

\*\*\*\*\*

# FAX

**Robynne Mills**  
**Archaeological and Heritage Services**  
**60 Watkin Street**  
**Newtown 2042**  
**Ph: (02) 95171413**  
**Fax: (02) 95179860**

\*\*\*\*\*  
To: Albury LALC  
Attention: Jason Clark Sites Officer  
Date: 18<sup>th</sup> October, 1998  
\*\*\*\*\*

**Message: Re archaeological survey at Red Hill**

Following are details of the archaeological survey of the Red Hill Quarry extensions.

I have been engaged by Sinclair Knight Merz to carry out a heritage assessment of the proposed quarrying of a section of Red Hill east of the airport. I have enclosed a map of the location and the extent of the proposed development.

I would like to carry out this survey on Monday 2<sup>nd</sup> November, 1998 if that is convenient.

I would also appreciate it, if the LALC could discuss the proposed development with Aboriginal Elders and Community members who may be able to identify areas or places of special importance for the Community within the proposed development area and identify any issues which the Community would like to raise in relation to the proposed development. Then these places and/or issues can be incorporated within the management framework.

I will make payment direct to the LALC upon receipt of a "Statement of Involvement" in the survey and the submission of a Land Council Invoice. "Statements of involvement" usually contain the name of the LALC representative, date of the survey, whether the LALC was happy with the level of consultation between the archaeologist and LALC representative; the way in which the survey was conducted and list any concerns the LALC has regarding management of sites found during the survey and any other concerns that the LALC would like to raise regarding the proposed development.

I will be in touch to confirm final arrangements



Robynne Mills

# FAX

**Robynne Mills**  
**Archaeological and Heritage Services**  
**60 Watkin Street**  
**Newtown 2042**  
**Ph: (02) 95171413**  
**Fax: (02) 95179860**

\*\*\*\*\*

To: Albury LALC  
Attention: Justine  
Date: 11<sup>th</sup> December

\*\*\*\*\*

**Message: Re archaeological survey at Red Hill**

Following are details of the archaeological survey of the Red Hill Quarry extensions.

Thanks for getting back to me about the survey. I really appreciate you coming out so close to Christmas. As I requested, we will carry out the survey on Monday 21<sup>st</sup> December. I am coming up on the plane which gets into Albury at 8 in the morning so if we could start work at 8.30 that would be great. I will meet you at the junction of Bowna Road and the Riverina Highway.

As I requested before I would appreciate it, if the LALC could discuss the proposed development with Community members who may be able to identify areas or places of special importance for the Community within the proposed development area and identify any issues which the Community would like to raise in relation to the proposed development. Then these places and/or issues can be incorporated within the management framework.

Once again thanks for your help in getting this survey done before Christmas.



Robynne Mills

**Appendix 6:**

**Gazetteer of previously recorded sites**

# FAX

**Robynne Mills**  
**Archaeological and Heritage Services**  
**60 Watkin Street**  
**Newtown 2042**

Ph (02) 95171413

Fax (02) 95179860

Email: [robynnemills@ozemail.com.au](mailto:robynnemills@ozemail.com.au)

\*\*\*\*\*

To: NPWS Site Register

Attention: Paul

Fax No:

Number of pages:1

\*\*\*\*\*

Dear Paul,

Could you please carry out the following site search:

## Search 1

Name of Company: Friedmann and Associates

Nature of Development: Housing development

Map Title: Botany Bay

Address 35-42 Woodlands Rd, Lugarno

Grid References for site: 317000-321000E

6236000-624000N

## Search 2:

Name of Company: Sinclair Knight Merz

Nature of Development: Red Hill Quarry

Map Title: Albury

Grid References for site: 490000-50000E

6004000-601400N

I have asked Cheryl to do the site card and report searches

Many thanks,



Robynne

## ASR Site Search Criteria

SiteID (like)	<input type="text"/>	Zone:	<input type="text" value="55"/>	District:	<input type="text"/>	
AMGE:	<input type="text" value="490000"/>	to	<input type="text" value="500000"/>	SiteType1:	<input type="text"/>	
AMGN:	<input type="text" value="6004000"/>	to	<input type="text" value="6014000"/>	SiteType2:	<input type="text"/>	
Name(like):	<input type="text"/>				SiteType3:	<input type="text"/>
Recorder:	<input type="text"/>				SiteType4:	<input type="text"/>
Date from:	<input type="text"/>	to	<input type="text"/>	SiteType5:	<input type="text"/>	
LGA:	<input type="text"/>					
Local ALC:	<input type="text"/>					

## ASR Standard Site List - 5427

10/12/98 14:54:59

SiteID:	SiteName:	Location:	Zone:	AMGE:	AMGN:	Check Method:	Site Type:	Recorder:	Record Date:	Assoc. Report:
<u>60-3-0001</u>	Thurgoona 1;		55	499056	6009132		Open Camp Site			C-1463,C-742,C-230
<u>60-3-0002</u>	Thurgoona 2;		55	499054	6009315		Open Camp Site			C-1463,C-742,C-230
<u>60-3-0003</u>	Thurgoona 3;		55	499316	6010506		Open Camp Site			C-1463,C-742,C-230
✓ <u>60-3-0011</u>	One Tree Hill;TS4;		55	494078	6013285		Scarred Tree			C-230
✓ <u>60-3-0013</u>	Galloway Park;Albury;		55	499544	6006121	✓	Scarred Tree			C-231
✓ <u>60-3-0014</u>	Galloway Park;Albury;		55	499082	6006573	✓	Scarred Tree			C-231
<u>60-3-0015</u>	Galloway Park;Albury;		55	499544	6006121	✓	Scarred Tree			C-231
<u>60-3-0016</u>	Galloway Park;Albury;		55	499544	6006121		Scarred Tree			C-231

NSW National Parks and Wildlife Service

\*\*\* End of Report \*\*\* Site Count: 8

1. Map Name Wangaratta SJSJ-4 5. Site No. 60-3-24  
 2. Scale 1:250,000 6. Site type Open  
 3. Grid ref E4988<sup>78</sup>N5508 Surface Camp Site  
 4. Site name(s) [Thurgoona-3] 7. Classification .....

---

8. Air photo ref .....

9. Cadastral .....

10. Land Status Public - Albury-Wodonga<sup>corp</sup> 11.

12. Directions for site relocation SEE REPORT WITH 60-3-1  
see attached maps  
site is located about 50 to 250 m east of The orphanage  
on St. John's Road.

13. Owner Albury-Wodonga Dev. Corp. 14. Tenant/Manager .....

Address Hume Highway Address .....

west wodonga .....

Attitude Cooperative Attitude .....

15. Site Description

site is a ground stone location consisting of 2 heavy  
duty implements showing a abrasion. Associated is a  
light scatter of quartz debitage over an area of  
200m by 200m, which corresponds to the extent  
of the freshly ploughed field.

E. Crosby's site TS3

16. Reasons for investigation Salvage survey funded by The

17. Condition indefinite degree of erosion and ploughing

18. Interpretation Scientific research

19. Visitation none

20. Recommendations see report

## 21. Environmental description of site locality

Site situated on ridge overlooking Murray River Terraces and Flood plain. Land is at present cleared for grazing. Elevation is about 200 metres ASL. The general setting is in the Murray Valley where the Kiewa and Mitta-Mitta Rivers enter the Murray. The valley here is some 5 to 10 km broad with steep mountain sides. The flood plains are covered with a red gum savanna and the mountains are forested by various gums and stringy barks. Actual position of site is on a spur sloping NE overlooking a small alluvial basin.

## 22. Relation to other sites in locality

Two other sites are known nearby

another site with lithics and animal bone and a scarred tree located near the Lincoln Causeway and 9 lithic and 3 scarred tree sites are known on the Kiewa River terrace near Baranduda. Another lithic site is at the base of Huon Hill near Woodonga.

## 23. Details of artifact collections

24. Is plan or diagram of site attached?

 Yes/No

25. Are annotated photographs attached?

Yes, No.

How many?

26. Other additions

27. Importance of site to Aborigines *not determined*

28. Source of this information

29. Oral sources of information *site is archaeological*

30. Written references *The Archaeological Survey of the Baranduda and Tharguona Areas. Dan Witter 1977 (C1463 C742) C230*

31. Recorded by *M. McIntyre*  
*P. Irish*

Filed by *Dan Witter**Victoria Archaeological Surv.*

Address

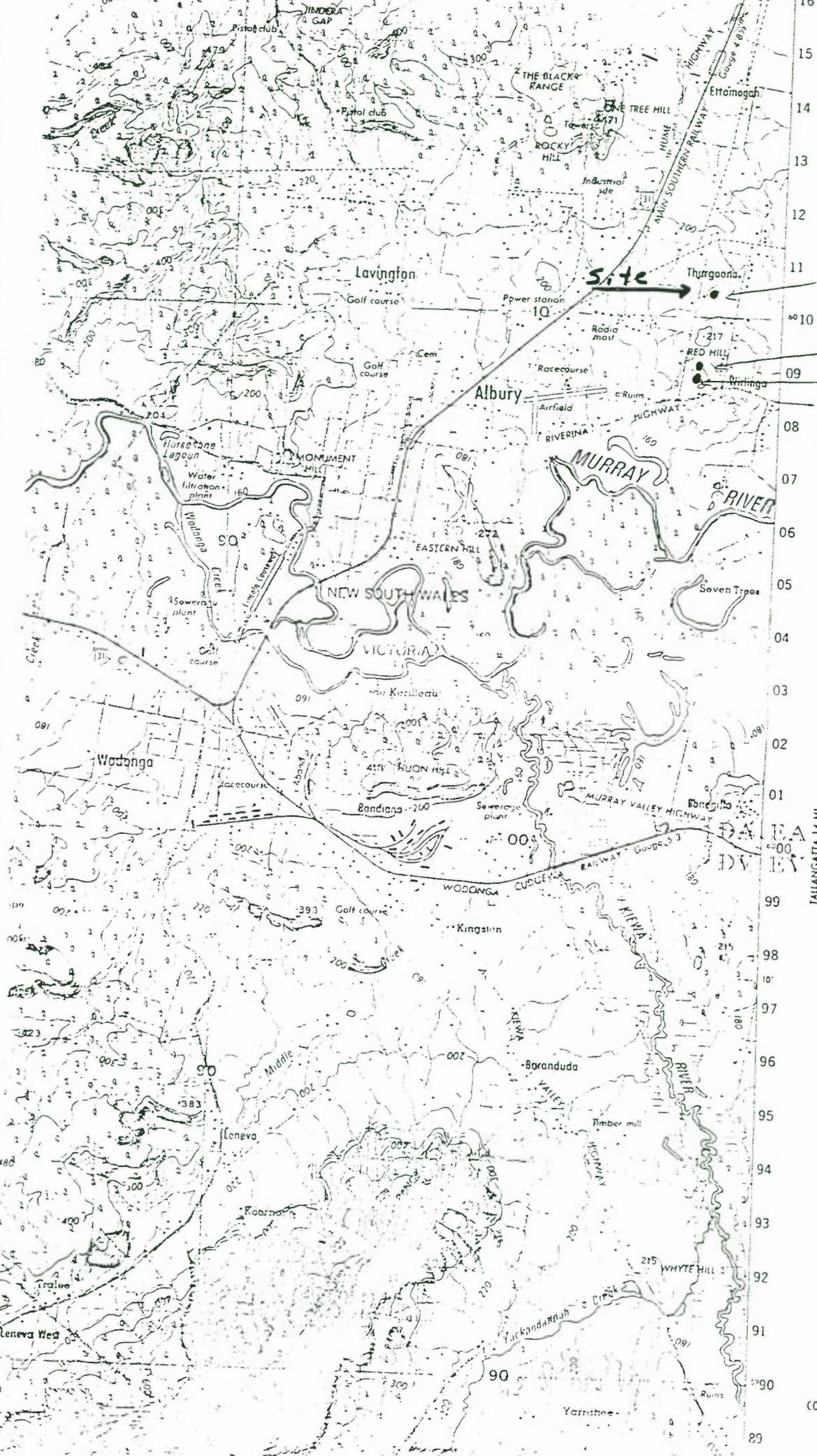
Date

Date

*20 May 77*



87 88 89 90 91 92 93 94 95 96 97 98 99 147°00' 163°00'



Thurgoona 3  
 Thurgoona 2  
 Thurgoona 1

TALCARGO 11 ML

TALLANGATTA 14 ML

CONVERSION TABLE

METRES TO FEET
1 3.281
2 6.562

1. Map Name Wangaratta SJS-2 5. Site No. 60-3-2  
2. Scale 1:250,000 6. Site type open  
3. Grid ref E4985<sup>75</sup>N5495 Surface Camp Site  
4. Site name(s) [Thurgoona-2] 7. Classification C

8. Air photo ref .....  
9. Cadastral .....  
10. Land Status Public - Albury-Wodonga<sup>corp</sup>

12. Directions for site relocation SEE REPORT WITH 60-3-1  
see attached maps  
site is located 60-75m north of Thurgoona-1 on the same  
ridge, some 400m north of The Riverina Highway, and  
between St. Johns and Bowina Roads.

13. Owner Albury-Wodonga Dev. Corp. 14. Tenant/Manager .....  
Address Hume Highway Address .....  
west Wodonga .....  
Attitude Cooperative Attitude .....

15. Site Description  
scattered quartz debitage was found over a 60m by  
140m area, but mainly concentrated along the  
ridge crest. Artifacts include a backed blade of quartz,  
a flaked cobble and a "hammerstone". The cultural material  
was exposed amongst sparse vegetation and had  
experienced historic disturbance (vineyards?)

E. Crosby's site TS 2

16. Reasons for investigation Salvage survey funded by The A.W.  
17. Condition indefinite degree of erosion and ploughing  
18. Interpretation Scientific research  
19. Visitation none  
20. Recommendations see report. Merits. Test pit investigation for  
deeper material, possible in situ

## 21. Environmental description of site locality

Site situated on ridge overlooking Murray River Terraces and Flood plain. Land is at present cleared for grazing. Elevation is about 200 metres ASL. The general setting is in the Murray Valley where the Kiewa and Mt. Ha-mitta Rivers enter the Murray. The valley here is some 5 to 10 km broad with steep mountain sides. The flood plain are covered with a red gum savanna and the mountains are forested by various gums and stringy barks.

## 22. Relation to other sites in locality

Two other sites are known nearby

another site with lithics and animal bone and a scarred tree located near the Lincoln Causeway and 9 lithic and 3 scarred tree sites are known on the Kiewa River terrace near Baranduda. Another lithic site is at the base of Huon hill near Wedonga.

## 23. Details of artifact collections

24. Is plan or diagram of site attached?

 Yes /  No

25. Are annotated photographs attached?

Yes. No

How many?

26. Other additions

27. Importance of site to Aborigines *not determined*

28. Source of this information

29. Oral sources of information

*site is archaeological*

30. Written references

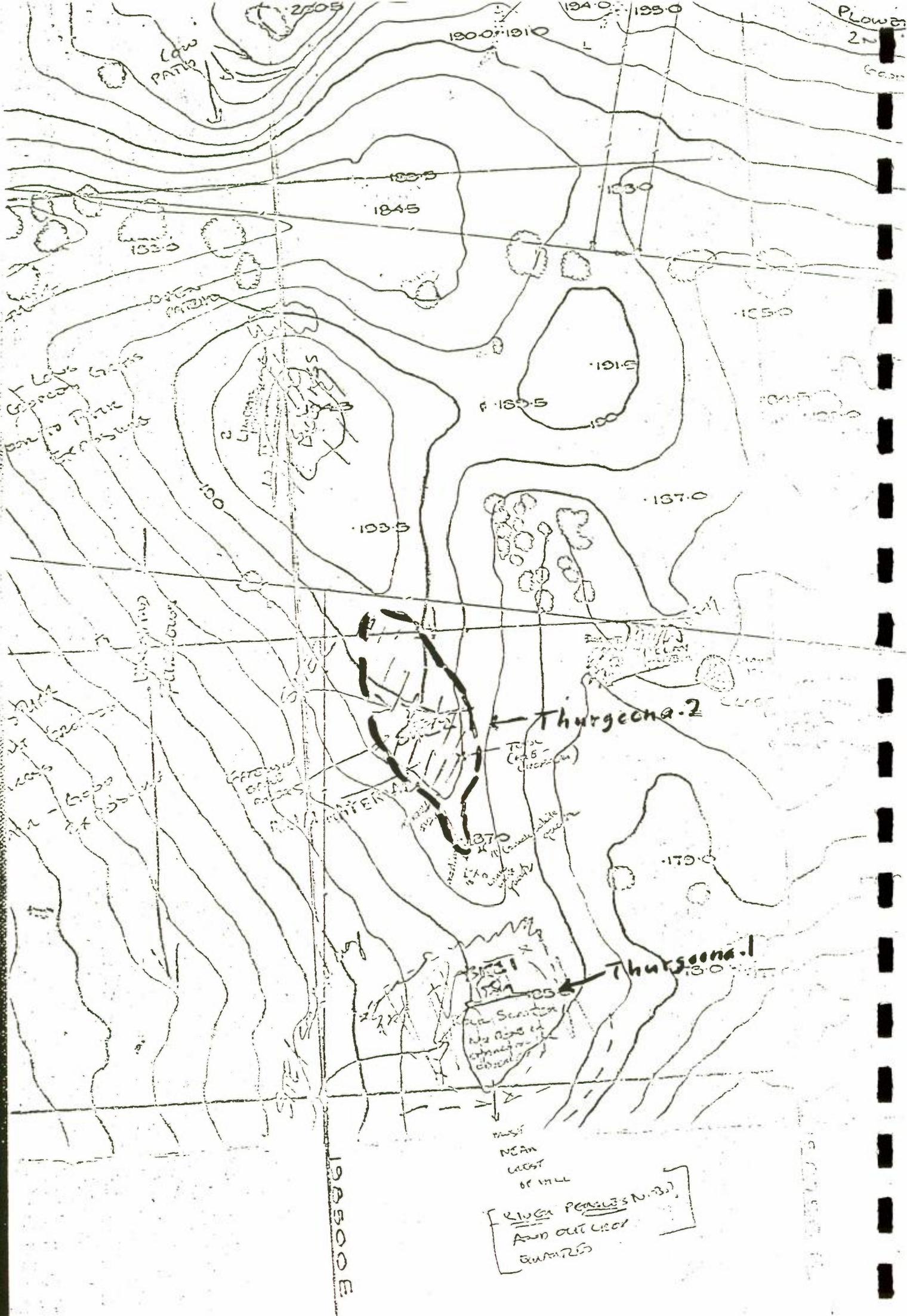
*The Archaeological Survey of the Baranduda and Thungoona Areas. Dan Witter 1977**(C1463, C742) same, C230*31. Recorded by *M. McIntyre**P. Irish*Filed by *Dan Witter**Victoria Archaeological Survey*

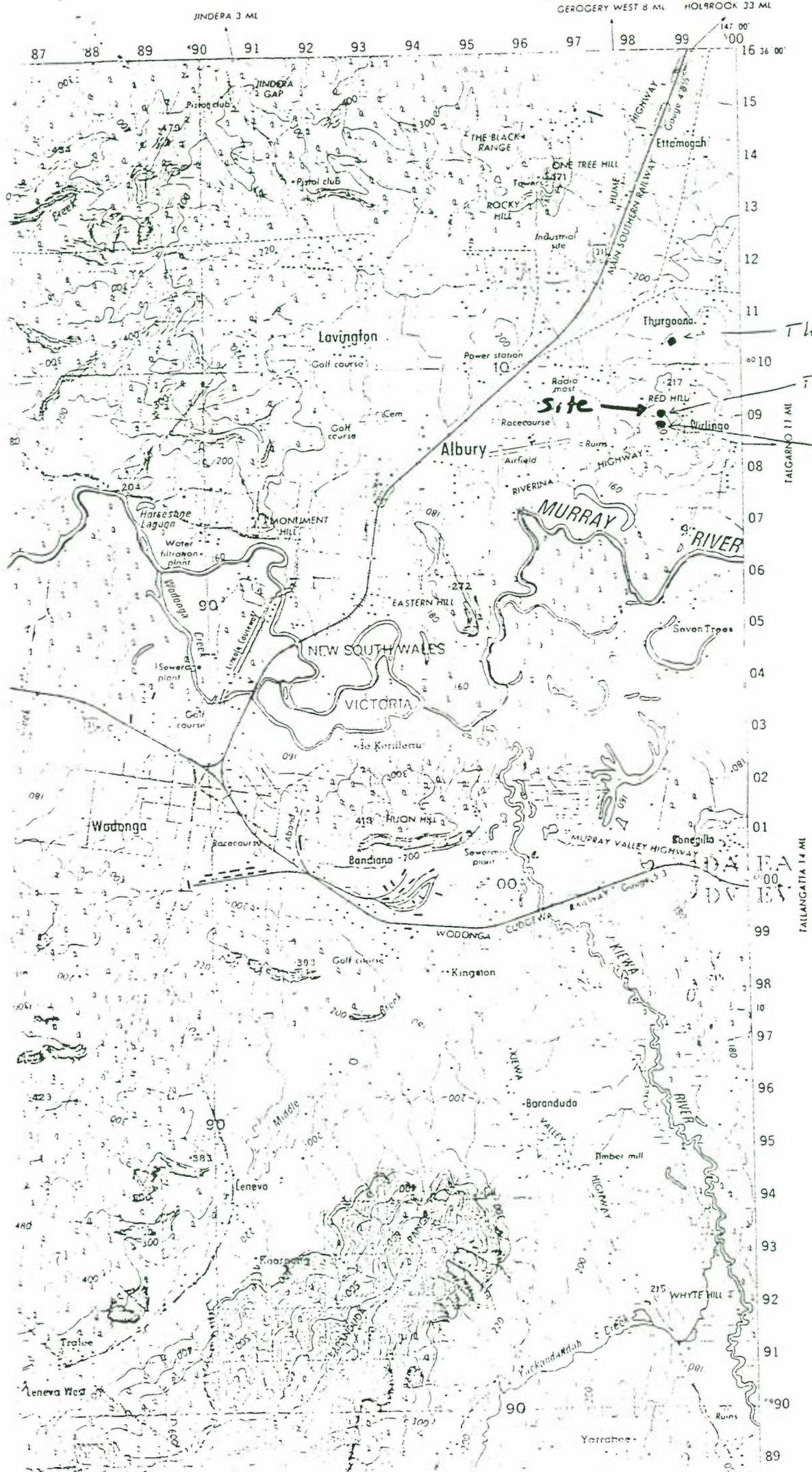
Address

Date

Date

*20 May 77**H. Clemens*





CONVERSION TABLE

METRES TO FEET
3 281
6 562

**Appendix 7:**

**NPWS site cards and field notes.**



# National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444  
Standard Site Recording Form Revised 5/88

NPWS Code

1:250,000 map sheet: \_\_\_\_\_

HEAD OFFICE USE ONLY:

AMG Grid reference 250K 250K  

4	9	8	7	8	0	mE	5/6 ↑	6	0	0	8	7	1	0	mN
25K								25K							

NPWS Site no: \_\_\_\_\_

Full reference - please include leading digits

Site types:

Scale of map used for grid reference [ ] 25K, 50K [ ] 100K [ ] 250K  
 Please use largest scale available. (preferred)

Accessioned by: \_\_\_\_\_ Date: \_\_\_\_\_

Data entered by: \_\_\_\_\_ Date: \_\_\_\_\_

1:25K 50K 100K map name: ALBURY 8225-1 & IV

Owner/Manager:

Address:

Site name: TH-ST-1 Locality/property name: \_\_\_\_\_

NPWS District: \_\_\_\_\_ Region: \_\_\_\_\_

Reason for investigation

RTA DEVELOPMENT OF FILL EXTRACTION SITE

Portion no: \_\_\_\_\_

Parish: \_\_\_\_\_

Photos taken? YES

How many attached? \_\_\_\_\_

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff (Draw diagram on separate sheet.) SEE ATTACHED DIAGRAM

LOCATION 120m NORTH-WEST OF JUNCTION OF BOWDA RD + RIVERINA HIGHWAY ALBURY.

Other sites in locality? YES

Site Types include: OCs, SCARRED TREES.

Are sites in NPWS Register? YES

Have artefacts been removed from site? NO.

When? \_\_\_\_\_

By whom? \_\_\_\_\_

Deposited where? /

Is site important to local Aborigines?

Give contact(s) name(s) + address(es) ALBURY - DISTRICT LALC. PO BOX 22 LARINGTON NSW.

Contacted for this recording? JOHN DAVID.

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).

NPWS Report Catalogue #

A HERITAGE ASSESSMENT OF THE PROPOSED RTA. FILL EXTRACTION SITE AT TRUALLOONA, ALBURY.

Checklist:

surface visibility,  
damage/disturbance/  
threat to site

Condition of site:

TREE DEAD, SCAR CONDITION GOOD.

Recommendations for management & protection (attach separate sheet if necessary):

NIL LALC. EXPRESSED DESIRE TO LEAVE TREE WHERE IT IS WITH NO SPECIFIC MANAGEMENT REQUIREMENTS.

Site recorded by:

Address/institution:

Robynne Mills  
60 Watkin Street  
Newtown NSW 2042

Date:

21-12-98.

**SITE POSITION & ENVIRONMENT**

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:  
 d. mark on diagram provided or on your own sketch the position of the site: e. Describe briefly:



GENTLE ROLLING HILLS  
 2 km NORTH OF MURRAY  
 RIVER

- f. Local rock type: GRAVEL / QUARTZ g. Land use/effect: HEAVILY GRAZED, CLEARED.

2. Distance from drinking water: 1 km. Source: WAVE MIE CK.

3. Resource Zone associated with site (estuarine, riverine, forest etc): Would have been forest.

4. Vegetation: BRASSIES.

5. Edible plants noted: NIL

6. Faunal resources (include shellfish): NIL

7. Other exploitable resources (river pebbles, ochre, etc): NIL.

Site type:  
 SCARRED TREE

DESCRIPTION OF SITE & CONTENTS.  
 Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

- CHECKLIST: length, width, height of site, deposit, structure, element eg. tri, grooves in rock
- DEPOSIT: color, texture, estimate depth, stratigraphic contents-shell stone, charcoal & distribution stone types, all types.
- ART: area of site, decorated, motifs, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.
- BURIALS: number & condition of bone, position, age, sex, associated artefacts.
- TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth
- QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.
- OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate

This scar was identified approximately 500mm above original ground level on the trunk of a felled eucalypt tree with a circumference of 2500mm (Sketch 1, Photo 1). The tree is located approximately 50m north of the Riverina Highway to the west of Old Sydney Rd (GPS 498776E/6008768N). The scar is in fair condition, elongated in shape and measures 800mm x 210mm. There were no axe marks visible but the scar has been assessed by the criteria outlined in Section 7.1 of this report as being a "possible" scarred tree (ie the scar is obviously a result of human cultural activity, however not necessarily Aboriginal. The shape of scar resembles the shape of more definite Aboriginal scarring and although the scar does not have axe marks visible, the height of the scar is consistent with a height which is considered favourable for the easy and comfortable removal of bark).

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.  
 Attach annotated photos (stereo where useful) showing scale, particularly for art sites.



# National Parks and Wildlife Service

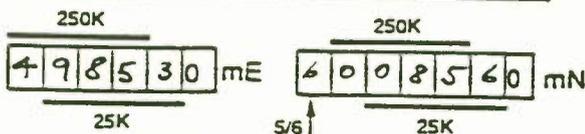
Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444

Standard Site Recording Form Revised 5/88

1:250,000 map sheet: \_\_\_\_\_

NPWS Code

AMG Grid reference



Full reference - please include leading digits

Scale of map used for grid reference  
Please use largest scale available.

[ ] 25K, 50K (preferred) [ ] 100K [ ] 250K

1:25K (50K) 100K map name: ALBURY 8225-10W

HEAD OFFICE USE ONLY:

NPWS Site no: \_\_\_\_\_

Site types: \_\_\_\_\_

Accessioned by: \_\_\_\_\_ Date: \_\_\_\_\_

Data entered by: \_\_\_\_\_ Date: \_\_\_\_\_

Owner/Manager: \_\_\_\_\_

Address: \_\_\_\_\_

Site name: TRIFF-1

Locality/property name: \_\_\_\_\_

NPWS District: QUEENBYRON

Region: \_\_\_\_\_

Reason for investigation

RTA DEVELOPMENT OF A FILL EXTRACTION SITE

Portion no: \_\_\_\_\_

Parish: \_\_\_\_\_

Photos taken? YES

How many attached? \_\_\_\_\_

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff (Draw diagram on separate sheet.))

SEE ATTACHED DIAGRAM.

LOCATION 100M NORTHWEST OF JUNCTION OF BOWDA RD + RIVERINA HIGHWAY.

Other sites in locality? YES

Site Types include: OCS, SHAGGED TREES.

Are sites in NPWS Register? YES

Have artefacts been removed from site? YES

When? 21-12-98

By whom? ALBURY LALC REP.

Deposited where? LALC OFFICE

Is site important to local Aborigines?

Give contact(s) name(s) + address(es) ALBURY + DISTRICT LALC, P.O. BOX 22 LAUNINGTON NSW.

Contacted for this recording? JOHN DAUG

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).

NPWS Report Catalogue #

A HERITAGE ASSESSMENT OF THE PROPOSED RTA FILL EXTRACTION SITE AT THERGONIA ALBURY.

Checklist:  
surface visibility,  
damage/disturbance/  
threat to site

Condition of site: HEAVILY DISTURBED. POSSIBLY INTRODUCED MATERIAL. ASSOCIATED WITH DAM CONSTRUCTION.

Recommendations for management & protection (attach separate sheet if necessary):

NIL.

Site recorded by:  
Address/institution:

Robynne Mills  
60 Watkin Street  
Newtown, NSW 2042

Date: 21-12-98.

**SITE POSITION & ENVIRONMENT**

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:  
 d. mark on diagram provided or on your own sketch the position of the site: e. Describe briefly:



GEARIE HILL SLOPE, 2 km north of  
MURRAY RIVER.

- f. Local rock type: *gneiss, quartz* g. Land use/effect: *HEAVY GRAZED.*

2. Distance from drinking water: *1 km.* Source: *Emile Cr.*

3. Resource Zone associated with site (estuarine, riverine, forest etc): *would have been forest + now cleared*

4. Vegetation: *scum grass.*

5. Edible plants noted: *nil*

6. Faunal resources (include shellfish): *nil*

7. Other exploitable resources (river pebbles, ochre, etc): *nil*

Site type:  
  
*IF.*

**DESCRIPTION OF SITE & CONTENTS.**  
 Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

- CHECKLIST TO H**  
 length, width, dept  
 height of site, shell  
 deposit, structure,  
 element eg. tree sc  
 grooves in rock.  
**DEPOSIT:** colour,  
 texture, estimated  
 depth, stratigraphy  
 contents-shell, bor  
 stone, charcoal, de  
 & distribution of it  
 stone types, artefa  
 types.  
**ART** area of surfac  
 decorated, motifs,  
 colours, wet, dry  
 pigment, technique of  
 engraving, no. of  
 figures, sizes,  
 patination.  
**BURIALS:** number &  
 condition of bone,  
 position, age, sex,  
 associated artefacts.  
**TREES:** number, alive,  
 dead, likely age, scar  
 shape, position, size,  
 patterns, axe marks,  
 regrowth.  
**QUARRIES:** rock type,  
 debris, recognisable  
 artefacts, percentage  
 quarried.  
**OTHER SITES EG.**  
 structures (fish traps,  
 stone arrangements,  
 bora rings, mia mias),  
 mythological sites, rock  
 holes, engraved groove  
 channels, contact sites  
 (missions massacres  
 cemeteries) as  
 appropriate

This isolated artefact was located approximately 32m north west of site TH-ST-1. The artefact/manuport is a river pebble measuring 235mm x 130mm x 48mm and was located in an area of high disturbance associated with the construction of dam and the presence of broken brick pieces. There is no doubt that this item is a manuport however the method of its arrival at the site is debatable. It is possible that the stone was brought to the site by Aboriginal people a conclusion supported to some degree by the close proximity of the scarred tree. However it is also possible that the stone was imported with spoil noted in the area. There was minimal abrasion to both ends of the of the stone however there was no clear evidence of impact points associated with this abrasion. There was also an area of slight abrasion on one flat surface. There was no area of potential archaeological deposit (PAD) identified in association with this artefact.

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.  
 Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

# Open Sites / Isolated Artefacts / Middens

Site Name: Th-IF-1

Date: 21-12-98

Grid Reference: 498532 E  
6008561 N

1. Landform Unit: HILL SLOPE ABOVE RIVER  
(hill slope, ridge top, floodplain etc)
2. Nature of deposit: SAND FLUVIAL LOAM  
(sandy, gravely, clay etc)
3. Erosion - On Site: Sheet Rilling Gully  
CATTLE TRACKS
- Environment: .....
4. Site Exposure / Extent: 20 x 12 m. Area .....m<sup>2</sup>  
(artefacts visible)
4. Surface Visibility (est.): <5% 5-10% 20-50% 50-70% 75-100%
5. Present Landuse: GRazing
6. Type of Archaeological STONE  
Material Present: .....
7. Artefacts in situ? NO  
(erosion occurring etc) .....
8. Artefact Density: 1 / m<sup>2</sup> (average) ..... / m<sup>2</sup> (Max.)
9. Total Number of artefacts: 1  
Estimated Number of artefacts: 50-100 100-200 <500 >500
10. Raw Material %s: RIVER PEBBLE MANUFACTURE
11. Site complex characteristics:  
(associated hearths, knapping floors, ST's etc)

Artefact Details: Open Camp Site (OS), Midden (M), Isolated Artefact (IF)

Site Field Name: TH - IF - 1

Date: 21-12-98

Grid Reference: 498532  
6008561

Artefact Type	Raw Material	Colour	Dimensions			Cortex	Comments
MANUFACTURED POSSIBLE HAMMERSTONE	RIVER OSSELE MUDSTONE QUARTZ QUARTZITE	GREY / WHITE FLAKES	235	130	48	100%	Hammerstone: Some abrasion to both ends Possible slight abrasion on one surface (?).



# Open Sites / Isolated Artefacts / Middens

Site Name: Th-IF-1

Date: 21-12-98

Grid Reference: 498532 E  
6006561 N

1. Landform Unit: HILL SLOPE ABOVE RIVER  
(hill slope, ridge top, floodplain etc)
2. Nature of deposit: SAND FLUVIAL LOAM  
(sandy, gravely, clay etc)
3. Erosion - On Site: Sheet Rilling Gully  
CATTLE TRENCH
- Environment: .....
4. Site Exposure / Extent: 20 x 10 m. Area ..... m<sup>2</sup>  
(artefacts visible)
4. Surface Visibility (est.): <5% 5-10% 20-50% 50-70% 75-100%
5. Present Landuse: GRazing
6. Type of Archaeological STONE  
Material Present: .....
7. Artefacts in situ? NO  
(erosion occurring etc) .....
8. Artefact Density: 1 / m<sup>2</sup> (average) ..... / m<sup>2</sup> (Max.)
9. Total Number of artefacts: 1  
Estimated Number of artefacts: 50-100 100-200 <500 >500
10. Raw Material %s: RIVER PEBBLE TRANSPORT
11. Site complex characteristics:  
(associated hearths, knapping floors, ST's etc)

Artefact Details: Open Camp Site (OS), Midden (M), Isolated Artefact (IF)

Site Field Name: TH-1E-1

Date: 21-12-98

Grid Reference:

408532  
608531

Artefact Type	Raw Material	Colour	Dimensions			Cortex	Comments
MANUFACTURED POSSIBLE HAMMERSTONE	RIVER BEDDLE LIMESTONE QUARTZ QUARTZITE	GREEN WHITE FLAKES	235	130	48.	100%	Hammerstone Fine edge 608532 608531 Located at the site of the camp, near the site of the 1st





**SITE POSITION & ENVIRONMENT**

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:  
 d. mark on diagram provided or on your own sketch the position of the site: e. Describe briefly:



GENTLE ROUNDED HILLS  
 2 km NORTH OF MURRAY  
 RIVER

- f. Local rock type: GRAVEL / QUARTZ g. Land use/effect: HEAVILY GRAZED, CLEARED.

2. Distance from drinking water: 1 km. Source: NWE MUR CK.

3. Resource Zone associated with site (estuarine, riverine, forest etc): Would have been forest.

4. Vegetation: GRASSES.

5. Edible plants noted: NIL

6. Faunal resources (include shellfish): NIL

7. Other exploitable resources (river pebbles, ochre, etc): NIL.

Site type:

SCARRED TREE

**DESCRIPTION OF SITE & CONTENTS.**

Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

CHECKLIST 1  
 length, width, height of site, deposit, stratigraphic element eg. tri grooves in rock  
 DEPOSIT: color, texture, estimate depth, stratigraphic contents-shell stone, charcoal & distribution stone types, artefact types.

ART: area of site decorated, materials, colours, wet, dry pigment, technique of engraving, no. of figures, sizes, patination.

BURIALS: number & condition of bone, position, age, sex, associated artefacts.

TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth

QUARRIES: rock type, debris, recognisable artefacts, percentage quarried.

OTHER SITES EG. structures (fish traps, stone arrangements, bora rings, mia mias), mythological sites, rock holes, engraved groove channels, contact sites (missions massacres cemeteries) as appropriate

This scar was identified approximately 500mm above original ground level on the trunk of a felled eucalypt tree with a circumference of 2500mm (Sketch 1, Photo 1). The tree is located approximately 50m north of the Riverina Highway to the west of Old Sydney Rd (GPS 498776E/6008768N). The scar is in fair condition, elongated in shape and measures 800mm x 210mm. There were no axe marks visible but the scar has been assessed by the criteria outlined in Section 7.1 of this report as being a "possible" scarred tree (ie the scar is obviously a result of human cultural activity, however not necessarily Aboriginal. The shape of scar resembles the shape of more definite Aboriginal scarring and although the scar does not have axe marks visible, the height of the scar is consistent with a height which is considered favourable for the easy and comfortable removal of bark).

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.

Attach annotated photos (stereo where useful) showing scale, particularly for art sites.



# National Parks and Wildlife Service

Box 1967, Hurstville NSW 2220. Tel: (02) 585 6444  
Standard Site Recording Form Revised 5/88

1:250,000 map sheet: \_\_\_\_\_ NPWS Code \_\_\_\_\_

AMG Grid reference 498530 mE 6008560 mN

Full reference - please include leading digits

Scale of map used for grid reference [ ] 25K, 50K [ ] 100K [ ] 250K  
Please use largest scale available. (preferred)

1:25K **50K** 100K map name: ALBURY 8225-1 IV

**HEAD OFFICE USE ONLY:**

NPWS Site no: \_\_\_\_\_

Site types: \_\_\_\_\_

Accessioned by: \_\_\_\_\_ Date: \_\_\_\_\_

Data entered by: \_\_\_\_\_ Date: \_\_\_\_\_

Owner/Manager: \_\_\_\_\_

Address: \_\_\_\_\_

Site name: TRIF-1 Locality/property name: \_\_\_\_\_

NPWS District: QUEENBYRON Region: \_\_\_\_\_

Reason for investigation

RTA DEVELOPMENT OF A FILL EXTRACTION SITE

Portion no: \_\_\_\_\_

Parish: \_\_\_\_\_

Photos taken? YES

How many attached? \_\_\_\_\_

How to get to the site (refer to permanent features, give best approach to site eg. from above, below, along cliff. (Draw diagram on separate sheet.) SEE ATTACHED DIAGRAM.

LOCATION 100m NORTHWEST OF JUNCTION OF BOWDA RD + RIVERINA HIGHWAY.

Other sites in locality? YES Site Types include: OCS, SCARRED TREES.

Are sites in NPWS Register? YES

Have artefacts been removed from site? YES When? 21-12-98

By whom? ALBURY LALC REP. Deposited where? LALC OFFICE

Is site important to local Aborigines?

Give contact(s) name(s) + address(es) ALBURY + DISTRICT LALC. P.O. BOX 22 LAUNINGTON NSW.

Contacted for this recording? JOHN DAUGY.

(Attach additional information separately) If not, why not?

Verbal/written reference sources (including full title of accompanying report).

A HERITAGE ASSESSMENT OF THE PROPOSED RTA FILL EXTRACTION SITE AT TURGOONA, ALBURY.

NPWS Report Catalogue #

Checklist: surface visibility, damage/disturbance/threat to site

Condition of site: HEAVILY DISTURBED. POSSIBLY INTRODUCED MATERIAL. ASSOCIATED WITH DAM CONSTRUCTION.

Recommendations for management & protection (attach separate sheet if necessary):

NIL.

Site recorded by: Robynne Mills Date: 21-12-98.

Address/institution: 60 Watkin Street  
Newtown NSW 2042

**SITE POSITION & ENVIRONMENT**

OFFICE USE ONLY: NPWS site no:

1. Land form a. beach/hill slope/ridge top, etc: b. site aspect: c. slope:  
 d. mark on diagram provided or on your own sketch the position of the site: e. Describe briefly:



GENTLE HILL SLOPE, 2km north of  
MURRAY RIVER.

- f. Local rock type: *GNEISS, QUARTZ* g. Land use/effect: *HEAVILY CLEARED.*

2. Distance from drinking water: *1 km.* Source: *Smile Ck.*

3. Resource Zone associated with site (estuarine, riverine, forest etc): *would have been forest now cleared*

4. Vegetation: *scum grass.*

5. Edible plants noted: *Nil*

6. Faunal resources (include shellfish): *Nil*

7. Other exploitable resources (river pebbles, ochre, etc): *Nil*

Site type:

*IF.*

**DESCRIPTION OF SITE & CONTENTS.**

Note state of preservation of site & contents. Do NOT dig, disturb, damage site or contents.

CHECKLIST TO H  
 length, width, dept  
 height of site, shell  
 deposit, structure,  
 element eg. tree sc  
 grooves in rock.

DEPOSIT: colour,  
 texture, estimated  
 depth, stratigraphy  
 contents-shell, bor  
 stone, charcoal, de  
 & distribution of th  
 stone types, artefa  
 types.

ART area of surfac  
 decorated, motifs,  
 colours, wet, dry  
 pigment, technique of  
 engraving, no. of  
 figures, sizes,  
 patination.

BURIALS: number &  
 condition of bone,  
 position, age, sex,  
 associated artefacts.

TREES: number, alive,  
 dead, likely age, scar  
 shape, position, size,  
 patterns, axe marks,  
 regrowth

QUARRIES rock type,  
 debris, recognisable  
 artefacts, percentage  
 quarried.

OTHER SITES EG.  
 structures (fish traps,  
 stone arrangements,  
 bora rings, mia mias),  
 mythological sites, rock  
 holes, engraved groove  
 channels, contact sites  
 (missions massacres  
 cemeteries) as  
 appropriate

This isolated artefact was located approximately 32m north west of site TH-ST-1. The artefact/manuport is a river pebble measuring 235mm x 130mm x 48mm and was located in an area of high disturbance associated with the construction of dam and the presence of broken brick pieces. There is no doubt that this item is a manuport however the method of its arrival at the site is debatable. It is possible that the stone was brought to the site by Aboriginal people a conclusion supported to some degree by the close proximity of the scarred tree. However it is also possible that the stone was imported with spoil noted in the area. There was minimal abrasion to both ends of the of the stone however there was no clear evidence of impact points associated with this abrasion. There was also an area of slight abrasion on one flat surface. There was no area of potential archaeological deposit (PAD) identified in association with this artefact.

Attach sketches etc. eg. plan & section of shelter, show relation between site contents, indicate north, show scale.

Attach annotated photos (stereo where useful) showing scale, particularly for art sites.

**Appendix 8:**

**Correspondence with NPWS, Queanbeyan**

## 1. Witter's Survey

Witter identified three sites within the proposed development area in a survey carried out in 1977 for the Albury Wodonga Development Corporation.

- 60-3-0001 Thurgoona 1
- 60-3-0002 Thurgoona 2
- 60-3-0003 Thurgoona 3

This survey is detailed in a report entitled "An archaeological survey of the Baranduda and Thurgoona Areas" (NPWS Catalogue No: 1463). Following are excerpts from that report with regard to these sites:

### Artefact description (Witter 1977 p:25)

- 60-3-0001 (TS-1) Results 6 quartz cores, 2 possible quartz core fragments, 2 cobble choppers with possible end pitting.
- 60-3-0002 (TS-2). Results: 1 quartz backed blade, 3 quartz cores, 1 quartz flake, 1 possible cobble hammerstone with pitted ends and possible groove: 1 basalt flaked axe/chopper: 1 cobble with usewear along one edge.
- 60-3-0003 (TS-3) Results: large waterworn cobble with pitted ends (Hammerstone) and an elongated cobble with a smooth side and pitted ends (multipurpose tool Hammerstone/abrader)

**Significance Statements:** (Witter 1977 as recorded in Table (no number in appendices of this report))

Site no.	Type	Preservation	Excavation potential	Research potential	Statistical potential	Public interest potential
TS-1 60-3-0001	lithic	poor	negligible	representative	poor	minimal
TS-2 60-2-0002	lithic	poor	negligible	representative	poor	minimal
TS-3 60-3-0003	ground stone	poor	nil	representative	poor	minimal

## 2. Crosby's survey and sub-surface testing

### 2.1 Aboriginal Heritage

In 1978 Crosby carried out the a sub-surface testing program at two sites identified by Witter within the proposed development area #60-3-0001 (TS-1) and #60-3-0002 (TS-2).

#### Excavation of Sites #60-3-0001 and #60-3-0002 (Crosby p:15):

##### Site #60-3-0001 (TS-1):

- A further surface survey was conducted in the vicinity of the recorded site. No additional artefacts were recorded.
- A 1m square test pit was excavated at this site to a depth of 30cm. It is stated that sieving conditions were difficult due to the damp condition of the soil.
- **Results:** "The very small size of rounded quartz pebbles raise problems of the distribution of pebbles and cobbles. The little pebbles are too small to have been used as tools or cores for flake production and there seems little reason for Aborigines to have brought them to the site, therefore if any explanation for their natural occurrence on the site can be advanced then the status of the other finds as artefacts must be closely examined. As the surface collections are not available to me these questions must remain unresolved".

My interpretation of the above statement is that:

- (i) the quartz identified in the excavation is most likely to be naturally occurring. In his report Witter shows a distribution of quartz material present at the site (Map 2)
- (ii) it would appear that the surface artefacts were collected as they were not on site for inspection.

##### Site #60-3-0002 (TS-2):

- A surface survey of this area was conducted however visibility is described as poor. 1 piece of glassy quartz 9mm long and wedge shaped was recorded and is described as possibly the result of deliberate flaking as the material differs from the milky white quartz of surface pebbles.
- one 50cm square pit was excavated to a depth of 28cm
- 2 small quartz pebbles and 1 piece of red coloured rock with mica flecks and a number of irregular pebbles similar to those occurring in TS-1 were recovered from spit 1.

#### Recommendations made by Crosby 1978 p: 18

- Further periodic surface collections on the sites at times when they are devegetated could be interesting, but a century of regular ploughing to which they have been subjected suggests that most structural evidence will have been destroyed. The stratigraphy also suggests that the material was originally located in the top soil of the ridge and has been gradually brought to the surface and concentrated there. It is possible that TS-1 is largely a downhill wash of the material from TS-2.

**2.2 European Heritage**

During her survey Crosby identified 2 European sites on the southern boundary of the proposed development site. This sites were labelled as TH4 and TH4A respectively (Map 3)

**Site Description: (Crosby 1978 p:14)**

- Mount Pleasant Homestead TH-4
- Mount Pleasant woolshed TH-4A.

“Mount Pleasant Homestead was constructed as a public house in 1859 and so far as the owners now know, it as not been structurally altered inside or out, except to re-roof over the original shingles. This being the case every effort should be made to have the site listed by the National Trust and a condition imposed on any future owner barring structural alterations to the building.

The adjoining brick building (TH 4A) was converted to a woolshed by adding verandahs and a lean to to the original stables. The owner assures me that every effort was made to retain the original form of the building”

Heritage check of the National Trust Records shows that this building has “Classified” status on the National Trust List.

NB This homestead and its boundaries have been excluded from the proposed development area.

Your opinion on these issues would be greatly appreciated.



Robynne.

\*\*\*\*\*

**SINCLAIR KNIGHT MERZ**

Facsimile Transmission

To: Robynne Mills  
Attention:  
Fax No: 9517 9860  
Copies:  
Subject: Fill Extraction Site at Albury

From: Ross Jones  
Job No: INO2260  
Date: 2 November 1998  
No of Pages: 1

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This facsimile may contain PRIVILEGED AND/OR CONFIDENTIAL INFORMATION intended only for the use of the addressee. If you are not the addressee, or the person responsible for delivering it to the person to whom it is addressed, YOU MAY NOT COPY OR DELIVER THIS MESSAGE TO ANYONE ELSE. If you received this facsimile by mistake, please telephone the nominated office (reverse charges). Thank you.

Robynne

I have just read the draft letter to NPWS, faxed to Jenny Bradford on 30/10/98. I have no problems with the letter as it stands, so please send as soon as you can. Regarding your invoicing on the Optus job, I am awaiting a call from Fiona Richmond, advising what you should do. When I hear something from Fiona, I'll let you know.

Yours sincerely



Ross Jones  
Executive Environmental Planner

---

Sinclair Knight Merz, A.C.N. 001 024 095  
100 Christie Street, St Leonards NSW 1590

Telephone: +61 2 9928 2100  
Fax: +61 2 9928 2500  
<http://www.skm.com.au>

**Appendix 9:**

**National Trust Heritage assessment for Mount Pleasant**

✓ ALBURY (Town or District)	MOUNT PLEASANT FORMER HOTEL	Hume Weir Road
Post Code 2640 Hume Shire Local Govt Area		
Author of Proposal D Woolcott		
Date of Proposal October 1987		
Suggested Listing Category CLASSIFIED	(Name or Identification of Listing) Bibliography Border Post, October 10th, 1857, Albury Banner, various dates, esp August 8th 1874. Personal infn from Miss Mabel Heath & Mr Fred Heath	(Address or Location) Owner and Address 1988. Mr. F.W. Heath owner/occupier
Committee (Trust Use) HBC		
Council (Trust Use) APPROVED CLASSIFIED 16/5/88		

Description Briefly cover the points on the following check list where they are relevant and within your knowledge.

History:

Style The former hotel stands on the north side of the Riverina Highway, just before the turn-off at Bowna Road. It has a verandah and distinctive gabled roof ven.

Construction Use Charles Hopgood bought 105 acres in 1854 and on it built the present structures which he called the Travellers Rest Hotel. It was opened on October 12th 1857.

Architect/s Builder/s Date of Construction Hopgood soon let the hotel to tenants, and its name was changed to Mount Pleasant. On Boxing Day 1858, it was the venue for the Mount Pleasant Races, the track being Mitchell's old racecourse across the road.

Present Condition History Owners Boundaries of proposed listing Among tenants known are: Charles Lee Morris (1858), Samuel Jordan (1860), A S Curtis (1860). In 1862 Hopgood got into financial trouble and the farm and house was sold. It remained empty for a considerable time, but in 1869, Samuel Harrison opened it as a public house. However, early in 1871, the licensing branch was informed the house was deserted, windows broken, and no liquor except ginger beer was on sale. J De Faye took over the hotel later that year, but in 1871 he and a man called Redelin put it up for sale, along with dining tables, chairs, sofas, pictures and other furniture

(see over)

Reasons for listing

Mt Pleasant is an attractive example of an early building in the Albury area. It had both an association with many prominent local identities and, through its varied functional history, with the general life of the area.

Sketch plan and photos Attach additional photos if any.

National Trust of Australia (N.S.W.) Listing Proposal NTN 05

ALBURY - MOUNT PLEASANT, FORMER HOTEL, HUME WEIR ROAD (CONT)

Early this century, Henry Heath occupied the house and farmed the area. His children attended the Thurgoona Public School and the Anglican Church, though went to a Sunday School run by the Presbyterians in the McLennan house, near where the airport now stands. The oldest son, Henry, became a senior public servant and completed his career as a member of the Public Service Board.

Although the land was bought by the AWDC, the house continued to be occupied by two of Henry Heath Snr's children, Fred and Mabel (Mamie). Miss Mabel Heath died in 1985. Mr Fred Heath still lives at Mount Pleasant, his brother Gordon nearby, and Mr Henry Heath in SYDNEY.

Description:

The house is built of brick in English bond style, and painted white. There are three doors opening onto the front verandah, and windows are of six panes. The hipped roof is of corrugated iron and contains three dormer windows. The verandah has wooden columns with scalloped valances. Side and rear walls are plastered. At the front is a large box hedge with a modern brick gate. The existing Hume Weir Road (Riverina Highway) is being upgraded and moved closer to the house. However, it will still be at least 25m from the house, and the mature trees at the front will remain.

On the eastern side is a modern garage. Also on the eastern side is a brick shed, which is of little interest. The curtilage is bounded on the front (southern side) by the hedge and on all other sides by an iron fence.

The house is in a good condition and is well maintained.

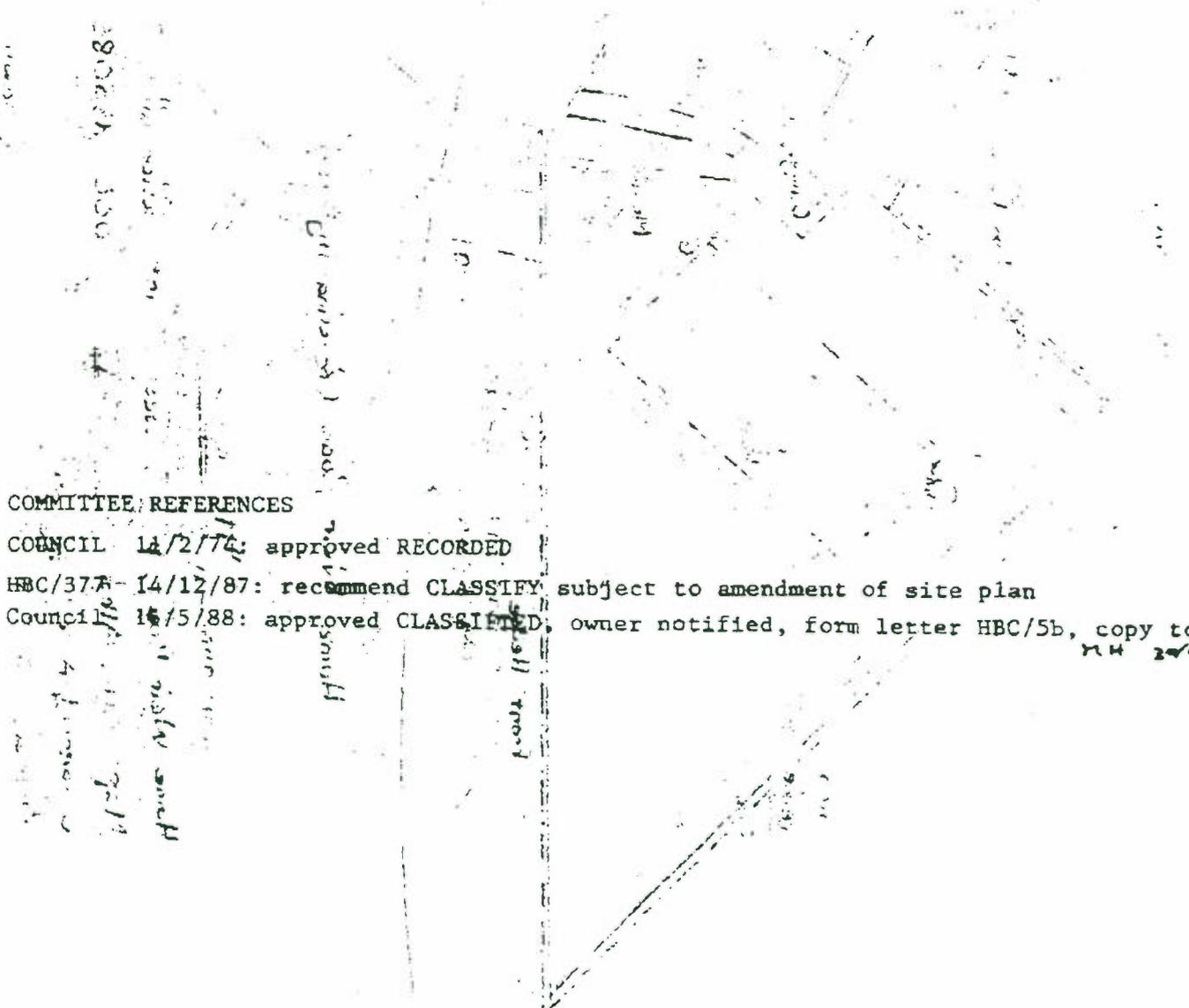
COMMITTEE REFERENCES

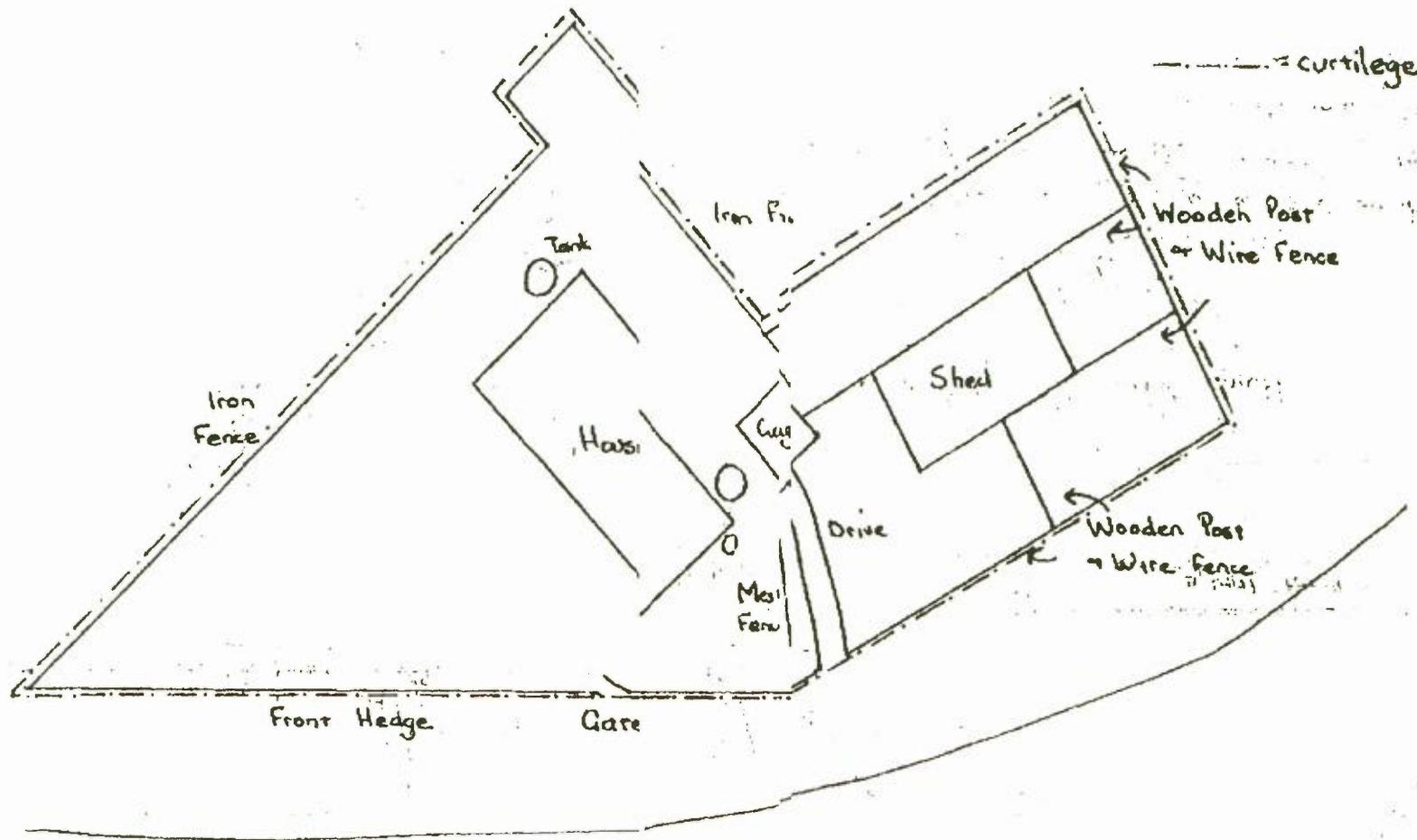
COUNCIL 14/2/76: approved RECORDED

HBC/377- 14/12/87: recommend CLASSIFY subject to amendment of site plan

Council 14/5/88: approved CLASSIFIED, owner notified, form letter HBC/5b, copy to LGA

RM 246





Hume Weir Road (enna Highway

"Mt. Pleas"

Hume Weir Road, 400m west intersect with Bowna Road (Shire of Hume)

Map: CMA Albury 8225-I+1:50001985086

Owner: Mr. F.W. Heath

Drawn by D. Woolcott 1-2-88)

011111076710:01  
04 JHN 05  
10:44 NO. 010 F. 04

## Appendix 10:

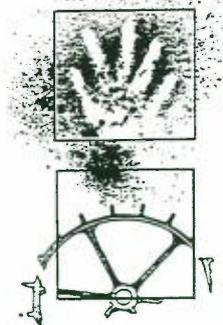
Addendum: Proposed haul road, Albury NSW,  
Archaeological survey for Aboriginal sites. A report to  
Sinclair Knight Merz by Navin Officer Heritage  
Consultants.

**Addendum:**

# **Proposed Haul Road, Albury, NSW**

**Archaeological Survey for Aboriginal Sites**

May 1999



***Navin  
Officer***

*heritage  
consultants*

102 Jervois St.  
Deakin ACT 2600

ph 02 6282 9415  
fx 02 6282 9416

A Report to Sinclair Knight Merz Pty Ltd

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## EXECUTIVE SUMMARY

The RTA proposes to construct a haul road from the vicinity of Albury Jet Boat Racing Facility to the National Highway Construction Site. The route begins in the south at Fallon Road and terminates in the vicinity of the junction of Dallinger Road and Corrys Road.

The present study was commissioned to identify any cultural heritage constraints that may affect the construction of the proposed road.

No Aboriginal archaeological sites were recorded during the survey which was carried out in conjunction with the Albury and District Local Aboriginal Land Council.

### **It is recommended that:**

- There are no Aboriginal archaeological constraints to the construction of the proposed road.

## 1. INTRODUCTION

The NSW RTA proposes to construct a haul road to provide access from a fill extraction site (borrow pit) to the new inner route alignment of the Albury Wodonga link of the National Highway. The road is located between Fallon Road in the south and the proposed Highway route. In the latter locality the route terminates to the northwest of the junction of Dallinger Road and Corrys Road. The route is located in an area which has been cleared for grazing (Figure 1).

### 1.1 Study Aims

The aims of the study were:

- to carry out background research into the study area,
- to assess the cultural heritage significance of the proposed bypass haul road route, and
- to provide management recommendations for the cultural heritage resources that may be located during the study.

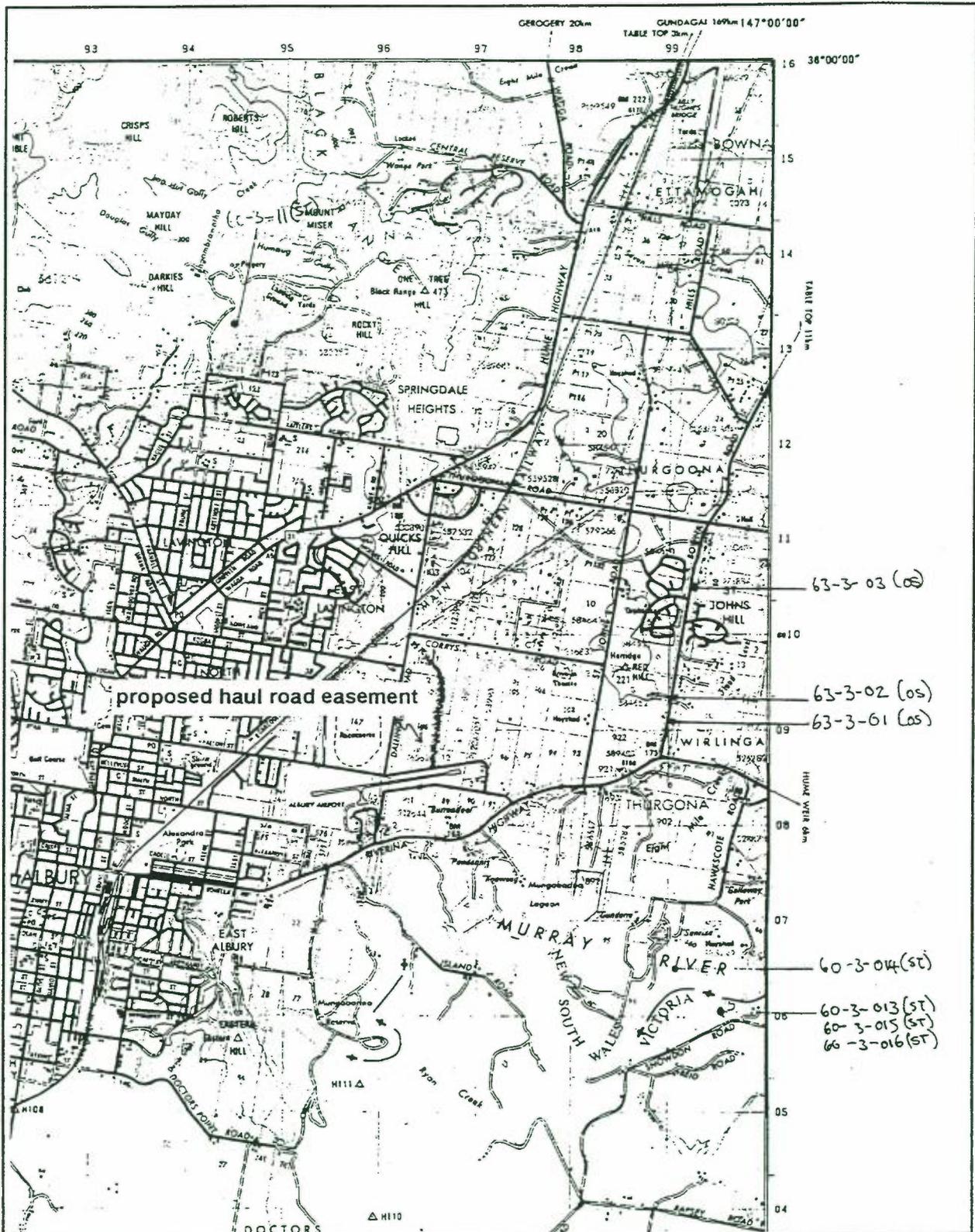
### 1.2 Background to Present Study

Robynne Mills was commissioned by Sinclair Knight Merz to conduct a heritage assessment of the proposed fill extraction site at Thurgoona, east of Albury. The extraction site is located about two kilometres to the east of the proposed route. During her study Mills investigated both Aboriginal and European cultural heritage issues. During the survey, which also attempted relocate previously recorded artefacts and sites, only one low density Aboriginal site and one isolated find (single artefact) were recorded. The site recorded by Mills was a felled scarred tree.

### 1.3 Report Outline

This report:

- documents Aboriginal consultation,
- briefly describes the environmental background of the study area, and
- describes the field survey, and
- documents the results of the investigation.



Base Map: CMA Topographical Map - 1:50,000 Albury 8225-1&4

Figure 1: The Study Area Showing Survey Area and Location of Previously Recorded Aboriginal Sites

## 2. ABORIGINAL PARTICIPATION AND CONSULTATION

The present study area falls within the boundaries of the Albury and District Local Aboriginal Land Council. The LALC was contacted with regard to the survey and informed of the location of the proposed route. The LALC was invited by Ms Kerry Navin of Navin Officer Heritage Consultants to take part in the survey. A representative of the LALC, Mr Jason Clark, took part in the survey. A report from the LALC with regard to the survey was commissioned through Mr Clark and is presented in Appendix I.

## 3. THE STUDY AREA

The study area consists of a narrow 1.5 kilometre long corridor within the boundaries of Portion 102; Lot 2, DP516572; Portion 100; and Portion 11, DP576562. As the proposed haul route was not marked on the ground with survey pegs a fairly broad route within the above properties was surveyed. The survey area is bounded in the north by Corrys Road and in the south by Fallon Road. The eastern side of the area is bounded by council depots and private houses and farm yards. Along the eastern side the survey area is bounded by a radio antennae facility and the Albury Jet Boat Racing Facility.

The proposed haul route is located in an area that has been disturbed in the past by the clearance of native forests, cultivation of exotic grasses and crops, and construction of residential dwellings, fences, roads/tracks and public utilities. It was noted during the survey that an AGL gas pipeline is located in the northern part of the survey area.

Within the study area most of the original native vegetation has been removed with few, if any, old growth native trees remaining. Spread throughout the survey area were several stands of mature eucalyptus trees, the age of which could not be determined. In the past, the survey area appears to have been used for both cultivation and grazing. The past use of the area is mirrored in the current vegetation regime which includes introduced grasses and weeds, which were present during the survey as a thick mat of vegetation covering the ground and markedly restricted archaeological visibility. At the time of the survey the area was used for grazing of horses. (Plates 1 and 2)

The topography of the study area is characterised by a low gradient landscape consisting of a broad flat low ridges, or spurs, and associated drainage lines. The topography is essentially one of very gently undulating minor ridges and drainage lines. The only ridge or spur of note was located in the northeastern part of the study area. Based on maps provided to the survey party it appears that this ridge will not be impacted by the proposed development. Within the drainage lines were several artificial dams used for storing water for stock.

All of the study area has apparently undergone extensive modification and disturbance as a result of European activities. As a result of these activities the survival of *in situ* Aboriginal archaeological remains will have been prejudiced. Landscape disturbance in the study area has occurred as a result of:

- vegetation clearance;
- establishment and maintenance of past cultivation practices; and
- construction of residential dwellings, roads, paths and fences.

## 4. PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Previous archaeological investigation in the Albury Region of NSW has been covered in the original report prepared by Mills (1998). It was noted that the majority of artefacts recorded during previous investigation were made of quartz stone. A similar finding was made by Dearling and Evans (1997) during an assessment of Cultural Heritage resources within the Army's Wirlinga Explosives storage area. This locality is approximately eight kilometres to the east of the present study area.

### 4.1 Known Aboriginal Sites in Vicinity

The database of Aboriginal sites maintained by NSW NPWS was consulted to ascertain if any known Aboriginal sites existed in or close to the present study area. This search resulted in eight such sites being identified. These sites consisted of three open camp sites (open artefact scatters) and five scarred trees. The three open camp sites (NPWS Sites # 60-3-0001; 60-3-0002 and 60-3-0003) are located to the east of the Old Sydney Road (Bowana Road) about two kilometres east of the present study area. The sites were located in the proposed fill extraction area. Dearling and Evans (1997) recorded a single low-density open artefact scatter in alluvial deposits near the junction of two drainage lines.

Five scarred trees are located to the southeast of the present study area and well outside the area. Four of the trees (NPWS Sites 60-3-0013; 0014; 0015; 0016) are located close to the Murray River. NPWS Site 60-3-0011 is located to the north of the town of Albury.

### 4.2 Predictive Model

During the present study the predictive model formulated by Mills (1998) has been used. This model saw most open camp sites being located on elevated alluvial terraces and creek bank areas. Reliable water was seen as a determining factor. A similar model for open campsites was advocated by Dearling and Evans (1997). The study area is within two kilometres of the Murray River and is located within the flood plain associated with the river. As such it would have been subjected to inundation. During wet conditions, and depending on the level of any water present, the low ridges and spurs within the area would have provided a reasonably dry habitation locality.

## 5. METHODOLOGY

### 5.1 Review of existing documentation

The NSW NPWS maintains a register of all recorded Aboriginal sites within the state of New South Wales. A search of the register was carried out prior to the survey to ascertain if any sites were known to be in the area of the present study, and to identify all previously recorded sites in the area. Associated with the register is a collection of archaeological reports, theses and papers dealing with previous archaeological studies. The only report that was consulted during the study was that prepared by Mills during a previous phase of the current project.

### 5.2 Field Surveys

Field investigation of the proposed route was carried out by two archaeologists and a representative from the Albury and District LALC. The presence of thick pasture grasses within the study area restricted the areas that could be effectively surveyed. The strategy adopted was for the field team to spread out approximately 15 metres apart and walk down one side of the proposed route. On reaching the southern boundary of the study area the team adopted the same method and returned surveying the other side of the centre line. This allowed a broad lineal area of the proposed route to be surveyed. The two transects combined gave a coverage of up to 35 to 40 metres either side of a nominal centre-line.

Due to the lack of surface visibility any disturbed ground that offered archaeological visibility and which was within close proximity to the survey transects was also investigated. One such area was located on the eastern boundary of Portion 102 near the boundary fence with the radio antenna compound. This area was an area of ground disturbed by stock and measured approximately fifty metres by four metres. All surveys were carried out on foot and incorporated all topographical units located within the study area (see Table 1).

### 5.3 Surface Visibility

The effectiveness of archaeological field surveys and the ability to find archaeological material is dependant on the amount of surface visibility. Surface visibility is the amount of bare ground visible to the archaeologist. The dominant factor affecting surface visibility is the amount of vegetation and ground litter. Within the present study surface visibility was a dominant factor in locating Aboriginal artefacts on the surface.

Overall visibility in the study area was poor. Within the study area, areas available for survey were restricted by the thick vegetation cover over the area. These areas included pasture grass with the surface visibility was very poor being less than 1%. Based on the overall coverage and degree of surface visibility the effective survey coverage within the survey area is estimated to be less than 1% (see Table 1).

Table 1 - Effective Survey Coverage

Survey Division	Survey Unit	Landform	Exposure Type	Survey Unit Area (ha)	Exposure as % of Total Area %	Average Exposure Visibility %	Estimate of Effective Coverage %
Portion 102	1	Mid Slope	Nil	2.4	100	1	0.024
	2	Upper Slope	Animal Pad	0.05	100	85	0.042
	3	Mid Slope	Dam/ Tracks	0.03	100	85	0.025
Lot 2	3	Foot/Mid Slope	Nil	1.2	100	1	0.012
	4	Foot Slope	Nil	0.6	100	1	0.0006
	5	Drainage Line	Nil	0.4	100	1	0.0004
Portion 100	6	Foot Slope	Nil	0.9	100	1	0.0009
	7	Drainage Line	Nil	0.9	100	1	0.0009
	8	Mid Slope	Nil	0.8	100	1	0.0008
Portion 11	9	Foot Slope	Nil	0.38	100	1	0.0004
	10	Mid Slope	Nil	1.25	100	1	0.0125
	11	Upper Slope	Nil	0.05	100	1	0.00005
<b>Totals:</b>				<b>8.96</b>			<b>0.11955</b>

## 6. RESULTS OF SURVEY

No Aboriginal relics were located during the survey. Included in the survey was a search of trees that may have been considered old enough to have had Aboriginal scars on them. None of the trees observed during the survey were considered of great antiquity, and most may date to the period post European settlement. No Aboriginal scarred trees were located.

## 7. DISCUSSION

Due to the poor ground surface visibility in the study area the option for sub-surface testing was considered and rejected, due primarily to the highly disturbed nature of the ground in the study area and the flood-plain context of the majority of the area. Mr Jason Clark, the representative of the Albury and District Local Aboriginal Land Council, concurred with this assessment.

## 8. MANAGEMENT RECOMMENDATIONS

Recommendations in this report are made after consideration of the following:

- Legal requirements under the terms of the NPWS Act 1974 (as amended) which states that it is an offence to deface, damage or destroy Aboriginal relics in NSW without first obtaining the written consent of the Director General of the NPWS;
- Consideration of the potential impact of the proposed development on Aboriginal relics;
- Background research into the Aboriginal archaeological record for the study area;
- The results of the investigations documented in this report; and
- Consultation with the Albury and District Local Aboriginal Land Council.

### It is recommended that:

1. There are no Aboriginal archaeological constraints to the proposed construction of the haul road.
2. Three copies of this report should be forwarded to the Southern Aboriginal Heritage Unit for consideration by the NSW NPWS

Southern Cultural Heritage Unit  
Aboriginal Heritage Division, NPWS  
PO Box 2115  
Queanbeyan, NSW, 2620

3. A copy of this report should be forwarded to:

Sites Officer  
Albury and District Local Aboriginal Land Council  
PO Box 22  
LAVINGTON NSW 2641

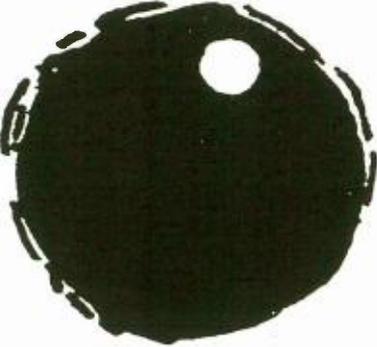
## 9. REFERENCES

Dearling C.D. and B. Evans 1997 *Albury Wodonga Military Area: Resource Assessment*, Unpublished report to the Australian Museum Business Services/Hyder Consulting, Grinberg Knight and Associates, Canberra ACT.

Mills, R. 1998 Archaeological Survey of Albury Borrow pit Area.

**APPENDIX I**

**CORRESPONDENCE FROM THE  
ALBURY & DISTRICT LALC**



---

ALBURY & DISTRICT LOCAL ABORIGINAL LAND COUNCIL

P.O. Box 22, LAVINGTON, N.S.W. 2641 PH:(02) 6025 7075 FAX:(02) 6025 4340

4 May 1999

Ms Kerry Navin  
Navin Officer Consultants  
102 Jervois Street  
DEAKIN ACT 2600

Dear Kerry

RE: SURVEY OF CORRYS ROAD AND FALLON STREET ALBURY

A survey was conducted on a property which is located at Corrys Road to Fallons Street, Albury. The area was surveyed for Aboriginal sites, none were located.

Yours sincerely

  
Jason Clark  
SITES OFFICER  
A&DLALC

APPENDIX II

PLATES

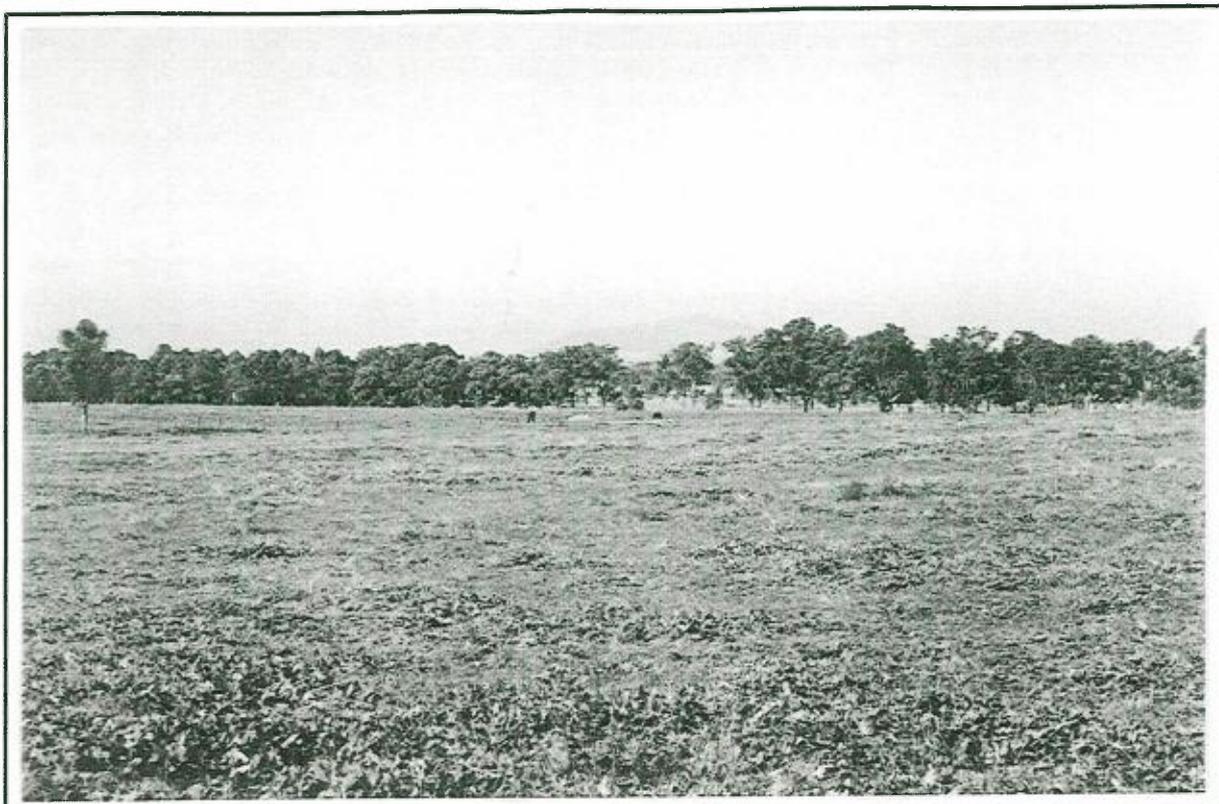


Plate 1: Haul road study area - showing dense groundcover

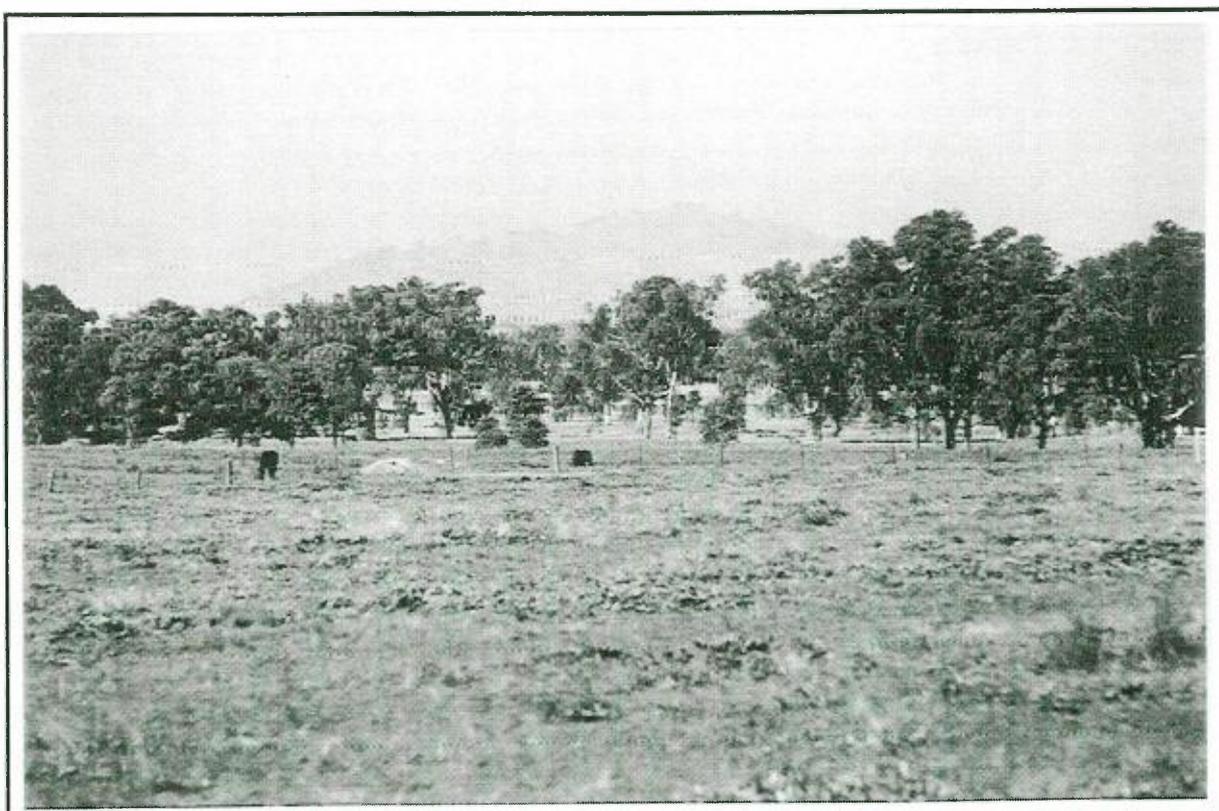
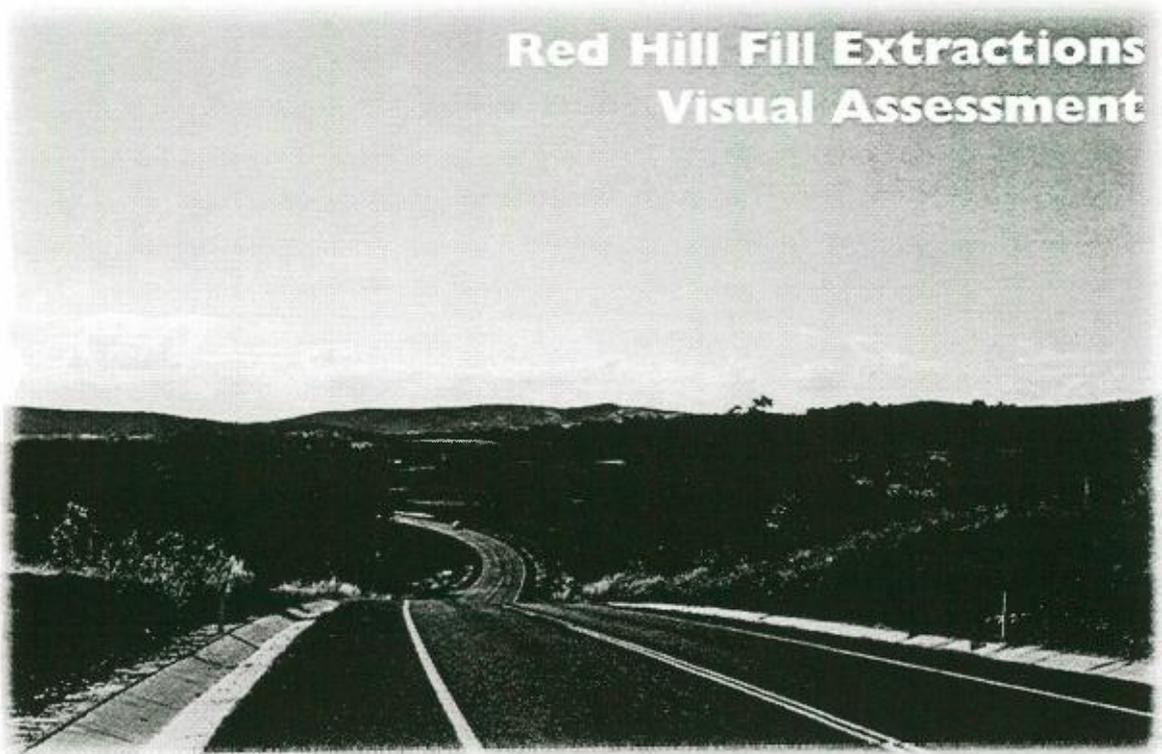


Plate 2: Haul road study area - showing dense groundcover

## Appendix - J Specialist Visual and Landscape

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Sinclair Knight Merz



February 1999

**EDAW**

Sinclair Knight Merz

# **Red Hill Fill Extractions Visual Assessment**

February 1999

**EDAW**

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## I INTRODUCTION

It is proposed to extract fill from a site near Red Hill, east of Albury ( see figure 1.1). The fill will be taken from the site to enable appropriate fill embankments to be built as part of the Albury Bypass. The fill material will be taken from the hill over a period of two years.

The extraction of approximately 2.2 million cubic metres of fill material is designated under Schedule 3 of the EP&A Regulation. In this context an EIS is being prepared for the project, to accompany the Development Application to be lodged with the City of Albury.

This report prepared by EDAW is in two parts. Part A considers the visual implication of the Proposal and Part B outlines site restoration strategies that aim at achieving appropriate visual and environmental outcomes following completion of extraction on the site.



Figure 1.1 Locality Map  
Albury Quarry - Visual Assessment

## 2 VISUAL ASSESSMENT

### 2.1 STUDY METHOD

This visual impact assessment is based on analyses of the following factors:

- the number of people who will be able to see components of The Proposal, and the distance and duration of their views.
- the degree of contrast between the components of The Proposal and the surrounding landscape.
- the nature, extent and timing of rehabilitation and landscape mitigation measures.

The visual impact assessment process involved the following tasks;

- a review of the regional landscape context of The Proposal,
- assessment of the local landscape character of the area surrounding The Proposal,
- a review of the components and timing of The Proposal, including recommendations to reduce visual impact,
- assessment of the visual effect of the components of the Proposal,
- assessment of the visibility of The Proposal,
- assessment of the visual sensitivity of the areas and localities that view The Proposal including identification of visual sensitivity of these areas,
- analyses of the visual sensitivity and visual effect to assess the visual impact of The Proposal,

Following is a description of visual sensitivity, visual effect and visual impact as defined by this report.

#### Visual Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different use areas. The assessment is based on the number of people affected, land use, and distance of the viewer from The Proposal.

People using a recreation area for example, will use

the surrounding landscape as a part of their leisure experience and will view change to the landscape more critically than for example people viewing The Proposal from an industrial or agricultural working situation. All other things being equal the shorter the viewing time (for example views whilst travelling along a road) the lower the sensitivity, similarly the greater the distance from The Proposal, the lower the sensitivity.

#### Visual Effect

The visual effect is the expression of the visual interaction between the Proposal and the existing visual environment. It can also be expressed as the level of visual contrast (ie form, shape, pattern, line, texture and colour) of the Proposal to the setting and background within which it is viewed.

A high visual effect will result if The Proposal has a high visual contrast to the surrounding landscape, and there is little or no natural screening or integration created by vegetation or topography.

A moderate level of visual effect occurs if The Proposal is visible and contrasts with the landscape but is integrated with it to some degree. This will occur if the surrounding vegetation and/or topography provide some measure of visual screening, backgrounding or other forms of visual integration of the Proposal with the existing landscape setting.

A low visual effect occurs if there is minimal contrast and a high level of integration of form, shape, pattern, line, texture or colour values between The Proposal and the existing landscape setting.

#### Visual Impacts

The visual impact is determined by consideration of both the visual effect and the visual sensitivity. Various combinations of visual effect and visual sensitivity will result in high, moderate and low overall visual impacts. Figure 1.2 gives an indication of the results that can be expected from the above analyses.

Visual Sensitivity	Visual Effect		
	High	Moderate	Low
High	VI: High	VI: High	VI: Moderate
Moderate	VI: High	VI: Moderate	VI: Low
Low	VI: Moderate	VI: Low	VI: Low

Figure 1.2: Visual Impact Determination

## 2.2 EXISTING VISUAL SETTING

### Regional Setting

The regional setting of Albury is dominated by the Murray River and the Mountains and Hills of the Black Range ( see figure 2.1) The Murray River runs east-west to the south of Albury, the airport and the site. The flood plain is dominated by the meandering river, oxbow lakes and billabongs. Treed creeklines, the river and other water features create a strong pattern in this area.

The Mountains of the Black Range are generally to the west of Albury with the foothills and more gentle slopes providing the appropriate non flood areas for the urban development of Albury adjacent to the Murray River. Red Hill, of which the site is a part, is within the gently sloping foothills.

The other major regional landscape feature is Lake Hume which is to the east of the site.

### Local Setting

The local setting of the site at the edge of the Murray River flood plain includes flat secondary flood plain areas as well as gently undulating hills generally above 170masl (see figure 2.2). The airport which is located on part of the secondary flood plain is located to the west of the site. Its linear patterns are not easily seen due to the flat nature of the terrain. The remainder of the flood plain supports scattered trees in open grassland.

The rolling hills also generally support scattered trees in open grassland. The creek lines and to a lesser extent fence lines and road lines also support tree

groups that help to punctuate the landscape.

A major feature of the landscape in the locality is the major tree planting belts that occur along the roads and in various locations in the landscape, such as significant hill tops.

There are a number of landuses that create the character of local landscape settings. This includes urban residential development, industrial areas, the race track, the airport and rural grazing land. The rural landscape also supports a number of rural homes that are generally close to adjoining roads.

The major road in the locality is the Riverina Highway. Other roads include Old Sydney Road (Bowna Road) that adjoins the site on the east, Elizabeth Mitchell Drive to the west of the site and Fallon Road which runs adjacent to the northern side of the airport.

### The Site

The site covers an area of approximately 30 ha. The site generally slopes and drains to the south. Slopes are gentle, generally not exceeding 1:10, with elevations varying from:

- 161masl in the south west corner of the site to
- 194masl in the central northern part of the site.

The site is dominated by exotic grassland. However a limited number of trees do occur on the southern side of the site, adjacent to the residential property and a small farm dam in the central drainage line.

The overall impression of the site is of a gently rolling grassy hill, adjoined on the lower slopes by tree belts, generally along the roadway. The off-site natural forest and tree planting belts on the adjacent Red Hill help to create a backdrop to the site when viewed from most viewing areas to the east, south and west of the site.

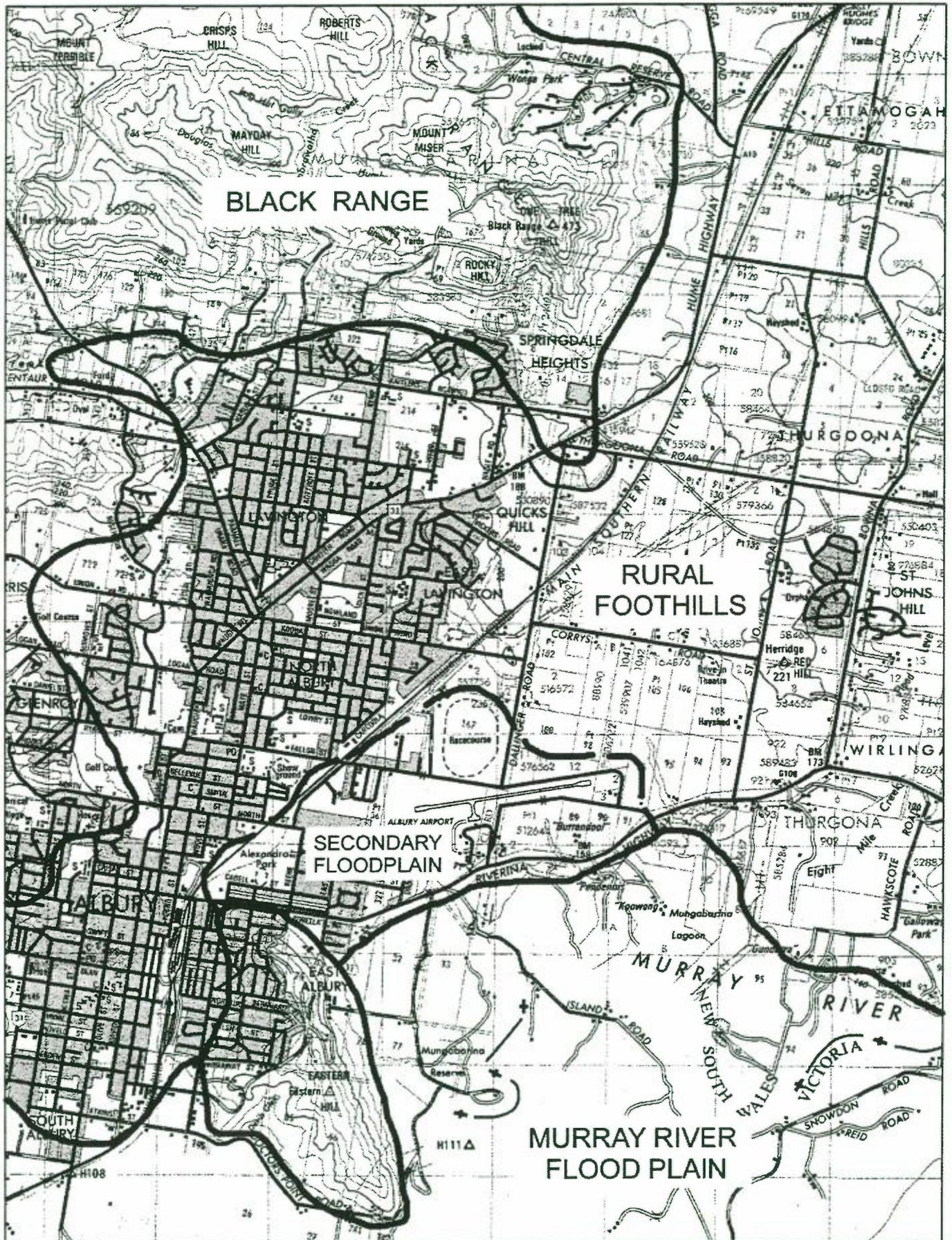
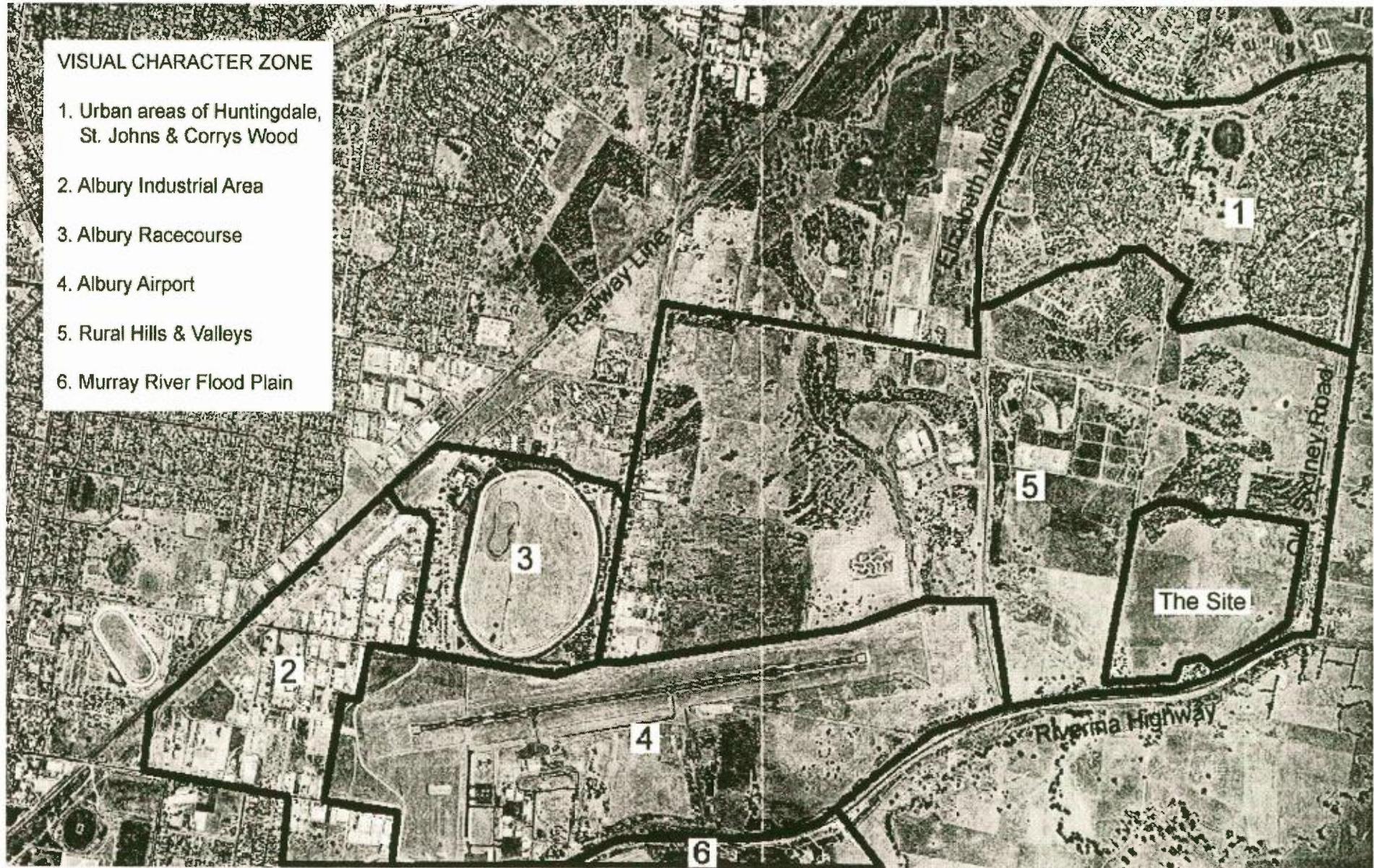


Figure 2.1 Regional Context  
Albury Quarry - Visual Assessment



- VISUAL CHARACTER ZONE**
1. Urban areas of Huntingdale, St. Johns & Corrys Wood
  2. Albury Industrial Area
  3. Albury Racecourse
  4. Albury Airport
  5. Rural Hills & Valleys
  6. Murray River Flood Plain

0 100 500 1000m  
 Scale 1:25 000



Figure 2.2 Local Setting  
 Albury Quarry Visual Assessment

## 2.3 DEVELOPMENT PROPOSAL

### The Proposal

It is proposed to extract 2.2 million cubic metres of fill from the undulating hill area to the south of Red Hill.

Most of the site, but excluding treed areas in the northern and southern parts of the site, will be excavated. Final landforms will create a new NE-SW drainage line that will link into existing site drainage lines.

It is proposed to regrade finished areas and restore these to grassland and woodland. Concepts to increase the amount the indigenous vegetation is limited by flight path restrictions and potential future uses (see figure 3.1).

### Visual Effect of Proposal

The removal of fill from the site will have two visual effects. Firstly, removal of grass cover and exposure of soil will introduce a strong colour contrast into the existing landscape. The planned removal of over two million cubic metres of fill from the site will alter the form and shape of the hill. It will also alter the outline of the hill as it is seen from various locations below it.

The scale of the operation is relatively large in relation to the setting of the small hill on which it occurs. It is envisaged that half of the seen area of the hill will be effected by the operation at various times. This will create a strong visual effect if the operation is not staged with progressive restoration.

The colour contrast will be strong creating a high visual effect if it is over a large area. The colour contrast will result from the exposed earth. This will vary in colour from the existing grass greens of the winter and spring grasses and the gold of the cured summer grass cover.

Form and line modification will also have a high visual effect in the short term. This is a result of the need to have cutting faces and working stock piles, all of which would create unnatural shapes and lines in the land-

scape. However in the longer term this effect will not be great as it can have a high degree of compatibility with adjoining landforms.

The Proposal will alter the character of the existing landscape both in the short and long term. However the visual effects will differ through time. In the short term, some high visual effects resulting from land stripping and excavation of material from the site can be expected. The degree of effect could be decreased by reducing the size of any one working area, leaving the larger part of the site in an undisturbed condition or in a restored condition.

The longer term visual effect will be low as grasslands will be restored on landforms that have been reshaped to emulate existing landforms.

## 2.4 VISUAL INTERACTIONS

### General

The site is viewed from a number of locations (see figure 2.3), generally to the west, south and east of the site. Northern views are restricted by Red Hill and adjoining ridges and spurs. Viewing areas are generally limited to the rural areas around the site.

The area is visible to a number of use areas around the site, as outlined below. However views are generally filtered though existing vegetation adjacent to the road edges and or vegetation in private gardens.

Trees along the Riverina Highway and Old Sydney Road (Bowna Road) are especially significant in filtering views to the site. This vegetation is very effective in screening or filtering views to the east and south. This vegetation is lacking along Elizabeth Mitchell Drive. This allows for long views into the site from this road as well as from Fallon Road.

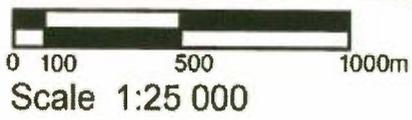
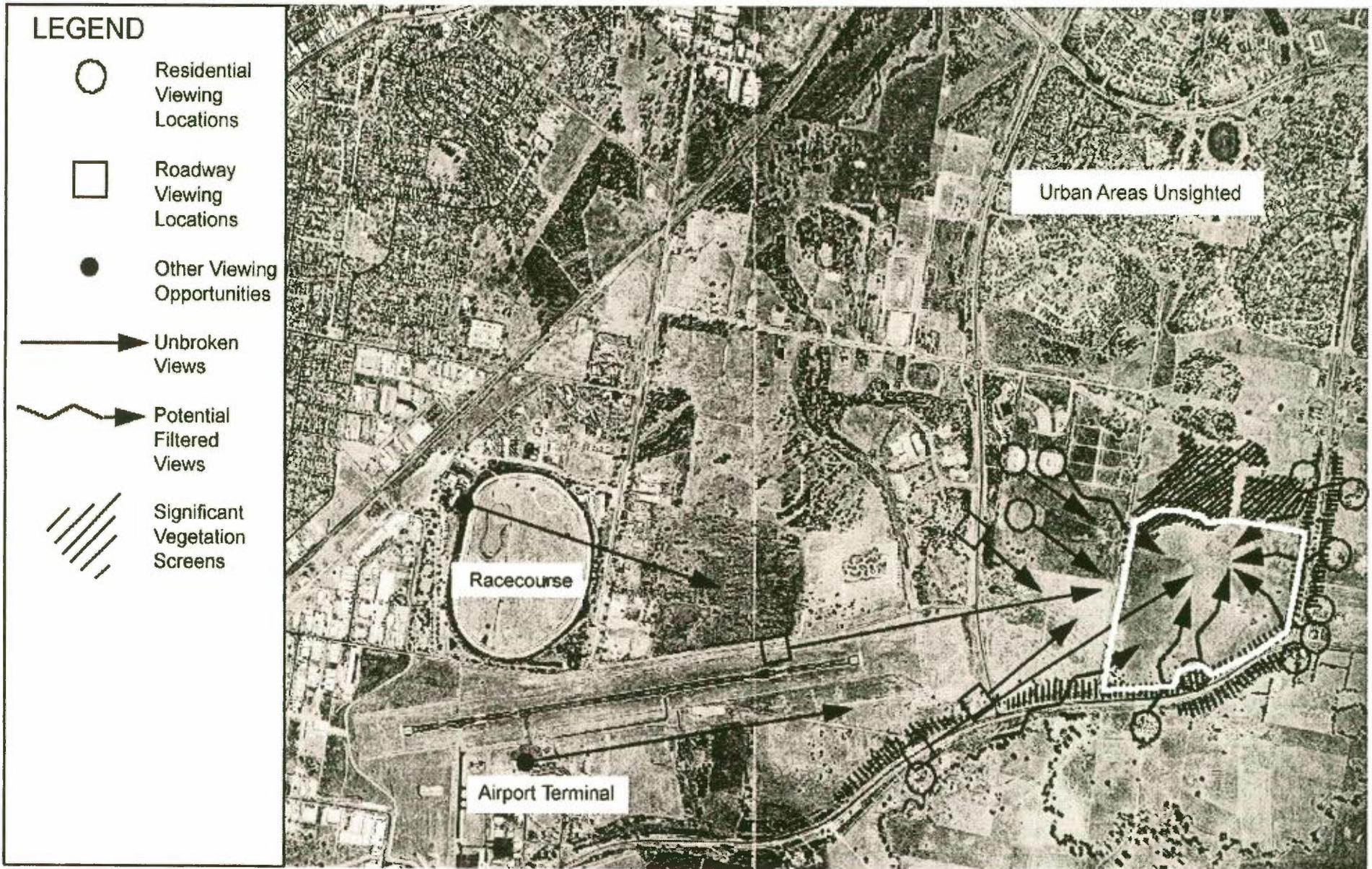


Figure 2.3: Visual Interaction  
Albury Quarry - Visual Assessment

## Urban Residential Areas

The urban residential areas of Huntingdale, St Johns Hill and Corry Wood are close to the northern edge of the site (figure 2.4). However the topographic form of Red Hill creates good visual separation between the site and these sensitive urban areas. This separation is further reinforced by existing woodland and plantations of native trees on the hill area and adjacent to the roads.

**These areas would have a high sensitivity, however they are unsighted and therefore would have low sensitivity to the Proposal.**

The Proposal is unseen from this area and therefore there is no impact.



Figure 2.4 Urban areas are visually screened from the site by topographic and vegetation features of Red Hill

## Riverina Highway

The highway is the main road adjacent to the site. The highway passes in an east west direction along the southern boundary of the site. Views from the road, into the site are possible from various locations along the road in both eastern and western travel directions (see figure 2.5). Generally these views are filtered through planted trees and some indigenous trees occurring on the northern side of the highway.

However there is one location, on the western journey, east of Old Sydney Road that there is a view from the top of a rise over the roadside vegetation directly into the site.

The site is generally only part of a sequential view

and is not a focal landscape to the road. This coupled with the general speed of travel renders this use area as having moderate to low sensitivity.

**The visual effect of the Proposal on this viewing zone will be low due to the screening and filtering**

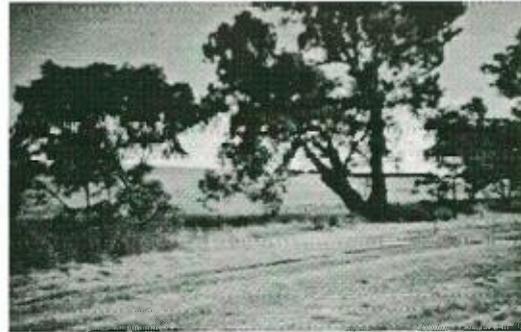


Figure 2.5: The site is visible to the Riverina Highway, though views are generally filtered

effect of the trees within the road reserve.

The visual impact on this viewing area is low.

## Elizabeth Mitchell Drive

Views from this road are extensive for both the north and south journey (see figure 2.6). Unlike the other roads in the location this road is not flanked by roadside vegetation. This is due to the clearance requirements for the Albury Airport runway immediately to the west of Elizabeth Mitchell Drive.

Views are outside the primary zone of vision (60 degrees) along the road. However the Proposal would be clearly visible.

**Due to clear visibility of the Proposal, the foreground location of The Proposal to the road and the character of viewing, ie speed and viewing angle, the road was ascribed a moderate sensitivity.**

The visual effect on this areas will be moderate to high depending in the initial stages, but low following restoration.

The visual impact of The Proposal on Elizabeth

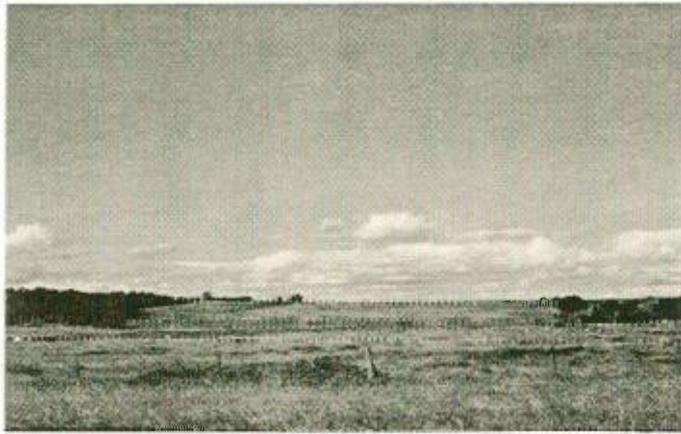


Figure 2.6: The site is visually exposed to views from Elizabeth Mitchell Drive and Fallon Road

Mitchell Drive will be moderate to high during the operation of the extraction zone, but will reduce to low following restoration.

### Old Sydney Road (Bowna Road)

Views from this road are limited. Although the site is immediately adjacent to the road, vegetation belts along the road limit views into the site (see figure 2.7). This is especially given the angles of view along the road and the speed of travel.

Due to limited views, speed of travel and angle of view create a low visual sensitivity.

The visual effect on the road will be moderate to low during the operation and low following restoration.

The visual impact on Old Sydney Road (Bowna



Figure 2.7: The site adjoins Old Sydney Road but is screened from it by adjoining vegetation

Road) will be low during operation and following restoration.

### Fallon Road

Views from this road are directly onto the site (see figure 2.6). The site is in a focal position in relation to this road and is not screened or filtered from view by vegetation. The site is in the viewshed of the road for a relatively long period of time for the eastern journey. This is due to the alignment of the road, the extension of which leads directly onto the site to be extracted.

The road is not extensively used, but is the main access to the racetrack. It also provides access to and from industrial areas adjacent to the airport.

The usage of the road would normally result in a low sensitivity, however the view type and time of viewing increases it to a moderate sensitivity.

The initial visual effect on Fallon Road will be high because of the sites focal point position and the long viewing time for the eastern trip along the road. Following restoration this effect will be low.



Figure 2.8: This residence will be visually exposed to some of the operations

The visual impact will initially be high, however this will reduce to low following restoration.

### Adjoining Residence

There is one rural homestead that is adjacent to the southern boundary of the site. The homestead is surrounded by trees, however views would be available from the north side of the house and back garden into the site and proposed work area (see figure 2.8).

This residence would have a high visual sensitivity to

the Proposal

The visual effect of the operation would be high if seen from any part of the house or any entertaining or recreational part of the garden. This visual effect will be reduced to low following restoration.

The visual impact of The Proposal will be high if seen and will reduce to low following restoration.

### Residences on the Riverina Highway

There are a number of houses adjacent to the southern side of the highway adjacent to the site. These potentially look onto the site. Filtered views will be available from various locations such as Driveways, various parts of the front gardens and perhaps some



Figure 2.9 Some residences on the old highway are exposed to the site, but generally screened to external views by 'oasis' plantings around the homestead

front rooms. However, the development of homestead gardens and the roadside vegetation tends to filter out these views, minimising their potential effect and impact (Figure 2.9).

Other houses, east of the intersection with Old Sydney Road (Bowna Road) are not oriented towards the site. However, there would be potential views from the gardens and approaches. The effectiveness of the road side tree screen was not high in this location, due to a gap in the tree belt. Effectiveness of visual connectivity is due mainly to the visual characteristics at the homestead and gardens.

Views from these houses along the Riverina Highway, is seen, would be highly sensitive, however,

these views are generally limited by gardens and roadside vegetation and in some cases house orientation.

The visual effect of the The Proposal from these locations is low, due to the screening and filtering effect of garden vegetation and roadside trees as well as plantings. Where such vegetation does not occur the visual effect would be high.

The visual impact on these houses is generally low due to lack of visibility. However, it would be high if the operational areas are visible. Impacts following restoration will be low.

The visual sensitivity of these houses would be high to any operation that are seen from the house.

The visual effect of The Proposal would be low due to the tree cover along both sides of Old Sydney Road.

The visual impact of The Proposal would be low on these houses as long as the operations are not seen.

### Residences on Old Sydney Road (Bowna Road)

There are two residences on the eastern side of Old Sydney Road (Bowna Road) that potentially would have views to the Proposal. The houses are oriented towards the Proposal and it is only intervening vegetation along the roadside that provides a screen to the Proposal.

These tree belts occur on both sides of the road and each is a belt of numerous rows of trees, creating an effective filter and screen.

The visual sensitivity of these houses would be high to any operations that are seen from the house.

The visual effect of the Proposal would be low due to the tree cover along both sides of Old Sydney Road.

The visual impact of the Proposal would be low on these houses as long as the operations are not seen.

### **Residences along Elizabeth Mitchell Drive**

A number of houses occur on the eastern side of Elizabeth Mitchell Drive. These houses are relatively new and do not have established gardens. This coupled with lack of tree growth between these properties and the Proposal create a situation of high visibility of the site and the Proposal.

**These houses would be highly exposed and have a high sensitivity to the southern part of the proposal.**

The visual effect of the operations on these houses would be high during operations. Restoration of the site will reduce this visual effect to low.

The initial visual impact of The Proposal would be high. This will be reduced to low following restoration.

### **Visual Mitigation Strategies**

The visual impact of The Proposal will depend to a large extent on mitigation strategies. In the first instance the visual effect of the operation will be due to the colour contrast created by exposure of raw earth. This is the major visual effect and its quick removal following the completion of the fill extraction will greatly reduce the visual effect of The Proposal.

The second basis for high visual effect is a dramatic change in land form. This will occur during the operation as fill is removed from the site. Restoration will need to create new landforms that emulate the existing landforms of gentle slopes and undulating plains.

**The following strategies will limit the visual impact of the Proposal:**

**Prepare a final operational plan and final landform plan according to these guidelines**

- At any one time, minimise the area that is exposed and without grass cover
- Complete the operation in a minimum of four work areas
- Carry out restoration of landform and regrassing as soon as an area has been worked

- Retain the undulating landform
- Ensure that adjoining vegetation is not damaged and
- Consider the need for supplementary planting adjacent to the adjoining homestead on the Riverina Highway.

## 2.6 CONCLUSION

The visual impact of The Proposal is generally not significant. In the short term over the two years of operation there will be some visual impacts. The operations will have a high impact on any residence it is seen from. Generally this is limited to 2-3 houses to the north west of the site and the house adjoining the site. Other houses are screened from view by existing trees within established gardens and roadside planting.

The visual impact on adjoining roads is low to moderate with the minor exception of Fallon Road.

The visual impact following restoration on all areas will be low as the original grass cover and colours will be restored and ground form will emulate existing land forms in the vicinity of the site. The overall visual impact of The Proposal is therefore thought to be of low significance, especially if the visual mitigation strategies can be implemented.

### 3 RESTORATION PLAN

#### 3.1 INTRODUCTION TO RESTORATION PLAN

The following restoration strategy should be implemented within the Red Hill extraction site to maintain the sites visual and environmental qualities and stability. These general strategies should be further developed in contract documentation and should be part of the Environmental Management Plan (EMP) for the site works.

The revegetation/restoration strategy addresses the following issues:

- Restoration Concept
- Soil Erosion and Water Quality Control
- Revegetation Strategies
  - Seed Collection
  - Vegetation Removal
  - Topsoil Management
  - Site Preparation/Ground Reshaping
  - Direct Tree Seeding/Planting details
  - Timing/Staging
  - Maintenance
- Monitoring.

#### Restoration Concept

The restoration concept is to reinstate the original balance between grassland and woodland. Any concepts to extend the woodland would be severely limited by the location of the site on the approach to the runway at Albury Airport. It is also intended that soil erosion be minimised and water quality of the catchment not be compromised.

The site includes rolling hill slopes that support two vegetation communities, agricultural grassland and Mixed Box Woodland. Grassland covers most of the site with remnant stands of woodland occurring around the edges of the site and in two small stands to the north of the site.

It is intended that the new landforms emulate the

existing rounded gentle slopes and that grassland be restored. Native trees and shrubs will be planted only on areas that are considered too steep to be left in a grassland condition for future grazing and any other future land use. This is consistent with existing vegetation conditions and runway approach restrictions. There will also be a planting of fast growing indigenous small trees and shrubs around the homestead adjoining the site to provide environmental protection to this property.

Indigenous species of Mixed Box Woodland would be re-established using direct seeding methods. It is not expected that residual seed in stripped soil will be a significant seed source because of the native vegetation. Supplementary tree planting will be carried out at the edge of the site around the adjacent homestead to provide some measure of visual and dust protection.

Prior to the commencement of fill removal, existing grassland would be cleared. The few trees that are on the area that will be excavated would be felled, mulched and stockpiled for later use. Topsoil would then be stripped to prescribed depths and either stockpiled for later use and respreading onto recontoured areas. Seed should be collected by the Principal from existing native vegetation would surrounding areas. The extent of this seed collection (i.e. species, quantities) should be determined to enable adequate cover to be achieved. Seed collection should commence as soon as possible.

Following the completion of excavation, areas would be recontoured prior to applying topsoil and in some situations mulch. The surface would then be cultivated to incorporate the mulch prior to seeding of native tree species. These activities would be closely coordinated with erosion and sediment control works. Well proven bushland regeneration techniques would be employed and the need for treatments such as smoke treatment of seed to enhance the germination and establishment of native vegetation should be investigated.

#### 3.2 EROSION AND WATER QUALITY CONTROL

The proposal for the quarry has the potential to

create soil erosion as well as adversely affect water quality of the adjoining catchment. During the operation of the quarry all possible efforts should be made to reduce the potential for soil erosion and the resultant increase in loads of suspended sediment in stormwater runoff.

Erosion & sedimentation controls should be based upon the standards set out in *Soil & Water Management for Urban Development* ( Department of Housing) and two EPA publications, *Management of Urban Stormwater Treatment Techniques* (1997) and the draft *Management Plans for Soils and Construction Criteria*.

The sediment and erosion strategies have been designed to minimise potential sediment and erosion. This includes progressive clearing and revegetation of working zones to minimise the area of exposed surfaces as well as use of contour benching on the outer edges of work areas to capture runoff from disturbed areas.

Stormwater should be retained within the extraction work area within constructed sedimentation ponds. Sediment-laden water should be allowed to settle before being discharged, or will be reused for dust suppression.

A preliminary sediment and erosion control strategy has been developed and is presented in Figure 3.1 as part of the Restoration Plan. This plan and the principles and guidelines outlined should be further developed as part of the Erosion and Sediment Control Plan (SECP) which will be an important component of the EMP for the project

### **Structural Protection Strategies**

Before quarrying activity begins the following soil and water quality protection strategies should be implemented.

- Complete detail design of soil erosion and water quality protection elements,
- The outline of the final quarry area should be defined on site by accurate survey,
- Diversion drains should be installed outside these

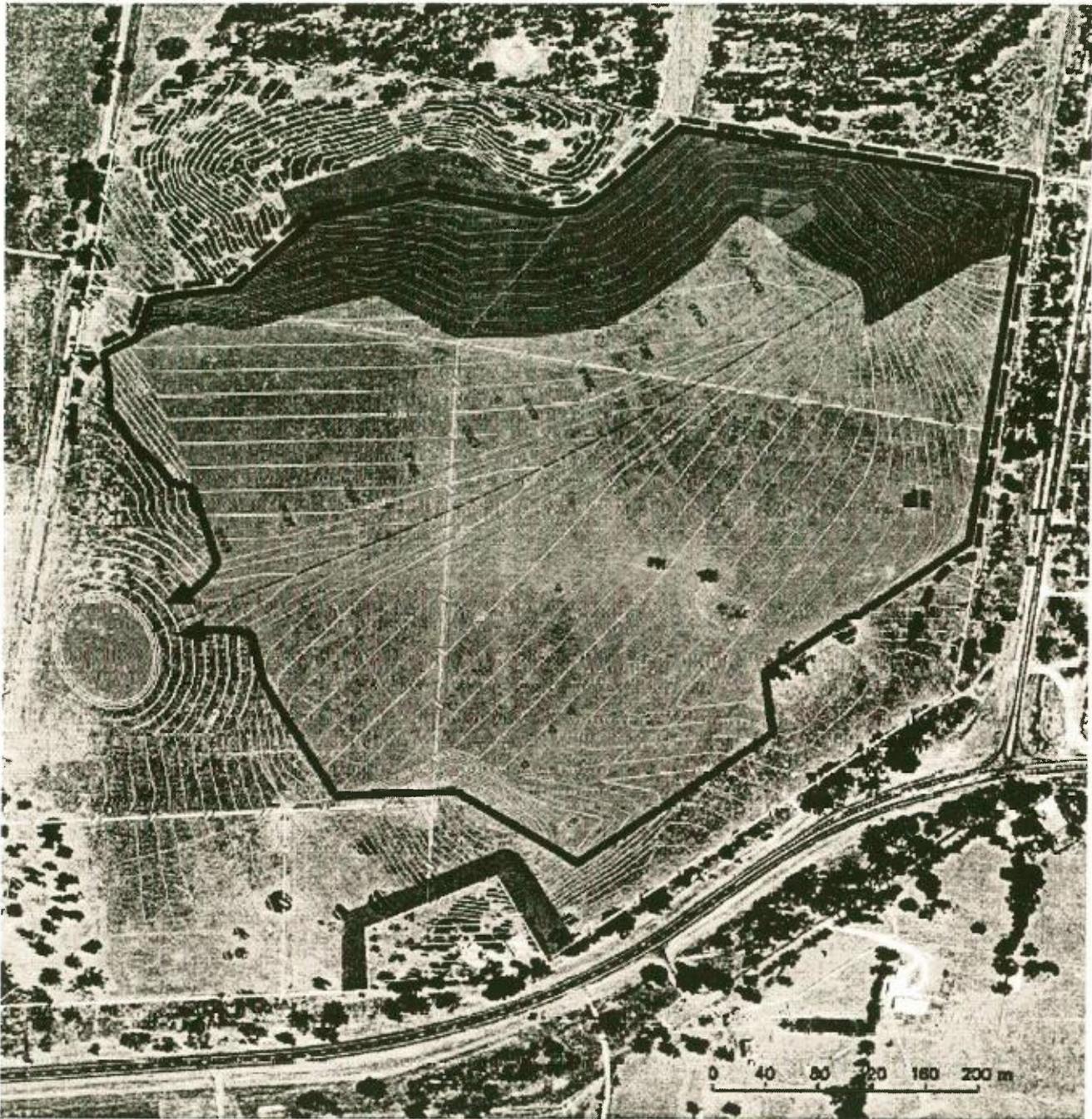
areas to ensure that surface runoff from undisturbed areas are separated from all operational areas.

- A silt fence should be placed around those parts of the site, that water discharge is possible. This fence should be complemented by pick-up drains that direct any runoff to a sediment settling pond,
- The silt fence and the pick-up drains around the total operational area, should be complemented by a similar fence and drain placed around each working area, until restoration of that area has been achieved,
- The sediment settling pond should be located to enable all waters discharged from the operational area to pass through it. This would include excavation areas and top soil and mulch stock piles as well as roadways on the site
- The appropriate capacity of the pond should be as per standards set by the EPA and DWLC
- The EPA and or DWLC should inspect the soil erosion and water quality protection works prior to the commencement of extraction work commencing.

### **Operational Protection Strategies**

A range of operational procedures should be undertaken to minimise erosion and impacts on water quality.

- Minimise the size of areas that are cleared for fill extraction at any one time,
- Other areas should be left in tack, while extraction is completed within work area one,
- Silt trap fencing and a pick up drain should be constructed around area work area one prior to construction,
- The location of these elements should also include the topsoil stock pile,
- Alternatively the stockpile can be surrounded by a hay bale barrier,



**LEGEND**

-  Area to be planted with indigenous trees
-  Area to be seeded with grass
-  Sedimentation basin to engineer's design
-  Area to be seeded with indigenous vegetation
-  Grassland and indigenous vegetation to be protected
-  Pick-up drain
-  Diversion drain

**Figure 3.1**  
**Site Restoration Plan**

- Any stockpile that is likely to be left for longer than 3 weeks should be seeded with a temporary grass cover,
- Sediment detention basins should be cleared of sediment if the volume of the basin is reduced by 40%,
- All drainage and erosion control elements should be regularly inspected on a fortnightly basis or following rainfall events,
- Each work area should be excavated to finished levels prior to work commencing on a new area,
- Each work area is to be rehabilitated according to procedures established in section x.x within 7 days of the operations ceasing and final levels being achieved

### 3.3 REVEGETATION STRATEGIES

Successful revegetation of the site depends on a number of operations being successfully implemented. These are outlined below as well as in Figure 3.1 and should be further developed in the EMP. As much as is possible indigenous seed and vegetation should be restored on the site. However in relation to grassland areas, the reality of restoring and maintaining native grassland areas must be considered in terms of future land use at the time of preparing the EMP.

#### Vegetation Removal

Felled trees would be mulched, stockpiled and respread onto reshaped and topsoiled areas that are to be replanted to woodland as they become available. Areas restored to grassland will not be treated in this way. Stockpile sites will not be large as there is limited indigenous vegetation on the site. Stockpile sites will be located within the perimeter of the site, preferably within areas that are to be disturbed.

Mulched vegetation will have limited seed content because of the nature of the material, however it will assist in organic soil conditioning and the reduction of surface erosion due to the binding effects of the mulch. Applied mulch will be incorporated into the surface by cultivation.

#### Top Soil Management

Topsoil will be stripped down to a level of at least 300mm. This material will be stored in stockpiles not deeper than 3metres. The periods of storage should be minimised to reduce the detrimental effects on any beneficial micro-organisms in the soil. Storage period minimisation would be assisted by the phased extraction and rehabilitation of the extraction area.

Topsoil will be stripped and respread onto reshaped areas. Topsoil will be spread evenly over recontoured areas to a depth of not less than 300mm. Staging of extraction areas will minimise the need for stockpiling and is to be encouraged.

Most topsoil will contain exotic grass seed and should be not be used in woodland replanting areas. For this purpose a soil stockpile should be established that does not include any soil from the top 150mm of natural ground level as this will contain grass seed. This is important as native seedlings will not be able to compete and introduced weed species can readily kill young germinating native plants.

#### Restoration of Indigenous Vegetation

##### A Seed Collection

Native seed collection should be undertaken prior to commencement of works. Where possible seed should be collected from adjacent woodland areas.

Seed will be used for both direct seeding of reshaped areas and for nursery propagation of seedlings as required. Direct seed application will be used to bolster seed contained naturally in respread topsoil. This will greatly assist the re-establishment of both local species and genetic strains. Where suitable species of sufficient quantities are unavailable, alternative local seed supply sources would be used.

##### B Site Preparation for woodland areas

Thorough site preparation should be undertaken to ensure rapid early growth of seedlings. All proposed seeding and tree planting areas should be ripped to a depth of 400 - 500mm. To minimise erosion, ripping will be undertaken on or as close to the contour as possible and the tines should be lifted for approxi-

mately 2 m every 50 m to reduce the potential for channelized erosion. Best results will be obtained by ripping when soil is moist and when undertaken immediately prior to sowing (before surface crusting occurs).

### **C Direct Tree Seeding**

A mixture of native trees, shrubs, and grasses should be sown onto recontoured banks following topdressing and site preparation. The seed mix should be made up of the species that have been identified in the flora assessment of the site and its immediate setting as occurring in the Mixed Box Woodland. These include:

*Acacia dealbata*, *Eucalyptus blakelyi*, *Eucalyptus citriodora*, *Eucalyptus goniocalyx*, *Eucalyptus macrorhyncha*, *Eucalyptus melliodora*, *Eucalyptus microcarpa*, *Eucalyptus sideroxylon*, *Eucalyptus viminalis*, *Bromus hordeaceus*, *Cynodon dactylon*.

Seed should be appropriately pre-treated in order to break dormancy restrictions. In addition to traditional methods of treatment, this could include, relevant seed species being treated with recently developed "smoke" technology in order to achieve earlier germination, more robust seedlings, wider and more uniform germination, increased germination rates and the germination of difficult species. Subject to sufficient follow up rain, high initial tree/shrub densities can be expected. These high densities will quickly assist in stabilizing and screening the site and will result in healthy mature tree stands over time.

Direct seeded tree stands are dynamic systems which change rapidly over time. High initial tree/shrub densities can be expected. Canopy closure will be rapid. This phenomenon will rapidly stabilize bare areas and protect against erosion compared to tree planted areas. Growth rates between 1 and 2 metres per year can be initially expected for some of the more aggressive trees and shrubs. Monitoring of sown tree stands will enable changes in stand dynamics and the adequacy of species diversity and growth rates to be checked to ensure that appropriate transitions occur.

The native tree and shrub seed mix will be sown at a total combined rate of not less than 8 kg per hectare. Seed should be mixed with Granulock 15 fertilizer at 100 kg per hectare. Tree seed and fertiliser will be broadcast evenly onto topdressed areas. All seed will be sown onto the surface and will not be buried. Seeding will preferably be conducted in late spring when optimum soil temperatures result in superior germination.

At the end of the seed collection period the number of species and quantities of each species collected will be reviewed. Any shortfall will be discussed with the Principal and alternative seed supply organised.

### **D Timing / Staging**

Tree seeding will preferably be undertaken in the warmer months when soil temperatures are higher, resulting in superior germination and species diversity. Seeding will be undertaken immediately after ripping and before rain (and surface crusting) occurs. Sowing prior to surface crusting and while a good tilth exists on the soil surface is important in maximising germination and tree establishment. Soil moisture should be maintained during the first year by spray irrigation from a water truck.

### **E Tree Planting**

Tree planting will largely be undertaken where it is desired to increase the dominance of a certain species or where sufficient numbers of a certain species are not present in high enough densities 6 months after sowing. Trees will be grown as tubestock and should be propagated at a local nursery.

A mix planting bed of not less than 5 rows of mixed eucalypt and fast growing acacias should be planted around the house adjacent to the southern boundary of the site.

### **F Maintenance**

Direct seeded trees generally requires minimal maintenance and rely on natural rainfall. Initial high tree densities and rapid canopy closure quickly eliminates many weeds. The only maintenance required will include planting of seedlings where changes in species

composition are required. No pest control will be required.

To ensure the success of the seeding program, spray watering from a water truck should be carried out as needed during the first year of growth. This will be feasible as there is only a small area of tree seeding and planting. Grass areas will not be irrigated.

In a similar way grassed areas should be watered if exceedingly dry periods threaten the viability of the seeded areas.

### **G Monitoring of seeded areas**

Direct seeded stands can initially be very dense with between 5,000 and 10,000 stems per hectare immediately after germination. These high densities will decline as many of the short-lived shrub species decline with time and as the more dominant forest species begin to emerge. Generally, strong Eucalypt emergence above the Acacia canopy after approximately 3 to 4 years can be expected. Minimum initial stem densities of 1,000 stems/ha should be achieved after 12 months.

Monitoring should be aware of these stand dynamics, especially in the first few years after establishment. In addition to monitoring stand density, monitoring should also parameters such as species composition, organic litter, etc.

Monitoring of grass areas should ensure that adequate soil moisture is maintained and that adequate levels of germination and grass growth is achieved.

## **3.4 GRASSING**

Following recontouring of the excavation area, they will be cultivated and grassed.

### **Grass Seeding**

Areas nominated for grassing may be sown with the following species and rates. Fertilizer such as Granulock 15 should be applied at 250kg per hectare.

Grass species could include:

Couch: 10 kg per hectare

Perennial rye: 10 kg per hectare

Japanese Millet / Oats: (depending on season)

20 kg per hectare

### **Timing**

Grass sowing will be undertaken as soon as areas are available. The species mix will be modified according to the season and should be done in consultation with the local DLWC office.

### **Maintenance**

Grassed areas will be spray irrigated to encourage rapid grass cover and stabilization.

Best horticultural practice will generally be applied to maintenance of grassed areas.

**Appendix - K Geotechnical Investigations**

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# **SOUTH WESTERN REGION GEOTECHNICAL SERVICES**

## **Final Report**

**Report No. 19980259**

**Project No. 60654/1**

**SH2 Hume Highway - Albury Bypass  
Potential Materials Borrow Site  
Airport Hill (Red Hill)**



**Prepared by Geotechnical Services Section  
South Western Region  
24 May 1999**

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**SUBJECT: SH2 - Hume Highway  
Albury Bypass  
Airport Hill Borrow Site  
Final Report**

**Project No. 60654/1  
Report/ Registration No. 19980254**

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## **1. INTRODUCTION**

This report covers the information obtained from geotechnical investigations carried out for a potential borrow site located at Airport Hill (also may be locally known as Red Hill), some five kilometres east of Albury, along SH20 (Riverina Highway). The report is also included for addition to and referral by the Environmental Impact Statement prepared for this potential borrow site. The site is a possible source of fill material for the construction of the Albury Bypass. The location of the site is shown as Figure 1 in Appendix A. Photographs of the site and surrounding area are included as Appendix B.

Factual and descriptive information obtained during the investigation is presented along with characteristics and properties of the subsurface materials derived from laboratory testing and field descriptions.

Airport Hill forms a low ridge up to 30m above the flat land to the west and about 10m above the land immediately to the east. It is orientated in a north south direction and runs north from the Riverina Highway. It has been almost completely cleared of trees and is predominantly used for grazing purposes. It is understood that up to 2.2 million cubic metres of fill material could be accessed from this potential borrow site.

## **2. SOURCES OF INFORMATION**

The information presented in this report was obtained from investigations carried out by RTA personnel and consultants between July 1998 and April 1999. The investigations comprised:

- (i) auger drilling:- rotary auger boreholes and logging and laboratory testing of disturbed samples taken from the auger.
- (ii) excavation, logging and sampling of test pits over the proposed site and laboratory testing of a selection of samples obtained from the pits.
- (iii) drilling, logging etc., of cored boreholes at locations over the site.
- (iv) seismic refraction surveys over the deeper sections of proposed excavation.
- (v) seismic tomographic imaging study undertaken between a number of the cored boreholes.

## ***2.1 Auger Drilling***

Rotary Auger drilling with a 90mm diameter auger was carried with a Gemco 210B trailer mounted drilling rig operated by South Western Region Geotechnical Services. The drilling was supervised by a Scientific Officer from South Western Region Geotechnical Services.

The locations of the twenty boreholes numbered AHA1 to AHA20 are plotted on the investigation plan included as Appendix C. The depths of the auger boreholes varied from 7.89m to 15.4m. Auger refusal did not occur in any of the boreholes.

The borelogs are included as Appendix E.

The laboratory test results relating to samples derived from the auger drilling are included as Appendix F.

## ***2.2 Test Pits***

Test Pit numbers (AH1- AH9) were excavated with a hired excavator with a depth capability of approximately 6 metres and a bucket width of 0.6 m. These test pits were excavated during July 1998. In April 1999, Test Pit numbers (AH10- AH15) were excavated with a hired tractor mounted rubber tyred backhoe. Selected samples were taken from the test pits and tested at the RTA laboratories at Deniliquin and Wagga Wagga.

The locations of the test pits are displayed on the investigation plan in Appendix C.

The test pit logs with photos are included as Appendix G.

The laboratory test results from selected samples from the test pits are included as Appendix H.

## ***2.3 Cored Boreholes***

Cored boreholes numbered AHD1, AHD2, AHD2A, AHD3 and AHD4 were drilled in November 1998 with a Pioneer P 400 truck mounted drilling rig by RTA Pavements Branch.

Cored boreholes numbered AHD5 to AHD17 were drilled during April 1999 with the RTA Pavements Branch Pioneer P 400 truck mounted drilling rig.

The locations of the cored boreholes are shown on the Investigation Plan in Appendix C.

The borelogs and core photos for the cored boreholes are contained in Appendix I. Explanatory notes for the drill logs are included as Appendix D.

## **2.4 Seismic Refraction Surveys**

A seismic refraction survey was carried out by personnel from the RTA's Pavements Branch. The locations of seismic lines are plotted on the site investigation plan in Appendix C. The locations of the seismic lines are also shown on Figure 2 in the report included as Attachment 1.

Results from this work are presented in the following report: **Attachment 1.**

**SH2 Hume Highway - Albury Bypass**

**Airport Hill Borrow Site**

**Seismic Refraction Investigation**

**Project No. 001326. Report G3022/1. A. Holmes 20/04/99.**

This report forms Attachment 1 to this final report and the results of the seismic investigation survey are included as interpreted seismic refraction profiles in Figures 3 - 6 of Attachment 1.

## **2.5 Seismic Tomographic Imaging Study**

Seismic Tomographic imaging study was carried out by personnel from Coffey Geosciences Pty. Ltd., assisted by personnel from RTA Pavements Branch. The field work was undertaken in January 1999 and the location of this work is shown on Appendix C, Site Investigation Plan.

Results from this work are presented in the following report: **Attachment 2**

**Seismic Tomographic Imaging Study**

**Albury By-Pass, Airport Hill - Borrow Pit, NSW**

**Report No. GY12019/1-AE, 14 April 1999**

This report forms Attachment 2 to this final report and the results of the seismic investigation survey are included as interpreted seismic refraction profiles in Figures 2 to 4 of Attachment 2.

## **3. PRESENTATION OF RESULTS**

Discussion about the site and materials is included in the main body of text in this Final Report. Also included as appendices and attachments to this report are.

**Appendix A:** Site Location Plan

**Appendix B:** Site Photos of Airport Hill and Haul Route

**ATTACHMENT 2:** Report by Coffey Geosciences Pty Ltd, entitled:  
“Seismic Tomographic Imaging Study  
Albury Bypass, Airport Hill - Borrow Pit, NSW”  
Report No. GY12019/1, 14 April 1999.

The report includes:

- Text including, Introduction, Equipment and Field Procedures, Processing and Interpretation, Discussion of Results and Conclusions and Recommendations.
- Figures 1-4, including Site Plan, Seismic Images and Crosshole Images.
- Appendix A: Seismic Tomography and Seismic Tomographic Images.

## **4. GEOLOGICAL SETTING**

### ***4.1 Introduction***

Information on the geology of Airport Hill, Albury has been obtained from published sources and geological maps, supplemented and modified on the basis of the data acquired during the geotechnical investigations carried out over the site.

### ***4.2 Note on Nomenclature***

It should be noted that the rock names used in describing drill core, auger product and rock intersected by test pits are visual interpretations made without verification by petrographic analysis. The rock names provided by visual interpretation are likely to be inaccurate because of the difficulty of fully identifying rock types in hand specimen when they are commonly moderately to extremely weathered.

A number of petrological terms are used to describe the rocks in the area. The differences in terms reflect the different approaches of the workers describing the materials, the purpose for which the rocks were being described and the actual material being described.

As different names have been legitimately applied to the same rocks by different workers, engineering properties of the rock types present cannot be inferred, or extrapolated through the site, on the basis of rock names alone. If detailed variations in rock type are considered to be of importance, assessment should be made on the basis of detailed examination of the drill core and available exposures.

### **4.3 Geology**

Reference to the 1:50 000 Geological Survey of Victoria for Albury shows the site to be named Red Hill and consist of Quaternary, Recent Colluvium consisting of unconsolidated hillwash scree. This material overlies Quaternary, Pleistocene Epoch, fluvial material consisting of clays, silts sands and gravels. Approximately 1.5 kilometres to the east of Red Hill, the geological map shows an outcrop of Silurian Jindera Granite consisting of Biotite Granite and Granodiorite.

Rock core, as described from the boreholes consisted of granite, generally yellow brown and pale grey and micaceous which is consistent with Jindera Granite or could also be known as the Rocky Hill Granite. The granite is deeply weathered and a large proportion of the subsurface material has weathered to form residual soil. It is possible that some of the surface clays have formed from colluvial deposition, however, the surface soils appear more likely to have been derived from weathering of the underlying granitic mass. The pedogenic soil profile consists of loams, red and yellow podsolics and yellow solodics soils.

## **5.0 USE OF DATA TO INTERPRET SUBSURFACE CONDITIONS**

### **5.1 Introduction**

In granitic environments, weathering patterns can often be extremely variable producing lateral variations in weathering, rock strength and boulder content.

The sources of data and information available to interpret likely subsurface conditions at Airport Hill are:

\* Data collected from within the materials to be excavated - Boreholes, testpits, interpreted seismic refraction profiles, seismic tomographic imaging study.

When assessing likely excavation conditions, the borehole and seismic information available need to be interpreted in combination with any other data or information available and with careful consideration of the limitations of borehole and seismic information summarised in Section 5.2.

### **5.2 Limitations of Borehole and Seismic Information**

Information to assist in the assessment of likely excavation conditions is provided by data from both the boreholes and the seismic refraction and seismic tomographic imaging surveys. However it must be borne in mind that these sources provide quite different types of information.

The bore hole data can provide precise pictures of conditions, but in some cases the information may only be applicable to the immediate vicinity of the borehole.

The drill core is essentially uni-dimensional, and cannot provide a picture of the three-dimensional distribution, spacing etc of the rock mass defects present in the area containing the borehole. The various joints occurring in the core may represent a different number of joint sets. Other sets may not be represented at all. The fracture spacing evident in the drill core, or the logged fracture spacing, is thus unlikely to bear a simple, or consistent relationship to the two or three dimensional "joint spacing" used in some systems of excavation assessment.

The seismic refraction profiles and seismic tomographic imaging profiles are interpretations showing the lateral and vertical distributions of variations in seismic velocity along the test lines. Such profiles are however, simplifications of actual field conditions. The velocities given are interpreted, averaged velocities and are not precise at any given point.

To make the best use of the seismic refraction and seismic tomographic profiles it is necessary that they be viewed in terms of a model consistent with both the actual ground conditions, and the simplifying assumptions made during interpretation of the field data. The model employed must make allowances for :

- (i) the likelihood of appreciable variations in weathering, degree of jointing and possibly material type, occurring along the test lines,
- (ii) the fact that the seismic refraction technique relies on the assumption that a number of discrete layers, each with a velocity higher than the above, occurs. A zone of low velocity beneath one of higher velocity usually cannot be detected.
- (iii) the number of boreholes used in the seismic tomographic study was limited and the information centred around the boreholes utilised.

(In regard to the assumptions made during the interpretations of field data, and other matters relating to information from the seismic refraction surveys, attention is drawn to the paper entitled "The Use of Interpreted Seismic Sections", a copy of which occurs as Appendix 1 to A. Holmes Report included as Attachment 1 to this Report.)

Interpretation of the seismic refraction work was limited due to the following reason. As reported in Attachment 1, **a seismic inversion layer was detected over the site**. A seismic inversion occurs when a higher seismic velocity layer is present over a lower seismic velocity layer and consequently the velocity of the underlying material cannot be measured unless other methods of investigation are carried out. That is why a tomographic imaging study was carried out.

It should specifically be noted that the reported velocities are averages representing the bulk properties of the interpreted layers, and that it is possible for averaging to conceal major local variations in velocity of up to at least two or three times the geophone spacing in width.

Thus, because of averaging effects, zones which have been measured as having quite low velocity may contain areas of much higher velocity which, along the test line, may be 10-15 m wide. These latter areas could contain materials requiring blasting, even though the low averaged velocities suggest easy excavation conditions.

It should also be noted that because of the averaging effects, and other factors, the boundaries shown on the seismic profiles may not correspond directly to specific changes in the rock mass. Some of the deeper layer boundaries, in particular, may be gradational in nature and not abrupt as shown on the sections.

It should further be noted that the computed layer thicknesses are only accurate to within some 30%. Thus layers shown on the seismic sections as occurring at a particular level may in fact occur at a higher or lower level during excavation.

Due to the considerable variations in weathering, jointing etc often exhibited by granitic rocks, and illustrated by the weathering in the recovered drill core, considerable skill and judgement will be required when using the data from the boreholes and seismic profiles in assessment of excavation conditions. Expert geotechnical advice in the interpretation of the available information may be required to determine excavation conditions.

*Table 1. Summary of Laboratory Testing from the Auger Borehole Samples*

Borehole No	Depth	Soaked CBR%	Liquid Limit %	Plasticity Index	MDD (Std Compaction) & OMC
AHA 1	11m-11.5m	30	23	6	2.06@9.1
AHA2	7.6m-9.5m		25.5	7	
AHA2	10.4m-12.0m		25.5	7.5	
AHA4	4.6m-14.0m		26	7	
AHA5	10.4m-11.6m	20	27.5	7.5	2.03@10.4
AHA7	11.0m-13.0m		36	8.5	
AHA8	3.0m-6.0m		28.5	7	
AHA8	6.0m-13.0m		31.5	10.5	
AHA9	4.4m-10.0m	30	23	6	1.72@19.1
AHA10	2.6m-9.8m		37	15	
AHA10	9.8m-13.2m	6	35	13.5	1.88@12.2
AHA11	4.6m-15m		33.5	9	
AHA12	1.4m-4.4m		30	11.5	
AHA12	6.0m-9.7m		33.5	11.5	
AHA13	3.2m-5.5m		37	14	
AHA13	11.6m-15.0m		31.5	12	
AHA14	1.0m-4.5m		32.5	10.5	
AHA14	4.5m-11.5m		38.5	12	
AHA16	3.7m-9.7m		46	30	
AHA17	0.7m-5.1m	2.5	58	38.5	1.68@21.5
AHA18	7.9m-9.8m		29	10	
AHA18	9.8m-13.4m		43	24.5	
AHA19	4.6m-13.4m	3.5	29	9	1.97@10.0
AHA20	1.6m-4.6m		47	29.5	
AHA20	4.6m-11.6m		35.5	19.5	

## 6.2 Test Pits:

Nine test pits, (AH1 - AH9) were excavated with a large excavator to depths ranging from 1.6m to 5.2m during July 1998. A further six test pits (AH10 - AH15) were excavated with a rubber tyred backhoe in April 1999, to depths of 1.0m to 2.5m.

In general, the test pits encountered a variable thickness of topsoil, described in the logs as dark brown, grey, grey brown or pale brown sandy silt, clayey silt or silty clay with some organic matter and/or fibrous roots.

As with the auger boreholes, it is noted that where laboratory test results indicate a soil classification different to what has been logged in the field, the classifications have been changed to fit the laboratory results. Generally, the laboratory classifications may have changed the field classifications slightly eg. from sandy clay (CL) to clayey sand (SC) or low to medium plasticity silty clay (CL-CI) to high plasticity silty clay (CH) or vice versa.

Topsoil consisting of silty clay and clayey silt type material ranged in thickness from 0.1m to 0.35m. An average of about 0.15m thickness of topsoil was located on the main north south trending ridge. To the west and east of the main ridge, topsoil thicknesses ranged from 0.18m to 0.35m and averaged about 0.28m in thickness.

Underlying the topsoil layers, excavation revealed variable materials consisting of low plasticity sandy clay, sand with clay, low and medium plasticity clayey sand, high plasticity clay, gravelly sands, low, medium and high plasticity silty clays. All of these

materials are generally considered to be residual soils derived from the weathering of the granite. However, on the lower flanks there maybe deposits of alluvial / colluvial material derived from the weathered granite mass. This was not observed in the test pits.

Some of the test pits also encountered a harder claystone type layer at depths of 1.8m and 0.75m (Test Pit AH6 and AH7). This material essentially consisted of a leached/cemented type material which is clay like in appearance but is quite hard and caused excavator refusal at depths of 2.0m and 1.6m respectively. Refusal occurred due to a lack of defects that the excavator teeth could dig into. This layer is probably the layer which has caused the seismic refraction inversion that is discussed in detail in Attachment 1.

Excavator or backhoe refusal only occurred in Test Pits AH6 and AH7.

**Table 2. Summary of Laboratory Testing from Test Pit Samples**

Test Pit No.	Depth	Soaked CBR%	Liquid Limit %	Plasticity Index	MDD (Std Compaction) & OMC
AH1B	0.15m-0.6m	25	14	0.5	2.01@9.7
AH1C	0.6m-1.2m	1	37.5	24.5	1.79@15.3
AH1D	1.2m-3.2m	3.5	29	14.4	1.73@18.4
AH1E	3.2m-4.2m	20	32.5	15.5	1.75@17.2
AH2B	0.15m-0.45m	10	40	23	1.75@18.0
AH2C	0.45m-0.7m	8	50.5	30	1.71@19.6
AH2D	1.0m-2.0m	4.5	52	34.5	1.73@17.9
AH2E	2.0m-5.2m	13	38.5	14.5	1.79@16.0
AH3C	0.3m-0.55m	6	50	34	1.78@15.3
AH3E	1.2m-2.0m	6	41	19	1.85@12.9
AH3F	2.0m-5.2m	3	45	20	1.73@16.1
AH4B	0.15m-0.45m	12	43.5	28	1.78@16.5
AH4D	1.8m-3.0m	3	52.5	35.5	1.76@17.0
AH4F	3.0m-5.4m	9	32	10.5	1.77@15.5
AH5D	0.9m-1.75m	20	33	15	1.89@13.0
AH5E	1.75m-2.2m	15	29	11	1.99@10.5
AH6D	1.0m-1.2m	17	39.5	26	1.94@12.6
AH6E	1.2m-1.8m	1	56.5	40.5	1.71@18.1
AH6F	1.8m-2.0m	16	39.5	19.5	1.59@17.98
AH8F	1.5m-4.8m	7	32.5	13	1.96@11.5
AH8G	4.8m-5.1m	15	34.5	13.5	1.83@13.3
AH10A	0-0.2m		31	17.5	
AH10B	0.2m-0.5m		38.5	23.5	
AH10C	0.5m-1.0m		19	4	
AH10D	1.0m-1.3m	8	51	36.5	1.67@19.9
AH10E	1.3m-2.5m	5	48	27	1.66@19.9
AH11C	1.5m-2.1m		31	17	
AH12B	0.3m-0.8m		42	26	
AH12C	0.8m-2.2m		33	11	
AH12D	2.2m-2.5m	14	33.5	12	1.87@13.9
AH13A	0-0.3m		18.5	2	
AH13B	0.3m-0.9m		36.5	21.5	
AH13C	0.9m-1.5m		37	18.5	
AH14A	0-0.35m	17	26	9	1.90@11.4
AH14B	0.35m-1.0m		37.5	22	1.82@14.7
AH14C	1.0m-1.35m	9	37	23	1.84@14.0

### **6.3 Diamond Cored Boreholes**

A total of fourteen diamond cored boreholes were drilled over the site to depths ranging from 8m to 37.95m. They all encountered granite or residual soils derived from the weathering of granite. The granite encountered was logged as generally extremely to highly, highly to moderately and moderately weathered with only minor areas of slightly weathered granite.

A hydrophone string was used for the seismic tomography and therefore water filled boreholes were required. Boreholes AHD2 and AHD3 did not hold water. Therefore new boreholes, offset by 1-2m, were rock rolled down to the depth of the original boreholes and used in the seismic tomography investigation. They were renamed AHD2B and AHD3B. Borehole AHD2A was deepened, cased with PVC and grouted and renamed AHD2C.

Boreholes AHD1, AHD2, AHD2A, AHD3 and AHD4 were drilled along the main north south ridge of Airport Hill. These holes were drilled deeper than the others as they are located in the area of greatest potential excavation depth. Their depth varied from 27m to 37.95m below the existing natural surface. Underlying surface clayey silts and silty clays and clays, these bores all encountered weathered granite from depths of 1.1m to 1.65m to the base of the bores.

**AHD1** encountered medium strength granite from a depth of 1.65m to 3.74m, overlying very low to extremely low strength granite to a depth of 32m. A medium strength band or corestone, 0.40m thick strength was encountered at a depth of 22.3m. Below about 32m, the strength of the granite increases to low strength and at about 35m to medium strength to the termination depth of 37.95m.

**AHD2** encountered very low strength granite from 1.6m to 2.1m, overlying extremely low strength granite to 9.6m and granite varying from extremely low to low strength. Below 24.3m the granite is of medium strength to the termination depth of 27m.

**AHD2A** was located close to AHD2 and encountered similar subsurface conditions. AHD2A intersected extremely low and very low to low strength granite down to 11.46m, then low to medium strength granite to about 16m, mostly low strength granite to about 27m overlying medium strength granite to the termination depth of 30m.

**AHD3** encountered very low and extremely low strength granite to a depth of 24.85m then predominantly low strength granite was encountered to 27.2m, medium strength granite to 28.5m and high strength granite to the termination depth of 29.86m where very high strength granite was encountered.

**AHD4** encountered extremely low and very low strength granite to a depth of 26.2m, except for a band of low strength granite from 8.0m to 8.22m and 17.5m to 17.9m. Below 26.2m, low strength granite was encountered to about 29m and low to medium strength granite to the termination depth of 29.56m

Note that bores **AHD7, AHD8, AHD11 and AHD12 were not drilled**. Bores AHD5, AHD6, AHD9, AHD10, AHD13, AHD14, AHD15, AHD16 and AHD17 were drilled to depths ranging from 8m to 14.35m.

**AHD5 and AHD6** encountered residual clays, clayey sandy silts, sandy silts and silty clays to their termination depths of 13m and 10m respectively.

**AHD9** encountered 2.73m of residual silty sandy clays and clayey silty sands over extremely weathered to residual soil type granite of extremely low strength to the termination depth of 10.0m.

**AHD10** did not encounter granite but did encounter residual silty clays clayey sandy silts, sandy gravelly clayey silts to the termination depth of 8.0m.

**AHD13** encountered 1.04m of residual clay overlying very low strength granite to 3.3m, then low strength granite to 4.3m very low strength granite to a depth of 6.4m and low and very low strength granite to the termination depth of 10m.

**AHD14** encountered residual silty clay, silty sandy clay, silty sand and sandy silts to a depth of 13.34m overlying extremely weathered granite with soil like properties to the termination depth of 14.35m.

**AHD15** encountered residual silty clay to 1.55m overlying extremely low to very low strength granite to the termination depth of 10m.

**AHD16 and AHD17** both encountered residual silty clay, clayey sandy silt, silty sandy clay and sandy silt to the termination depth of 10m.

## **6.4 Seismic Refraction Survey**

A summary of the seismic refraction survey results is included here, however it is essential that the **report by A. Holmes (Attachment 1)** is read to gain the complete information and to understand how the seismic profiles were derived. A number of assumptions were made due to the presence of a seismic inversion layer occurring at depths of around 1-3m. Note that where seismic tomographic images (**Attachment 2**) have been produced at specific locations, they should be given precedence in interpretation over the interpreted seismic refraction sections shown on Figures 3 to 6 in Attachment 1 to this report.

All seismic lines had geophone and shot spacings of 5m and 10m respectively. Line No. 1 was 550m long and was orientated approximately north south along the top of the ridgeline. Line No. 2 was 275 metres long and was positioned at right angles to and crossing Line No. 1 in approximately the centre. Similarly, Line 3, 335m long, crossed Line 1 approximately at right angles in the northern part of Line 1 and Line 4 also 335m long, crossed on the southern part of Line 1.

The results of the seismic refraction traverses are presented as Interpreted Seismic Sections in the report included as Attachment 1. These have been produced after:

- normal interpretation procedures using program REFRACT
- consideration of seismic data characteristics and borehole results
- recognition of the presence in some areas of a shallow thin seismic velocity inversion layer
- seismic tomographic imaging in boreholes
- assumptions about the seismic profile beneath the seismic inversion layer
- raytrace modelling and refinement to a final interpreted seismic section

This is set out in detail in Attachment 1. In particular it has been assumed that the seismic velocity beneath the shallow inversion is 740 m/s and that this layer extends to considerable depth and is then underlain directly by a high velocity basal layer (4600-4900 m/s). There is evidence from boreholes and seismic tomographic images that there is an intermediate to high velocity layer (up to 2800m/s) at depth between the low velocity (740 m/s) and high velocity (4600-4900 m/s) layers, at least

Bore /Test Pit No.	Depth (m)	Material Description	Soaked CBR%	LL %	PI %	MDD & OMC (Std)	Potential Use Indication only
AH11C	1.5-2.1	Gravelly Sand		31	17		Common?
AH12B	0.3-0.8	Clayey Sand		42	26		Common?
AH12C	0.8-2.2	Clayey Sand		33	11		UZF?
AH12D	2.2-2.5	Clayey Sand	14	33.5	12	1.87 @ 13.9	UZF?
AH13A	0-0.3	Silty Sand		18.5	2		Topsoil
AH13B	0.3-0.9	Sandy Clay		36.5	21.5		Common?
AH13C	0.9-1.5	Clayey Sand		37	18.5		Common?
AH14A	0-0.35	Sandy Clay	17	26	9	1.90 @ 11.4	Topsoil
AH14B	0.35-1.0	Sandy Clay		37.5	22	1.82 @ 14.7	Common/UZF?
AH14C	1.0-1.35	Sandy Clay	9	37	23	1.84 @ 14.0	Common/UZF?
AHA10D	2.5-9.8	Clayey Sand		37	15		UZF/Common?
AHA10E	9.8-13.2	Clayey Sand	6	35.5	13.5	1.88 @ 12.2	UZF?
AHA11E	4.6-13.2	Silty Sand with clay		33.5	9		UZF/Select ?
AHA12C	1.4-4.4	Clayey Sand with fine gravel		30	11.5		UZF/Select ?
AHA12E	4.4-9.7	Clayey Sand		33.5	11.5		UZF/Select ?
AHA13E	3.2-5.5	Clayey Sand		37	14		UZF/Select ?
AHA13G	11.4-13.4	Clayey Sand		31.5	12		UZF/Select ?
AHA14C	1.0-4.5	Clayey Sand		32.5	10.5		UZF/Select ?
AHA14D	4.5-11.6	Silty Sand with clay		38.5	12		UZF/Select ?
AHA16DEF	3.7-9.7	Silty Clay with sand		46	30		Common?
AHA17B	0.7-5.1	Clayey Gravel	2.5	58	38.5	1.68 @ 21.5	Common?
AHA18F	7.9-9.8	Clayey Sand		29	19		Common?
AHA18G	9.8-13.4	Clayey Gravel		43	24.5		Common?
AHA19E	4.6-13.4	Clayey Sand	3.5	29	9	1.97 @ 10.0	Common?
AHA1F	5.2-8.9	Clayey Sand		28	10.5		UZF/Select ?
AHA1I	11-11.5	Silty Sand/Clayey Sand with gravel	30	23	6	2.06 @ 9.1	Select?
AHA20D	1.6-4.6	Clayey Sand		47	29.5		Common?
AHA20E	4.6-8.7	Sandy Clay		35.5	19.5		Common?
AHA2I	7.5-9.5	Silty Sand/Clayey Sand trace gravel		25.5	7		UZF/Select ?
AHA2K	10.4-12	Sandy Clay		25.5	7.5		UZF/Select ?
AHA4E	4.65-12.5	Silty Clay		26	7		UZF/Select ?
AHA5G	10.4-11.6	Silty Sand/Clayey Sand	20	27.5	7.5	2.03 @ 10.4	Select?
AHA7F	5.4-10	Clayey Sandy Silt		36	8.5		UZF/Select ?
AHA8E	3.6-6.0	Silty Sand/Clayey Sand		28.5	7		UZF/Select ?
AHA8F	6.0-11.5	Clayey Sand		31.5	10.5		UZF/Select ?
AHA9E	4.56-10	Silty Clay	5	43	26	1.72 @ 19.1	Common?

It is important to note the large variation in CBR and Plasticity Index results across the site. This is indicative of the insitu weathering of granite. It is very difficult from these results to predict with any certainty the percentage of material uses that may be won from this site. No areas or zones of better quality material has been identified, however where material has been logged as weathered granite as along the north south ridge, material with a lower plasticity index and higher CBR maybe more prevalent.

Changes in material properties over very short distances can be expected. Constant testing of excavated materials will be required to ensure that materials management of potential select and upper zone of formation materials is properly controlled to reserve material of suitable quality for various uses.

**Emerson Dispersion** tests were carried out on samples selected from the cored boreholes. These results are contained in Appendix K.

The results indicate the material from Airport Hill are not overly dispersive with the majority of the material having an Emerson Class No. of 5-6. Some materials recorded an Emerson Class of No.3, which indicates they are moderately dispersive. However, the majority of the materials from this site will be highly erodible due to their high sand content and therefore batter design and protection measures will be essential to avoid erosion and deposition of sediments along the drain and water catchment area.

### **6.8 Soil Contamination Testing**

Seven samples of topsoil were taken from the site and tested for pesticide contamination and two were taken for heavy metal in soil analysis. Results are contained in Appendix J.

In summary, pesticides were all below the reporting level of 0.05 mg/kg. No petroleum hydrocarbons were detected in any of the samples analysed. Heavy metal results are well below the typical investigation levels as defined in ANZECC, Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council, "Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites".

## **7.0 GEOTECHNICAL MODEL**

The proposed Airport Hill borrow site is located east of Albury Airport. It is understood that the current concept / EIS design allows for up to 2.2 million cubic metres to be excavated down to about RL 165m. The site has been investigated by:

- auger boreholes to depths in the range 7.9 to 15.4m
- test pits to depths in the range 1.0 to 5.4m
- laboratory testing of samples from test pits and auger drilling
- cored boreholes, 5 to depths in the range 27.00 to 37.95m and 5 to depths in the range 8.00 to 14.35m
- lines of surface seismic refraction totalling 1500m (Attachment 1 report)

weathered to soil for depths in excess of 10m with no thin shallow elevated strength zone - however iron oxide nodules are recorded in shallow soils. The seismic refraction investigation indicates that the thin seismic velocity inversion layer also occurs at some locations away from the main north-south ridge.

In summary, there is strong evidence for a thin shallow elevated strength layer in the northern and central parts of the main north - south ridge area and some evidence for its presence at some locations elsewhere in the site. It is likely that it is discontinuous or absent in some areas.

In the main north - south ridge area the cored borehole logs indicate generally extremely to very low strength granite (beneath the thin near surface layer of elevated strength) extending to depths in the range about 23-32m, although it only extends to 11.46m in borehole AHD 2A. Below this zone the borehole logs indicate steadily increasing rock strengths up to medium strength down to the ends of boreholes at depths of 27.00 to 37.95m. Exceptions are AHD 3, where borderline high / very high strengths are indicated from about 28.5m to end of coring at 29.86m, and AHD 2A where low or borderline low / medium strengths are indicated at about 11.5-26.9m. With the exception of borehole AHD 1 at 1.65-3.74m, medium strength granite in these boreholes occurs at or below RL 160m, which is below the deepest proposed excavation levels in the borrow pit area.

Away from the north - south ridge area cored boreholes are shallower (depths 8.00-14.35m) and indicate mostly soil derived from weathering of granite. Auger boreholes are generally consistent with this trend. However, because of the sample breakup and mixing effects of augering, descriptions of material are less reliable when distinguishing between weathered rock and soil. Only soils are indicated in most test pits away from the main north - south ridge area except AH8 and AH3 in which extremely to highly weathered granite is described.

It is important to note that the information on the increasing rock strengths with depth in the deeper parts of the subsurface profile comes almost entirely from only 5 cored boreholes spread along the main north - south ridge of the site, and from associated seismic tomographic images. Other cored boreholes, the auger boreholes and test pits were too shallow to reach this zone. Also this zone was generally not indicated by surface seismic refraction due to the effects of the shallow thin seismic velocity inversion layer and the possibility that the deep zone of increasing rock strength may be a seismic hidden or blind zone. The Seismic Refraction Report (Attachment 1) discusses the uncertainties in the interpreted seismic sections in detail. Thus the most reliable information on the deeper parts of the subsurface comes from the 5 cored borehole sites of the main north - south ridge area and from the associated seismic tomographic images (Attachment 2) which apply to sections immediately surrounding the relevant borehole sites.

The interpreted seismic sections presented in Attachment 1 are generally consistent with the cored borehole information and with the seismic tomographic images presented in Attachment 2, except for the very high velocity basal layer (4,600-4,900 m/s) at depth which is shown in the interpreted seismic sections of Attachment 1. The boreholes have not extended to sufficient depth to test this however the generally low to medium strength rock in the lower parts of the cored boreholes is consistent with the intermediate to high seismic velocities (up to 2800m/s) indicated in the lower parts of the seismic tomographic images. As discussed in the seismic refraction report of Attachment 1 the high velocity layer may in fact occur at greater depth, beneath an intermediate to high velocity hidden or blind zone. At this site the basal layer seismic velocities of 4,600-4,900m/s would be expected to occur in generally high to extremely high strength granite with widely spaced fractures. Such

rock strengths were encountered in only one borehole, AHD 3, in the bottom 1.4m with vertical natural fracture spacing of 0.3-1.0m.

It is also noted that the seismic tomographic images (STI) presented in the Coffey Geosciences report (Attachment 2) indicate some lateral variability in the vicinities of boreholes which may represent variability in material properties. In particular the east-west (surface to borehole) STI through borehole AHD2B and the crosshole STI between boreholes AHD 2C (same as AHD 2A) and AHD 2B indicate intermediate to high seismic velocities up to at least 2800m/s at depths below about 8m. These may represent uniform zones of elevated strength or zones of variable strength which may have high boulder contents, with strengths of boulders possibly up to extremely high. It is important to note that such zones could occur elsewhere in the subsurface profile at any depth and that most of the subsurface profile of the site has not been investigated sufficiently to allow a reasonable estimation of the likely amount of elevated strength or bouldery zones to be encountered during excavation.

Seismic velocities in the range 1100-1200m/s are indicated for layer 3 in the western part of Seismic Line 4. This is consistent with the STI for boreholes AHD 2B and AHD 2A and also the occurrence of low strength granite in borehole AHD 2A below about 11.5m depth. However such a velocity range could also indicate scattered to concentrated boulders of high to extremely high strength rock in a generally extremely low to very low strength matrix. It is noted this zone was able to be detected by surface refraction due to the absence of the thin shallow seismic inversion layer at this location. Similar zones could exist elsewhere at seismic line locations but be not detected due to the masking effects of the shallow seismic inversion layer or to the zone being hidden or blind - ie too deep and relatively thin to be detected.

In this connection it is also important to note that, although boreholes did not intersect high to extremely high strength granite within the generally thick extremely low to very low strength granite profile, only a very small fraction of the volume of this zone has been sampled. Boulders and boulder concentrations could occur in the subsurface and it is very difficult to impossible to predict their occurrence or concentration.

It is also noted that some boulders, which appear to be of included blocks of volcanic or sedimentary rock, occur on the surface in the southern part of the north - south ridge area.

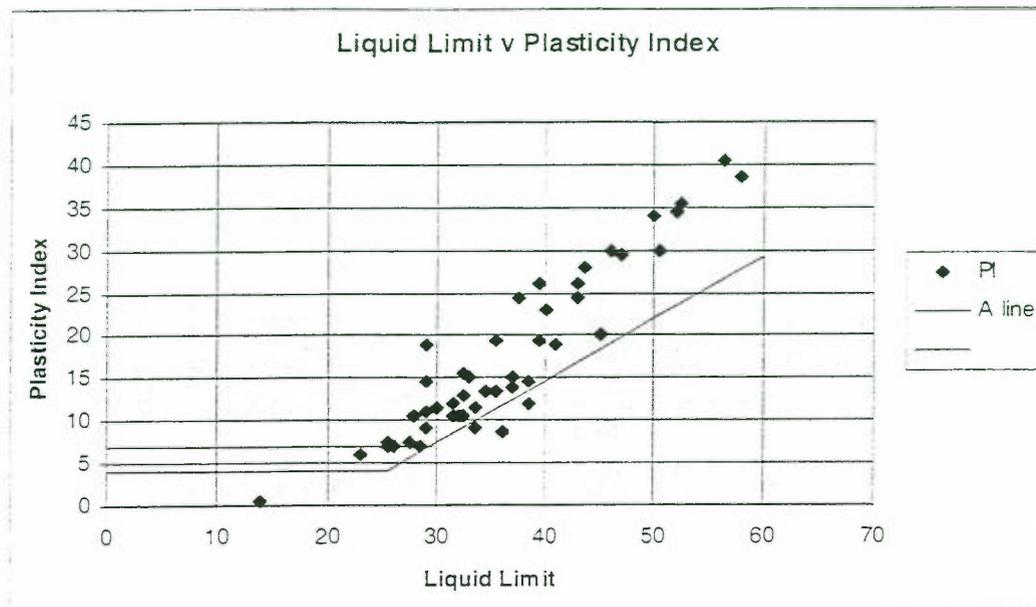
In relation to the seismic reports of Attachments 1 and 2 it is noted that these reports were completed before additional core drilling (AHDs 5 to 17) and pitting (AHs 11 to 20) was carried out. Nevertheless the results of this drilling are considered not to affect the applicability of the results and conclusions of the seismic reports.

Laboratory testing has been carried out on disturbed samples from auger drilling and test pitting. It is noted that laboratory test results from test pits AH10-AH14 are not included in the following graphs, nor in the following related discussion, as test results were not available at the time of compiling the graphs. The samples not included number fifteen and range in depth from the surface to a depth of 2.5m. These materials show a wide variation in Plasticity Index ranging from 2 to 36.5 and soaked CBR's from 5% to 17% and would, if plotted, confirm the scatter of results for the near surface materials. The following discussion would not be substantively altered by the additional test results.

The locations of sample (and investigation) sites is weighted to the main north - south ridge area of the proposed borrow site. The depths of samples are weighted towards shallow depths by the number of test pits (range 1.0-5.4m) and the limited depth of auger boreholes (7.9-15.4m). Of 47 samples 23 are shallower than 4m, 34

are shallower than 8m and only 1 is deeper than 12m - average sample depths are calculated at halfway between the top and bottom of the sample depth interval. Graphs of laboratory test results are shown and discussed below.

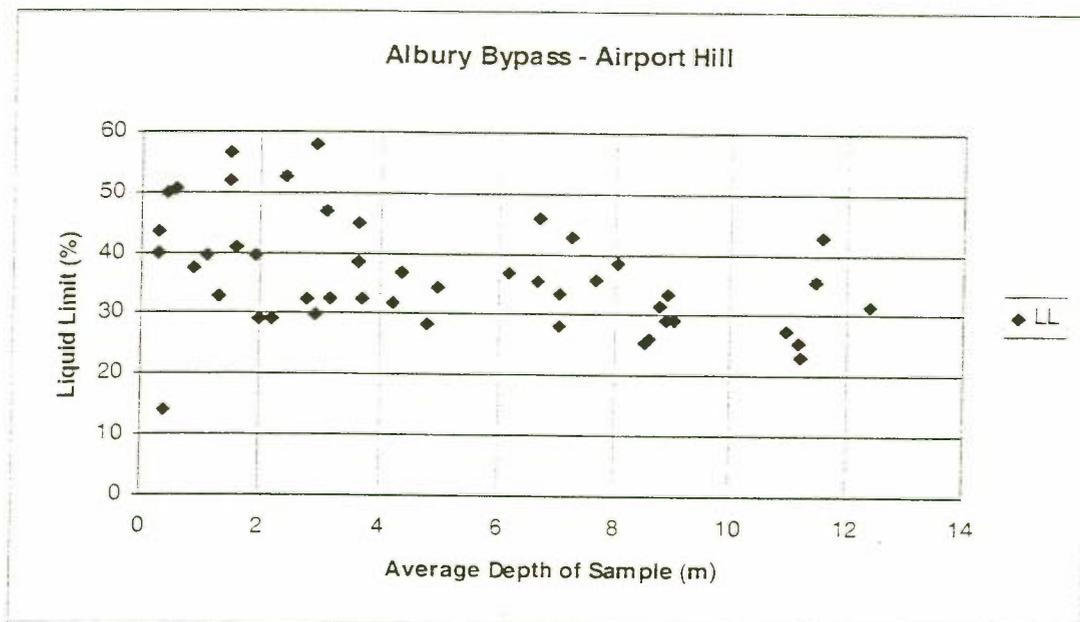
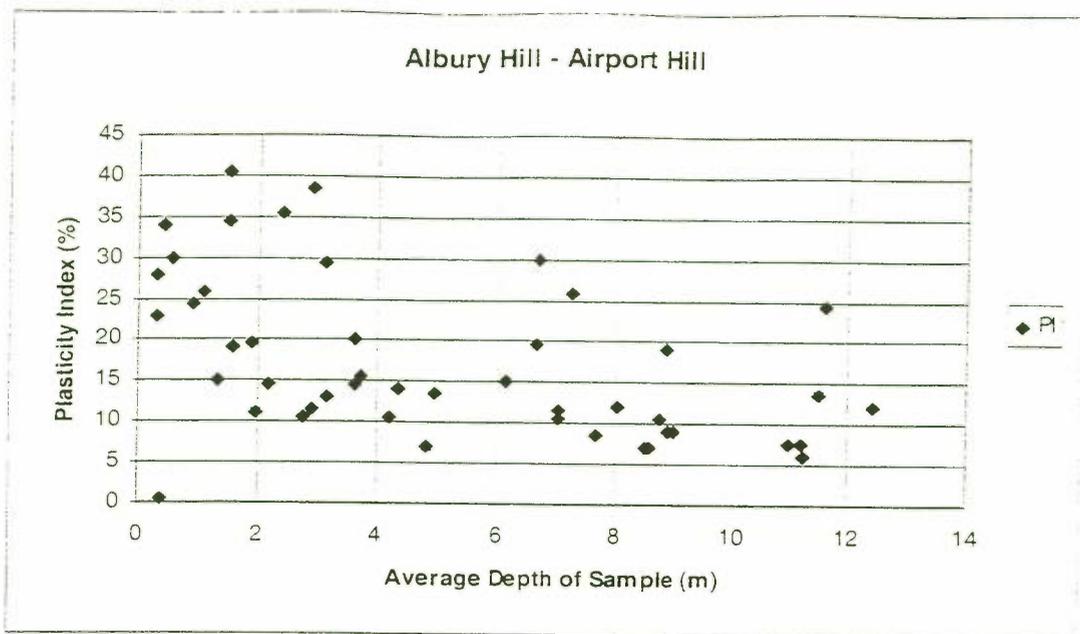
Sample descriptions, based on gradings and plasticities range between clays and sands, with varying proportions of silt and gravel and also some clayey gravel and gravel / sand mixtures.

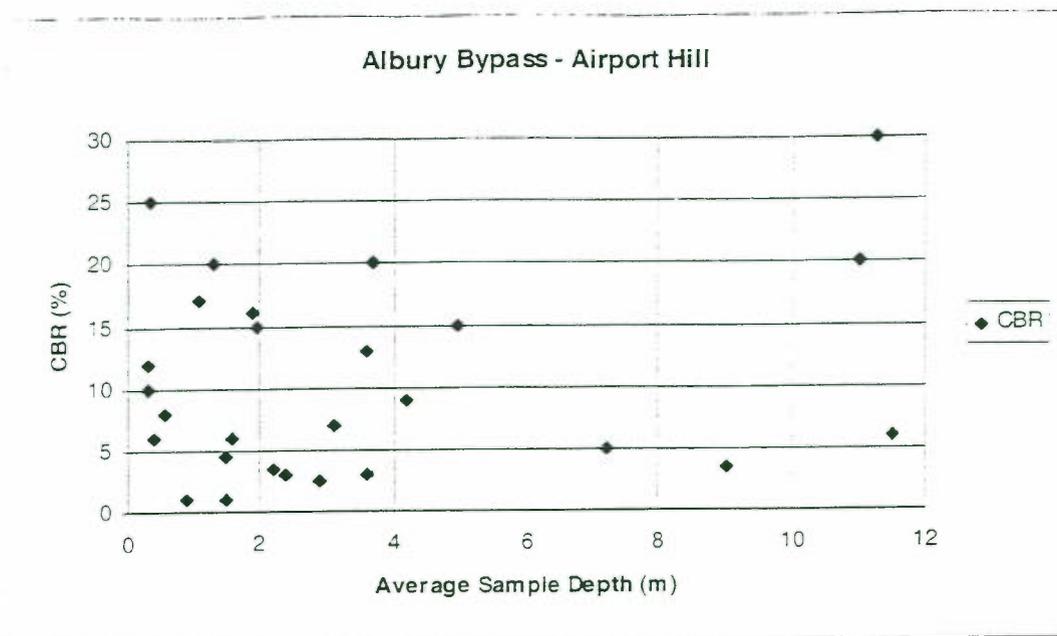


For liquid limit (LL) versus plasticity index (PI) most results plot above the A line with the fine fraction (-425 micron) having classifications mostly in the CI range (LL 30-50%) with some CL-ML, ML and CH. The overall pattern of plots of CBR versus PI and LL are similar to each other with a shift of about +20% for LL values from PI values. These plots show a wider distribution of LL and PI values for lower CBRs and a narrow range of low PI and LL values for high CBRs. Thus the data indicates that for the granitic materials tested low PI and LL values are a pre-requisite for high CBR values but do not necessarily imply high CBR values.

Trends of LL and PI versus average depth are again similar to each other with a general narrowing of the range of LL and PI values, and also a trend to a slight reduction in LL and PI values, with increasing depth. This is consistent with a general overall reduction of weathering (and thus clay content) with depth and with the general occurrence of differentiated clay rich and clay poor layers in the near surface pedogenic soil zone.

The plot of CBR versus average depth shows a general trend to a reducing range of CBR values with depth and also declining maximum CBR values with depth down to about 9m. Between 10 and 12m average depth are three samples with widely scattered CBR values (from 6 to 30%). As there is more limited sampling for CBR testing it is uncertain if much meaning can be attached to these trends, and whether these represent real trends in the subsurface or are a result of random variations within a limited sample population. Nevertheless 20 CBRs values for average depths down to about 4m are the range 1-25% (mostly 1-20%). From 4-12m average depth there are only 7 test results and these are in the range CBR 4-30%.





Overall no definite sources of better quality material, that could be separately worked, have been identified. However the occurrence of generally extremely low to very low strength granite in the main north - south ridge area, combined with generally reasonable CBR values at depth particularly in the southern parts, indicate that this area is the most likely possible source of better quality fill materials, which could be utilised for the upper zone of formation and / or select material zone. It is noted that this area is also where excavation depths would be greatest, increasing the chances of finding lower PI and higher CBR material. It is also noted that away from the main north - south ridge area the investigation indicates that the granite is generally deeply weathered to soil.

## 8.0 HAUL ROUTE APPRAISAL

The proposed haul route runs west from Airport Hill and along Fallon Street. Halfway between Terry Circuit and Dallinger Road it turns north and north east towards Corrys Road. The proposed haul route crosses Corrys Road near Dallinger Road and then meets the proposed Bypass where material could be transported north and south as desired.

As a preliminary assessment of the haul route, four hand auger boreholes were drilled and a visual assessment made of material types, strengths and moisture contents.

The assessment is that low CBR silty clays and clayey silts up to 0.22m in depth are present that may require some stripping, especially if work is carried out in the wetter periods of the year. A CBR of 2% or less in the wetter times of the year could be anticipated for the subgrade and the pavement thickness required for the haul road could be in the vicinity of 800mm including 300mm of select type material.

The subgrade conditions at the time of writing, (May 1999) are relatively dry with estimated CBR's from dynamic cone penetrometer testing indicating values of 6% to 31% at a site 310m north of Fallon Street, 13% at a site 160m north of Fallon Street, 22% about 300m east of Elizabeth Mitchell Drive and 18% about 200m south of Corrys Road.

It is stressed that this is only a preliminary assessment and a pavement investigation and design would be necessary to have some certainty about subgrade conditions and pavement thicknesses.

## 9.0 DISCUSSION and CONCLUSION

Below are a number of relevant points raised about the proposed borrow site.

It is understood that a maximum excavation depth of RL 168m to RL 170m is proposed. Examining bore core, seismic refraction profiles, tomographic images and auger boreholes, the expectation is that the deposit appears to be rippable to the desired excavation level.

However, there are a number of unknowns and these include the occurrence and distribution of harder boulders that could require blasting. This is commonly the case with granite environments and although no fresher harder boulders were intersected by the bores, that does not mean they will not be present. It is very difficult with the available site investigation techniques to predict the occurrence and concentration of boulders.

The presence of a moderate seismic velocity of around 1600m/sec could indicate a large proportion of harder boulders in a weaker rock matrix. Lesser proportions of boulders could occur in lower seismic velocity zones. Attention is drawn to the paper presented in Appendix L on averaging of seismic velocities.

The seismic refraction work was marred by the presence of the shallow inversion layer which prevented valuable information being obtained from the underlying material in some locations and necessitated the use of a number of assumptions to produce seismic profiles. The seismic tomography images provided assistance with the seismic refraction interpretation, however the area covered by the tomography survey was not large. These are all variables that add to the conclusion that there is some uncertainty regarding the absolute rippability of the site.

It appears that the majority of the deposit consists of extremely to moderately weathered granite which is partly friable and has areas where it exhibits soil like properties or has weathered to residual soils such as silty clays, sandy clays, silty sands, clayey sands and sandy silts. The major depth of excavation will be over the north south trending ridge which is where the geotechnical investigation was concentrated. It also appears that if better quality material is to be won from this site, it will be won from an area such as along the north south ridge where material with rock properties was more generally encountered. The eastern half of the site appears to be mainly suitable for common fill purposes and the depth of excavation in this area is minimal compared to the ridge line.

The successful excavation of material from this site will most likely involve the following heavy plant;

Large Excavators

Large Scrapers

Large Bulldozers with rippers

Large Haul Trucks and Loaders

Due to the variability of material contained in this site, constant laboratory testing of excavated materials will be required to determine the quality and potential use of the material.

The material is expected to be highly erodible and therefore it is important that batter slopes are not left exposed to the elements where deep scouring could occur. Batter protection such as topsoiling and seeding as soon as possible will be essential.

As the material exhibits soil like properties and the fresher material will weather rapidly on exposure, batter slopes for excavated faces should not be steeper than 2:1 H:V. Flatter batter slopes will potentially produce more surface area exposed to the elements and possibly more erosion. The use of berms to slow the runoff speed and shorten the slope distance should also be considered. Drains should be constructed along the berms to ensure surface water is removed. They should be lined to prevent erosion.

## 10.0 QUALIFICATIONS

The qualifications in this report are generalisations based on the factual and descriptive information presented in the Appendices and Attachments to this report, together with observations and experience. Being generalisations, it is likely that there will be some areas to which the comments do not apply.

Although the conclusions presented are believed to be consistent with the data on which they are based, it is not claimed that they are necessarily the only conclusions that can be drawn from the available information. Where considered critical to a particular aspect of the project, the generalisations in this report should be checked against the factual and descriptive information presented with it, and the information obtained from published sources and inspection of the site.

The limit between rippability and non-rippability of a given material in a given situation is influenced by many factors, some of which are basically economic in nature and unrelated to the nature of the material. In the absence of detailed information concerning the economic factors influencing the decision to rip or blast (some of which are confidential to individual contractors) it is not possible to predict comprehensively or precisely (even within the limits of uncertainty which apply to such predictions) parts if any of the excavation that could require blasting.



24/5/99.

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