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OLD COOMA ROAD REALIGNMENT
REVIEW OF ENVIRONMENTAL FACTORS

SCOPING ASSESSMENT

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1. Introduction

The following scoping report has been prepared as the first step in undertaking the review of environmental factors (REF) for the realignment of Old Cooma Road between Edwin Land Parkway and Googong Road.

Scoping is an important element of environmental assessment in focusing attention on those issues which are most relevant at a given stage of decision-making in order to achieve good environmental outcomes. It is commonly done subconsciously by experienced environmental practitioners, but can be documented more formally to make the assessment process more transparent for purposes of independent assessment.

The scoping process involves reviewing the project against the environmental characteristics at a general level in order to identify:

(a) which environmental issues justify further analysis and presentation in the REF, together with their likely relative importance; and

(b) the points in the decision-making process when these issues need to be addressed (e.g. some issues are important in relation to early planning decisions while others are more relevant in relation to detailed design or construction management).

The consultancy brief (Section 2.5.1) requires the format of the REF to follow the Road and Traffic Authority (RTA) guidelines, *Environmental Impact Assessment Policy Guidelines Procedures 2001*, and to also satisfy the requirements of the following:

- Clause 228 of the *Environmental Planning & Assessment Regulation 2000*
- The *Threatened Species Conservation (TSC) Act 1995*
- The *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*
- Section 111 *Environmental Planning & Assessment Act 1979.*

While the RTA guidelines do not specifically discuss scoping as a tool for guiding the content and presentation of an REF, they are consistent with such an approach, emphasising the need to consider major issues in greater detail than other issues (p. A-12).

These guidelines (p. A-12) also identify four stages for considering environmental impact assessment:

- Strategic
- Concept
- Detailed assessment
- Implementation

The stages relate directly to points in the decision-making process, to which the scoping assessment relates.

The various legislative requirements listed above identify matters which need to be considered in preparing the REF, at least at the scoping stage. The level of detail at which they need to be addressed in the REF will depend on their relative importance as determined through the scoping assessment.

The RTA guidelines and the above legislative requirements are generally flexible with respect to how information is presented in the REF, and do not specify rigid proformas. This is important in enabling the project to be presented in the REF in a manner which facilitates its understanding by readers of the REF, particularly those who are otherwise not familiar with the project.

2. Levels of Decision-making

The levels of decision-making relevant to the Old Cooma Road realignment are discussed using the terminology in the RTA guidelines:

Strategic. The key decision at the strategic level is the decision to allow residential development to proceed in the Googong area. Implicit in that decision is the decision to improve road access between Googong and other parts of Queanbeyan, including upgrading of existing or previously proposed roads within the Queanbeyan road network, if required. These decisions and their implications need to be documented as background to the REF, but are not subject to further debate in the context of the REF. It is understood that the planning process leading to this decision incorporated an appropriate level of environmental assessment and public consultation at the strategic level of decision-making.

Concept. In providing for improved road access between Googong and the Queanbeyan road network just north of the proposed Edwin Land Parkway (Candlebark Road), it is understood that the following concepts for various sections of the road have already been endorsed by Council and are not subject to further analysis or review in the REF:

> **Section 1. Candlebark Road to Wickerslack Lane.** Two alternatives have been considered for this section of road. The original proposal involved a route through native forest and woodland within an area subject to an Aboriginal land claim, which is understood to have been granted. The alternative proposal involves upgrading the road on its existing alignment. This alternative has been adopted for purposes of the current scoping assessment, but it is understood that the route could still revert to the original proposal. The REF would be based on the route that is finally selected, and the review of that decision would be beyond the scope of the REF.
>
> **Section 2. Wickerslack Lane to Tempe Crescent.** Upgrade Old Cooma Road on its existing alignment.
>
> **Section 3. Tempe Crescent to bend at start of rural subdivision near top of climb.** Construct a new road running parallel to and west of the existing lower sections of Tempe Crescent and Heights Road. This represents a major deviation from the existing road which swings west around the hill past the entrance to the quarry. It is understood that while minor variations to the proposed alignment may be subject to review in the REF, the alternative of upgrading the road on the existing alignment has been rejected and does not fall within the scope of the REF, other than on background to the current decision.
>
> **Section 4. Start of rural subdivision to Googong Road.** Upgrade Old Cooma Road on its existing alignment.

In summary, two major decisions on route options at the concept level will have already been made. While some sectors of the community are known to have an interest in these route options, it is understood that the decisions on these options have not been subject to any formal environmental review process to date. It will therefore be necessary for the REF to justify, at least in general terms, the technical and environmental basis for the preferred options at the concept level.

Detailed assessment. The current brief for the road design and environmental assessment is directed primarily at this level of decision-making. The objective of the current design project is to achieve an adequate technical design for the road which is consistent with the current concept and which also addresses any environmental concerns to an acceptable degree. Based on the analysis of environmental issues, there may be some scope in adjusting the location and design of the road to mitigate any significant concerns or to provide offsets to any adverse impacts. These issues are discussed in detail in the REF to identify the potential impacts and explain how they have been addressed.

Implementation. The detailed assessment should provide some guidance with respect to environmental management practices that should be incorporated into the implementation of the project. It is not practicable at the current stage of design, however, to anticipate in detail all of the environmental problems that may arise during the construction, operation and maintenance of the project. Further decisions will need to be made during these phases of the project and it may be practicable for the REF only to identify general principles relating to these decisions.

3. Environmental Issues

3.1 Introduction

The following section reviews the potential environmental issues that may be relevant to the Old Cooma Road realignment in terms of their relative importance and the level of decision-making at which they need to be considered. In the latter context, it should be noted that some issues, while important, have already been determined at a strategic level through previous decisions and are beyond the scope of the present REF.

The presentation of the environmental issues broadly follows the order in the RTA guidelines, with some issues expanded in scope and some further issues identified. Some of the issues are interdependent and are cross-referenced where appropriate.

3.2 Landform modification

There is potential for modification to the landform through creation of cuttings or fill areas, but these would be localised and determined by the engineering design of the road. Such landform modification may not be significant in its own right, but may be of more concern through its secondary effects such as visual impacts, implications for traffic noise, or interference with wildlife movement. If there are any major changes to the landform, these should be identified in the REF.

3.3 Geotechnical assessment

Geotechnical assessment is important in relation to the design of the road, particularly in addressing slope stability in cuttings, suitability of fill, potential groundwater discharges etc. Assuming that the design of the road would respond to any identified geotechnical constraints, there are unlikely to be any major residual concerns of a geotechnical nature. The REF should nevertheless identify how any potential geotechnical constraints have been reflected in the road design.

3.4 Soil management

The road design is expected to incorporate an environmental management plan which would identify measures for control of soil erosion and sedimentation, at least in general terms, as well as measures for topsoil management. It may not be practicable to specify the details for such works until the implementation stage, however. Any particular issues relating to soil management should be identified in the REF.

3.5 Contaminated land

There does not appear to be any basis for anticipating problems with contaminated land in relation to the road construction, although this should be reviewed when the geotechnical assessment has been completed. Unless that assessment identifies any potential contamination concerns, it is not expected that the issue of contaminated land will need to be addressed in the REF.

3.6 Climate and microclimate

There are no features of the Queanbeyan climate or the local microclimate of the road corridor which suggest any particular constraints on the design or construction of the road, or which are likely to pose exceptional hazards in its use (e.g. through shading/ice formation). Unless any such issues become apparent in the design of the road, this issue is not considered to warrant further discussion in the REF.

3.7 Drainage changes

The construction of the road is likely to lead to at least localised drainage changes along its road. These would be addressed in the design of the road, together with possible water quality control ponds and similar works for runoff management. While it is not expected to be a major issue, the REF will need to assess such drainage changes and any consequent effects that they may have.

3.8 Flood risks

Flood risks are most likely to be relevant to the northern end of the road in the Barracks Creek area, and would be addressed in the road design. The measures to provide an adequate level of flood protection should be identified in the REF.

3.9 Water quality

Water quality is likely to be of concern mainly in relation to soil erosion and sediment control (see Section 3.4) and should be addressed in this context in the REF. Other water quality issues relating, for example, to contaminants washed off the road or the risk of accidental spillages, are common to the Queanbeyan road network in general and cannot be addressed in a meaningful way in the context of the REF.

3.10 Traffic impacts

The impacts of increased traffic flows, both on Old Cooma Road itself and elsewhere within the Queanbeyan road network, are a consequence of the decision to allow residential development at Googong and are not determined by the design of the road. A discussion of these impacts is therefore beyond the scope of the present REF. Information on projected traffic flows is nevertheless relevant to the assessment in the REF of some other impacts, particularly traffic noise, and information on traffic flows should be presented in this context.

3.11 Air Quality

The volume and nature of traffic on the Old Cooma Road following the development of Googong is most unlikely to result in air quality concerns at nearby residences, and is not considered to be a factor influencing the design of the road. It does not warrant detailed analysis or discussion in the REF.

3.12 Traffic noise and vibration

In contrast to air quality, traffic noise has the potential to be an important environmental concern at several locations along the route of the road, and is a factor that may be strongly influenced by the design of the road and possible noise protection measures. From a community viewpoint, it is likely to be one of the main environmental issues associated with the road, and will require detailed presentation in the REF.

3.13 Ecological impacts

Because the road will impact on native vegetation and habitat over much of its length, the ecological impacts, both in general terms and on some threatened species and communities, will need to be addressed in detail in the REF.

The ecological issues to be addressed include the following:

General ecological impacts. Loss of native forest, woodland or grassland which does not necessarily constitute an endangered ecological community. In this respect, widening the northern section of the road (Stage 2A) on the existing alignment, rather than clearing a new corridor through native forest or woodland, would be beneficial in reducing the general ecological impacts.

Threatened species and communities. Previous studies have identified the possibility of several species/ecological communities listed under NSW and/or Commonwealth legislation in the vicinity of the proposed roadworks. These are subject to further assessment through the preparation of a Species Impact Statement, which will be summarised in the REF. In assessing the impacts on these species/ecological communities, it is necessary to consider the wider local context in which they are found, as well as the potential for mitigating or offsetting any impacts.

Significant trees. Large old trees containing hollows have the potential to be valuable as habitat, particularly in areas where the surrounding groundcover vegetation is attractive for native fauna. The protection of these trees for their habitat value, as well as their landscape value, may be a factor influencing the design of the road, and should be addressed in the REF.

Other habitat features. Other habitat features which may be affected by the road need to be identified in the REF. These may include any areas of aquatic habitat that may be affected.

Ecological connectivity. The REF should identify where the road upgrading would result in any new barriers that may affect ecological connectivity, or would increase

the effects of any existing barriers. Alternatively, there may be the opportunity in the road design to provide for underpasses which may mitigate any new barrier effects or reduce existing ones.

Altered hydrological regimes. The REF should consider whether the road would result in any altered hydrological regimes which could have secondary effects on vegetation communities or aquatic/semi-aquatic habitats. Based on information to date, however, this does not appear likely.

Exotic plants and animals. It is desirable to avoid the introduction of exotic plants (including weeds) or animals into areas where they are currently absent, as a result of road construction. This may be relevant to the choice of species used in landscaping of the road corridor, and should be discussed in the REF.

Modification of animal behaviour. As there are existing roads through most of the area, the effects of lighting etc. on animal behaviour is unlikely to result in any new impacts, although the intensity of any such impacts would be increased due to higher traffic volumes.

Wildlife mortality. It seems likely that the rate of animal mortality along Old Cooma Road would increase as a result of the traffic volumes associated with the Googong development. This is a consequence of the strategic decision to develop Googong, rather than the upgrading of the road itself. There may be the potential to reduce potential mortality rates through design measures associated with the road and adjacent land (e.g. partial fencing along the road). This should be discussed in the REF, together with any adverse impacts on other environmental values (e.g. visual impacts, restriction of human movement).

Potential for ecological enhancement. If there are any measures associated with the road design which may enhance the ecological values of the road corridor, these should be discussed in the REF.

3.14 Visual impacts

The new or widened section of the road have the potential to be visually prominent, but whether this visual impact is significant will depend on whether the road can actually be seen from locations which are used by people. Such locations include residences which may overlook the road and public land, such as the upper slopes of Jerrabomberra Hill, from which the road may be visible. The potential visual impact of the road may be strongly influenced by its design, as well as landscaping and retention of trees within the road corridor. The two alternatives for Stage 2A would have quite different visual impacts.

It may be appropriate also to consider the appearance of the road at night, particularly in relation to the movement of car lights, compared with the existing situation. While the visual impact of the road may turn out to be minor, it is nevertheless an issue warranting analysis and discussion in the REF.

3.15 View from the road

The view from the road has the potential to enhance the experience of people travelling along it. This is a consideration in the design of the road and associated landscaping. The REF should identify any significant view opportunities, whether these are deliberate features of the road design or an incidental benefit.

3.16 Cultural heritage – indigenous

Consideration of indigenous cultural heritage is a normal requirement of environmental assessment in New South Wales, and will need to be addressed in the REF, irrespective of whether it raises any significant issues. Any implications relating to the land in Stage 2A that is subject to an Aboriginal land claim should be acknowledged.

3.17 Cultural heritage – non-indigenous

There do not appear to be any obvious issues relating to non-indigenous cultural heritage but, if any arise in the case of the cultural heritage assessment, these should be addressed in the REF.

3.18 Geological heritage

There do not appear to be any features of geological heritage value that would be affected by the road proposal.

3.19 Land use impacts/land acquisition

Any widening or realignment of the road onto land which is currently in private ownership or use would have implications that would need to be addressed in the REF, as well as through direct negotiation. This issue clearly relates to the design of the road, and may have implications for the possible mitigation of some other impacts such as noise control and protection of native vegetation.

3.20 Community characteristics

The implications for the semi-rural community currently established along Old Cooma Road are likely to arise from the future residential development at Googong, rather than from the road itself, and are hence beyond the scope of the REF. The direct impacts of the road on this community, such as traffic noise or visual impacts, are addressed elsewhere in the REF.

3.21 Property values

It may be expected that, if there are adverse impacts on residential properties close to the road, these impacts may reflect negatively on property values. There are many other factors, however, including the Googong development itself, which may be more significant in influencing property values along the road, particularly in the longer term. It is therefore not considered practicable in the REF to make a meaningful assessment of the impacts of the road upgrade on property values.

3.22 Other economic effects

The realignment and upgrading of Old Cooma Road may contribute to other economic effects but is likely to be only one of several factors in this respect. Again, the development of Googong is likely to be more influential, and this is beyond the scope of the REF.

3.22 Effects on recreational uses

There do not appear to be any existing recreational uses that would be affected significantly by the road, although this needs to be confirmed through consultation with the local community. If this is confirmed, the effects on recreational use would not need to be discussed in the REF.

3.24 Effects on educational or scientific uses

It appears unlikely that the road would have any effects on existing educational or scientific uses. This issue would therefore not need to be discussed in the REF.

3.25 Improved access

The road is expected to provide improved and safer access for motor vehicles, as well as potentially cyclists, pedestrians and public transport. Such benefits would be influenced directly by the design of the road, and should be identified in the REF.

3.26 Natural resource management implications

As currently proposed, the road does not appear to significantly affect any areas managed for their natural resource values (e.g. nature reserves). While the Stage 2A option which follows the existing road may impact on the edge of an area of native forest, this impact would be minor and much less than that of the alternative route which would bisect that area. Maintaining management access into the area may be a consideration in the road design, but it is not likely to be an issue requiring discussion in the REF.

3.27 Bushfire risk

Compared with the existing situation, the road proposal does not appear to raise any additional concerns with respect to bushfire risk. It may be marginally beneficial in providing improved access and a wider buffer between flammable vegetation on either side of the road. Bushfire risk is not seen as an issue requiring discussion in the REF.

3.28 Waste management

The disposal of waste generated during the road construction (e.g. surplus spoil, cut timber) would relate primarily to the implementation phase, but may be discussed in general terms in the REF in the context of an environmental management plan.

3.29 Resource demand

If additional fill is required for road construction, this would need to be identified at the design stage and discussed in the REF. As well as identifying the source of such fill, it may be necessary to discuss any impacts of transporting it to the site.

3.30 Effects on existing services and infrastructure

Identifying existing services and infrastructure that would be affected by the roadwork and developing means of protecting or relocating these is an important component of the road design. These issues and their solutions should be documented in the REF.

3.31 Operational hazards and risks

Hazards and risks associated with the operation of the road are unlikely to be a consequence of the road design, but are related more to land uses that use the road for access. The design of the road to a safer standard has the potential to reduce such risks. This is therefore not a significant issue in the present REF.

3.32 Energy implications

Any energy implications (or climate change implications resulting from carbon emissions) would relate to the future development of Googong, rather than to the upgrading of the road. It is therefore not considered meaningful to discuss these implications in the context of the REF.

3.33 Construction impacts

Construction impacts are a potential concern in relation to any major project, particularly in terms of the ways in which they may affect existing road users or nearby residents. Such impacts can include:

- noise and vibration (including blasting);
- movement of construction traffic;
- dust;
- runoff management and erosion control;
- construction waste disposal; and
- impacts of site sheds, storage areas etc.

These need to be addressed in the REF, at least in general terms through an environmental management plan, although specific details may need to be resolved at the subsequent implementation stage.

3.34 ESD principles

There is a requirement under the *Environmental Planning and Assessment Regulations* to discuss how the proposal relates to those principles of ecologically

sustainable development that are described in Schedule D of that regulation, namely:

- the precautionary principle;
- intergenerational equity;
- conservation of biological diversity and ecological integrity; and
- improved valuation and pricing of environmental resources.

This discussion would be based on other specific measures developed in the design of the road and reviewed earlier in the REF.

3.35 Cumulative effects

Any cumulative effects in relation to the Old Cooma Road realignment should have been addressed in the strategic context of the Googong development. It is unlikely that any meaningful assessment of cumulative effects will be feasible in the context of the present REF. In any case, such effects are unlikely to influence the design of the road.

4. Conclusions

The most important environmental issues which are relevant to the design of the road and its subsequent implementation are seen potentially as follows:

- Traffic noise – in relation to existing residences close to the future road.
- Visual impacts – from private or public locations used by people, from which the road could be seen.
- Impacts on native vegetation or habitat, and particularly on threatened ecological communities, as well as other ecological impacts.
- Construction impacts – particularly on nearby residents and road users.
- Effects on existing services and infrastructure.
- Flood risks – specifically in the Barracks Creek area.
- Impacts on existing land uses, including land acquisition.
- Geotechnical assessment.

Other issues which are relevant to the current stage of decision-making and which are of sufficient importance to warrant discussion in the REF, or are required to be addressed in any case, include:

- Landform modification
- Soil management
- Drainage changes
- Water quality – particularly in relation to soil erosion and sediment control
- Traffic impacts – as background to noise assessment
- View from the road

- Cultural heritage – indigenous
- Improved access
- Waste management
- Resource demand – if relevant
- ESD principles

Based on current information, issues which do not appear to be of sufficient relevance in the context of the present project to warrant detailed discussion in the REF are as follows:

- Contaminated land
- Climate and microclimate
- Air quality
- Cultural heritage – non-indigenous
- Geological heritage
- Community characteristics – other than as addressed in relation to noise and visual impacts
- Property values
- Other economic effects
- Effects on recreational uses
- Effects on educational or scientific uses
- Natural resource management implications
- Bushfire risk
- Operational hazards and risks
- Energy implications
- Cumulative effects

The above assessments may change should additional information relevant to those issues come to light or if there are significant changes to the project. In the latter respect, it should be noted that the scoping assessment is based on Stage 2A following the existing road, rather than a route through the native forest/Aboriginal title area. Should the route through the forest be adopted, this would raise issues related to recreational use, natural resource management and bushfire risk (and possibly educational or scientific uses), as well as additional ecological and visual impacts, which would need to be discussed in the REF.

It is possible also that other issues which are not evident may be raised in the course of community consultation, and may need to be addressed in the REF.

Environmental

Services

Flora and Fauna Assessment

Proposed Deviation of Old Cooma Rd
Googong

City of Queanbeyan

August 2007

Our Reference: 6527

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Proposed Deviation of Old Cooma Road, Googong

City of Queanbeyan

Prepared August 2007

for

Canberra Investment Corporation Ltd
on behalf of
Queanbeyan City Council

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EXECUTIVE SUMMARY

This report has described the biological environment affected by the proposed straightening and upgrading of a section of Old Cooma Road at Googong, and assessed the potential effects on threatened and migratory species, endangered populations and threatened ecological communities of the proposal to construct a two to four lane dual-carriageway road.

The existing environment of the unformed road easement and adjoining areas was examined in detail from literature review and from data gathered during fieldwork in November 2006 and January 2007. Flora and fauna surveys resulted in the recording of 110 flora species and 21 fauna species. Two vegetation communities Ecotonal Tablelands Dry Shrub/Tussock Grass Forest and Disturbed Tableland Dry Grassy Woodland were recorded within the easement.

No threatened or migratory fauna species listed on the Schedules of the *NSW Threatened Species Conservation Act 1995* (*TSC Act*), *NSW Fisheries Management Act 1994* (*FM Act)* or *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, were recorded in the study area.

One flora species, the Hoary Sunray *Leucochrysum albicans,* listed as endangered on the *EPBC Act*, was recorded in the study area. No threatened flora species listed on the Schedules of the *TSC Act,* were detected in the study area.

One endangered ecological community listed on Schedule 1 Part 3 of the *TSC Act,* White Box, Yellow Box, Blakely's Red Gum Woodland*,* was recorded in the study area. The study area also contains the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, which is listed as a critically endangered ecological community on the schedules of the Commonwealth *EPBC Act*.

Following the application of the seven factors from Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, as required by the *TSC Act* and the *FM Act* in accordance with relevant assessment guidelines, it was concluded that the proposal may have a significant effect on threatened species, endangered populations, endangered ecological communities, or their habitats, and a Species Impact Statement is required.

Following consideration of the administrative guidelines for determining significance under the *EPBC Act*, it was concluded that the proposal may have a significant impact on matters of National Environmental Significance and a referral to the Commonwealth Environment Minister is recommended.

A number of practices/measures were recommended to ameliorate potential impacts of the proposal on flora and fauna.

1. INTRODUCTION

1.1 Background

This report has been prepared by Bushfire and Environmental Services (BES) at the request of Canberra Investment Corporation Pty. Ltd. on behalf of Queanbeyan City Council to accompany a development application to straighten and upgrade a narrow and winding section of Old Cooma Road at Googong.

The road easement and associated lands comprise an area of approximately 10 ha, located approximately 4 km south of the centre of Queanbeyan, as shown in Figure 1. The deviation and upgrading of Old Cooma Road will provide major safety and travel flow improvements, which are particularly important for the proposed Googong township.

This report is the outcome of the flora and fauna investigations and desktop analyses undertaken by BES between October 2006 and July 2007.

1.2 The Proposal

1.2.1 Description

The development proposal involves the construction of a new 1.5km section of Old Cooma Road at Googong to improve traffic capacity and safety. The proposed deviation will replace the winding section of Old Cooma Road in the vicinity of the Cooma Road Quarry with a straighter and wider section of road on the eastern side of Lot 120 DP 754881, which is currently zoned as rural and owned by Council. The proposal includes the upgrading and widening of the existing Old Cooma Road to the north and south of the proposed deviation on Lot 120. The proposed road design has not yet been finalised, but is likely to comprise a dual carriageway of between two and four lanes, together with associated structures and drainage. The road is not proposed to be upgraded from two lanes to four lanes until 2027.

1.2.2 Direct and Indirect Impacts

The following direct impacts on flora and fauna are anticipated from the proposal:

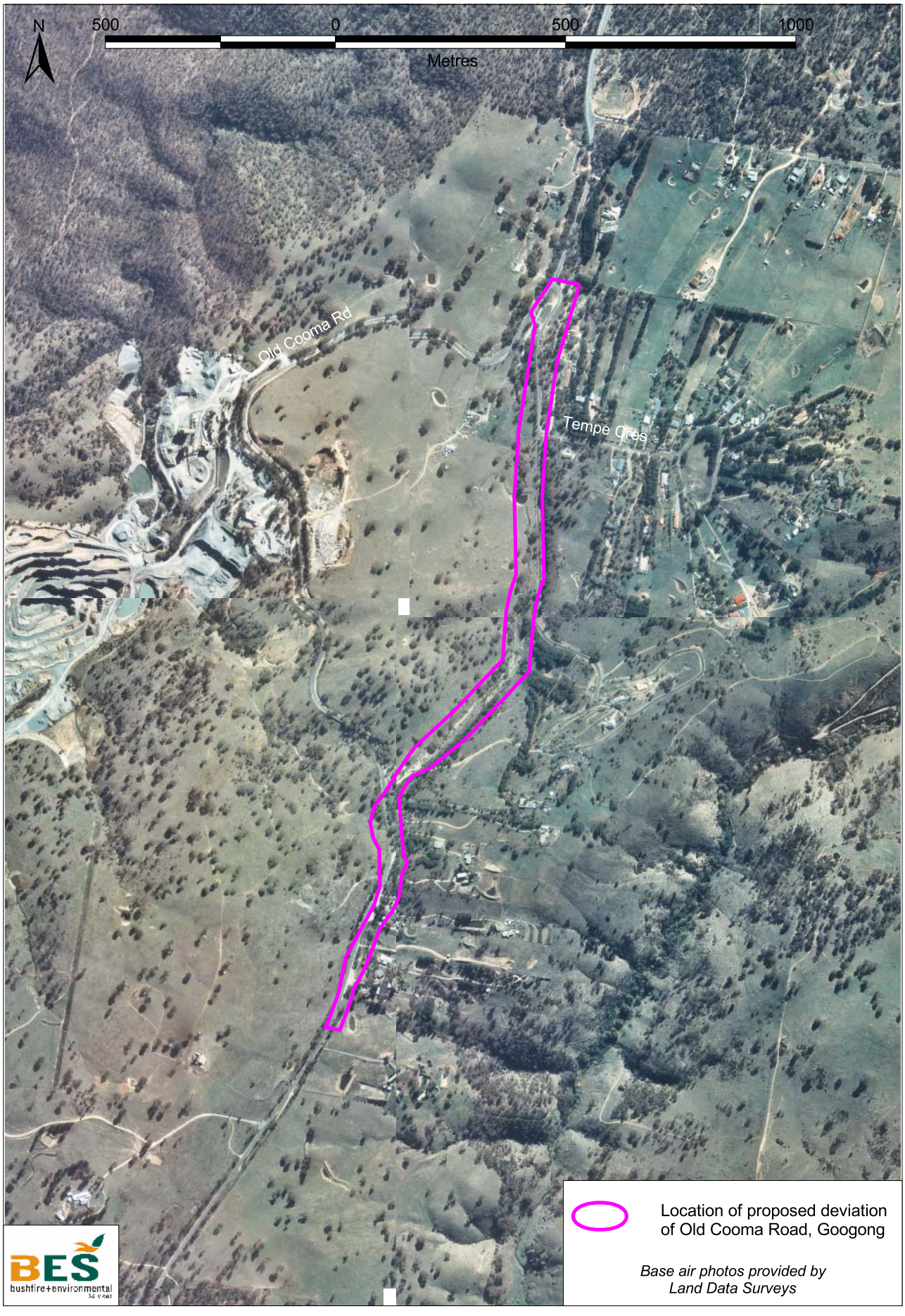
a) Clearing of native vegetation for the development footprint;

b) Removal of fauna habitats including rocks, hollow-bearing trees and termite mounds for the development footprint;

c) Excavation of some earth material within the proposed development road footprint and the under-grounding of services;

d) Compaction and covering of the soil within areas to be concreted and/or bitumen sealed; and

Figure 1: Location of the proposed deviation of Old Cooma Road, Googong



e) Death or injury to native and introduced flora and fauna inhabiting the areas to be cleared and excavated for the proposal.

The following indirect impacts on flora and fauna are anticipated from the proposal:

a) Microclimate changes to areas of vegetation to be retained arising from clearing of adjoining areas;

b) Changes to drainage characteristics from the concentration and redirection of stormwater;

c) Weed invasion into areas of native vegetation adjoining the proposal;

d) Increased potential for discharges of sediments into downstream habitats during construction of the proposal;

e) Increased noise and air pollution levels from motor vehicle traffic;

f) Increased injury and death of native fauna species resulting from collisions with motor vehicles; and

g) Alteration to the flow regime of the ephemeral drainage line within the road easement.

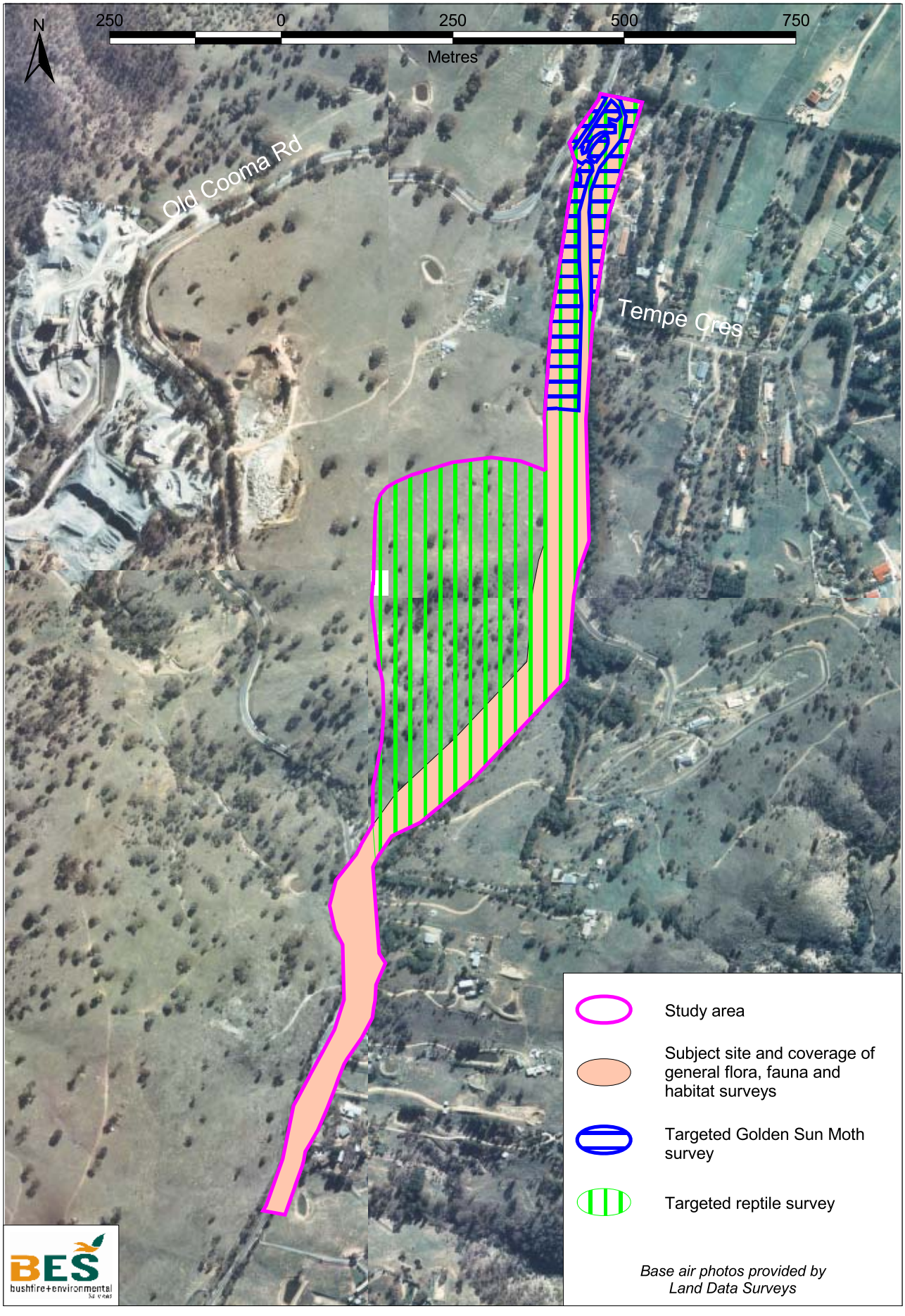
1.3 Subject Site, Study Area and Locality

The subject site for the purposes of this report comprises all parts of the study area to be directly impacted by the proposal and is comprised of a number of road easements and rural zoned land owned by Council up to 60m in width (Figure 2). These comprise the northern portion of Tempe Crescent, the northern portion of Heights Road, an unnamed corridor linking Heights Rd to Cooma St, and a portion of Cooma St (Old Cooma Rd) about 560m long. The subject site has an area of approximately 9.73ha and is currently comprised of two vegetation communities at various levels of disturbance and a network of roads, trails and tracks.

The study area for the purposes of this report is the subject site together with a portion of adjoining land on Lot 120 DP 754881 (Heffernan property) on which additional studies were undertaken (Figure 2). The northern extremity of the study area is approximately 350m south of the intersection of the existing Old Cooma Rd and Wickerslack Lane. The southern extremity is defined by the northern boundary of land owned by CIC where it crosses the existing Old Cooma Rd, approximately 1.5km north of the intersection of the existing Old Cooma Rd and Googong Rd. To the east and west, the study area is bounded by rural properties of various dimensions, with the Queanbeyan River further to the east and Cooma Road Quarry further to the west.

The locality for the purposes of this report is the area of land within 5 km of the study area. It extends just past Cuumbeun Nature Reserve to the east, to Googong and Googong Reservoir

Figure 2: Subject site, study area and locations of flora and fauna surveys



to the south and southeast, almost to Hume in the west, and towards the northern extremities of the Queanbeyan urban area to the north.

1.4 Aim and Objectives

The aim of this investigation was to assess the ecological impacts of the proposal on flora, fauna and habitats within the study area.

The objectives of this investigation were:

a) to identify and describe the flora species and vegetation communities present in the study area and their conservation significance;

b) to identify and describe the fauna habitats present in the study area and their condition;

c) to identify the fauna species which are present or likely to occur in the study area, and their conservation significance;

d) to assess the impacts of the proposal on vegetation, fauna, habitats, and other environmental features as necessary;

e) to determine whether there is likely to be a significant effect on threatened species, endangered populations or endangered ecological communities, or their habitats, pursuant to Section 5A of the *NSW Environmental Planning and Assessment Act 1979* as required by the *NSW Threatened Species Conservation Act 1995*;

f) to determine whether there is likely to be a significant effect on threatened species, endangered populations or endangered ecological communities, or their habitats, pursuant to Section 5A of the *NSW Environmental Planning and Assessment Act 1979* as required by the *NSW Fisheries Management Act 1994*;

g) to determine whether the proposal involves an action that has, will have, or is likely to have, a significant impact on a matter of national environmental significance under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*; and

h) to make recommendations regarding any environmental management and impact mitigation/amelioration measures, which can be implemented to limit the effects of the proposal on vegetation, fauna, habitats, and other environmental features as necessary.

2. METHODS

2.1 Review of Existing Data

A review of relevant information was undertaken prior to the commencement of field studies, which involved:

a) reviewing available literature including relevant flora and fauna studies, legislation, environmental planning instruments, topographic maps and aerial photographs of the study area;

b) searching the Atlas of NSW Wildlife for records of threatened flora and threatened fauna species in the locality; and

c) using the Commonwealth Environment Protection & Biodiversity Conservation Act Protected Matters Search Tool to search for records of matters of national environmental significance in the locality.

The data gathered during the field studies and from the review of literature were analysed and interpreted in accordance with the provisions of legislation and planning controls pertaining to flora and fauna.

2.2 Flora Survey Methods

A detailed botanical survey was conducted by BES in the study area and surrounds on 1 November 2006 in the locations shown in Figure 2. Butler (2007) conducted additional surveys in the study area during July 2007 to determine the presence of the Commonwealth endangered community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. The details of this report are presented in Appendix B.

Community Identification and Floristic Audit

The Random Meander technique documented by Cropper (1993) was used across the study area and surrounds, to document the flora species present, including those of conservation significance, and the location and extent of vegetation communities.

Several vegetation survey sheets were completed for the vegetation communities that occur within the study area. The vegetation was surveyed at all levels present: the canopy (trees), middle canopy (trees), understorey (shrubs), and groundcover plants (plants less then one metre in height). An abundance score was assigned to each species recorded. Dominant species and the projected foliage cover of each stratum were recorded at locations that typified the vegetation communities present in the study area. A general description of the vegetation was then prepared based on structural characteristics and dominant canopy species in accordance with Walker and Hopkins (1990) and Specht (1970). These techniques were used to classify and name the vegetation communities in the study area and immediate surrounds.

The vegetation communities identified in the study area were compared with the Final Determinations of the NSW Scientific Committee and the listing advice of the Commonwealth Threatened Species Scientific Committee to ascertain whether the communities comprised listed threatened ecological communities.

Targeted Searches

Specific searches for plant species of conservation significance known from the locality were conducted using the Random Meander method targeting areas of potential or suitable habitat. This technique was used to target the Yass Daisy *Ammobium craspedioides,* Hoary Sunray *Leucochrysum albicans var. tricolor,* Button Wrinklewort *Rutidosis leptorrhynchoides,* Small Purple-pea *Swainsona recta,* Silky Swainson-pea *Swainsona sericea,* and Austral Toadflax *Thesium australe*.

Limitations

The floristic audit undertaken recorded as many species as possible and provides a comprehensive but not definitive species list. More species would probably be recorded during a longer survey over various seasons.

Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to assess the impacts of the proposal on the flora species and vegetation communities found within the study area.

Nomenclature

Most of the plant species names in this report are the current names published in the Flora of NSW (Harden 1990-2000). The taxonomic names have been supplemented with common names obtained from various sources. The scientific and conservation significance of individual plant species was established with reference to Briggs and Leigh (1996) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* in the national context, and to the *NSW Threatened Species Conservation Act 1995* in the state context.

Flora Survey Effort

The flora survey effort employed a total of 11 person-hours as documented in Table 1.

Table 1: Flora survey effort employed over the study area

DATE	METHOD	EFFORT	TARGET SPECIES
1 November 2006	Random meander	8 person-hours	All flora species
	Vegetation plots	3 person-hours	All flora species
TOTAL FLORA SURVEY EFFORT		**11 PERSON-HOURS**	

2.3 Fauna Survey Methods

Field investigations for fauna were conducted in the study area by BES on 24 and 25 November 2006 and 17 January 2007 in the locations shown in Figure 2. Prior to the commencement of field surveys, discussions were held with relevant staff from the Department of Environment and Climate Change to establish appropriate survey techniques, effort and timing required for various threatened species with the potential to occur in the habitats of the study area.

Opportunistic Diurnal Surveys

Opportunistic fauna surveys involved observations of animal activity, habitat surveys and searches for indirect evidence of fauna.

Diurnal mammal searches were conducted in areas of potential habitat across the study area, with emphasis on searches for scats, tracks, burrows, diggings and scratchings. Specific bird, reptile and amphibian searches were conducted across the study area involving both visual and aural detection of species.

Specific searches were conducted for habitats or resources of relevance for those threatened fauna species known from the general region, or species, which might be anticipated to occur given the vegetation communities and habitats present. Opportunistic records of all fauna species observed were maintained throughout the survey period, and an inventory was compiled of all species recorded during the current investigations.

Targeted Reptile Surveys

Reptile surveys primarily targeting the Pink-tailed Worm Lizard were undertaken within the subject site on 24 November 2006 for six person-hours. Two ecologists actively searched for reptiles under rocks, logs and debris between 2pm and 5pm. Approximately 150 rocks and 40 logs were turned during the targeted reptile survey. On 17 January 2007, surveys for the Pink-tailed Worm Lizard were undertaken for 10 person-hours on parts of the Heffernan property adjacent to the subject site. During this time, two ecologists searched habitat between the hours of 6.30am and 11.00am, turning approximately 1100 rocks and 100 logs. All reptiles found during these surveys were identified. As much as possible, rocks and logs were placed back in their original positions.

Targeted Golden Sun Moth Surveys

Open grassy areas were intensively searched for the Golden Sun Moth for two person-hours on the 24 November 2006. Two ecologists slowly walked through patches of suitable habitat between the hours of 2pm and 3pm during warm, sunny and still conditions amenable to detection of the Golden Sun Moth. Green-meshed butterfly nets were used to capture moths and butterflies for identification.

Habitat Analysis

A description of the fauna habitats in the study area was prepared because the type of habitat in an area influences which animals occur there, as well as diversity and abundance. This habitat assessment also has an important role in predicting threatened fauna likely to occur in an area. The information collected usually includes the type of vegetation present, the presence/absence of rock outcrops, tree hollows, dams, ponds, streams, foraging substrates and other features likely to attract threatened fauna. The study area was traversed along a number of transects to identify habitat components, which were recorded and described.

Limitations

The results of fauna surveys can be optimised by conducting investigations over a long period to compensate for the effect of unfavourable weather, seasonal changes and climatic variation. In general, the longer the survey the more species will be detected. Results can also be improved by using a wide range of techniques, since some species are more likely to be detected by a particular method. Such techniques include scat analysis, small-cage trapping, pitfall trapping, hair tubing and harp trapping.

However, surveys are subject to constraints that determine the amount of time allocated, the methods used and the timing of the work. Thus, the results should be viewed in the light of these limitations. The fauna detected in current survey work are a guide to the native fauna present, but are by no means a definitive list of the species occurring in the study area.

Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to assess the impacts of the proposal on the fauna species and habitats found in the study area.

Nomenclature

The nomenclature in this report is based on the Mammals of Australia (Strahan 1995), Australian Bats (Churchill 1998), The Taxonomy and Species of Birds of Australia and its Territories (Christidis & Boles 1994) and Reptiles and Amphibians of Australia (Cogger 1996).

Survey Conditions

Survey conditions throughout the study period are detailed in Table 2 below.

Table 2: Fauna survey conditions

DATE	TEMPERATURE	WIND	CLOUD	MOON	RAIN
24 November 2006	34 ^{0}C – 23.5 ^{0}C	Nil	0/8	-	None
25 November 2006	14 ^{0}C – 35 ^{0}C	Light	0/8	-	None
17 January 2007	20 ^{0}C – 28 ^{0}C	Nil	0/8	-	None

Survey Effort

The fauna survey effort employed a total of 21.5 person-hours as documented in Table 3.

Table 3: Fauna survey effort employed over the study area

DATE	METHOD	EFFORT	TARGET SPECIES
24 November 2006	Diurnal fauna and habitats	2 person-hours	All species
	Targeted searches	2 person-hours	Golden Sun Moth
	Targeted searches	6 person-hours	Pink-tailed Worm Lizard, Striped Legless Lizard, Grassland Earless Dragon
25 November 2006	Diurnal fauna and habitats	1.5 person-hours	All species
17 January 2007	Targeted searches	10 person-hours	Pink-tailed Worm Lizard
TOTAL FAUNA SURVEY EFFORT		**21.5 PERSON HOURS**	

3. THE EXISTING ENVIRONMENT

3.1 Topography, Geology, and Soils

The study area lies at an altitude between approximately 670 and 770 metres Australian Height Datum. Along its approximately 1.8km length, the study area rises from about 670m in the north to about 770m in the south, giving an average gradient of about 3°. For the majority of its length, the study area is in a depression in the north, running between two hills towards the south, with its southern end running along the eastern side of a hill. An unnamed watercourse flows for about 600m of the study area's length in the depression.

The underlying geology in the northern half of the study area is Barracks Creek Adamellite with Adamellite and leucogranite. The southern half is Colinton Volcanics with Feldspathic and lithic meta-arenite, metasiltstone and conglomerate proximal turbidites, with structurally intercalated or stratigraphically underlying chert, jasper and basic meta-volcanics.

3.2 Disturbances

The study area comprises a mix of generally heavily disturbed and less disturbed lands.

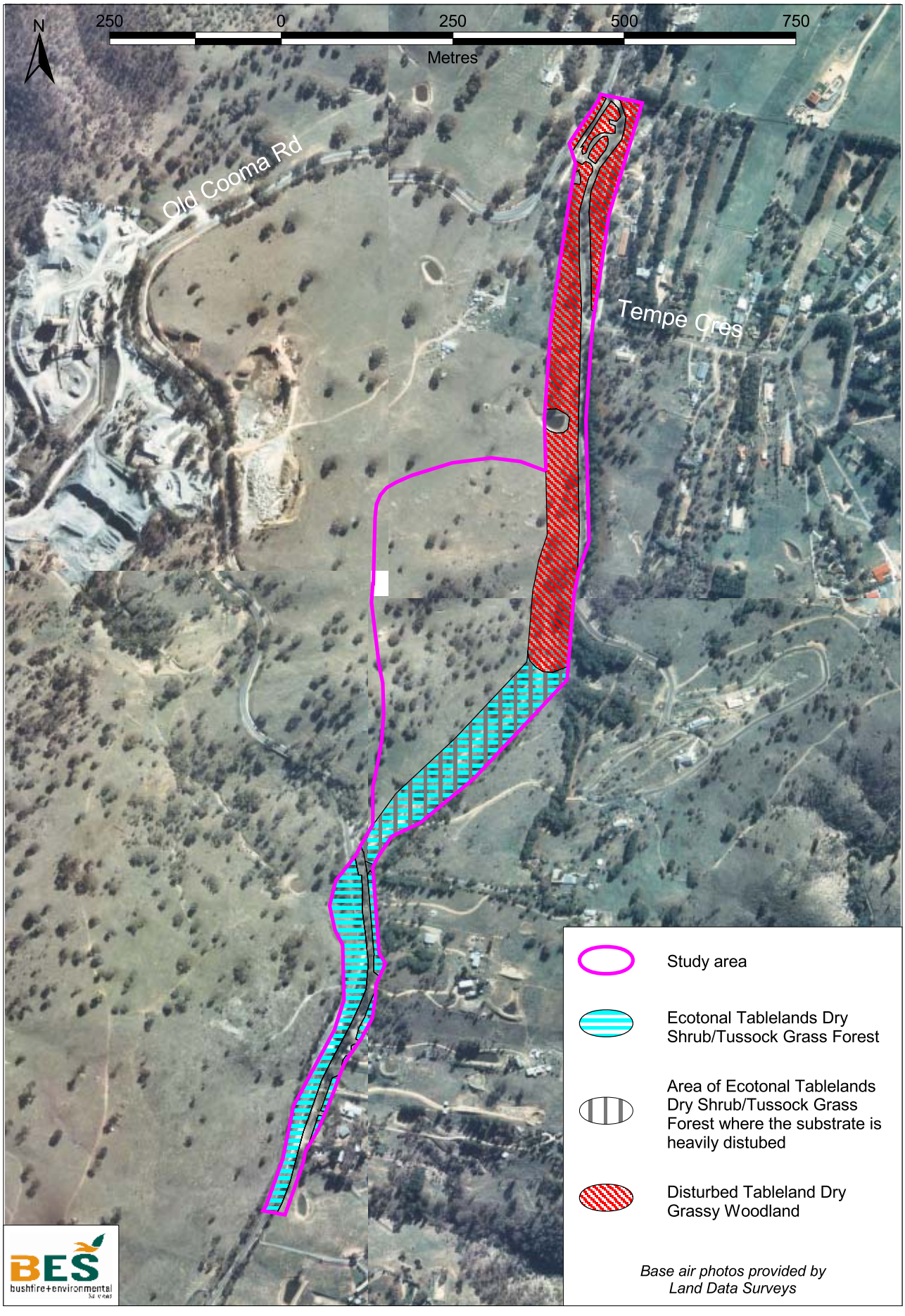
The study area within the Heffernan's property has experienced historic and ongoing heavy disturbances in association with historic clearing and ongoing grazing, fencing, the development of a farm dam, and in association with the existing powerline easement that traverses the southern parts of the property. This area is has also been subject to massive sheet and gully erosion, with the gully erosion extending down the extent of the channel of the tributary of Barracks Creek, which traverses the central and northern parts of the study area. The study area within the Heffernan's property also supports large weed infestation in places.

The study area beyond the Heffernan's property, along and adjacent to the Old Cooma Road, is generally less heavily disturbed beyond the surface, cuttings and shoulders of the road and property access tracks. However these areas also exhibit evidence of historic disturbances such as minor excavations and have been invaded by weeds and garden escapes in places.

3.3 Flora

The vegetation communities within the study area have been typed with reference to the classifications of Gellie (2005). Using the classifications of Gellie (2005), the study area supports two vegetation communities Ecotonal Tablelands Dry Shrub/Tussock Grass Forest and Disturbed Tableland Dry Grassy Woodland, as shown in Figure 3.

Figure 3: Vegetation communities



3.3.1 Ecotonal Tablelands Dry Shrub/Tussock Grass Forest

This community occurs across the southern parts of the study area and is generally present along that part of the study area that coincides with the existing Old Cooma Road road reserve and the southern parts of the Heffernan's property, as shown in Figure 3.

The community is referred to as ecotonal, as it includes some elements of the Tableland Dry Grassy Woodland communities that occur in surrounding areas, such as the presence of two individuals of Yellow Box *Eucalyptus melliodora.* In the southern parts of the Heffernan's property the community is heavily disturbed as a result of grazing and the extensive erosion that occurs in this area. These parts of the community include large infestations of Blackberry *Rubus fruiticosus* complex, Burgan *Kunzea ericoides* and many individuals of Radiata Pine *Pinus radiata*. The recovery potential of the community in this area has been extremely compromised as a result of the extensive disturbances to the substrate.

The canopy is dominated by Red Box *Eucalyptus polyanthemos* and to a lesser extent Red Stringybark *Eucalyptus macrorrhyncha* but also includes Inland Scribbly Gum *Eucalyptus rossii,* Bundy *Eucalyptus nortonii*, Apple Box *Eucalyptus bridgesiana* and two individuals of Yellow Box, to a height of 8-12 m and Projective Foliage Cover (PFC) of approximately 10-30%. The understorey includes species such as Mountain Hickory *Acacia penninervis,* Burgan, Silver Wattle *Acacia dealbata*, Black Wattle *Acacia mearnsii*, Grey Guinea-flower *Hibbertia obtusifolia,* Daphne Heath *Brachyloma daphnoides*, Urn-heath *Melichrus urceolatus*, *Daviesia mimosoides*, *Daviesia acicularis, Monotoca scoparia* Native Indigo *Indigofera australis,* Cherry Ballart *Exocarpus cupressiformis*, *Grevillea juniperina,* Dusty Miller *Spyridium parvifolium* and a few individuals of Black Cypress Pine *Callitris endlicheri* to a height of approximately 1-3 m and PFC of generally less than 10%.

The groundcover is dominated by *Pultenaea procumbens*, Silvertop Wallaby Grass *Joycea pallida*, Speargrass *Austrostipa scabra* subsp. *falcata*, Many-flowered Mat-rush *Lomandra multiflora* subsp*. multiflora* and in places Hoary Sunray *Leucochrysum albicans*, but also includes a range of other native and exotic species including Mulga Fern *Cheilanthes sieberi*, Blue Flax-Lily *Dianella revoluta*, Poverty Raspwort *Gonocarpus tetragynus, Phalaris* sp*., Plantago lanceolata,* Quaking Grass *Briza maxima,* Wild Oats *Avena fatua*, Red Leg *Bothriochloa macra,* Common Everlasting *Chrysocephalum apiculatum*, Fuzzweed *Vittadinia cuneata*, Spiny-headed Mat-rush *Lomandra longifolia,* Forest Goodenia *Goodenia hederacea*, Twining Pea *Hardenbergia violacea*, *Poranthera microphylla*, Australian Bluebell *Wahlenbergia stricta* and Climbing Saltbush *Einadia nutans,* to a height of approximately 1 m and PFC of approximately 10-20%.

3.3.2 Disturbed Tableland Dry Grassy Woodland

This vegetation community occurs in the northern extremities of the study area on the Heffernan's property in association with the lower parts of the drainage line that traverses the

study area and to the north in the existing Old Cooma Road reserve, as shown in Figure 3. The community is generally heavily disturbed as a result of the ongoing grazing, however there are patches, particularly in the northern parts of the study area where a more diverse native groundcover is present.

The canopy is dominated by Yellow Box and Apple Box and also includes Blakley's Red Gum *Eucalyptus blakleyi* and Red Stringybark to a height of 16-18 m and PFC of approximately 10-20%.

The understorey is generally sparse away from the drainage line and includes species such as Blackthorn, Grey Guinea-flower, Burgan, Common Cassinia *Cassinia aculeata*, *Dodonaea viscosa* subsp. *angustifolia,* and the weeds Sweet Briar *Rosa rubiginosa* and Blackberry which is particularly abundant in the creek channel*,* to a height of approximately 1-2 m and PFC of generally less than 10%.

The groundcover includes a reasonably diverse range of native and exotic grasses, sedges, ferns and herbs such as Cocksfoot *Dactylis glomerata*, Speargrass, Short Wallaby Grass *Austrodanthonia carphoides*, *Acaena ovina*, Fuzzweed *Vittadinia cuneata*, St. Johns Wort *Hypericum perforatum*, Paterson's Curse *Echium plantagineum*, *Plantago varia*, Cutleaf Cranesbill *Geranium solanderi*, Stinking Pennywort *Hydrocotyle laxiflora*, Swamp Dock *Rumex brownii*, Poverty Raspwort, Hoary Sunray, Wheatgrass *Elymus scaber* var. *scaber*, Great Mullein *Verbascum thapsus*, Wild Oats, Berry Saltbush *Einadia hastata*, and Common Everlasting to a height of approximately 1 m and PFC of 20-30%. Tall Sedge *Carex appressa* is abundant in the creek channel in places.

3.3.3 Flora Species

A total of 110 flora species were recorded in the study area during the flora survey. The species recorded comprised 84 native species and 26 introduced species, and these are listed in Table 4 below.

Table 4: Flora species recorded in the study area (* denotes introduced species or planting).

SCIENTIFICE NAME	COMMON NAME
*Acacia baileyana**	Cootamundra Wattle
Acacia dealbata	Silver Wattle
Acacia genistifolia	Early Wattle
Acacia falcata	Sickle Wattle
Acacia implexa	Hickory
Acacia mearnsii	Black Wattle
Acacia penninervis	Mountain Hickory
Acacia pycnantha	Golden Wattle

Acacia rubida	Red-stemmed Wattle
Acaena echinata	-
Acaena novae-zelandiae	Bidgee-widgee
Acaena ovina	-
*Acetosa vulgaris**	Sheep Sorrell
Allocasuarina verticillata	Drooping Sheoak
Amyema miquelii	-
*Arctotheca calendula**	Capeweed
Aristida sp. *ramosa*	A wiregrass
Astroloma humifusum	Cranberry Heath
Austrodanthonia caespitosa	Ringed Wallaby Grass
Austrodanthonia carphoides	Short Wallaby Grass
Austrostipa scabra subsp. falcata	Speargrass
*Avena fatua**	Wild Oats
Bothriochloa decipiens	Redleg Grass
Bothriochloa macra	Red Grass
Brachyloma daphnoides	Daphne Heath
*Briza maxima**	Quaking Grass
*Briza minor**	Shivery Grass
*Bromus diandrus**	Great Brome
*Bromus rubens**	Red Brome
Bursaria spinosa	Blackthorn
Callitris endlicheri	Black Cypress Pine
*Capsella bursa-pastoris**	Shepherd's Purse
Carex appressa	Tall Sedge
Cassinia aculeata	Common Cassinia
Cassinia longifolia	-
Cheilanthes sieberi	Mulga Fern
Chrysocephalum apiculatum	Common Everlasting
Convolvulus erubescens	Blushing Bindweed
Conyza sp.*	A fleabane
*Crataegus monogyna**	Hawthorn
*Dactylis glomerata**	Cocksfoot
Daviesia acicularis	-

Daviesia mimosoides	-
Dianella revoluta	Blue Flax-Lily
Dichelachne sp.	A Plume Grass
Dichondra repens	Kidney Weed
Dodonaea viscosa subsp. *angustifolia*	A hop bush
Echium plantagineum	Paterson's Curse
*Echium vulgare**	Vipers Bugloss
Einadia hastata	Berry Saltbush
Einadia nutans	Climbing Saltbush
Elymus scaber var. *scaber*	Wheatgrass
*Erodium cicutarium**	Common Storksbill
Eucalyptus blakelyi	Blakley's Red Gum
Eucalyptus bridgesiana	Apple Box
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus nortonii	Bundy
Eucalyptus polyanthemos	Red Box
Eucalyptus rossii	Inland Scribbly Gum
Exocarpos cupressiformis	Cherry Ballart
Genista sp.*	A broom
Geranium solanderi	Cutleaf Cranesbill
Glycine clandestina	Love Creeper
Glycine tabacina	Love Creeper
Gonocarpus tetragynus	Poverty Raspwort
Goodenia hederacea	Forest Goodenia
Grevillea juniperina	-
Hardenbergia violacea	Twining Pea
Hibbertia obtusifolia	Grey Guinea-flower
*Holcus lanatus**	Yorkshire Fog
Hydrocotyle laxiflora	Stinking Pennywort
Hypericum gramineum	Small St John's Wort
*Hypericum perforatum**	St. Johns Wort
*Hypochaeris radicata**	Flatweed
Indigofera australis	Native Indigo

Joycea pallida	Silvertop Wallaby Grass
Juncus sp.	-
Kunzea ericoides	Burgan
Leucochrysum albicans	Hoary Sunray
*Lolium perenne**	Perennial Rye Grass
Lomandra filiformis subsp. *filiformis*	Wattle Mat-rush
Lomandra filiformis subsp. *coriacea*	Wattle Mat-rush
Lomandra longifolia	Spiny-headed Mat-rush
Lomandra multiflora	Many-flowered Mat-rush
Melichrus urceolatus	Urn-heath
*Modiola caroliniana**	Red-flowered Mallow
Monotoca scoparia	-
*Nasella trichotoma**	Serrated Tussock
*Plantago lanceolata**	Lambs Tongue
Plantago varia	-
Phalaris sp.*	-
*Pinus radiata**	Radiata Pine
Poa annua	Winter Grass
Poa meionectes	Snowgrass
Poa sieberana	Tussock
Poranthera microphylla	-
Pultenaea microphylla var. *microphylla*	-
Pultenaea procumbens	-
*Rosa rubiginosa**	Briar Rose
Rubus fruiticosus complex*	Blackberry
Rumex brownii	Swamp Dock
Spyridium parvifolium	Dusty Miller
Themeda australis	Kangaroo Grass
Tricoryne elatior	Yellow Rush-lily
*Verbascum thapsus**	Great Mullein
Vittadinia cuneata	Fuzzweed
Vittadinia muelleri	-
Wahlenbergia communis	Tufted Bluebell
Wahlenbergia stricta	Australian Bluebell

3.4. Fauna

3.4.1 Fauna Habitats

The fauna habitats present in the study area are limited in diversity and have been subject to relatively high levels of disturbances.

Most resources are associated with the remnant woodland that occurs as discontinuous linear sections within the subject site. The woodland habitats have been highly degraded and are fragmented from other large areas of woodland, apart from the northern extent of the study area. Limited habitat interconnections are present in the northern most portion of the study area although this area is highly fragmented by roads. Connectivity in all other directions is limited by the presence of intensive rural development and agriculture.

The woodland contains foraging resources for native fauna species mainly in the form of eucalypt and mistletoe nectar, pollen and associated invertebrates. The patchy areas of native and introduced grasses provide foraging resources for species including macropods and granivorous birds, although these patches are fragmented by roads, driveways, fences and other vegetation disturbances, so reduce the potential for these resources to be utilised by native species. Relatively small patches of blackberry provide a moderate amount of fleshy fruit foraging resources for various birds and mammals, while also providing a shelter source for some birds and introduced mammals such as the rabbit and fox. The part of the study area within the Heffernan's land contains surface rocks and logs that provide shelter for reptiles. These resources occur within disturbed and sparse grassy groundcover which provides potential habitat for the threatened Pink-tailed Worm Lizard, although this habitat has been subject to either heavy grazing pressure or substantial erosion. Otherwise sheltering resources in the study area were poor due to a long history of disturbances. Seven termite mounds occur within the subject site, which provide important breeding sites for monitors including the threatened Rosenberg's Goanna, which is known to occur in adjacent woodland to the north. None of these termite mounds showed evidence of use as a monitor breeding site and they persist in a highly disturbed and fragmented landscape, reducing the likelihood of this resources being used by monitors. Fourteen trees with hollows are contained within the subject site, which provide important shelter and/or breeding resources for a range of birds and microchiropteran bats in particular. The quality of hollows however, was generally poor due to the small size and configuration of most of the hollows and/or proximity to roads.

One dam was located in the subject site, and together with an associated ephemeral drainage line, may provide habitat for common amphibians and a few water birds. The dam lacked emergent or fringing vegetation and was regularly used by sheep, so was very limited in habitat value. Similarly the ephemeral drainage lines which traverse the northern half of the study area lacked any substantial riparian vegetation or water retention areas and was completely dry during the survey period.

3.4.2 Fauna Species

Targeted fauna surveys and opportunistic observations during the survey period resulted in the recording of 21 faunal species inhabiting the study area, comprising four introduced species and 17 native species. No fauna species of conservation significance were recorded.

A total of five mammals, 13 birds and three reptiles were recorded and these are listed in Table 5.

Table 5: Fauna species recorded during this study (*denotes introduced species)

CATEGORY	COMMON NAME	SCIENTIFIC NAME	DETECTION METHOD
Mammals	Common Wombat	*Vombatus ursinus*	Bone identification
	Dog *	*Canis familiaris* *	Scat identification
	European Rabbit *	*Oryctolagus cuniculus* *	Digging signs
	Fox*	*Vulpes vulpes**	Direct observation
	Sheep*	*Ovis aries*	Direct observation
Birds	Australian Magpie	*Gymnorhina tibicen*	Direct observation
	Australian Raven	*Corvus coronoides*	Call recognition
	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Direct observation
	Brown Thornbill	*Acanthiza pusilla*	Call recognition
	Buff-rumped Thornbill	*Acanthiza reguloides*	Direct observation
	Crested Pigeon	*Ocyphaps lophotes*	Call recognition
	Crimson Rosella	*Platycercus elegans*	Direct observation
	Laughing Kookaburra	*Dacelo novaeguineae*	Call recognition
	Pied Currawong	*Strepera graculina*	Direct observation
	Red Wattlebird	*Anthochaera lunulata*	Direct observation
	Superb Fairy-wren	*Malurus cyaneus*	Direct observation
	Weebill	*Smicrornis brevirostris*	Direct observation
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Direct observation
Reptiles	A skink	*Ctenotus orientalis*	Direct observation
	Garden Skink	*Lampropholis delicata*	Direct observation
	Jacky Lizard	*Amphibolurus muricatus*	Direct observation

4. CONSERVATION SIGNIFICANCE

The *NSW Threatened Species Conservation Act 1995* (*TSC Act*) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) provide for the listing of threatened flora and fauna species, endangered populations and threatened ecological communities. The *EPBC Act* also provides for the listing of migratory species. The *NSW Fisheries Management Act 1994* (*FM Act*) provides for the listing of threatened fish species and marine vegetation.

The *TSC Act* classifies threatened flora and fauna species as Endangered (Schedule 1, Part 1), Vulnerable (Schedule 2), or Presumed Extinct (Schedule 1, Part 4). Records of these species may be obtained by searching the Atlas of NSW Wildlife.

The *EPBC Act* classifies threatened flora and fauna species as Extinct, Critically Endangered, Endangered or Vulnerable. An indication of the threatened and migratory species likely to be encountered in a locality may be obtained by using the *EBPC Act* Protected Matters Search Tool.

Both of these databases were searched on 18 October 2006 for records of threatened flora, threatened fauna and migratory species within the locality.

The *FM Act* classifies threatened fish and marine vegetation as Endangered, Vulnerable, or Presumed Extinct. An indication of the species likely to be encountered in a locality may be obtained by reviewing the recommendations for threatened species listed on the schedules of the *FM Act*.

An indication of the endangered populations and threatened ecological communities likely to be encountered in the locality can be obtained by reviewing the Final Determinations of the NSW Scientific Committee, NSW Fisheries Scientific Committee and the schedules of the TSC Act, FM Act and EPBC Act.

However give the absence of any suitable water bodies within the study area threatened fish and marine vegetation will not be assessed further in this report.

4.1 Threatened Flora

The outcomes of database searches for threatened flora were reviewed to yield the list of species shown in Table 6 below, with the status of each species listed as endangered (E) or vulnerable (V).

The potential for each of these species to occur in the study area and the importance of the habitats to be affected by the proposal are discussed in Table 6 and a decision made regarding the need or otherwise for further assessment in this report.

Table 6: Threatened flora species recorded or likely to occur in the locality

THREATENED FLORA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Ammobium craspedioides Yass Daisy	V	V	This rosette-forming perennial has solitary hemispherical flower-heads that appear in spring. The rosette dies off after fruiting. The species is known from dry forest, Box-Gum Woodland and secondary grassland on the southern tablelands and south western slopes with most populations occurring in the Yass region. The species is apparently unaffected by light grazing. The study area provides potential habitat for the species in association with the Disturbed Tableland Dry Grassy Woodland, however it is considered highly unlikely that the species occurs within the study area as the study area is substantially beyond its known range and the species was not detected there despite good survey coverage during the flowering period.	No
Calotis glandulosa Mauve Burr-daisy	V	V	This species occurs in subalpine habitats and would not occur within the study area.	No
Leucochrysum albicans var. *tricolor* Hoary Sunray	-	E	This erect perennial woody herb grows to a height of 45 cm and flowers in spring and summer. The species is found in grassy woodland and grassland mainly on the Monaro but also on the central and southern tablelands and the central-western slopes. The species was detected within the study area in a number of locations, and several thousand plants were detected either within or immediately adjacent to the study area. However similar numbers of individuals of the species occur in vegetation contiguous with but beyond the study area to the north, south and east.	Yes
Pomaderris pallida Pale Pomaderris	V	V	This species usually grows in shrub communities surrounded by Brittle Gum *Eucalyptus mannifera* and Red Stringybark or *Callitris* spp. Woodland. The study area does not provide suitable habitat for this species and it is considered highly unlikely that it occurs there.	No

THREATENED FLORA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Rutidosis leptorrhynchoides Button Wrinklewort	E	-	This perennial multi-stemmed herb grows to 35 cm in height and has bright yellow button-like flower-heads between December and March. The species occurs in Box-Gum Woodland and Natural Temperate Grassland and is associated with shallow, stony red-brown clay loams. The species is known from Goulburn, the Canberra-Queanbeyan areas, Michelago and Victoria. The species colonises disturbed areas and has been observed to flourish following fire, however it is susceptible to grazing and is now known only from un-grazed or lightly grazed sites. The un-grazed Disturbed Tableland Dry Grassy Woodland within the study area provides a small amount of potential habitat for the species, however it is considered unlikely that the species occurs within the study area and it was not detected there despite good survey coverage during the flowering period.	No
Swainsona recta Small Purple-pea	E	E	This species is a slender erect perennial herb growing to 30 cm in height. It bears sprays of 10-20 purple pea shaped flowers between late September and early December. Plants die back in summer shooting again in autumn. The species is associated with grassy Box-Gum Woodlands and its current known NSW distribution is restricted to the Queanbeyan and Mudgee-Wellington areas. The study area provides a small amount of potential habitat for the species however it was not detected there despite good survey coverage during the flowering period and, as such, it is considered unlikely that the species occurs within the study area.	No
Swainsona sericea Silky Swainson-pea	V	-	This species is found in Temperate Montane Grasslands and Box-Gum Woodland in the Southern Tablelands and South West Slopes. The species has been recorded in association with Yellow Box woodland on a property 2.5 km to the south of the study area. The study area provides a small amount of potential habitat for the species however it was not detected there despite good survey coverage during the flowering period and, as such, it is considered unlikely that the species occurs within the study.	No
Thesium australe Austral Toadflax	V	V	This species is associated with damp sites in native grasslands and grassy woodlands and is a hemi-parasite of Kangaroo Grass *Themeda australis*. The study area does not support an abundance of Kangaroo Grass and the species was not recorded within the study area despite good survey coverage. It is considered unlikely that the species would occur there.	No

Note: Habitat requirements for flora species in Table 5 have been sourced from Eddy *et. al* (1998), Harden (1990-2000), www.npws.nsw.gov.au (accessed 2006), NSW DEC www.threatenedspecies.environment.nsw.gov.au (accessed 2006) and PlantNET http//plantnet.rbgsyd.gov.au (accessed 2006).

The study area supports known habitat for the Hoary Sunray which is listed as endangered under the EPBC Act. Consequently the effects of the proposal on the Hoary Sunray will be assessed further in Section 5.6 of this report.

4.2 Threatened Fauna

The outcomes of database searches for threatened fauna and the recommendations for threatened species listed on the schedules of the *FM Act* were reviewed to yield the list of species shown in Table 7 below, with the status of each species listed as endangered (E) or vulnerable (V). The potential for each of these species to occur in the study area and the importance of the habitats to be affected by the proposal are discussed in Table 7 and a decision made regarding the need or otherwise for further assessment in this report. Additional species that may inhabit the study area have also been included by correlating habitat requirements with the attributes of the study area. Marine and oceanic species have been omitted as they would not occur in the study area.

Table 7: Threatened fauna species recorded or likely to occur in the locality

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Mammals				
Eastern Bentwing Bat *Miniopterus schreibersii oceanensis*	V	-	This bat uses caves as roosting sites and woodlands/forests for foraging. No roosting sites are present in the study area and the amount of foraging habitat to be removed by the proposal is negligible in relation to the extent of available habitat in the locality and the wide foraging range of this species.	No
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V	-	Prefers moist habitats, with trees taller than 20 m. The study area does not represent preferred habitat for this species. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Up to 14 trees with hollows may be removed or otherwise affected by the proposal. Most of these hollows are small, branch hollows or otherwise of poor quality for regular microchiropterans use. The hollows to be removed are not expected to provide important roosting resources and were thus not assessed further by targeted surveys. No evidence (guano deposits) of communal roosting sites was recorded at any of the trees with hollows. The trees with hollows to be affected by the proposal are not unique or rare in the wider landscape. The relatively small amount of foraging habitat to be removed by the proposal is negligible in relation to the extent of available habitat in the locality and the wide foraging range of this species.	No

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Koala *Phascolarctos cinereus*	V	-	Inhabits eucalypt woodlands and forests with a fragmented distribution through eastern Australia. The species is irregularly recorded in the general area and the closest records are associated with the Queanbeyan River corridor. These records include a 2007 sighting on the eastern outskirts of Queanbeyan and a 1984 record from the north of Googong Dam. A number of secondary feed tree species occur in the study area, but no primary feed tree species listed in the draft recovery plan for the Koala (NPWS 2003) occur in the study area. The species is unlikely to occur in the highly disturbed habitat within the study area, particularly given the extent of vegetation removal surrounding the study area. No individuals or evidence (scats or claw marks on tree trunks) of the species were found during the survey period. The extent of disturbances (including cars, dogs and people) and lack or records close to the study area suggest that the species is unlikely to occur there and would not be affected by the proposal.	No
Spotted-tailed Quoll *Dasyurus maculatus*	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. The highly disturbed study area does not contain suitable habitat for this species, nor does it provide a corridor between areas of better habitat. No evidence of the species was recorded during the survey period. The closest record of this species to the study area (according to BioNet databases) is at Googong Dam from over 20 years ago. The species is not expected to occur in the study area.	No
Birds				
Brown Treecreeper *Climactis picumnus*	V	-	Found in eucalypt woodlands (including Box-Gum Woodland). Sedentary and considered to be resident in many locations throughout its range so is present in all seasons or year-round at many sites. Hollows (greater than 6cm diameter) in standing dead or live trees and tree stumps are essential for nesting. The study area contains a low number of tree hollows of a suitable size for nesting, but the high level of disturbances, including broad-scale vegetation removal, renders the general habitat in the study area largely unsuitable for the species. The species was not recorded during the survey period. Habitats within the study area are unlikely to be of importance to this species and it is unlikely to occur there.	No

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Diamond Firetail *Stagonopleura guttata*	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands. Also occurs in Natural Temperate Grassland, and in secondary grassland derived from other communities. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. The species was not recorded during the survey period and no evidence of nests was found, but the species is known from the general area and could potentially occur in the northern and southern parts of the study area with a grassy understorey on occasions. The small patches of grassy foraging habitat within the study area would offer relatively low quality resources, and as such, the species is not expected to occur in the study area on a regular basis. The fragmented foraging habitat within the study area is limited to road easements and for the most part surrounded by heavily modified environments. These areas of habitat are discontinuous and the presence of larger areas of better habitat in the locality suggests that the species is very unlikely to be reliant on habitats in the study area or occur there regularly.	No
Gang-gang Cockatoo *Callocephalon fimbriatum*	V	-	Preferred habitat is tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests, but will also occur in drier vegetation on the coast and ranges. Nests in tree hollows. This species was not detected during the survey period. The study area contains marginal foraging habitat for this species. Trees with hollows to be removed for the proposal are generally unsuitable as nesting sites for this species. The species is unlikely to occur in the study area and the habitats to be affected by the proposal are not important for this species.	No
Hooded Robin *Melanodryas cucullata*	V	-	Prefers lightly wooded country, usually open eucalypt woodland, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. May breed any time between July and November. The species was not recorded during the survey period and is unlikely to occur in the study area given the highly disturbed and fragmented nature of habitats present. The removal of this habitat for the proposal is unlikely to be detrimental to the species.	No

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Speckled Warbler *Pyrrholaemus sagittatus*	V	-	The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The species was not recorded during the survey period and the highly disturbed and fragmented vegetation within the study area is generally unsuitable habitat. The species is not expected to occur in the study area.	No
Reptiles				
Grassland Earless Dragon *Tympanocryptis pinguicolla*	E	E	Restricted to a small number of Natural Temperate Grassland sites dominated by wallaby grasses (*Autrodanthonia* spp.), spear grasses (*Austrostipa* spp.), Poa Tussock (*Poa sieberiana*), Red Grass (*Bothriochloa macra*), and occasionally Kangaroo Grass (*Themeda australis*). Introduced pasture grasses occur at many of the sites supporting this species, which has also been captured in secondary grassland. Within its habitat, apparently prefers areas with a more open structure, characterised by small patches of bare ground between the grasses and herbs. In addition to tussocks, partially embedded surface rocks, and spider and insect holes are used for shelter. These are important micro-habitat elements within the grassland habitat. This species was not detected during targeted reptile surveys. The highly disturbed and fragmented woodlands of the study area represent at best marginal habitat. Open grassy groundcover components of these woodlands tend to occur only in a few small and isolated patches. The species is not expected to occur in the study area.	No
Little Whip Snake *Suta flagellum*	V	-	Occurs in Natural Temperate Grasslands and grassy woodlands. Also occurs in secondary grasslands derived from clearing of woodlands. Found on well drained hillsides, mostly associated with scattered loose rocks. Most specimens have been found under rocks or logs lying on, or partially embedded in, the soil. This species was not recorded during intensive targeted reptile surveys or at other times during the survey period and is not known to occur in the immediate area. Some potential habitat of lower quality may occur in the study area, although this is not expected to be important for the species. The species would appear unlikely to occur in the study area.	No

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
Pink-tailed Worm-lizard *Aprasia parapulchella*	V	V	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. The species was not detected during targeted surveys, however the slopes towards the southern portion of the subject site contain some potential habitat for this species, as do the rocky slopes immediately to the west of this section.	Yes
Rosenberg's Goanna *Varanus rosenbergi*	V	-	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in. The species was not recorded during the survey period, but some potential habitat including termite mounds exists in the study area. The species is known from adjoining woodland to the north.	Yes
Striped Legless Lizard *Delma impar*	V	V	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass, spear-grasses *Austrostipa spp*. and poa tussocks *Poa spp*., and occasionally wallaby grasses *Austrodanthonia spp*. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. The study area contains relatively low quality habitat for this species and such habitat is patchy and fragmented. Disturbances in and adjacent to the study area which have removed potential habitat include construction of roads and provision of underground service easements, severe erosion and heavy grazing. The species was not detected during targeted reptile surveys that searched potential shelter sites under rocks, logs and debris. It is not known to occur in the immediate area and is not expected to occur in the study area. The habitats to be affected by the proposal are not considered to be important for this species.	No
Amphibians				
Green and Golden Bell Frog *Litoria aurea*	E	V	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. There is an extant population near Captains Flat, however the species is not known to occur in the locality and was not detected during the survey period. The study area does not contain suitable habitat. The single dam in	No

THREATENED FAUNA SPECIES	STATUS		POTENTIAL TO OCCUR IN THE STUDY AREA AND IMPORTANCE OF HABITATS TO BE AFFECTED BY THE PROPOSAL	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
	TSC Act	EPBC Act		
			the study area does not contain emergent vegetation or other adjacent shelter sites. The species is not expected to occur in the study area.	
Southern Bell Frog *Litoria raniformis*	E	V	Usually found in or around permanent or ephemeral Black Box/*Lignum*/*Nitre* Goosefoot swamps, *Lignum*/*Typha* swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. The species is thought to be extinct on the NSW tablelands. The study area contains a single dam within an ephemeral drainage line which does not constitute suitable habitat for this species.	No
Invertebrates				
Golden Sun Moth *Synemon plana*	E	E	Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which ground layer is dominated by wallaby grasses *Austrodanthonia* spp. Grasslands dominated by Wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses *Austrostipa* spp. or Kangaroo Grass *Themeda australis*. The species is known from the general locality. The study area contains only small, patchy areas of marginal habitat for this species. These few open patches of mixed native grasses were intensively searched for the species during the known flying season and during suitable conditions, however no individuals were recorded. Repeat The very small areas of low quality habitat within the study area would not be important for the species, which is considered unlikely to occur there.	No

Note: Habitat requirements for fauna species in Table 7 have been sourced from Blakers et.al. (1984), Churchill (1998), Clout (1989), Cogger (1996), Commonwealth DEH (1999), Commonwealth DEH (2001), Daly and Murphy (1996), Ehmann (1997), McDowell (1996), NSW NPWS (1996), NSW NPWS (1998), NSW NPWS (2000), NSW DEC http://threatenedspecies.environment.nsw.gov.au (accessed 2007), Strahan (1995).

The effects of the proposal on the threatened Pink-tailed Worm Lizard and Rosenberg's Goanna will be assessed in subsequent sections of this report.

4.3 Migratory Species

The outcome of the database search for migratory species was reviewed to yield the list of species shown in Table 8 below.

The potential for each of these species to occur in the study area is discussed in Table 8 and a decision made regarding the need or otherwise for further assessment in this report. None of these species were recorded during the survey period.

Species encountered in marine and wetland environments have been omitted as these habitats do not occur in the study area.

Table 8: Migratory species recorded or likely to occur in the locality

SPECIES	POTENTIAL TO OCCUR IN THE STUDY AREA	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
Latham's Snipe *Gallinago hardwickii*	This species is found in a range of vegetated wetland environments. No suitable habitat occurs in the study area. The single dam in the study area is very small, isolated and lacks associated vegetation. The species was not recorded in or near the study area during the survey period and is not expected to occur there.	No
Painted Snipe *Rostratula benghalensis*	This species is usually found in vegetated, shallow, temporary or infrequently filled wetlands. No suitable habitat occurs in the study area. The single dam in the study area is very small, isolated and lacks associated vegetation. The species was not recorded in or near the study area during the survey period and is not expected to occur there.	No
Regent Honeyeater *Xanthomyza phrygia*	This nectivorous species occurs predominantly in dry, open forests and woodlands, particularly Box-Ironbark woodland and River She-oak forests. The study area does not contain preferred vegetation communities or important foraging resources, although the species could potentially forage in flowering eucalypts and mistletoes on occasions. The species is not known to nest in the area. The species is unlikely to occur in the study area regularly given the limited resources present. The amount of potential foraging resource to be affected by the proposal is inconsequential relative to the extent of foraging resources in the locality.	No
Rufous Fantail *Rhipidura rufifrons*	This species is known to utilise dense understorey in damp forests or beside rivers. Suitable habitat does not occur in the study area, and the species is unlikely to occur there.	No
Satin Flycatcher *Myiagra cyanoleuca*	This species inhabits lowland eucalypt forests. It is known to nest in dense gully vegetation. The study area contains marginal to unsuitable habitat for this species and it is unlikely to occur there.	No
White-bellied Sea-eagle *Haliaeetus leucogaster*	This species inhabits coastal environments and inland rivers, lakes, dams and other substantial sources of water. Suitable habitat does not occur in the study area and the species is not expected to occur there.	No

SPECIES	POTENTIAL TO OCCUR IN THE STUDY AREA	FURTHER ASSESSMENT REQUIRED IN THIS REPORT
White-throated Needletail *Hirundapus caudacutus*	This species is associated with steep hillsides and is thought to spend all of its time in the air whilst in Australia. The study area is not on a prominent hillside so the species is unlikely to occur there apart from over-flying the area. It was not detected during the survey period and the study area does not provide habitat for this species.	No

No migratory species are likely to be affected by the proposal and none were recorded in the study area during the survey period. No further consideration is given to migratory species in this report.

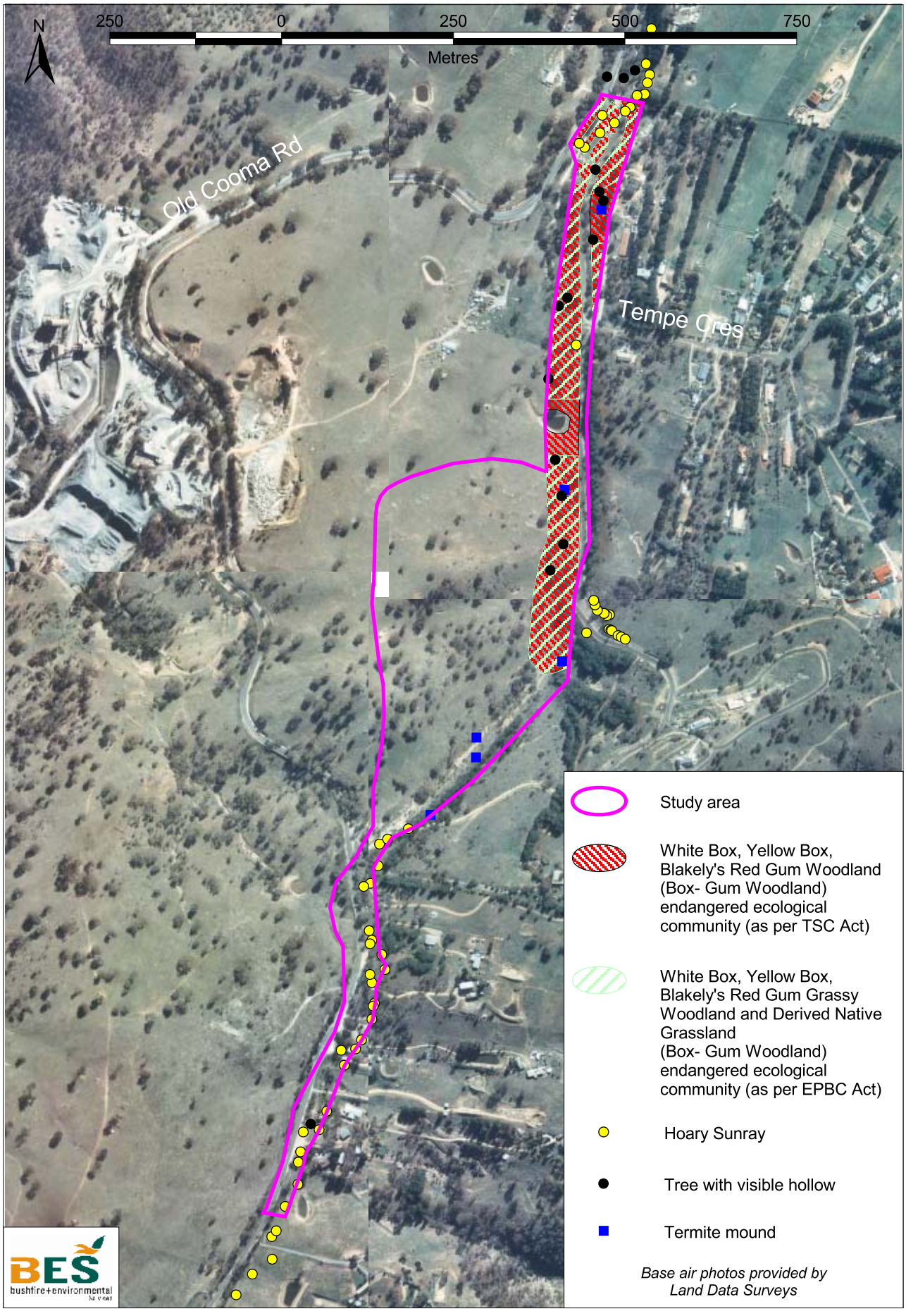
4.4 Endangered Populations

The *TSC Act* provides for the listing of endangered populations on Schedule 1, Part 2. There are no endangered populations listed on the schedules of the *TSC Act* within study area.

4.5 Endangered Ecological Communities

The *TSC Act* and *EPBC Act* provide for the listing of threatened ecological communities. The vegetation within the study area includes the endangered ecological community White Box, Yellow Box, Blakely's Red Gum Woodland (Box-Gum Woodland) which is listed on Schedule 1 Part 3 of the *TSC Act* (Figure 4). The study area also includes occurrences of the White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (Box-Gum Woodland) which is listed on the *EPBC Act* (Figure 4).

Figure 4: Communities and species of conservation significance, trees with hollows and termite mounds



5. IMPACT ASSESSMENT

5.1 Impacts on Vegetation Communities

Much of the vegetation within the study area has been modified by historic and ongoing disturbances associated within agriculture, the construction and maintenance of Old Cooma Road, the provision of electricity services, and in association with surrounding rural residential development. However disturbances have been heaviest in the central parts of the study area, on the Heffernan's property, where heavy erosion has removed topsoil leaving bare ground and regrowth vegetation dominated by weeds and species indicative of heavy disturbances. The vegetation in this area is highly modified has little recovery potential and is subsequently of little conservation significance.

Elsewhere within the study area the remnant vegetation is in reasonably good condition. For instance, there are patches of Disturbed Tableland Dry Grassy Woodland within the northern parts of the Heffernan's property where a reasonably diverse native groundcover persists below a sparse canopy of remnant and regrowth eucalypts. Similarly, much of the remnant vegetation within the Old Cooma Road road reserve is in relatively good condition with only minor weed invasion and a diverse range of native species in all strata, including a relative abundance of the nationally endangered species Hoary Sunray.

The vegetation in these parts of the study area are of greater conservation significance and especially those parts that comprise the endangered ecological communities White Box, Yellow Box, Blakely's Red Gum Woodland (Box-Gum Woodland) which is listed on Schedule 1 Part 3 of the *TSC Act* and the White Box, Yellow Box, Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands which is listed on the *EPBC Act* (Figure 4).

The study area supports approximately 3.7 ha of Ecotonal Tablelands Dry Shrub/Tussock Grass Forest. However only approximately 1.7 ha the community is, whilst heavily fragmented, otherwise in reasonably good condition. The other 2 ha is heavily disturbed in association with the heavy disturbances to the substrate that have occurred in the southern parts of the Heffernan's property. The study area also supports approximately and 4 ha of Disturbed Tableland Dry Grassy Woodland that, whilst heavily disturbed in places, could be recovered with appropriate management in the long term.

Gellie (2005) estimates that there is approximately 94,600 ha of Tablelands Dry Shrub/Tussock Grass Forest extant which is estimated to be approximately 45% of the communities pre 1750 extent. Approximately 16,800 ha or 8% of the communities pre 1750 extent is in dedicated conservation reserves (Gellie 2005). Under these circumstances, the loss of approximately 1.7 ha or 0.002 % of the extant distribution of the Tablelands Dry Shrub/Tussock Grass Forest in association with the proposal is considered an acceptable impact. However, the 1.7 ha of the community within the study area supports part of the local population of the Hoary Sunray and is

part of a narrow band of less disturbed remnant native vegetation associated with the Old Cooma Road road reserve, which provides a linkage to larger areas of remnant native vegetation to the south of the study area. In this context, the removal of the 1.7 ha of the Ecotonal Tablelands Dry Shrub/Tussock Grass Forest in the southern parts of the study area compromises a potentially substantial impact on remnant native vegetation within the locality and on biodiversity generally in the locality. As such this report includes recommendations to mitigate the adverse impacts associated with the removal of the Ecotonal Tablelands Dry Shrub/Tussock Grass Forest within the Old Cooma Road road reserve in the southern parts of the study area.

The Disturbed Tableland Dry Grassy Woodland within the study area comprises a disturbed occurrence of the White Box, Yellow Box, Blakely's Red Gum Woodland (Box-Gum Woodland) endangered ecological community which is listed on Schedule 1 Part 3 of the *TSC Act* and the White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grassland endangered ecological community which is listed on the *EPBC Act*. The affects of the proposal on this community will be assessed further in Section 5.3 and 5.5 of the report.

5.2 Impacts on Fauna Habitats

The fauna habitats to be removed or modified for the proposal are those associated with disturbed woodlands and are of relatively low quality.

Up to 7.7ha of disturbed woodland would be removed for the proposal, although none of the foraging resources to be removed are unique in the locality or restricted to the areas to be affected by the proposal. Foraging substrates for native fauna in the form of flowering trees and seeding groundcover plants and grasses occur relatively widely in the locality.

Shelter sites and foraging substrates in the form of surface rocks and logs will be removed from the subject site, although most of these resources occur in the highly disturbed grazing land on the Heffernan's property and fauna surveys indicated that these habitats did not support a large diversity of fauna. Water habitats to be affected by the proposal include a highly eroded ephemeral drainage line and constructed dam in the north of the study area. The condition and value of these habitats was considered to be poor, and thus the removal and modification of these habitats constitutes a relatively minor impact to fauna habitats within the locality.

A total of 14 trees and stags with hollows are likely to be removed for the proposal, however they all offer relatively low quality shelter sites for native fauna. Survey results suggest that trees with hollows in the study area are not particularly important resources for native fauna and would appear unlikely to be regularly used by any hollow-dependant threatened species. A large quantity of trees containing higher quality hollows are expected to occur within the large areas of nearby woodland. In this context, the removal of up to 14 trees or stags containing low quality hollows is considered acceptable.

A total of seven termite mounds, which provide potential egg-laying sites for the threatened Rosenburg's Monitor, are likely to be removed for the proposal. The Rosenburg's Monitor is known from habitat in the Wickerslack Lane area, which is adjacent to the north of the study area. Termite mounds are expected to occur widely throughout woodland in the locality and the limited and highly disturbed habitats of the study area are of much lower quality than woodland to the north of Wickerslack Lane. This would suggest that habitats in the study area would not be important to the Rosenberg's Goanna or other monitors. Thus the loss of seven termite mounds from within the study area is not considered to be a major loss.

The extent of fauna habitats proposed to be removed from the study area is relatively minor in the context of the extent of these resources in the locality. The study area does form a narrow, disrupted and relatively low quality north-south movement corridor which links larger areas of fauna habitat in the north and south of the study area. The size and condition of this corridor suggests is likely to be utilised mainly by birds. The loss of most or all of the fauna habitats from the subject site may therefore also adversely impact biodiversity in the wider area by reducing habitat connectivity. This impact could be ameliorated by a system of strategic revegetation on other land tenures to the east and west of Old Cooma Road, which, in conjunction with existing patches of native vegetation, could enhance the connectivity between the larger patches of woodland to the south and north of the study area.

Further recommendations to mitigate the impacts on habitats in the study area are made in a subsequent section of this report.

5.3 Effects on Threatened Biota (Assessment of Significance)

An assessment of the effects of the proposal on threatened species, ecological communities and endangered populations likely to occur in habitats similar to those available in the study area, may be carried out by applying the seven factors from Section 5A of the amended *NSW Environmental Planning and Assessment Act 1979*, to each identified threatened species, endangered population and endangered ecological community.

This Seven-Part-Test-Of-Significance is presented below for the Pink-tailed Worm Lizard, Rosenberg's Goanna and Box-Gum Woodland. No endangered populations or threatened flora species listed on the schedules of the TSC Act occur in the study area.

Part a)

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Pink-tailed Worm Lizard (Schedule 2, Vulnerable)

The Pink-tailed Worm-lizard inhabits sloping well drained areas that have rock outcrops or scattered partially buried rocks and support open woodlands with a groundcover of

predominantly native grasses, particularly those dominated by Kangaroo Grass (*Themeda australis*). The species is commonly found beneath small partially embedded rocks and appears to spend considerable time in ant and termite burrows below these rocks. The species is only known from the central and southern tablelands and the south western slopes. There is a concentration of populations in the Canberra/Queanbeyan Region, however other populations are known from near Cooma, Yass, Bathurst, Albury and West Wyalong.

The central parts of the study area contain potentially suitable habitat for this species as many scattered rocks occur within areas of native grasses and a much reduced tree density has occurred through clearing.

The life cycle of the Pink-tailed Worm-lizard could be significantly disrupted if:

- important areas of sheltering and or foraging habitat are modified, removed or isolated;
- heavy grazing and trampling by stock and rabbits cause habitat degradation through root damage, prevention of seedling establishment and erosion,
- other disturbances or modifications to ecological processes result in habitat degradation;
- populations are subject to predation pressures from feral or domestic predators.

The action proposed would remove up to 3.5 ha of potential habitat along the road easement of 40-60m in width. An adjacent area on the Heffernan's property to the west of the road easement also contains potential habitat for the species. None of this potential habitat is considered to be of high quality as the full extent of this habitat has been subject to high grazing pressures and/or heavy erosion in the higher reaches of the ephemeral drainage channel. These disturbances have substantially reduced or removed topsoil and native grass cover throughout the areas covered by surface rocks. Patches of woodland containing less disturbed native grasses occur within the easement to the north and south of the Heffernan's property, however these areas lack surface rocks required to provide suitable habitat.

Targeted surveys involving searches under rocks, logs and debris within the road easement and adjoining areas of potential habitat failed to find any individuals. Surveys were undertaken on two occasions in November 2006 January 2007, during conditions that should have been amenable to detection of the species and when the species was likely to be active near the surface. Potential habitat over approximately 12 ha of the study area was searched for 16 person-hours and over 1,600 rocks and 200 logs were turned in search of the species.

The lack of evidence of any individuals and degraded habitat suggests that the species is not present within the study area. Thus, current data suggest that the proposal would be unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Rosenberg's Goanna (Schedule 2, Vulnerable)

Rosenberg's Goanna is a terrestrial monitor which occurs in heath, open forest and woodland. Termite mounds are a critical habitat component as the species lays eggs within these mounds. Termites re-seal the mound and the goanna eggs are maintained at a relatively constant temperature to incubate. Hatchlings dig themselves out of the termite mounds. The species shelters in burrows, rock crevices and hollow logs and feeds on a range of small animals, eggs and carrion. The species is known from adjoining woodland near Wickerslack Lane. The species was not recorded during the survey period, but marginal habitat containing termite mounds exists in the study area.

The life cycle of Rosenberg's Goanna could be significantly disrupted if:

- important areas of sheltering or nesting habitat (termite mounds) are removed or isolated;
- large areas of foraging habitat are removed or fragmented;
- upgrading or construction of roads increases mortality rates from vehicle collisions;
- populations are subject to predation pressures from cats or dogs.

The study area is adjacent to relatively high quality habitat to the north of Wickerslack Lane where the species is known to occur. However, the study area contains much lower quality habitat for the species due to the range and intensity of historic and current disturbances. Some termite mounds, potential shelter and foraging resources are present at relatively low densities, but these resources exist within a heavily modified landscape.

The action proposed would remove an area of sub-optimal habitat along the road easement of 40-60m in width (7.12-10.68 ha) and would remove up to seven termite mounds which offer potential nesting resources. The species was not observed during the survey period and none of the termite mounds within the study area showed evidence of use as an incubation chamber. While some habitat components are present, the species is not considered likely to use the area on any more than an occasional basis given the extent of vegetation removal and other disturbances. The species requires a large home range, which would not be accommodated by the study area. The study area is very unlikely to function as a habitat corridor for this species given the distribution of suitable habitat in the locality.

The highly disturbed habitats within the study area are very unlikely to be of importance to this species and the proposal is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Part b)

In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

No endangered populations listed in *Schedule 1 Part 2* of the *TSC Act*, are found in the study area.

Part c)

In the case of an endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The study area supports approximately 4 ha of disturbed Box-Gum Woodland. The local occurrence of the Box-Gum Woodland extends beyond the study area into contiguous vegetation particularly to the north of the study area in association with the Old Cooma Road road reserve. Field observations and aerial photo interpretation suggest that the Box-Gum Woodland within the northern parts of the study area is contiguous with the Box-Gum Woodland that occurs in association with the lower parts of Barracks Creek and tributaries, and on the lands to the north of Wickerslack Lane.

Whilst it has not been determined precisely, the extent of the local occurrence of the Box-Gum Woodland is estimated to be at least several hundred hectares. Thompson and Mullins (2004) mapped several hundred hectares of the community on properties approximately 2-3 km to the south-east and south-west of the Box-Gum Woodland within the study area, and a large patch of the community occurs to the immediate north north-east of the study area, on the property to the north of Wickerslack Lane. This area, like the Box-Gum Woodland in the lower parts of Barracks Creek and tributaries, has been mapped by Gellie (2005) as South Eastern Tablelands Dry Shrub-Grass-Herb Forest. Limited surveys by BES on the property to the north of Wickerslack Lane (BES 2007a) indicate that at least parts of the property support Box-Gum Woodland, although the extent of the community on the property has not been determined precisely. The local occurrence of the Box-Gum Woodland is also likely to extend further to the east on the eastern side of Queanbeyan River where there are lands that have also been mapped by Gellie (2005) as South Eastern Tablelands Dry Shrub-Grass-Herb Forest, and is likely to occur, at least in patches throughout the rural lands between the areas mentioned above.

Under theses circumstances it would appear reasonable, given the relative proximity of known patches of Box-Gum Woodland and the distribution and extent of other remnant native vegetation within the locality, that exchange of genetic material occurs across the patches that comprise the known extent of the community in the locality. However, on the basis of the surveys undertaken for this report it is not possible to demonstrate this definitively. As such, whilst the local occurrence of the Box-Gum Woodland is expected to be hundreds of hectares in extent, it is possible that the local occurrence is limited to the Box-Gum Woodland within the study area and contiguous Box-Gum Woodland associated with Old Cooma Road easement to the north, the lower parts of Barracks Creek and tributaries, and on the lands to the north of Wickerslack Lane.

The action proposed involves the removal or modification of approximately 4 ha of disturbed Box-Gum Woodland, which is likely to be a relatively small proportion of the local occurrence of the community. However, given the uncertainty regarding the extent of the local occurrence of the community, it is possible that the action proposed may more substantially reduce the extent of the local occurrence of the Box-Gum Woodland. Notwithstanding the potential reduction in extent of the local occurrence of the Box-Gum Woodland associated with the action proposed, given the known extent of Box-Gum Woodland contiguous with the Box-Gum Woodland within the study area, it is considered unlikely that the action proposed will reduce the extent of the Box-Gum Woodland such that its local occurrence is likely to be placed at risk of extinction.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

The Box-Gum Woodland beyond the study area is likely to support areas with a similar composition to that within the study area, and the study area is not expected to support a unique assemblage of characteristic species of the community that does not occur elsewhere within the local occurrence. The Box-Gum Woodland in the locality is likely to vary in condition, with much of it likely to be heavily disturbed as is the case within much of the Box-Gum Woodland within parts of the study area. However, it is known that the lands to the north of Wickerslack Lane support occurrences of the community that are in very good condition. Furthermore, Thompson and Mullins (2004) describe large areas of Box-Gum Woodland in similar condition states to that within the study area on properties to the south.

The fauna assemblage inhabiting the study area is likely to be distributed throughout the Box-Gum Woodland in the locality. Fauna species such as invertebrates, amphibians, reptiles, birds, arboreal mammals and microchiropteran bats utilising foraging substrates would not be restricted to the areas affected by the action proposed and would be highly likely to continue to utilise habitats in the Box-Gum Woodland in the locality.

Under these circumstances the action proposed is unlikely to substantially and adversely modify the composition of Box-Gum Woodland such that its local occurrence is likely to be placed at risk of extinction.

Part d)

In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed.

The proposal is expected to remove approximately 4 ha of disturbed Box-Gum Woodland, approximately 3.5 ha of potential and substantially disturbed habitat for the Pink-tailed Worm Lizard and up to 10.68 ha of potential and marginal habitat for Rosenberg's Goanna.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action.

The Box-Gum Woodland within the within the northern parts of the Old Cooma Road road reserve occurs in a narrow band of remnant vegetation on either side of the existing pavement. On the Heffernan's property, where the Box-Gum Woodland is present, it is more extensive and generally occurs across the entire width of the study area. However, in both locations, the Box-Gum Woodland immediately beyond the study area boundaries, appears to have become locally extinct as a result of heavier historic and ongoing disturbance regimes.

As a result of these historic disturbances, the Box-Gum Woodland within the study area is already at the southern margins of the patch of more or less contiguous Box-Gum Woodland that extends south from the lower parts of Barracks Creek and tributaries, and the lands to the north of Wickerslack Lane, along the Old Cooma Road road reserve and into the eastern margins of the Heffernan's property. As such the action proposed will not isolate or fragment habitat for the Box-Gum Woodland in this area, as the fragmentation has already occurred in association with historic disturbances, and the Box-Gum Woodland to be removed occurs at the margins of the community.

Pink-tailed Worm Lizard

The proposed action is not considered likely to fragment or isolate habitat for the Pink-tailed Worm Lizard as the species is unlikely to occur within the subject site or within adjacent habitat to the west on the Heffernan's property. Targeted surveys were undertaken to investigate the presence of the species within and adjacent to the subject site, as there was the potential to isolate habitat within the Heffernan's property if the species was present. The negative results from the targeted surveys and severe disturbances to this area, including ongoing heavy grazing, suggest the species is not present within the study area.

Rosenberg's Goanna

The proposed action is not expected to remove any habitat occupied by the Rosenberg's Goanna, and will not fragment or isolate habitat suitable for the species.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposal is expected to remove approximately 4 ha of the local occurrence of the Box-Gum Woodland.

Whilst the 4 ha of Box-Gum Woodland to be removed or modified by the proposal is in places in relatively good condition and could potentially be recovered with appropriate long-term management, it is not considered particularly important to the long-term survival of the local occurrence of the Box-Gum Woodland as it:

- is unlikely to be substantially different in composition and condition to the rest of the Box-Gum Woodland in the locality;
- comprises only 4 ha of a local occurrence of the Box-Gum Woodland which is estimated to be several hundred hectares in extent; and

- is at the margins of an existing zone of heavy disturbance.

However, whilst there are expected to be hundreds of hectares of the community in varying condition states within the locality, across its range the community has been heavily depleted with estimates of between 96% and 99% of its pre 1750 extent removed (NSW Scientific Committee 2002). Similarly, many of the threatening processes which affect the community have not been affectively controlled to date and continue to cause further reductions in the extent and condition of the community. Furthermore, none of the local occurrence of the community is known to occur in lands that are managed for conservation purposes. As such, all occurrences of Box-Gum Woodland are potentially important to the long-term survival of the species, including those occurrences within the study area.

Pink-tailed Worm Lizard

Approximately 3.5 ha of potential habitat for the Pink-tailed Worm Lizard is expected to be removed by the proposed action. This habitat is highly degraded, particularly through grazing, erosion and weed invasion. Targeted surveys failed to find the species within the areas to be affected by the proposal. Targeted surveys also failed to find evidence of the species on adjacent potential habitat immediately to the west. This habitat was also subject to the same degrading processes and in relatively poor condition for this species. As a result, the species is considered unlikely to occur in the study area and the habitats present are not considered important to the long-term survival of the species in the locality.

Rosenberg's Goanna

Up to 10.68 ha of marginal and disturbed habitat is likely to be removed by the action proposed. While this habitat contains seven termite mounds and some potentially suitable foraging and sheltering resources, the vast majority of the study area contains low quality habitat for this species due to extensive disturbances including roads, fences, heavy grazing, clearing, substantial erosion and weed invasion. The narrow, linear habitat in the study area would not be favoured by the species and does not form a viable corridor to areas of better quality habitat. The species is considered unlikely to occur in the study area and the habitats present are not considered important to the long-term survival of the species in the locality.

Part e)

Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

The action proposed will not affect any critical habitat that has been declared under the *TSC Act*.

Part f)

Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There have been no approved or draft recovery plans prepared for Box-Gum Woodland, the Pink-tailed Worm Lizard or Rosenberg's Goanna. No threat abatement plans have been prepared for the threatening processes which apply to the action proposed: *Clearing of native vegetation; Invasion of native plant communities by exotic perennial grasses:* and *Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands.*

Part g)

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The action proposed constitutes the key threatening processes *Clearing of native vegetation* and may exacerbate the key threatening processes *Invasion of native plant communities by exotic perennial grasses* and *Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands.*

Clearing of native vegetation

The extent of clearing or other vegetation modification for the action proposed is approximately 7.7 ha: 3.7 ha of Ecotonal Tablelands Dry Shrub/Tussock Grass Forest; and 4 ha of Disturbed Tableland Dry Grassy Woodland. However, approximately 2 ha of the Ecotonal Tablelands Dry Shrub/Tussock Grass Forest has been heavily disturbed in association with the heavy disturbances to the substrate that have occurred in the southern parts of the Heffernan's property, and the recovery potential of this parts of the community appears to have been heavily comprised.

The Ecotonal Tablelands Dry Shrub/Tussock Grass Forest to be cleared in association with the action proposed is small in the context of the extent of similar vegetation in the locality including in the lands to the east surrounding the Googong Water Treatement Plant. However, the community has generally been cleared or otherwise heavily disturbed on lands immediately adjoining the study area. Within the study area the community is generally in relatively good condition with a relatively diverse native understorey and groundcover, which includes individuals of the nationally endangered Hoary Sunray.

The 4 ha of Disturbed Tableland Dry Grassy Woodland comprises the Box-Gum Woodland endangered ecological community which has been much affected by the threatening process of *Clearing of native vegetation.* Indeed across its range it is estimated that between 96% and 99% of the pre 1750 extent of the Box-Gum Woodland has been cleared (NSW Scientific Committee 2002).

Some opportunities for regeneration of native species on the fringes of the main roadworks may exist following construction, and the duplication of the Old Cooma Road deviation (from two lanes to four lanes) is not proposed until 2027.

Nonetheless, in the context of the impacts on remnant native vegetation, endangered flora and ecological communities, the action proposed is likely to result in the operation of and increase the impact of the threatening process of *Clearing of native vegetation.*

Invasion of native plant communities by exotic perennial grasses

The existing disturbances to the native vegetation within the study area have already resulted in much of the study area, becoming invaded by exotic perennial grasses. The proposed action may provide new opportunities for the invasion of such grasses into remnant native vegetation to be retained within the proposal or adjoining the study area. In order to mitigate the potential impacts of this threatening process it is proposed that indigenous native species, non-invasive exotic species, or sterile annual cover crops, are used for landscaping or soil stabilisation purposes. In addition, the post completion monitoring of the proposal should include appropriate actions to monitor and treat any invasion of remnant native vegetation by exotic perennial grasses or other weeds.

Under these circumstances it is considered unlikely that the action proposed will result in the operation of and increase the impact of the threatening process of *Invasion of native plant communities by exotic perennial grasses*.

Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands.

The action proposed will increase the hard surface area on a slope containing an ephemeral drainage channel in the northern half of the study area. In the northern portion of the study area, the ephemeral drainage line is contained within the proposed road easement/subject site. The action will result in some alteration to the flow regime of this drainage line, including potentially altering the structure of the drainage line itself and higher velocity flows from the road surface. The proposal should be designed to limit these impacts to the road easement within the study area by designing appropriate drainage related structures which slow peak flow velocity, capture run-off pollutants and control erosion and sedimentation.

While some alteration to the drainage line in the north of the study area is unavoidable, the drainage line and surrounding landscape have already been subjected to severe modifications including mass clearing of vegetation and construction of substantial roads and dams, which have permanently altered the natural flow regime of the ephemeral drainage line in the north of the study area.

Under these circumstances it is considered that while the action proposed will result in some alteration to the existing flow regime in the study area, the proposal has the potential to limit its contribution to this key threatening process and given the current level of disturbances, should not substantially increase the impact of this key threatening process.

Conclusion

The action proposed may have a significant effect on threatened species, populations or ecological communities or their habitats pursuant to Section 5A of the *NSW Environmental Planning and Assessment Act 1979* as it,

- will remove habitat for an endangered ecological community that may be important for its long-term survival; and
- is likely to result in the operation of and increase the impact of the threatening process of *Clearing of native vegetation.*

Under these circumstances, a Species Impact Statement may be required for the proposal.

5.4 Impacts on Threatened Fish

No threatened fish are expected to occur in the study area, so an assessment pursuant to section 5A of the *NSW EP&A Act* in accordance with section 5C of the *NSW EP&A Act* as required by Part 7A of the NSW *Fisheries Management Act 1994*, would conclude that the proposal is unlikely to have a significant effect on threatened fish or their habitats.

5.5 Commonwealth EPBC Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) contains provisions to protect commonwealth land and matters of national environmental significance (NES) listed by the Act, including World Heritage properties, Ramsar wetlands, threatened species, migratory species, nuclear actions and the commonwealth marine environment.

Under this Act a person may require assessment and/or approval from the Commonwealth Environment Minister if they are undertaking an action that has, will have, or is likely to have, a significant impact on a matter of national environmental significance. Administrative guidelines have been produced to assist proponents in determining whether an action should be referred to the Commonwealth Environment Minister for a decision on whether approval is required.

The proposal involves construction works and the clearing and/or modification of vegetation, which may constitute an action defined by the *EPBC Act*.

The study area provides suitable habitat for the following matters of National Environmental Significance listed on the schedules of the *EPBC Act* that may be indirectly impacted by the proposal:

- the Endangered Species; Hoary Sunray *Leucochrysum albicans* var*. tricolour*; and
- the Critically Endangered Ecological Community; White Box, Yellow Box, Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands (Box-Gum Woodland).

No Commonwealth listed vulnerable or migratory species were recorded in the study area during the survey period and none are expected to occur or rely on the habitats found there.

Commonwealth Endangered Species

The Hoary Sunray is a perennial wind dispersed everlasting daisy that occurs in grasslands and woodlands where there is continual exposure of open or bare ground and as such requires regular appropriate disturbances to its habitat. As such the species often occurs on road sides and similar areas where regular light disturbances to the substrate occur. However, in NSW at least, the species does not appear to persist in areas that are subject to even moderate levels of grazing (R. Rehwinkel pers. comm., 2007). The species requires outcrossing for successful reproduction and is pollinated by many different insects including bees and flies.

The Hoary Sunray was detected primarily in the northern and southern extremities of the study area, with;

- approximately 700 individuals detected with the road reserve of the Old Cooma Road in the southern parts of the study area;
- more than 1000 plants detected primarily within the road reserves of Tempe Crescent, Heights Road and Old Cooma Road in the northern parts of the study area, but also in the northern parts of the Heffernan's property; and
- approximately 10 plants detected in the vicinity of Heights Road where the turnoff to "Talpa" is proposed. A significant number of plants were also detected in this area on the north-eastern batter of Tempe Crescent and in adjacent vegetation to the north-east.

Beyond the study area, the Hoary Sunray appears to be relatively abundant at a number of locations elsewhere in the locality, and was recorded in several locations within 1 km of the study area by BES during recent surveys (BES 2007 a & b), including along the proposed Edwin Lane Parkway, within the road reserve of Wickerslack Lane, and within the Old Cooma Road road reserve beyond the study area. The species is also known from the Stoney Creek and Cuumbeun Nature Reserves to the east of Queanbeyan.

However, the parts of the locations where the species was detected at the Edwin Lane Parkway and Wickerslack Lane are subject to development proposals. Furthermore, it is thought that the species is restricted primarily to remnant roadside vegetation in the locality, and thus that the abundance of the species in the locality is significantly overstated by extrapolating its abundance within roadsides (R. Rehwinkel pers. comm., 2007). This is observation is supported by surveys undertaken for this assessment, as the species generally did not appear to extend into similar habitats contiguous with the study area, presumably as most of these areas are subject to grazing pressure.

There is insufficient information available at present to definitively determine the level of exchange of genetic material between the discrete occurrences of the species that have been recorded within the study area and elsewhere within the locality. However, where there is inadequate information on a species with which to assess the extent to which genetic material is exchanged, a population can be defined using the "rule of thumb" given by Keith *et al*. (1997) as a "geographic discontinuity of more than 1 kilometre". Given this, the discrete occurrences of the species within the study area and those described elsewhere in the locality, such as along Old Cooma Road, Wickerslack Lane, on the proposed Edwin Lane Parkway, and near Tempe Crescent, can be considered to be a single population. On the basis of the surveys undertaken for this assessment, the size of the local population of the species is estimated to be at least tens of thousands of individuals in size. However the bulk of the known local population is associated with a large number of individuals that occur at a single location to the north of the eastern end of the proposed Edwin Lane Parkway.

It is estimated that the proposal will remove or otherwise disturb at least 1700 individuals of the species. Whilst the species requires disturbance to persist, the disturbances associated with the proposal are likely to be primarily gross disturbances that would destroy individuals of the species and its habitat. Thus it is expected that all or the vast majority of the individuals within the study area will be destroyed by the proposal.

Thus, with respect to Commonwealth Endangered Species, the proposal may:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of the species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or
- interfere with the recovery of the species.

Under these circumstances, it is possible that the proposal may have a significant impact on a Commonwealth Endangered Species listed by the *EPBC Act* that occurs in the study area and a referral to the Commonwealth Environment Minister is recommended.

Commonwealth Endangered Ecological Communities

As described in Section 5.3 the proposal will remove or further modify approximately 4 ha of Disturbed Tableland Dry Grassy Woodland, of which approximately 3.5 ha comprises the critically endangered ecological community Box-Gum Woodland (Butler, 2007). Whilst impacts will be limited to occurrences of the community that have already been disturbed and

fragmented by previous activities and are likely to be limited to a relatively small portion of the local occurrence of the community as discussed in Section 5.4, the proposal may:

- reduce the extent of an ecological community;
- adversely affect habitat critical to the survival of an ecological community;
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns; or
- interfere with the recovery of an ecological community.

Under these circumstances, the proposal may have a significant impact on the Box-Gum Woodland matter of national environmental significance and a referral to the Commonwealth Environment Minister is recommended.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Two vegetation communities were identified within the study area Ecotonal Tablelands Dry Shrub/Tussock Grass Forest and Disturbed Tableland Dry Grassy Woodland. A total of 110 flora species were recorded in the study area including 28 exotic species. Twenty-one fauna species were recorded in the study area including one native and four introduced mammals, 13 native birds and three reptiles.

No flora or fauna species listed on the TSC Act were detected within the study area and it is considered unlikely that the study area constitutes important habitat for any threatened flora or fauna species listed on the TSC Act. However one species, the Hoary Sunray *Leucochrysum albicans* var. *tricolor*, which is listed as an endangered species on the EPBC Act, was detected within the study area.

The study area does not support any endangered populations, but one threatened ecological community, *Box – Gum Woodland* was recorded in the northern parts of the study area. This community is listed as an endangered ecological community on the TSC Act and as a critically endangered ecological community on the EPBC Act.

Given the extent and nature of the impacts of the proposal on the *Box – Gum Woodland* it was concluded that the proposal may significantly impact on both the state and nationally listed community.

Similarly, given the extent of the Hoary Sunray individuals and habitat to be affected by the proposal in the context of the;

- known size of the local population;
- the relatively limited extent of suitable habitat for the species in the locality; and
- the relatively limited representation of the local population in conservation reserves or other lands managed for conservation purposes;

it was concluded that the proposal may have a significant impact on the species.

It was also concluded that the proposal, by removing the remnant vegetation associated with the southern parts of the Old Cooma Road road reserve, may have substantial adverse impacts on remnant native vegetation and generally on biodiversity in the locality.

As such, following the application of the assessment of significance pursuant to Section 5A of the *NSW Environmental Planning & Assessment Act 1979*, it is concluded that the proposal may have a significant effect on threatened species, populations, ecological communities or their habitats and that a Species Impact Statement should be prepared for the proposal.

Following consideration of the administrative guidelines for determining significance under the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal may have a significant impact on matters of National Environmental Significance, and a referral to the Commonwealth Environment Minister is recommended.

A number of impact mitigation and amelioration strategies have been recommended that should be adopted for the proposal and these are set out in the section below. These strategies further mitigate the effects of the proposal on the flora and fauna values of the study area and surrounds in general.

6.2 Recommendations

Box – Gum Woodland

The proponent should seek the requirements for a Species Impact Statement from the Director General of the NSW Department of Environment and Conservation with respect to the proposal and refer the proposal to the Commonwealth Minster for the Environment.

Hoary Sunray

1. The proponent should refer the proposal to the Commonwealth Minster for the Environment.
2. The extent of patches of Hoary Sunray to be retained should be marked in the field by an appropriate person and surveyed by a registered surveyor.
3. Hoary Sunray individuals or patches should be retained within the final design of the proposal wherever possible.
4. The design of any future road works in the vicinity of Heights Road, Googong should take into account, and if possible avoid, the locations of Hoary Sunray individuals.
5. Hoary Sunray individuals beyond the proposal should be protected from disturbance by appropriate protection during the construction phase of the proposal.

Vegetation Management

6. The final design of the proposal should give consideration to the retention, protection, and where possible, recovery and enhancement, of the remnant native vegetation within the study area, and in particular within the existing Old Cooma Road road reserve.
7. Clearing, excavation, and other disturbances for the proposal should be limited to the minimum required to establish the proposed infrastructure and should not extend beyond the boundaries of the study area as identified in this report. Construction materials, machinery or other substances should not be stored in areas supporting remnant native vegetation to avoid physical damage to remnant native vegetation, and all other remnant trees and native vegetation within and beyond the study area should be retained and appropriately protected during the construction phase of the proposal.

8. Any trees or vegetation to be retained within the proposal and vegetation in adjoining areas should be protected from disturbances such as damage to trunks, compaction of root systems, and the build-up of soil around tree bases, by the implementation of appropriate construction practices such as the provision of temporary protective fencing.

9. An induction program for workers should be developed and implemented to inform them of the limitations of the construction site. Temporary fencing should be installed along the edges of development footprint and workers instructed to avoid encroaching into these areas.

10. The proponent should investigate the revegetation of strategic areas to the east and west of the study area to enhance the function of existing remnant vegetation as a habitat corridor (at least for birds) connecting woodland near the Googing Dam Road/Old Cooma Road intersection to larger areas of woodland to the northeast and northwest of the study area.

Landscaping

11. Native plants characteristic of the Tablelands Dry Shrub/Tussock Grass Forest and the Box Gum Woodland endangered ecological community, should be included in any landscaping for the proposal and should consider the existing distribution of the communities as identified in Figures 3 and 4.

Weed Control

12. No known environmental weeds or known invasive plant species should be used in any landscaping for the proposal.

13. With respect to the use of grasses in the proposal, only indigenous native species, non-invasive exotic species, or sterile annual cover crops, are used for landscaping or soil stabilisation purposes.

14. The proposal should include appropriate actions to monitor and treat any invasion of remnant native vegetation by exotic perennial grasses or other weeds.

Sediment and Drainage Controls

15. Appropriate sediment control measures should be established before the commencement of work on the proposal and retained in place until all bare areas have been revegetated.

16. The proposal should be designed so that drainage related structures slow peak run-off flows, capture run-off pollutants and control erosion so that water discharging from the study area into woodland to the north is not significantly lower in quality or altered in quantity.

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APPENDIX A:

FINAL DETERMINATION
OF THE
NSW SCIENTIFIC COMMITTEE

FOR THE KEY THREATENING PROCESS

Invasion of native plant communities by exotic perennial grasses

Invasion of native plant communities by exotic perennial grasses - key threatening process declaration

NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the Invasion of native plant communities by exotic perennial grasses as a KEY THREATENING PROCESS in Schedule 3 of the Act. Listing of key threatening processes is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. A number of exotic perennial grasses including *Cenchrus ciliaris* (Buffel Grass), *Hyparrhenia hirta* (Coolatai Grass), *Eragrostis curvula* (African Lovegrass), *Nassella neesiana* (Chilean Needlegrass) and *Nassella trichotoma* (Serrated Tussock) invade and may dominate native plant communities competing with, and displacing, many native species. Some other perennial grasses (in alphabetical order) that invade smaller areas of native plant communities include *Agrostis capillaris* (Browntop Bent), *Andropogon virginicus* (Whisky Grass), *Chloris gayana* (Rhodes Grass), *Cortaderia* spp. (Pampas Grasses), *Ehrharta erecta* (Panic Veldgrass), *Melinis minutiflora* (Molasses Grass), *Panicum repens* (Torpedo Grass), *Paspalum urvillei* (Vasey Grass), *Pennisetum clandestinum* (Kikuyu), *Phalaris aquatica* (Phalaris), *Setaria sphacelata* (South African Pigeon Grass), *Sporobolus fertilis* (Giant Parramatta Grass), *Sporobolus natalensis* (Giant Rats Tail Grass) and *Urochloa mutica* (Para Grass). Other exotic perennial grasses not specified may, or have the potential to, adversely affect native plant communities and native species.

2. Exotic perennial grasses have been both deliberately and accidentally introduced to New South Wales. *Hyparrhenia hirta* and forms of *Eragrostis curvula* were introduced for soil stabilisation while species such as *Cenchrus ciliaris* and *Phalaris aquatica* have been introduced for pasture. These species as well as accidentally introduced *Nassella neesiana* and *Nassella trichotoma* have spread to become dominant species in some native grasslands and woodlands.

3. The characteristics of vigorous growth, prolific seed production and effective seed dispersal enable many exotic perennial grasses to compete strongly with, or in some places displace, native vegetation. Exotic perennial grasses may also change the fuel load in plant communities. The changed structure and fire regimes of the habitat is likely to adversely impact on both native vertebrate and invertebrate fauna.

4. Dense monocultures of perennial grasses that develop after invasion threaten local vegetation at all sites that are affected. This may result in local and regional declines of many native species and communities, possibly to the extent that they become endangered. Many of the perennial exotic grasses establish following disturbances such as overgrazing, road works and management of roadside areas. Spread of these grasses is often aided by slashing, weed control, forestry and mining operations, movement or addition of fertilisers and nutrients, changes to drainage and fire regimes. Some species, such as *Hyparrhenia hirta*, *Sporobolus fertilis, Sporobolus natalensis Nassella neesiana*, *Nassella trichotoma*, and forms of *Eragrostis curvula*, are also considered a problem in pastures. These

grasses are not favoured grazing species and selective grazing results in a rapid increase in numbers of these less palatable grasses.

5. Invasion of native plant communities by exotic perennial grasses is an identified threat to a number of communities listed in Schedule 1 of the Threatened Species Conservation Act including, but not restricted to:

White Box, Yellow Box, Blakely's Red Gum Woodland
McKie's Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions
Howell Shrublands in the Northern Tablelands and Nandewar Bioregions
Cumberland Plain Woodland

These grasses are also an identified threat to a number of plant species listed in Schedule 1 and Schedule 2 of the Threatened Species Conservation Act, including:

Calystegia affinis
Desmodium camplocaulon
Dichanthium setosum
Digitaria porrecta
Eucalyptus mckieana
Goodenia macbarronii
Polygala linariifolia
Rutidosis heterogama
Thesium australe

Many terrestrial orchid species listed in Schedule 1 and Schedule 2 of the Threatened Species Conservation Act are also threatened by exotic perennial grasses.

A number of bird, reptile and invertebrate species listed on Schedule 1 and Schedule 2, and dependent on plants that are being displaced by exotic perennial grasses are also likely to be threatened. Examples of some listed bird species are:

Chthonicola sagittata	Speckled Warbler
Emblema guttata	Diamond Firetail
Melanodryas cucullata	Hooded Robin
Pomatostomus temporalis	Grey-Crowned Babbler

6. In view of above the Scientific Committee is of the opinion that the Invasion of native plant communities by exotic perennial grasses adversely affects two or more threatened species, populations or ecological communities.

Associate Professor Paul Adam
Chairperson
Scientific Committee

Proposed Gazettal date: 12/09/03
Exhibition period: 12/09/03 – 24/10/03

APPENDIX B:

BOX WOODLAND ASSESSMENT REPORT
for
Edwin Land Parkway (2 sites)
&
Cooma Road Deviation

Queanbeyan City Council

July 2007

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Box Woodland Assessment – Queanbeyan City Council

INTRODUCTION

The brief for this project was provided by Mr. David Coombes of Bushfire and Environmental Services.

The scope of works was to examine three pre-defined areas of Box/Gum woodland in Queanbeyan. One of these areas is located near the Old Cooma Road and the other two are part of the easement for the Edwin Land Parkway.

Initial assessment had defined these areas are being categorised as endangered Box/Gum woodland in NSW, and this project was to re-assess the areas and:

- determine the presence and extent of critically endangered Commonwealth Box/Gum woodland as defined under the EPBC Act;
- prepare a brief report documenting the methods used and result of the field work.

METHODOLOGY

The sites were visited on the 3rd July and the 9th July. The season of the visit was not the most conducive time for vegetation assessment.

The initial visit involved walking two traverse lines through each of the linear woodland occurrences, primarily to gain a visual appreciation of the vegetation and its diversity at each site. An indicative flora checklist was compiled at each of these sites while undertaking the traverses. The checklist recorded a diversity of species at each site, a considerable number of which are regarded by the Commonwealth as important species for Box/Gum vegetation community.

The second visit was to undertake 30m x 30m quadrats at selected sites in the occurrences. The Commonwealth guideline suggests using an area that contains the most native species in the ground layer; however these assessments used areas with average diversity within each site. It would reasonably be expected that a number of other herbaceous species would be located in spring and early summer.

COMMONWEALTH DEFINITION OF BOX/GUM WOODLAND

The Commonwealth has listed White Box/Yellow Box/Blakely's Red Gum grassy woodlands and derived native grasslands as a critically endangered ecological community due to:

- the decline in its geographic distribution;
- a reduction in community integrity.

Box woodlands can occur either as:

- an intact tree layer with a predominantly native ground layer, or
- an intact ground layer with a high density of native species but no remaining trees.

To reach the definition of Box Woodland, it must be over 0.1 ha (1000sq.m.) in area. At least 12 species must be present other than grasses, including one important species.

A shrub layer is sometimes present in Box Woodland and derived grassland, but if this layer rises above 30% coverage in derived grassland, it is no longer regarded as the endangered community.

THE ASSESSMENTS

Old Cooma Road Deviation (Map 1)

Table 1: Indicative Checklist for Old Cooma Road Deviation.

Note: Plant species regarded as important components of Box Gum woodland by the Commonwealth are highlighted

Scientific Name	Common Name
Acacia dealbata	Silver Wattle
Acacia genistifolia	Early Wattle
Acacia implexa	Lightwood
Acacia mearnsii	Black Wattle
Acaena ovina	Sheep's Burr
Allocasuarina verticillata	Drooping Sheoak
Amyema pendula	Mistletoe
Aristida ramosa	Wire Grass
Astroloma humifusum	Native Cranberry
Austrodanthonia sp 1	Wallaby Grass
Austrodanthonia sp. 2	Wallaby Grass
Austrostipa scabra	Spear Grass
Bothriochloa macra	Red Grass
Brachyscome spathulata	Spoon Daisy
Bursaria lasiophylla	Native Blackthorn
Carex appressa	Common Sedge
Cassinia quinquefaria	Rosemary Cassinia
Chrysocephalum apiculatum	Yellow Buttons
Convolvulus erubescens	Australian Bindweed
Daucus glochidiatus	Native Carrot
Dianella revoluta	Black-anther Flax-lily
Dillwynia sericea	Showy Parrot-pea
Dodonaea viscosa ssp. angustissima	Sticky Hop-bush
Einadia nutans	Nodding Saltbush
Enneapogon nigricans	Nine-awn Grass
Eucalyptus bridgesiana	Apple Box
Eucalyptus melliodora	Yellow Box
Euchiton involucratus	Star Cudweed
Exocarpos cupressiformis	Native Cherry
Geranium sp.	Native Geranium
Glycine tabacina	Native Glycine
Gonocarpus tetragynus	Common Raspwort
Hibbertia obtusifolia	Grey Guinea Flower

Hydrocotyle laxiflora	Stinking Pennywort
Juncus subsecundus	Finger Rush
Kunzea parvifolia	Pink Kunzea
Leucochrysum albicans var. tricolor	Hoary Sunray
Lissanthe strigosa	Peach Heath
Lomandra filiformis	Wattle Mat-rush
Lythrum hyssopifolium	Hyssop Loosestrife
Oxalis perennans	Grassland Wood Sorrel
Panicum effusum	Hairy Panic
Plantago varia	Variable Plantain
Pultenaea procumbens	Heathy Bush-pea
Rumex brownii	Native Dock
Senecio quadridentatus	Cotton Fireweed
Solenogyne dominii	Smooth Solenogyne
Styphelia triflora	Five-corners
Themeda australis	Kangaroo Grass
Tricoryne elatior	Yellow Rush-lily
Vittadinia muelleri	Narrow-leaf New Holland Daisy
Wahlenbergia sp.	Bluebell

This area is (or has been) under an agricultural (grazing) landuse. This area has been disturbed by the landuse, construction of roads and farm tracks, underground utilities, and dam. A considerable length of the southern end of the study area a deeply incised creek exists. The initial site assessment revealed a greater diversity of native species associated with the northern end near Wickerslack Lane and the southern end near Talpa Heights Road.

Quadrat 1 (northern end of study area)

This area was located as marked on Map 1. Important species under the EPBC Act are highlighted. Species located were:

Acacia dealbata	Silver Wattle
Acaena ovina	Sheep's Burr
Aristida ramosa	Wiregrass
Astroloma humifusum	Native Cranberry
Austrostipa scabra	Spear Grass
Bothriochloa macra	Red Grass
Bursaria lasiophylla	Native Blackthorn
Cassinia quinquefaria	Rosemary Cassinia
Chrysocephalum apiculatum	Yellow Buttons
Dianella revoluta	Black-anther Flax-lily
Dodonaea viscosa subsp. angustissima	Sticky Hop-bush
Eucalyptus bridgesiana	Apple Box

Eucalyptus melliodora	Yellow Box
Exocarpos cupressiformis	Native Cherry
Glycine tabacina	Native Glycine
Gonocarpus tetragynus	Common Raspwort
Hibbertia obtusifolia	Grey Guinea Flower
Leucochrysum albicans var. tricolor	Hoary Sunray
Lomandra filiformis	Wattle Mat-rush
Panicum effusum	Hairy Panic
Pultenaea procumbens	Heathy Bush-pea
Styphelia triflora	Five-corners
Themeda australis	Kangaroo Grass
Vittadinia muelleri	Narrow-leaf New Holland Daisy

Quadrat 2

This area was located as marked on Map 1. Important species under the EPBC Act are highlighted. Species located were:

Acacia genistifolia	Early Wattle
Acaena ovina	Sheep's Burr
Allocasuarina verticillata	Drooping Sheoak
Aristida ramosa	Wiregrass
Austrodanthonia sp.	Wallaby Grass
Bothriochloa macra	Red Grass
Chrysocephalum apiculatum	Yellow Buttons
Daucus glochidiatus	Native Carrot
Einadia nutans	Climbing Saltbush
Eucalyptus melliodora	Yellow Box
Geranium sp.	Native Geranium
Hydrocotyle laxiflora	Stinking Pennywort
Lomandra filiformis	Wattle Mat-rush
Lythrum hyssopifolium	Hyssop Loosestrife
Rumex brownii	Native Dock
Solenogyne dominii	Smooth Solenogyne
Themeda australis	Kangaroo Grass
Vittadinia muelleri	Narrow-leaf New Holland Daisy

Conclusion

Both quadrats fall within the Commonwealth definition of Box/Gum woodland. An area located above and below the dam appears to have much less diversity and would be outside the Commonwealth definition.

Edwin Land Parkway - eastern end. (Map 2)

Table 2: Indicative Checklist for Edwin Land Parkway – eastern end.

Note: Plant species regarded as important species of Box Gum woodland by the Commonwealth are highlighted

Scientific Name	Common Name
Acacia dealbata	Silver Wattle
Acacia genistifolia	Early Wattle
Acacia pycnantha	Golden Wattle
Acacia rubida	Red-stem Wattle
Acaena ovina	Sheep's Burr
Aristida ramosa	Wire Grass
Austrodanthonia sp 1	Wallaby Grass
Austrodanthonia sp 2	Wallaby Grass
Austrostipa scabra	Spear Grass
Bossiaea buxifolia	Box-leaf Bitter-pea
Bothriochloa macra	Red Grass
Brachyscome rigidula	Leafy Daisy
Bursaria lasiophylla	Native Blackthorn
Cassinia quinquefaria	Rosemary Cassinia
Cheilanthes sieberi	Rock Fern
Cryptandra amara	Bitter Cryptandra
Chrysocephalum apiculatum	Yellow Buttons
Chrysocephalum semipapposum	Clustered Everlasting
Cymbopogon sp.	Bears-ear
Dillwynia sericea	Showy Parrot-pea
Daviesia leptophylla	Slender Bitter-pea
Dianella revoluta	Black-anther Flax-lily
Dodonaea viscosa spp. angustissima	Narrow-leaf Hopbush
Daucus glochidiatus	Native Carrot
Einadia hastata	Saloop
Einadia nutans	Climbing Saltbush
Eucalyptus bridgesiana	Apple Box
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus polyanthemos	Red Box
Eucalyptus rossii	Scribbly Gum
Euchiton sp	Cudweed
Exocarpos cupressiformis	Native Cherry
Exocarpos strictus	Dwarf Cherry
Geranium sp.	Native Geranium
Gompholobium huegellii	Pale Wedge-pea

Goodenia hederacea	Ivy-leaf Goodenia
Hibbertia obtusifolia	Grey Guinea Flower
Hydrocotyle laxiflora	Stinking Pennywort
Hypericum gramineum	Native St John's Wort
Joycea pallida	Red-anther Wallaby Grass
Juncus subsecundus	a Reed
Kunzea ericoides	Burgan
Lepidosperma laterale	Variable Sword-sedge
Lissanthe strigosa	Peach Heath
Leucochrysum albicans var. *tricolor*	Hoary Sunray
Lomandra filiformis	Wattle Mat-rush
Lomandra longifolia	Spiny Mat-rush
Melichrus urceolatus	Urn heath
Oxalis perennans	Grassland Wood Sorrel
Pimelea curviflora	Curved Rice Flower
Plantago varia	Variable Plantain
Poa sp.	Snow Grass
Pomaderris eriocephala	Pomaderris
Pultenaea microphylla	Spreading Bush-pea
Pultenaea procumbens	Heathy Bush-pea
Ranunculus lappaceus	Common Buttercup
Rumex brownii	Native Dock
Senecio quadridentatus	Fireweed
Solenogyne dominii	Smooth Solenogyne
Styphelia triflora	Five-corners
Themeda australis	Kangaroo Grass
Velleia paradoxa	Spur Velleia
Vittadinia muelleri	Narrow-leaf New Holland Daisy
Xerochrysum viscosum	Sticky Everlasting

This area does not appear to have been significantly disturbed by agricultural landuses to any great extent, though a deeply incised gully would indicate significant previous disturbance and loss of ground cover at some time in the past. The disturbance which exists has probably been created in more recent decades. Dams have constructed to manage sediment.

Urban development has had a profound effect in some places, especially where horse paddocks and a golf driving range were established, and under almost the whole route of the power line and the maintenance track(s).

Numerous other tracks also bisect the area, and now appear to be used heavily by motorbikes, with many motorbike tracks being seen.

Some dumping and other soil disturbances are present at the eastern end of the study area.

In some parts wattles have grown and dominate sections, and the site does not appear to have been burnt for some time. Wattles have tended to shade out some sections, though areas immediately alongside show a reasonable diversity.

Hoary Sunray (endangered nationally) was located at many sites in BES survey. This species may continue to increase on more open areas as it is a coloniser.

Heavy infestations of weeds occur near the horse yards and golf driving range, many typical of those brought in by imported fodder and agricultural regimes. Urban weed escapes are irregular.

Quadrat 1

This area was located as marked on Map 2. Important species under the EPBC Act are highlighted. Species located were:

Acacia pycnantha	Golden Wattle
Acaena ovina	Sheep's Burr
Austrodanthonia sp.	Wallaby Grass
Austrostipa scabra	Spear Grass
Bursaria lasiophylla	Native Blackthorn
Cheilanthes sieberi	Rock Fern
Dianella revoluta	Black-anther Flax-lily
Dodonaea viscosa subsp. angustissima	Sticky Hop-bush
Einadia hastata	Saloop
Einadia nutans	Climbing Saltbush
Eucalyptus melliodora	Yellow Box
Eucalyptus polyanthemos	Red Box
Hydrocotyle laxiflora	Stinking Pennywort
Lepidosperma laterale	Sword Sedge
Lomandra filiformis	Wattle Mat-rush
Pultenaea microphylla	Spreading Bush-pea
Pultenaea procumbens	Heathy Bush-pea
Senecio quadridentatus	Cotton Sneezeweed

Quadrat 2

This area was located as marked on Map 2. Important species under the EPBC Act are highlighted. Species located were:

Acacia pycnantha	Golden Wattle
Austrodanthonia sp	Wallaby Grass

Cassinia quinquefaria	Rosemary Cassinia
Cheilanthes sieberi	Rock Fern
Dianella revoluta	Black-anther Flax-lily
Eucalyptus bridgesiana	Apple Box
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Joycea pallida	Red-anther Wallaby Grass
Juncus subsecundus	a Reed
Kunzea ericoides	Burgan
Lomandra filiformis	Wattle Mat-rush
Melichrus urceolatus	Urn Heath
Poa sp.	Snow Grass
Pultenaea microphylla	Spreading Bush-pea
Pultenaea procumbens	Heathy Bush-pea
Rumex brownii	Native Dock
Styphelia triflora	Five-corners

Conclusion

Both quadrats fall within the Commonwealth definition of Box/Gum woodland.

Edwin Land Parkway - western end. (Map 3)

Table 3: Indicative Checklist for Edwin Land Parkway – western end.

Note: Plant species regarded as important components of Box Gum woodland by the Commonwealth are highlighted

Scientific Name	Common Name
Acacia genistifolia	Early Wattle
Acacia gunnii	Ploughshare Wattle
Acacia pycnantha	Golden Wattle
Acaena ovina	Sheep's Burr
Amyema pendulum	Mistletoe
Aristida ramosa	Wire Grass
Astroloma humifusum	Native Cranberry
Austrodanthonia sp 1	Wallaby Grass
Austrostipa scabra	Spear Grass
Billardiera scandens	Hairy Apple-berry
Bothriochloa macra	Red Grass
Brachyloma daphnoides	Native Daphne
Bursaria lasiophylla	Native Blackthorn
Caladenia sp.	Caladenia
Cassinia quinquefaria	Rosemary Cassinia
Cheilanthes sp	Rock Fern
Chrysocephalum apiculatum	Yellow Buttons
Craspedia variabilis	Variable Billy Button
Crassula sieberiana	Swamp Stonecrop
Cymbopogon sp.	Bears-ear
Daucus glochidiatus	Native Carrot
Daviesia leptophylla	Narrow-leaf Bitter-pea
Dillwynia sericea	Showy Parrot-pea
Dianella revoluta	Black-anther Flax-lily
Einadia hastata	Saloop
Einadia nutans	Climbing Saltbush
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus polyanthemos	Red Box
Exocarpos cupressiformis	Native Cherry
Geranium sp.	Native Geranium
Gonocarpus tetragynus	Common Raspwort
Hibbertia obtusifolia	Grey Guinea Flower
Hydrocotyle laxiflora	Stinking Pennywort

Joycea pallida	Red-anther Wallaby Grass
Juncus subsecundus	a Reed
Kunzea ericoides	Burgan
Lepidosperma laterale	Sword Sedge
Leptospermum multicaule	Silver Tea Tree
Lissanthe strigosa	Peach Heath
Leucochrysum albicans var. tricolor	Hoary Sunray
Lomandra filiformis	Wattle Mat-rush
Lomandra longifolia	Spiny Mat-rush
Luzula sp	Woodrush
Melichrus urceolatus	Urn heath
Microlaena stipoides	Weeping Grass
Oxalis perennans	Wood Sorrel
Panicum effusum	Hairy Panic
Plantago gaudichaudii	Narrow-leaf Native Plantain
Plantago varia	Variable Plantain
Poa ?labillardieri	River Tussock
Pterostylis sp.	Greenhood
Pultenaea microphylla	Spreading Bush-pea
Pultenaea procumbens	Heathy Bush-pea
Rumex brownii	Native Dock
Senecio ?hispidulus	Hill Fireweed
Senecio quadridentatus	Cotton Fireweed
Solenogyne dominii	Smooth Solenogyne
Stylidium graminifolium	Grass-leaf Trigger plant
Styphelia triflora	Five Corners
Themeda australis	Kangaroo Grass
Velleia paradoxa	Spur Velleia
Vittadinia muelleri	Narrow-leaf New Holland Daisy
Wahlenbergia sp.	Bluebell

This is a small area of very diverse woodland remaining in the road reserve sandwiched in by urban areas. Urban weed escapes and Pinus Radiata have commenced invading this area.

Quadrat 1

This area was located as marked on Map 3. Important species under the EPBC Act are highlighted. Species located were:

Acacia genistifolia	Early Wattle
Acacia gunnii	Ploughshare Wattle
Acacia pycnantha	Golden Wattle
Aristida ramosa	Wire Grass

Astroloma humifusum	Native Cranberry
Austrodanthonia sp.	Wallaby Grass
Austrostipa scabra	Spear Grass
Brachyloma daphnoides	Native Daphne
Cassinia quinquefaria	Rosemary Cassinia
Cheilanthes sieberi	Rock Fern
Crassula sieberiana	Swamp Stonecrop
Daviesia leptophylla	Narrow-leaf Bitter-pea
Dianella revoluta	Black-anther Flax-lily
Dillwynia sericea	Showy Parrot-pea
Einadia hastata	Saloop
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Gonocarpus tetragynus	Common Raspwort
Hibbertia obtusifolia	Grey Guinea Flower
Hydrocotyle laxiflora	Stinking Pennywort
Joycea pallida	Red-anther Wallaby Grass
Kunzea ericoides	Burgan
Lepidosperma laterale	Sword sedge
Leptospermum multicaule	Silver Tea tree
Lissanthe strigosa	Peach Heath
Lomandra filiformis	Wattle Mat-rush
Oxalis perennans	Wood Sorrel
Plantago gaudichaudii	Narrow-leaf Native Plantain
Pultenaea microphylla	Spreading Bush-pea
Pultenaea procumbens	Heathy Bush-pea
Stylidium graminifolium	Grass-leaf Trigger Plant
Vittadinnia muelleri	Narrow-leaf New Holland Daisy

Quadrat 2

This area was located as marked on Map 3. Important species under the EPBC Act are highlighted. Species located were:

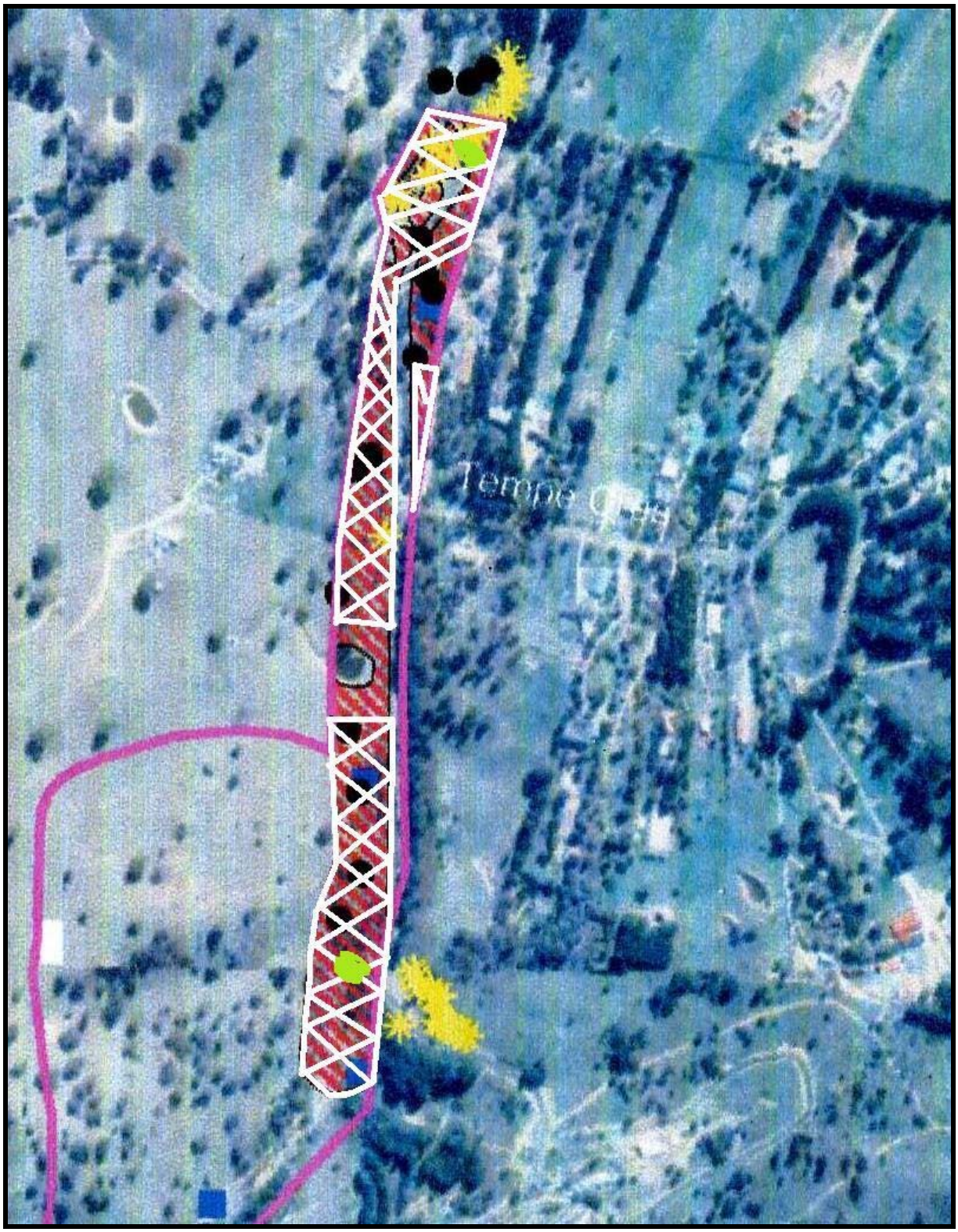
Acacia pycnantha	Golden Wattle
Aristida ramosa	Wiregrass
Astroloma humifusum	Native Cranberry
Austrodanthonia sp.	Wallaby Grass
Austrostipa scabra	Spear Grass
Bothriochloa macra	Red Grass
Craspedia variabilis	Variable Billy Button
Cymbonotus sp.	Bear's Ear
Daucus glochidiatus	Native Carrot

Dianella revoluta	Black-anther Flax-lily
Einadia hastata	Saloop
Einadia nutans	Climbing Saltbush
Eucalyptus blakelyi	Blakely's Red Gum
Exocarpos cupressiformis	Native Cherry
Geranium sp.	Native Geranium
Juncus subsecundus	a Reed
Kunzea ericoides	Burgan
Lomandra filiformis	Wattle Mat-rush
Microlaena stipoides	Weeping Grass
Oxalis perennans	Wood Sorrel
Panicum effusum	Hairy Panic
Plantago gaudichaudii	Narrow-leaf Native Plantain
Poa ?sieberiana	Snow Grass
Rumex brownii	Native Dock
Senecio ?hispidulus	Hill Fireweed
Senecio quadridentatus	Cotton Sneezeweed
Solenogyne dominii	Smooth Solenogyne
Themeda australis	Kangaroo Grass

Conclusion

Both quadrats fall within the Commonwealth definition of Box/Gum woodland.

MAP 1 – Old Cooma Road Deviation

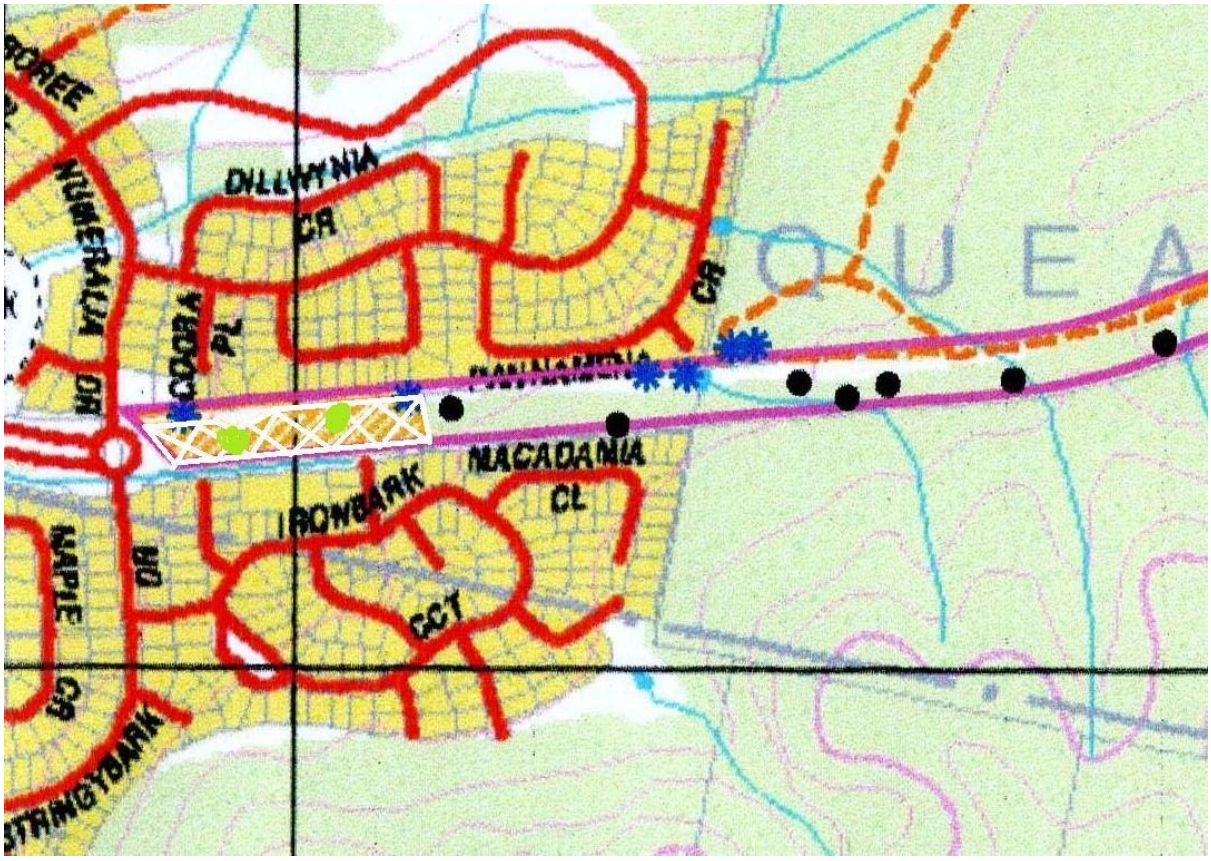


Commonwealth defined Box woodland marked in white hatching. Green areas mark the quadrats.

Map 2 – Edwin Land Parkway – eastern end

Commonwealth defined box woodland marked in white hatching. Green areas mark the quadrats.

MAP 3 – Edwin Land Parkway – western end



Commonwealth defined box woodland marked in white hatching. Quadrats are marked in green.

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ADDENDUM
To
Edwin Land Parkway/Old Cooma Road
Box Woodland Report
July 2007

INTRODUCTION

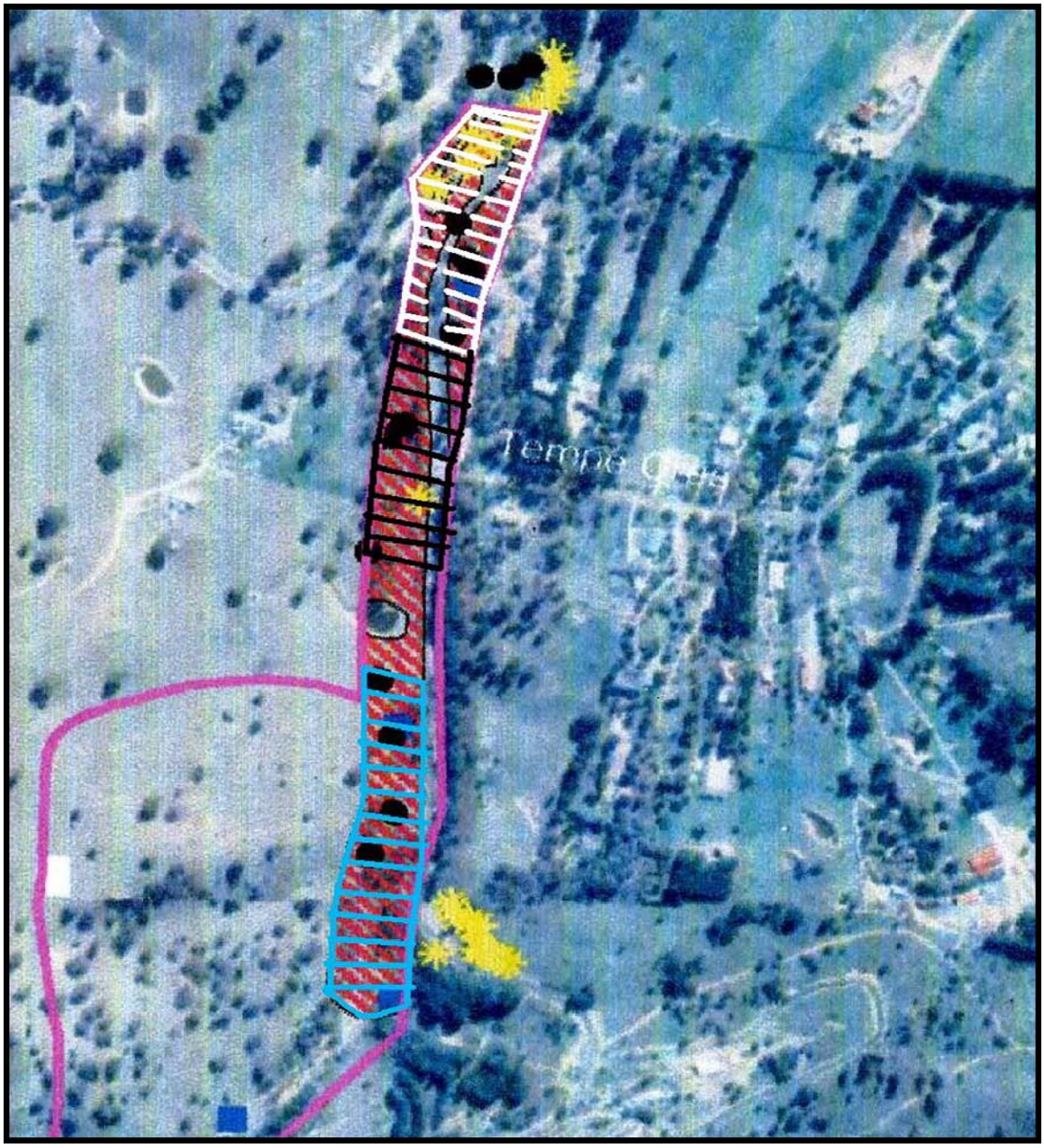
This report is to provide more detail on the quality of the Commonwealth-defined box woodlands on the Edwin Land Parkway and the deviation to the Old Cooma Road in Queanbeyan.

The woodlands have been rated on the following maps as either High (white hatching), Moderate (black hatching) or Low (Blue hatching).

It is somewhat difficult to assess these areas, as they appear to have been outside average environmental influences for some time. Sections have been dominated by acacia which have grown and many are now in decline.

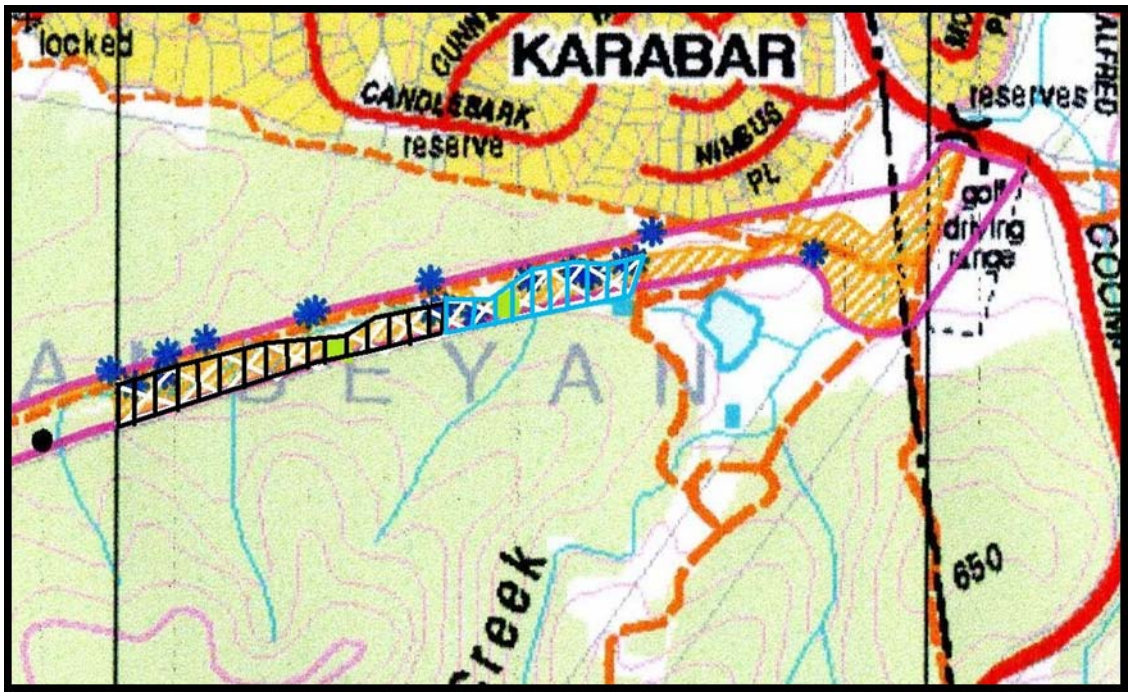
However, quadrat searches undertaken for the original report still located a diversity of species and a suite of important species that are an important factor under the Commonwealth definition.

Old Cooma Road Deviation



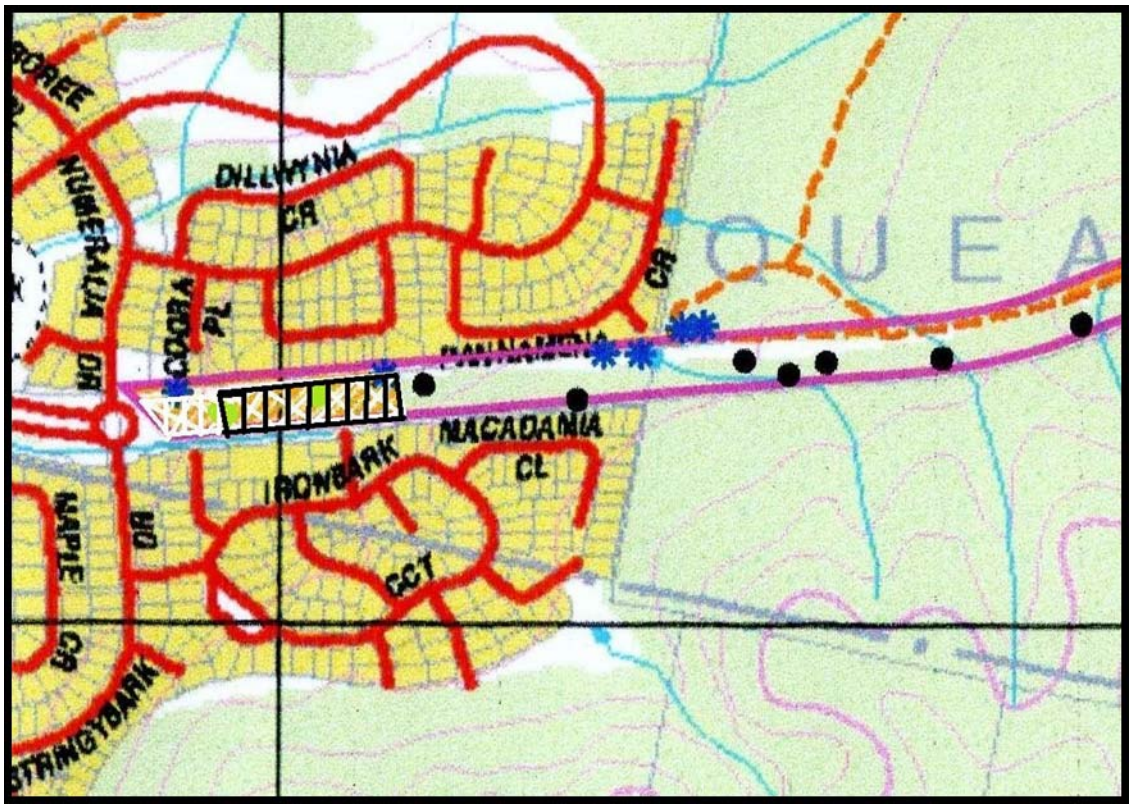
The area marked as High (white hatching) is dissected by numerous tracks roads and other disturbances. It remains primarily because much of it is roadside reserve. Some easily managed woody weed species are present. The Moderate area (black hatching) survives on the roadside and in the paddocks, with some of the latter area verging toward Low. The Low area (blue hatching) is highly infested with weeds, particularly on the deeply incised creek.

Edwin Land Parkway (East)

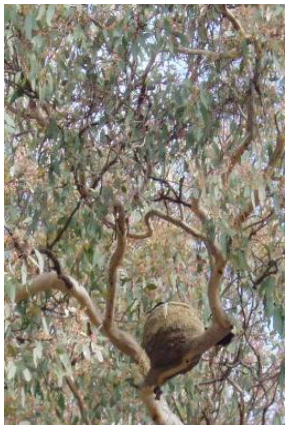


This area is somewhat stagnating at peak vegetation loads, primarily because of wattle growth and decline. The Low area (blue hatching) is affected by wattle growth which in places has reduced the understorey. The Moderate area (black hatching) has a greater diversity in the understorey.

Edwin Land Parkway (West)



The High area (white hatching) remains open and has a high diversity of species. The Moderate area (black hatching) is impacted similarly to the Edwin Land east section, with wattles dominating some areas.



Old Cooma Road Realignment Queanbeyan, NSW

Cultural Heritage Assessment

March 2009

A Report to Brown Consulting (ACT) Pty Ltd

Navin Officer

heritage consultants Pty Ltd

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EXECUTIVE SUMMARY

Planned land releases at Googong are expected to result in increased traffic movements along Cooma Street / Old Cooma Road. Upgrades to this road will be required as this route forms a key part of the regional transport corridor. The project has been divided into three stages.

The Old Cooma Road Realignment project will necessitate the disturbance of ground within the footprint of the realignment in stage 1 and the duplication in stage 3 of the project.

Five Aboriginal sites comprising four artefact scatters (GA12, GA15, TSR1 and TSR2) and one potential archaeological deposit (GPAD7) have been previously identified in the study area by Navin Officer Heritage Consultants in 2003 and the Department of Environment and Conservation (DEC) in 2005.

Five Aboriginal sites, comprising three isolated finds (OCR1, OCR2 and OCR5) and two artefact scatter (OCR3 and OCR4) were identified within the Old Cooma Road Realignment study area during the current study.

Site OCR1 may be impacted by stage 1 of the project. Sites OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1, TSR2 and GPAD7 may be impacted by stage 3 of the project.

One historical heritage site has been identified in the Old Cooma Road Realignment study area, Googong TSR. This site has been assessed as having no heritage significance and does not fulfil the NSW Heritage Council's criteria for local heritage listing. This site does not pose any constraint to the study area.

It is recommended that:

1. Where possible, disturbance to archaeological sites OCR1, OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1, TSR2 and area of potential archaeological deposit GPAD7 should be avoided.

2. If impact to Aboriginal sites OCR1, OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1 and TSR2 cannot be avoided then a Section 90 Consent to Destroy must be obtained for the Aboriginal objects prior to disturbance.

3. If disturbance is unavoidable in the vicinity of GPAD7, then a program of archaeological subsurface investigation should be conducted. The aim of this program will be to determine the nature and significance of any Aboriginal objects present in the area.

   An application should be made to the Director General of the DECC for a section 87 *Aboriginal Heritage Impact Permit* under the provisions of s87 of the *National Parks and Wildlife Act 1974* for subsurface testing with the PAD.

4. Prior to the application of the s87 or s90 permit it will be necessary to implement the *DECC Interim Guidelines for Aboriginal Community Consultation – Requirements for Applicants* for this project.

5. If Aboriginal Objects as defined under the *National Parks and Wildlife Act 1974* are encountered during works associated with the Old Cooma Road Realignment then all works should cease in the vicinity of the find/s, the project archaeologist should be contacted, and advice sought as to an appropriate course of action.

6. No further actions are required in relation to the historical site (Googong TSR) and there are no historical cultural heritage constraints to the proposed development.

7. If historical relics as defined under the *Heritage Act 1977* are encountered during works associated with the Old Cooma Road, then all works should cease in the vicinity of the find/s, the project archaeologist should be contacted, and advice sought as to an appropriate course of action

TABLE OF CONTENTS

1. INTRODUCTION

1.1 The Proposed Works

Planned land releases at Googong, to the east of Canberra, are expected to result in increased traffic movements along Cooma Street / Old Cooma Road. Upgrades to this road will be required as the route forms a key part of the regional transport corridor. Upgrade works to Cooma Street / Old Cooma Road will be undertaken in three stages.

- Stage 1 consists of a new, approximately 1.1 km stretch, of road to be constructed to bypass the 'bend' in the current alignment from Tempe Crescent turnoff on Old Cooma Road to the southern connection of Heights Road into Old Cooma Road (also known as Talpa Road).

- Stage 2 consists of a two lane single carriageway. This stage has been divided into three substages:

  - Stage 2a includes extending Edwin Land Parkway to connect into Old Cooma Road. This work will involve designing the southern arm of the main Edwin Land Parkway Roundabout, which will be approx 600 m long and join into Old Cooma Road approx 300 m to the north of Wickerslack lane.

  - Stage 2b includes the realignment of Old Cooma Road from where the southern arm of the Edwin Land Parkway Roundabout connects to Old Cooma Road (Stage 2a) to the northernmost extent of the Stage 1 work. Approximate distance is 0.85 km.

  - Stage 2c includes the realignment of Old Cooma Road from the southern extent of the new road section (Stage 1) to the Googong Road turnoff. Approximate distance is 2 km.

- Stage 3 involves the duplication of Old Cooma Road from Edwin Land Parkway to Googong Road.

This report documents the results of a cultural heritage assessment of each of the three stages of the proposed Old Cooma Road Realignment. The report was commissioned by Brown Consulting (ACT) Pty Ltd.

1.2 Report Outline

This report:

- Documents consultation with local Aboriginal groups carried out in the course of the investigation;

- Outlines the study methodology;

- Describes the environmental setting of the study area;

- Provides a background of regional and local archaeology and history for the study area;

- Documents the results of a field survey of the study area and identifies the likely cultural heritage values that may exist within it;

- Defines statutory requirements relevant to the cultural heritage of the area; and

- Provides recommendations relating to the cultural heritage resource of the study area.

Figure 1.1 The Old Cooma Road Realignment Study Area (red outline)
(base map Google Earth 2008)

2. ABORIGINAL PARTICIPATION AND CULTURAL VALUES

There are currently four groups that have an interest in cultural heritage issues in the Queanbeyan region. They are the:

- Buru Ngunnawal Aboriginal Corporation;
- Consultative Body Aboriginal Corporation;
- Ngarigu Currawong Clan; and
- Ngambri Local Aboriginal Land Council.

Contact was made with all four groups to inform them of the project and to organise representation during the field survey. Subsequently, a representative from the Buru Ngunawal Aboriginal Corporation, Wally Bell, the Consultative Body Aboriginal Corporation, Carl Brown and Ngarigu Currawong Clan, David Mundy, attended the first field survey and the Ngambri Local Aboriginal Land Council, Joe House, attended the second field survey and actively participated in the survey.

Records of Aboriginal Participation for the field survey component of this project are provided in Appendix 1.

As noted in the DECC Aboriginal Cultural Heritage Standards & Guidelines Kit (NPWS 1997:2, 8), participation of Aboriginal communities and Aboriginal owners in archaeological field assessments should not be construed as 'consultation'. It is not a substitute for an assessment of Aboriginal cultural interests or values in a particular area of land or particular sites, such assessments are separate from archaeological assessments and should be made by Aboriginal people themselves.

As such, all three attending representatives have been requested to provide a written report giving their organisation's views and an assessment of the Aboriginal cultural values of the area surveyed.

A copy of that request is provided in Appendix 1.

A response was received by Buru Ngunawal Aboriginal Corporation (provided under separate cover).

A draft copy of this report was provided to each of the above groups in February 2009 with a request for comment, no comments were received.

3. STUDY METHODOLOGY

3.1 Literature and Database Review

A range archaeological and historical data was reviewed for the Old Cooma Road study area and its surrounds. This literature and data review was used to determine if known Aboriginal and historical sites were located within the area under investigation, to facilitate site prediction on the basis of known regional and local site patterns, and to place the area within an archaeological and heritage management context. The review of documentary sources included heritage registers and schedules, local histories, and archaeological reports.

Aboriginal literature sources included the Aboriginal Heritage Information Management System (AHIMS) maintained by the NSW Department of Environment and Climate Change (DECC) and associated files and catalogue of archaeological reports; and theses held in the library of the School of Archaeology and Anthropology, the Australian National University. Sources of historical information included regional and local histories, heritage studies, theses and parish maps.

Searches were undertaken of the following statutory and non-statutory heritage registers and schedules:

- Statutory Listings
  - Aboriginal Heritage Information Management System (AHIMS) (NSW DECC);
  - World Heritage List;
  - The National Heritage List (Australian Heritage Council);
  - The Commonwealth Heritage List (Australian Heritage Council);
  - The State Heritage Register (NSW Heritage Office); and
  - Heritage Schedule(s) from the Queanbeyan Local Environmental Plan 1998.
- Non-Statutory Listings
  - The Register of the National Estate (Australian Heritage Council);
  - The State Heritage Inventory (NSW Heritage Office); and
  - Register of the National Trust of Australia (NSW).

3.2 Fieldwork and Personnel

Fieldwork was undertaken over two days in July and November 2008 by archaeologists Nicola Hayes, Lindsay Smith and Deirdre Lewis-Cook. Mr Wally Bell, Mr Carl Brown and Mr David Mundy from the Buru Ngunawal Aboriginal Corporation, Consultative Body Aboriginal Corporation and the Ngarigu Currawong Clan participated in the first survey and Mr Joe House participated in the second day of field survey.

Personnel conducted a survey of the site on foot using straight line and opportunistic transects across the assessment area.

The straight line transects involved inspecting the ground while walking evenly-spaced transects along the length of the proposed pipeline easement. Opportunistic transects were undertaken to inspect areas of bare ground within the assessment area. The majority of bare ground within the assessment area was inspected and, in areas of limited exposure, an assessment was made of the potential for that area to include Aboriginal sites below the ground.

This report was prepared by Nicola Hayes.

3.3 Recording Parameters

3.3.1 Aboriginal Sites and PADs

The archaeological survey aimed at identifying material evidence of Aboriginal occupation as revealed by surface artefacts and areas of archaeological potential unassociated with surface artefacts. Potential recordings fall into three categories: isolated finds, sites and potential archaeological deposits.

Isolated finds

An isolated find is a single stone artefact, not located within a rock shelter, and which occurs without any associated evidence of Aboriginal occupation within a radius of 60 metres. Isolated finds may be indicative of:

- Random loss or deliberate discard of a single artefact;
- The remnant of a now dispersed and disturbed artefact scatter; and
- An otherwise obscured or sub-surface artefact scatter.

Except in the case of the latter, isolated finds are considered to be constituent components of the *background scatter* present within any particular landform.

The distance used to define an isolated artefact varies according to the survey objectives, the incidence of ground surface exposure, the extent of ground surface disturbance, and estimates of *background scatter* or *background discard* densities. In the absence of baseline information relating to background scatter densities, the defining distance for an isolated find must be based on methodological and visibility considerations. Given the varied incidence of ground surface exposure and deposit disturbance within the study area, and the lack of background baseline data, the specification of 60 metres is considered to be an effective parameter for surface survey methodologies. This distance provides a balance between detecting fine scale patterns of Aboriginal occupation and avoiding environmental biases caused by ground disturbance or high ground surface exposure rates. The 60 metre parameter has provided an effective separation of low density artefact occurrences in similar southeast Australian topographies outside of semi-arid landscapes.

Background scatter

Background scatter is a term used generally by archaeologists to refer to artefacts which cannot be usefully related to a place or focus of past activity (except for the net accumulation of single artefact losses). However, there is no single concept for background discard or 'scatter', and therefore no agreed definition. The definitions in current use are based on the postulated nature of prehistoric activity, and often they are phrased in general terms and do not include quantitative criteria. Commonly agreed is that background discard occurs in the absence of 'focused' activity involving the production or discard of stone artefacts in a particular location. An example of unfocused activity is occasional isolated discard of artefacts during travel along a route or pathway. Examples of 'focused activity' are camping, knapping and heat-treating stone, cooking in a hearth, and processing food with stone tools. In practical terms, over a period of thousands of years an accumulation of 'unfocused' discard may result in an archaeological concentration that may be identified as a 'site'. Definitions of background discard comprising only qualitative criteria do not specify the numbers (numerical flux) or 'density' of artefacts required to discriminate site areas from background discard.

Sites

A site is defined as any material evidence of past Aboriginal activity that remains within a context or place which can be reliably related to that activity.

Frequently encountered site types within southeastern Australia include open artefact scatters, coastal and freshwater middens, rock shelter sites including occupation deposit and/or rock art, grinding groove sites and scarred trees.

Most Aboriginal sites are identified by the presence of three main categories of artefacts: stone or shell artefacts situated on or in a sedimentary matrix, marks located on or in rock surfaces, and scars on trees. Artefacts situated within, or on, a sedimentary matrix in an open context are classed as a site when two or more occur no more than 60 metres away from any other constituent artefact. The 60 metre specification relates back to the definition of an isolated find (*Refer above*). In a rockshelter, a site is defined as one or more artefacts occurring within or immediately adjacent to the sheltered space. Unlike a single artefact in an open context, a rock shelter provides a probable occupational focus to the interpretation of a single artefact and can therefore be considered to be indicative of a site. An exception would be a single artefact which may have been deposited in the shelter through natural processes.

Any location containing one or more marks of Aboriginal origin on rock surfaces is classed as a site. Marks typically consist of grinding features such as grinding grooves for hatchet heads, and rock art such as engravings, drawings or paintings. The boundaries of these sites are defined according to the spatial extent of the marks, or the extent of the overhang, depending on which is most applicable to the spatial and temporal integrity of the site.

Potential Archaeological Deposits

A potential archaeological deposit, or PAD, is defined as any location where the potential for subsurface archaeological material is considered to be moderate or high, relative to the surrounding study area landscape. The potential for subsurface material to be present is assessed using criteria developed from the results of previous surveys and excavations relevant to the region. Where necessary, PADs can be given an indicative rating of their 'archaeological potential' based on a combined assessment of their potential to contain artefacts, and the potential archaeological value of the deposit. Table 3.1 illustrates the matrix on which this assessment is based. Locations with low potential for artefacts fall below the threshold of classification. In such cases the potential incidence of artefactual material is considered to be the same as, or close to that for background scatter. Where there is moderate potential for artefacts, the predicted archaeological potential parallels the potential significance of the deposit. For deposits with high potential for artefacts, the assessed archaeological potential is weighted positively.

The boundaries of PADs are generally defined by the extent of particular micro-landforms known to have high correlations with archaeological material. A PAD may or may not be associated with surface artefacts. In the absence of artefacts, a location with potential will be recorded as a PAD. Where one or more surface artefacts occur on a sedimentary deposit, a PAD may also be identified where there is insufficient evidence to assess the nature and content of the underlying deposit. This situation is due mostly to poor ground surface visibility.

Table 3.1 Matrix showing the basis for assessing the archaeological potential (shown in bolded black text) of a potential archaeological deposit

		Potential to contain Aboriginal objects		
		Low	*Moderate*	*High*
Potential archaeological significance	*Low*	---	**low**	**moderate**
	Moderate	---	**moderate**	**high**
	High	---	**high**	**high**

3.3.2 Historical Sites and Features

Historical archaeology refers to the 'post-contact' period and includes: domestic, commercial and industrial sites as well as most maritime sites. It is the study of the past using physical evidence in conjunction with historical sources. The three primary types of places or items that may form part of the historical archaeology context include:

1. Below ground evidence, including building foundations, occupation deposits, features and artefacts; and above ground evidence, including buildings, works, industrial structures and relics that are intact or ruined;

2. Areas of land that display evidence of human activity or occupation; and

3. Shipwrecks, deposits and structures associated with maritime activities.

Within these broad parameters, an historical archaeological site may include:

- Topographical features and evidence of past environments (that is, resident in pollens and diatoms);

- Evidence of site formation, evolution, redundancy and abandonment (that is, features and materials associated with land reclamation, sequences of structural development, demolition/deconstruction, and renewal);

- Evidence of function and activities according to historical theme/s represented (for example, an industrial site may contain diagnostic evidence of process, products and by-products);

- Evidence associated with domestic occupation including household items and consumables, ornaments, personal effects and toys;

- Evidence of diet including animal and fish bones, and plant residues;

- Evidence of pastimes and occupations including tools of trade and the often fragmentary signatures of these activities and processes;

- Methods of waste disposal and sanitation, including the waste itself which may contain discarded elements from all classes of artefact as well as indicators of diet and pathology; and

- Any surviving physical evidence of the interplay between site environment and people.

The information found in historical archaeological sites is often part of a bigger picture which offers opportunities to compare and contrast results between sites. The most common comparisons are made at the local level, however, due to advances in research and the increasing sophistication and standardisation of methods of data collection, the capacity for wider reference (nationally and, occasionally, internationally) exists and places added emphasis on identification and conservation of historical archaeological resources.

4. ENVIRONMENTAL CONTEXT

The Old Cooma Road Realignment study area comprises an approximately four kilometre long easement from Candlebark Road Queanbeyan to Googong Road. The easement primarily uses the already-formed Old Cooma Road. An approximately 1.1 km long section diverts from the current road and follows a service easement.

The Old Cooma Road alignment, including the new alignment section (Stage 1), has been used since at least the late 19th century (see Section 6.1) The study area has been highly disturbed by the current road and from other service easements including a Telstra cable that parallels the road for the majority of the study area.

The study area passes through two main geologies, a Devonian to Silurian granite in the north and the Silurian Colinton Volcanics in the south. The study area also crosses a small area of Ordovician Acton Shale and a small area of Silurian Mount Pleasant porphyry.

The soils reflect the underlying geology. In the north the soils consist of granitic sandy gravel and in the south consist of a shale-derived gravelly loam.

The terrain bordering the Old Cooma Road consists of a series of gently to steeply sloping spurlines running from ridgelines to the east and west. The majority of the study area is located within the heavily eroded gullies between these ridgelines and on the mid to basal slopes of the spurlines.

Most of the area has been cleared for pastoral purposes, and pastoralism has been the dominant activity in the area since European settlement in the early to mid nineteenth century. Vegetation in the study area consists of savannah woodland and pockets of dry sclerophyll forest. Canopy trees are predominantly Eucalyptus species (*E.melliodora & E.Bridgesiana*), most of which represent regeneration following nineteenth century clearance and firing of the original vegetation.

5. ABORIGINAL CONTEXT

5.1 Tribal Boundaries & Ethno-history

Tribal boundaries within Australia are based largely on linguistic evidence and it is probable that boundaries, clan estates and band ranges were fluid and varied over time. Consequently 'tribal boundaries' as delineated today must be regarded as approximations only, and relative to the period of, or immediately before European contact. Social interaction across these language boundaries appears to have been a common occurrence.

A reconstruction of clan boundaries based on Tindale (1974) indicates that the south Canberra area was close to the tribal boundaries of the Ngunnawal and Walgalu people. Horton's (1994) map shows a Ngarigo tribe in the southern Canberra area.

There is some uncertainty as to which language was spoken by the Aborigines of Queanbeyan region. The area appears to have been close to the linguistic boundary between the Gundungurra and Ngunnawal languages. Eades (1976) notes that published grammars for these two languages (Mathews 1900, 1901, 1904) are virtually identical. However, according to Eades' boundaries, the Ngunnawal of Canberra probably spoke the Gundungurra language.

Bluett states that the Aboriginal group which camped at Pialligo were referred to by early settlers as the 'Pialligo Blacks' and the larger group which camped near Black Mountain were called the 'Canburry or Nganbra Blacks" (Bluett 1954).

Jackson-Nakano (2001:xiv) notes that Aboriginal family groups within the Canberra-Queanbeyan district and surrounds were known by many names in the early nineteenth century, but local Europeans who knew them best referred to them as Kamberri – also spelled Kgamberry, Kamberra and even Nganbra (Ngambri). She says the heart of their country was centred on the area now referred to as the Acton Peninsular. Some Kamberri individuals, she says, intermarried with neighbouring Ngunawal families from the 1880s, and some descendants of such marriages re-identify in modern times as Ngunnawal. While maintaining their distinct association with the ACT and surrounds, members of Kamberri-Ngunnawal families might also identify personally as Ngunawal, Walgalu or even Wiradjuri through their familial links to these other groups (Jackson-Nakano 2001:xv).

References to the traditional Aboriginal inhabitants of the Queanbeyan region are rare and often difficult to interpret. The consistent impression however is one of rapid depopulation and a desperate disintegration of a traditional way of life over little more than fifty years from initial white contact (Officer 1989). The disappearance of the Aborigines from the region was probably accelerated by the impact of European diseases which may have included the smallpox epidemic in 1830, influenza, and a severe measles epidemic by the 1860s (Flood 1973, 1980; Butlin 1983).

By the 1850s the traditional Aboriginal economy had largely been replaced by an economy based on European commodities and supply points. Reduced population, isolation from the most productive grasslands, and the destruction of traditional social networks meant that the final decades of the region's indigenous culture and economy was centred on white settlements and properties (Officer 1989).

By 1856 the local 'Canberra Tribe', presumably members of the Ngunnawal or Ngarigo, were reported to number around seventy (Schumack 1967) and by 1872 recorded as only five or six 'survivors' (*Goulburn Herald* 9 November 1872). In 1873 one so-called 'pure blood' member remained, known to the white community as Nelly Hamilton or 'Queen Nellie'.

Early accounts of Aboriginal lifestyles in and comparable with the study locality describe aspects of a successful hunting and gathering economy and eventful social life and inter-group contacts. The material culture, which is partly reflected in the surviving archaeological record, included stone and wooden artefacts, skin clothing and bark and bough temporary dwellings (Flood 1980, Huys 1993).

5.2 Regional Overview

Stone artefact scatters are the most frequently occurring residue of prehistoric activity in the region. They may range considerably in size and density, factors that are often interpreted as an indication of intensity of the Aboriginal landuse. As well, they provide insight into stylistic and technological behaviours. Such scatters are representative of one or more stages in what is termed a 'reduction sequence'. That is, the entire process from obtaining stone raw material, to manufacture of stone tools and to eventual discard or loss and incorporation into the archaeological record. Isolated finds are artefacts that occur without any apparently associated archaeological materials or deposit. Open scatters are defined as spatially concentrated occurrences of two or more flaked stone artefacts.

Broad distinctions may be made between sites formed as a result of general living and habitation activities and sites located in response to the fixed locations of specific resources. Occupation sites relating to the former activities are most commonly recognised by the discard of flaked stone materials in sedimentary deposits. Subsequent processes of erosion or landuse may deflate or section these sediments to reveal surficial or embedded (sometimes stratified) materials. Sites formed as a result of resource location may be recognised by a range of features including the proximity of discarded stone materials to source stone materials and characteristic extraction and use marks upon stone or wood materials, i.e. quarries, hatchet grinding grooves and scarred trees.

The wider regional pattern of Aboriginal occupation site occurrence within the Queanbeyan/ACT region is one of higher site size and frequency in areas proximate to major permanent creeklines with a reduction in site size and frequency around less permanent water sources. Whilst sites have been found to occur throughout topographic and vegetational zones, there is a tendency for more of the larger sites to be located in proximity to creeks, wetlands and proximate parts of valley floors. A trend for larger sites to be near major water sources, but avoiding frost drainage hollows, was noted at a regional level by Flood (1980). Elsewhere in the Canberra/Queanbeyan region high site and artefact frequencies have also been correlated with the geographic occurrence of specific resources particularly, stone procurement outcrop locations (Access Archaeology 1990; Heffernan and Klaver 1995; Kuskie 1992a, 1992b).

Scarred trees may be the result of Aboriginal uses of bark and/or wood materials. Various other activities, including the retrieval of honey and other foodstuffs may also result in distinctive 'toe hold' and extractive scars. Scarred trees are sparsely documented in the wider Canberra/Queanbeyan region where suitable mature woodland has been retained (Officer 1992). The identification of scars as Aboriginal in origin is problematic for a number of reasons. A variety of natural processes such as fire damage, lightning strike and branch tears may mimic the scars formed by Aboriginal bark removal. In addition, bark was also a building material favoured by early European settlers, and there are instances where Aboriginal people were employed to strip bark for European buildings. The distinction between Aboriginal and historic scarred trees is therefore often difficult.

5.3 Previous Archaeological Investigations in the Local Area

A search of the DECC Aboriginal Heritage Information Management System (AHIMS) has shown that five Aboriginal sites have been previously recorded within 200 m either side of the current study area. Site types include open artefact scatters, isolated finds and one potential archaeological deposit.

The majority of archaeological investigations that have been carried out in the region have been field surveys and assessments necessitated by proposed developments. These previous studies include surveys for subdivisions at Gale Precinct (Navin and Officer 1990), and Googong (Navin Officer Heritage Consultants 2003), the CSR Readymix Quarry on Cooma Road , and surveys along Old Cooma Road (AASC 2001; Saunders 2001[a], 2001[b], 2001[c], 2002).

Survey of 130 ha at Gale Precinct (Navin and Officer 1990), to the north of Wickerslack Lane, identified twelve Aboriginal sites, comprising eight low density artefact scatters (NPWS Sites 57-2-0100 – 57-2-0107), three isolated finds, and one possible Aboriginal scarred tree (NPWS Site 57-2-0108). Lithic materials identified at the sites included chert (27%), fine-grained volcanics (25%), quartz (18%) and silcrete (10%).

No Aboriginal sites were located in the course of a survey of the CSR Readymix Quarry on Cooma Road, to the west of the study area (Navin 1993). However, based on the relatively high degree of survey coverage achieved and the generally unfavourable topographic setting for campsites, the absence of sites within the study area was considered to be a real archaeological pattern.

In a 16 ha survey for a subdivision on the Old Cooma Road, AASC (2001) located one isolated find (NPWS Site 57-2-0252) and one open artefact scatter (NPWS Site 57-2-0251) comprising one chert core and one chert flake (AASC 2001). Visibility conditions during the survey were generally good (15-20%), resulting in an overall effective survey coverage of 27%. Soils were shallow gravelly loams, and areas of the study area were relatively steep and unsuitable for occupation. Based on these factors, together with the good visibility and low numbers of recorded artefacts, it was concluded that the area was of relatively low archaeological sensitivity.

During 2001 and 2002 some 7.5 km of Old Cooma Road was surveyed as part upgrades to the road (Saunders 2001[c], 2002[a]). The first survey covered a 2 km section of road corridor to the north of Jerrabomberra Creek. It resulted in the location of one isolated find on low gradient basal slopes adjacent a drainage line (Saunders 2001[c]). The second survey covered approximately 4.5 km of the corridor from Jerrabomberra Creek to the Monaro Highway. No sites were located during the survey, however two areas of potential archaeological deposit were identified on the flats and basal slopes adjacent Jerrabomberra Creek and Guises Creek. Monitoring was recommended in both of these areas (Saunders 2002[a]).

Three Archaeological surveys have been undertaken in the Googong area. The first of survey for Aboriginal and European sites within the 216 ha property of *Talpa Crest* (Saunders 2001[a]), in the northeastern corner of the study area.

Fourteen Aboriginal archaeological sites, consisting of seven open artefact scatters and seven isolated finds were identified within the 216 ha property of *Talpa Crest* (Saunders 2001[a]). The majority of the open sites were small low-density artefact scatters, however sites TC2, TC4 and TC11 were substantially larger, comprising up to an estimated 500 artefacts. Assemblages at these sites were dominated by flakes and flaked pieces, although cores, blades, hammerstones and a fragment of a ground edged axe were also recorded. The predominant stone types were quartz and quartzite, with chert, silcrete, volcanic, metamorphosed tuff and metamorphosed sedimentary also present. Areas of high archaeological potential were also identified along the low gradient southern sections of 'Gorge Creek' and the tributary adjacent to the east.

The second study (Saunders 2001[b]) was a preliminary archaeological assessment. Five Aboriginal sites were located in the course of the survey. The sites comprised four small, low density, artefact scatters (SQBN-W1, SQBN-W2, SQBN-E1 & SQBN-E2) and one isolated find (SQBN-W3). Three of the sites (W1, W2 & W3) were located on ridge crests, while the remaining two were located on low gradient basal slopes. In addition to these sites three areas of high archaeological potential were identified along the low gradient basal slopes adjacent Jerrabomberra Creek.

Navin Officer Heritage Consultants Pty Ltd (2003) undertook the cultural heritage component of the Googong Local Environmental Study. The subject area comprised approximately 1000 hectares and is located at the southern end of the Old Cooma Road study area. Eighteen previously recorded Aboriginal sites were known to exist in the Googong LES prior to the 2003 field survey (TC1-TC14, S.QbnW2, S.QbnW3, S.QbnE1 and S.QbnE2). Five previously recorded historical sites were known to exist in the study area prior to the survey.

The Googong LES survey identified thirty-four Aboriginal sites, comprising twenty artefact scatters and fourteen isolated finds, and twenty-four areas of potential archaeological deposit. Four of the Aboriginal sites and one PAD are located in the Old Cooma Road study area.

5.4 The Old Cooma Road Study Area

Four previously identified Aboriginal sites (GA12, GA15, TSR1 and TSR2), and one area of potential archaeological deposit (GPAD7) are located within the Old Cooma Road Study area. The sites and PAD are described below in Section 7.2.1.

5.5 Predictive Model for Aboriginal Sites

As a result of the numerous archaeological surveys undertaken to date in the local area qualitative observations regarding Aboriginal site location parameters may be summarised as follows:

- the most commonly recorded site types are low-density surface scatters of stone artefacts
- artefact densities in open artefact scatters may vary considerably.
- open artefact scatters are most likely to occur on relatively level ground in locally well-drained contexts, either spurline crests, terraces or elevated creek banks in valley floor contexts, low gradient crests and streamline banks in mid valley slope contexts, and level crests, shoulders and saddles on major ridgelines and spurs.
- the majority of open artefact scatters, (particularly larger sites), are situated adjacent to, or in close proximity to, creek flats or valley bottom contexts, frequently on low gradient basal slopes adjacent to streams or wetlands.
- open artefact scatters which contain relatively large artefact assemblages and densities occur most frequently and consistently within 100-150 metres of major and relatively permanent drainage lines.
- open artefact scatters which occur away from the valley basal slopes and major tributaries tend to be small and more sparse. A preference for major confluences and valley constrictions may be indicated.
- most sites located away from major water sources will consist of low density scatters of artefacts, and mostly contain less than 10 visible surface artefacts.
- artefacts may occur wherever surface exposures of exploitable rock occur, rock sources which are known to have been locally exploited include chalcedony, chert, quartz, and fine grained igneous rocks such as fine grained porphyry and fine-grained intrusives within granodiorite.
- the occurrence of high grade chert does not necessarily indicate Aboriginal exploitation (Officer and Navin 1992).
- Aboriginal scarred trees may occur anywhere old-growth trees survive. It is estimated that Aboriginal scars in the Canberra/Queanbeyan region would need to be in the order of 150 to 200 years old.

6. HISTORICAL CONTEXT

6.1 Historical Overview

The first documentation of Europeans in the Canberra/Queanbeyan area is in 1820 and 1821 when exploratory expeditions in search of the Murrumbidgee River passed through the area (Gillespie 1985). The Queanbeyan area was first visited by Europeans in 1822 when a small group of men led by William Kearns crossed the Molonglo Plains and eventually reached the Queanbeyan River (Lea-Scarlett 1968: 5-6). By the mid-1820s the first settlers, squatters and graziers had moved into the district, some individuals obtaining crown and compensatory land grants.

Following the establishment of the large land grantees whose land covered the best grasslands on the river flats and basal valley slopes, the pattern of land selection was characterised by the purchase or selection of small parcels of forested land, following the Robertson Land Act of 1861. The land selectors who applied for land under the Robertson Land Acts were often people of limited financial resources or no government contacts, and often locals whose occupations and families were connected to the labour force of the larger estates. Their landholdings were often small and conditionally purchased, with freehold title only gained after completion of all payments. During the payment period, various conditions were often specified, including the conduct of improvements such as fencing and clearing, and a period of residency on the block.

Compared to the original government grants, the land subject to selection was mostly more marginal and forested, and often poorly watered in upper creek catchments. In many cases the small holdings proved uneconomic and selectors could not support their payments and consequently lost or sold their holdings. The buyers were frequently the neighbouring large estate holders who retained the best land, the best water sources and could raise sufficient capital.

The Old Cooma Road alignment has been a road since at least the late 19th Century and has been declared a road reserve since the at least 1967, including the section that will be Stage 1 of the current project (Figure 6.1).

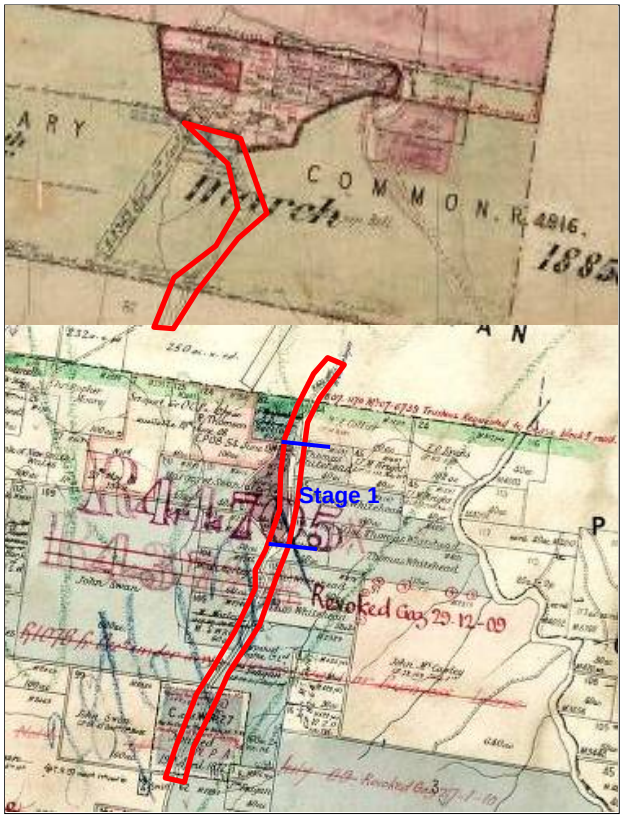

Figure 6.1 Extracts of the Queanbeyan 2nd edition 1881 (top) and Googong 3rd edition 1905 (bottom) parish maps showing the current study area (red outline)

The current study area passes through the Googong No. 35 Travelling Stock Reserve (TSR) (Figure 6.3). The TSR has been in public hands since at least 1872 (Figure 6.4). The parish maps show that from 19th April 1872 the TSR was a Camping and Water Reserve and from December 1882 was reserved for the Googong Public School (Figures 6.5). The TSR was reserved from occupation for residential or business from 25 July 1893, was required for camping from 2 August 1894 and from 23 April 1932 was under the Pastures Protection Board, first Queanbeyan then Braidwood, as a Travelling Stock Reserve.

A majority of the TSR was purchased in the 1970s by E.W. Heffernan and B.G. Scott leaving the current TSR boundaries.

Figure 6.3 Googong No. 35 Travelling Stock Reserve

Figure 6.4 Extract from the Googong 3rd edition 1905 Parish map showing the TSR

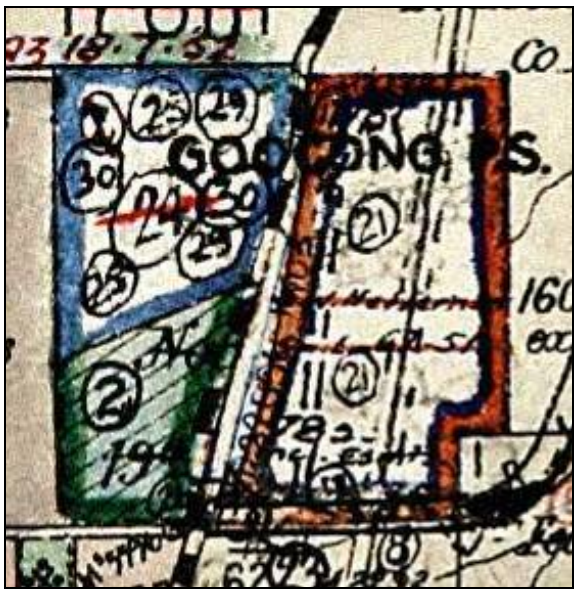

Figure 6.5 Extract from the Googong 5th edition 1921 Parish map showing the TSR

The Googong Public School was a provisional public school from January 1883 to July 1896. From then on Googong Public School was a halftime school first with Black Creek from January 1897 to October 1897, with Malcolm Vale from October 1897 to July 1901, again with Black Creek from January 1905 to November 1905 and lastly with Burra from November 1905 to October 1913 (Fletcher and Burnswoods 1983). The presence of a school at Googong is indicative of quite a sizeable family population.

6.2 Heritage Listed Items

There are no heritage listed items within the Old Cooma Road study area.

6.3 Predictive Historical Archaeology Statement

Unrecorded historic sites and features of heritage significance that may occur within the study area include:

- Old fence lines (such as post and rail fencing); these may occur along road easement boundaries and farmlands. Other indications of field systems, such as drainage channels and ridge and furrow ploughlands, are likely to survive in low lying agricultural ground, especially in areas that are now used for grazing, rather than cropping.

- Traces of agricultural and industrial processing or extractive sites such as dairies, factories, and quarries; these may be found throughout agricultural lands on valley floors and adjacent low ranges;

- Archaeological sites such as the occupation remains of former dwellings including homesteads, houses and huts; these will be distributed in close association with land settlement patterns, and correlated with favourable agricultural lands, trading nodes and transport corridors;

- Nineteenth-century structures such as farm dwellings, outbuildings, selector's and timber-getters huts; these may survive as standing buildings, ruins or archaeological deposits and are most likely to survive on less developed rural properties, on early portion numbers, and in or near established farm building complexes;

- Standing buildings and structures; these will be focused in the town and along the early centres and corridors of occupation, industry, travel and transport;

- Sites associated with early roads; these will be closely associated with early cadastral road reserves, watershed ridgelines, and related to early river and creek crossing points;

- Transport and access routes such as bridle paths, stock routes, and roads of varying forms and ages; these may survive as abandoned remnants adjacent to modern transport routes, or as alignments now followed by more modern or upgraded road and track infrastructure; and

Structures of historical interest and heritage significance may be standing, ruined, buried, abandoned or still in use.

7. RESULTS

7.1 Summary

Five Aboriginal sites comprising four artefact scatters (GA12, GA15, TSR1 and TSR2) and one potential archaeological deposit (GPAD7) have been previously identified in the study area by Navin Officer Heritage Consultants in 2003 and the Department of Environment and Conservation (DEC) in 2005.

Five Aboriginal sites, comprising three isolated finds (OCR1, OCR2 and OCR5) and two artefact scatter (OCR3 and OCR4) were identified within the Old Cooma Road Realignment study area during the current study.

One historical heritage site, the former and current Googong Travelling Stock Reserve (Googong TSR) has been identified in the Old Cooma Road Realignment study area.

Sites and PAD locations are shown on Figure 7.10.

7.2 Aboriginal Sites and PADs

7.2.1 Previously Recorded Sites

GA12 (*GDA 7019828.6079086*)

This site comprised three artefacts located on exposures formed by animal trails. The topographic context was the northeast slope of a small spur between two minor drainage lines. The artefacts were located within an area of some 300 m^2 on a gentle to moderate gradient, approximately 100 m from the crest-slope interface (Figure 7.1). Visibility in the area was generally low (<2%) due to extensive leaf litter and background gravels, however within the recorded exposures, surface visibility was as high as 30% along 50 cm wide trails.

Local soil was brown gravelly loam with a high quartz gravel content; it is generally shallow. Potential for further artefacts to occur was moderate; the potential for subsurface cultural material to be associated with the site was considered to be low.

Figure 7.1 GA12 facing southwest (photo taken 2003)

GA15 (*GDA 701925.6078650*)

This site comprised at least eight artefacts located in exposures provided by vehicular track, bare earth and installation of a Telstra cable. Artefact distribution covered an area of approximately 300 m^2, however five artefacts were concentrated in an area of some 50 m^2. (Figure 7.2). This local concentration of artefacts included four tuff flakes and a core that may be the remnants of a flaking

floor. Topographic context of the site is a low broad spur crest with open to northerly aspect. Visibility within the recorded exposures ranges from 25-60%, while surrounding visibility is approximately 2 - 5%

Local deposit was shallow gravelly loam with substantial quantities of shale. Disturbance across the site was moderate to high. While impact to the site from the Telstra cable installation was restricted to a 2 m wide corridor, the surrounding area had also been impacted by construction, habitation and subsequent demolition of a residential complex within 10 m of the recorded artefacts. Potential for more artefacts to occur in this location was high; the potential for subsurface cultural material to be associated with the site was considered to be low.

Figure 7.2 GA15 - facing northeast (photo taken 2003)

GPAD7 (*Approximate centre GDA 701675.6078650*)

This recording comprised a terrace on the southern side of the creekline that drained to the east of GPAD5. The identified area was approximately 80 m long x 70 m wide. Visibility in this area was generally less than 2%, although small sections of soil profile visible along the creek revealed the local deposit to be light brown silty loam (colluvial/alluvial) approximately 30 cm or greater in depth above an orange brown gravelly clay.

Primary identifying attributes included the following:

- Proximity to a semi-permanent water source (minor creek);
- Topographic context and constituent landscape features that may have acted as a natural camping points, ie elevated area of level grand formed by the terrace;
- Depth of deposit generally greater than 30 cm with high potential to contain *in situ* subsurface material

TSR1 *(GDA 701799.6078680)* and **TSR2** *(GDA 701818.6078694)*

These sites were identified by the DEC in 2005. No further information is available on these sites.

7.2.2 Sites and PADs Recorded in Current Study

Old Cooma Road 1 (OCR1) *GDA 702806.6080647*

This site is an isolated find located in a gully beside a deeply incised drainage line. The artefact was located in an animal track adjacent to an ants nest (Figure 7.3).

Local deposit is shallow gravelly loam. Disturbance across the areas was moderate (40%) and visibility within the disturbed areas was 50%.

There is low potential for this site to be larger; the potential for subsurface cultural material to be associated with the site was considered to be low.

Artefact:

1. broken pebble manuport, no obvious signs of use, 103 x 56 x 52 mm (Figure 7.4).

Figure 7.3 location of OCR1 looking south

Figure 7.4 Artefact 1 OCR1

Old Cooma Road 2 (OCR2) *GDA 702494.6079992*

This site is a scatter of two artefacts located on the flat mid slopes of a gently rising hill west of Old Cooma Road (Figure 7.5 and 7.6). Disturbance across the areas was 60% and visibility within the disturbed areas was 30% due to the highly gravelly soil. The soil is shallow with bedrock at the surface up slope. Disturbance across the site was moderate.

There is low potential for this site to be larger; the potential for subsurface cultural material to be associated with the site was considered to be low.

Artefacts:

1. grey tuff core, 1 platform, 39 x 47 x 28 mm
2. white quartz flake, 28 x 29 x 4 mm

Figure 7.5 Location of OCR2 looking southwest

Figure 7.6 OCR2 looking east

Old Cooma Road 3 (OCR3) *GDA 702462.6079916*

This site is an isolated find located on the flat mid-slopes of a gently rising hill west of Old Cooma Road (Figure 7.7 and 7.8). Disturbance across the areas was 70% and visibility within the disturbed areas was limited to 30% (due to the gravelly soil). Soil is shallow, with bedrock visible at the surface up slope.

Disturbance across the site is high; the site has been disturbed by the installation of a Telstra cable and a fenceline. There is low potential for this site to be larger or to contain subsurface Aboriginal objects.

Artefact:

1. dark grey tuff flaked piece, 31 x 19 x 17 mm

Figure 7.7 OCR3 looking west

Figure 7.8 OCR3 looking east

Old Cooma Road 4 (OCR4) *GDA 703031.6081811*

This site is a scatter of at least four artefacts located above the current Old Cooma Road cutting on gently midslopes above a gully (Figure 7.9). Disturbance across the areas was 50% and visibility within the disturbed areas was limited to 60% (due to the gravelly soil). Soil is shallow and very rocky. The site measures approximately 10 x 2 m.

Disturbance across the site was moderate; the site has been disturbed by a near by quarry and local erosion. There is moderate potential for this site to be larger and low potential for the site to contain subsurface Aboriginal objects.

Artefacts:

1. blue/grey rhyolitic tuff flake 37 x 32 x 6 mm
2. rounded pebble manuport 100 x 62 x 30 mm
3. dark grey rhyolitic tuff flake 32 x 15 x 9 mm
4. cream silcrete flake core 26 x 25 x 9 mm

Figure 7.8 OCR4 looking west towards Old Cooma Road

Old Cooma Road 5 (OCR5) *GDA 703171.6082491*

This site is an isolated find located on mid to basal slopes (Figure 7.9). Disturbance across the areas was 90% and visibility within the disturbed areas was limited to 50% (due to the gravelly soil). Soil is shallow and very rocky.

Disturbance across the site was moderate; the site has been disturbed by a dirt vehicle track. There is moderate potential for this site to be larger and low potential for the site to contain subsurface Aboriginal objects.

Artefact:

1. dark grey rhyolitic tuff flake 33 x 30 x 7 mm, positive and negatives scars

Figure 7.9 OCR5 looking west towards Old Cooma Road

7.3 Aboriginal Cultural Values

Participating Aboriginal groups have been invited to provide comment/information on the Aboriginal cultural values the project area. (Refer Appendix 2).

7.4 European Sites

Googong Travelling Stock Reserve (former and current) (Googong TSR)
GDA 701610.6079250, 702400.6079100, 702300.6078460, 702200.6078480, 702170.6078325 and 701475.6078455

This site is the location of the 1872 *Camping and Water Reserve* and later *Googong Public School.* The block was later declared a *Travelling Stock Reserve* (TSR) and most of it has now been subdivided. A small section of the original block is still a TSR today (see Section 6.1).

The location of the Googong Public School, which operated from 1883 to 1913 could not be confirmed, however, the most likely location is at the entrance to the current TSR (Figure 7.9).

Figure 7.9 Looking east over the possible location of the Googong Public School

7.5 Inventory of Site Locations

Recording Type	Recording Code	GDA Reference
artefact scatter	GA12	7019828.6079086
artefact scatter	GA15	701925.6078650
PAD	GPAD7	701675.6078650
isolated find	OCR1	702806.6080647
artefact scatter	OCR2	702494.6079992
isolated find	OCR3	702462.6079916
artefact scatter	OCR4	703031.6081811
isolated find	OCR5	703171.6082491
artefact scatter	TSR1	701799.6078680
artefact scatter	TSR2	701818.6078694
European site	Googong TSR	701610.6079250 702400.6079100 702300.6078460 702200.6078480 702170.6078325 701475.6078455

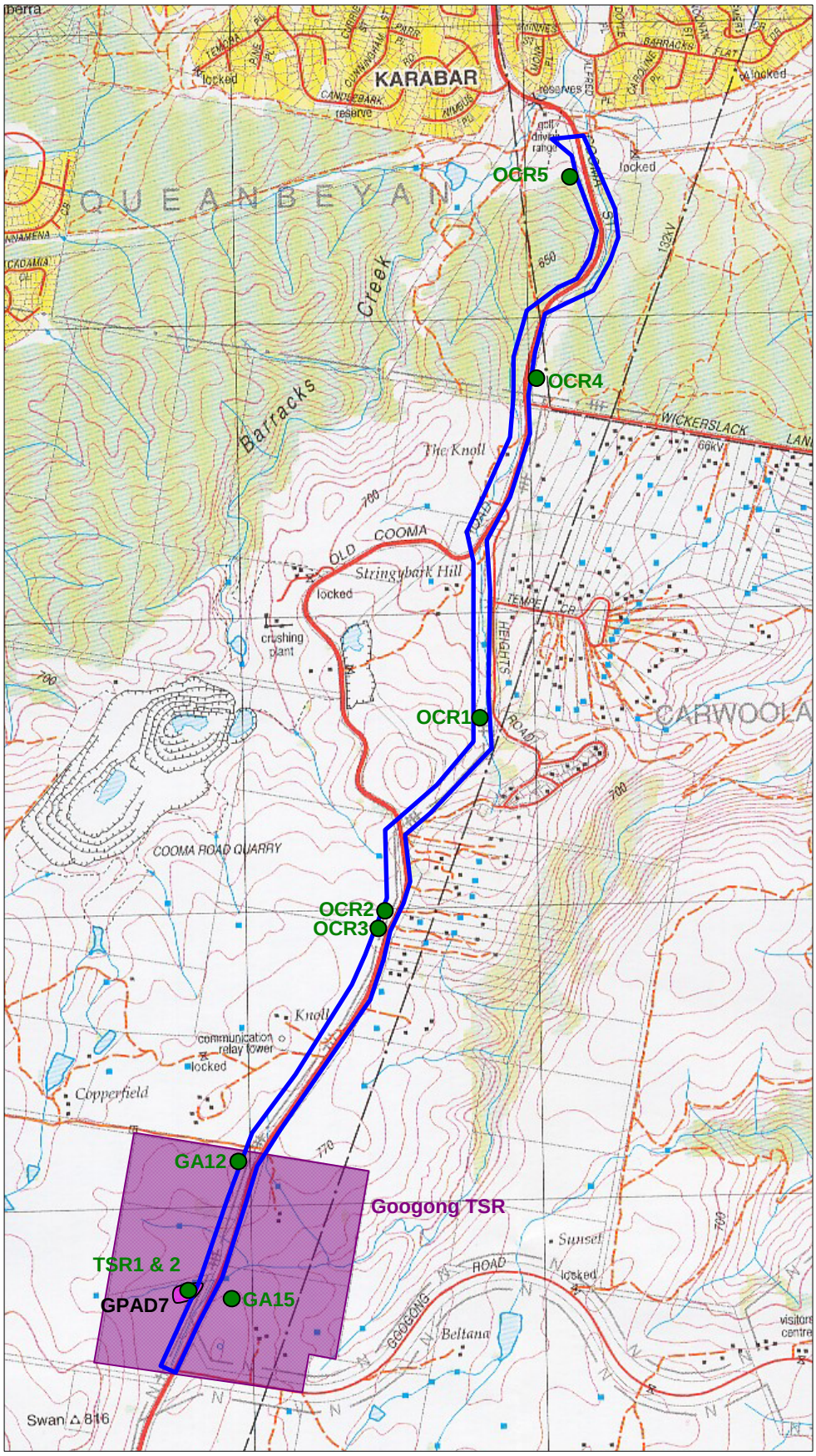

Figure 7.10 Location of sites and PADs in and in the near vicinity of the Old Cooma Road Realignment study area (blue outline) (extract from 1:25,000 topographic maps of Tuggeranong 8727-3S 2nd Edition)

7.6 Survey Coverage and Visibility Variables

The effectiveness of archaeological field survey is to a large degree related to the obtrusiveness of the sites being looked for and the incidence and quality of ground surface visibility. Visibility variables were estimated for all areas of comprehensive survey within the study area. These estimates provide a measure with which to gauge the effectiveness of the survey and level of sampling conducted. They can also be used to gauge the number and type of sites that may not have been detected by the survey.

Ground surface visibility is a measure of the bare ground visible to the archaeologist during the survey. There are two main variables used to assess ground surface visibility, the frequency of exposure encountered by the surveyor and the quality of visibility within those exposures. The predominant factors affecting the quality of ground surface visibility within an exposure are the extent of vegetation and ground litter, the depth and origin of exposure, the extent of recent sedimentary deposition, and the level of visual interference from surface gravels. Two variables of ground surface visibility were estimated during the survey:

- A percentage estimate of the total area of ground inspected which contained useable exposures of bare ground; and

- A percentage estimate of the average levels of ground surface visibility within those exposures. This is a net estimate and accounts for all impacting visual and physical variables including the archaeological potential of the sediment or rock exposed.

The obtrusiveness of different site types is also an important factor in assessing the impact of visibility levels. Artefacts made from locally occurring rock such as quartz may be more difficult to detect under usual field survey conditions than rock types that are foreign to the area. The impact of natural gravels on artefact detection was taken into account in the visibility variables estimates outlined above.

The current study surveyed the Old Cooma Road Realignment project area from Wickerslack Lane to Googong Road. The Western side of Old Cooma Road was surveyed where the current alignment will be duplicated. The area to the west of Tempe Crescent was surveyed where

Table 7.1 summarises estimates for the degree to which separate landforms within the study area were examined and also indicates the exposure incidence and average ground visibility present in each case. A total of 80% of the ground area in the study area was inspected during the survey, with 40% providing useable archaeological exposures.

A graphic approximation of the surface survey coverage achieved within the study area is shown in Figure 7.10.

Taking into account survey coverage, archaeologically useable exposures, and visibility variables, the effective survey coverage (ESC) was 19.2% of the total survey area. The ESC attempts to provide an estimate of the proportion of the total study area that provided a net 100% level of ground surface visibility to archaeological surveyors.

The ESC calculation is defined and required by the DECC and stated to be of use in assessing and cross comparing the adequacy of archaeological surface surveys. The actual utility of the ESC calculation however is challenged by many archaeologists. The limitations of the ESC calculation are emphasised by differences in the subjective assessment of exposure and visibility levels, variations in how survey units are defined and measured, and differences in how and which variables are estimated and combined. In reality, ESC results tend only to be meaningful when compared across surveys conducted by the same surveyors and ESC measurers.

Table 7.1 Survey Coverage Data

Survey division	Survey unit	Landform	Survey mode	Main exposure types	Estimated Survey Unit area (ha)	Proportion of unit surveyed %	Area of unit surveyed (ha)	Exposure incidence %	Average exposure visibility %	Net effective exposure (ha)	Effective survey coverage of survey unit %	Aboriginal Archaeological recordings
1	A	Minor hills and ridgelines, flat open areas and small drainage/creek lines	foot	animal and vehicle tracks, gully erosion, erosion scalds	17.5	80	14	40	60	3.3600	19.2	7
Total					*17.5*		*14*			*3.3600*	*19.2*	

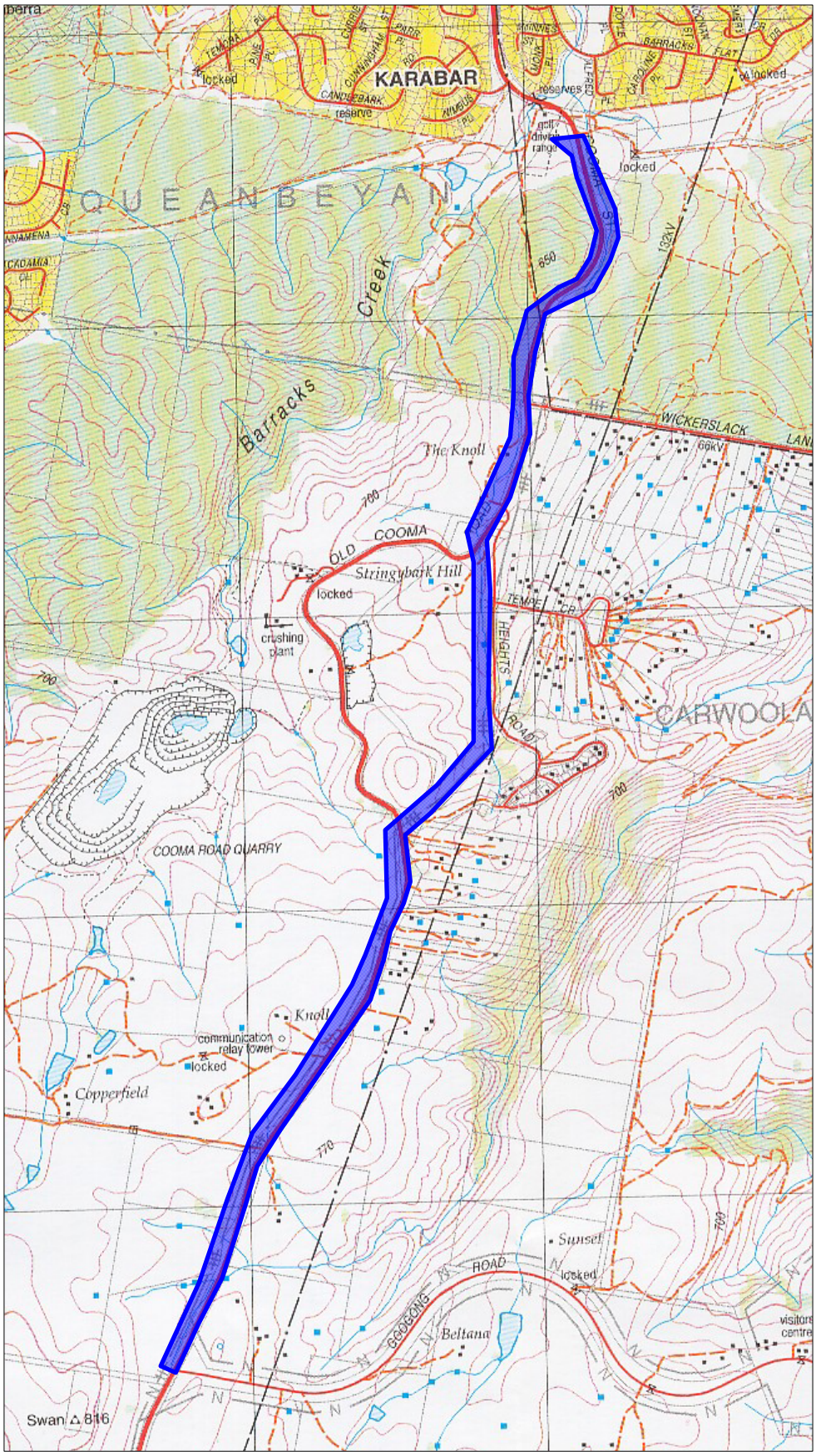

Figure 7.10 A graphic approximation of the surface survey coverage achieved within the study area (blue) (extract from 1:25,000 topographic maps of Tuggeranong 8727-3S 2nd Edition)

8. SIGNIFICANCE ASSESSMENT

8.1 Aboriginal Heritage

Assessment Criteria

The Burra Charter of Australia defines cultural significance as 'aesthetic, historical, scientific or social value for past, present and future generations' (Aust. ICOMOS 1987). The assessment of the cultural significance of a place is based on this definition but often varies in the precise criteria used according to the analytical discipline and the nature of the site, object or place.

In general, Aboriginal archaeological sites are assessed using five potential categories of significance:

- Significance to contemporary Aboriginal people;
- Scientific or archaeological significance;
- Aesthetic value;
- Representativeness; and
- Value as an educational and/or recreational resource.

Many sites will be significant according to several categories and the exact criteria used will vary according to the nature and purpose of the evaluation. Cultural significance is a relative value based on variable references within social and scientific practice. The cultural significance of a place is therefore not a fixed assessment and may vary with changes in knowledge and social perceptions.

Aboriginal significance can be defined as the cultural values of a place held by and manifest within the local and wider contemporary Aboriginal community. Places of significance may be landscape features as well as archaeologically definable traces of past human activity. The significance of a place can be the result of several factors including: continuity of tradition, occupation or action; historical association; custodianship or concern for the protection and maintenance of places; and the value of sites as tangible and meaningful links with the lifestyle and values of community ancestors. Aboriginal cultural significance may or may not parallel the archaeological significance of a site.

Scientific significance can be defined as the present and future research potential of the artefactual material occurring within a place or site. This is also known as archaeological significance.

There are two major criteria used in assessing scientific significance:

1. The potential of a place to provide information which is of value in scientific analysis and the resolution of potential research questions. Sites may fall into this category because they: contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a constituent of a larger significant structure such as a site complex.

2. The representativeness of a place. Representativeness is a measure of the degree to which a place is characteristic of other places of its type, content, context or location. Under this criteria a place may be significant because it is very rare or because it provides a characteristic example or reference.

The value of an Aboriginal place as an educational resource is dependent on: the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

The principal aim of cultural resource management is the conservation of a representative sample of site types and variation from differing social and environmental contexts. Sites with inherently unique

features, or which are poorly represented elsewhere in similar environment types, are considered to have relatively high cultural significance.

The cultural significance of a place can be usefully classified according to a comparative scale which combines a relative value with a geographic context. In this way a site can be of low, moderate or high significance within a local, regional or national context. This system provides a means of comparison, between and across places. However it does not necessarily imply that a place with a limited sphere of significance is of lesser value than one of greater reference.

The following assessments are made with full reference to the scientific, aesthetic, representative and educational criteria outlined above. Reference to Aboriginal cultural values has also been made where these values have been communicated to the consultants. It should be noted that Aboriginal cultural significance can only be determined by the Aboriginal community, and that confirmation of this significance component is dependent on written submissions by the appropriate representative organisations.

The Study Area

Site GA12 was assessed as moderate local significance and GA15 was assessed as low-moderate local archaeological significance in 2003 (Navin Officer Heritage Consultants 2003:95). Sites TSR1 and TSR2 have not been assessed by the site recorders (ie. the DECC).

The visible artefacts at sites OCR1, OCR2 OCR3, OCR4 and OCR5 are common artefact types and common raw materials. The sites have low potential to be associated with undisturbed archaeological deposit. The sites are therefore assessed as having low archaeological significance.

8.2 European Heritage

Assessment Criteria

The NSW Heritage Office has defined a methodology and set of criteria for the assessment of cultural heritage significance for items and places, where these do not include Aboriginal heritage from the pre-contact period (NSW Heritage Office & DUAP 1996, NSW Heritage Office 2000). The assessments provided in this report follow the Heritage Office methodology.

The following heritage assessment criteria are those set out for Listing on the State Heritage Register. In many cases items will be significant under only one or two criteria. The State Heritage Register was established under Part 3A of the Heritage Act (as amended in 1999) for listing of items of environmental heritage that are of state heritage significance. Environmental heritage means those places, buildings, works, relics, moveable objects, and precincts, of state or local heritage significance (section 4, Heritage Act 1977).

An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria:

Criterion (a) an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

Criterion (d) an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

Criterion (e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (g) an item is important in demonstrating the principal characteristics of a class of NSW's

- cultural or natural places; or
- cultural or natural environments.

(or a class of the local area's

- cultural or natural places; or
- cultural or natural environments.)

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register. Only particularly complex items or places will be significant under all criteria.

In using these criteria it is important to assess the values first, then the local or State context in which they may be significant.

Different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases it is constructive to note the relative contribution of an item or its components. Table 8.1 provides a guide to ascribing relative value.

Table 8.1 Guide to ascribing relative heritage value

Grading	Justification	Status
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness Item can be interpreted relatively easily.	Fulfils criteria for local or State listing.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or State listing.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

The Study Area

The *Googong TSR* is historically and associatively important in NSW and the local area. The condition of the site however does not allow for the demonstration of uncommon, rare, endangered or characteristically important features, and the site is unlikely to yield information that will contribute to an understanding of the cultural history of NSW or the local area.

The condition of the site detracts from, and is damaging to, its significance. The site is therefore considered to be of little heritage significance and does not fulfil the NSW Heritage Council's heritage significance criteria for either a local or State listing. That is, the site is not considered to have any heritage significance.

9. STATUTORY AND POLICY CONTEXT[1]

9.1 National Parks and Wildlife Act 1974

The rationale behind the *National Parks and Wildlife Act 1974* (NP&W Act) as amended is the prevention of unnecessary or unwarranted destruction of Aboriginal Objects, and the active protection and conservation of Aboriginal Objects that are of high cultural significance.

With the exception of projects subject to the provisions of Part 3A of the EP&A Act, the NP&W Act (as amended) provides the primary basis for the legal protection and management of Aboriginal sites within NSW. The implementation of the Aboriginal heritage provisions of the Act is the responsibility of the Department of Environment and Climate Change (DECC).

The following summary is based on:

- The provisions of the current *National Parks and Wildlife Act 1974* (NP&W Act) as amended; and
- Department of Environment and Climate Change (DECC) policy as presented in the 1997 Standards and Guidelines Kit for Aboriginal Cultural Heritage provided by the (then) NSW NPWS, and as communicated orally to the consultants on a periodic basis.

The guideline documents presented in the 1997 Standards and Guidelines Kit were stated to be working drafts and subject to an 18 months performance review. The Standards Manual was defined not to be a draft and subject to periodic supplements.

An Aboriginal object is defined as:

> 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.' [s5(1)].

In practice, archaeologists use a methodology that groups 'Aboriginal objects' into various site classifications according to the nature, occurrence and exposure of archaeological material evidence. The archaeological definition of a site may vary according to survey objectives; however a site is not recognised or defined as a legal entity in the Act. It should be noted that even single and isolated artefacts are protected as Aboriginal objects under the Act.

The investigation, use or destruction of Aboriginal objects is managed through a system of Aboriginal Heritage Impact Permits under the provisions of s87 and s90 of the Act. Section 87 relates to actions which do not involve direct damage to Aboriginal objects, and s90 relates to damage or defacement of Aboriginal objects.

Under s87 of the Act, it is an offence to do any of the following without a Permit from the Director-General of the DECC: disturb or excavate any land for the purpose of discovering an Aboriginal object; disturbing or moving an Aboriginal object; take possession of or removing an Aboriginal object from certain lands; and erecting a building or structure to store Aboriginal objects on certain land (s86). The maximum penalty is $11,000 for individuals and $22,000 for corporations.

Under s90 of the Act, a person who, without first obtaining the consent of the Director-General knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or damage to, an Aboriginal object or Aboriginal Place is guilty of an offence against the Act.

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[1] The following information is provided as a guide only and is accurate to the best knowledge of Navin Officer Heritage Consultants. Readers are advised that this information is subject to confirmation from qualified legal opinion.

Where salvage actions (such as collection or re-positioning) are proposed in conjunction with an application to destroy Aboriginal objects, then an application for a s87 permit must accompany the s90 application. This is because a consent issued solely under s90 of the Act is not considered to permit actions other than those which destroy, deface or damage Aboriginal objects.

In January of 2005, the DECC introduced *Interim Guidelines for Aboriginal Community Consultation* with regard to the preparation of applications for a consent or permit under Part 6 (s87 and s90) of the NP&W Act. The Interim Guidelines include a required process of notification of intended applications in the local media, an invitation for stakeholder groups to register interest, and various time periods providing an opportunity for registered stakeholders to comment and review proposed methodologies and assessments.

It should be noted that s75U of the EP&A Act (as amended) establishes an exemption to the application of s87 and s90 of the NP&W Act. It states that a Permit under s87 or a consent under s90 of the NP&W Act is not required for an approved project subject to the provisions of Part 3A of the EP&A Act. Section 75U also extends this exemption to include 'any investigative or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements under this Part in connection with an application for approval to carry out the project or of a concept plan for the project' (s75(U)4 EP&A Act 1979 (as amended)).

Section 175B of the NP&W Act outlines circumstances where corporation directors may be taken to have contravened these provisions, based on the acts or omissions of that Corporation.

The processing and assessment of permit and consent applications is dependent upon adequate archaeological review and assessment, together with an appropriate level of Aboriginal community liaison and involvement (refer Standards for Archaeological Practice in Aboriginal Heritage Management in 1997 NPWS Standards and Guidelines Kit).

The Minister may declare any place which, in his or her opinion, is or was of special Aboriginal significance with respect to Aboriginal culture, to be an Aboriginal place (s84). The Director-General has responsibility for the preservation and protection of the Aboriginal place (s85). An area declared to be an Aboriginal place may remain in private ownership, or be acquired by the Crown by agreement or by a compulsory process (s145).

The Director General may make an interim protection order and order that an action cease where that action is, or is likely to, significantly affect an Aboriginal object or Aboriginal place. Such an order is current for 40 days (s91AA, Schedule 3[10]). Such an order does not apply to certain actions, such as where they are in accordance with development consents or emergency procedures.

General Management Constraints and Requirements

Except where a project is subject to the provisions of Part 3A of the EP&A Act, the NP&W Act, together with the policies of the DECC provide the following constraints and requirements on land owners and managers:

- It is an offence to knowingly disturb an Aboriginal object (or site) without an appropriate permit or consent (s87 and s90);

- Prior to instigating any action which may conceivably disturb an Aboriginal object (this generally means land surface disturbance or felling of mature trees), archaeological survey and assessment is required (refer Standards for Archaeological Practice in Aboriginal Heritage Management in 1997 NPWS Standards and Guidelines Kit);

- When the archaeological resource of an area is known or can be reliably predicted, appropriate landuse practices should be adopted which will minimise the necessity for the destruction of sites/Aboriginal objects, and prevent destruction to sites/Aboriginal objects which warrant conservation (refer Standards for Archaeological Practice in Aboriginal Heritage Management in 1997 NPWS Standards and Guidelines Kit) and

- Documented and appropriate consultation with relevant Aboriginal Community representatives is required by the DECC as part of the prerequisite information necessary for endorsement of consultant recommendations or the provision of consents and permits by the DECC (refer Standards for Archaeological Practice in Aboriginal Heritage Management in 1997 NPWS Standards and Guidelines Kit).

Statutory Constraints Arising from Artefacts which Constitute Background Scatter

Background scatter is a term used generally by archaeologists to refer to artefacts that cannot be usefully related to a place or focus of past activity. There is no single concept for background 'scatter' or discard, and therefore no agreed definition. The recognition of background material within a particular study area is dependent on an appreciation of local contextual and taphonomic factors. Artefacts within a 'background' scatter can be found in most landscape types and may vary considerably in density.

Standard archaeological methodologies cannot effectively predict the location of individual artefacts within background scatters. Surface survey may detect background material either as individual artefacts ('isolated finds'), or even as small, low-density 'sites'. Subsurface testing may sample, and through analysis, characterise background material. However, beyond the scope of archaeological sampling, the potential to encounter background artefacts within the context of development related ground disturbance will always remain.

Most previous cultural resource management archaeological methodologies have acknowledged that there is little scientific justification for the conduct of archaeological salvage or ground disturbance monitoring to effect the recovery of background artefacts. The intrinsic scientific value of any recovered artefacts does not, in general, outweigh the expense of conducting the monitoring. However, low density distributions of artefacts are a current subject of interest by some heritage practitioners and DECC policy regarding this issue may change in the future. The monitoring of construction related ground works by Aboriginal groups is now increasingly practiced. The recovery of background scatter artefacts is often a probable outcome of such monitoring exercises.

Given the nature of statutory and DECC policy requirements in NSW, the detection of background artefacts during monitoring can be problematic. Except where a project is subject to the provisions of Part 3A of the EP&A Act, or where an Aboriginal object is covered by a current Aboriginal Heritage Impact Permit from DECC, all further impact to an Aboriginal object detected during development works, and to the ground in its immediate vicinity, must cease until an appropriate Permit or Consent is gained. It may take up to eight weeks for this to occur. However, in the past the DECC has not as a general rule granted consents to cover artefacts within background scatters which remain undescribed and undetected. This is because the DECC sought to provide consents where the significance and location of the Aboriginal objects to be impacted could be reliably defined. By their very nature, this may not be possible for artefacts that constitute a background scatter.

The present application of policy of the DECC does not provide for a consistent or proactive means of dealing with the statutory constraints posed by the detection of background scatter artefacts during development works. In those cases where the provisions of Part 3A of the EP&A Act do not apply, an option is the provision by the DECC of a s87 Permit or s90 Consent which includes all Aboriginal objects situated within the defined development site rather than specific sites or finds within it. This approach has been adopted by some DECC branch jurisdictions where an assessment has been provided which suitably investigates the known and predicted incidence of Aboriginal objects potentially subject to disturbance. Other DECC jurisdictions do not accept this approach and only provide permits and consents for known and defined Aboriginal object occurrences.

It should therefore be noted, that in the event that an Aboriginal artefact ('Aboriginal object') is detected during ground disturbance within a development study area, and that area or Aboriginal object is not covered by an AHIP, there may be considerable delays to development works while an application for a Consent to Destroy is processed.

9.2 National Parks and Wildlife Amendment Act 2001

This Act identifies that the requirement for a s90 'consent to destroy' from the Director-General has been replaced by a 'heritage impact permit'. It also includes the following provisions:

- Section 90 (1) – The offence under s90 of the Principal Act of 'knowingly' destroying, defacing or damaging Aboriginal objects and Aboriginal Places without consent has been changed so that the element of knowledge has been removed. The amended s90(1) reads:

  'A person must not destroy, deface, damage or desecrate, or cause or permit the destruction, defacement, damage or desecration of, an Aboriginal object or Aboriginal place.'

- Section 90 (1B) – Subsection 90 (1) does not apply with respect to an Aboriginal object or Aboriginal place that is dealt with in accordance with a heritage impact permit issued by the Director-General;

- Section 90 (1C) – It is a defence to a prosecution for an offence against subsection (1) if the defendant shows that

  (a) he or she took reasonable precautions and exercised due diligence to determine whether the action constituting the alleged offence would, or would be likely to, impact on the Aboriginal object of Aboriginal place concerned, and

  (b) the person reasonably believed that the action would not destroy, deface, damage or desecrate the Aboriginal object or Aboriginal place.

- Section 90 (8) and 90 (9) – A court is able to direct a person to mitigate damage to or restore an Aboriginal object or an Aboriginal place in appropriate circumstances when finding the person guilty of an offence referred to in s90 of the Principal Act.

9.3 NSW Aboriginal Land Rights Act 1983

This Act recognises that land in NSW was traditionally owned and lived on by the Aborigines and that land is particularly important to Aborigines for spiritual, social, cultural and economic reasons.

The Act was designed to give control over land, where possible, to local Aboriginal communities. The principal objectives of the Act are to:

- Constitute Land Councils as Aboriginal land holding and managing bodies corporate;
- Facilitate the acquisition of land by transfer (of existing Aboriginal reserves), and open market purchase;
- Define a process for the processing of land claims against certain forms of crown land;
- Define which crown lands were open to claim, and
- Provide for Land Council funding (7.5% of the previous years land tax, to end after 15 years, that is, 1998).

The Act defines claimable land as Crown Land which is not lawfully used or occupied and which is neither needed nor likely to be needed for "an essential public purpose" (s36). The Lands Department includes the following as lands which need to be retained for future public purposes: lands needed or likely to be needed for conservation reserves, dams, forestry, flood mitigation, urban commercial and industrial development, public recreation, and public access.

Once granted, s42 exempts Aboriginal land from compulsory acquisition except by a special Act of Parliament.

The Act provides for a three tiered structure of Aboriginal Land Councils at the Local, Regional and State level. The aim of the Council system is to provide Local Council representation across the whole of NSW. Land Council membership is open to any Aboriginal person over 18 who lives within

the defined boundaries of a Council area, or has since moved elsewhere. In the latter case membership is subject to a vote by Council members. Council executive positions are elected from and by the membership. Representatives from each of the Local Land Councils form the Regional Councils (or Branch Officers), and representatives from each of the Regional Councils form the State or NSW Aboriginal Land Council.

The Land Council system of representation was originally to be complemented by an Aboriginal Heritage and Culture Commission with responsibility for the protection and management of Aboriginal sites. This never eventuated however and these legal responsibilities remain with the NSW National Parks and Wildlife Service.

In the absence of any purposefully constituted system of representation for Aboriginal cultural heritage management, the Land Councils have, until recently, acted as the most accessible and representative bodies for providing community comment on cultural site management and development assessment investigations.

A criticism of the use of the Land Council system in consultation on cultural heritage issues has been the lack of formal representation for people with local tribal and cultural affiliations. Land Council office bearers are elected from contemporary resident Land Council members and need not have traditional ties to the Council area. Similarly, Land Council boundaries do not necessarily relate to tribal or traditional boundaries. For these reasons, and particularly following the recognition of native title rights, additional Aboriginal organisations have developed which specifically seek to represent traditional cultural interests and rights according to various tribal group criteria.

9.4 NSW Heritage Act 1977

Overview

The purpose of this Act is to ensure that the heritage of New South Wales is adequately identified and conserved. In practice the Act has focused on items and places of non-indigenous heritage to avoid overlap with the NP&W Act, which has primary responsibilities for nature conservation and the protection of Aboriginal relics and places in NSW.

The *Heritage Amendment Act 1998* came into effect in April 1999. This Act instigated changes to the NSW heritage system, which were the result of a substantial review begun in 1992. A central feature of the amendments was the clarification and strengthening of shared responsibility for heritage management between local government authorities, responsible for items of local significance, and the NSW Heritage Council. The Council retained its consent powers for alterations to heritage items of state significance.

The Heritage Act is concerned with all aspects of conservation ranging from the most basic protection against damage and demolition, to restoration and enhancement. It recognises two levels of heritage significance – State and Local significance across a broad range of values. Some key provisions of the Act are:

- The establishment and functions of the Heritage Council (Part 2);
- Interim heritage orders (Part 3), the State Heritage Register (Part 3A);
- Heritage Agreements (Part 3B);
- Environmental planning instruments (Part 5);
- The protection of archaeological deposits and relics (Part 6); and
- The establishment of Heritage and Conservation Registers for state government owned and managed items (Part 7).

Generally this Act provides protection to items that have been identified, assessed and listed on various registers including State government section 170 registers, local government Local

Environmental Plans and the State Heritage Register. The Interim Heritage Order provisions allow the minister or his delegates (local government may have delegated authority) to provide emergency protection to threatened places which have not been previously identified.

In addition, the Act includes provisions which relate to the definition and protection of relics.

Protection of Relics and Archaeological Deposits

Section 139 of the Act specifically provides protection for any item classed as a relic. A relic is defined as "...any deposit object or material evidence -

(a) Which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement; and

(b) Which is 50 or more years old."

(Heritage Act 1977, Part 1, Section 4)

Section 139 of the Act disallows disturbance of a relic unless in accordance with an 'excavation permit' from the Heritage Council. This section also allows the Heritage Council to create exceptions to the requirement for an excavation permit with respect to certain types of relic, contexts, or types of disturbance (refer below).

Section 146 of the Act requires that the discovery of a previously unknown relic be reported to the Heritage Council within a reasonable time of its discovery.

Current policy and interpretation by the NSW Heritage Office (Department of Planning) limits the scope of the ‘relic’ definition to exclude above ground structures and a range of ground features or ‘works’ which may include roads, embankments and other forms of constructed ground relief.

Permits and Approval Requirements

The Act includes two key approval requirements;

- A permit must be obtained for works which have the potential to interfere with a heritage item or place which is either listed on the State Heritage Register or the subject of an interim heritage order (s57); and

- A permit must be obtained to disturb or excavate land where it is known (or there is reasonable cause to suspect) that such action will or is likely to uncover or affect a relic (s139). This permit is known as an excavation permit and can be applied for under section 140 of the Act. Current interpretation of the Act by the Heritage Office indicates that excavation permits are only applicable to relics which are situated below the ground surface.

It should be noted that section 75U of the EP&A Act establishes an exemption to the requirement for an excavation permit. It states that an approval under Part 4 or an excavation permit under s139 of the Heritage Act is not required for an approved project subject to the provisions of Part 3A of the EP&A Act. Section 75U also extends this exemption to include ‘any investigative or other activities that are required to be carried out for the purpose of complying with any environmental assessment requirements under this Part in connection with an application for approval to carry out the project or of a concept plan for the project’ (s75(U)4 EP&A Act 1979 (as amended)).

Exemptions for works requiring Heritage Council Approval

Certain activities which may be conducted on heritage item listed on the State Heritage Register are exempted from the s57 approval requirements. Such exemptions are granted by the Minister and fall into two groups, standard exemptions and site specific exemptions.

A schedule of s57 standard exemptions has been formulated which includes activities such as certain types of maintenance and repair, minor excavations, changes of use, some temporary structures and ‘anything which in the opinion of the Director is of a minor nature and will not adversely affect the heritage significance of the item’. In many cases notification of such proposed

activities must be made by the applicant to the Director, and written notification from the Director received regarding his satisfaction that the exemption criteria have been met.

Exceptions from Excavation Permit Requirements

Certain activities are excluded from the s139 permit approval requirements. A series of exceptions have also been established for s139 Permit approval requirements. This includes demolition and maintenance of bridges not listed on the State Heritage Register, some forms of excavation and maintenance of underground services, conservation and repair of monuments and grave markers, and the exposing of survey marks in the course of survey operations.

On the 5 March of 2003, the following s139 exceptions were notified:

> Excavation or disturbance of the following land does not require an excavation permit under s139, provided that the Director is satisfied that the criteria in (a), (b) or (c) have been met and the person to undertake the excavation or disturbance has received a notice advising that the Director is satisfied:
>
> (a) Where an archaeological assessment has been prepared in accordance with Guidelines published by the Heritage Council of NSW which indicates that there is little likelihood of there being any relics in the land or that any relics in the land are unlikely to have State or local heritage significance;
>
> (b) Where the excavation or disturbance of land will have a minor impact on the archaeological resource; and
>
> (c) Where the excavation or disturbance of land involves only the removal of fill which has been deposited on the land.

A person proposing to excavate or disturb land according to the above criteria must write to the Director and describe the proposed excavation or disturbance and set out why it satisfies the criteria. The Director shall notify the applicant if he or she is satisfied that one or more of the criteria have been met.

The Heritage Council of NSW

The role of the Heritage Council is to provide the Minister with advice on a broad range of matters relating to the conservation of the heritage of NSW. It also has a role in promoting heritage conservation through research, seminars and publications. The membership of the Heritage Council is designed to reflect a broad range of interests and areas of expertise.

Interim Heritage Orders

Under the provisions of Part 3 of the Act, the Minister can make an interim heritage order (IHO). A recommendation with respect to an order can come from the Heritage Council, either based on a request for the Minister, or the Council's own considerations. The Minister can also authorise Local Councils to make IHOs within their area. An interim conservation order may remain in force for up to 12 months, until such time as it is revoked or the item is listed on the State Heritage Register. A heritage order may control activities such as demolition of structures, damage to relics, places or land, development and alteration of buildings, works or relics.

The State Heritage Register

Changes to the Heritage Act in the 1998 amendments established the State Heritage Register which includes all places previously protected by permanent conservation orders (PCOs) and items identified as being of state significance in heritage and conservation registers prepared by State Government instrumentalities. Sites or places which are found to have a state level of heritage significance should be formally identified to the Heritage Council and considered for inclusion on the State Heritage Register.

Heritage Agreements

Under s39 of the Act, the Minister can enter into an Agreement with the owner of a heritage item listed on the State Heritage Register to ensure its conservation. Such an Agreement can cover a range of responsibilities including financial or specialist assistance and can be attached to the title of the land.

Environmental Planning Instruments

Part 5 of the Act gives the Heritage Council the authority to request that an environmental planning instrument be prepared covering certain lands. It also directs that the Heritage Council shall be consulted by others when preparing a draft planning instrument affecting land to which an interim heritage order applies or which includes an item listed on the State Heritage Register. In addition it gives the Heritage Council the authority to produce guidelines for the preparation of such planning instruments.

Heritage and Conservation Registers

Section 170 of the Act requires all state government instrumentalities to establish and maintain a Heritage and Conservation Register that lists items of environmental heritage. The register is to include items which are, or could potentially be, the subject of a conservation instrument, and which are owned, occupied or otherwise under the control of that instrumentality.

9.5 Implications for the Old Cooma Road Realignment

9.5.1 NSW Aboriginal Land Rights Act 1983

A section of the Old Cooma Road Realignment study area is currently owned by the Ngunnawal Local Aboriginal Land Council. Legal opinion should be sought on the implications of this land tenure.

9.5.2 Aboriginal Heritage

Aboriginal 'objects' as defined under the *National Parks and Wildlife Act 1974* have been identified within the Old Cooma Road Realignment study area. It is an offence to knowingly disturb an Aboriginal Object (or site) without an appropriate permit or consent (Sections 87 and 90).

Consequently, no impact should occur to these identified Aboriginal objects in the Old Cooma Road Realignment study area until the DECC has issued the appropriate permit or consent. To obtain a s90 or s87 permit it will be necessary to implement the *Interim Guidelines for Aboriginal Community Consultation*.

9.5.3 Historical Heritage

Site Googong TSR, has been assessed as having no heritage significance and does not fulfil the NSW Heritage Council's criteria for local heritage listing. This site does not pose any statutory constraint to the proposed development in the study area.

10. CONCLUSIONS AND RECOMMENDATIONS

The Old Cooma Road Realignment project will necessitate the disturbance of ground within the footprint of the realignment.

Four Aboriginal sites comprising four artefact scatters (GA12, GA15, TSR1 and TSR2) and one potential archaeological deposit (GPAD7) have been previously identified in the study area by Navin Officer Heritage Consultants in 2003 and the DECC in 2004.

Five Aboriginal sites, comprising three isolated finds (OCR1, OCR2 and OCR5) and two artefact scatter (OCR3 and OCR4) were identified within the Old Cooma Road Realignment study area during the current study.

Site OCR1 may be impacted by stage 1 of the project.

Sites OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1, TSR2 and GPAD7 may be impacted by stages 2 and 3 of the project.

One historical heritage site, the Googong TSR, has been identified in the Old Cooma Road Realignment study area. This site has been assessed as having no heritage significance and does not fulfil the NSW Heritage Council's criteria for local heritage listing. This site does not pose any constraint to the study area.

It is recommended that:

1. Where possible, disturbance to archaeological sites OCR1, OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1, TSR2 and area of potential archaeological deposit GPAD7 should be avoided.

2. If impact to Aboriginal sites OCR1, OCR2, OCR3, OCR4, OCR5, GA12, GA15, TSR1 and TSR2 cannot be avoided then an *Aboriginal Heritage Impact Permit* under the provisions of s90 of the *National Parks and Wildlife Act 1974* must be obtained for the Aboriginal objects prior to disturbance.

3. If disturbance is unavoidable in the vicinity of GPAD7, then a program of archaeological subsurface investigation should be conducted within the PAD. The aim of this program will be to determine the nature and significance of any Aboriginal objects present in the area.

   An application should be made to the Director General of the DECC for a section 87 *Aboriginal Heritage Impact Permit* under the provisions of s87 of the *National Parks and Wildlife Act 1974* for subsurface testing with the PAD.

4. Prior to the application of the s87 or s90 permit it will be necessary to implement the *DECC Interim Guidelines for Aboriginal Community Consultation – Requirements for Applicants* for this project.

5. If Aboriginal Objects which are not covered under a s87 and/or s90 Permit *Aboriginal Heritage Impact Permit* are encountered during works associated with the Old Cooma Road Realignment then all works should cease in the vicinity of the find/s, the project archaeologist should be contacted, and advice sought as to an appropriate course of action.

6. No further actions are required in relation to the historical site Googong TSR.

7. There are no historical cultural heritage constraints to the proposed development.

8. If historical relics as defined under the *Heritage Act 1977* are encountered during works associated with the Old Cooma Road, then all works should cease in the vicinity of the find/s, the project archaeologist should be contacted, and advice sought as to an appropriate course of action.

9. Three copies of this report should be forwarded to the NSW DECC for their records at the following address:

   Cultural Heritage Officer
   EPRD
   Department of Environment and Climate Change
   Southern Region
   PO Box 2115
   QUEANBEYAN NSW 2620

10. One copy of this report should be forwarded to each of the participating Aboriginal stakeholder groups for their consideration and comment.

11. REFERENCES

Access Archaeology Pty Ltd 1990 Ginninderra Water Quality Control Pond 1: Archaeological Survey. Report to ACT Public Works, Department of Urban Services.

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APPENDIX 1

ABORIGINAL PARTICIPATION

Record of Aboriginal Representative Participation*

Name(s) of Aboriginal Representative: Wally Bell

Name of Aboriginal Organisation: Buru Ngunawal Aboriginal Corporation

Archaeologist(s): name & address: Nicola Hayes
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street, Kingston, ACT 2604

Project Name: **Old Cooma Road Upgrade**

Client: name & address: Mr Glenn Lacey
(please send your invoice to this address) Brown Consulting (ACT) Pty Ltd
PO Box 5004
Lyneham ACT 2602

Type of participation:

- ☐ Guided inspection of study area and sites
- ☑ Accompanied/participated in archaeological survey
- ☐ Separate inspection or survey
- ☐ Accompanied/participated in excavation program

Period of participation:

Date(s)	Start	Finish
29/7/08	9am	12.30pm

Issues raised:

Signed *(archaeologist)*: N. Hayes

Signed *(Aboriginal representative(s))*: Wally Bell

* *please note this form is not an invoice. For payment, please send an invoice from your organisation to the client name and address provided above.*

Record of Aboriginal Representative Participation*

Name(s) of Aboriginal Representative: David Mundy

Name of Aboriginal Organisation: Ngarigu Currawong Clan

Archaeologist(s): name & address: Nicola Hayes
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street, Kingston, ACT 2604

Project Name: **Old Cooma Road Upgrade**

Client: name & address: Mr Glenn Lacey
(please send your invoice Brown Consulting (ACT) Pty Ltd
to this address) PO Box 5004
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Period of participation:

Date(s)	Start	Finish
29/7/08	9am	12:30pm

Issues raised:

Signed *(archaeologist)*: N. Hayes

Signed *(Aboriginal representative(s))*:

* *please note this form is not an invoice. For payment, please send an invoice from your organisation to the client name and address provided above.*

Record of Aboriginal Representative Participation*

Name(s) of Aboriginal Representative: Carl Brown

Name of Aboriginal Organisation: Consultative Body Aboriginal Corporation on Indigenous Land and Artefacts in the Ngunnawal Area

Archaeologist(s): name & address: Nicola Hayes
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street, Kingston, ACT 2604

Project Name: **Old Cooma Road Upgrade.**

Client: name & address: Mr Glenn Lacey
(please send your invoice to this address) Brown Consulting (ACT) Pty Ltd
PO Box 5004
Lyneham ACT 2602

Type of participation:

- ☐ Guided inspection of study area and sites
- ☑ Accompanied/participated in archaeological survey
- ☐ Separate inspection or survey
- ☐ Accompanied/participated in excavation program

Period of participation:

Date(s)	Start	Finish
29/7/08	9am	12.30pm

Issues raised:

Signed *(archaeologist)*: N. Hayes

Signed *(Aboriginal representative(s))*: Carl Brown

* *please note this form is not an invoice. For payment, please send an invoice from your organisation to the client name and address provided above.*

Record of Aboriginal Representative Participation*

Project Name: ..... **Old Cooma Road Realignment** .....

Name(s) of Aboriginal Representative: .....

Name of Aboriginal Organisation: Ngambri Local Aboriginal Land Council .....

.....

Archaeologist: ..... Nicola Hayes .....
address ..... Navin Officer Heritage Consultants Pty Ltd .....
..... 4/71 Leichhardt Street, KINGSTON, ACT 2604 .....
..... ph: (02) 6282 9415; fax: 62829416 .....

Client name: ..... Ms Julie Pearson .....
..... Brown Consulting (ACT) Pty Ltd .....
..... PO Box 5004 .....
..... Lyneham ACT 2602 .....
(please send your invoice to this address)

Type of participation:
- [x] Guided inspection of study area and sites
- [x] Accompanied/participated in archaeological survey/salvage
- [ ] Separate inspection or survey
- [ ] Accompanied/participated in excavation program

Period of participation:

Date(s)	Start	Finish
12/11/08	8:30 am	11 am

Comments: ~No Issues~ .....

.....

.....

.....

Signed *(archaeologist)*: N. Hayes .....

Signed *(Aboriginal representative(s))*: .....

* *Please note this form is not an invoice. For payment, please send an invoice from your organisation to the client name and address provided above.*

Navin Officer
heritage consultants pty ltd
abn: 28 092 901 605
Kerry Navin
Kelvin Officer
Nicola Hayes
Daniel Powell
Lindsay Smith

29 July 2008

Mr Wally Bell
Buru Ngunawal Aboriginal Corporation

Mr Tony Boye
Ngarigu Currawong Clan

Mr Carl Brown
Consultative Body Aboriginal Corporation on Indigenous Land and Artefacts in the Ngunnawal Area

Dear Sir/Madam,

Request for Information on Aboriginal Cultural Heritage Values for Old Cooma Road Upgrade Project

Thank you for your organisation's participation in the archaeological field survey component of this investigation.

As you know, participation of Aboriginal communities and Aboriginal owners in archaeological field assessments should not be construed as 'consultation'. It is not a substitute for an assessment of Aboriginal cultural interests or values in a particular area of land or particular sites, such assessments are separate from archaeological assessments and should be made by Aboriginal people themselves.

As such, we invite your organisation to provide a written report giving your organisation's views and assessment of the Aboriginal cultural values of the area surveyed.

Your report could provide the following:

- A title page; maps of the study area; a table of contents; an introduction; the qualifications/ experience of persons providing the report; a methodology; a description of the study area and proposed activity/development;
- Information on whether there are Aboriginal cultural heritage values associated with the subject site – this will include information detailing the landscape, the history of the peoples living on that land, the material evidence, and the cultural and social values attached to the land and the material evidence;
- Information on the social/cultural values including on the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for *the present-day Aboriginal community* – this may include a description of the physical setting of the land to be assessed and its resources, and relevant archival, historical and ethnographic sources;
- An assessment of the significance of the identified Aboriginal cultural heritage values;
- An assessment of the *level* of significance of the identified Aboriginal cultural heritage values;
- An assessment of the impact of the proposed development on Aboriginal objects and Aboriginal places;
- A description and justification of the proposed outcomes and alternatives;
- A conclusion, and recommendations for the appropriate protection of Aboriginal cultural heritage; and

- As necessary, references, a glossary, appendices, photographs, figures, etc., may be included with the report.

Could you please provide your written report to the address or fax number shown on this letter. In order that your organisation's views can be taken into account at this stage, it would be appreciated if your organisation could provide a response within the next two weeks.

If no response is received by the end of that period then it will be assumed that your organisation does not associate any cultural values with the study area, other than those that may have been identified by your organisation's representatives during the field survey.

Finally, we would like to thank you for your participation in the project and look forward to working with you again in the future.

Yours sincerely,

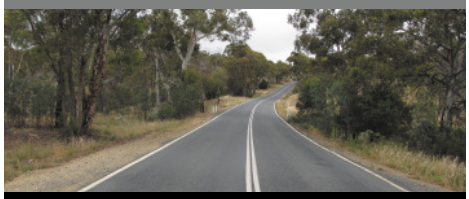
Nicola Hayes

OLD COOMA ROAD REALIGNMENT

an assessment of visual landscape character

by

JEA



Report prepared for

BROWN CONSULTING

Queanbeyan City Council

December 2009

JEA
Unit 5, 97 Northbourne Ave, Tuner ACT 2612
02 62626363
jea@jea.com.au

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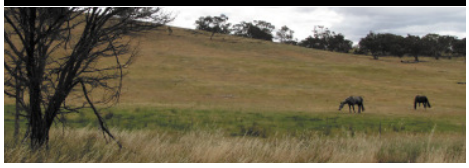
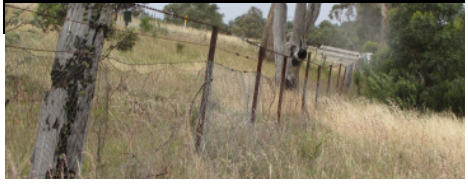


CONTENTS



LIST OF IMAGES

1.0 INTRODUCTION

Brown Consulting has been commissioned by Queanbeyan City Council to identify and document the likely impact future road improvements will have on adjacent residences including potential road noise and visual disturbance, viewsheds from the road and the surrounding ecology. These road improvements have been divided into two stages of development. Stage 1 is a realignment of old Cooma Road between chainages 1650.000 and 3100.000. Stage 2 development involves the duplication of existing carriagways, between chainages 400.000 (Refer Context Plan Page 4).

JEA has been engaged by Brown Consulting to conduct a visual landscape character assessment of the Old Cooma Road Realignment and Road Duplication area, as part of a Land Character Assessment. The land character assessment of the study area involves an assessment of existing environmental conditions in order to identify opportunities and constraints for road development.

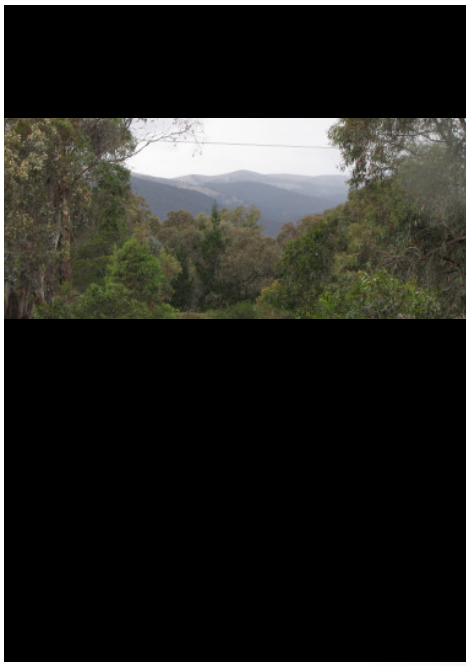
The study area is a large site that spans approximately 3.925km length and varies between 30m to 90m in width. This report documents the existing landscape and visual quality of the area surrounding the proposed road realignment and the duplication of the Old Cooma Road. The report more generally seeks to:

- Describe existing landscape and visual quality
- Provide an investigation and analysis of landscape character, visual qualities/views - including features that contribute to the character and setting of the area, (key approaches, the rural setting, avenues, vantage points, open spaces, backdrops, hills and so on)
- Identify visual features
- Identify constraints and opportunities of the existing landscape assessment
- Provide recommendations through synthesis and analysis of opportunities and constraints, to enhance improvements to the road

This report follows the division of development works, which breaks the site into two broad zones. These are:

1. Stage 1 Realignment– includes a section of new road to be realigned that diverts traffic from the existing road that winds around and bypasses the Cooma Road Quarry
2. Stage 2 Road Duplication – includes two sections of the existing road. The north zone and south zone, duplicates the existing road to provide a duel carriageway in each direction with a median between the roads. Stage 2 Duplication also duplicates the new road of Stage 1.

The visual landscape character of the *Old Cooma Road Realignment* and *Road Duplication* study area is largely undulating rural landscape with Box-Gum woodland and sclerophyll communities. Major road corridors intercept the proposed road and provides the community with a relatively high level of scenic quality and rural experience - wooded hillsides, farmhouses, grazing cattle - as they travel through the area. The proposed new road; realignment of the old Cooma Road lies in a low point within the topography minimising the visual impacts to adjacent housing in Stage 1. The steep slope may encourage traffic noise as trucks in particular gear down, however the nominated low position within the gully is expected to contain the sound with approprate plantings. Increased development in the area has the potential to impact on the existing visual landscape character. Landscape treatments can aid any negative visual effects.



2.0 STUDY AREA

Refer to Page 4, showing the study area in the context of the Queanbeyan City.

Old Cooma Road Realignment area is located to the south of the Queanbeyan NSW, encompassing an area of land (24 ha in area) stretching from the proposed Edwin Land Parkway in the north to Googong Dam Road in the south, and includes the existing Old Cooma Road corridor, parcels of rural properties, native bushland and modified pastral use land. Much of the land in the study area has been identified as Private Property Rural Land Parcels that support live stock.

2.1 Previous Studies

Recent studies have been conducted in the Old Cooma Road area. These include:

- Australian Botanical Surveys. 2001. Flora and fauna habitat survey along the proposed Cooma Road realignment. Report prepared for National Environmental Consulting Services.
- Bushfire and Environmental Service (BES) 2007a. Flora and Fauna Assessment – Proposed Deviation of Old Cooma Road, Googong. A report for Canberra Investment Corporation Ltd on behalf of Queanbeyan City Council.
- Bushfire and Environmental Service (BES) 2007b. Flora and Fauna Assessment – Proposed Extension of Edwin Lane Parkway, Stage 1, Jerrabomberra to Karabar. A report for Canberra Investment Corporation Ltd on behalf of Queanbeyan City Council.
- Bushfire and Environmental Service (BES) 2007c. Flora and Fauna Assessment – Infrastructure for the Proposed New Googong Township. A report for the Canberra Investment Corporation.
- Butler, G. 2007. Box Woodland Assessment Report For Edwin Land Parkway

(2 Sites) and Cooma Road Deviation. Unpublished report for Quenabeyan City Council, Geoff Bulter and Associates Environmental and horticultural Consultancy, Wamboin.

• Eco Logical Australia (ELA). 2009. Species Impact Statement: Old Cooma Road Realignment Queanbeyan. Report prepared for Brown Consulting & Queanbeyan City Council.

• GHD (2009). Species Impact Statement, Report for Edwin Land Parkway Extension, Queanbeyan. Report prepared for Queanbeyan City Council.

2.2 Planning Context

Under the *The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, Old Cooma Road Realignment site has been identified as an area that impacts National Environmental Significance. Endangered ecological community Box-Gum Woodland and the endangered flora species Hoary Sunray Leucochrysum albicans, listed under the EPBC Act in particular has been identified as an area which is under investigation for future road development. The EPBC provides a national scheme to protect biodiversity and the environment.

The *Environmental Planning and Assessment Act 1979 (EP&A Act)* provides a general policy framework for land use planning in the NSW. Of particular relevance in the context of this report Queanbeyan City Council is the formative authority for the proposal under Part 5 of the EP&A Act. Pastoral land use policies apply to the majority of the study area. Other land use policies include: Designated areas; River Corridors; Municipal; and Hills, Ridges and Buffers.

The *Roads and Traffic Authority, NSW* provides design policy, procedures and design principles; Beyond the Pavement. Objectives, strategies and actions are outlined address issues regarding the landscape design adjact to road transitways. The Authority also provides urban design policy and guidelines in the documents:

- The Noise Abatement Program (NAP) addresses the effects of very high road traffic noise on properties near noisy roads.
- The RTA Code of Practice for Water Management - Road Development and Maintenance (WCoP) has been prepared to promote understanding of water management throughout the RTA. The RTA's work in this area is governed by a Water Policy and a Code of Practice for Water Management; The Water Management Act 2000 (WM Act) .

2.3 Current and future issues associated with growth in the study area

• Increased traffic along Old Cooma Road with the opening of Edwin Parkway

Extension and populations in proposed townships of Googong reaching 16,000 over the next 25 years
- Traffic congestion on Cooma Street at peak times
- The construction of the proposed pond at Heffernan's adjacent to Stage 1 realignment and it's potential to be a key man-made visual feature
- Protection and enhancement of key approach routes into Queanbeyan City
- Preservation of Box-Gum Grassy Woodland
- Preservation of native sclerophyll forest areas

2.4 Site Description

The site consists of predominantly natural woodland, with pastoral landuse along with hills, buffers and ridges.

A large section of Stage 1 development is positioned within an undulating gully. Water naturally flows to this low point in the topography allowing a variety of vegetation to flourish in this area. Many weed species proliferate in the fertile creekbed including, Sweet Briar *Rosa rubiginosa*, Blackberry brambles *Rubus fruticosus agg.*, Firethorn genus *Pyracantha*, Privet *Ligustrum lucidum* and several perrenial weeds such as Patterson's curse *Echium plantagineum* , Sow thistle *Sonchus oleraceus*, St. Johns wort *Hypericum perforatum*. Portions of Stage 1 are sited on private land parcels where numerous grazing stock trails meander across and along the creekline. Built forms in this area include culverts, fences and dams. A steep bank along the eastern side of the proposed road between chainages 2600.000 and 2950.000, is dominated by Pine trees *Pinus radiata,* expected to have escaped from the windbreaks planted on the higher hills. Water runoff is anticipated to be of a substantial quantity during rainfall events and flowing at a fast rate. A majority of the steep hills on either side of the proposed road are sparsely treed communities, with large areas of a bare groundlayer.

Stage 2 Road duplication to the north and south of Stage 1 is largely different in character due to the existing carriageway. Vegetation is dominated by tall eucalyptus overstory, with native grasses below and scattered .

The northern zone of Stage 2 connects to the proposed Edwin Land Parkway Extension to the west and future Ellerton Drive to the east. These new roads that collectively bisect Old Cooma Road form the boundary between the suburb Karabar in Queanbeyan and Native Dry Forest and Box-Gum Woodland. The landscape adjacent to the road on the west side is an open valley floor with a rural property set back. Views become enclosed as the mature eucalypt overstory donminates either side of the road. This type of character extends to Wickerslack Lane at chainage 1350.000 where rural, broadacre land use begins and views from the road open out.Vegetative screening is very sparse along the west side of the road from chainage 1350.000 to 1650.000 where Stage 1 road realignment initiates. According to the recent draft Species Impact Statement by ELA (2009), this area is valuable in ecological terms, as it displays an exceptional variety of diversity and quality of ecological attributes.

In the southern zone of Stage 2, south of Stage 1 at chainage 3100.000 views open out wide as there are scattered eucalypts along the road with cleared stock grazing land with rural residential dwellings and associated structures behind. Land gently undulates and the remvoal of native forest creates the broadest views, from chainage 3100.000 to 4100.000, in the entire subject site. Stands of remnant vegetation remain and surround two rural properties between chainage 4100.000 and 4600.000 on the west side and 4800.000 on the east side of the road. Views become enclosed in this area and all views to dwellings are densly filtered.

The carriageway in Stage 2 Duplication, in the southern zone, the western carriageway specifically, clashes with the majority of mature buffer planting. Very little buffer planting along the west side of the road will create uniterupted views to cleared rural grazing stock land until road buffer planting matures. Existing buffer planting along the eastern side of the road filters views to the distant Queanbeyan Reserve.

3.0 METHODOLOGY

The Western Australian Planning Commission has released a document entitled "Visual Landscape Planning in Western Australia: A Manual for Evaluation, Assessment, Siting and Design" (Nov 2007). The manual suggests several broad steps for both visual landscape evaluation and visual impact assessment. Their suggested methodology for landscape evaluation has been used as a guide for this study.

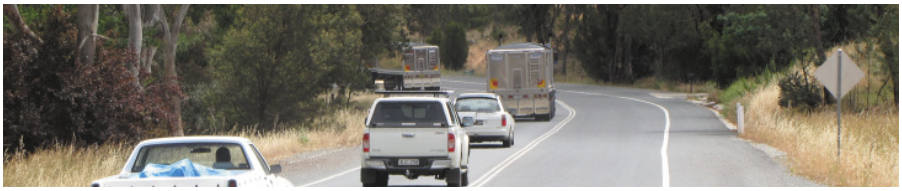
Visual landscape evaluation is appropriate in this context because it is a proactive process used in the preparation of planning strategies and schemes.

The visual landscape evaluation process adopted for this study consists of several steps:

1. Defining the scope of the evaluation and setting the context.
The scope of the evaluation and setting the context has been defined above.

2. Describing the visual character
Individual character units will be identified, described and mapped (within each 'zone'). Again, this will be done on a broader scale, given the size of the study area. Landscape character units are comprised of homogenous characteristics in terms of landform, vegetation, built form and/or landuse.

3. Evaluating the way the visual character is viewed, experienced and valued.
Given that this is primarily a desktop study, 'how' the landscape is assessed



and experienced by others is difficult. However, this assessment will be based on where the important views are from and what is it about the particular landscape's features that are valued. This will be done by identifying primary viewing locations, identifying key views, determining visibility (view sheds, seen area and so on), and identifying key individual landscape features that are valued by the community.

4. Identifying constraints and opportunities for development and developing strategies for managing visual landscape character.
Following an assessment of the visual landscape character, constraints and opportunities will be identified, and implementation strategies for managing future landscape character will be suggested. Again, this will be in the broader planning context, and will focus primarily on potential ecological corridors and key landscape features within the study area.

4.0 PHOTOGRAPHIC SURVEY

A photographic survey of each broad zone was conducted. Appendix 1 contains north/west/south/east photos for each zone and the location and direction the photo was taken. This survey assisted in the identification of character units and evaluating the way that visual character is viewed, experienced and valued in the study area.

5.0 LANDSCAPE CHARACTER UNITS

5.1 Identification of character units or 'precincts'

A broad analysis of the visual character of the study area was conducted. The following character units were identified:

Unit 1 - Wooded hills and slopes
Unit 2 - Upper valley - wooded, with predominantly rural landuse
Unit 3 - Open valley with grassland and predominantly rural landuse
Unit 4 - Ephemeral creekline riparian zone

Refer also to Image 2, character units map.

Water bodies have been also identified in Image 2, along with major transport corridors.

5.2 Description of character units

Refer also to Image 1 mapping landscape character for each Unit within the study site.

Unit 1 is characterised by hills and slopes densly covered by woodland and sclerophyll forest. It is predominantly a natural landscape and provides a backdrop to much of Stage 2 in the northern zone. Much of the woodland is remnant Box-Gum Grassy Woodland and provides important habitat and wildlife movement corridor. Unit 1 extends from chainage 350.000 to 1350.000 in Stage 2 in the northern zone and between 4100.000 to 4850.000 in the southern zone. The landscape in Unit 1 adjoins Crown Land in the northern zone of Stage 2.

Unit 2 is characterised by more open, wooded upper valley with broadacre/ agricultural landuse. Stage 1 realignment, which proposes a new road that deviates from the winding road that currently bypasses the quarry, is proposed in this unit.

The natural vegetation has largely been cleared, but stands of remnant vegetation remain. The character is 'rural'. Broadacre/agricultural activities dominate the character of Unit 2, with visual character elements, such as farm homesteads, remnant trees, stands of exotic trees and dams creating a rural character. Most of the original woodland vegetation has been cleared, however, areas of remnant sclerophyll forest occur in patches in this unit of the study area. (ELA, 2009; Coombes, Smithers). The narrow steep terrain within the valley enclose views shifting focus onto natural distinctive landscape elements. Unit 2 is distinguished from units 1 and 3 as there is no existing sealed road in this area.

Unit 3 is characterised predominantly by gentle, rolling hills, covered by introduced perrenial grass species with interuped stands of remnant woodland. There are various unsealed rural driveways, dams, rural residential and associated farm structures, including fencing and letterboxes. Roadside planting in Unit 3 is clustered allowing views to be open and long in the clear areas.

Unit 4 is characterised as an ephemeral creek that is disorderly and unharmonious and feeds an existing dam on Heffernans property that has been proposed to be relocated in the new designs for Stage 1. A broad variety of introduced and native tree, shrub and ground cover species thrive in the creek bed and along the bank in the fertile soil. Many weed species proliferate in Unit 4, new development should encourage the restoration of this degraded landscape and protect down stream water courses. Unit 4 is enclosed with the creek lying at the lowest point in the valley. The terrain in Unit 4 is scarred on the steep, western slopes by grazing stock. The ground either side of the creek slopes down in varying gradients. High rainfall events are expected to cause this area to fill quickly as there are large patches of sparce vegetation with few other obstacles to reduce flow rates. The creek bed climbs gently from the north to the south with stretches of steep inclines. The new road, realignment of Stage 1, is proposed to fill and continue along the gradual and relatively straight line of the creek bed of Unit 4.

5.3 Analysis of character units

The table below uses standard visual descriptors to describe the appearance of the visual landscape character of each unit. *(Terminology adopted from the "Visual Landscape Planning in Western Australia: A manual for Evaluation, Siting and Design", Nov. 2007)*

	CHARACTER UNIT			
	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
Scale	Large/vast	Small To Large	Medium-Long	Medium-Long
Enclosure	Enclosed	Open To Enclosed	Narrow-Enclosed	Narrow-Enclosed
Diversity	Simple	Simple	Diverse-complex	Diverse-complex
Texture	Textured	Textured	Rough	Rough
Form	Rolling	Rolling	Vertical - Gully	Rolling
Line	Curved	Curved	Curved-sinuous	Curved-sinuous
Colour	Muted	Muted to colourful	Muted to colourful	Colourful
Balance	Balanced	Balanced	Balanced	Balanced
Movement	Calm	Calm	Calm	Calm
Pattern	Random	Random	random-organised	Random

The basic landscape elements in the study area are subtly varied, with a general natural/ rural character. Scale for example varies as views become enclosed within the gully and open out at hill crest and cleared road screening. In Unit 2, the scale of built elements, for example a farm building, is small in comparison with the scale of a rolling hill. Likewise, enclosure varies within units, perhaps with the exception of Unit 1 where woodland vegetation is largely enclosed. Likewise, diversity varies considerably, again with the exception of Unit 1, where diversity at the larger scale, is simple. Form throughout Stage 2 is either rolling or horizontal with a road already existing, while stage 1 is steep and enclosed. Vertical elements exist in Unit 1 with mature woodlands either side of the road. Similar variations exist with line, balance, colour and pattern. Perhaps the least variation exists with movement. Movement is relatively calm throughout.

6.0 VISUAL LANDSCAPE CHARACTER ELEMENTS

Visual landscape character elements within the landscape help convey the character of an area, and include both natural and built features. There has been some discussion in the previous section with regard to character elements, and how the prominence of particular elements help distinguish one character unit from another. This section will briefly discuss types of visual character elements and give examples from the study area. It is important to note, that some visual character elements are located outside the study area, but need to be mentioned because there are key feature views to them.

6.1 Natural landscape character elements

Natural elements are those that are largely unmodified in the study area, and include the overall landform, vegetation, water and soils, such as:

- Surrounding hills which form an important visual backdrop - Mt. Jerrabomberra, Mt. Ainslie, Black Mountain
- Box-Gum Grassy Woodland on hills and slopes
- Natural and Introduced Temperate Grassland on wide open plains
- Slopes, valleys • Creeklines
- Riparian vegetation associated with creeklines

6.2 Rural landscape character elements

Rural landscape character elements are particularly important in the study area, due to largely pastoral landuse and associated activities. They have particular significance for the community in their perception of the character of the area. They will also be the elements that are most impacted on by growth and development in the googong Township area, and include:

- Individual remnant or exotic trees throughout
- Groves of exotic trees and windshelters associated with farm houses
- Roadside plantings - natives and exotics
- Clearings amongst woodland and on open plains
- Crop patterns
- Farm homesteads and associated buildings
- Historic buildings e.g. along Old Cooma Road near chainage 3200.000
- Farm entrances, gates, mail boxes throughout the broadacre areas
- Rural roads - gravel, tree lined winding roads
- Livestock - Horses, cattle
- Dams

7.0 CHARACTER OF KEY VIEWS

The photographic survey - Appendix 1 shows viewshed from a hyperthetical road at regular intervals along the alignment, consistantly parralell and perpendicular to the existing and proposed road alignment in an anti-clockwise direction in four shots.

7.1 Types of views

Key types of views in the study include: panoramic, enclosed, sequential, feature, focal, landmark, axial/view corridors, long vistas and detailed views.

Panoramic views are prominent along the southern section of Stage 2 Duplication of Old Cooma Road where the valley opens out to a predominantly grassland character. Visibility is high, with views to key landscape features, such as Mt.

Jerrabomberra, Mt. Majura, Mt. Ainslie, Lake Burley Griffin and Black Mountain from chainage 3600.000 looking to the west.

Further south, as one comes to the point in the road where Stage 1 merges with Stage 2 at chainage 3100.000 views become panoramic once again, with views to Black Mountain to the north/west.
Along the southern section of Stage 2 between chainages 3100.000 and 4100.000, panoramic views from the road across the open grasslands to the east and west, are prominent, and there are long views towards Queanbeyan Reserve, a significant and key landscape feature.

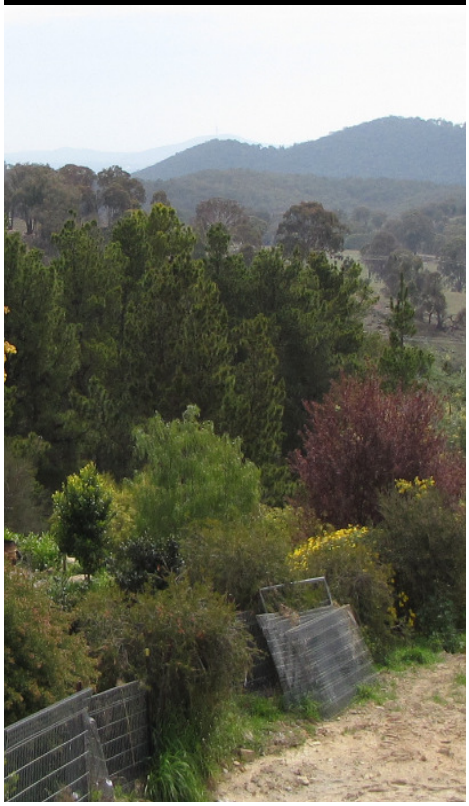
Sequential views are those that are obtained along most of the road corridors through Stage 2 Northern zone. Sequential views are particularly common in Character Unit 1 where road corridors wind through hilly wooded areas, such as the northern section of Stage 2.

Feature views are those where a specific key visual landscape feature draws the viewer's attention. They are not necessarily natural features, and in the study area, there are a number of prominent built elements that contrast with the surrounding landscape character. Examples of feature views include those towards larger hills and mountains, the taller and more unusual buildings. Road intersections along the major road corridors also, to some extent, provide feature views. For example, the Poplars, at the intersection of the Cooma Street and the proposed Edwin Land Parkway and The future Ellerton Drive, are a key landscape feature.

Axial views, or *view corridors* are those that are provided along road corridors. Examples of view corridors are: Bungendore Street in Queanbeyan adjacent to Dodsworth Park, Anzac Parade, Canberra. Axial view corridors exist along the straight stretches of road also described as Enclosed Views along Stage 2 in the southern zone between chainage 3100.000 to 4100.000.

Enclosed views are those enclosed by vegetation or built form, in particular along road corridors in Stage 2. Enclosed views focus attention on foreground detail. For example, as one travels along Old Cooma Road Stage 2 and passes through chainage 400.000 to 1250.000 in the north and between 4100.000 to 4850.000 in the south, views become 'enclosed' by Dry Woodland forest on either side of the road. Similarly along Stage 1 realignment, views are enclosed along sections of the road by steep hills covered in woodland vegetation on either side.

The character of some parts of the Study Area is heightened by views of the immediate foreground. *Detailed* views provide visual interest and richness to character. Examples of detailed views, where visual interest is heightened by the diversity in visual character elements typical of the rural character are rail fencing, colourful signage, flowering plants and trees, pots, letter boxes and so on.



7.2 Views along road corridors

Views from road corridors through the study area are significant at a few points where the panoramic views open up to Mt. Jerrabomberra and further to Canberra's Black Mountain. A majority of views from the road are of rural dwellings with other farm structures amoung a cleared grazing stock Landscape and Dry Forest Box-Gum Woodlands that open and close with the undulating topography. Distant views to the east are of Cuumbeun Nature Reserve and Queanbeyan Reserve. To the west there are distant views to Jerrabomberra Mountain and further to the Brindabella Mountain Ranges.

8.0 COMMUNITY VALUES

The 'value' of visual landscapes is related to how people perceive them, are connected to them, relate to them with regard to sense of place and how they affect their quality of life. Assessment of 'value' is subjective, and because this is a desktop study, local community preferences were not surveyed. Therefore, the list of 'visual landscape character preference indicators' provided in Appendix 2 of the 'Visual Landscape Planning in Western Australia: A Manual for Evaluation, Assessment, Siting and Design' has been used as a guide. (Refer to Appendix 2).

8.1 'Most Preferred' landscape character elements

Character indicators for *'most preferred'* are defined as those elements in the landscape that are perceived by the community as being highly valued in contributing to visual character. The following is a list of 'Most Preferred' character elements in the study area. They have been broken down into natural, rural, and built landscape character:

Natural:

- Wooded hills and slopes - particularly where woodland has been undisturbed
- Nature reserves - such as Cuumbeun Nature Woodland Reserve, Queanbeyan Reserve, Stony Creek Nature Reserve and Wanna Wanna Nature Reserve
- Variations in topography within the study area - for example, hills and valleys through to broad open plains
- Individual hills/mountains (not within the study area, but noted because of significant feature views to them) - for example, Mt. Jerrabombera, Mt. Majura, and Black Mountain.
- Natural water elements - Rivers and creeks
- Wetland areas

Rural:

• Diversity in colours and textures in rural private properties
• Transition zones between natural vegetation and rural land - for example, the edges of the creek floodplain, and the grazing cattle amongst large remnant native trees
• Historic homesteads - such as Heffernan Property
• Other individual features associated with farming and rural activities- such as entry gates to farms, historic relics - such as the remnant buildings - old farm sheds, clusters of farm buildings
• Remnant vegetation located along creeks and roadsides
• Groves and forests of exotics - for example - Wind break of pine forest, the cluster of exotics at the intersection of Temple Cres and Heights Road

Built:

• Water bodies - such as dams

8.2 'Least Preferred' landscape character elements

Character indicators for *'Least Preferred'* are defined as those elements in the landscape that are not valued by the community and are seen to detract from visual character, and include:

Natural:

• Water bodies with weed infestations - for example some areas along the ephemeral creek bed in Stage 1 road realignment
• Scarred landscape due to quarrying and mining - for example, the quarries along Old Cooma Road
• Bare ground layers showing signs of erosion, litter, stagnation - parts of Stage 1 Creek
• Landuse that contrast significantly with the natural landscape

Rural:

• Areas of weed infestation
• Eroded areas due to over grazing
• Tips/dumps within rural areas including landfill sites
• Landuse that contrasts significantly with rural landuse
• Farm structures and buildings in disrepair and with graffiti
• Dams and waterbodies during times of drought, void of water
• Scarred landscape from new roads and developments
• Recently harvested areas/or removal of trees

Built:

• Industrial areas
• Intrusive advertising signage and billboards
• Buildings that intrude on views
• Buildings that create a solid wall effect which do not allow views through
• Barriers/fencing such as chainwire fencing

9.0 CONSTRAINTS AND OPPORTUNITIES FOR DEVELOPMENT

Based on an analysis of the visual landscape character of the Old Cooma Road site, a number of constraints and opportunities for development have been identified:

9.1 Constraints

• Stage 1 Realignment is proposed in a natural creek line, attracting complicated water management issues. The highly modified slopes due to rural landuse on either side of the creek has compromised the integrity of the natural groundlayer. Water flows in rainfall events are largely uninterupted creating fast rates and erode stock trails.

• Stage 1 Realignment has stretches of steep gradients which will cause trucks in particular to gear down causing excess traffic noise. Adjacent rural dwellings are expected to be affected by traffic noise during peak traffic times.

• Stage 1 Realignment is a new road that will require disturbance to existing flora and fauna communities. Significant and endangered endemic vegetative species are not found in Stage 1, however it forms part of the natural mosaic corridore for wildlife and provides some habitat for native and introduced species.

• Stage 1 Realignment has the potential to impact on the rural character of the existing road. Important rural character elements should be carefully protected when road design is developed.The wide double lane, dual carriageway that replaces the existing singlelane carriageway that is winding discourages high speeds. Straightening the alignment can potentially encourage increased speeds and deminish the rural character.

• The proposed Edwin Land Parkway and the future Ellerton Drive that will run perpendicular to the study area are all dual carriageways that will occupy a large area where the roads intercept. This large intersection has the potenial to negatively impact on the high visual quality views that exist where the Box-Gum woodland meets the urban suburb of Karaba. This approach junction should be carefully planned and tightly co-ordinated between commissioned consultants given the stagered time schedule for development.

• Stage 2 Southern Zone Road Duplication proposes a new road to be constructed over existing roadside mature tree screening. These mature Eucalypts and shrubs exist in clusters along the western side of the road and form an integral part of the framed views to the open plains in this section of the study site. The removal of the mature screen planting will result in onobsured views and noise to two rural properties between chainages 3100.000 to 4100.000.

9.2 Opportunities

• Opportunities exist in Stage 1 as the introduction of road will provide a new driving experience, one which will bypass a new stormwater catchment pond. This development has the potential to to offer significant, high quality views and character to users. Viewsheds to this waterbody and its surrounding landscape should be key objective in the design process. The proposed Pond on the Heffernan Property has the potential to provide a high quality visual landscape feature, amenity and provide a focal point.

• The potential establishment of reserves for the protection of important habitat - particularly in the northern zone of Stage 2 - has the advantage of maintaining and enhancing the existing natural landscape character.

• Water mitigation along either side of the new proposed road in Stage 1 has the potenial to greatly improve the visual character and become a key element of this area within the study site.

• Sympathetic treatment of new road corridors would provide an opportunity for a high quality experience for commuters and interstate visitors travelling through the area.

• Opportunities exist for enhancing key entries, gateways and nodes, by providing high quality signage and landscape treatment, particularly where travellers enter the City of Queanbeyan.

• Opportunities exist for restoring and enhancing degraded visual landscape character, such as in the Stage 1 creekline site through carefully planned development and the implementation of landscape treatment strategies.

10.0 SUGGESTED STRATEGIES FOR MANAGING THE VISUAL LANDSCAPE CHARACTER OF THE OLD COOMA ROAD AREA

Broad scale strategies are suggested and will act as a guide and to form the basis for further, more detailed work. The strategies encompass the following broad visual management objectives:

10.1 Objectives

• The existing visual character of the study area should be protected and maintained where possible

• The existing visual landscape character where degraded, should restored and enhanced

• Where development is proposed, best practice siting and design should be implemented

10.2 Strategies

Suggested strategies for the management of visual landscape character in the study area:

• Maintain and protect significant views - in particular, wide open panoramic or feature views to key landscape elements. Development/built form should be 'not evident' - that is, hidden, screened or not visible.

• Ensure built development in buffer areas/or on the perimeter of contrasting character units, 'blends' in with adjacent landscape character. It should be screened, not prominent and should 'borrow' from the adjacent landscape setting.

• Road and lot alignment should allow for the establishment of view corridors through to key landscape features, such as the Mt. Jerrabomberra/Mt. Ainslie ridgelines and Black Mountain.

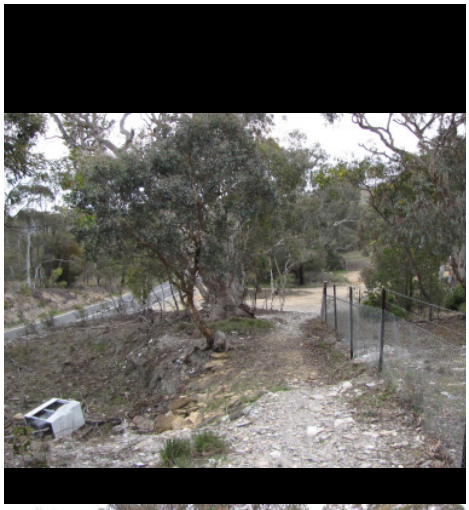
• Protect and retain important visual character elements - identified as 'most preferred', which significantly contribute to the visual landscape character. For example, rural character elements are important features in the study area, which contribute significantly to experiential quality.

• Minimise the introduction of landscape character elements deemed to be 'least preferred' by the community, and restore and enhance degraded areas where possible. For example mitigate water flow rates and control erosion on steep slopes with appropriate understory planting in Stage 1.

• Provide increased opportunities for detailed views where possible. Detailed views to visual elements in the foreground enrich a viewer's experience of landscape character. Opportunities for providing detailed views exist at key nodes and intersections, and along local streets and roads, such as the intersection at Wickerslack Lane, and Farm entries.

• Ensure the introduction of new road corridors produces minimal impact on surrounding landscape character. Minimise the removal and degradation of important landscape character elements and ensure road design and landscape treatment is appropriate to the landscape character context within which it sits.

• Enhance or provide sound abatement controls in unprotected areas where there is adjacent residential properties particularly where steep gradients along the road are proposed.



• Provide appropriate landscape treatment at intersections and nodes that will enhance landscape character and provide focal points and increased legibility. Key entry nodes, such as the intersection of the proposed Edwin Parkway and future Ellerton Drive, and the Googong Dam Road intersection should provide identifiable visual cues.

• Protect mature road screening that exists along the western side of Stage 2, southern zone. Stands of remnant woodland and sclerophyll could be retained by realigning the proposed Road Duplication 5m to the west. Negative impacts from light and sound to adjact rural residences could be significantly reduced by retaining the existing stands of vegetation in the road median. While new landscape planting will take time to be effective, the mature median planting could protect framed views for vehicles travelling south.

11.0 FUTURE STUDIES

A more detailed study of individual character units should be conducted. An inventory of all important key landscape elements and views should be conducted and rated based on perceived community value. Ideally, community surveys should also be undertaken to gain a true assessment of community values and perceptions of landscape character. Potentials and constraints should be identified, and objectives and strategies for managing the visual character of each landscape character unit should also be established.

Landscape master plans should be produced for the whole site, particularly at the intersection of Old Cooma Road and Edwin Parkway and Ellerton Drive , given the staggered development dates. These should address the preservation and enhancement of the visual landscape character and propose appropriate treatment for new road corridors, entries, and nodes.

12.0 CONCLUSION

An assessment of the visual landscape character has been undertaken as part of the Land Capability Assessment of Old Cooma Road study area. The existing visual character has been described by breaking the site down into zones, and then character units. Character units have been described and analysed, and significant views and key landscape character elements identified. Given that this is a desktop study, 'perceived', rather that 'real' community values, based on visual landscape character preference indicators were used to determine the value of particular character elements. Issues were then identified which are currently affecting, or will affect the visual landscape character of the study area. Constraints and opportunities were then listed. Broad scale strategies for maintaining and enhancing the visual landscape character were the suggested. It was determined that:

• Development at the intersection of Old Cooma Road, Edwin Land Parkway and Ellerton Drive will occupy a large footprint and carefull Master Planning should be done for this area to protect high value natural and rural character considering works are proposed for this intersection over the next two decades.

• Significant and protected tree species found in the Crown Land Reserve that will be removed for the duplication of Stage 2 in the northern zone will have to be offset and planted to replace the lost Box-Gum Woodland. High quality character of this area is not expected to change with the duplication of the road, due to the homogenous quality of this unit, aside of the increased clearing width.

• The new proposed road in Stage 1 presents an opportunity to improve the degraded state of the creek and protect the ground layer that has been disturbed by rual activities and grazing with approriate landscape treatments. Road works will result in undesirable plant species being removed, increasing the opportunity for endemic species to to suceed and therefore - reinstate and encourage native flora and fauna communities.

• The mitigation of water run-off in Stage 1 has the potential to become an attractive element of the landscape character and enhance the driving experience of this new road.

• Consideration should be given to viewsheds and corridors to and from existing homesteads and residences in the study area. Appropriate sound and visual buffering should be implemented strategically along the entire subject site.

• Mature roadside screening along the southern zone of Stage 2 could be retained by realigning the proposed duplication, thereby reducing the negative visual and sound impacts in this area.

• Significant entries, nodes, intersections and gateways should be treated appropriately to provide a visual cues to alert drivers of approaching traffic conditions

• Significant views should be retained and enhanced where possible, particularly those to key landscape elements.

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Appendix 2
Visual landscape character preference indicators

Effective planning and management of visual landscapes must be based on a comprehensive understanding of community perceptions, preferences and values. This knowledge can be gained from various sources including a large body of existing perception research, surveys and community testing, workshops and personal interviews.

Where comprehensive project based perception studies are not available, assumptions should be based on community workshops and surveys. In addition, perception research conducted in WA and elsewhere in Australia indicates substantial agreement as to indicators of visual landscape character in natural, rural and built landscapes. The list opposite suggests some of the key character indicators that provide a basis for classification of landscape and features into two preference categories: **most preferred**; and **least preferred.**

Every project will be different. Project managers should use the character indicator lists during the community consultation process to stimulate discussion and as guidelines to be modified and/or refined to suit local conditions and preferences.

The character indicators have been established for the three land categories: **natural, rural** and built landscapes.

Visual landscape character preference indicators

"Most preferred":

Character indicators for **most preferred** can be defined as landscapes and features that are highly valued by the community, and that contribute to the visual character of the landscape.

Natural landscape character:

- high degrees of perceived naturalness;
- high degree of topographic variety or vertical relief (dramatic relief, ruggedness, rock outcropping, outstanding ridgelines and beach forms);
- vegetative diversity (distinctive patterns, species composition, height, colour and texture);
- diversity of vegetation age and density (structural complexity);
- unusually expansive landforms or vast horizontal scale (desert landscapes, beach and dune fields, rolling hills);
- presence of water bodies (waterfalls, rivers, estuaries, oceans, lakes, inundated areas);
- distinctive displays of colour: soils, vegetation (often seasonal), topography, rock formations or water bodies;
- distinctive landscape features (waterfalls, unique plants, reefs, geological formations such as ranges, cliff faces and granite outcrops);
- outstanding combinations of landform, vegetation patterns and water features in one area;
- seascapes (combinations of ocean, reefs, beach, dune formation, coastal rocks, coastal vegetation); and
- areas or sites frequently prone to ephemeral features (fauna, water or wave conditions, beach erosion scarps, climatic conditions).

Rural landscape character

• unusual diversity in agricultural landscapes (colour and contrast or species diversity of cropping);
• agricultural patterns, colours and textures that complement natural features;
• gradual transition zones between agricultural land and natural landscape;
• topographic variety and ruggedness;
• presence of water bodies (dams, lakes, inundated areas) that borrow location, shape, scale and edge configuration from natural elements;
• areas or sites frequently prone to ephemeral features (presence of fauna, distinctive crop rotations, water conditions and climatic conditions);
• significant landscape features (trees and tree stands, historic relics, some windmills and areas of unusual topographic variation);
• settlement patterns and individual structures that strengthen the local rural character (silos, windmills, water tanks, historic buildings, bridges, hay bales and dams);
• historic features and land use patterns that strengthen the local rural character (historic farm machinery, old shearing sheds, windmills and historic buildings); and
• distinctive remnant vegetation located along streamsides, roadsides and in paddocks (parkland cleared paddocks).

Built landscape character

• presence of trees, greenery, parks and gardens, street trees, canopied streets, median strip vegetation;
• complementary building styles in neighbourhoods;
• diverse building styles in neighbourhoods;
• built developments that do not impinge on dominant natural features (for example, the Darling Scarp, river foreshores and coastal landscapes);
• coherence of industrial buildings in one area (eg industrial parks and buffers);
• elevated landforms and undulating terrain;
• presence of water bodies;
• presence of natural rock features (eg limestone cliffs, granite outcrops);
• historic features including land uses that strengthen the local urban character;
• well maintained gardens (native and exotic);
• incorporation of significant cultural and environmental features into urban design;
• urban water management (water bodies that are well maintained, and open drains with a complementary appearance to the surrounding built form);
• development sites supporting and enhancing the urban context in which they are located;
• development sites designed so they strengthen local character and promote a sense of community;
• design which takes account of landscape features, vegetation and landform;
• services being underground to reduce cabling and severance of street trees;
• unobtrusive mobile phone towers and other utility towers;
• unobtrusive advertising;
• presence of community artworks;
• multi-storey buildings that maintain the CBD character (graduated skyline and gaps between clusters of buildings to allow views).

Visual landscape character preference indicators
"Least preferred":

Character indicators for **least preferred** can be defined as landscapes and features that are not valued by the community, and to detract from the visual character of the landscape.

Natural landscape character
• disturbed areas with little evidence of naturalness;
• areas of diseased, dead or dying vegetation;
• areas with severe weed infestations in a natural landscape;
• areas of soil erosion (especially where human-induced);
• water bodies with degraded banks, weed infestations, stagnation, eutrophication, algae or litter; and
• evidence of mining (gravel pits, sand mines, limestone).
Rural landscape character
• areas of soil salinity/salt scalds or dead, dying or diseased vegetation;
• areas of extensive weed infestation;
• eroded areas;
• tips, dumps and landfill areas;
• recently harvested areas (stumps, debris, abandoned off-cuts);
• land use areas that contrast significantly from natural landscape characteristics (can include plantations, mines, rural settlement and/or housing, utility towers, roads and fencing);
• abandoned structures in a state of disrepair or destruction;
• unmanaged roads and access tracks;
• farm structures and buildings in a state of disrepair;
• jetties and other marine structures that are either closed or not maintained; and
• eutrophied dams, lakes and water bodies.
Built landscape character
• derelict industrial areas (junkyards);
• large carparks without trees;
• run-down residential areas (dead grass, bare sand, dead vegetation, derelict housing and/or buildings, abandoned and/or trashed cars)
• graffiti;
• intrusive billboards (particularly along roads and railway reserves);
• buildings which contrast sharply from the surrounding built character (large isolated shopping centres, apartments, hotels);
• arterial highways with strip commercial and light industrial developments, lacking trees and other vegetation;
• utilities (towers, transmission lines, overhead powerlines);
• severed or badly pruned street trees;
• lack of vegetation;
• degraded areas prone to depreciative uses and unregulated vehicle activities;
• poorly maintained waterways and drains prone to stagnation, pollution and littering;
• extensive areas of urban sprawl lacking vegetation or public open space;
• extensive retaining walls which result in concrete canyon effects on roadways;
• buildings that create a solid wall effect (no gaps to allow views between buildings).