INTERIM MANAGEMENT GUIDELINES

Proposed Matuwa (Lorna Glen) and Kurrara – Kurrara (Earaheedy) Conservation Reserves

2007-2013

Department of Environment and Conservation

November 2006

INDEX

ACKNOWLEDGEMENTS

1. PURPOSE OF INTERIM MANAGEMENT GUIDELINES (IMGs)

1.1 Principal Management Directions
1.2 Area Description

2. MANAGEMENT FOR NATURE CONSERVATION

2.1 Geology and Landforms
2.2 Vegetation Associations, Flora and Land Systems
2.3 Introduced Plant Species
2.4 Native Fauna
2.5 Introduced Animals
2.6 Aboriginal Heritage
2.7 European History
2.8 Landscape
2.9 Erosion, Mining and Rehabilitation
2.10 Fire
2.11 Land Tenure, Boundary and Internal Fences
2.12 Artificial Waters

3. MANAGEMENT FOR PARKS AND VISITOR SERVICES

3.1 Access, Roading and Basic Raw Materials
3.2 Tourism and Visitor Safety
3.3 Infrastructure and Facilities
3.4 Information and Interpretation

4. RESEARCH AND MONITORING

4.1 Nature Conservation
4.2 Social

5. IMPLEMENTATION AND WORKS PROGRAM

6. REFERENCES

7. APPENDICES

1. Location Map
2. Station Map at 1:250 000 Scale
3. Vegetation Map
4. Mineral tenements
5. Access and rehabilitation plan
6. Operations plan

ACKNOWLEDGEMENTS

All DEC Goldfields Region staff contributed to the preparation of these Interim Management Guidelines. Thanks also go to John and Ken Quadrio the former owners of Lorna Glen Station for sharing knowledge of the stations and providing advice.

1. PURPOSE OF INTERIM MANAGEMENT GUIDELINES (IMGs)

Introduction

Interim Management Guidelines (IMG) are strategic planning documents used to describe management activities for a specific reserve or DEC managed areas, when a management plan for that area has not been completed and is not a current priority. The IMG provides context for operational activities in an area and provides the basis for the preparation of annual works programs. IMGs can be prepared at any time but they are most relevant when significant change is proposed in recreational activities, public utilities or visitor use, or when there is a significant threat or change to natural or cultural values.

The proposed Lorna Glen and Earaheedy reserves

This IMG is valid for a period of up to 5 years. Amendments may occur if warranted by significant change.

Legislative and Management Framework

Unlike management plans, IMGs are not statutory documents. Therefor operational activities described in the IMG are guided by the use of “necessary” or “compatible” operations, consistent with section 33(3) of the Conservation and Land Management Act 1984 (CALM Act). Necessary operations are defined as, “those that are necessary for the preservation or protection of persons, property, land, waters, flora or fauna, or for the preparation of a management plan”. Necessary operations apply on all reserve types. Compatible operations are, “operations approved by the Minister as being in his opinion compatible with the purposes for which the park or management area is managed under this Act”. They only apply to national parks and conservation parks, marine parks and marine conservation areas.

Operational activities are also guided by other legislation and policy. For a comprehensive summary, see Appendix 1 “*Draft Guidelines for the Preparation of Management Plans for Terrestrial Conservation Reserves,* (2006) Department of Environment and Conservation, Management Planning Unit, Perth”.

Management Summary Table

The management activities for the proposed Lorna Glen and Earaheedy Reserves are summarised in the following table. The column entitled “Key Points” lists the pertinent legislation and provides necessary background and context for management in the form of issues and site-specific values. The “Objectives and Strategies” column contains a summary of the proposed management actions and operations.

These guidelines are required for planning purposes so that certain operations can be carried out in an orderly fashion in the absence of an approved management plan. The operational activities described in the guidelines are defined as those actions necessary for the preservation or protection of persons, property, land, flora and fauna.

This IMG has been prepared in accordance with departmental policy and to fulfil the requirements of Environment Australia under the National Reserve System project.

1.1 Principal Management Directions

These guidelines cover the major management issues. They are:

- the conservation of biological, physical, cultural and landscape resources
- the facilitation of recreation in a safe and appropriate form in relation to the physical and climatic conditions of the area and the conservation objectives
- to seek a better understanding of the natural and cultural environment and the impacts of a range of management activities.

1.2 Area Description

This IMG has been prepared for both Lorna Glen and Earaheedy Stations which were purchased by CALM in August 2000 and March 1999 respectively. These stations once purchased became unallocated Crown land managed under Section 33(2) of the CALM Act, pending conversion to a conservation reserve.

The former Lorna Glen pastoral lease is situated 100-150 kilometres north east of Wiluna (150 km by road to the homestead). The lease straddles the boundary of the Gascoyne and Murchison Biogeographic Regions and covers an area of 243 994ha. It is close at the north east corner to Earaheedy Station and a small area of unallocated Crown land joins the two leases. Earaheedy Station also falls within the Gascoyne Biogeographic Regions and encompasses 321 812ha.

The climate of the area is characterised by low and erratic rainfall with the annual average rainfall of 234mm. Average maximum daily temperatures range from 19.4°C in winter to 39°C in summer.

Lorna Glen lease is near the highest part of the inland plateau in WA. The western portion lies across the watershed between Lake Nabberru to the west and south west and Lake Carnegie to the east. Running diagonally through the centre of the lease is the south west plateau of the north east uplands. This geological feature appears to demarcate the boundary between the Murchison and Gascoyne IBRA regions. Breakaway complexes and hills occur regularly with extensive sandplain and broad outwash plains and occasional lake and claypan systems.

The vegetation of Lorna Glen consists of chenopod shrublands, succulent steppe, extensive areas of spinifex sandplain and Acacia (mainly mulga) woodland, Acacia shrubland and scattered Eucalypts.

Earaheedy is generally flat with low rises. Large areas in the east are subject to inundation and a series of spine-like parallel ridges occur to the north. The vegetation consists of chenopod shrublands, spinifex sandplain, Acacia (mainly mulga) woodland and scattered Eucalypts.

2. MANAGEMENT FOR NATURE CONSERVATION

2.1 Geology and Landforms

Lorna Glen
Mabbut *et al* (1963) describes the geology and geomorphology of much of Lorna Glen. This information is summarised below, with refinements from field observation.

Lorna Glen lies near the highest part of the inland plateau of Western Australia. The western portion lies over the Salinaland Plains that form the broad watershed between the catchments of Lakes Carnegie and Naberru. Within Lorna Glen, this area comprises restricted areas of gently undulating sandstone plateau and stony plains, on weathered Archaean granite and gneiss, formed by dissection of an ancient plateau surface. However the majority of this area is superficially overlain by red aeolian sandplain, with scattered dunes and little surface drainage.

Running diagonally through the centre of the lease (NW-SE) are the South-Western Plateau, of the North-Eastern Uplands. This is a belt of undulating uplands, remnant of the ancient plateau surface and discontinuous plateau, formed by strong dissection of the plateau surface. The undulating uplands are of weathered mudstone, shale and sandstone, of the Upper Proterozoic, commonly with a lateritic duricrust.

Drainage is diffuse and relatively broad alluvial trains have formed where gradients are low. The plateau and stony crests are of Upper Proterozoic sandstone and quartzite and are strongly dissected by strike valleys and alluvial plains.

Internally and on the edges of the South-Western Plateau, the lowlands and broad drainage channels develop further into non-saline alluvial plains and stony upper tributary plains. These are depositional areas of cemented Quarternary alluvium, commonly with broad sand banks.

Further downstream again, modern drainage meets a paleo-drainage system, choked by calcreted valley fills. This is part of the same ancient drainage system on which Lake Carnegie has formed. It exists here as broad saline alluvial plains and calcreted platforms. In the south-east of Lorna Glen, the South-Western Plateau are heavily broken by this drainage system, such that stony uplands and crests rise directly up from the saline plains. Here saltpans, including the Lindsay Gordon Lagoon, lie over the senescent drainage valley. The saltpans exist variously as bare or vegetated saline clay, with gypsiferous drifts and fringing dunes and banks of aeolian sand and/or kopi.

The north-eastern portion of Lorna Glen lies over the Inner Lowlands of the North-Eastern Uplands. This is an area of isolated, low hills of Upper Proterozoic mudstone and shale. Extensive lowlands separate these and broad, partly saline alluvial plains, with extensive wanderrie banks. There is also an area of broad aeolian sandplain.

Earaheedy
Earaheedy has deposits of laterite, silcrete and clacrete occurring on infilled ancient drainage systems. There are numerous claypans and lakes in the east and the unique Leeuwin land system, an ancient drainage channel, in the west. The Lee-Steere Range runs close to the north boundary and contains the unique geological feature of the Sydney Heads Conglomerate, which is confined to a single outcrop in the Sydney Heads Pass (Goldfields Magazine).

Earaheedy comprises Cainozoic deposits and units derived from the Earaheedy Group rock. The Cainozoic deposits of laterite, silcrete and calcrete occur on infilled Tertiary drainage systems, often just above those of the present day.

Heavy folding of rock of the Earaheedy Group formed the Mudan Hills / Lee Steere Range Belt. Surface geology reflects the strong folding of this shallow water sequence of shale, sandstone, limestone and granular iron formation.

North of the Mudan Hills is Slate Bluff, an expression of the Troy Creek Beds. This is a diverse group of rocks, which includes shale, phyllite, quartz sandstone, chert and felsic volcanics.

A unique geological feature is the Sydney Heads Conglomerate, which is entirely confined to a single outcrop in the Sydney Heads Pass. This structure is a series of conglomerate beds, laid down when the area was still tectonically active.

The surrounding plains are of colluvium, alluvium and eolian sand derived from degradation of the Earaheedy Group rock. Lowest in the landscape are the saline and gypsiferus lake deposits surrounded by sometimes gypsiferus sand dunes.

Landforms are generally of low relief with large areas in the east subject to inundation, consisting of numerous small claypans surrounded by sandy rises. The Mudan Hills / Lee Steere Range Belt flanks the northern boundary. This is a strongly folded series of spine-like, parallel ridges, which rise steeply from the surrounding plains.

There are no perennial watercourses on the property. Semi-permanent water bodies are restricted to rock holes in the hills country. However, following significant rainfall events, many ephemeral lakes persist in the east for months.

Action

- Provide interpretative material on the geology, landforms and soils of both the areas as warranted.

2.2 Vegetation Associations, Flora and Land Systems

Lorna Glen

A biological survey conducted over three years in different seasons found more than 450 plant species on Lorna Glen. The area is particularly rich in eremophilas and acacias, as these species are well adapted to the erratic and unreliable rainfall of the region (Goldfields Magazine).

Lorna Glen contains ten vegetation types (associations) and bare lake areas according to the vegetation mapping at the 1:250 000 scale by J S Beard (1974). These are listed below in order of the extent of their areas within the leases (from Hopkins, A. 2000, Appendix 3).

Vegetation code No 107	$a_1e_{21}Srt_2Hi$, Hummock grasslands, shrub steppe; mulga (*Acacia aneura*) and *Eucalyptus kingsmillii* over hard spinifex *Triodia basedoiwii* (71,276 ha).
Vegetation code No. 18	a_1Li, Low woodland; mulga (*Acacia aneura*) (67,290 ha).

Vegetation code No. 29	a_1Lp, Sparse low woodland; mulga, discontinuous in scattered groups (33,547 ha).
Vegetation code No. 39	a_1Si, Shrublands; mulga scrub (19,142 ha).
Vegetation code No. 95	anSrt_2Hi, Hummock grasslands, shrub steppe; Acacia and Grevillea over *Triodia baesdowii* (17,078 ha).
Vegetation code No. 204	$a_{1.8}$Srk1,2Ci, Succulent steppe with open scrub: scattered mulga (*Acacia aneura*) and *Acacia sclerosperma* over saltbush and bluebush (11,713 ha).
Vegetation code No. 546	a_1Lrk_3Ci, Succulent steppe with open low woodland; mulga (*Acacia aneura*) over samphire (10,563 ha).
Vegetation code No. 676	k_3Ci, Succulent steppe; samphire (6,663 ha).
Vegetation code No. 1446	a_1Sik_2Ci, Succulent steppe with scrub; mulga (*Acacia aneura*) over bluebush (5,083 ha).
Vegetation code No. 125	sl, Bare areas; salt lakes (2571 ha).
Vegetation code No. 2081	a_9Si, Shrublands; *Acacia linophylla/A. ramulosa (*Bowgada) scrub (166 ha).

Seven of these associations contain mulga (*Acacia aneura*): hummock grassland shrub steppe, low woodland, sparse low woodland mulga scrub and three succulent steppe – low mulga woodland over saltbush and samphire associations. The other main association found on red/yellow sands sometimes in dune and swale complexes is spinifex grassland with emergent mallees (*Eucalyptus kingsmillii)* and Marble gums. The two remaining vegetation types are associated with salt lakes and claypans being open lake beds and samphire flats.

There are a number of additional associations that are not recognised in Beard's 1:250 000 vegetation mapping but are identified by early (Mabbutt *et al* (1963) Agriculture WA's Rangeland mapping for all of the lease apart from the top 3 paddocks (Northwest, North and Electric). These include 10 land types supporting 16 distinct land systems, many which support similar vegetation types to Beard's associations, while many are quite distinctive in terms of their vegetation.

The land types and their associated land systems are summarised below.

LAND TYPE	**UNDULATING TERRAIN FORMING PART OF THE OLD PLATEAU**
LAND SYSTEM	
Dural	Strongly undulating terrain on weathered mudstone and basalt, relief up to 12 m. Stable crests; shallow gravelly and stony soils; open mulga with mallee, spinifex, and annual grasses. Lower slopes; mainly shallow red earths; mulga with sparse grasses.
Lorna	Gently undulating terrain on weathered mudstone and shale, relief up to 6 m. Rises and shallow depressions; red sandy soils; dense mulga with edible shrubs and perennial grasses. Sloping plains; red sandy soils, spinifex with mulga and clumps of mallee.
LAND TYPE	**Surfaces formed by dissection of the old plateau**
LAND SYSTEM	

Sandstone plateau

Glengarry — Sandstone plateau, relief 15 – 60 m. Uplands; shallow stony soils; mainly dense mulga and shrubs, feathertop spinifex, and other perennial grasses. Drainage floors; red earths of variable depth; dense mulga with abundant herbage.

Lynne — Sandstone plateau, relief up to 45 m. Uplands; shallow stony soils, open mulga with inedible shrubs and annual grasses. Flood-plains; texture-contrast soils; bluebush and other halophytes with sparse mulga.

Low Hills

Sodary — Uplands and plains on grit and mudstone, relief up to 30 m. Uplands; shallow stony soils; mulga and inedible shrubs and grasses. Alluvial plains; red earths and texture-contrast soils; variable mulga with sparse chenopods and patches of herbage and annual grasses.

Breakaways and plains

Sherwood — Breakaways and plains on gneiss and granite. Plains; shallow stony soils; open mulga and sparse shrubs and short grasses. Lateritic breakaways; stunted mulga and native pines and sparse shrubs. Alluvial plains; red earths and texture-contrast soils; stunted mulga with bluebush, dense mulga with edible shrubs along drainage lines.

Millrose — Plains, relief less than 3m. Wanderrie banks; red sandy soils; open mulga with edible shrubs and grasses. Wanderrie flats and stony granitic plains; shallow red earths and other soils; sparse mulga and shrubs with annual grasses.

LAND TYPE **Surfaces eroded below the old plateau**

LAND SYSTEM

Plains

Kalyaltcha — Plains on mudstone and shale, relief up to 1 m. Stony plains, shallow soils, with red earths in drainage floors; open stunted mulga with short annual grasses. Alluvial plains; texture-contrast soils; halophytic shrublands.

LAND TYPE **Depositional surfaces**

LAND SYSTEM

Calcreted valley fills

Cunyu — Valley fills non-saline alluvium. Low calcrete platforms; shallow calcareous earths; open mulga with abundant annuals. Alluvial plains; red earths; minor texture-contrast soils; dense mulga on margins; open woodland with sparse shrubs and patches of halophytic shrubland in central tracts.

Mainly non saline alluvial plains

Jundee — Stony upper tributary plains, gradients above 1 in 500; shallow red earths; mulga groves with edible shrubs and perennial and annual grasses, edible shrubs locally.

Yanganoo	Upper tributary plains, gradients above 1 in 500; red earths, with sandy soil on margins; prominent mulga groves with edible shrubs and variable grasses, spinifex with dense mulga on margins.
Yandil	Lower tributary plains, gradients 1 in 500 to 1 in 1000; shallow red earths; open mulga and curara with unpalatable shrubs and annual grasses.
Mitchell	Tributary plains, gradients 1 in 250 to 1 in 500. Alluvial plains; mainly red earths, locally salt-affected; open mulga, halophytic shrubland, and short annual grasses. Wanderrie banks and sand plain; red sandy soils; open mulga, with edible shrubs and perennial grasses.

Alluvial plains with wind modification

Belele	Wanderrie plains, gradients between 1 in 500 and 100 in 1000. Alluvial flats; shallow red earths, sparse mulga with stunted shrubs and annual grasses on wanderrie flats, denser mulga on drainage floors. Wanderrie banks; red clayey sands, open mulga with edible shrubs and palatable perennial grasses.

Sand plain and dunes

Bullimore	Sand plain with scattered dunes; deep red sandy soils; spinifex with mulga and mallee.

Salt lakes and dunes

Carnegie	Large salt lakes and surrounds. Bare floors with saline sediments. Alluvial plains; various saline soils in lower parts, texture-contrast soils in higher parts; samphire in lower parts, halophytic shrubland in higher parts. Sand dunes; open mulga with halophytic and other palatable shrubs and perennial grasses.

Earaheedy

Beard (1974) recognises six broad vegetation categories and bare areas (lakes) and Agriculture WA (1997) describe nine vegetation communities and range types within Earaheedy Station. These are;

Beard's vegetation categories with general area calculations (Appendix 3);

676	k_3Ci	Succulent steppe; samphire. Area in Earaheedy is 114 658ha.
18	a_1Li	Low woodland; mulga. Area in Earaheedy is 101 947ha.
29	a_1Lp	Sparse low woodland; mulga. Area in Earaheedy is 79 610ha.
97		anSrp$_2$Hi Hummock grasslands, shrub steppe; acacia species over *Plectrache melvillei*. Area in Earaheedy is 13 430ha.
95	anSrt$_2$Hi	Hummock grasslands, shrub steppe; Acacia and Grevillea over *Triodia baesdowii*. Area in Earaheedy is 8 854ha.
125	sl	Bare areas; salt lakes. Area in Earaheedy is 2 736ha.
39	a_1Si	Shrublands; mulga scrub. Area in Earaheedy is 117ha.

Agriculture WA vegetation and rangeland communities interpreted for 16 0252ha of the western part of the lease (developed paddocks only) and areas are;

Ms - Mulga/ Spinifex. Area in Earaheedy is 36 977ha.
Ccm - Chenopod/ Claypan / mulga sandy bank. Area in Earaheedy is 20 098ha.
Sbl - Sandy bank lake country. Area in Earaheedy is 40 066ha.
Rh - Rocky hills. Area in Earaheedy is 823ha.
Leeuwin - Leeuwin. Area in Earaheedy is 3 388ha.
Bcp - Broad chenopod plains. Area in Earaheedy is 23 204ha.
Gmwp - Groved mulga wash plain. Area in Earaheedy is 25 389ha.
Bf - Breakaway footslopes. Area in Earaheedy is 2 140ha.
Cr - Creekline. Area in Earaheedy is 8 167ha.

The vegetation types within Earaheedy are;
Salt flats support halophytic low shrubs and are devoid of an upper story. The surrounding sand dunes typically consist of Acacia and Melaleuca shrubs over spinifex hummock grasslands.

Slightly higher in the landscape are vast saline flats vegetated by an Acacia overstory with a mixed understory of *Kochia spp, Eremophila spp* and *Maireana spp*.

Running through the centre of the station is the Leuwin drainage system which overlies a Quaternary paleodrainage channel. High in the drainage system are groves of *Acacia aneura* over *Acacia tetragonophylla, Eremophila spp, Maireana spp* and native grasses. The drainage channel proper is indicated by a tall overstory *of Acacia aff. papyrocarpa* with *Acacia aneura, Scaevola spp* and *Maireana spp*.

Deep colluvial soils elsewhere support spinifex grasslands with an open overstory of *Acacia spp* and occasional *Eucalyptus kingsmillii* and *Eucalyptus gamophylla*.

The sandstone rises across the station have very stony soils and support a sparse understory. Scattered small trees and shrubs include *Acacia spp, Hakea spp, Eucalyptus kingsmillii* and *E. pachyphylla*.

Soils of the Mudan Hills/ Lee Steere Range are also stony and support very little understory. The deeper soils have small trees and shrubs such as *Acacia aneura, Ptilotus obovatus* and *Senna spp* over spinifex grasslands.

The Sydney Heads Conglomerate and parts of the Lee Steere Ranges support an obviously distinct community, consisting of open Acacia species over spinifex with *Thryptomene spp, Ptilotus obovatus* and *Eremophila latrobei*. Suitable microhabitats support *Eucalyptus camaldulensis, Ficus platypoda, Gastrolobuim grandiflorum* and the fern *Cheilanthes lasiophylla*. The rugged outcroppings near Slate Bluff support these species as well as *Callitris collumellaris* and *Eucalyptus carnei*.

Earaheedy is rich in Eucalypts with 13 species noted and *Eucalyptus* " lenziop", a hybrid of *Eucalyptus lenziana* and *Eucalyptus opaca* also believed to be present (M. French, pers comm).

There are no known species of threatened flora within Earaheedy.

Action

- Detailed flora and vegetation associations surveys and mapping are required for both Stations.

- Conduct surveys on both Lorna Glen and Earaheedy for the presence of threatened and priority flora, or geographically restricted species and determine appropriate management.

2.3 Introduced Plant Species

Introduced plants include garden species and weeds around the homesteads and some weeds on parts of the lease. A preliminary weed survey recorded Buffel grass and double gee in several isolated patches, they appear to be restricted to disturbed areas, around infrastructure.

No major weed infestation has resulted however ongoing monitoring will be required.

Doublegee and Buffel are the only problem weed species away from the homesteads requiring control and management at present. These plants are confined to several small populations adjacent to bores. Any other weeds located will be simultaneously controlled.

Introduced plants include garden species around the homestead and weeds. A preliminary survey discovered Buffel Grass and Birdwood restricted to the homestead area, doublegees at 2 sites (homestead and Popes Well), ruby dock around the homestead and other garden weeds. Ongoing survey is required.

Hay cultivation, based on irrigating Sudax, occurred at a small area at Garden Patch Well. No major weed infestation has resulted however monitoring is required.

The doublegee and ruby dock are the only problem weed species requiring management at present. These plants are confined to several small populations adjacent to bores (R. Quatermaine, pers comm). Other weeds will be simultaneously controlled.

Action
- Ongoing control of doublegees, ruby dock, buffel and other weeds. Ongoing survey and monitoring around previous artificial water points for the occurrence of other weeds is required.

2.4 Native Fauna

Lorna Glen
Lorna Glen has a rich and diverse fauna. Biological surveys to date have recorded more than 76 species of reptile alone and this is one of the richest reptile faunas documented anywhere in the Australian arid zone. Some of these reptile species are at the limits of their known range while others had not previously been recorded from this region (pers comm Mark Cowan 2006).

There have been at least 14 native and extant species of mammal recorded excluding bats and of these there are at least 5 species of dunnart. Significant mammal fauna includes the long-tailed dunnart (*Sminthopsis longicaudata*), a priority 4 species and the declared rare Mulgara (*Dasycercus cristicauda*). The rarely seen Kultarr have also been recorded on a number of occasions within Lorna Glen (pers comm Mark Cowan 2006).

Lorna Glen also has a rich bird life, particularly after substantial rain when lakes and clay pans support a variety of waterfowl and waders. The previous lessee reports large groups of Black Swans and waterfowl nesting after cyclonic rainfall events. During inspections by CALM staff, a

group of more than 100 Red-necked Avocets was observed in standing water, on a fresh water wetland. Waterfowl were also observed elsewhere on the lease. More than 100 bird species have currently been recorded from the area but the number is likely to increase with further survey work (Goldfields Magazine – Lorna Glen only). The Malleefowl (*Leipoa ocellata*) which is listed as threatened under the *Wildlife Conservation Act 1950* has also been recorded within Lorna Glen (pers comm Mark Cowan 2006).

Extinct mounds and nests of Burrowing Bettong (*Bettongia lesueuer)*, and Stick-nest rats (*Leporillus* sp) occur within the lease.

The first biological survey conducted on Lorna Glen Station was carried out in 2002 and comprised of the establishment of 24 permanent sites stratified by both land system and vegetation associations. At each site a set of pit traps lines was installed for assessment of ground dwelling vertebrates and select invertebrates, along with a 30x30 flora quadrat for botanical work. Surveys were carried out twice in 2002 incorporating periods of maximum vertebrate activity, Autumn and Spring and then three times annually from 2003 on with the addition of a winter survey.

Earaheedy
No systematic fauna surveys have been carried out on Earaheedy. It is likely that some of the species that occur within Lorna Glen may be found within Earaheedy however without systematic surveying it is not possible to have a definitive species list.

There is strong potential for a diverse waterbird population following good rainfall events. Opportunistic surveys during inspections have recorded 60 bird species with others reported by the previous managers. A Malleefowl nest has also been recorded on Earaheedy.

Action

- Continue the fauna monitoring at Lorna Glen for the next 5 years with a preference for biannual surveys.
- Conduct a detailed biological survey of Earaheedy.

2.5 Introduced Animals

Lorna Glen
When CALM purchased Lorna Glen Station in 2000 the station still carried cattle. By December 2001 the majority of stocked had been removed from Lorna Glen.

Introduced animals have the potential to adversely impact on natural systems and biodiversity values. Adverse impacts can be through predation of native animals, habitat destruction, competition for food and territory and accelerating erosion. The introduced animals present on Lorna Glen include the feral cat, fox, wild dog, camel, goat, donkey, horse, house mouse and rabbit. Camels and goats are present in low numbers while rabbits occur in high numbers in certain areas within Lorna Glen such as Lake frontages and some mills.

In 2003 a feral animal control program was established at Lorna Glen. This program was developed using ideas from the Desert Dreaming Project that was carried out in the Gibson Desert

Nature Reserve. The long term goal of the Desert Dreaming Project was the reintroduction of rare and endangered mammals once endemic to the area but now locally extinct. The key elements of the project were feral predator control work and habitat modification through controlled burning. The Project was unsuccessful possibly due to the predator control work focussing on the control of wild dog and foxes not enough focus on feral cats.

This feral animal control program was established in Lorna Glen in 2003. The reasons behind the move from the Gibson Desert to Lorna Glen included:

- that biological survey work in Lorna Glen had already identified a rich and diverse fauna suggesting apart from critical weight range mammals a relatively intact ecosystem;
- almost the entire study area at Eagle Bore in the Gibson Desert Nature Reserve was burnt in late 2002;
- Lorna Glen is also a representative of desert ecosystems;
- Lorna Glen already contained good infrastructure for carrying out research and management (i.e. access, buildings, airstrip and water); and
- Lorna Glen is less remote than the Gibson Desert Nature Reserve being only 500km north of Kalgoorlie compared to 800km north east of Kalgoorlie.

The project has now become known as the 'Introduced predator baiting program into the Rangelands of WA'. This project involved establishing 8 additional fauna sites which included pitfall traps and would compliment those sites already established by the Goldfields Region staff. The first surveys were pre-bait cat/fox/dog density surveys. Trial baiting was carried out in June 2003 at 50 baits per square kilometre and covered an area of approximately 625 km^2. Post-bait surveys were then carried out (Burrows N., et al 2005).

The baiting program continues annually between June and July. Baiting appears to be most effective during these months as it is a cold time of the year when live prey is the least active. Post-aerial baiting surveys are conducted three times a year. It is proposed that if sustained predator control can be demonstrated then in July 2007 native mammal re-introductions will be trialed. The species proposed for re-introduction is the bilby and the possum.

Earaheedy

Earaheedy was destocked in March 2000. The introduced animals present on Earaheedy include the feral cat, fox, wild dog, camel, goat, donkey, horse, house mouse and rabbit. Rabbits, horses, donkeys, foxes and wild dogs are present in low numbers. Feral cats are widespread on the lease. Goats have been absent for several years (R Quartermaine, pers comm).

In November 2006 an aerial survey was carried out by DEC to determine feral herbivore numbers across Lorna Glen and Earaheedy. Horse numbers recorded for Lorna Glen was 320 and for Earaheedy was 20. Camel numbers for Lorna Glen was 8 and Earaheedy was 128.

Both Lorna Glen and Earaheedy fall within Kalgoorlie Zone Control Authority (ZCA). DEC is a member of the ZCA and is required to help manage wild dogs across the conservation estate and unallocated Crown land.

Action

- Continue contributing to the Regional dog/ feral predator control program including aerial baiting.
- Monitor introduced animal populations and initiate control programs as appropriate.

- Monitor stock activity and natural waters adjacent to the Lorna Glen and Earaheedy boundaries and subsequent re-entry by neighbouring stock. Assess their impact, and develop control measures in conjunction with neighbours if necessary. These measures will almost certainly involve the fencing off of natural waters on Lorna Glen and Earaheedy and possibly joint maintenance or upgrading of common boundary fences. HAS THIS LAST BIT ALREADY BEEN DONE?
- Systematically decommission all artificial water points, to deny supplies to introduced animals and to restore the natural balance of native fauna. Undertake this work when animal populations are naturally dispersed as sudden denial of water from artificial sources is undesirable. Initiate a monitoring program to assess the effect of this. I AM GUESSING THAT THIS HAS BEEN DONE FOR BOTH STATIONS
- Discourage domestic animals from Lorna Glen and Earaheedy.

2.6 Aboriginal Heritage

Lorna Glen

In pre European contact times, Aboriginal people lived in the Lorna Glen and Earaheedy area and used the land for hunting, gathering and cultural purposes. There is evidence of occupation at several sites within Lorna Glen.

The Wiluna Native Title Claimants have lodged two native title determination applications (WAG6164/98 and W241) over all of Lorna Glen and Earaheedy. It is registered to Wilma Freddy, Kenny Farmer, Alan Ashwin and 15 others. This claim is a combination of previous claims Wiluna WC98/7 and Tulloch WC97/32. A hearing is anticipated during October 1999 to determine eligibility for registration. DID THIS EVER HAPPEN???

NEED TO CHECK ON THE DIA SACRED SITES WEBSITES FOR ANY REGISTERED SITES FOR BOTH STATIONS.

A Memorandum of Understanding (MOU) was signed between the Department of Environment and Conservation (formerly Department of Conservation and Land Management) and the Wiluna Native Title Claimants over Lorna Glen and Earaheedy. The MOU signifies the intent of DEC and the Wiluna Claimants to work co-operatively together in relation to Lorna Glen and Earaheedy and in accordance with the principles and guidelines that address their common concerns, as set out in the MOU. Both DEC and the Wiluna Native Title Claimants agree that the lands will be managed for the conservation of flora, fauna and Aboriginal heritage.

The MOU establishes a working group that will:

1. undertake interim joint management of the Land and develop an agreed management plan for the longer term joint management of the Land;
2. work towards implementing training and development opportunities for the Wiluna claimants.

The Working Group have met XX times since the MOU was signed.

Under this MOU DEC and the Wiluna Aboriginal people have carried out work projects including:
WHAT ARE THESE WORK PROJECTS??

Earaheedy
The original Aboriginal inhabitants had moved off the area by the 1940's and were replaced by Aboriginal people from the desert lands as pastoral lease workers; they practised their traditional activities on Earaheedy (pers comm. M Capper).

There are 10 registered Aboriginal sites centred on Earaheedy and 3 others (10 square km areas) located adjacent to Earaheedy, which may overlap the station boundary.

Action
- Continue working with the Wiluna Native Title Claimants through the Working Group to promote and further joint management of Lorna Glen and Earaheedy.
- Accommodate and protect sites, cultural values and interests during the planning and management of Lorna Glen and Earaheedy.

2.7 European History

Lorna Glen
It is believed that Lorna Glen was established as a pastoral property in the 1920's and was stocked continually for the next 80 years.

Earaheedy
John Forest's 1874 expedition passed within 10 miles north of what later became Earaheedy Station. In 1893, Surveyor CE May mapped a 'Low Conspicuous Hill' on what is now Earaheedy Station.

H.G.B. Mason pegged 5 pastoral blocks covering 125 000ha, and named the low hill 'Earaheedy Hill' in 1905. The blocks were surrendered about 1912.

Around 1926 A.G. Herbert took up a 60 000ha pastoral block on the western part (Earaheedy) and F Pope took up a 30 000ha block east of this (Warrabindie block). The first stock to be run were horses belonging to Fred Pope about 1926. Further to the east A.E. Green and H.E. Vale took up 200 000ha in two blocks in 1926 and 1929 (Greenvale block). The Earaheedy and Greenvale blocks were forfeited in 1933.

In 1934 Archie Hogg and Mel Clark took up the Earaheedy lease and sheep were introduced in 1935. Between 1935 and 1945 there were several owners and partners with further development happening. In 1946 Maitland and Lillian Quatermaine became partners and took over in 1947 with additional blocks added and boundaries adjusted. The Quatermaine family developed and managed Earaheedy from 1947 until selling to CALM in March 1999.

The original homestead in the 1930's was near Earaheedy Well, and consisted of a bough shed. The current station homestead site, near Curara Well has undergone many changes and upgrades over the years. There is currently the homestead, shearers quarters, machinery shed, shearing shed and associated infrastructure.

There are no known marked or unmarked graves within Earaheedy. The full history of the station is outlined in "Earaheedy Station: A Short History" by M.K. and R.A. Quartermaine.

Action

- Document, maintain and protect the heritage of Lorna Glen.
- Research, document and provide historical information at the Lorna Glen and Earaheedy homesteads for visitors.
- Maintain essential field study centre infrastructure at the homestead complex at Earaheedy. SHOULD THIS BE LG?

2.8 Landscape

The term landscape is used to describe the visual image of an area. In many places the natural landscape has been modified by the activities of man to become the cultural landscape; the landscape has already undergone modifications and will continue to change. It is the rate of change and degree of impact, which are important to management of the landscape.

The objective of DEC's Visual Resource Management Policy is to ensure that all lands are managed in ways that sustain the beauty of the natural environment.

Lorna Glen and Earaheedy are both located within the "Meekatharra Plateau" Landscape Character Type (Stuart-Street and Kirkpatrick, 1994). Typical of this landscape is gently undulating sandplains with ridges of metamorphic rocks and granite hills and rises. Small scattered erosional breakaways are evidence of a former plateau landscape. Areas of salt lake, saline playas and clay pans are common. Various associations of Mulga (*Acacia aneura*) dominate the vegetation.

Action

- Ensure all development proposals are managed to minimise impact on the landscape, in accordance with DEC's Visual Resource Management guidelines (Policy Statement No. 34).

2.9 Mining

Mining includes exploration, fossicking, prospecting and mining operations. Mining on land managed by DEC is in accordance with the *Mining Act 1978*, *Petroleum Act 1967*, *Petroleum Pipelines Act 1969* and *Petroleum (Submerged Lands) Act 1982*. The exploration and subsequent mining of minerals in Western Australia is primarily administered by the Department of Industry and Resources (DOIR) through the granting of various tenements including prospecting licences, exploration licences and mining leases. Active mining exploration does occur within sections of both Lorna Glen and Earaheedy.

Lorna Glen

Lorna Glen has no history of mining. There is a history of exploration and prospecting and currently there are 4 exploration licences on Lorna Glen in areas east and south of the homestead. An inspection is required and liaison with tenement holders relating to ongoing and proposed activities. (IS THIS STILL CORRECT?)

There is a history of prospecting and fossicking for gemstones which may require management if it continues.

Earaheedy
There is no known history of previous mining.

Currently four exploration licences exist in the eastern part of the station. Four Exploration Licences have been applied for, two in the north and two in the east, and are awaiting grant. UPDATE THIS THROUGH TENGRAPH OR JULIE

Action

- Any future mining tenements will be granted in accordance with conditions agreed to between DEC and the Department of Industry ad Resources (DOIR). Prior to any ground disturbing activity a detailed program will be prepared by the proponent and referred to DEC. This program will also address rehabilitation requirements.
- Map and inspect all exploration activity and liaise with tenement holders

WHAT MINERALS ARE OF INTEREST IN THE TWO AREAS?

2.10 Erosion and rehabilitation

Lorna Glen
Much of Lorna Glen is in fair to good rangeland condition at present. Heavy impacts from grazing are restricted to water points and holding yards. Concerns raised in Range Condition Reports (Blood 1998) appear to be on the basis of reduced grazing value, rather than major changes in community structure. Two areas impacted heavily by grazing are the Top and Main Holding Paddocks and the wetland in Christmas Creek Paddock. None of these areas appear to require any remedial action, other than the removal of domestic stock and control of feral herbivores. UPDATE THIS

Several rangeland photographic monitoring points were visited by CALM during the initial inspection. Considerable improvement in range condition was noted, at all sites, from that presented in photographic records, made in 1995. General improvement in range condition, through management by the present Lessee, is acknowledged in the most recent Range Condition Report.

Some localised active track erosion has occurred on some tracks where overland water flow has been intercepted by these alignments. Repair and rehabilitation work is required.

Earaheedy
Agriculture WA rangeland condition reports indicate that of the 40% of the property that has been developed most is in poor to fair rangeland condition. Areas where water supplies have only recently been developed are still in good rangeland condition. Areas favoured for grazing are expected to slowly regenerate naturally once stock is removed. UP DATE THIS NOW AFTER 5 YEARS.

Some localised active track erosion has occurred in the Leeuwin range type and on other access tracks.

Action

- Carry out erosion control and rehabilitation work (bunding, fill and closure) along approx 10km of eroded tracks as outlined on the firebreak, access and rehabilitation plan. Assess all tracks and complete work on a priority basis.

Earaheedy

- Carry out approximately 10km of erosion control work (bunding, realignment and fill) on eroded tracks in the Leeuwin range type. Assess all tracks and complete work on a priority basis.

2.11 Fire

Fire is a natural element in ecosystems. The frequency and intensity of a fire will determine whether it has a positive or negative effect on the natural system. Current knowledge indicates that in order to optimise and protect biodiversity, fire regimes need to be applied that provide for an interlocking mosaic of patches of vegetation and habitats that represent a range of fire frequencies, fire intervals, seasons, intensities and scales.

Fire is a major ecological process in spinifex communities which burn readily and are adapted to fire. In these communities fire is a major determining factor for ecological diversity. Mulga communities and most of the other vegetation associations on Lorna Glen are fire sensitive.

Lightning is the main source of ignition in Lorna Glen and Earaheedy. Strikes are largely random in spatial distribution however the areas most critical for implementation of fire management on Lorna Glen are the spinifex grasslands and fringing woodlands.

A Fire Management Plan (FMP) was prepared for Lorna Glen in September 2003. The FMP was developed by mapping the fire history of Lorna Glen over 6 month intervals from 1984 to 2003. The reason for developing an FMP was that the occurrence of large wildfires could impact on cat and native fauna numbers which in turn could jeopardise the feral cat control program and the potential for the reintroduction of native fauna (CALM 2003). Other fire management considerations included the protection of persons, property and conservation values.

The FMP took into consideration the protection of infrastructure, distribution of vegetation assemblages, occurrence of priority and declared rare flora and fauna, provision of suitable habitat for fauna, ongoing research on the property (both the feral cat research program and biological survey work) and management of fires in relation to property boundaries.

Earaheedy

Fire management considerations include the protection of persons, property and conservation values. Fire is a major ecological process in spinifex communities which burn readily and are adapted to fire. In these communities fire is a major determining factor for ecological diversity. Mulga communities and most of the vegetation associations on Earaheedy is fire sensitive. There has been no recent fire history on Earaheedy although evidence of past fires in spinifex communities exist (charcoal, regeneration and burnt mulga).

Action

- Continue to implement the Fire Management Plan for Lorna Glen.

- Use historical data and survey to map fire history, impacts and prescribed burning needs for Earaheedy. Interpret, through biological survey and mapping vegetation associations, the fire susceptible areas requiring management and protection.
- Grade strategic access tracks and firebreaks on Lorna Glen and Earaheedy as required.

2.12 Land Tenure, Boundary and Internal Fences

Lorna Glen Pastoral Lease (3114/955) was purchased by CALM on the 1st August 2000. The area became unallocated Crown land, managed by CALM under section 33(2) of the CALM Act as agreed in the MOU between CALM and DOLA, pending action to set them aside as conservation reserves. The intention is to convert this previous pastoral leases to a Conservation Park, vested with the Conservation Commission of Western Australia (CCWA) and consistent with Native Title requirements. Liaison with stakeholders including Native Title claimants, the Shire of Wiluna and the DOIR will be necessary.

Lorna Glen, from the north east corner in a clockwise direction, has common boundaries with;

- ❖ Wongawal Pastoral Lease 3114/1068 (45 km of boundary with fences variable from a reasonable quality effective fence in the south to poor and non-existent in the north). Not developed or grazed adjacent to the boundary.
- ❖ Yelma Pastoral Lease 3114/1067 (29 km of boundary with fences variable from a reasonable quality effective fence in the north to poor and non existent old poor quality sheep fence on the south boundary). Not developed or grazed adjacent to the boundary.
- ❖ UCL (18 km of boundary with poor and non existent old poor quality sheep fence on the south boundary). Not developed or grazed adjacent to the boundary.
- ❖ Millrose Pastoral Lease 3114/960 (45 km of boundary with poor and non existent fencing). Sheep and cattle grazing adjacent to boundary. Mainly spinifex vegetation types.
- ❖ Granite Peak Pastoral Lease 3114/645 (52 km of boundary with very old poor quality or non existent sheep fence). Some cattle adjacent to the boundary.
- ❖ UCL (10 km of boundary with poor and non existent old poor quality sheep fence.). Not developed or grazed adjacent to the boundary.

Only parts of the Lorna Glen east boundary fence are stock proof. No other external or internal fences are stock proof to either cattle or sheep.

Currently there are only stock (cattle) adjacent to the boundary in the southwest and west on Millrose PL and some to the north on Granite Peak PL where there are no stock proof fences. Boundary fencing will be monitored and maintained where grazing is occurring adjacent to the reserve.

Stock movements are limited by the availability of natural or artificial waters and the type of country, especially where spinifex vegetation occurs adjacent to the boundary. Once Lorna Glen's artificial waters have been closed down, entry and grazing by neighbouring stock will be limited to when seasonal conditions provide surface water and where there are waters adjacent to the boundary. UPDATE - HAVE ARTIFICIAL: WATERS BEEN SHUT DOWN?

There is in excess of 340km of internal sheep and cattle fencing in various states of repair from good, through poor to virtually non-existent. Some fences restrict access, interfere with water flow and creeks, are dangerous to wildlife and require removal.

Earaheedy

Earaheedy Pastoral Lease (3114/445) was purchased by CALM on 17th March 1999 and is currently still held as pastoral lease by the Director General of DEC. The intention is to convert the lease to a Conservation Park vested with the Conservation Commission of Western Australia (CCWA) and consistent with Native Title requirements. Liaison with the Shire of Wiluna and the Department of Industry and Resources (DOIR) will be necessary.

Earaheedy has a common eastern boundary with Carnegie Pastoral Lease 3114/1070 (7km of boundary with 7km of poor quality sheep fence) and Niminga PL 3114/1069 (22km of boundary with no fencing or track), Niminga is leased by the same leaseholder as Wongawol.

The southern boundary of Earaheedy adjoins Wongawol PL 3114/1068 (76km of boundary with 27km of poor, very poor quality and almost non existent sheep fence) and a small area of VCL in the south west (23km of boundary with no fencing) which separates Lorna Glen and Earaheedy.

The west and south west boundary adjoins Granite Peak PL 3114/654 (48km of boundary with 41km of poor and very poor quality sheep fence).

There is a strip of unallocated Crown Land to the north (100km of boundary with 20km of poor, very poor quality and almost non-existent sheep fence). The unallocated Crown land separates Glenayle Pastoral Lease from Earaheedy.

None of the boundary fencing or internal fences are stock proof to either cattle or sheep. Stock movements have been limited by the availability of natural or artificial waters. Once artificial waters have been closed down, grazing by neighbouring cattle may still occur occasionally in the south (from Wongawol), east (from Carnegie, and west (from Granite Peak) when seasonal conditions provide water in the numerous ephemeral lakes.

There is approximately 470km of internal sheep fencing in various states of repair from good, through poor to virtually non-existent. Some fences restrict access, interfere with water flow and creeks, are dangerous to wildlife and require removal.

Action

- Remove internal fencing on Lorna Glen and Earaheedyon a priority basis especially sections of internal fences which cross-creeks or impact on access, landscape and tourism management.
- Commence the process of changing the tenure of Lorna Glen and Earaheedy to a DEC managed conservation reserve under relevant legislation including a review of unallocated Crown land adjacent to Earaheedy with a view to incorporation into the reserves. .
- For Lorna Glen and Earaheedy monitor entry by neighbouring stock, assess their impact, and develop control measures by fencing where necessary, in conjunction with neighbours.
- Once reserve vesting is finalised, undertake statutory management planning for Lorna Glen and Earaheedy.
- Establish a boundary track, in liaison with neighbours, where required, to demarcate the reserve and facilitate fence, fire and stock management.

2.13 Artificial Waters
NEED IAN TO UPDATE ME WITH REGARD TO THIS SECTION
Lorna Glen
At the time of inspection for the IMG's (March 2001) of the 65 bores and wells listed on the lease (22 on the boundaries) around 42 had operational windmills (2 on the boundary) with an additional 9 windmills shut down (1 on the boundary). All of the mills and waters infrastructure, apart from those at the Lorna Glen homestead complex, remains the property of the former owners.

Several waters (shared) occur on the boundary with ownership and future management as follows;

- Bartletts bore and mill on the west boundary. Owned by Lorna Glen it will be sold to Millrose. This water is to remain operating and will require negotiation about management of impacts of grazing into Lorna Glen and fencing. Being in spinifex vegetation grazing may be manageable using the water supply.
- Tommy's bore and mill on the south-west boundary. Owned by Millrose. This water is to remain operating and will require negotiation about management of impacts of grazing into Lorna Glen and fencing. Being largely in spinifex vegetation grazing may be manageable using the water supply.
- Deep and No. 9 bores and mills on the north boundary. Owned by Lorna Glen. They will either be sold to Granite Peak or removed and sold. If these waters are sold to Granite Peak and remain operating it will require negotiation about management of impacts of grazing into Lorna Glen and fencing. Being in sparse low mulga woodland vegetation, while grazing may be manageable using the water supply, the potential impacts are greater.
- Thompson Bore on the north boundary. No mill or infrastructure. Granite Peak station has indicated a desire to recommission this water and establish a mill. If this happens it will require negotiation about management of impacts of grazing into Lorna Glen and fencing. Being in sparse low mulga woodland vegetation, while grazing may be manageable using the water supply, the potential impacts are greater.
- Other boundary wells, bores and mills will not be retained as there is no requirement for them by either Lorna Glen or neighbours.

Artificial waters support artificial population levels of animals, concentrated in areas surrounding those waters. Artificial waters will be systematically closed down as seasonal conditions and destocking permit. This will be done when existing native animal populations are naturally dispersed as sudden denial of water from artificial sources is undesirable.

Action LG

- Existing mills, other than the mill at the Lorna Glen homestead (subject to negotiated ongoing caretaking needs) and those listed above will be systematically closed down as seasonal conditions and destocking determine. Open wells and bores will be secured so they are safe and not accessible to stock and wildlife.
- Windmills and infrastructure (privately owned), other than those at the homestead and listed above will be sold and removed by the former owners following destocking. Anticipated to be after December 2001.
- Negotiate with neighbours about waters adjacent to the boundary and management of impacts of grazing into Lorna Glen and fencing.

Earaheedy
At the time of purchase of Earaheedy by CALM there were 23 operational mills, one pump bore and eight dams that were included in the sale to CALM. Most of the mills are in the western part

of the lease and the dams in the east. In addition, there were 22 mills and bores abandoned, or not in use with various infrastructure, that were not part of the sale.

Action E

- Existing mills (other than the 2 mills and bore at the homestead) will be systematically closed down as seasonal conditions and destocking determine. Open wells and bores will be secured so they are safe and not accessible to stock and wildlife.
- The dams closest to the southern boundary will be de-commissioned (by closing inlets) and allowed to dry out to discourage neighbouring stock from entering the area. Other dams will be monitored and closed if attracting feral animals and stock.
- Windmills and infrastructure (CALM's and those privately owned), other than those at the homestead, will be sold and removed within 12 months.

3. MANAGEMENT FOR PARKS AND VISITOR SERVICES

3.1 Access, Roading and Basic Raw Materials

(same for both LG and E)

Public access through the lease is currently limited to the N-S Wiluna-Granite Peak Road through the centre of the area and the E-W access road to the homestead.

There is a network of boundary and internal station tracks (more than 520 km) in various states of repair, with some overgrown.

Shire gravel borrow pits occur adjacent to the Wiluna-Granite Peak Road and the Sydney Head Road which passes within view of the Earaheedy Homestead. Some of the borrow pits, particularly at the Sydney Head Pass require rehabilitation for landscape and erosion management.

Action

- Review PVS program opportunities, demands and needs. Develop an access and site management plan for the reserve and Lorna Glen homestead as demand dictates.
- Establish strategic direction and orientation signs throughout the lease in areas accessed by visitors.
- Advise visitors of hazards through signage or brochures. Liase with commercial tour operators and issue licences.
- Investigate, in conjunction with the Shire of Wiluna, the possibility and cost of re-aligning Sydney Head Road away from Earaheedy homestead.
- Liase with the Shire of Wiluna to ensure current and future borrow pits are operated in accordance with DEC Basic Raw Material Guidelines and rehabilitated to current standards. Rehabilitate the Sydney Heads Pass borrow pits.
- Maintain a strategic network of roads for management, fire control and visitor access. This will involve some grading, realignment, clearing of overgrown vegetation and possible minor new construction
- Erect boundary and management signs at entry points to the station and the homestead.

3.2 Infrastructure and Facilities

Lorna Glen
Infrastructure has been established for management of the area as pastoral leases including buildings (homesteads and shearers' quarters), sheds, shearing shed, fences, yards, roads, water points, a rubbish tip and airstrips. There is asbestos in an abandoned house that requires removal and proper disposal. A review of infrastructure and buildings for hazards (asbestos, electrical wiring, etc) is required.

The Lorna Glen homestead complex has good quality facilities and buildings including the 2 homesteads, Shearers' quarters, shearing shed and associated sheds, outbuildings, yards, fences and water supply. The homestead buildings require some maintenance and the Shearers' quarters are in need of major maintenance and review. The water supply requires rationalising and review. There is evidence of considerable termite activity that will need regular treatment.

For ongoing management and protection of the reserve some infrastructure will be required including possible 'caretaker' accommodation at the Lorna Glen homestead, “field study centre” accommodation for visiting staff and for biological survey projects, airstrips, roads and tracks and some internal management fences and boundary fencing.

A Telstra DCS tower is located on a breakaway off the main road north or the turnoff to the homestead. The access track to the tower is eroded.

Earaheedy
Assess the safety and risk factors, value, practicality and cost/benefit of maintaining the homestead buildings. Remove or retain and maintain infrastructure such as buildings following this assessment.

Maintain the airstrip located near the Lorna Glen homestead.
Rationalise, bury existing rubbish and re establish the rubbish tip as a managed site.
Assess the status of asbestos in the abandoned house and arrange removal and proper disposal.
Liaise with Telstra about ongoing access and management of the DCS tower and track.

Infrastructure has been established for management of the area as a pastoral lease. Existing facilities include the station homestead buildings (homestead and shearers quarters), sheds, shearing shed, fences, yards, roads, water points, a rubbish tip and airstrips. For ongoing management and protection of the reserve some infrastructure will be required including accommodation at the homestead “field study centre”, airstrips, roads and tracks and some internal management fences and boundary fencing.

Action LG
- Conduct a visitor risk, health and safety issues analysis.
- Maintain essential homestead facilities and infrastructure for a possible caretaker and the field study centre accommodation (homesteads) at the Lorna Glen homestead complex.
- Maintain (bore and rainwater), rationalise and review the homestead water supply infrastructure.
- Treat the homestead for termites and assess damage and management options at the shearers' quarters and other buildings.
- Clean up the homestead complex as required once removal of equipment occurs, subject to negotiated ongoing caretaker occupancy terms.

Action E

- Assess the safety and risk factors, value, practicality and cost/benefit of maintaining the homestead buildings. Remove or retain and maintain infrastructure such as buildings following this assessment with a view to maintaining a basic level of shelter and accommodation for staff and visitors visiting the reserve.
- Maintain a water supply (bore and rainwater) to the homestead complex.
- Maintain the two airstrips located near the homestead.
- Rationalise, bury existing rubbish and re establish the rubbish tip as a managed site.

EARAHEEDY TOURISM AND VISITOR

Earaheedy will continue to receive many visitors, both private and commercial, particularly travellers entering or leaving the Canning Stock Route via Glenayle or Granite Peak. Sydney Head Pass, where the Sydney Head Road cuts through the Mudan Hills, is the focus for recreation by travellers. The Sydney Heads Pass is an attractive site with some camping occurring adjacent to the creek and pass. A ‘lookout” has been constructed by dozing a track up the ridge, this requires management, redesign realignment and signposting.

There is also the possibility of 4WD convoy tours being run from Granite Peak especially to the Sydney Heads Pass and “lookout”. No location or direction signs exist on the lease other than on the main road, there are safety issues associated with this.

The extent and type of visitor use of the area requires assessing and management.

Action E

- Conduct a visitor risk analysis.
- Assess the need to maintain, upgrade, close or rehabilitate access roads and tracks.
- Develop a site management plan for Sydney Head Pass as demand dictates. Manage, redesign and realign the “lookout” access.
- Establish strategic direction and orientation signs throughout the lease in areas accessed by visitors.
- Advise visitors of hazards through signage or brochures. Liase with commercial tour operators and issue licences.

3.3 Information and Interpretation

A well-informed and supportive public can greatly assist DEC with the management of remote areas such as Lorna Glen. Information and interpretative display boards at key recreation, historical and cultural locations provide an important avenue for communicating with visitors. Staff contact on site is also an effective means of communicating information. The remoteness of Lorna Glen and Earaheedy restricts regular DEC staff visits. The appointment of a 'caretaker' at Lorna Glen and Honorary DEC Officers may provide opportunities for the transfer of information and assist with management activities.

Action LG & E

- Identify key locations for the provision of suitable interpretative material.
- Prepare information about the reserve for distribution on site, regionally and through the Wiluna Shire office.
- Provide interpretative displays in accordance with existing standards.
- Develop a 'caretaker' role for Lorna Glen and liase with neighbouring land managers about assistance and HCO roles for both Lorna Glen and Earaheedy.

RESEARCH AND MONITORING

4.1 Nature Conservation

Effective conservation management requires adequate knowledge of flora, fauna and natural processes within the landscape, including baseline condition and changes associated with management, natural events and climate. Survey, research and monitoring provided long term information on trends.

Earaheedy

Effective conservation management requires adequate knowledge of flora, fauna and natural processes within the landscape, including baseline condition and changes associated with management, natural events and climate. Survey, research and monitoring provides long term information on trends.

Action LG

- Feral animal and weed populations will be monitored and controlled through appropriate management.
- Monitoring of recovery and succession trends following removal of grazing pressure, particularly around former artificial water points. This will be achieved by reviewing and where required maintaining the existing series of pastoralists rangeland monitoring sites and WARMS sites established by Agriculture WA and establishing a new series of sites.
- Identify and monitor degraded areas to prevent further degrade and damage.
- Detailed flora and fauna surveys (biological survey) are required for Earaheedy to document baseline condition, locate threatened or priority species of flora and fauna and document vegetation associations including any unique assemblages.
- Several exclusion plots established by Ross Quartermaine in the Leeuwin land system on Earaheedy require assessment of functionality and suitability for ongoing monitoring.
- Degraded areas in the Leeuwin land system require the identification and protection (fencing if needed) of potential seed banks for regeneration purposes.
- Earaheedy and Lorna Glen require monitoring for the presence and impact of stray cattle.

4.2 Social

Lorna Glen

Visitor numbers to the area are expected to increase once the area is gazetted as a CALM Reserve.

To assist in the development of interpretative information and other facilities, regional staff will need to gather information about the number of visitors, their expectations and reasons for travelling in this area. Visitor surveys will provide information about patterns of use and the need for the provision of facilities and information.

Earaheedy
Visitor numbers to the area are expected to increase as a result of the seasonal non-availability of access to the Canning Stock Route south of Well 5 and once the area is gazetted as a CALM Reserve.

To assist in the development of interpretative information and other facilities, regional staff will need to gather information about the number of visitors, their expectations and reasons for travelling in this area. Visitor surveys will provide information about patterns of use and the need for the provision of facilities and information.

Action
- Conduct appropriate visitor surveys as required for Lorna Glen and Earaheedy.
- Monitor visitor impacts to Lorna Glen and Earaheedy.
- Install a vehicle counter (VISTAT) at the homestead access gate and liase with the Wiluna Shire about vehicle usage levels on the main road. (FOR LORNA GLEN OR EARAHEEDY??)

IMPLEMENTATION AND WORKS PROGRAM

The implementation of these guidelines will be undertaken within the annual works program developed by Goldfields regional staff. Implementation activities will also be subject to broader regional priorities and will depend on the availability of staff and other resources.

These guidelines may be amended as new information becomes available or major development (such as mining activities) occurs.

Activities that will be conducted over the next few years, and costs are identified in the Operations Plan (Appendix 6).

“High Priority” activities are programmed for completion in 2007/2008 and 2008/2009

“Medium Priority” activities are programmed for completion in 2009/2010

“Low Priority” activities are programmed for completion as resources permit

REFERENCES.

Beard J (1974a) *Vegetation Survey of Western Australia. Great Victoria Desert. 1: 1 000 000 Vegetation Series*. UWA Press.

Beard J (1974b) *Vegetation Survey of Western Australia. Murchison. 1: 1 000 000 Vegetation Series*. UWA Press.

Blood D (1998) *Range Condition Report. Lorna Glen Station*. Pastoral Lands Board of Western Australia.

Burrows N., Algar D., Barton B., Cowan M., Liddelow G., Ward B., Orell P., Morris K. and Asher J. (2005). *Expanded introduced predator baiting program into the Rangelands of WA. A Project for 2005/2006*. CALM unpublished.

CALM Department of Conservation and Land Management (2003*). Fire Management Plan Lorna Glen and neighbouring Unallocated Crown Land.*

CALM Department of Conservation and Land Management (2005). *Goldfields Magazine*.

Hopkins, A. (2000). *Report on an acquisition proposal: Lorna Glen pastoral lease north-east of Meekathara*. Department of Conservation and Land Management Internal Report.

Mabbut *et al* (1963) *Lands of the Wiluna-Meekatharra Area, Western Australia*. CSIRO.

McKenzie N Burbidge A and Baynes A (undated) Unpublished addendum to Stahan (1995).

Storr G, Smith L and Johnstone R a (1981) *Lizards of Western Australia I Skinks*. UWA Press/WA Museum.

Storr G, Smith L and Johnstone R b (1983) *Lizards of Western Australia II Dragons*. WA Museum.

Storr G, Smith L and Johnstone R c (1990) *Lizards of Western Australia III Geckoes*. WA Museum.

Storr G, Smith L and Johnstone R d (1986) *Snakes of Western Australia*. WA Museum.

Strahan (1995) *The Mammals of Australia*. Reed Books.

Stuart-Street, A. and Kirkpatrick, B. (1994). *Reading the remote- Landscape characters of Western Australia*. Department of Conservation and Land Management, Perth

Table 1 Implementation and Works Program

ACTION	PRIORITY H, M, L	COMPLETION DATE	COMMENTS
2.1 Geology and Landforms			
Provide interpretative material on the geology, landforms and soils of both the areas as warranted.			
2.2 Vegetation Associations, Flora and Land Systems			
Detailed flora and vegetation associations surveys and mapping are required for both Stations.			
Conduct surveys on both Lorna Glen and Earaheedy for the presence of threatened and priority flora, or geographically restricted species and determine appropriate management.			
2.3 Introduced Plant Species			
Ongoing control of doublegees, ruby dock, buffel and other weeds. Ongoing survey and monitoring around previous artificial water points for the occurrence of other weeds is required.			
2.4 Native Fauna			
Continue the fauna monitoring at Lorna Glen for the next 5 years with a preference for biannual surveys.			
Conduct a detailed biological survey of Earaheedy.			
2.5 Introduced Animals			
Continue contributing to the Regional dog/ feral predator control program including aerial baiting.			
Monitor introduced animal populations and initiate control programs as appropriate.			
Monitor stock activity and natural waters adjacent to the Lorna Glen and Earaheedy boundaries and subsequent re-entry by neighbouring stock. Assess their impact, and develop control measures in conjunction with neighbours if necessary. These measures will almost certainly involve the fencing off of natural waters on Lorna Glen and Earaheedy and possibly joint maintenance or upgrading of common boundary fences.			

HAS THIS LAST BIT ALREADY BEEN DONE?			
Systematically decommission all artificial water points, to deny supplies to introduced animals and to restore the natural balance of native fauna. Undertake this work when animal populations are naturally dispersed as sudden denial of water from artificial sources is undesirable. Initiate a monitoring program to assess the effect of this. I AM GUESSING THAT THIS HAS BEEN DONE FOR BOTH STATIONS			
Discourage domestic animals from Lorna Glen and Earaheedy.			
2.6 Aboriginal Heritage			
Continue working with the Wiluna Native Title Claimants through the Working Group to promote and further joint management of Lorna Glen and Earaheedy.			
Accommodate and protect sites, cultural values and interests during the planning and management of Lorna Glen and Earaheedy.			
2.7 European History			
Document, maintain and protect the heritage of Lorna Glen.			
Research, document and provide historical information at the Lorna Glen and Earaheedy homesteads for visitors.			
Maintain essential field study centre infrastructure at the homestead complex at Earaheedy. SHOULD THIS BE LG?			
2.8 Landscape			
Ensure all development proposals are managed to minimise impact on the landscape, in accordance with DEC's Visual Resource Management guidelines (Policy Statement No. 34).			
2.9 Mining			
Any future mining tenements will be granted in accordance with conditions agreed to between DEC and the Department of Industry ad Resources (DOIR). Prior to any ground disturbing activity a detailed program will be prepared by the proponent and referred to DEC. This program will also address rehabilitation requirements.			
Map and inspect all exploration activity and liaise with tenement holders.			
2.10 Erosion and Rehabilitation			
Carry out erosion control and rehabilitation work (bunding, fill and closure) along approx 10km of eroded tracks as outlined on the firebreak, access and rehabilitation plan. Assess all tracks and complete work on a priority basis.			

Earaheedy Carry out approximately 10km of erosion control work (bunding, realignment and fill) on eroded tracks in the Leeuwin range type. Assess all tracks and complete work on a priority basis.			
2.11 Fire			
Continue to implement the Fire Management Plan for Lorna Glen.			
Use historical data and survey to map fire history, impacts and prescribed burning needs for Earaheedy. Interpret, through biological survey and mapping vegetation associations, the fire susceptible areas requiring management and protection.			
Grade strategic access tracks and firebreaks on Lorna Glen and Earaheedy as required.			
2.12 Land Tenure, Boundary and Internal Fences			
Remove internal fencing on Lorna Glen and Earaheedyon a priority basis especially sections of internal fences which cross-creeks or impact on access, landscape and tourism management.			
Commence the process of changing the tenure of Lorna Glen and Earaheedy to a DEC managed conservation reserve under relevant legislation including a review of unallocated Crown land adjacent to Earaheedy with a view to incorporation into the reserves.			
For Lorna Glen and Earaheedy monitor entry by neighbouring stock, assess their impact, and develop control measures by fencing where necessary, in conjunction with neighbours.			
Once reserve vesting is finalised, undertake statutory management planning for Lorna Glen and Earaheedy.			
Establish a boundary track, in liaison with neighbours, where required, to demarcate the reserve and facilitate fence, fire and stock management.			
2.13 Artificial Waters			
Lorna Glen Existing mills, other than the mill at the Lorna Glen homestead (subject to negotiated ongoing caretaking needs) and those listed above will be systematically closed down as seasonal conditions and destocking determine. Open wells and bores will be secured so they are safe and not accessible to stock and wildlife.			
Windmills and infrastructure (privately owned), other than those at the homestead and listed above will be sold and removed by the former owners following destocking. Anticipated to be after December 2001.			
Negotiate with neighbours about waters adjacent to the boundary and management of			

impacts of grazing into Lorna Glen and fencing.			
Earaheedy Existing mills (other than the 2 mills and bore at the homestead) will be systematically closed down as seasonal conditions and destocking determine. Open wells and bores will be secured so they are safe and not accessible to stock and wildlife.			
The dams closest to the southern boundary will be de-commissioned (by closing inlets) and allowed to dry out to discourage neighbouring stock from entering the area. Other dams will be monitored and closed if attracting feral animals and stock.			
Windmills and infrastructure (CALM's and those privately owned), other than those at the homestead, will be sold and removed within 12 months.			
3.1 Access, Roading and Basic Raw Materials			
Review PVS program opportunities, demands and needs. Develop an access and site management plan for the reserve and Lorna Glen homestead as demand dictates.			
Establish strategic direction and orientation signs throughout the lease in areas accessed by visitors.			
Advise visitors of hazards through signage or brochures. Liase with commercial tour operators and issue licences.			
Investigate, in conjunction with the Shire of Wiluna, the possibility and cost of re-aligning Sydney Head Road away from Earaheedy homestead.			
Liase with the Shire of Wiluna to ensure current and future borrow pits are operated in accordance with DEC Basic Raw Material Guidelines and rehabilitated to current standards. Rehabilitate the Sydney Heads Pass borrow pits.			
Maintain a strategic network of roads for management, fire control and visitor access. This will involve some grading, realignment, clearing of overgrown vegetation and possible minor new construction.			
Erect boundary and management signs at entry points to the station and the homestead.			
3.2			