Main Roads Western Australia

Gibb River Road Preliminary Environmental Impact Assessments

Galvan's Gorge section SLK 280-287
Russ Creek section SLK 413-446

Home Valley section SLK 573-613

Report

April 2005

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1. Summary of Statutory Approvals Required

No statutory approvals will be required for the upgrades to the three sections of the Gibb River Road. However, further permits may be required for water extraction in creeks or for extra pumping at existing bores.

2. Introduction

GHD Pty Ltd (GHD) were commissioned by Main Roads Western Australia (MRWA) to prepare a Preliminary Environmental Impact Assessment (PEIA) for three locations along the Gibb River Road in the Kimberley programmed for improvement works between 2005 and 2007. The work programmed for 2005 is the Galvan's Gorge section (SLK 280 – 287), which is between the Mount Barnet and Imintji communities. The Russ Creek section (SLK 413 – 446) is programmed for 2006, and the Home Valley section (SLK 573 – 613) for 2007.

The PEIA has been prepared in line with the MRWA brief for the project and describes the approvals process.The report will also provide the basis for discussion with the Environmental Protection Authority (EPA) regarding the need to refer the proposal for statutory approval.

2.1 Background

The Gibb River Road is a predominantly gravel road that was originally built to provide road access to remote Kimberley stations. It runs approximately 650 km between Derby and intersects with the Great Northern Highway between Wyndham and Kununurra. It also serves as the access point for vehicles travelling to Kalumburu on the Kalumburu Rd (local government maintained).

The Gibb River Road is the main link for these remote stations to receive fuel and supplies, and export live cattle. However of late the road has developed into one of the Kimberley's premier wilderness tourist attractions. Recent figures show that during the wet seasons the average daily traffic (ADT) is approximately 40 vehicles per day (both directions) at the two ends, but with far fewer towards the middle. However, the dry season ADT increases to around 140 vehicles per day, with approximately 95% being light vehicles, some with caravans and trailers.

The gravel road has a derestricted speed zone. Flooding can cause washouts and other road hazards on parts of the road.

MRWA's ongoing improvement plan has identified sections of the Gibb River Road that require improvement, as described above and indicated below in Figure 1.

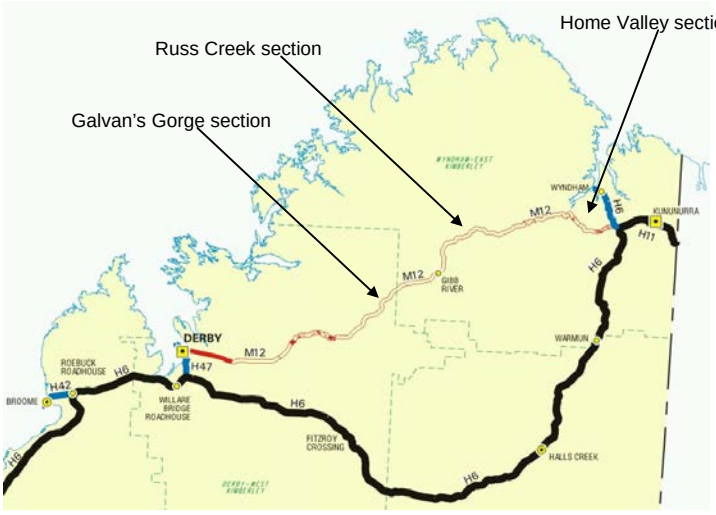

Figure 1 Overview of the sections to be upgraded

2.2 Scope

MRWA's brief required that

"The consultant will undertake a broad environmental impact assessment for each of the proposed projects, and each shall include the following items:

- conduct an initial site assessment to determine the key environmental aspects for the three road proposals;
- undertake a vegetation assessment (based on community type and condition);
- assess all environmental aspects likely to require referral of the project to the EPA (of Main Roads environmental guideline Environmental Assessment and Approval) and advise whether the project should be referred;
- assess all matters of National Environmental Significance likely to require referral of the project to Environment Australia (Main Roads environmental guideline Environmental Assessment and Approval) and advise whether the project should be referred;
- consult with relevant government agencies as required;
- determine (but do not apply for) clearances required under other legislative provisions, including (but not limited to) those required under the following Acts:
  - Conservation and Land Management Act 1984;

– Wildlife Conservation Act 1950;
– Environmental Protection Act 1986;
– Heritage of Western Australia Act 1990;
– Aboriginal Heritage Act 1972; and
– Environmental Protection and Biodiversity Conservation Act 1999.

and provide a concise report on the findings".

Before making a recommendation about the need to refer the proposal to the EPA, GHD carried out desktop investigations, discussed the proposal with staff from the Department of Conservation and Land Management (CALM) and also the Department of Environment (DoE), as well as carrying out field surveys during the week of April 11th 2005. During this process, it became apparent that the *Rights in Water and Irrigation Act 1914* should also have been included in this list of legislation.

2.3 Desktop Investigation

The MRWA brief required that "The consultant will consider all aspects relevant to the proposed project. This is to include, but is not limited to:

- Air quality;
- Dust;
- Fauna;
- Vegetation - threatened species and communities;
- Vegetation - clearing;
- Vegetation – dieback, other diseases and weeds;
- European cultural heritage;
- Aboriginal heritage;
- Surface waters / drainage (watercourses, erosion, stormwater disposal, water quality);
- Groundwater;
- Wetlands;
- Noise and vibration;
- Visual amenity;
- Public safety and risk (industrial plant, gas pipeline, unexploded ordinance);
- Contaminated sites;
- Reserves and conservation areas; and
- Other project-specific aspects not covered elsewhere in this list. Examples include environmentally significant landforms, coastal and mangrove areas."

2.4 Consultation and liaison

The MRWA brief required that "The consultant will liaise with government regulatory authorities as required to obtain the information required to undertake the study and will consult with the EPA to determine the likely need to refer this proposal. If required the consultant will assist Main Roads with obtaining advice under Section 16 of the Environmental Protection Act 1986".

The brief stated that no public consultation was to be undertaken by the consultant.

2.5 Report

The MRWA brief also stipulated that "The Preliminary EIA report will contain the following text components:

1. Summary of statutory approvals likely to be required;
2. Introduction, including background and scope of the report;
3. Brief description of the proposal;
4. Environmental aspects. Identification of key environmental aspects and desktop assessment of potential impacts under each of the following categories. (This section should include a description of the existing environment):
5. Area of assessment;
6. Method of evaluation;
7. Extent of potential impact;
8. Relevant standards / regulations / policies; and
9. Further specific environmental investigations likely to be needed.
10. Approvals required;
11. Agencies / organisations consulted and outcomes;
12. Other information; and
13. References."

3. Description of the Proposal

Main Roads has programmed improvement works for three locations along the Gibb River Road in the Kimberley between 2005 and 2007. These locations are referred to as the Galvan's Gorge (scheduled for 2005), Russ Creek (for 2006), and Home Valley (for 2007) sections.

3.1 Galvan's Gorge section

The scope of works for this section involves gravel re-sheeting and drainage improvements to the section SLK280-284.5. The works are limited to the road reserve, and will generally not extend beyond the existing roadway by more than 5m either side, except for offshoot drains which may extend up to 50m. It is expected that two floodways in this section shall be cement stabilised.

The section SLK284.5-286 is the jump-up itself. At this location, major cut-to-fill earthworks shall be used to smooth the road profile. This will involve substantial widening of the embankment and sealing of the section.

A camp will be established in previously cleared gravel pit areas.

The section SLK286-287 will be re-sheeted as per the first section, with one floodway to be stabilised.

Materials have been pushed up previously. Surface water is to be drawn from creeks at SLK269 and SLK299, approval for which has already been requested.

3.2 Russ Creek section

The scope of works for this section involves forming up, re-sheeting and drainage improvements to the section SLK413.5-446.3. There are approximately 15 floodways to be stabilised, with 2 major floodways at SLK417 and SLK429 requiring culverts. Three small jump-ups in the section may be sealed. The works area is limited to the road reserve, and will generally not extend beyond the existing roadway by more than 5m either side, except for offshoot drains which may extend up to 50m and the proposed re-alignment of 200-300m in length, commencing at around 413.5SLK.

A camp will be established in a location yet to be determined.

Materials have been pushed up previously. Water is to be drawn from a bore at SLK 434.3, and if necessary from other creeks as required.

3.3 Home Valley section

The works for this section involves forming up, re-sheeting and drainage improvements to the section SLK573-613. There is a major crossing at the Pentecost River, but no work is planned for it. The remainder of the works are yet to be scoped.

4. Legal and Other Requirements

Legal and other requirements, which may be relevant to the upgrades along the Gibb River Road, have been determined and are summarised in Table 1. The environmental aspects are detailed in Section 5, and will be used to further determine the relevance of these legal and other requirements.

Table 1 Legal and other requirements that may be relevant to the project

Legislation	Application	Relevant Department
Environmental Protection Act, 1986.	Approval for the project.	Department of Environment.
Environmental Protection and Biodiversity Conservation Act 1999.	Rare flora and fauna protection. Pollution prevention licences.	Department of Environment and Heritage.
Rights in Water and Irrigation Act 1914	Construction of new bores, dams or drawing of surface water. Disturbance to banks and bed of natural waterways	Department of Environment.
Wildlife Conservation Act 1950.	Rare flora and fauna protection.	Department of Conservation and Land Management.
Conservation and Land Management Act 1984.	Management of flora and fauna and reserves.	Department of Conservation and Land Management.
Environmental Protection (Clearing of Native Vegetation) Regulations, 2004.	Permit to clear native vegetation (where not exempted).	Department of Environment.
Bush Fires Act 1954.	Management of fire safety.	Fire and Emergency Services.
Aboriginal Heritage Act, 1972.	Management of impacts to Aboriginal Heritage sites.	Department of Indigenous Affairs.
Native Title Act, 1993.	Rights of Aboriginal claimants to consult on projects on public land.	National Native Title Tribunal.
Australian Heritage Commission Act 1975.	Lists areas of national heritage significance.	Australian Heritage Commission.

Legislation	Application	Relevant Department
Agriculture and Related Resources Protection Act 1976	Weed control.	Department of Agriculture.
Explosives and Dangerous Goods Act 1961.	Regulates the use of explosives and other dangerous goods.	Department of Industry and Resources.
Environmental Protection (Noise) Regulations, 1997.	Control of noise pollution.	Department of Environment.
Section 6 of the Australian Standard 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites.	Control of construction noise.	Department of Industry and Resources.
SPP No. 2: Environment and Natural Resources Policy (June 2003).	Integration of environment and natural resources with land-use planning.	Western Australian Planning Commission.
Prevention of Air Quality Impacts from Land Development Sites (EPA Guidance Note No. 18, 2000)	Guides the control of air pollution from development sites.	Department of Environment.

5. Environmental Aspects

Environmental Aspects at the upgrade sites (road sections) have been assessed through desktop study and a field survey conducted from west to east over three consecutive days in April 2005 (11th to 13th April), with one section surveyed each day. This survey recorded broad soil types, landscape features and vegetation types within each of the three sections. A search for priority flora was also conducted as part of the field survey. Discussion on the environmental aspects pertaining to the sections is provided below.

5.1 Climate

The Kimberley region has a tropical climate with two main seasons referred to as the 'wet' and the 'dry'. May to October is the Kimberley's dry season, typified by warm sunny days and cooler nights. Hot to very hot and humid conditions characterise the wet season, which extends over the months of November to April. The region receives around 90% of its rainfall during this season mainly from thunderstorms, monsoonal rain and occasionally, tropical cyclones. Mean annual rainfall is highly variable with 1400 mm in the high rainfall areas in the north-west grading to 400 mm in the southerly inland areas. The Gibb River Road extends through regions that receive an average annual rainfall of between 600 mm and 800 mm (Bureau of Meteorology, 2005).

5.2 Landuse

Much of the Kimberley Region is occupied by pastoral lease land used for extensive cattle grazing. The reminder of the region is occupied either by Aboriginal reserves, mining leases, national parks, conservation reserves, nature reserves, private nature reserves, military reserves and vacant crown land. The Ord River Irrigation Scheme near Kununurra feeds an area of intensive agriculture.

All three sections of proposed works traverse either unallocated crown land (at Galvan's Gorge only), stock routes (on occasion) or for the most part, pastoral lease holding. The pastoral leases involved are indicated in Table 2. MRWA has advised that all proposed roadworks will be contained within the Gibb River Road Reserve.

Table 2 Pastoral leases adjacent to the upgrade sites.

Section	Pastoral Lease Holding	Homestead present	Primary use
Galvan's Gorge	Mt Barnett	Yes	Pastoral Lease (Roadhouse at Mt Barnett)
Russ Creek	Gibb River, Pentecost Downs, Ellenbrae	Yes	Pastoral Lease, overnight tourist accommodation (in case of Ellenbrae)

Section	Pastoral Lease Holding	Homestead present	Primary use
Home Valley	Home Valley	Yes	Pastoral Lease, overnight tourist accommodation
	El Questro	Yes	Pastoral lease, tourism

Stock route and communication reserves are encountered in the Home Valley section as summarised in Table 3 and shown in Appendix 4.

Table 3 Stock route and communications reserves in Home Valley Section

Class & Reserve #	Purpose	Land Use	Vesting	Area (Ha)
C/22256	Stock Route	Stock Route	Shire of Wyndham-East Kimberley	251.4
C/40701	Repeater Station Site	Communications	Australian Telecommunications Commission	0.36
C/17421	Stock Route	Stock Route	XXX	?

5.3 Topography and Soils

In broad terms, soils range from shallow lithosols on ridges, to deeper colluvial and alluvial profiles overlying bedrock on lower slopes and adjacent to drainage features. Rocky sandstone ridges are prevalent throughout. Along much of the Home Valley section, the road skirts the footslopes of the Cockburn Range and coincides roughly with the boundary between the floodplain of the Pentecost and King Rivers or their tributaries, with shallow soils and sheet rock on the upslope side. Broad plateaus of varying extent are often encountered, of varying length, where drainage is obviously imperfect to poor, with *Melaleuca* species becoming more common and the *Eucalypt* and *Corymbia* overstorey becoming either much more sparse or in places, being absent.

McArthur *et al*. (1967) describes the soils likely to be encountered as follows

- Galvan's Gorge: JK 14, BA 6
- Russ Creek area is dominated by BA 6, with pockets of JK 14 and Ui 2.
- Home Valley area near Pentecost River is defined as Jw 1 – clayey soils with minimal development. The remainder of the area is defined as BA 6 - coherent sands shallow variation.

JK 14 = Gently undulating country, developed on sandstone with widely spaced steep sided residuals: chief soils are sandy soils sometimes with much ferruginous gravel. Associated are shallow stony calcareous soils with much rock outcrop on interfluves

deeper sands on foot slopes and gravely hard yellow mottled soils on plateau tops where drainage is restricted.

BA 6 = Rugged stony country – ridges, cuestas and plateaux with some sloping or low hilly dissected areas on sandstone, quartzite, shale and some limestone; many rock outcrops: chief soils are shallow sandy, often stony soils. Valley plains are narrow and of limited extent.

Ui 2 = Gently undulating country – developed on shales and sandstone, with a few widely spaced steep-sided residuals: chief soils are neutral hard yellow mottled soils with associated areas of yellow clayey subsoils with sandy surface soils. Shallow stony sandy soils flank the sandstone – capped scarps on which there is much rock outcrop. Sandy detritus borders streams.

Jw1 = Firm grey clays = low lying coastal plains with some sand dunes: chief soil are saline clay on the flat to very gently sloping plains. Associated are clay soils along the inland margin of the plains; areas of saline muds on slopes to flats submerged at high tide; and very small areas of calcareous sands and to siliceous sands on coastal dunes.

5.4 Hydrology

5.4.1 Drainage

The Kimberley Region contains some very large, mainly unutilised, fresh surface water resources. The Gibb River Road crosses many natural waterways, the majority of which are ephemeral. MRWA proposes to stabilise the formation through a number of floodways with cement and or rockwork, supplemented by cut-off drains on approaches where required. Three floodways have been identified as requiring stabilisation in the Galvan's Gorge section. In the Russ Creek section, there are fifteen floodways earmarked for stabilisation, and culverts are proposed for two major floodways, including Russ Creek itself, designed and set at an appropriate level to avoid creation of dams. Both of these convey flows into the early dry season. The Home Valley section is notable for the numerous floodways draining the Cockburn Ranges, the permanent waterbody at Fish Hole located quite close to the road and the permanently submerged shallow crossing of the Pentecost River. No work is proposed for the latter and MRWA is otherwise yet to determine what works will be required on the many floodways, many of which were scoured during the recent heavy rains associated with Cyclone Ingrid.

Water for the construction work is to be drawn from creeks at SLK 269 and SLK 299, and approval has already been requested (Main Roads brief). Any use of water from other creeks will be subject to permits from the Department of Environment (see Section 7.1).

5.4.2 Wetlands

Other than some linear waterways, some with pools and some which were still flowing, no inundated wetlands were observed, although dry depressions of varying extent,

containing *Melaleuca,* occurred in places, most often alongside the road. These are likely to have developed as a result of borrow for the road and increased runoff from the road.

5.4.3 Groundwater

The Kimberley region contains very large, mainly unutilised, fresh groundwater resources. Station lessees draw water from various bores for domestic and stock use purposes.

Construction water is to be drawn from a bore at SLK 434.3. If pumping capacity at existing bores is to be increased, a permit from the DoE will be required (see Section 7.1).

5.5 Reserves and Conservation Areas

The proposed works do not occur within, or adjacent to, any gazetted conservation reserves.

5.6 Vegetation and Flora

5.6.1 Vegetation Communities

The vegetation types present along the roadside within each of the three sections were recorded during the field survey in April 2005. Woodland, dominated by *Eucalyptus*, *Corymbia* (bloodwoods) and *Terminalia* species, and swamps with *Melaleuca* species were the most common vegetation type observed. *Acacia* and *Sorghum* species were also common, and dominant in disturbed roadside areas.

Galvan's Gorge (SLK 280 to SLK 287)

The sandstone lithosols of the Philips Range (SLK 280 to SLK 285.1) supports woodland dominated by *Corymbia collina* (Silver-leaf Bloodwood), with an understorey dominated by Spinifex (*Triodia* sp), and the perennial grasses *Sorghum stipodeum* (Sand-soil Canegrass) and *Eriachne obtusa* (Northern Wandarrie Grass). Other common species include *Bossiaea bossiaeoides* (Bossiaea), *Grevillea heliosperma* (Rock Grevillea), *Grevillea agrifolia* (Blue Grevillea), *Terminalia hadleyana* subsp *hadleyana* and *Terminalia canescens* (Bendee). A minor saddle (SLK 281 to SLK 281.3) supports low woodland, with the species *Melaleuca viridifolia* (Broadleaf Paperbark) and *Verticordia verticillata* (Featherflower), probably indicating shallow soils over a localised perched water table.

The descent from Phillips Range, with its rocky soils, begins at SLK 285.1, and while the dominant species remain the same, other taxa, adapted to rocky slopes were observed, and include *Cochlospermum fraseri* (Kapok Tree), *Calytrix exstipulata* (Kimberley Heather), *Acacia adenogonia* and *Acacia delibrata*.

The rocky gully crossing Gibb River Road at the base of the Phillips Range is located at approximately SLK 286. Soils are comprised of colluvium from the adjacent hillslopes, and the understorey is denser because of the waterway. The Boab

(*Adansonia gregorii*) is present, as are *Melaleuca viridifolia* (Broadleaf Paperbark), *Hakea* aff *macrocarpa* and *Calytrix exstipulata* (Kimberley Heather). The understorey becomes less dense with distance from the drainage line.

The colluvial plain that extends east of Phillips Range (SLK 286.6 to Mt Barnett Roadhouse) also supports Eucalypt woodland. The dominant species on deeper soils on the plain are *Eucalyptus tectifica* (Darwin Box) and *Eucalyptus jensenii* (Wandi Ironbark). Other common species include *Dodonaea oxyptera* (Hop Bush), *Gossypium australe* (Wild Cotton), *Grevillea agrifolia* (Blue Grevillea) and *Grevillea pyramidalis* (Caustic Bush). Shallower soils or minor drainage lines are indicated by the presence of occasional *Adansonia gregorii* (Boab) and *Eucalyptus confertiflora* (Rough-leaf Cabbage Gum), and the Melaleuca species *M. viridifolia* (Broadleaf Paperbark) and *M. minutifolia* subsp *minutifolia* (Tea Tree).

Acacia platycarpa (Pindan Wattle) is scattered along the roadside at various locations along the length of the Galvan's Gorge section, and appears to be indicative of disturbance.

Russ Creek (SLK 413 to SLK 446)

The vegetation of the Russ Creek section reflects the soils, topography and drainage of the area. A majority of the section supports Eucalypt woodland on well drained red sandy soils. *Eucalyptus lirata* (Kimberley Yellowjacket) dominates in the upper storey, along with a mixture of other trees, including *Eucalyptus tectifica* (Darwin Box), *Corymbia collina* (Silver leaf Bloodwood), *Eucalyptus miniata* (Woollybutt), *Eucalyptus tetrodonta* (Darwin Stringybark), *Corymbia confertiflora* (Rough-leaf Cabbage Gum) *Eucalyptus jensenii* (Wandi Ironbark), *Owenia vernicosa* (Emu Apple) and *Erythrophleum chlorostachys* (Cooktown Ironwood). Other species found commonly in the understorey are *Grevillea pyramidalis* (Caustic Bush), *Petalostigma quadriloculare* (Quinine Bush), *Calytrix achaeta*, and *Acacia translucens* (Poverty Bush), and *Sorghum stipodeum* (Sand-soil Canegrass) is the most common grass species.

Melaleuca shrubland comprised of *Melaleuca minutifolia* and *M. viridiflora* is found along the roadside in areas where soils were shallow and prone to waterlogging in the wet season.

Low-lying areas and minor drainages on medium fine yellow sands support trees and shrubs over grasses, including *Corymbia grandifolia* (Large-leaf Cabbage Gum), *Corymbia polycarpa* (Long-fruited Bloodwood), and *Eucalyptus apodophylla* subsp *apodophylla* (Whitebark), *Pandanus spiralis* (Screwpine), *Dolichandrone heterophylla* (Lemonwood) and *Bossiaea bossiaeoides* (Bossiaea). The creek crossing at SLK 437.4 also supports a variety of shrub and herb species on the exposed sandy banks on the right hand side. These include species of Grevillea and Acacia, as well as three Trigger Plants (*Stylidium fissilobum*, *S. claytonoides* and *S. ceratophorum*), *Drosera burmanni* (Tropical Sundew) and *Goodenia sepalosa*.

The sharp right turn at SLK 414.2 takes the road up a short incline onto a ridge between two creeklines. Main Roads has advised that the vertical alignment could be improved in this area by cut to fill works on the east. The area proposed for the realignment is a rocky low escarpment composed of exposed sandstone with red fine

sandy soil. A number of herbs and low shrubs are found in this area, and include *Buchnera ramosissima* (Blackrod), *Haemodorum ensifolium*, and *Boronia ?jucunda*. ***B. jucunda*** is a **Priority 1** species, and is discussed further in Section 5.6.4.

The **Priority 3** species, ***Gardenia ?sericea***, was observed on a rocky ridge at SLK 420.5, and is discussed further in Section 5.6.4.

Home Valley (SLK 573 to SLK 613)

In conjunction with the climate, the valley of the Pentecost River and the adjacent Pentecost and Cockburn Ranges have influenced the soils, drainage, and therefore the vegetation in the Home Valley Section. Soils are deeper and sandier closer towards the Pentecost River and its associated drainage features. Deeper soils like this support Woodland comprised of *Corymbia confertiflora* (Rough-leaf Cabbage Gum), *Corymbia dichromophloia* (Variable-leaved Bloodwood), *Eucalyptus obconica* (Kimberley Box), *Corymbia abbreviata* (Scraggy Bloodwood), *Eucalyptus flavescens* (Scraggy Cabbage Gum) and *Terminalia canescens* (Joolal).

Shallow shaley soils are common near the top of ridges, and slopes on both sides of the Pentecost River. The vegetation they support depends on the soil depth, with open Melaleuca woodland on those soils that are shallow and have poor drainage. Common species are *Melaleuca viridiflora* (Broadleaf Paperbark) and *M. minutifolia* (Tea Tree), as well as *Cochlospermum fraseri* (Kapok Tree) and *Bauhinia cunnighamii* (Bauhinia). Exposed rocky surfaces don't support much more than Spinifex, and a few ephemeral herb species.

The many drainage lines and floodways are generally rocky, reflecting flooding and high velocity flows, which have scoured away the sand, leaving only the rocks. On the eastern side of the Pentecost River, the vegetation is not significantly different in these floodways, as the land slopes relatively steeply to the Cockburn Ranges, and the resultant flooding is ephemeral. To the west of the Pentecost River, where the relief is less steep, species commonly found along the drainage lines include *Owenia vernicosa* (Emu Apple), *Barringtonia acutangula* (Freshwater Mangrove), *Eucalyptus camaldulensis* (River Gum), *Pandanus spiralis* (Screwpine), *Ficus opposita* (Sandpaper Fig), *Gyrocarpus americanus* (Helicopter Tree), *Melaleuca leucadendra*, *Corymbia polycarpa* (Long-fruited Bloodwood), *Adansonia gregori* (Boab) and *Corymbia grandifolia* (Large-leaf Cabbage Gum).

The vegetation of the Pentecost River, with its deep sandy soils, is limited to a number of dominant species that are apparently adapted to the saline conditions, tides, and seasonal flooding. These species include *Eucalyptus camaldulensis* (River Gum), *Melaleuca viridiflora* (Broadleaf Paperbark), *Melaleuca leucadendra*, *Barringtonia acutangula* (Freshwater Mangrove), *Acacia stipuligera*, *Acacia latifolia* and *Sesbania cannabina* var *cannabina* (Sesbania Pea).

5.6.2 Threatened Ecological Communities

A review of the Department of Conservation and Land Management's (CALM) list of Threatened Ecological Communities (TECs) was undertaken. Gordon Graham from

CALM's Kununurra Regional Office confirmed that there are no TECs within the study area.

5.6.3 Flora

The flora survey was not comprehensive in that its scope was to identify common taxa in each upgrade section, as well as determine the presence of Declared Rare or Priority species. A list of common taxa adjacent to the three upgrade sections was generated as a result of the survey between 11th and 13th April 2005 and is provided at Appendix B. Forty-one taxa were recorded at Galvan's Gorge, 61 at Russ Creek, and 71 in the Home Valley Section. Weed species were observed during the survey, particularly along the disturbed road margins, and in damp areas, but an exhaustive list of weeds was not generated. Weeds are discussed in Section 5.6.5.

5.6.4 Declared Rare and Priority Flora

A list of Priority flora that could possibly be found within the study areas was generated through a review of CALM's Declared Rare and Priority Flora list for 2005. This was checked against species locations in Florabase, CALM's internet database of Flora in Western Australia. Additional searches on Florabase were also made, and taxa that were located within the general vicinity of the study areas were added to the list. The descriptions of the expected Priority Flora are provided in Appendix B, as are explanations of each Priority rating.

Three Priority Flora were recorded during the field survey in mid-April 2005. Two of these species were found in the Russ Creek section, and one in the Home Valley section (see Flora List at Appendix B):

- *Boronia ?jucunda* (Priority 1) was found on the rocky low scarp at the right hand turn (SLK 414.2). This species has been recorded between Halls Creek and Kununurra, and is found on rocky areas in open Eucalypt woodland. A population of *B. ?jucunda* was present, and flowering, at this location. This population would be impacted by the realignment of the road.
- *Gardenia ?sericea* (Priority 3) was found on a rocky ridge at SLK 420.5. This species is typically found on sandstone. This plant would only be impacted if the works extend beyond the current extent of the roadway at this point.
- *Eucalyptus ordiana* (Priority 2) was found as a population around SLK 611.3 in the Home Valley section. This species has been previously recorded the area, where it grows on skeletal soils over sandstone or quartzite on steep rocky outcrops. One or two of these trees may be impacted if the works extend beyond the current extent of the roadway in this area. Once the scope of the works has been determined, it is recommended that further survey of this area be conducted in order to determine the impacts on this species.

Recent burning (within the last 1-2 dry seasons) was evident along much of the Gibb River Road, with commensurate influences on abundance and growth stage and thus ease of detection of understorey plants and annuals in particular. There is some

potential for other priority flora to be found within the upgrade sections, particularly annuals and perennial herbs.

5.6.5 Weeds and Pest Plants

Weed species were observed during the survey, particularly along the disturbed road margins, and in damp areas, but an exhaustive list of weeds was not generated. The margins of roads are often excellent habitat for weed species as they respond well to disturbance and quickly colonise exposed areas. Runoff from the exposed road surface often pools in depressions adjacent to the road, aiding the growth of weeds. Roads can also act as transport corridors for weeds, with vegetative parts and seeds of weeds "hitching rides" on vehicles. Other pests also can spread into an area in the same way.

The Department of Agriculture's Declared Plants list (2005) records 66 species of weeds that are a threat to agriculture in the West and East Kimberley. The *Draft Kimberley Natural Resource Management Plan* (Rangelands NRM Co-ordinating Group, 2004) identified a number of weeds of significance in the Kimberley. Weeds of National Significance (WONS) are:

- Mesquite - *Prosopis pallida* (Declared Plant);
- Parkinsonia – *Parkinsonia aculeata* (Declared Plant);
- Prickly Acacia - *Acacia nilotica*;
- Rubber Vine – *Cryptostegia grandiflora* and *C. madagascariensis* (Declared Plant); and
- Salvinia – *Salvinia molesta* (Declared Plant).

Other significant weeds in the Kimberley are:

- Belly-ache Bush – *Jatropha gossypifolia* (regionally significant, Declared Plant);
- Noogoora Burr – *Xanthium strumaruim* (regionally significant, Declared Plant);
- Neem - (environmental weed);
- Lead Tree– *Leucaena leucocephala* (environmental weed); and
- Calotrope – *Calotropis procera* (environmental weed)

Weeds are present in all three sections of the Gibb River Road scheduled for upgrade, however, no Weeds of National Significance were recorded. Some Calotrope (a Declared Plant) was recorded along the route. However, due to its existing extent, this weed is excluded from control requirements in the Wyndham-East Kimberley and Derby-West Kimberley Shires. General weeds should be managed to prevent spread.

5.6.6 Plant Diseases

No plant diseases of a spreading nature were observed during the field survey in April 2005.

5.7 Fauna

A search of the Western Australian Museum database identified 74 mammal species, 225 bird species, 161 reptile species, 36 amphibia species and 129 fish species as possibly occurring within the vicinity of the proposed works and which could possibly be affected. These species are listed in Appendix C.

5.7.1 Conservation Significance of Fauna

In Western Australia fauna are protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (*EPBC Act*) 1999 and by the state Western Australian *Wildlife Conservation Act* 1950.

The significance levels for fauna used in the *EPBC Act* are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994). The *WA Wildlife Conservation Act* 1950 uses a set of Schedules (described in Appendix C) but also classifies species using some of the IUCN categories. The Department of Conservation and Land Management (CALM) produces a list of declared threatened fauna in the state. This list includes the declared threatened, vulnerable and critical species as well as a supplementary list of Priority Fauna, which are species that are not considered Threatened under the WA Act but for which the Department feels there is cause for concern. Some Priority species, however, are also assigned to an IUCN category. The CALM list also includes "other specially protected fauna" such as the fauna species protected by international treaties. The classifications used in the CALM list are described in Appendix C.

The *EPBC Act* list of protected species, the *Wildlife Conservation Act* 1950 list of protected species and the CALM list were checked to determine the presence of any specially protected fauna species that may occur in the study area. There are a number of species that may occur in the area of works that are listed as threatened or priority. The status of the fauna of the region has been included in Appendix C.

The species that may occur in the area that are protected under either the *EPBC Act* or the *Wildlife Conservation Act* are:

Birds:

- *Erythrotriorchis radiatus* Red Goshawk; Schedule 1(*Wildlife Conservation Act* / Vulnerable (*EPBC Act*);
- *Geophaps smithii blaauwi* Partridge Pigeon; Schedule 1(*Wildlife Conservation Act* / Vulnerable (*EPBC Act*);
- *Falcunculus frontatus whitei* Crested Shriketit; Schedule 1(*Wildlife Conservation Act* / Vulnerable (*EPBC Act*);
- *Erythrura gouldiae* Gouldian Finch; Schedule 1(*Wildlife Conservation Act* / Endangered (*EPBC Act*);
- *Pezoporus occidentalis* Night Parrot; Schedule 1(*Wildlife Conservation Act* / Endangered (*EPBC Act*);

- *Malurus coronatus coronatus* Purple-crowned Fairy-wren; Vulnerable *(EPBC Act);*
- *Polytelis alexandrae* Princess Parrot; Vulnerable *(EPBC Act);*
- *Tadorna radjah rufitergum* Burdekin Duck; Schedule 4 *(Wildlife Conservation Act)*.

Reptiles:

- *Crocodylus johnstoni* Freshwater Crocodile; Schedule 4 (*Wildlife Conservation Act);*
- *Crocodylus porosus* Saltwater Crocodile; Schedule 4 *(Wildlife Conservation Act).*

Mammals:

- *Rhinonicteris aurantius* Orange Leaf-nosed Bat; Schedule 1*(Wildlife Conservation Act* / Vulnerable (*EPBC Act*);
- *Isoodon auratus auratus* Wintarru, Golden Bandicoot; Schedule 1*(Wildlife Conservation Act* / Vulnerable *(EPBC Act);*
- *Macrotis lagotis* Bilby; Schedule 1(*Wildlife Conservation Act* / Vulnerable (*EPBC Act);*
- *Mesembriomys macrurus* Golden-backed Tree Rat: Vulnerable *(EPBC Act);*

Any potential impacts on these species would require referral to the Department of Environment and Heritage under the *EPBC Act* 1999 or the Environmental Protection Authority under the *Wildlife Conservation Act* 1950. Impacts on these species should be avoided and appear unlikely given the scope and description of the works supplied by MRWA.

5.7.2 Pest Animals

The spread of the Cane Toad into and across the Kimberley is of particular concern. There is a risk that these animals could be brought onto or spread along the Gibb River Road on machinery or in materials. Care will need to be taken when bringing machinery or materials from the Kununurra or Wyndham areas.

5.7.3 Impacts

Given that the project entails the upgrading of an already existing road, except for a short section of proposed re-alignment of 200-300m, the impact on fauna species is expected to be minimal. However,

- The construction of the roadway and movement of machinery could result in injury or mortality to fauna. However, since the amount of clearing required is minimal and because the road traverses large areas of relatively undisturbed native vegetation, fauna will be able to readily move into adjacent areas, further reducing the already low risk of mortality being caused by the works;
- Animals could possibly fall into and become trapped in excavated areas; and
- Culverts, floodways and other drainage features could obstruct fish passage. Careful design and placement will negate any potential adverse impacts.

5.8 Contaminated sites

No sites or areas of potential contamination were identified within the study areas during the field survey.

5.9 Noise and vibration

Noise and vibration will inevitably be generated during the roadworks. However, tourist traffic numbers are low, and occupied homesteads and campsites are a significant distance from the sections where work is to be carried out. Therefore, noise and vibration are not likely to be significant aspects of the upgrades.

5.10 Dust and Air Quality

Dust will inevitably be generated during the roadworks. Dust is already an anticipated feature of travel along the route by virtue of the usual vehicle and stock and freight transport traffic. In addition, tourist traffic numbers are low, and occupied homesteads and campsites are some distance from the sections where work is to be carried out.

5.11 Visual amenity

The Gibb River Road provides several major functions for the Kimberley Region, including servicing the needs of the pastoral, mining and tourism industries and linking aboriginal communities. Each of the three sections contains features that are recognised tourist destinations, and the roadworks may cause some minor temporary adverse impacts on the 'wilderness' experience for some tourists.

5.12 Public safety and risk

The remoteness of the Gibb River Road minimises risks to public safety. Notification through local media at major towns, and the usual route signage and traffic control measures implemented by MRWA will be adequate controls. The works do not interact with or traverse sites housing industrial facilities, water or gas pipelines, or areas likely to contain unexploded ordinance and so on.

5.13 European Heritage

No sites of European Heritage were encountered along the sections of proposed works. This was confirmed through searches of the following databases:

- Australian Heritage Places Inventory;
- Heritage Council of Western Australia – Places Database; and
- Australian Heritage Database.

5.14 Aboriginal Heritage

Aboriginal archaeological and ethnographic desktop studies were undertaken for the sections scheduled for upgrade by Rory O'Connor and Gary Quartermaine respectively. The full reports and recommendations are attached at Appendix D.

5.14.1 Archaeological assessment

Following are the conclusions from the archaeological assessment:

- The potential for archaeological sites in the area of the proposed road works is considered to be low due to the scope of the works and previous disturbance.
- The registered Aboriginal site locations are not definite and care needs to be taken in the vicinity of the sites listed in Table 1 (at Appendix D) to ensure there is no inadvertent disturbance to the sites.
- Unregistered archaeological sites may be located on the margins of watercourses, particularly if water is present, at suitable rock outcrops and in rock shelters. These are most likely to be artefact scatters but other potential site types are burials, quarries, art sites and stone arrangements.
- Based on the results of this investigation, no further archaeological work is warranted, provided the registered Aboriginal sites are not disturbed.

5.14.2 Ethnographic assessment

No aboriginal heritage sites are found within the road reserve, but the following points can be made as a result of the ethnographic survey:

- At Galvan's Gorge, if the major cut-to-fill earthworks associated with improvement of the jump-up itself extend far beyond the existing road, there is a possibility that they may intrude into areas of Aboriginal heritage interest. It is therefore recommended that Main Roads Western Australia notify Mount Barnett and Imintji Aboriginal communities of the proposed works in advance of commencement in order to afford to community elders the opportunity to comment, if they so wish.
- At Russ Creek, a painting site is found close to the road, but it is unlikely to be within the roadway or reserve. Nonetheless, care should be exercised when working in this area to avoid any rock outcrops or overhangs that may contain Aboriginal rock art. Additionally, it is recommended the matter of Aboriginal Heritage should be revisited when a camp location is selected.
- As the scope for the works at Home Valley has not been determined, the following recommendations were made:
  - When proposed works are scoped, the matter of possible Aboriginal heritage interests should be revisited, particularly if proposed works are carried out at a distance from the existing road;
  - If works are proposed in the vicinity of the Pentecost River crossing, it may be necessary to commission a full Aboriginal heritage survey before ground disturbance commences.

6. Approvals Required

6.1 Commonwealth Government

No Threatened Ecological Communities or flora listed under the Commonwealth's *Environmental Protection (Biodiversity) Conservation Act* (1999) have been identified within the project area. Fauna species which could occur in the upgrade areas are listed under the Act, but would only trigger referral if the impacts on the species were considered to be significant. As the habitat being impacted is small relative to the surrounding remnant vegetation, it is considered that the impacts would not be significant. The guidelines on significance, which relate to the *EPBC* Act, mention that significance means loss of a large area of breeding or feeding grounds or a direct loss of a considerable percentage of the population of the species.

No other issues which would trigger referral under the EPBC Act are present in or adjoining the project area.

6.2 Western Australian Government

6.2.1 Conservation and Land Management

No formal approvals are required under the *Wildlife Conservation Act*, 1950.

6.2.2 Department of Environment

Clearing of Native Vegetation

Under the amended *Environmental Protection Act 1986* (*EP Act*) clearing of native vegetation must be under the authority of a clearing permit, unless subject to an exemption.

It is understood that Main Roads have obtained an exemption under the *Environmental Protection (Clearing of Native Vegetation) Regulations,* 2004 until 8 January 2006. This exemption applies to clearing activities that are required for road widening and realignment projects, where the clearing has been completed before 8 January 2006. This exemption covers all clearing activities that are required to deliver the road project such as:

- clearing for the construction footprint;
- clearing to search for road base materials;
- extracting road base materials;
- constructing temporary vehicular tracks;
- construction work camps;
- clearing for stockpile areas; and
- establishing new sightlines.

As the Galvan's Gorge upgrade will take place in mid-2005, it will fall under this exemption.

With regard to the realignment of part of the Russ Creek section, the DoE's Native Vegetation Officer at the North West Region advised that the Russ Creek realignment would be exempt from requiring a permit to clear. The relevant legislation is the:

- *Environmental Protection Act* 1986;
- *Environmental Protection (Clearing of Native Vegetation) Regulations* 2004 - Item 23 b) Schedule 3, Clause d) "*road widening or realignment, or construction of a crossover from a road ....."*
- The exemption only applies as there are no 'Environmentally Sensitive Areas' in the vicinity, which were checked on the DoE's Geographic Informations System (GIS).

The DoE's ten principles of clearing are listed in Table 4. Each of the three sections was evaluated against this table, and while the Galvan's Gorge and Russ Creek sections do not match any of these principles, the Home Valley upgrade may involve clearing in close proximity of the Pentecost River. As this upgrade is only scheduled for 2007, it is recommended that once the scope of works has been determined, the issue of clearing be revisited and discussed with representatives of the DoE.

Table 4 Department of Environment's ten principles of clearing

Clearing Principle
Does the area to be cleared comprise a high level of biological diversity?
Does the area to be cleared comprise the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia?
Does the area to be cleared include, or is necessary for the continued existence of, rare flora?
Does the area to be cleared comprise the whole or a part of, or is necessary for the maintenance of, a threatened ecological community?
Is the area to be cleared significant as a remnant of native vegetation in an area that has been extensively cleared?
Does the area to be cleared within, or in association with, an environment associated with a watercourse or wetland?
Is the clearing of the vegetation likely to cause appreciable land degradation?
Is the clearing of the vegetation likely to have an impact on the environmental values of any adjacent or nearby conservation area?
Is the clearing of the vegetation likely to cause deterioration in the quality of surface or underground water?
Is the clearing of the vegetation likely to cause, or exacerbate, the incidence or intensity of flooding?

7. Stakeholder Consultation

GHD met with representatives of the Department of Conservation and Land Management (CALM) and the Department of Environment (DoE) in Kununurra on 13th April 2005, and the Department for Planning and Infrastructure (DPI) on the15th April 2005. In each case, the proposed works and locations were described, and the MRWA project brief was read by the agency representative. Outcomes from those discussions are summarised in the following sections.

7.1 Department of Environment

- Lisa Mazzella, Environmental Officer, North West Region (9166-4111) advised that
  - MRWA would need to obtain a water allocation licence if it intended to construct a new bore(s), dam(s) or increase pumping capacity at any existing bores (see Section 26d of the *Rights in Water and Irrigation (RIWI) Act* 1914. Further, MRWA would need to obtain a permit to draw water from (new) creeks (see Section 5c of the *RIWI Act*).
  - A permit would be required (also under the *RIWI Act*) for 'disturbance' to natural waterways, other than maintenance of existing structures, which includes grading of natural fords. Installation of culverts, ford stabilisation works and new crossings would require a permit.
- Susie Williams, Native Vegetation Officer, North West Region (9166 4102) advised that the Russ Creek realignment would be exempt from requiring a permit to clear. The relevant legislation is the:
  - *Environmental Protection Act* 1986;
  - *Environmental Protection (Clearing of Native Vegetation) Regulations* 2004 - Item 23 b) Schedule 3, Clause d) "*road widening or realignment, or construction of a crossover from a road ....."*
  - The exemption only applies as there are no 'Environmentally Sensitive Areas' in the vicinity, which were checked on the DoE's Geographic Informations System (GIS).

7.2 Department of Conservation and Land Management

- Gordon Graham, Regional Leader Conservation, Kimberley Region (9168-4214) advised there were no major concerns and was satisfied with the 2 stage process GHD had followed (desktop database search followed by field survey) to locate possible DRF and priority species. The Phillips Range area was of particular interest as it's flora is relatively poorly described, however Mr Graham did not see any particular cause for concern given the nature of the works as described in the MRWA project brief.
- CALM would need to be consulted if Priority Flora are likely to be impacted by the works.

7.3 Department for Planning and Infrastructure

- Jennifer Ninyette, DP&I Officer, Land Asset Management Services (9168-0602). Discussed proposed works and checked land tenure maps. Investigation of the determination of the Wanjina-Wunggurr-Wilinggin native title claim revealed that works within the road reserve are excluded from native title (under Schedule 2b).

8. References

Bureau of Meteorology, 2005. *Averages for Western Australian Sites*. [http://www.bom.gov.au/climate/averages/tables/ca_wa_names.shtml]

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Rangelands NRM Co-ordinating Group 2004. *Kimberley Natural Resource Management Plan: Draft for Public Comment*. Kununurra, WA.

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Appendix A

Reserves and Land Tenure in the Home Valley Section

Appendix B

Flora

Flora List

Priority Flora most likely to be found in the vicinity of the upgrade sites (source CALM)

Explanation of Vegetation Condition Rating

Explanation of Vegetation Condition Rating

Rating	Description	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance
2	Excellent	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species
3	Very Good	Vegetation structure altered, obvious signs of disturbance
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbance, retains basic vegetation structure or ability to regenerate it
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost without native species

Appendix C

Fauna

Fauna lists for Amphibia, Birds, Fish, Mammals and Reptiles

Status Codes for Fauna in Western Australia

Appendix D

Aboriginal Ethnographic and Archaeological Assessment

Ethnographic Assessment (R O'Connor, April 2005)

Archaeological Assessment (G Quartermaine, April 2005)

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