

Main Roads WA

Muir's Highway Upgrade
(SLK 34.8 - SLK 40.8)

Environmental Impact
Assessment and Environmental
Management Plan

August 2006



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Executive Summary

GHD Pty Ltd (GHD) was commissioned by Main Roads Western Australia's South West Region (Main Roads) to prepare an Environmental Impact Assessment and Environmental Management Plan (EIA and EMP) for the proposed Muirs Highway (SLK 34.8 – SLK 40.8) Upgrade project. The project is located between Nyamup and Strachan in the Shire of Manjimup.

The proposed works will improve road safety by reconstructing the existing highway with increased width and improved geometry. The proposed works are a part of the progressive upgrade of Muirs Highway, which has been occurring over a number of years. This section of roadworks is expected to be constructed in 2008 / 2009.

The proposed works occur entirely within the Shire of Manjimup and within the Main Roads South West region boundaries. It is anticipated that the roadworks will be carried out by a private contractor on behalf of Main Roads. Pre-construction works including logging by the Forest Products Commission (FPC) and clearing will occur typically one year in advance of roadworks.

The development, management and rehabilitation of the raw materials source areas is addressed independently of this EIA and EMP.

The project area traverses the Perup River and its tributaries while being approximately 450 m north of the Warren River. The project area occurs within the Warren Recovery Catchment, which is a prescribed catchment under the *WA Country Areas Water Supply Act (1947)*.

The project area is bounded to the north and south by [private property and State Forest, (including Topanup, Murtin, Tone and Meribup Forest blocks (State Forest 38 and State Forest 55)). For the implementation of the project 6.1 ha of land will need to be acquired from the State Forest. The 'C' Class Reserve (R11081) is located to the north of the existing alignment and it is anticipated that 0.62 ha of land will be acquired from this reserve. 7.06 ha of land will also be acquired from private property for the implementation of the project.

The project area lies in the Menzies Botanical subdistrict of the Darling Botanical District of the South West Botanical province (Beard, 1981). The project area supports a mixture of good quality Medium Jarrah (*Eucalyptus marginata*) – Marri (*Corymbia calophylla*) forest and tall Jarrah – Marri – Karri (*Eucalyptus diversicolor*) forest. The clearing for the proposed project will not impact on vegetation types considered to be regionally poorly represented.

No Declared Rare and Priority Flora were located within the project area after a site survey by a botanist from the Department of Conservation and Land Management (now Department of Environment and Conservation).

No Threatened Ecological Communities were identified within or adjacent to the project area.

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* require the issuing of a permit by the Department of Environment and Conservation (DEC) prior to the clearing of any native vegetation. Main Roads has been issued with a Purpose Clearing Permit (CPS 818/2), which is applicable for Main Roads operations where clearing is not at serious variance with the Ten Clearing Principles outlined in the permit. The clearing required for the implementation of this project has been assessed against the Ten Clearing Principles and it was concluded that it is not at variance with the



clearing principles. The clearing of native vegetation required for the implementation for the project can therefore be conducted under Main Roads Purpose Clearing Permit (CPS 818/2).

A dieback survey of the project area conducted by DEC in 2006 did not identify any dieback infestations along the proposed alignment. A total area of 24.7 ha of forest was classed as uninfested (protectable) and 26.3 ha as uninterpretable vegetation within the project area.

DEC does not anticipate that the proposed works will impact significantly on any of the identified threatened fauna species. A low density population of Western Ringtail Possums has historically been identified within the eastern extent of the project area; however no possums were identified during the 2006 spotlight survey completed by DEC for Main Roads. Management measures to minimise the potential impact on possums have been included in this EIA and EMP. Proposed roadworks are not expected to significantly impact on any conservation significant fauna species potentially occurring within the project area.

An Aboriginal Heritage Survey of Muirs Highway, between Manjimup and the Frankland River (SLK 0 – SLK 75), was completed by McDonald Hales and Associates for Main Roads in October 1996 (McDonald Hale and Associates, 1997). The ethnographic survey identified the Perup River (associated with the *Dwert* or dingo Dreaming) as a site of significance to Aboriginal people occurring within the current project area. After additional consultation with representatives of the local Aboriginal community regarding the project and the Perup River site, Main Roads will apply for Ministerial consent under Section 18 of the Western Australian *Aboriginal Heritage Act (1972)* to use the land for the upgraded highway.

No direct impact on the river will occur as the existing bridge will be maintained as the Perup River crossing.

No recorded European heritage sites were identified as occurring within 1 km of the project.

At the completion of roadworks, and after revegetation of redundant sections of road, surplus land will be amalgamated with areas of adjacent State Forest.

A brief investigation of the current land use and recent history of the project area indicates little likelihood of a contaminated site occurring within the project area. No evidence of industrial sites or fuel storage centres / service stations were identified within the project area.

No issues or impacts considered to be of National Environmental Significance were identified during the preparation of this EIA and EMP. It is believed that the project does not require referral to the Commonwealth Minister for the Environment under the provisions of the *Environmental Protection and Biodiversity Conservation Act (1999)*.

No environmental issues or impacts as a result of the project are considered to warrant referral of the project to the Environmental Protection Authority under the provisions of the *Environmental Protection Act (1986)*.



1. Introduction

GHD Pty Ltd (GHD) was commissioned by Main Roads Western Australia's South West Region (Main Roads) to prepare an Environmental Impact Assessment and Environmental Management Plan (EIA and EMP) for the proposed Muirs Highway (SLK 34.8 – SLK 40.8) Upgrade Project. The project occurs between Nyamup and Strachan in the Shire of Manjimup as shown at Figure 1.

Main Roads proposes to re-align the 6 km section of Muirs Highway (SLK 34.8 – SLK 40.8 km) east of Manjimup, to improve road safety by providing increased width and improved geometry of the highway. The proposed works are a part of a progressive upgrade of Muirs Highway, which has been occurring over a number of years.

Main Roads requires the EIA and EMP be used to assess and manage the environmental impacts of the project. As the project requires an excision from State Forest, there is the need to forward this proposal to the Conservation Commission for their approval, before proceeding with the excision process, which involves obtaining approval of both Houses of State Parliament.

This EIA and EMP has been prepared congruent with Main Roads brief for the project and:

- » Describes the significant aspects of the existing project environment
- » Details the primary environmental and social impacts of the proposed works; and
- » Details actions to manage and minimise the identified impacts.

The EIA and EMP has been prepared based on:

- » Discussions with Main Roads Project Manager
- » A biological flora and fauna survey and dieback survey undertaken by DEC
- » Inspection of the project site; and
- » A relevant literature and database review.

Environmental and social aspects identified as requiring consideration during the proposed roadworks and addressed in this report are:

- » Rivers, catchment and drainage
- » Reserves and conservation areas
- » Vegetation – Declared Rare and Priority Flora, threatened ecological communities and vegetation clearing
- » Main Roads purpose clearing permit
- » Weed management
- » Topsoil management
- » Dieback disease
- » Rehabilitation and revegetation
- » Fauna
- » Aboriginal heritage



- » European and natural heritage
- » Land acquisition
- » Visual amenity
- » Traffic noise
- » Contaminated sites
- » Construction phase impacts – damage to public property, noise and vibration, local community consultation and complaints management, dust, traffic safety and access, fire management, fuel and chemical storage, and rubbish disposal.

Impacts associated with air quality and acid sulphate soils were not considered issues relevant to this project and therefore not discussed within this EIA and EMP. The project will replace the exiting highway and is not expected to result in any significant increases in regional traffic movements, and the site is not considered to be an acid sulphate soil risk area.



2. Project Description and Justification

Main Roads for a number of years has been upgrading the narrow single lane seal sections of Muirs Highway between Nyamup and Strachan. The proposed works will address the narrow seal width and substandard geometry of the existing road, and in turn address the safety and efficiency of the road. The length of single lane seal is currently 9 km between Nyamup and Strachan.

Muir's Highway is the main road that connects the South West Highway at Manjimup to the Albany Highway at Mt Barker, a length of 161 km. This inter-regional link road is utilised by tourist and commuter traffic along with general freight vehicles, including road trains and plantation harvest trucks. It is also an important link for interstate long vehicles servicing the horticultural areas around Manjimup.

The upgrade strategy for Muir's Highway has had a very high profile in Manjimup and Mount Barker. Increases in plantation log truck traffic have heightened safety concern with respect to the narrow sections of the road.

Main Roads is currently planning to upgrade a 6 km section of the highway with construction expected to begin in 2008 / 2009. These works are the focus of this EIA and EMP. The remaining 3 km of narrow highway has been previously approved for upgrading and will be constructed in 2006 / 2007.

Figure 1 shows the location of the project area including the widening and re-alignment sections. A major consideration in the design of the alignment is the need to minimise the clearing of native vegetation. This has been achieved by maximising the use of existing clearings in road corridors or cleared farmland.

The project traverses a sparsely populated area with an undulating landscape. Landuse of the area is essentially State Forest and cleared farmland.

The key characteristics of the project is summarised in the Table 1 below.

Table 1 Key Characteristics of the Muir's Highway (SLK 34.8 – SLK 40.8) Upgrade Project

Issue	Description
Project length	6.0 km
Formation width	7 m seal, 2 m shoulders
Table drains	2 m wide with 1:4 slope
Typical batter slopes	1:3
Clearing area	Approximately 11.6 ha
Land Requirement	State Forest and 'C' Class Reserve – 6.73 ha Private Property – 7.06 ha

The proposed works occur within the Shire of Manjimup. It is expected that roadworks will be carried out by the Shire of Manjimup or a private contractor on behalf of Main Roads. Pre-construction works including logging by the Forest Products Commission (FPC) and clearing will occur typically one year in advance of roadworks.



The Muirs Highway project also involves the development of gravel pit G34, which is located in nearby State Forest 38. The development, management and rehabilitation of this pit is addressed in a separate document and not considered in this EIA and EMP.



3. Environmental Impacts and Management

The following section identifies and discusses the environmental and social aspects considered relevant to the project, and those issues considered necessary to describe the project site. This section also details actions to manage the expected impacts of the roadworks, with the management action followed by the project personnel responsible to implement the action.

An Environmental Aspects Table summarising potential environmental impacts is included at Appendix A. Relevant environmental management measures and responsibilities are also summarised in an Environmental Management Responsibilities Table included at Appendix B. Appendix B is designed to be used as a 'stand alone' EMP during the design and implementation of the project.

Photographs of the project area are included in Appendix C.

3.1 Natural Environment

3.1.1 Climate

The climate of the project area is best described as mild Mediterranean with warm dry summers and mild wet winters. The closest Bureau of Meteorology weather-recording station to the project site is located at Manjimup located approximately 40 km west of the project site. The recorded climate data at Manjimup is summarised below:

Manjimup Weather Station

Mean Annual Maximum Temperature Range	27.1°C (January) to 14.3°C (July)
Mean Annual Minimum Temperature Range	13.3°C (February) to 6.4°C (July / August)
Mean Annual Rainfall	1022.3 mm
Mean Annual Raindays per year	157.9 days

(Source: Bureau of Meteorology – Climate Average for Australian Sites, 2004)

3.1.2 Geomorphology, Landform and Soils

The project area traverses both the Manjimup Plateau System and the Wilgarup Valleys System. The Manjimup Plateau System is a lateritic plateau occurring in the northwest of the Warren-Denmark Southland. The soils of this system include sandy gravel, loamy gravel, non-saline wet soil and deep sand (Churchward, 1992). The Wilgarup Valleys System consists of valleys located in the northeast of the Warren-Denmark Southland. The soils of this system include loamy gravel, sandy gravel, loamy earth, stony soil and loamy duplex, and according to Churchward (1992), the project traverses a number of subsystems as described below:



Table 2 Systems and Subsystems Traversed by the Project Area

Unit Name	Landform	Geology	Soil
Manjimup Plateau System	Lateritic plateau with broad swampy depressions	Deeply weathered profile over metasediments and granitic rocks	Duplex sandy gravels, loamy gravels and wet soils
Bevan subsystem	Undulating plateau	Laterite and colluvium underlain by granite	Pale shallow sand and duplex sandy gravel, with pale deep sand and loamy gravel
Catterick subsystem	Shallow minor valleys	Laterite and colluvium with sandy alluvium and swamp deposits	Loamy gravel, duplex sandy gravel, wet soil, and friable red brown loamy earth
Corbalup subsystem	Gently undulating terrain		Semi wet soil, loamy gravel, duplex sandy gravel
Wilgarup Valleys System	Major valleys	Colluvium over granitic rocks	Loamy gravels, duplex sandy gravels, stony soils, friable red/brown loamy earths and brown deep loamy duplexes
Strachan subsystem	Valleys with smooth gentle slopes	Colluvium over granitic rocks	Duplex sandy gravel, loamy gravel, grey deep sandy duplex

3.1.3 Rivers, Wetlands and Drainage

The project area traverses the Perup River and its tributaries, while being approximately 450 m north of the Warren River. The ungraded road will cross the Perup River at the existing bridge. The highway occurs parallel and 30 - 50 m south of the river for approximately 800 m west of the bridge crossing. The alignment also crosses a tributary of the Perup River, a small creekline approximately 500 m east of the bridge location.

The project area occurs within the Warren Recovery Catchment, which is a prescribed catchment under the *Country Areas Water Supply Act (1947)*. Before the introduction of the *Environmental Protection (Clearing of Native Vegetation) Regulations (2004)* clearing of native vegetation within the catchment area required a 'Licence to Clear' from the Department of Water issued under the *Country Areas Water Supply Act (1947)*. Advice from DoW is that a licence is no longer required and that clearing approvals are now subject to the *Environmental Protection (Clearing of Native Vegetation) Regulations (2004)*, which is discussed further in Section 3.1.6 of this report.

In addition to the Perup River crossing, several minor drainage lines are traversed by the project. Roadside drainage will replicate that of the existing road by the use of table drains, off-shoot drains and culverts.



Existing surface water flows will be maintained by replacing and / or extending existing crossroad culverts. In addition erosion control measures will be incorporated into the constructed drainage system.

Action: Main Roads Project Manager / Main Roads Project Designer / Main Roads Construction Manager / Construction Contractor

Main Roads will design the roadside drainage in consultation with the Department of Environment and Conservation to ensure that where practicable road run-off drains directly into unprotectable or dieback infested areas.

Action: Main Roads Project Manager / Main Roads Project Designer / Main Roads Construction Manager / Construction Contractor

3.1.4 Reserves and Conservation Areas

The project area is bounded to the north and south, in sections, by State Forest, including Topanup, Murtin, Tone and Meribup Forest blocks (State Forest 38 and State Forest 55). For the implementation of the project 6.103 ha of State Forest will be acquired from these State Forest areas.

The 'C' Class Reserve (R11081) is located to the north of the existing alignment and will be impacted by the proposed works. This reserve is vested within the Department for Planning and Infrastructure and managed by the Shire of Manjimup for the purpose of Gravel, Parklands Regeneration and Waterway. It is anticipated that 0.62 ha will be acquired from this reserve for the proposed works to be implemented.

Approval from the Conservation Commission is required before proceeding with the excision of land from State Forest, which involves obtaining approval of both Houses of Parliament.

Main Roads will liaise with the Conservation Commission prior to proceeding with the excision process.

Action: Main Roads Project Manager

3.1.5 Vegetation, Declared Rare and Priority Flora, Threatened Ecological Communities and Vegetation Clearing

The project area lies in the Menzies Botanical subdistrict of the Darling Botanical District of the South West Botanical province (Beard, 1981). The project area supports a mixture of Medium Jarrah (*Eucalyptus marginata*) – Marri (*Corymbia calophylla*) forest and tall Jarrah – Marri – Karri (*Eucalyptus diversicolor*) forest.

Declared Rare and Priority Flora

Following a survey of the project area, the DEC has advised that no Declared Rare and Priority Flora have been identified in the project area.

Threatened Ecological Communities

No threatened ecological communities were identified within or adjacent to the project area.

Vegetation Clearing in a Regional Context

The vegetation to be impacted by the proposed reconstruction and realignment works was compared against the regional remnant vegetation mapping by the Department of Agriculture (June 2005) to give an indication of the regional impact of the proposed clearing. The remnant vegetation within the project area was identified as belonging to the following vegetation types.



Table 3 Regional Assessment of Vegetation Extent

Vegetation Classification	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	Approx. clearing area (ha)
Nornalup 3	167 391	151 095	90.3	2.4
Nornalup 1116	4646	4226	91.0	4.0
Nornalup 1144	157 595	124 717	79.1	5.2

Position Statement No. 2 Environmental Protection of Native Vegetation in Western Australia (EPA 2000) sets a “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level. The “threshold level” is regarded as being at a level of 30% of the pre-clearing extent of the vegetation type. Below this “threshold level”, vegetation types are considered to be poorly represented at a regional level.

Table shows that the clearing for the proposed project will not impact on vegetation types considered to be regionally poorly represented.

Vegetation Clearing

The following section describes how clearing activities will be conducted to minimise environmental impacts.

Dieback hygiene requirements detailed at Section 3.1.10 will be complied with during the clearing activities.

Action: Main Roads Construction Manager / Construction Contractor

Prior to clearing for roadworks forest timber product will be salvaged from the project area by the Forest Products Commission.

Action: Main Roads Project Manager / Forest Products Commission Contractor

Remaining salvageable timber will be stockpiled on-site and made available for re-use.

Action: Main Roads Construction Manager / Construction Contractor

During roadworks, damage to existing remnant vegetation will be avoided as far as is practicable. Clearing will be restricted to 3m from the edge of earthworks.

Action: Main Roads Construction Manager / Construction Contractor

Prior to the start of clearing operations the Construction Contractor will mark out the clearing line and this will be checked by Main Roads Construction Manager to ensure that it is correctly defined. Trees of particular significance within the clearing area to be conserved will be clearly marked prior to the commencement of clearing.

Action: Main Roads Construction Manager / Construction Contractor

Mature trees especially will be conserved as far as practicable and will not be disturbed for temporary works such as access tracks, spoil areas or site offices. Vehicles and equipment will not be parked or driven over tree roots.



Action: Main Roads Construction Manager / Construction Contractor

Trees to be removed will be felled in a manner so that they fall within the approved clearing area.

Action: Main Roads Construction Manager / Construction Contractor

Any damage caused by the Construction Contractor to vegetation, landforms or fauna habitat outside of the works area will be rehabilitated at the Contractor's cost. If environmental damage beyond the works area is identified Main Roads may withhold the payment of monies due to the Contractor, where the extent of damage exceeds \$5 000, determined at the following rates:

- » For damaged trees greater than 3m in height - \$1 000 each.
- » For damaged trees and shrubs up to 3m in height - \$500 each.
- » For damaged grassland, open soil areas, rock faces and landforms, and habitats in general - \$10 per square metre.

Action: Main Roads Construction Manager / Construction Contractor

3.1.6 Clearing Permit

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* require the issuing of a permit by the DEC prior to the clearing of any native vegetation. Main Roads has been issued with a Purpose Clearing Permit (CPS 818/2) for their operations, which is applicable to projects where clearing is not at variance with the Ten Clearing Principles outlined in the permit.

A search of the DEC website indicates that the project area does not occur within, or in close proximity to, an Environmentally Sensitive Area.

The clearing required for the implementation of this project has been assessed against the Ten Clearing Principles as detailed in the Table 4 below.



Table 4 Assessment of Project Against the Ten Clearing Principles

Principle No.	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it comprises a high level of biological diversity	The vegetation to be cleared within the project area occurs within State Forest. The proportion of vegetation to be cleared in relation to the amount of vegetation remaining within the adjacent vegetated areas is very small and not considered significant.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(b)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Clearing of vegetation for the implementation of the project is not considered to significantly impact local fauna populations.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora	Clearing of vegetation for the implementation of the project is not considered to impact rare flora populations.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community	Clearing of vegetation for the implementation of the project is not considered to impact any threatened ecological communities.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	Clearing of vegetation for the implementation of the project is not considered to impact regionally poorly represented vegetation types.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(f)	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	The existing Perup River Crossing will be utilised for the proposed works to remove the need to impact on the native vegetation growing in association with this river crossing.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The clearing of native vegetation is not expected to cause appreciable land degradation of adjacent land. Potential impacts from runoff, sedimentation, dieback and weed dispersal will be appropriately managed during and after roadworks.	Appropriate management plans to mitigate potential impacts. Clearing for roadworks is not at variance with the clearing principle.



Principle No.	Principle	Assessment	Outcome
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	Potential impacts on the conservation values of adjacent State Forest from clearing for the project are considered to be negligible due to the extent of the surrounding State Forest and occurrence of the exiting road. Impacts will be minimised through the preparation and implementation of appropriate management measures.	Appropriate management plans to mitigate potential impacts. Clearing for roadworks is not at variance with the clearing principle.
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	The potential clearing of native vegetation is considered unlikely to cause deterioration in the quality of surface or underground water.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.
(j)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding	The clearing of native remnant vegetation for this project is considered unlikely to cause, or exacerbate, the incidence or intensity of flooding.	Native vegetation may be considered to be cleared. Clearing for roadworks is not at variance with the clearing principle.

Table 4 indicates that clearing of native vegetation for the implementation of the project can be considered not to be at variance with any of the Ten Clearing Principles. Thus, the clearing of native vegetation required for the implementation of the project can be conducted under Main Roads Purpose Clearing Permit (CPS 818/2).

Main Roads will undertake the clearing of native vegetation required for the implementation of the project under their Purpose Clearing Permit (CPS 818/2).

Action: Main Roads Project Manager

Main Roads will record and report on the project to the Department of Environment and Conservation under the requirements of CPS 818/2.

Action: Main Roads Project Manager

3.1.7 Weed Management

The condition of the vegetation over the project length varies from 'pristine, or nearly so', in the State Forest sections to 'entirely cleared' in the farmland sections. The sections of road reserve adjacent to farmland show substantial weed invasion with introduced perennial and annual pasture weeds being dominant in the understorey of these sections.

Machinery and vehicle hygiene measures will avoid the inadvertent spread of weeds and the management measures detailed at Section 3.1.10 will reduce the potential for the inadvertent transport of weeds throughout the site, and from the site to other sites. The management measures detailed at Section 3.1.9 will provide for suitable site topsoil management during roadworks.



Action: Main Roads Project Manager / Main Roads Construction Manager / Construction Contractor

Main Roads will implement and monitor weed management measures as part of the project congruent with CPS 818/2.

Action: Main Roads

Longer-term management of weeds within the project area will be conducted post construction during the annual herbicide and weed management program conducted by Main Roads.

Action: Main Roads Term Network Contractor

3.1.8 Topsoil Management

After the completion of timber salvage and clearing activities, topsoil will be stripped to a nominal depth of 100 mm from the works area and windrowed parallel to the road alignment.

Action: Main Roads Construction Manager / Construction Contractor

Topsoil will be stored and respread within the section that it was stripped from to minimise the potential to spread dieback and weeds.

Action: Main Roads Construction Manager / Construction Contractor

At the completion of roadworks the topsoil will then be respread evenly to a nominal depth of 100 mm over disturbed soil surfaces.

Action: Main Roads Construction Manager / Construction Contractor

Unsuitable material and spoil will only be disposed of in State Forest areas with the approval of DEC.

Action: Main Roads Construction Manager / Construction Contractor

3.1.9 Dieback Disease

The project area does not occur within a recognised Disease Quarantine Area. DEC's Manjimup Forest Management Branch office carried out a dieback survey of the project area for Main Roads in February 2006.

The dieback survey identified that the project area includes dieback uninfested (protectable) and dieback uninterpretable sections. Within the project area 24.7 ha of forest was classed as uninfested and 26.3 ha as uninterpretable. There were no dieback infestations identified along the proposed re-alignment.

Within the project area seven sections of protectable forest were identified. Each section varies in size due to the influence of the open roads that transect through the proposed areas to be cleared for the re-alignment of Muirs Highway.

As the road construction activities are not expected to occur until 2008 / 2009 the dieback mapping and management measures will be updated within 12 months of the commencement of construction.



Action: Main Roads Project Manager

Dieback Management Recommendations (CALM, 2006)

As a result of the 2006 dieback interpretation the following management measures were recommended by CALM. It is expected that management measures based on future dieback mapping will be congruent with these recommendations:

- » All machines and vehicles to be clean prior to entering any protectable areas of forest
- » Offshoots, roadside drainage and clean down points need to be strategically placed so that any water and effluent drains directly into unprotectable or dieback infested areas (**Note: Main Roads will comply with this requirement wherever possible**)
- » Hygiene management points will require ramp/skids, where machines and vehicles can be suspended above the effluent, during the cleaning down process
- » If possible, program construction works in protectable uninfested/uninterpretable areas during dry soil conditions. Note: If this method is deployed then there would only be a requirement to either brush down or use compressed air to clean down machinery; and
- » Operations should be carried out according to the Phytophthora cinnamomi Hygiene Plan in conjunction with the “Phytophthora cinnamomi and Disease caused by it, Volume I – Management Guideline” (CALM, 2003).

Action: Main Roads Project Manager / Main Roads Construction Manager / Construction Contractor

Further to these recommendations, logging, clearing and topsoil stripping will be carried out under the following dieback hygiene conditions:

- » Dieback boundaries will be clearly signed in the field by the use of signs and / or flagging tape; and
- » All site employees will be advised of the dieback hygiene measures.

Action: Main Roads Construction Manager / Construction Contractor

3.1.10 Rehabilitation and Revegetation

Clearing for the project will be kept to the minimum necessary for the safe construction and operation of the highway. Redundant sections of Muirs Highway (approximately 1 ha) will be revegetated and rehabilitated.

Redundant sections of the highway will be rehabilitated as described below:

- » All culverts, pipes, posts and other road furniture will be removed and disposed of at a Shire of Manjimup approved waste disposal site
- » Redundant sections of road will be ripped to a minimum depth of 300 mm at a minimum of 300 mm spacings
- » Redundant sections of road will be contoured to the existing landform as far as practicable; and
- » Redundant sections will be revegetated by direct seeding with locally occurring native vegetation species.



Action: Main Roads Project Manager

The redundant sections of highway will be revegetated by direct seeding and hand planting of seedlings as described below:

- » Planting and seeding will be conducted at the break of the season (typically in April/May)
- » All species planted will be locally occurring indigenous species sourced from within the provenance
- » Prior to broadcast 60% of the seed mix will be pre-treated to break seed dormancy and improve germination rates. Seed will be pre-treated using smoke water concentrate or similar
- » Seed will be broadcast at a rate of 4 kg/ha;
- » Direct seeding areas will be fertilised at a rate of up to 200 kg/ha using Agras No. 1 with trace elements
- » Hand planting of 1000 overstorey species per hectare. Plants will be planted so that the root ball is covered with soil and the top of the root ball is 15 mm to 25 mm below the finished ground level; and
- » Slow release fertiliser tablets, Baileys "Apex Native" slow release fertiliser or equivalent, will be placed 100 mm to 150 mm below soil surface and 100 mm away from the root ball of each seedling.

Action: Main Roads Project Manager

The completion criteria for the rehabilitation works as detailed in CALM's "Guideline for the Management and Rehabilitation of Gravel Pits – South West Forest Areas" will be adopted for the site two years after seeding. This completion criteria requires 30 under / mid storey species and four upper storey plant species within any 10m x 10m grid over 90% of the rehabilitated area.

Action: Main Roads Project Manager

To minimise the potential for erosion and improved revegetation all cut batters steeper than 1 in 3 and greater than 1m in height will be benched at 0.5m intervals and covered with topsoil at the completion of earthworks.

Action: Main Roads Construction Manager / Construction Contractor

3.1.11 Fauna

The fauna species detailed at Appendix D are listed under the *Wildlife Conservation (Specially Protected Fauna) Notice 2005* or recognised by the Commonwealth Department of Environment and Heritage as having been recorded within, or in the vicinity of, the project area.

An assessment of fauna occurrence within the project area was conducted by DEC's Manjimup office in early 2006 as part of the flora survey. The site assessment, including spotlight survey, did not identify any Western Ringtail Possums at the site, but historical data indicated the presence of a low density population of eastern end of the project area.

It is understood that the project will not threaten the local possum population.

DEC will brief contractors prior to the commencement of logging and/or clearing activities regarding appropriate management should possums be encountered.



Action: Main Roads Project Manager

The proposed roadworks are not expected to threaten local or regional populations of any threatened fauna species potentially occurring in the project area.

3.1.12 Contaminated Sites

A brief investigation of the current land use and recent history of the project area indicates little likelihood of a contaminated site occurring within the project area. No evidence of industrial sites or fuel storage centres / service stations were identified within the project area.

3.2 Social Environment

3.2.1 Aboriginal Heritage

An Aboriginal Heritage Survey of Muirs Highway, between Manjimup and the Frankland River (0 – 75 SLK), was completed by McDonald Hales and Associates for Main Roads in October 1996 (McDonald Hale and Associates, 1997).

The survey considered both archaeological and ethnographic sites. The surveys involved consultation with members of the Manjimup Aboriginal Corporation and the Bibbulmun Tribal Group. The archaeological survey identified a number of Aboriginal heritage sites within the search area. Two recommendations relevant to this project were documented:

- » It is recommended that the proposed realignment of the Perup River (SLK 37.5 – SLK 39.0) section proceed.
- » It is recommended that any future upgrading of the Muirs Highway (SLK 34.3 – SLK 37.5, SLK 39 – SLK 75.2) within the 200 m corridor from the centreline of the existing alignment be permitted to proceed.

The ethnographic survey identified three sites of significance including the Muirs Highway Ethnographic Site No.2 – the Perup River associated with the *Dwert* or Dingo Dreaming. This site is located within the project area, at the Perup River crossing. During the survey Aboriginal community representatives requested that a 30m buffer be established along the banks of the river however they recognised that road and bridge works should be permitted within the buffer zone.

McDonald Hales and Associates (1997) recommended that:

- » Main Roads apply for Ministerial consent under Section 18 of the *Aboriginal Heritage Act, (1972)* to crossings and associated roadworks at the Perup River; and
- » That the Aboriginal consultants be further consulted by Main Roads Western Australia respect to the proposed crossing of the Perup River.
- » The banks of Perup River be rehabilitated following the construction of the bridges and that the Aboriginal community be consulted in respect of the rehabilitation programme.

Action: Main Roads Project Manager

A review of the Department of Indigenous Affairs (DIA) database indicates that no new Aboriginal heritage sites have been registered within the project area since the survey was completed in 1996.



The ethnographic component of the Aboriginal heritage survey was conducted in October 1996. DIA request that ethnographic surveys that are five years old should be revisited and additional consultation with the Aboriginal community conducted.

Main Roads will initiate an update of the 1996 Ethnographic Survey for the Muirs Highway SLK 34.8 – SLK 40.8 Upgrade Project prior to submission of the Section 18 application.

Action: Main Roads Project Manager

Accordingly Main Roads will apply for Ministerial consent under Section 18 of the Western Australian *Aboriginal Heritage Act (1972)* to construct bridge approaches to the Perup River.

Action: Main Roads Project Manager

If during roadworks, any materials of significance to Aboriginal people are uncovered by the Construction Contractor, works will immediately cease within 50 m of the material and both Main Roads Aboriginal Liaison Officer and the DIA will be notified immediately.

Action: Main Roads Project Manager / Main Roads Construction Manager / Main Roads Construction Contractor

If skeletal material is uncovered during works then the WA Police Service will also be advised immediately.

Action: Main Roads Project Manager / Main Roads Construction Manager / Main Roads Construction Contractor

3.2.2 European and Natural Heritage

The assessment of European heritage issues for the project included an inspection of the project site and a review of the Shire of Manjimup Municipal Register of Heritage Places, Australian Heritage Commission on-line database, Australian Heritage Places Inventory on-line database, and the Western Australian Heritage Council on-line register.

No recorded European heritage sites were identified as occurring within 1 km of the project site and as such none are expected to be directly impacted by roadworks.

3.2.3 Land Acquisition

For the implementation of the project 6.103 ha of land will be acquired from State Forest 38 and State Forest 55. Approval from the Conservation Commission is needed before proceeding with the excision process, which involves obtaining approval of both Houses of Parliament.

Main Roads will seek the approval of the Conservation Commission for the acquisition of State Forest to road reserve prior to proceeding with the excision process.

Action: Main Roads Project Manager



7.06 ha of land will be acquired from private property for the implementation of the project.

Land that is to be acquired from private property should be acquired under the provisions of the *Land Administration Act (1997)*, which provides for financial compensation to affected landowners based on the current local market value and the area of land required.

Action: Main Roads Project Manager

At the completion of roadworks and after revegetation redundant sections of road will be amalgamated with the adjacent State Forest.

Action: Main Roads Project Manager

3.2.4 Visual Amenity

Congruent with the adjacent land use the viewshed from this section of Muirs Highway mainly comprises of views to State Forest and to a lesser extent cleared farmland. The viewshed from the re-aligned sections will be of cleared farmland and cleared road batters. The views of the cleared road reserve and road batters will in time be softened as the revegetation becomes established.

Views of the redundant sections of highway will also affect the visual amenity, although this will become less over time as the revegetation establishes and matures.

3.2.5 Noise

There is no anticipated increase in traffic noise as a result of the implementation of the project as the closest residential property to the project area is greater than 500 m away.

3.3 Pre-construction Activities

A number of existing services have been identified within the project area.

Environmental management measures detailed in the EIA and EMP that are applicable for the works relating to the service re-locations will be complied with by relevant service providers.

Action: Main Roads Project Manager / Service Providers

A copy of the EMP (Appendix B) will be provided to the various agencies and contractors responsible for the service relocations with a requirement to fulfil the specific environmental management measures during service relocation works.

Action: Main Roads Project Manager

3.4 Construction Activities

The project area traverses a sparsely populated rural and forest landscape. Within the project area there are several private residences, which the closest being 500 m south of the existing alignment. The impact of the proposed roadworks to adjacent landowners, and through traffic, will be temporary and limited to the period of road construction activities.

In addition to the relevant management measures detailed in Section 3 above, the following issues will be managed during construction of the works:



- » Damage to public property, noise and vibration
- » Dust
- » Traffic safety and access
- » Fire management
- » Fuel and chemical storage; and
- » Rubbish disposal.

3.4.1 Environmental Management and Quality Plan

The Construction Contractor will prepare a Quality Plan for the project, which will address the Construction Contractor's management responsibility, authority and communication requirements and clearly detail the Contractor's 'Quality Management Representative (QMR)' role with respect to the Contract in accordance with AS/NZS ISO 9001.

Action: Construction Contractor

The Quality Plan will be submitted to Main Roads Superintendent for approval within twenty-eight days of award of the Contract or ten days of Possession of Site being granted whichever is the earlier.

Action: Construction Contractor

3.4.2 Damage to Public Property, Noise and Vibration

The Construction Contractor will nominate a person responsible for reviewing and monitoring all operations in order to prevent or minimise the impact of vibration, noise and dust and other forms of pollution on property and the public.

Action: Main Roads Construction Manager / Construction Contractor

No private residences or buildings occur within 100 m of the project area with the closest residence being some 500 m south of the project area. As such, impacts on private property, vibration impacts and / or noise impacts from construction works are not expected to impact on adjacent landholders.

Regardless, the Construction Contractor is required to observe its obligations under the *Environmental Protection Act (1986)*, the *Environmental Protection (Noise) Regulations 1997* and the Section 6 of the Australian Standard 2436 – 1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

Action: Main Roads Construction Manager / Construction Contractor

3.4.3 Dust

There is likely to be some dust lift generated during the construction works and as a result of passing traffic. The Construction Contractor will employ construction methods that will keep dust lift to a minimum, and as required provide for the management of dust such as by watering of the works area and of roads, streets and other areas immediately adjacent to the works.



Action: Main Roads Construction Manager / Construction Contractor

Where it is found that vehicles leaving the site have dropped excessive soil material onto adjacent sections of Muirs Highway these sections should be swept to reduce the potential for dust generation and maintain traffic safety.

Action: Main Roads Construction Manager / Construction Contractor

3.4.4 Traffic Access and Safety

To ensure the safe access of traffic through the construction site the Construction Contractor will develop and implement a Traffic Management Plan congruent with the current Australian Standard Manual 1742.3 of Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works On-Road (Standards Australia) and the current Main Roads Traffic Management Requirements for Works on Roads.

Action: Main Roads Construction Manager / Construction Contractor

The Traffic Management Plan (TMP) will conform to the current Main Roads Traffic Management Requirements for Works on Roads and the current Australian Standard Manual 1742.3 of Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works On-Road (Standards Australia). The TMP will be submitted to Main Roads for approval within twenty-eight days of Award of Contract or within ten days of Possession of Site being granted or prior to the commencement of works, whichever is earlier.

Action: Main Roads Construction Manager / Construction Contractor

The Construction Contractor will submit with the TMP a Certificate of Compliance certifying that the TMP has been prepared and/or reviewed by an appropriately qualified person as defined in the current Main Roads publication Traffic Management Requirements for Works on Roads.

Action: Main Roads Construction Manager / Construction Contractor

All traffic control measures will be in place and fully operational before the Construction Contractor commences any work activity that affects existing roadways.

Action: Main Roads Construction Manager / Construction Contractor.

3.4.5 Fire Management

The risk of igniting a fire during roadworks will be minimised and managed by compliance with the management measures detailed below.

Machines and vehicles should be restricted to designated cleared areas.

Action: Main Roads Construction Manager / Construction Contractor

The Construction Contractor will conform to any specific requirements for fire prevention requested by the Shire of Manjimup, DEC and/or the Fire and Emergency Services Authority.

Action: Main Roads Construction Contractor / Construction Contractor



During road construction activities, the following fire management requirements will be complied with:

- » All plant and vehicles operating over vegetation will have exhaust systems in good working order
- » All machinery will be shut down during periods of extreme fire hazard as advised by DEC or the Shire of Manjimup; and
- » All machinery to be fitted with fire extinguishers.

Action: Main Roads Construction Manager / Construction Contractor

3.4.6 Fuel and Chemical Storage

No on-site storage of fuel, oils and other contaminant materials will be permitted during road construction.

Action: Main Roads Construction Manager / Construction Contractor

Major vehicle and plant servicing will not be conducted on the project site.

Action: Main Roads Construction Manager / Construction Contractor

3.4.7 Rubbish Disposal

Domestic site rubbish will not be disposed of by burning. All domestic rubbish, campsite effluent and other rubbish will be disposed of at an authorised waste disposal site, or a site agreed upon with the Shire of Manjimup.

Action: Main Roads Construction Contractor / Construction Contractor



4. Consultation

No formal public consultation program has been conducted for the Muirs Highway (SLK 34.8 – SLK 40.8) Reconstruction and Realignment Project as yet.

Main Roads will prepare and distribute a press release, within local print media, advising local community of the proposed roadworks and project timing.

Action: Main Roads Project Manager

During the development of this EIA and EMP, GHD consulted with DEC on several occasions:

- » Mr Mike McKenna from the DEC's Bunbury office was contacted regarding the project. No comment to date was provided.
- » Ms Kim Lewis also from the DEC's Bunbury office was contacted regarding the requirement for a Licence to Clear under the *Country Areas Water Supply Act (1947)*, and the relationship of this Act to the *Environmental Protection (Clearing of Native Vegetation) Regulations (2004)*. Ms Lewis advised that a licence is not required under the *Country Areas Water Supply Act (1947)*, and that clearing can be conducted under Main Roads Purpose Clearing Permit (CPS 818/2).
- » The DEC's Donnelly District and the Manjimup Branch undertook Rare Flora and Fauna and Dieback investigations within the project area. Mr Ian Wilson, District Nature Conservation Coordinator, advised that the implementation of the project would not significantly impact flora or fauna.
- » Mr Colin Hooper, Senior Disease Hygiene Officer Manjimup undertook Dieback interpretation of the project area. The dieback interpretation results and recommendations have been included in Section 3.1.10.



5. Environmental Approvals

5.1 Commonwealth Government

No environmental impacts identified during the preparation of this EIA and EMP are considered to warrant the referral of the project to the Commonwealth Minister for the Environment under the provisions of the *Environmental Protection and Biodiversity Conservation Act (1999)*.

5.2 Western Australian Government

It is not anticipated that the Muirs Highway SLK 34.8 – SLK 40.8 Reconstruction and Realignment Project will require referral to the EPA under the provisions of the *Environmental Protection Act (1986)*.

It is anticipated that the clearing of native vegetation required for the implementation of the project can be conducted under Main Roads Purpose Clearing Permit (CPS 818/2).



6. Environmental Compliance and Monitoring

Main Roads South West Region is responsible for the Muirs Highway Upgrade (SLK 34.8 – SLK 40.8) in line with the environmental management measures detailed in this EIA and EMP.

Action: Main Roads Project Manager

Environmental management measures detailed in this EMP will be included in the Technical Specification prepared for the project.

Action: Main Roads Project Manager

During the project construction phase, compliance with environmental management measures will be regularly monitored. Any non-conformances will be addressed at the first opportunity, while the non-conformance and any improvement actions implemented will be detailed in appropriate construction superintendence documentation.

Action: Main Roads Project Manager / Main Roads Construction Manager



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Standards Australia. (2002). *Australian Standard 1742.3-2002 Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works On-road*. Homebush, New South Wales

Water and Rivers Commission. (1996). *Policy and Guidelines: Granting of Licences to Clear Indigenous Vegetation in Catchments subject to Clearing Control Legislation*. Internal Water and Rivers Commission document.

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Figure 1

Project Concept Design Aerial Overlay



Appendix A

Project Environmental Aspects Table



Environmental Aspect	Potential Impact	Management Measure	Phase
Rivers, Wetlands and Drainage	Project area occurs within the Warren Recovery Catchment.	Minimise vegetation clearing and undertake clearing of native vegetation under Main Roads Purpose Clearing Permit (CPS 818/2).	Design and Construction
	Disturbance to Perup River.	Minimise impacts on Perup River by utilising existing river crossing and minimising vegetation clearing. If possible shift re-alignment as far south as possible to maximise distance to the river.	
	Disturbance to existing surface water flows.	Existing surface water flows will be maintained by replacing and / or extending existing crossroad culverts.	
	Potential spread of dieback through surface flows.	Design the roadside drainage where practicable so that road run-off drains directly into unprotectable or dieback infested areas.	
Vegetation and Clearing Permit	11.6 ha of clearing of native vegetation.	Clearing of native vegetation not at variance with clearing principles. Clearing of native vegetation can be conducted under Main Roads Purpose Clearing Permit (CPS 818/2).	Design and Construction
Declared Rare and Priority Flora	No DRF or Priority Flora within project area.	No impact	N/A
Threatened Ecological Communities	No threatened Ecological Communities within project area.	No impact	N/A



Environmental Aspect	Potential Impact	Management Measure	Phase
Environmentally Sensitive Areas	No ESAs within, or in close proximity, to the project area.	N/A	N/A
Weeds	Project area contains a variety of weeds.	Dieback hygiene measures will reduce potential of impact, export or spreading of weeds within the site. Topsoil management will ensure that weed infested soil is not respread in State Forest.	Construction Construction
Topsoil	Stripping and respread of topsoil	Manage topsoil stripping and respread. Respread topsoil in the section from which it was stripped.	Construction. Construction
Dieback Disease	The project area includes dieback uninfested (protectable) and dieback uninterpretable sections.	Implement dieback hygiene measures to minimise the risk of spreading dieback within and from the project area.	Design, Pre-construction and Construction
Fauna	Specially protected fauna species have been recorded in the project area. A low-density population of Western Ringtail Possum has been recorded in the eastern section of the project site in the past – none were observed during recent spotlight survey.	Works will not significantly impact any threatened species.	Construction



Environmental Aspect	Potential Impact	Management Measure	Phase
Aboriginal Heritage	The Perup River has been identified as an Aboriginal site associated with the <i>Dwert</i> or dingo Dreaming and is located within the project area.	Apply for Ministerial consent under Section 18 of the Western Australian <i>Aboriginal Heritage Act (1972)</i> to construct bridges or other types of crossings (and associated roadworks) over the Perup river.	Design
		Main Roads should initiate an update of the 1996 Ethnographic Survey for the project area.	Design
		Comply with Ministerial Conditions and recommendations made as a result of the 1996 survey.	Construction
European Heritage	No listed heritage sites in the vicinity of the project area.	No impact.	N/A
Land Acquisition	6.103 ha to be acquired from State Forest. 0.64 ha to be acquired from the 'C' Class Reserve (R1108).	Liaise with the Conservation Commission prior to proceeding with the excision process.	Pre-construction
		Acquisition of land from the 'C' Class Reserve (R1108) and State Forest will take into account the requirements of the Commonwealth <i>Native Title Act (1993)</i> .	Pre-construction
		Acquire land from private property under the provisions of the WA <i>Land Administration Act (1997)</i> .	Pre-construction
	7.06 ha to be acquired from private property.		
	Redundant sections of road to be amalgamated adjacent into State Forest.	Revest redundant road reserve into State Forest.	Post construction



Environmental Aspect	Potential Impact	Management Measure	Phase
Visual Amenity	No long-term change to current visual amenity expected.	Rehabilitate and revegetate redundant road reserve.	Post-construction
Contaminated Sites	No contaminated sites identified within the project area.	No impact.	N/A
Pre-Construction Activities	Service relocations may be required.	Comply with environmental management measures during pre-construction activities and at any time a service provider is involved in works within the project area.	Pre-construction
Construction Activities	Various short term impacts expected as a result of roadworks.	Manage impacts of roadworks according to EMP.	Construction
Monitoring	Monitor compliance with management measures.	Main Roads will regularly monitor compliances with environmental management measures outlined in EMP.	Construction
		Monitoring of rehabilitation and Landscaping Plan will be conducted for a minimum period of 3 years from the time of implementation.	Post-construction



Appendix B

Environmental Management Responsibilities and Actions Table (EMP)



Recommendation		Expected Outcome	Responsibility
<u>1.0</u>	<u>Overall Project Activities</u>		
Project Environmental Management			
1.1	Main Roads South West Region is responsible for the Muirs Highway (SLK 34.8 – SLK 40.8) upgrade in line with the environmental management measures detailed in this EIA and EMP.	Implement the project as detailed in this EIA and EMP.	Main Roads Project Manager
1.2	Environmental management measures detailed in this EMP should be included in the Technical Specification prepared for the project.	Document in contract documentation / specification environmental management measures.	Main Roads Project Manager



Recommendation		Expected Outcome	Responsibility
2.0 <u>Pre-construction \ Design Activities</u>			
Rivers, Wetlands and Drainage			
2.1	Roadside drainage will replicate that of the existing road by the use of table drains, off-shoot drains and culverts. Existing surface water flows will be maintained by replacing and / or extending existing cross-road culverts. Erosion control measures will be incorporated into the constructed drainage.	Maintain existing surface water movements.	Main Roads Project Manager / Main Roads Project Designer
2.2	Main Roads will design the roadside drainage in consultation with the Department of Environment and Conservation so that where practicable road run-off drains directly into unprotectable or dieback infested areas.	Reduce the risk of spreading dieback within and from the project area.	Main Roads Project Manager / Main Roads Project Designer
Dieback Management			
2.3	Dieback mapping and management measures will be updated within 12 months of the commencement of construction.	Update dieback mapping and management measures to be appropriate at time of construction	Main Roads Project Manager
Aboriginal Heritage			
2.4	Main Roads will initiate an update of the 1996 Ethnographic Survey for the Muirs Highway Upgrade Project (SLK 34.8 – SLK 40.8).	Consultation with Aboriginal community regarding the project and its impacts	Main Roads Project Manager
2.5	Main Roads will apply for Ministerial consent under Section 18 of the Western Australian <i>Aboriginal Heritage Act (1972)</i> to construct bridge approaches to the Perup River.	Comply with the requirements of the <i>Aboriginal Heritage Act 1972</i> .	Main Roads Project Manager
Land Acquisition			
2.6	Main Roads will seek the approval of the Conservation Commission for the acquisition of State Forest to road reserve prior to proceeding with the excision process.	Obtain approval from the Conservation Commission to excise the portion of State Forest required for the implementation of the project.	Main Roads Project Manager



	Recommendation	Expected Outcome	Responsibility
2.7	Acquisition of land from the 'C' Class Reserve (R11081) (0.62 ha) and State Forest will take into account the requirements of the Commonwealth <i>Native Title Act (1993)</i> .	Land to be acquired from the State Forest will be done so in accordance with the relevant act.	Main Roads Project Manager
2.8	Land that is to be acquired from private property should be acquired under the provisions of the <i>WA Land Administration Act (1997)</i> , which provides for financial compensation to affected landowners based on the current local market value and the area of land required.	Land to be acquired in consultation with landowners and in accordance with the relevant act.	Main Roads Project Manager
Service Relocations			
2.9	Environmental management measures detailed in the EIA and EMP that are applicable for the works relating to the service re-locations will be complied with by relevant service providers.	Implement environmental management measures during service relocations.	Main Roads Project Manager / Service Providers
2.10	A copy of the EMP (Appendix B) will be provided to the various agencies and contractors responsible for the service relocations with a requirement to fulfil the specific environmental management measures during service relocation works.	Implement environmental management measures during service relocations.	Main Roads Project Manager



Recommendation		Expected Outcome	Responsibility
3.0 Construction Activities			
Drainage			
3.1	Roadside drainage will replicate that of the existing road by the use of table drains, off-shoot drains and culverts. Existing surface water flows will be maintained by replacing and / or extending existing cross-road culverts. Erosion control measures will be incorporated into the constructed drainage.	Maintain existing surface water movements and minimise potential for erosion.	Main Roads Construction Superintendent / Construction Contractor
3.2	Main Roads will design the roadside drainage in consultation with the Department of Environment and Conservation so that where practicable road run-off drains directly into unprotectable or dieback infested areas.	Reduce the risk of spreading dieback within and from the project area.	Main Roads Construction Superintendent / Construction Contractor
Vegetation and Clearing			
3.3	Main Roads will undertake the clearing of native vegetation required for the implementation of the project under their Purpose Clearing Permit (CPS 818/2).	Implement the project under the provisions of the <i>WA Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i> .	Main Roads Project Manager
3.4	Main Roads will record and report on the project to DEC as the clearing of native vegetation required for the implementation of the project.	Comply with conditions of Main Roads Purpose Clearing Permit (CPS 818/2).	Main Roads Project Manager
3.5	Main Roads will implement and monitor weed management measures as part of the project.	Comply with conditions of Main Roads Purpose Clearing Permit (CPS 818/2).	Main Roads Project Manager
3.6	Dieback hygiene requirements will be complied with during the clearing activities.	Comply with dieback management measures	Main Roads Construction Manager / Construction Contractor
3.7	Prior to clearing for roadworks forest timber product will be salvaged from the project area by the Forest Products Commission.	Optimise utilisation of cleared timber.	Main Roads Project Manager / Forest Products Commission Contractor



	Recommendation	Expected Outcome	Responsibility
3.8	Remaining salvageable timber will be stockpiled on-site and made available for re-use.	Optimise utilisation of cleared timber.	Main Roads Construction Manager / Construction Contractor
3.9	During roadworks, damage to existing remnant vegetation will be avoided as far as is practicable. Clearing will be restricted to 3m from the edge of earthworks.	Minimise clearing impacts.	Main Roads Construction Manager / Construction Contractor
3.10	Prior to the start of clearing operations the Construction Contractor will mark out the clearing line and this will be checked by Main Roads Construction Manager to ensure that it is correctly defined. Trees of particular significance to be conserved will be clearly marked prior to the commencement of clearing.	Minimise clearing impacts.	Main Roads Construction Manager / Construction Contractor
3.11	Mature trees especially will be conserved as far as practicable and will not be disturbed for temporary works such as access tracks, spoil areas or site offices. Vehicles and equipment will not be parked or driven over tree roots.	Minimise clearing impacts.	Main Roads Construction Manager / Construction Contractor
3.12	Trees to be removed will be felled in a manner that ensures they fall within the approved clearing area.	Minimise clearing impacts.	Main Roads Construction Manager / Construction Contractor
3.13	Any damage caused by the Construction Contractor to vegetation, landforms or fauna habitat outside of the works area will be rehabilitated at the Contractor's cost. If environmental damage beyond the works area is identified Main Roads may withhold the payment of monies due to the Contractor, where the extent of damage exceeds \$5 000, determined at the following rates: » For damaged trees greater than 3m in height - \$1 000 each. » For damaged trees and shrubs up to 3m in height - \$500 each. » For damaged grassland, open soil areas, rock faces and landforms, and habitats in general - \$10 per square metre.	Minimise clearing impacts.	Main Roads Construction Manager / Construction Contractor



Recommendation	Expected Outcome	Responsibility
3.14 To minimise the potential for erosion and improved revegetation all cut batters steeper than 1 in 3 and greater than 1m in height will be benched at 0.5m intervals and covered with topsoil at the completion of earthworks.	Minimise soil erosion and provide for revegetation of batters	Main Roads Construction Manager / Construction Contractor
Weed Management		
3.15 Machinery and vehicle hygiene measures will avoid the inadvertent spread of weeds and the management measures detailed at 3.18 will minimise the potential for weeds to be inadvertently transported throughout the site, and from the site to other sites..	Minimise potential for the introduction and spread of weeds within, and from the project area.	Main Roads Project Manager / Construction Manager / Construction Contractor
Topsoil Management		
3.16 After the completion of timber salvage and clearing activities, topsoil will be stripped to a depth of 100 mm from the works area and windrowed parallel to the road alignment.	Manage topsoil during works.	Main Roads Construction Manager / Construction Contractor
3.17 Topsoil will be stored and respread within the section that it was stripped from to minimise the potential to spread dieback.	Manage topsoil during works.	Main Roads Construction Manager / Construction Contractor
3.18 At the completion of roadworks the topsoil will then be respread evenly to a depth of at least 100 mm over disturbed soil surfaces.	Manage topsoil during works.	Main Roads Construction Manager / Construction Contractor
3.19 Unsuitable material and spoil will only be disposed of in State Forest areas with the approval of DEC.	Manage topsoil during works.	Main Roads Construction Manager / Construction Contractor



Recommendation	Expected Outcome	Responsibility
Dieback Disease		
3.20 Dieback management measures will include: » All machines and vehicles to be clean prior to entering any protectable areas of forest. » Offshoots, roadside drainage and clean down points need to be strategically placed so that any waster and effluent drains directly into unprotectable or dieback infested areas. (Note: Main Roads will comply with this requirement wherever possible) » Hygiene management points will require ramp/skids, where machines and vehicles can be suspended above the effluent, during the cleaning down process. » If possible, program construction works in protectable uninfested/uninterpretable areas during dry soil conditions. Note: If this method is deployed then there would only be a requirement to either brush down of use compressed air to clean down machinery. » Operations should be carried out according to the <i>Phytophthora cinnamomi</i> Hygiene Plan in conjunction with the “<i>Phytophthora cinnamomi</i> and Disease caused by it, Volume I – Management Guideline” (CALM, 2003).	Manage dieback during roadworks.	Main Roads Project Manager / Main Roads Construction Manager / Construction Contractor
3.21 Further to these recommendations, logging, clearing and topsoil stripping will be carried out under the following dieback hygiene conditions: » Dieback boundaries will be clearly signed in the field by the use of signs and / or flagging tape. » All site employees will be advised of the dieback hygiene measures.	Manage dieback during roadworks.	Main Roads Construction Manager / Construction Contractor
Fauna		
3.22 DEC will brief contractors prior to the commencement of logging and/or clearing activities regarding appropriate management should Western Ringtail Possums be encountered.	Manage potential impacts on Western Ringtail Possums	Main Roads Project Manager



Recommendation	Expected Outcome	Responsibility
Aboriginal Heritage		
3.23 If during roadworks, any materials of significance to Aboriginal people are uncovered by the Construction Contractor, works will immediately cease within 50 m of the material and both Main Roads Aboriginal Liaison Officer and the DIA will be notified immediately.	Ensure that previously unidentified Aboriginal heritage Sites are not disturbed without appropriate approvals.	Main Roads Project Manager / Main Roads Construction Manager / Main Roads Construction Contractor
3.24 If skeletal material is uncovered during works then the WA Police Service will also be advised immediately.	Ensure that previously unidentified Aboriginal heritage Sites are not disturbed without appropriate approvals.	Main Roads Project Manager / Main Roads Construction Manager / Main Roads Construction Contractor
Environmental Management and Quality Plan		
3.25 The Construction Contractor will prepare a Quality Plan for the project, which will address the Construction Contractor's management responsibility, authority and communication requirements and clearly detail the Contractor's 'Quality Management Representative (QMR)' role with respect to the Contract in accordance with AS/NZS ISO 9001.	Ensure adequate environmental management during roadworks.	Construction Contractor
3.26 The Quality Plan will be submitted to Main Roads Superintendent for approval within twenty-eight days of award of the Contract or ten days of Possession of Site being granted whichever is the earlier.	Ensure adequate environmental management during roadworks.	Construction Contractor
Damage to Public Property, Noise and Vibration		
3.27 The Construction Contractor will nominate a person responsible for reviewing and monitoring all operations in order to prevent or minimise the impact of vibration, noise and dust and other forms of pollution on property and the public.	Minimise impacts of roadworks on property and the public.	Main Roads Construction Manager / Construction Contractor
3.28 Regardless, the Construction Contractor is required to observe its obligations under the <i>Environmental Protection Act (1986)</i> , the <i>Environmental Protection (Noise) Regulations 1997</i> and the Section 6 of the Australian Standard 2436 – 1981 “ <i>Guide to Noise Control on Construction, Maintenance and Demolition Sites</i> ”.	Minimise impacts of roadworks on property and the public.	Main Roads Construction Manager / Construction Contractor



Recommendation		Expected Outcome	Responsibility
Dust			
3.29	The Construction Contractor will employ construction methods that will keep dust lift to a minimum, and as required provide for the management of dust such as by watering of the works area and of roads, streets and other areas immediately adjacent to the works.	Minimise dust lift and impacts of dust and safety on the public.	Main Roads Construction Manager / Construction Contractor
3.30	Where it is found that vehicles leaving the site have dropped excessive soil material onto adjacent sections of Muirs Highway these sections will be swept to reduce the potential for dust generation and maintain traffic safety.	Minimise dust lift and impacts of dust and safety on the public.	Main Roads Construction Manager / Construction Contractor
Traffic Access and Safety			
3.31	The Construction Contractor will develop and implement a Traffic Management Plan congruent with the current Australian Standard Manual 1742.3 of Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works On-Road (Standards Australia) and the current Main Roads Traffic Management Requirements for Works on Roads.	Maintain safe access for through traffic and local traffic movements.	Main Roads Construction Manager / Construction Contractor
3.32	The Traffic Management Plan (TMP) will conform to the current Main Roads Traffic Management Requirements for Works on Roads and the current Australian Standard Manual 1742.3 of Uniform Traffic Control Devices: Part 3 Traffic Control Devices for Works On-Road (Standards Australia). The TMP will be submitted to Main Roads for approval within twenty-eight days of Award of Contract or within ten days of Possession of Site being granted or prior to the commencement of works, whichever is earlier.	Maintain safe access for through traffic and local traffic movements.	Main Roads Construction Manager / Construction Contractor
3.33	The Construction Contractor will submit with the TMP a Certificate of Compliance certifying that the TMP has been prepared and/or reviewed by an appropriately qualified person as defined in the current Main Roads publication Traffic Management Requirements for Works on Roads.	Maintain safe access for through traffic and local traffic movements.	Main Roads Construction Manager / Construction Contractor



	Recommendation	Expected Outcome	Responsibility
3.34	All traffic control measures will be in place and fully operational before the Construction Contractor commences any work activity that affects existing roadways.	Maintain safe access for through traffic and local traffic movements.	Main Roads Construction Manager / Construction Contractor.
	Fire Management		
3.35	Machines and vehicles will be restricted to designated cleared areas.	Reduce the fire risk as a result of roadworks.	Main Roads Construction Manager / Construction Contractor
3.36	The Construction Contractor will conform to any specific requirements for fire prevention requested by the Shire of Manjimup, DEC and/or the Fire and Emergency Services Authority.	Comply with local fire management requirements.	Main Roads Construction Contractor / Construction Contractor
3.37	During road construction activities, the following fire management requirements should be complied with: » All plant and vehicles operating over vegetation should have exhaust systems in good working order » All machinery will be shut down during periods of extreme fire hazard as advised by DEC or the Shire of Manjimup; and » All machinery to be fitted with fire extinguishers.	Reduce the fire risk as a result of roadworks.	Main Roads Construction Manager / Construction Contractor
	Fuel and Chemical Storage		
3.38	No on-site storage of fuel, oils and other contaminant materials will be permitted during road construction. Chemicals required for the cleanup of any accidental spillages will be maintained on-site.	Avoid hazardous chemical storage on the project site and maintain chemicals required for the clean up of any accidental spillages.	Main Roads Construction Manager / Construction Contractor
3.39	Major vehicle and plant servicing will not be conducted on the project site.	Avoid the occurrence of oil spillage from vehicle servicing on-site.	Main Roads Construction Manager / Construction Contractor



Recommendation		Expected Outcome	Responsibility
Rubbish Disposal			
3.40	Domestic site rubbish will not be disposed of by burning. All domestic rubbish, campsite effluent and other rubbish should be disposed of at an authorised waste disposal site, or a site agreed upon with the Shire of Manjimup.	Ensure that rubbish is disposed of appropriately.	Main Roads Construction Contractor / Construction Contractor
Monitoring			
3.41	During the project construction phase, compliance with environmental management measures will be regularly monitored. Any non-conformances should be addressed at the first opportunity, while the non-conformance and any improvement actions implemented should be detailed in appropriate construction superintendence documentation.	Monitor compliance with environmental management measures.	Main Roads Project Manager / Main Roads Construction Manager



Recommendation		Expected Outcome	Responsibility
4.0	Post Construction Activities		
Land Acquisition			
4.1	At the completion of roadworks and after revegetation redundant sections of road will be amalgamated with the adjacent State Forest.	Off-set the clearing impacts of the project.	Main Roads Project Manager
Revegetation and Rehabilitation			
4.2	Redundant sections of highway will be rehabilitated as described below: » All culverts, pipes, posts and other road furniture will be removed and disposed of at a Shire of Manjimup approved waste disposal site; » Redundant sections of road will be ripped to a minimum depth of 300 mm at a minimum of 300 mm spacings; » Redundant sections of road will be contoured to the existing landform as far as practicable; and » Redundant sections will be revegetated by direct seeding with locally occurring native vegetation species.	Successful rehabilitation of redundant sections of Muirs Highway prior to handover to the Conservation Commission for inclusion into the adjacent State Forest.	Main Roads Project Manager



Recommendation	Expected Outcome	Responsibility
4.3 The redundant sections of highway will be revegetated by direct seeding and hand planting of seedlings as described below: » Planting and seeding will be conducted at the break of the season (typically in April/May) » All species planted will be locally occurring indigenous species sourced from within the provenance » Prior to broadcast 60% of the seed mix will be pre-treated to break seed dormancy and improve germination rates. Seed will be pre-treated using smoke water concentrate or similar » Seed will be broadcast at a rate of 4 kg/ha » Direct seeding areas will be fertilised at a rate up to 200 kg/ha using Agras No. 1 with trace elements » Hand planting of 1000 overstorey species per hectare. Plants will be planted so that the root ball is covered with soil and the top of the root ball is 15 mm to 25 mm below the finished ground level; and » Slow release fertiliser tablets, Baileys “Apex Native” slow release fertiliser or equivalent, will be placed 100 mm to 150 mm below soil surface and 100 mm away from the root ball of each seedling.	Successful rehabilitation of redundant sections of Muirs Highway prior to handover to the Conservation Commission for inclusion into the adjacent State Forest.	Main Roads Project Manager
4.4 The completion criteria for the rehabilitation works as detailed in CALM’s “Guideline for the Management and Rehabilitation of Gravel Pits – South West Forest Areas” will be adopted for the site two years after seeding. This completion criteria requires 30 under / mid storey species and 4 upper storey plant species within any 10m x 10m grid over 90% of the rehabilitated area.	Successful rehabilitation of redundant sections of Muirs Highway prior to handover to the Conservation Commission for inclusion into the adjacent State Forest	Main Roads Project Manager
4.5 To minimise the potential for erosion and improved revegetation all cut batters greater than 1m in height will be benched at 0.5m intervals and covered with topsoil at the completion of earthworks.	Successful rehabilitation of redundant sections of Muirs Highway prior to handover to the Conservation Commission for inclusion into the adjacent State Forest.	Main Roads Construction Manager / Construction Contractor



Recommendation		Expected Outcome	Responsibility
Weed Management			
4.6	Main Roads will implement and monitor weed management measures as part of the project congruent with CPS 818/2.	On-going weed management within the project area.	Main Roads
4.7	Longer-term management of weeds within the project area will be conducted during the annual herbicide and weed management program conducted by Main Roads.	On-going weed management within the project area.	Main Roads



Appendix C

Photographs of the Project Area



Photo 1: Western end of project looking east



Photo 2: Deeside Coast Rd intersection looking west



Photo 3: Typical section of Muirs Highway project area



Photo 4: Eastern approach to Perup River bridge looking west



Photo 5: Eastern end of farmland re-alignment looking west



Photo 6: Eastern end of project area looking east



Appendix D

Conservation Significant Fauna Species Potentially Occurring in the Project Area



Schedule 1 species are those fauna which are Rare or likely to become Extinct as defined by the Wildlife Conservation (Specially Protected Fauna Notice) 2005.

Chuditch (*Dasyurus geoffroii*):

This species is also listed as Vulnerable under the EPBC Act. This mammal species has a patchy distribution throughout the southwest and has been recorded in the nearby State Forest. Chuditch are found in a variety of habitats including Jarrah-Marri forest where suitable hollow logs or den sites occur. They are a mobile nocturnal species with large home ranges (up to 15km²) where they forage for insects, small birds and mammals, and carrion.

Western Ringtail Possum (*Pseudocheirus occidentalis*):

This species is also listed as Vulnerable under the EPBC Act. This arboreal mammal was previously widespread in WA but is now restricted to coastal areas between Busselton and Albany in Peppermint (*Agonis flexuosa*) woodland. Inland populations have declined but they are believed to be relatively common and abundant in the Perup Nature Reserve and surrounding forest blocks near Manjimup, where they occur in the absence of Peppermint. Ringtail Possums are also prevalent in near coastal areas.

Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*):

This species is also listed as Vulnerable under the EPBC Act. This bird species is most common in the forests of the far southwest although it is considered to be threatened by its low fecundity precluding it from replacing the large numbers shot in the past. Feeding on the seeds of Marri, Banksia, Hakea and pear and apple orchards it also strips the bark from trees in search of beetle larva. The species is recognised as occurring in the area although clearing for road widening is not anticipated to pose a threat to the survival of local populations.

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*):

This species is also listed as Endangered under the EPBC Act. This species breeds primarily in the Eucalypt woodlands of the Wheatbelt (Salmon Gum and Wandoo) moving to the higher rainfall coastal areas when not breeding. It is likely to be a passing visitor to the project area.

Forest red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*):

This bird species was previously common occurring in Jarrah forest and feeding on the seeds of Jarrah, Marri, Blackbutt, Karri, Sheoak and Snottygobble. The species has declined due to the impacts of logging and fire in the southwest forests, loss of nesting sites to competition from feral bees and the extended range of Wood Duck and Shelduck.

Quokka (*Setonix brachyurus*):

This species is also listed as Vulnerable under the EPBC Act. Quokkas are widespread in the southern forest region occurring in areas of dense vegetation often along watercourses and surrounding wetlands. Foraging at night around the margins of water sources they tend to hide during the day. They are believed to converge in groups at suitable water sources at night although local populations are understood to widely disperse during winter.



Schedule 4 Species – Other specially protected fauna

Peregrine Falcon (*Falco peregrinus*)

This species is uncommon and prefers areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land. It may occur in this area.

Priority 3 Species

These are defined as “Taxa which is known from a few specimens or sight records, some of which are on land not under threat of habitat destruction or degradation. The Taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as a threatened fauna”.

Southern Brush-tailed Phascogale (*Phascogale tapoatafa*):

Historically widespread in south western Australia Phascogale are presumed to be abundant in suitable habitat of woodland and open forest. Now known from Perth through to Albany highest densities occur at a number of sites including the Perup/Kingston area. The Phascogale is a small arboreal carnivorous mammal that feeds mainly on insects and small invertebrates including spiders and centipedes. Phascogale have been recorded in the local area in recent years.

Priority 4 Species

Western Brush Wallaby (*Macropus irma*):

The Brush Wallaby is a grazing mammal widely dispersed across the south* west from Kalbarri to Cape Arid, including the local area. They are found in open Jarrah woodland with suitable grazing sites including areas of low cropped grass.

Priority 5 Species

Woylie (*Bettongia pennicillata ogilbyi*):

Woylies are ground dwelling nocturnal marsupials that shelter in domed nests of grass or shredded bark during the day. Believed to be once widespread over sub-tropical Australia their population and range has been reduced dramatically. Woylie are known to occur at the Perup Nature Reserve where suitable habitat of open forest and woodland with a low understorey of grasses or woody scrub. They occupy distinct home ranges that include both nesting and feeding areas.

Other species identified on the Environmental Australia database as being potential ‘trigger’ issues under the EPBC Act are listed below.

White-Bellied Sea-Eagle (*Haliaeetus leucogaster*):

This species is restricted to coastal areas and will not be impacted by road widening.



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