

BROOKTON HIGHWAY UPGRADE 2006

[Amended on 26-03-2008]

Project Rehabilitation Plan

For Gorge Rock and Hartley to Bartlett Rd Sections

215.95 SLK to 218.250 SLK

221.05 SLK to 226.00 SLK



Project Manager: Henryk Marek (SPM)

Environmental Officers: Peter Denton (TO); Rowena Beaton (SVE)

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1. ABOUT THIS DOCUMENT

Main Roads' Wheatbelt South division have been progressively re-constructing various sections of the Brookton Hwy (which is a major tourist route) since the early nineties. The above sections (215.95 - 218.25 SLK and 221.05 - 226.00 SLK) were identified for reconstruction due to pavement widths, line of sight and curve alignment which were all far below standard.

The planned construction requires the clearing of native vegetation. In order to offset the vegetation removed, Main Roads will rehabilitate cleared areas such that after construction, the net vegetated area is greater than before clearing.

This document details the planned rehabilitation methods.

1.1 Project Stakeholders

Relevant stakeholders include Main Roads Western Australia (MRWA), local environmental groups, project neighbours, the Corrigin Shire Council, local Aboriginal groups, the Department of Environment and Conservation [DEC], the Environmental Protection Authority (EPA) and any other interested groups.

****Attached to this document is an aerial photograph of the project area: colour coded to give a quick overview of the extent of proposed rehabilitation works.**

2. SUMMARY OF REHABILITATION

2.1 Areas to be rehabilitated

- Two sections of closed road
- Four access tracks, including an access road to Gorge Rock
- An old (disused) gravel borrow pit within the project area
- Forming road reserves alongside the new road (on resumed farmland)
- The batters and embankments of a truncation through bushland
- The project gravel borrow pit on adjacent private land (at the end of construction).

See Appendix A for photographs of areas referred to in this document.

2.2 Rehabilitation methods

- Ripping of hardstand banks, access tracks and existing sealed road surfaces
- Cross ripping and battering of exhausted on-site gravel pit
- Planting of native species in seedling form
- Direct seeding of native seed, and “brush” seeding of pre-cultivated surfaces
- The spreading of seed laden clean gravel from an on-site gravel pit
- The spreading of seed laden topsoil from the proposed cleared area of the Nature Reserve at Gorge Rock site to be spread on the adjacent old road after cultivation.
- Spraying with glyphosate to reduce weed invasion and encourage natural germination of local species.

2.3 Timing

Works would be undertaken between the months of May 2006 through to July 2008, weather permitting. Weather is a critical factor – dry conditions will delay commencement date, and an extremely dry or wet season will affect germination. The success rate of plant species will largely be determined by weather conditions.

2.4 Anticipated project outcomes

In total, 17.2 Ha of land will be rehabilitated by the end of this project, offsetting the 2.43 Ha which will be cleared for construction.

Success of the rehabilitation would realise new vegetated corridors as near as or better than the original bushland. These corridors will connect other remnant bushland areas, forming habitat, nesting sites and safe passage for locally migrating fauna species, and the continuation of pollen and seed movement of plant species. Aesthetics, although considered a lesser factor than above will be of some benefit to tourism and general road users.

It is expected that the corridors will mature and become sustainable within 7 – 25 years.

3. EXISTING ENVIRONMENT: SPECIES COMPOSITION

A site visit was carried out by environment officers P Denton and R Beaton in January 2006 to examine the existing vegetation. The following species were identified for use in the revegetation process, although some of the species are difficult to propagate and not readily available as growing plants. In this scenario reliance will be placed on natural regeneration.

3.1 Hartley Road to Bartlett Road section (highway closure)

Melaleuca uncinata (broombush) and *Casuarina campestris* are the dominant species.

The following species are also present: *Leptospermum erubescens*, *Eucalyptus eremophila* (tall sand mallee), *Hakea scoparia*, *Lepidosperma* (sp.), *Eucalyptus wandoo*, *Eucalyptus capillosa* (inland wandoo), *Gastrolobium spinosum*, *Hakea lissocarpha*, *Santalum acuminatum* (quondong), *Grevillea tridentifera*, *Damperia* (sp.), *Acacia lasiocalyx*, *Epacris* (sp.), *Dianella revoluta*, *Eucalyptus loxophleba* (subs. *gratieae*), *Allocasuarina heugeliana*, *Eucalyptus loxophleba*, *Eucalyptus salmonophloia*, *Acacia acuminata* and *Acacia microbotrya*.

3.2 Gorge Rock alignment

The dominant species in the vicinity of Gorge rock are *Lepidosperma* (sp.), *Borya* (sp.) and *Dianella revoluta* (though *Acacia acuminata* is dominant on the eastern side of the Old Kulin road).

Also present are *Conosperma* (sp.), *Allocasuarina campestris*, *Grevillea tridentifera*, *Glystrocharyon aureum*, *Carex* (sp.), *Hakea verrucosa*, *Melaleuca platycalyx*, *Persoonia* (sp.), *Allocasuarina microstachys*, *Santalum spicatum* (sandalwood), *Stipa elegantissima*, *Waitzia* (sp.), *Verticordia* (sp.), a dodder vine species and various sedges.

3.3 Kondinin end

This stretch of straight road consists primarily of woodland with little or no undergrowth. Several weed species were located, namely wild oats and annual ryegrass.

The species present are *Eucalyptus salmonophloia*, *Eucalyptus loxophleba*, *Eucalyptus erythronema*, *Eucalyptus salubris*, *Allocasuarina heugeliana*, *Melaleuca acuminata*, *Maireana brevifolia* and *Atriplex semibaccata*.

4. DETAILED METHODOLOGY

4.1 Rehabilitation of Hartley Road to Bartlett Road section (highway closure)

The existing highway between the bend after Hartley Road and the intersection with Bartlett Road will be closed. There will be 3.75 Ha of land available for rehabilitation after this closure.

The sealed surface will be ripped and then graded to each side to fill in drains. The remaining soil and gravel underneath is to be ripped to 300 mm deep. Every 100 metres, for a distance of 20 metres, the ripping is to be undertaken across the profile to reduce erosion.

An existing stockpile of gravel in the bush pit at 217.62 SLK is to be spread over the ripped roadway at staggered intervals. The whole area is then to be cultivated with a disc harrow or similar implement.

Direct seeding of a pre-mixed seed and carrier (vermiculite or damp yellow sand) at 100 L/Ha of carrier and 2.5kg/Ha of seed can then be executed. Additional brush seeding cut from adjoining trees and shrubs can then be spread intermittently over the whole area to provide soil protection and add to the seed base.

There will be no need for weed control in this section.

4.2 Rehabilitation of closed Gorge Rock section of highway

An 800 metre section of highway (from 221.7 to 222.7 SLK) alongside Gorge Rock will also be closed as part of this project, and a new truncation set to the south (see below). After this closure, there will be approximately 1.2 Ha available for rehabilitation (including two rest areas). This road will be rehabilitated in the same method as for the Hartley Road to Bartlett Road section (see above).

Note: Investigations are still being undertaken as to which access track into Gorge Rock will be closed, and which will remain open. The continued use of the current access track involves keeping part of this section of highway open, which will reduce the area to be rehabilitated by 0.2 Ha.

4.3 Rehabilitation of new truncation (Gorge Rock realignment)

The new truncation of the highway (which bypasses the current Gorge Rock highway section as described above) requires the clearing of .82 Ha of native vegetation, of which approximately 0.45 Ha will be revegetated.

All vegetative and topsoil materials (deemed weed free and pristine) resulting from clearing and construction of the new truncation are to be stockpiled at the worksite. At the end of the project, the batters and embankments of the new truncation are to be ripped and treated with this material as a mulch and seed base, eliminating the need to conduct a direct seeding process.

Any remaining material will be spread on the adjacent Gorge Rock closed highway section (see above).

4.4 Rehabilitation of Kondinin end acquired roadside area

From 222.7 to 226 SLK, land has been resumed which expands the road reserve to 40 m width. Prior to construction, existing vegetation on the northern side of the road will be

cleared (total area approximately 1.6 Ha). After construction, 2.6 Ha will be rehabilitated.

Heavy clays and clay loam make the direct seeding method undesirable in this area, particularly as the project site is in a low rainfall area.

Planting lines will be ripped prior to winter. These lines are to be no more than 300mm deep and spaced at 2.5 metres apart, with a 3 metre gap between the new farm fence and the first tree rip line. Trees and shrubs are to be planted at 2 metre spacing.

Acquired roadside areas are to be sprayed to control weed growth in the initial stages. Chemicals to be used are Glyphosate at 2 L/Ha and Simazine at 100 mL/Ha. This will take place after the opening winter rains and major weed germination.

4.5 Creation of road reserves for Lewis's resumption

The new Hartley-Bartlett Road highway will cross resumed land for 1800 m. Land resumption width is 60 m in this section, so after construction 5.6 Ha of farmland will be rehabilitated. 0.36 Ha of clearing is required prior to construction, 0.12 Ha of which is previously cleared land.

The reserves will be planted with seedlings, as in the "Kondinin end" area, since weeds and clay soils would cause direct seeding to be ineffective. Lines will be ripped at 2 m apart, and planting will occur at 2 m intervals. Weed control will be implemented in the same way as in the "Kondinin end" section (see above).

4.6 Rehabilitation of access tracks and existing borrow pit at 217.62 SLK

The pit at 217.62 SLK is approximately 0.4 Ha in area and contains one gravel pile of approximately 1000 m³ in volume. Most of this stockpile will be used on the closed section of highway from Hartley to Bartlett Road. All remaining gravel is to be spread evenly over the pit and blue metal hardstand areas, and then ripped on the contour with rip lines 300mm deep. The area can then be direct seeded as per Hartley-Bartlett Road.

All other access tracks identified during the site visit (of which there are 4, totalling 1.16 Ha in area) are to be ripped, closed off and direct seeded. Additional brush seeding cut from adjoining trees and shrubs can then be spread intermittently over the whole area.

4.7 Rehabilitation of landowners' (Lewis's) borrow pit

The project borrow pit is approximately 2 Ha in area.

Road works spoil (particularly weed laden spoil) which is not used in revegetation is to be carted in to replace bulk excavations at the project end. It will then be covered by stockpiled paddock overburden and levelled to the original ground line profile.

4.8 Project Monitoring

All rehabilitated and revegetated sites will be monitored ongoing;

[a] By before and after photographic detail of individual sites.

[b] On ground species identification, specifically for new germinants on rehabilitated existing alignment and batters.

[c] Record rainfall during growing season, as in the past several years [due to drying seasons and climate change] rainfall has been a critical factor in determining the

performance of seedlings. Over the past 5 years rainfall generally in the region has diminished by up to 25%. Change of climate will determine what species will be planted in the future and when they will be planted.

[d] Records are to be kept and updated.

[e] Infill planting of failed areas commenced in the 2008 season, offset areas will be monitored for strike rates and infill planted where necessary under the Regional Revegetation Planning Scheme.

Minimising damage during and after construction.

4.8 Clearing

Where the re-alignment traverses existing fragile bushland areas, clearing will be kept to a minimum; and wherever possible only one side of the road reserve will be cleared.

Cleared vegetation will be re-used as seed material and soil cover, rather than stockpiled. Large logs will be retained and used on site as habitat. Local (weed free) earths will also be re-used as topsoil.

All other unused vegetative materials from the clearing process, shall be mulched and respread at the immediate site.

4.9 Machinery

All machinery movements are to be strictly confined to and within the tagged clearing zone.

General Hygiene

All servicing of machinery is to be carried out in one location only (preferably off site). Oil filters, mechanical parts and other disposable items are to be transferred to an approved refuse site, and not left on site.

Any chemicals that are to be used on site must be accompanied by the relevant MSD sheets [Material Safety Data] and made readily available to all employees, visitors and contractors working on the site.

All care is to be taken not to spill fuels, chemicals, oils and greases at the worksite.

All other refuse created during construction is to be taken to an approved refuse site.

4.10 Weed issues

Machinery travelling from outside of worksite to the worksite must be weed seed free. All soil debris must be washed off prior to entering worksite.

Machinery and other work vehicles must have tyres checked for calthrop and double gee before entering worksite. Special care is to be taken in the Gorge Rock new truncation.

Since the project site receives less than 400 mm average annual rainfall, dieback (phytophthora cinnamomi) is not considered to be an issue, and does not warrant a dieback survey to be carried out.

4.11 Spoil management

Movement of all spoil is to be confined to the immediate construction area.

Exceptions:

- Weed-infested spoil is to be carted to landholders' borrow pit.
- All other weed free gravels and soils are to be used in on-site rehabilitation after construction.

Revegetation; Gorge Rock Nature Reserve Section

The 800 metre section [1.6ha] to be cleared through the Nature Reserve is specific to being revegetated with local species. At this site, 2.6ha [of the total area of Project site of 17.2ha as offsets] will be revegetated as an offset as outlined below.

All new cleared areas will be bordered by virgin bushland, which will hinder weed invasion.

With the planned revegetation process, extra care is to be exercised to ensure that the original vegetation complex is re created as close to or as existing . This will be dependant however on seasonal conditions, synthetic nutrient levels and requires an extended time frame of up to 25 years for the complex to begin the sustainability process. The following procedures are to be adhered to as to ensure that the desired result is realised.

- Seed is collected from the site specific [Seedlings are now in propagation from local seed]
- *Plant seedlings and respread saved topsoil from clearing at optimum time. The material will be spread over old ripped road surfaces and batters. [This process must take place prior to Winter or valuable seed stock will lose viability]*
- Spray for weed control [Post emergence for narrow leaf grass control]
- Monitor ongoing vegetation progress
- Collate Photographic history [Already in action]
- Monitor fauna activity and floral movements

Specific species such as *Eucalyptus loxophleba*, *Allocasuarina campestris*, *Acacia acuminate*, *Acacia lasiocalyx*, and *Eucalyptus salmonophloia* as the dominant species will form the over story.

Eucalyptus loxophleba [York Gum] and *Acacia acuminate* [Jam Tree], are prolific colonisers after disturbance.

Other species such as *Dianella revoluta*, *Grevillea tridentifera*, Sedge species, annual herbs, mosses plus other species such as *Waitzia* would be expected to colonise following winter rains.

H52 222SLK-226SLK Gorge Rock Project [15,000]

Acacia acuminata
Acacia lasiocalyx
Eucalyptus salmophloia
Eucalyptus loxophleba
Eucalyptus loxophleba [grateia]
Eucalyptus capillosa
Eucalyptus erythronema
Eucalyptus eremophila
Eucalyptus salubris
Allocasuarina heugeliana
Allocasuarina campestris
Leptospermum erubescens
Melaleuca spicigera
Melaleuca cordata
Melaleuca acuminata
Melaleuca uncinata
Melaleuca radula
Hakea multilineata
Hakea verrucosa
Hakea lissocarpha
Santalum spicatum.

Appendix A: Site Photographs Prior to Works

Figure 1: Hartley – Bartlett road section (taken at 216.1 SLK facing east).



Figure 2: Farmer's access track (216.1 SLK facing north).



Figure 3: Embankment near gravel pit (216.72 SLK facing south-east).



Figure 4: Gravel pit at 216.72 SLK, showing old gravel pile.



Figure 5: Gravel pit at 216.72 SLK, showing blue metal hardstand.



Figure 6: Access road from gravel pit (216.72 SLK facing east).



Figure 7: Access track to Lewis's resumption (215.8 SLK facing west).



Figure 8: New alignment across resumed farmland, Lewis's resumption (218.1 SLK facing west).



Figure 9: Proposed Gorge Rock alignment (facing east).



Figure 10: Proposed Gorge Rock alignment (facing west).



Figure 11: Existing Gorge rock alignment, to be closed (221.9 SLK facing west).



Figure 12: Existing road exiting Gorge Rock, to be widened (222.8 SLK facing east). Left side only to be cleared.



Figure 13: Existing road, Kondinin end, to be widened (224.8 SLK facing east). Left hand side only to be cleared.



Photographic History-Environmental Revegetation Projects