REVEGETATION PLAN

Gibb River Road upgrade works
SLK 324.1 - 370
Gravel Resheeting

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GIBB RIVER ROAD UPGRADE WORKS
SLK 324.1 – 370

REVEGETATION PLAN

1. PROJECT DESCRIPTION

1.1 Purpose

Main Roads Western Australia (MRWA) has a policy aim to "protect and enhance the environmental values of road reserves". This document has been prepared to ensure compliance with Main Roads' Environmental Policy and Main Roads' statewide Purpose Permit CPS 818/5.

In the process of establishing new roads and upgrading existing roads, there is often a need to undertake revegetation of the road reserve or other affected areas. Where clearing of native vegetation is to occur under Main Roads' statewide Purpose Permit CPS 818/5, a revegetation plan is required for temporary clearing (eg. borrow pits, access tracks, camps etc.). Where the temporary clearing exceeds 0.5ha, the revegetation plan needs to be forwarded to the Department of Environment and Conservation prior to clearing.

This revegetation plan sets out the rehabilitation requirements for the upgrade works occurring along the Gibb River Road SLK 324.1 – 370.

The purpose of the revegetation plan is to identify effective revegetation practices that help accelerate the natural succession processes that occur following the clearing of native vegetation and soil disturbance.

1.2 Background

The Gibb River Road is predominantly gravel road that was originally built to provide road access to remote Kimberley stations. The road runs approximately 650 kms between Derby and intersects with the Great Northern Highway between Wyndham and Kununurra.

Main Roads Western Australia (MRWA) is planning to commence road formation and drainage improvements along 45.9km of the Gibb River Road (SLK 324.1 – 370).

The road improvement works will be staged over a couple of years and will aim to improve the condition of the road, provide increased serviceability, reduce maintenance and freight costs and improve the level of serviceability to the local community.

Figure 1 indentifies that location of the project area.

1.3 Previous Assessment Work

GHD (March 2011) Report for Gibb River Road Upgrade Works SLK 324.1 – 370 Environmental Impact Assessment and Environmental Management Plan.

1.4 Project Description

The proposed road formation and drainage improvements will improve the road condition, provide increased serviceability, reduce maintenance and freight costs and improve the level of serviceability to the local community.

Clearing of remnant native vegetation will occur for the removal of borrow and gravel material for embankment fill and gravel resheeting of the existing gravel road. Minor road widening, establishment of a temporary sidetrack for traffic diversion and the establishment of offshoot drains will also result in clearing of vegetation.

Road improvements works will be staged over a couple of years. If the whole section of the Gibb River Road from SLK 324.1 – 370 is upgraded, clearing of (up to) approximately 150 ha of native vegetation could occur. Most of the clearing will be associated with the establishment of a sidetrack, borrow pits and gravel pits and much of this clearing will be temporary with rehabilitation undertaken to restore disturbed areas. Environmental impacts and management measures outlined in the Environmental Management Plan (GHD, 2011) aim to minimise any potential environmental impacts from the proposed upgrade works.

For 2011 proposed upgrade works, the following areas to be rehabilitated are shown in Table 1:

Table 1: Revegetation Area Details

Type	**Area**
Temporary clearing revegetation	40 hectares
Other revegetation	Nil

**For future upgrade works proposed 2012 and 2013, Main Roads will calculate the quantity of temporary clearing and notify the DEC prior to any clearing being undertaken.*

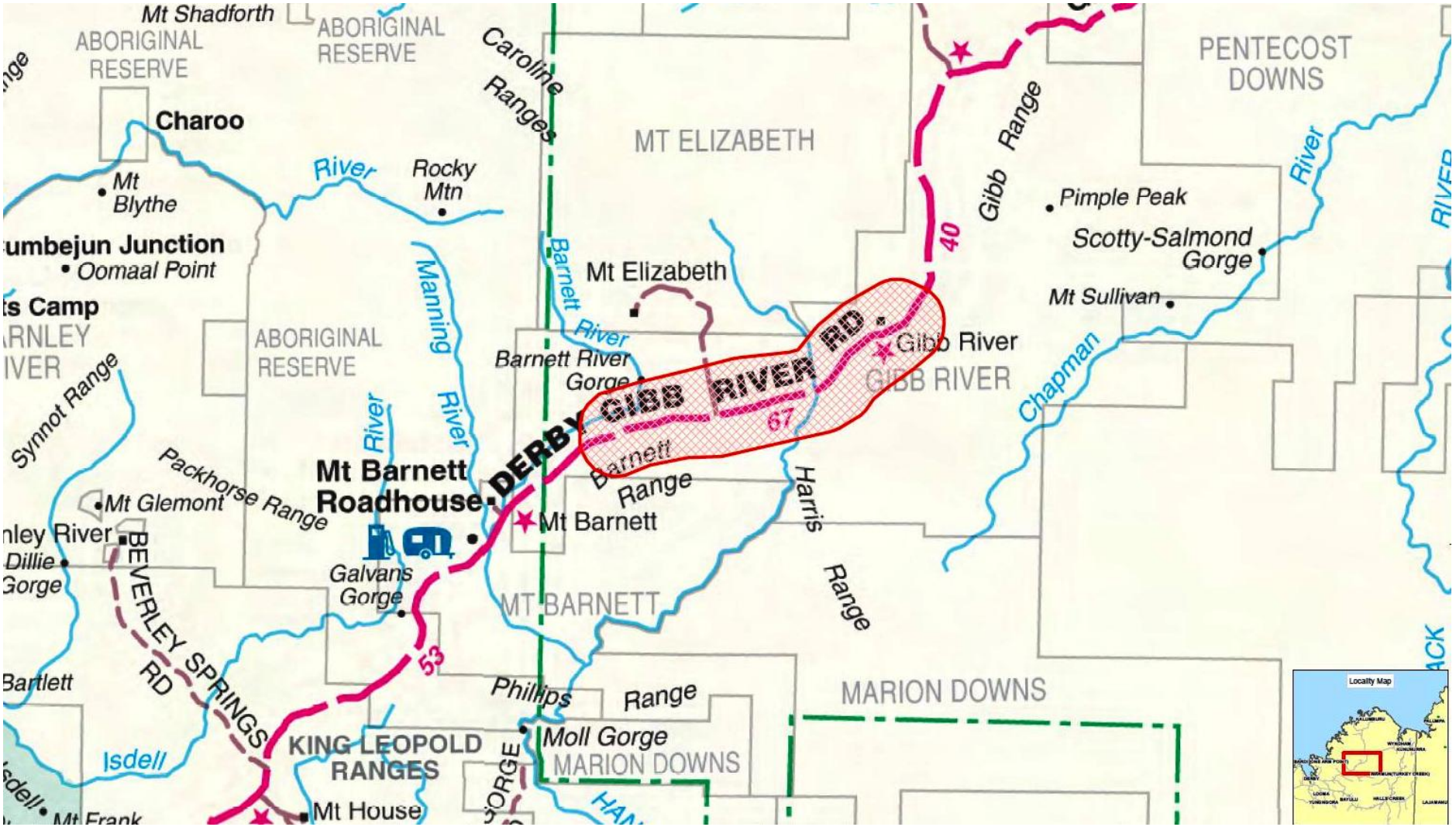

Figure 1…Location of Gibb River Road upgrade works

1.5 Existing vegetation

Vegetation type, extent and conservation status (after Shepherd *et al*., 2002) for the Gibb River Road upgrade works:

Vegetation Association Number	Association Description	% Remaining
739	Grasslands, high grass savannah woodland; grey box *Eucalyptus tectifica* and cabbage gum over white grass (*Sehima nervosum*)	100.0

1.6 Weeds

Weeds of National Significance (WONS), Declared Plants and Regionally significant weed species that *may* occur in the project area are as follows:
Mesquite – *Prosopis paalida*
Parkinsonia – *Parkinsonia aculeata*
Prickly Acacia – *Acacia nilotica*
Rubber Vine – *Cryptostegia grandiflora* and *C. madagascariensis*
Salvinia – *Salvinia molesta*
Bellyache Bush – *Jatropha gossypifolia*
Noogoora Burr – *Xanthium strumaruim*
Lead Tree – *Meucaena leucocephala*
Calotrope – *Calotropis procera*

2. SITE PREPARATION

2.1 Vegetation clearing, mulching and re-use

All vegetation will be cleared from the works area and non-weed infested vegetation will be stockpiled. Stockpiled vegetation will not be placed on the very edge of the approved cleared area in order to prevent machinery going outside the cleared area to push the stockpile forward again. Weed infested vegetation will be disposed of at an appropriate site. Burning of the cleared vegetation will not be permitted.

2.2 Topsoil stripping and re-use

Topsoil will be stripped to a maximum depth of 100 mm. Topsoil will be stored in a weed free (as far as possible) area, as close as possible to the area to be rehabilitated. The topsoil will be placed in windrows of less than 1.5m in height and reinstated as soon as possible, to prevent deterioration to the in-situ seeds and maintain seed viability.

3. WEED CONTROL

Weeds can out-compete the local native species and reduce the habitat value. The following management procedures will be implemented to minimise the potential for spread of Declared Plants and environmental weeds:

- Adequate control measures will be incorporated to ensure weeds are killed or not transported to other areas. Control measures include removal of weeds to an approved dump site or treatment of weeds such as using herbicide spraying;
- Herbicide spraying shall only be carried out by licensed operators and herbicide shall be mixed and applied in accordance with manufacturer's instructions;
- Any observed Declared Plant infestations shall be treated prior to clearing if an effective control is available;
- Where practicable, weeds should not be removed when they are in flower or seeding;
- Minimum clearing footprints will be utilised where practicable to avoid creating conditions suitable for weed proliferation;
- Measures to prevent plants, seeds and topsoil being moved to non-infested areas will be implemented;
- All machinery shall be free of built up soil and vegetative material before entering and leaving the site to help minimise the transportation of weeds and their seeds;
- No weed-infested soil material or road-building material shall be imported into the area as fill;
- Exploration of soils should be avoided in those areas affected by infestation;
- Exposed areas such as bare batters and borrow pits shall be promptly rehabilitated to reduce the ingress of weeds;
- Where works are adjacent to good quality vegetation, weeds within the project area will be removed or killed once a year for up to three years.

4. REVEGETATION THROUGH REGENERATION

4.1 Revegetation objectives

The revegetation objectives are to:

- Ensure roadside stability and minimise ongoing maintenance;
- Ensure that conservation values and biodiversity are protected; and
- Ensure local amenity and aesthetics are enhanced.

4.2 Required vegetation cover

The roadside vegetation should be similar in structure and content to comparable naturally occurring vegetation in the local area and will reflect the vegetation communities present in the road reserve and adjacent bushland. The width of the vegetation setbacks and clearances will be appropriate for the specific location and will be dependent on an assessment of the road design speed, road alignment and the roadside batter slopes.

4.3 Revegetation Techniques

The following rehabilitation works shall be undertaken on areas of disturbed earth requiring rehabilitation:

- Topsoil will be uniformly respread to a minimum depth of 100mm over the area; and
- Area to be ripped to a minimum depth of 200mm deep with rip lines approximately 300mm apart. Where slopes are present, rip lines shall be along contours.

The following rehabilitation work shall be undertaken at borrow/gravel pits:

- Overburden and then topsoil shall be uniformly and evenly spread over the disturbed areas of the pit. Depending on the slope of drainage lines within the pit, it may be necessary to form small swales from the topsoil to reduce erosion velocities and encourage the deposition of seeds.
- The existing pit floor shall be ripped to a depth of 300 – 500mm deep with rip lines between 500 - 800mm apart, if the material in the floor of the pit is able to be ripped. The whole area of the pit, including drainage lines, shall be ripped.

- All stockpiled vegetation shall be spread along the contour and pit floor to help promote seed deposition and further reduce erosion velocities.

4.4 Timing and Staging of Revegetation Works

Project works are planned to continue for two-three years during the dry seasons of 2011, 2012 and 2013. Gravel and borrow area which have been exhausted of material will be rehabilitated, with topsoil and vegetative material respread over disturbed areas, at the end of each dry season.

The approximate timing and staging of revegetation works is outlined below –

Timing	Timing
Clearing and stockpiling of vegetation	May-June 2011
Stripping and stockpiling of topsoil	May-June 2011
Re-spreading of topsoil and vegetative material	October/November 2011
Monitoring and maintenance	April/May 2012 April/May 2013

**Monitoring will continue for a minimum of two years following completion of works*

5. VEGETATION ESTABLISHMENT PERIOD

The vegetation establishment period will be for at least twelve months following the completion of the works. During this period, the maintenance and monitoring will be undertaken, see Section 6.

6. ONGOING MAINTENANCE AND MONITORING

Maintenance and monitoring of the project shall be ongoing to measure regeneration effectiveness and to control weeds.

6.1 Maintenance and Monitoring

After rehabilitation activities are undertaken, rehabilitated areas will be inspected for a minimum of two years following completion of works. Rehabilitated areas will be inspected in April or May and just prior to the wet season (approximately 9 months after rehabilitation efforts) to assess rehabilitation performance against the completion criteria outlined below. Monitoring of the rehabilitation activities will determine if follow up seeding will be required.

If required, follow up herbicide applications will occur on problem weeds for up to three years after topsoil respread or planting/seeding. This herbicide will be spot sprayed on the weeds by hand to avoid overspray onto native plants and will allow these plants to develop without competing with weeds.

Monitoring will essentially involve visual assessment to ensure the rehabilitation works have been implemented as planned. Table 2 shall be used as the monitoring guide to assess the success or otherwise of the revegetation / rehabilitation plan.

Due to the variable rainfall patterns in pastoral areas, revegetation works may not be successful, despite the use of best management practices.

Table 2: Revegetation Monitoring Guide

Criterion	Target	After six months	After one year	After three years
Mean vegetation foliage cover (%) excluding weeds.	>50	0	20	40
Mean number of stems (excluding weed species) / ha within each rehabilitated area	100 stems / ha	400 stems / ha	300 stems / ha	200 stems / ha
Mean weed foliage cover (%).	<20	<20	<20	<20
Amount of bare soil areas >4m^2 (%).	<30	<100	<80	<70