REVEGETATION PLAN

Galvans Gorge to Barnett Gorge
Gibb River Road, SLK 286.5 – 324.1
Gravel Resheeting Project

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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 818/4.

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 818/4, 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 Galvans Gorge to Barnett Gorge, Gibb River Road gravel resheeting project, SLK 286.5 – 324.1.

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.

MRWA is planning to commence road formation and drainage improvements along approximately 37 km of the Gibb River Road (SLK 286.5 – 324.1).

Figure 1 indentifies that location of the project area.

1.3 Previous Assessment Work

GHD (April 2009) Galvans Gorge to Barnett Gorge (SLK 286.5 – 324.1) Preliminary Environmental Impact Assessment.

GHD (August 2009) Galvans Gorge to Barnett Gorge (SLK 286.5 – 324.1) Targeted Flora Survey.

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.

It is proposed to investigate nine material investigation areas (MIAs) to locate naturally occurring gravel material suitable for resheeting of the Gibb River Road project. Not all of the areas detailed in Figures 1-4 will be required to be cleared and excavated but the best available materials will be sourced from within the areas.

Once Aboriginal heritage clearances have been undertaken for the proposal (expected to occur November 2009), Main Roads will have a clearer understanding of areas that can and cannot be accessed. Currently, Main Roads believes that suitable road building material could occur in MIA 2 (northern section), 3, 5, 6 and 8. If Main Roads is able to obtain Aboriginal heritage clearances for these MIAs, then clearing activities will only be undertaken in these areas.

As the road through this area is gravel and will remain so for the anticipated future it is essential that one of the pits remain active (open) to allow maintenance and flood damage repairs to be undertaken. Main Road anticipates that either MIA 3 or 6 will need to remain open. All other pits that are excavated will be rehabilitated.

The areas to be rehabilitated are shown in Table 1:

Table 1: Revegetation Area Details

Type	**Area**
Temporary clearing revegetation	37 hectares
Other revegetation	Nil

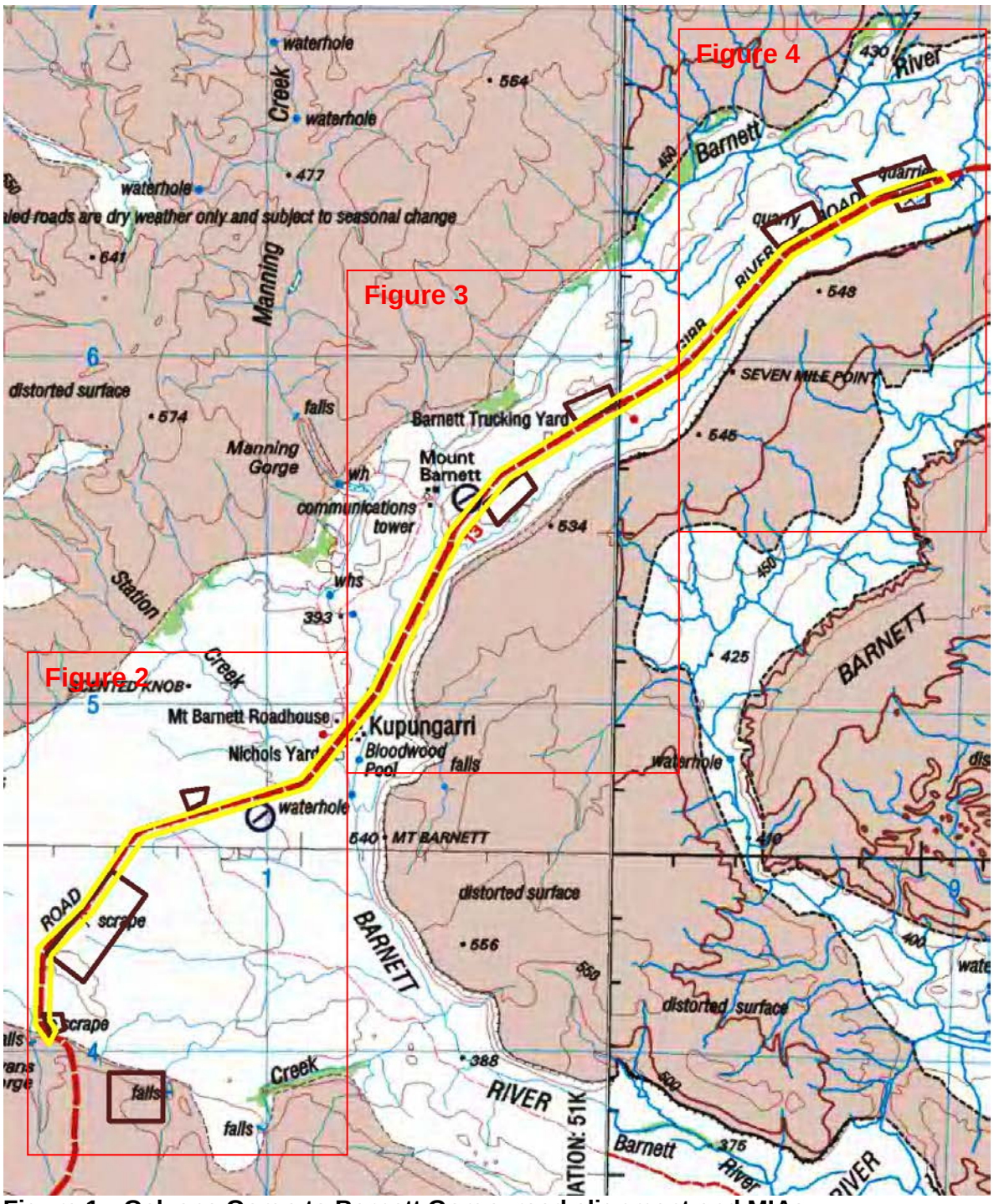

Figure 1…Galvans Gorge to Barnett Gorge, road alignment and MIAs.

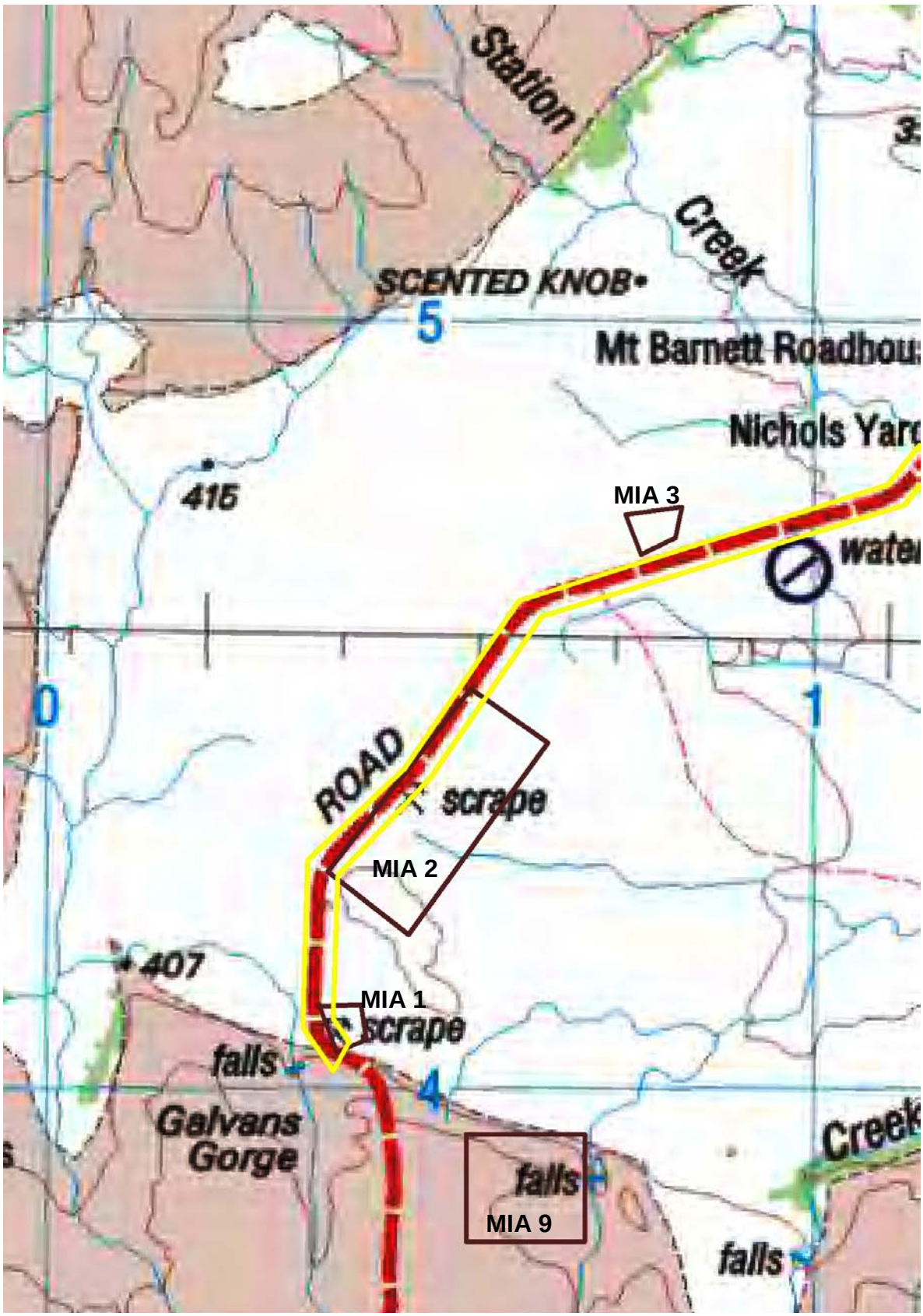

Figure 2…Galvans Gorge to Barnett Gorge (southern section) project area, including MIAs 1, 2, 3 & 9.

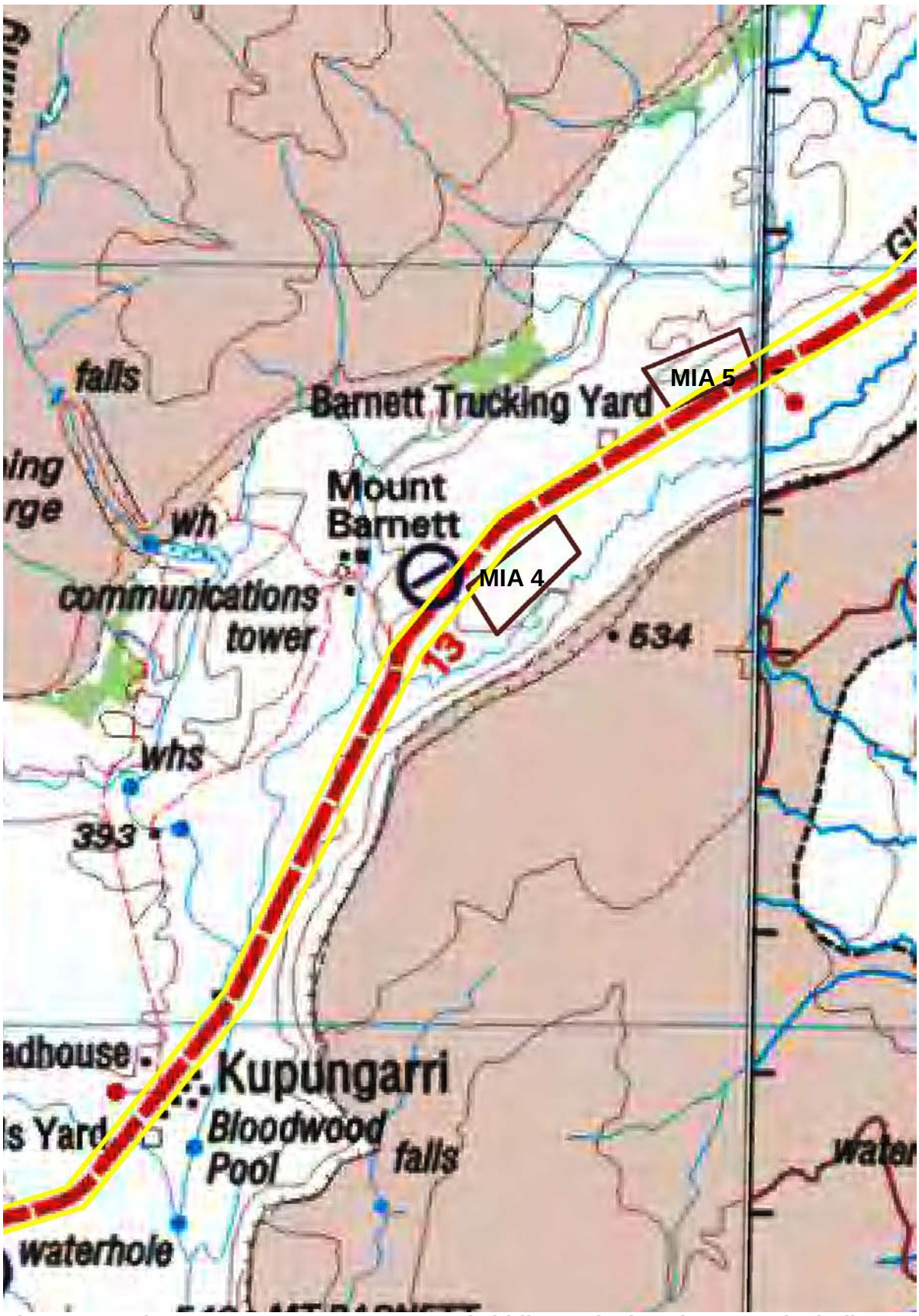

Figure 3…Galvans Gorge to Barnett Gorge (middle section) project area, including MIAs 4 & 5.

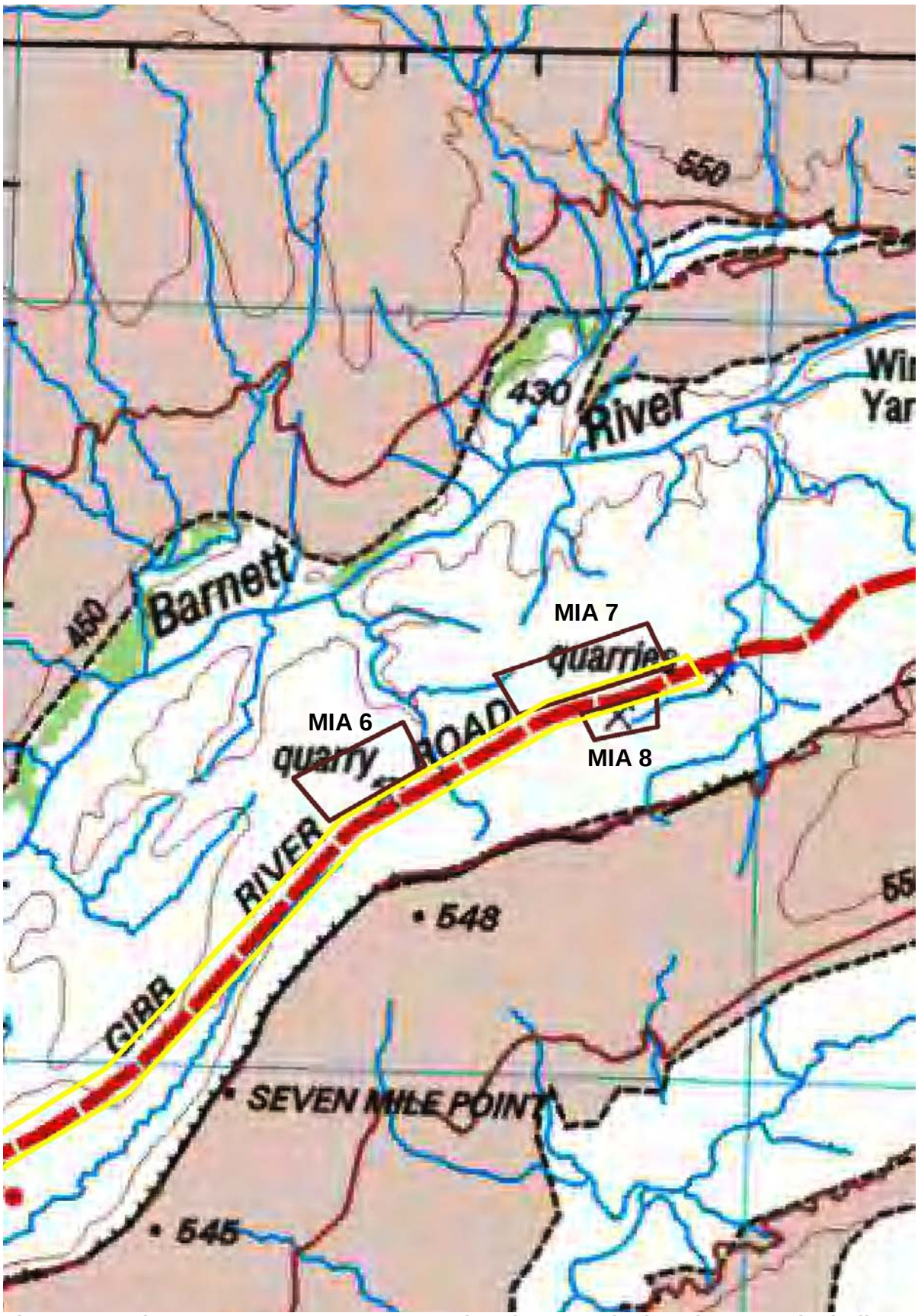

Figure 4…Galvans Gorge to Barnett Gorge (northern section) project area, including MIAs 6, 7, & 8.

1.5 Existing vegetation

Vegetation type, extent and conservation status (after Shepherd *et al*., 2002) for the Galvans Gorge to Barnett Gorge gravel resheeting proposal:

Vegetation Association Number	Association Description	% Remaining
75	Grasslands, curly spinifex, low tree savannah woodland; gnaingar (*Eucalyptus phoenicea*) and *Corymbia ferruginea* over *Triodia bitextura*	100.0
739	Grasslands, high grass savannah woodland; grey box *Eucalyptus tectifica* and cabbage gum over white grass (*Sehima nervosum*)	100.0
744	Grasslands, tall bunch grass savannah sparse low tree; *Vachellia suberosa* over Mitchell grass on black soil	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

Stockpiling of road building material for the Galvans Gorge to Barnett Gorge proposal is expected to commence at the beginning of the dry season (April / May) 2010. Stripping and stockpiling of vegetation and topsoil will occur at approximately the same time.

Project works are planned to continue for two years during the dry seasons of 2010 and 2011. Areas that 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 timing and staging of revegetation works is outlined below –

Timing	Activity
Clearing and stockpiling of vegetation	April/May 2010
Stripping and stockpiling of topsoil	April/May 2010
Re-spreading of topsoil and vegetative material	October/November 2011 October/November 2012
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