REVEGETATION PLAN

Kununurra Heavy Vehicle Route,
Stage 1 Western Link
Preconstruction Activities

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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 revegetation requirements for the Kununurra Heavy Vehicle Route Stage 1 Western Link Preconstruction Activities.

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

MRWA is proposing to construct the Kununurra Heavy Vehicle Route which will involve approximately 27 km of new road alignment including a new bridge over the Ord River with culverts and drainage structures. The proposed project will be undertaken in two stages:

- Stage 1 – Western Link (Victoria Highway west of Kununurra townsite to Weaber Plain Road, north of Kununurra townsite). Stage 1 involves the provision of a single carriageway heavy vehicle route, consisting of around 10 km of new road alignment and a 480 m bridge over the Ord River. The bridge will be located approximately 7 km downstream of the Kununurra Diversion Dam.

- Stage 2 – Eastern Link (Weaber Plain Road, north of Kununurra townsite to Victoria Highway east of Kununurra townsite). Stage 2 involves the provision of a 16 km single carriageway heavy vehicle route.

As a pre-cursor to the commencement of the Kununurra Heavy Vehicle Route – Western Link (Stage 1) proposal, MRWA is proposing to undertake pre-construction activities commencing early June 2009.

Preconstruction activities will involve investigating certain material extraction areas to identify the whereabouts of the most suitable road building materials. Sections within material areas where no environmentally sensitive areas are known to occur (see figures 1 and 2) will be divided into grids. These grids will be investigated by digging holes to determine the most suitable road building material. Those holes will be backfilled with soil and levelled to allow natural regeneration of vegetation to occur.

As an upper limit, 25 hectares of vegetation will be temporarily cleared for preconstruction activities; however, this figure is more likely in the order of 15 hectares – these areas will be rehabilitated upon completion of works.

1.3 Project Description

Pre-construction activities will have low environmental impact and will involve the following general methodology:
The materials technician would drive through the areas of low environmental sensitivity (utilising existing tracks, where possible) and identify any obvious areas that would not produce road building materials (e.g. black soil, solid rock out crops, very roughed or steep terrain, creek lines and major drainage paths, etc). These areas would not be investigated;
A 100 m grid would be established over the area for investigation where a backhoe would drive through and dig a hole approx 2 m x 2 m x 1-2 m deep every 100 m in order to determine where the good road building material is located;
When establishing this grid, the backhoe would generally avoid all trees where possible, but in more thickly vegetated areas, would only clear trees that a 4WD vehicle could push over. Normally all large trees would be left in place (driven around);
Any areas that show poor quality road building materials would not be investigated further and the grid and excavation holes would be rehabilitated;
Areas that indicate good quality road building materials would have investigation holes dug every 50 m and then 25 m if good quality materials are found that are of an economical thickness to obtain and have a manageable amount of overburden on them. This level of investigation also assists in determining the consistency of the underlying material often being clay or rock. This is particularly important since obtaining the road building material can be much more difficult if the floor is rough or very uneven;
Where rock is encountered under a good quality material the backhoe will dig several "slots" within the investigation area in an easy to access area (e.g. in grassland or light vegetation) in order to obtain a better idea of rock surface condition (to determine evenness);
In some cases, the following investigations may be required:

- If significant oversize (rubble or rock sized 50-250 mm) or very tightly bound material is encountered, and there is very high confidence the material is of good quality it may be necessary to trial a small stockpile with a dozer. Normally this would confirm that the material can be won producing suitable material if there is any minor doubt. It will also assist in better understanding the material if further processing is needed (e.g. crushing of larger hard particles to make high quality pavement materials). Normally only one test stockpile would be done in a pit if it is almost certain to be used and only if absolutely necessary (as it is expensive).
- In areas where hard rock may be available and is being sought, the surface would be exposed with 3-4 backhoe slots to determine the surface condition of the rock. If the rock appears fresh and of good quality a drill rig would drill 3-4 rock cores up to around 30 m depth to confirm the quality of the rock.

All areas impacted by the pre-construction activities will be rehabilitated in accordance with the Main Roads Statewide Purpose Permit (CPS 818/4).

Temporary Clearing = 25 ha approx. (as an upper limit)

The areas to be rehabilitated are shown in Table 1:

Table 1: Revegetation Area Details

Type	**Area**
Temporary clearing revegetation	25 hectares
Other revegetation	

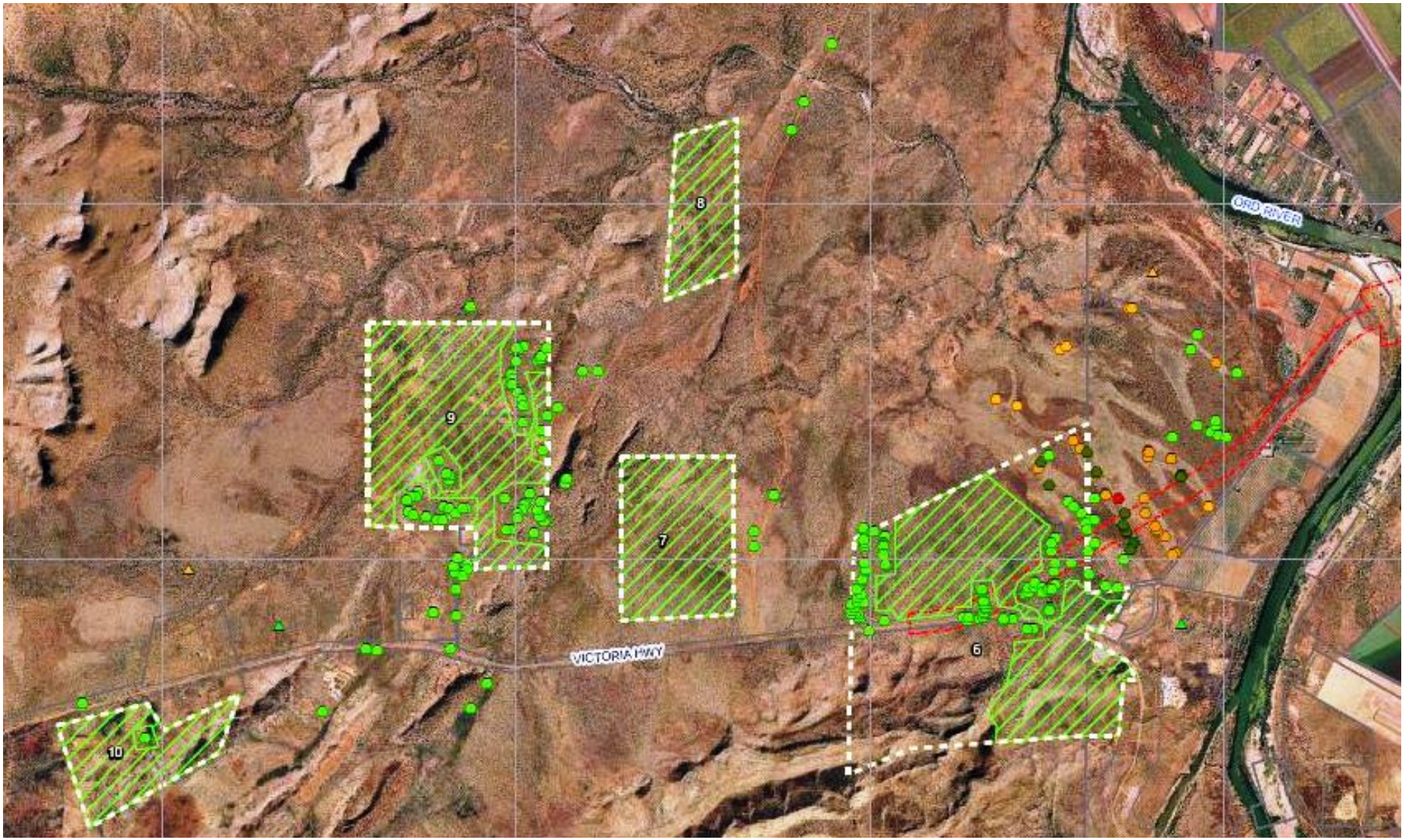

Figure 1…Kununurra Heavy Vehicle Route, areas of low sensitivity where preconstruction activities are proposed to be undertaken.

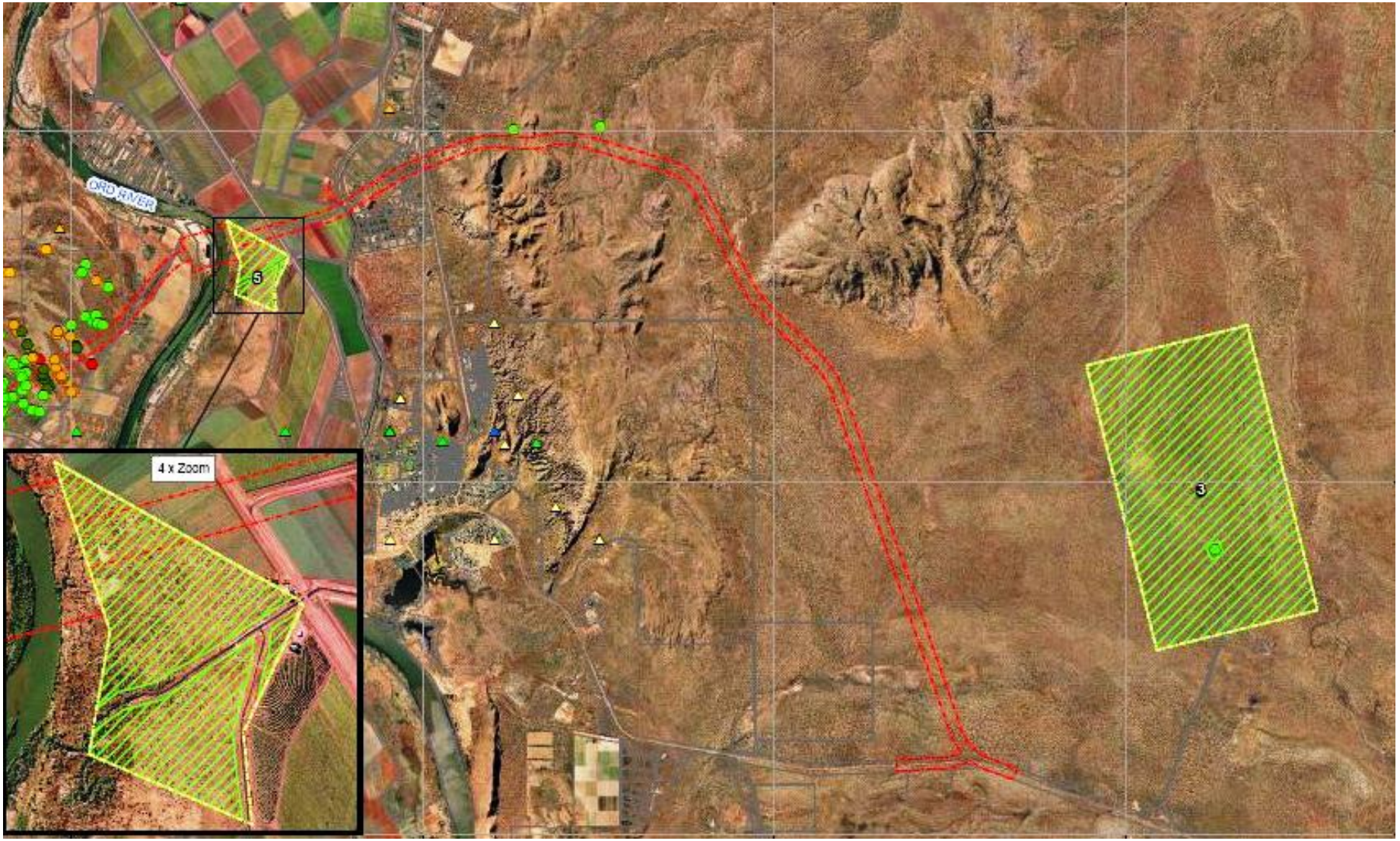

Figure 2…Kununurra Heavy Vehicle Route, areas of low sensitivity where preconstruction activities are proposed to be undertaken.

1.4 Existing vegetation

Vegetation type, extent and conservation status (after Shepherd *et al*., 2002) for the Kununurra Heavy Vehicle Route Stage 1 Western Link Preconstruction Activities:

Vegetation Association Number	Association Description	% Remaining
52	Grasslands , high grass savanna woodland; bloodwood and stringybark over upland tall grass and curly spinifex	100.0
59	Grasslands , high grass savanna sparse tree; bauhinia and coolabah over Mitchell, blue & tall upland grasses	88.4
800	Grasslands, high grass savanna woodland; stringybark & woollybutt over (upland) tall grass & curly spinifex	100
901	Grasslands , high grass savanna woodland; stringybark & woollybutt over upland tall grass and curly spinifex	99.5
909	Grasslands , high grass savanna woodland; bloodwood, stringybark & woollybutt over upland tall grass and curly spinifex on sandplain	99.7

1.5 Weeds

No Declared Plants or Weeds of National of Significance were recorded from the survey area.

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

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.

Where practicable, weeds should not be removed when they are in flower or seeding.

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.

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 5 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.

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 revegetation works, revegetated areas will be inspected every twelve months for a total of 24 months to monitor and control weeds and to measure the effectiveness of revegetation works.

Monitoring will comprise the use of criteria. Essentially, this involves visual assessment to ensure the revegetation works have been implemented as planned. Table 2 shall be used as the monitoring guide to assess the success or otherwise of the revegetation 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 three months	After one year	After three years
Mean vegetation foliage cover (%) excluding weeds.	>50	0	20	40
Mean weed foliage cover (%).	<20	<20	<20	<20
Amount of bare soil areas >4m^2 (%).	<30	<100	<80	<70