PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN (MINOR PROJECTS)

Pinjarra – Williams Road widening
71.62 – 81.7 SLK
Quindanning, Shire of Boddington

SOUTH WEST REGION

APRIL 2010

CONTENTS

1. PROJECT DESCRIPTION

Main Roads Western Australia proposes to widen the Pinjarra – Williams Road for approximately 10 km. The project area commences at the Worsley bauxite mine access road 71.62 SLK and proceeds south towards Quindanning for approximately 7.32 km to 81.7 SLK along the Pinjarra - Williams Road. The works will involve creating a new seal with a minimum of 6 m clearance of vegetation from the new edge of seal.

2. BACKGROUND

Pinjarra – Williams Road is the only single lane sealed main road in the South West Region. It is of an inappropriate standard for a road of its importance and usage.

Seal width is insufficient for opposing vehicles to pass each other without either one or both leaving the sealed surface. Many drivers are not aware of the usual conventions of passing on single lane seal roads, that is moving the left side wheels onto the gravel shoulder and this could lead to confusion. Even for those who are aware of the conventions, leaving the sealed surface introduces an additional driving hazard that is not appropriate on a modern road.

Also, the road is of a far lower standard than adjacent sections of main road and other main roads in the Region. The inconsistent and unpredictable speed environment could create a hazard for drivers not familiar with the area.

With the opening of the New Perth Bunbury Highway in 2009 the Pinjarra – Williams Road, in conjunction with the proposed Pinjarra bypass and Greenlands Road, will provide access to the Port of Fremantle. The convenient access afforded by this route to Port of Fremantle will increase the likelihood of it being used to transport freight.

As per Main Roads' Environmental Assessment and Approval process, the Low Impact Environmental Screening Checklist has been completed for the proposal, refer Appendix A. As the proposed works involve the clearing of native vegetation and the expansion of the existing road reserve, the preparation of a project specific Preliminary Environmental Impact Assessment (PEIA) and Environmental Management Plan (EMP) are required. This report fulfils this requirement.

3. DESCRIPTION OF THE PROJECT

The project locality area and study area are shown on the figures below:

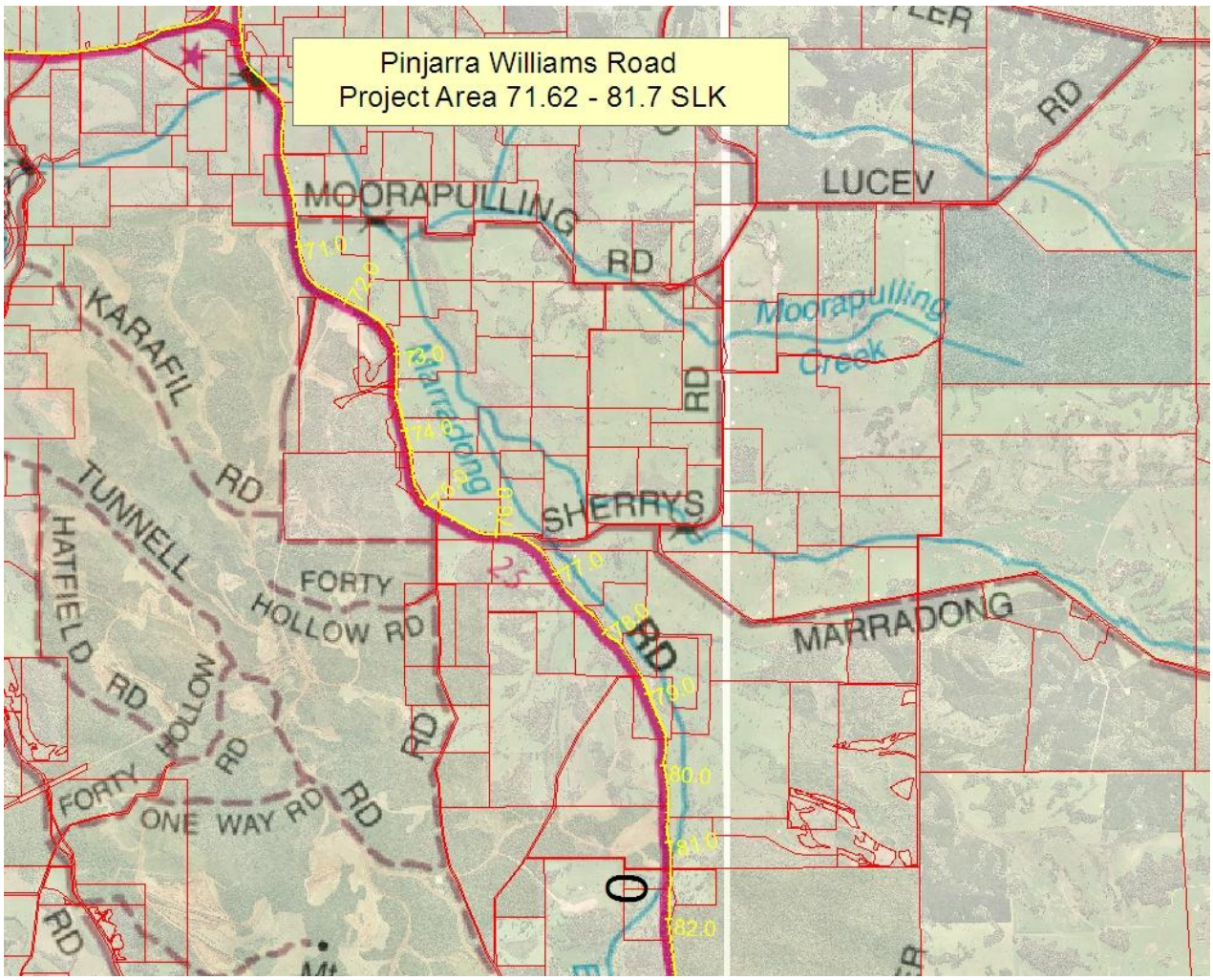


Figure 1 Locality Map

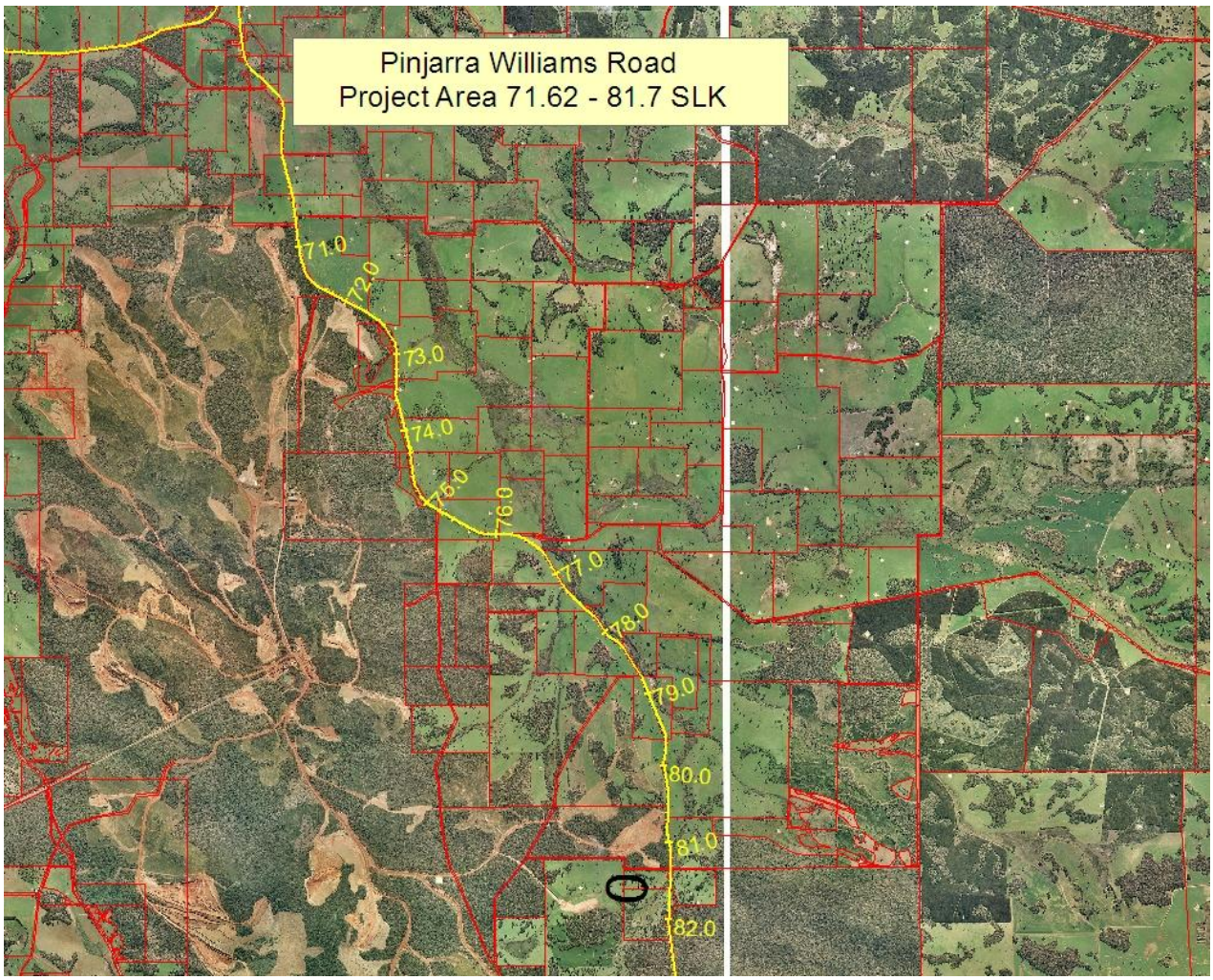


Figure 2 Location of proposed widening of Pinjarra – Williams Road

Pinjarra – Williams Road is single carriageway road. The widening is proposed to be done at the following location.

3.1 Methodology

3.1.1 Low Impact Environmental Screening Checklist

A Low Impact Environmental Screening Checklist was completed by the Project Manager and reviewed by the Environment Officer (Appendix A).

3.1.2 Preliminary Desktop Study

A preliminary assessment of the project area and its potential constraints was undertaken by reviewing a number of government agency managed databases.

Vegetation Issues: Threatened Flora, Fauna and Communities, Conservation and Environmentally Sensitive Areas and Weeds
The Main Roads' ArcGIS data base was used to search for Department of Environment and Conservation (DEC) environmental issues including Threatened Ecological Communities (TEC) and Environmentally Sensitive Areas (SEA). The Department of Environment's 'Native Vegetation Map Viewer' was also consulted regarding significant vegetation at the site. (Appendix B)

Heritage
Non-indigenous heritage was examined utilising the Australian Heritage Places Inventory, and the sites register from the Heritage Council of Western Australia (Appendix C).

Aboriginal Heritage
A Search of the Department of Indigenous Affairs' (DIA's) database was undertaken to determine whether the project area contains any sites of Aboriginal heritage. (Appendix C).

Sensitive Water Resources
The Department of Water's Geographic Data Atlas was consulted by the Department of Water on the location of sensitive water resources including Public Drinking Water Source Areas and Country Area Water Supply areas; and to determine whether the project area supported, or was adjacent to, any significant lakes, rivers or wetlands or proclaimed areas (Appendix D).

Contaminated Sites
Historical landuse of the area was examined for any evidence of contaminated sites and also the DEC Contaminated sites register for any listed sites (Appendix E).

Acid Sulphate Soils
The Western Australian Planning Commission's acid sulphate soils maps do not cover the project area.

Dieback
DEC Bunbury undertook a dieback survey February 2010. The project area was found to be uninterpretable (Appendix G).

Wetlands
The locations of wetlands within the project area were determined using the Commonwealth Department of the Environment, Water Resources Heritage & the Arts (DEWHA) mapping tool (Appendix H).

Commonwealth Referral
The decision as to whether to refer the project to the Commonwealth DEWHA will be based upon whether the project is going to impact upon matters of national significance, eg World

Heritage properties, protected wetlands and migratory species, Commonwealth marine areas, threatened species or communities or nuclear.

4. EXISTING ENVIRONMENT

4.1 Description

A search of the Department of Agriculture and Food SLIP database was done (refer http://spatial.agric.wa.gov.au/slip/framesetup.asp) to confirm the type of vegetation associations to be cleared. These included a combination of: Medium woodland; marri and wandoo and Medium forest; jarrah-marri (Refer to Appendix B)

5. SITE INVESTIGATION

A site visit was carried out by the Environmental Officer, Project and Asset Managers 6th November 2009 to examine the general features of the area. The broad vegetation types in the vicinity of the project area were identified. Other issues were considered including topography, the impacts on any creek lines, property access and the potential for noise and vibration impacts.

Photos of the trees to be impacted were taken (refer Appendix H). The following was noted from the site investigation:

- The vegetation to be cleared consists of marri, jarrah and wandoo woodland;
- The road verge is quite narrow, approx 5.5 m of vegetation on each side of the road with the verge being approximately 20m wide.
- Trees are generally range from between 100-400 mm is diameter with the occasional tree up to 600 mm diameter.
- According to Keighery Vegetation Condition Rating, the condition of the native vegetation to be cleared is Keighery Vegetation Conditoin Rating 5-6: Degraded to Completely Degraded on the eastern side. Some areas adjacent to forest on the western side could be given a rating of 4 (Good)
- The project area adjoins mainly farmland, although some adjoins BHP (Crown land).
- The soils are mainly the gravel/laterite.
- There was one location that had a spring emerging from the gravel shoulder.

Site Investigation	**Description/Comment**
Total area (ha) of native vegetation to be cleared	2.586
Total area (ha) of other vegetation, including regrowth, landscape areas, to be cleared	0
Weeds present	Some grasses present from adjoining farmland
Drainage areas or wetlands present	2 ephemeral watercourses (Marradong brook and one unnamed creek)
Adjacent land uses	Farmland and BHP (leased Crown land)

6. CLEARING OF NATIVE VEGETATION

As noted in the Low Impact Environment Assessment, native vegetation will be required to be cleared outside of the maintenance zone for the construction footprint.

In assessing whether the project is likely to have a significant impact on the environment, the project has been assessed against the DEC's 10 principles of clearing. Further details are included in the Vegetation Clearing Assessment Report in Appendix Y.

7. ASPECTS AND IMPACTS

Assessment of Aspects and Impacts

Table 1: Aspects and Impacts – Pinjarra Williams Road widening 71.62-81.7 SLK, Quinndanning

Aspect	Evaluation of Potential Impacts
Air quality	Not relevant to the proposed works
Dust	Likely to be a minor issue during earthworks. Activities will need to be subject to dust suppression to control short-term dust generation. Likely to be easily managed by standard construction dust management techniques. The shire of Boddington should be consulted regarding the proposed dust control measures.
Fauna	The project area occurs in potential foraging and nesting sites of the following birds: - Forest Red-tailede Black Cockatoo : Vulnerable (EPBC Act) - Baudins Black Cockatoo (long billed): Vulnerable " - Carnabys Black Cockatoo (short billed): Endangered " - Mallee Fowl: Vulnerable " A cockatoo survey was completed by Tony Kirkby (January 2010) and the results are found in Appendix B Locations of feeding and habitat trees were overlayed on to a survey of the road alignment and then the area of foraging trees required to be cleared was calculated. This was conservatively estimated at being 70 trees (ie approx. 0.7 Ha) There were 2 significant (potential habitat) trees noted along the alignment (Refer Appendix B) that will be retained. Therefore no matters of National Environmental Significance as protected under EPBC Act (1999) will be significantly impacted.
Vegetation – clearing	Approximately 2.586 Ha of native vegetation will required to be cleared.
Vegetation – TECs/DRF	No Threatened Ecological Communities or ESAs have been identified within the project area. (Refer Appendix B) Correspondence from DEC (Perth Hills District, 2/03/10) indicated that from their search of the DEC's Threatened Flora Database and the WA Herbarium's Flora Base that although no Declared Rare Flora species were recorded alongside or within 200m of the project area, 5 priority species occur within close proximity to the project area and in the same vegetation complexes through which the road widening is to occur. These are: • *Calytrix simplex* subsp. *simplex* (P1) • *Stylidium marradongese (P3)* • *Tetratheca pilifera (P3)* • *Templetonia drummondii (P4)* DEC recommended that: "Main Roads further investigate the possible occurrence of threatened flora along the section of Pinjarra-Williams Road, as detailed above, prior to road works taking place. The flora survey will need to be carried out by a qualified botanist at an appropriate time of the year in accordance with EPA Statement 51."
Vegetation – weeds	Department of Agriculture and Food (*Lindsay Strang, Peel Bio-security Officer – 23/02/10)* noted that there may be the odd occurrence of Cotton Bush in the project area, and these plants must be removed ie if they had no seeds, pulled and left along the roadside (not in the adjoining paddock) or if with seeds, they need to be legally destroyed. (Refer Appendix B) Also it was noted that Cape Tulip might occur in the project area but would not be seen at this time of the year. Therefore, the risk of spreading this weed species as part of the proposed work should be minimised. Standard weed hygiene measures will be applied for all earthworks in the area, including ensuring that plant and equipment brought on to the site are clean of soil. The contractor will need to have all machinery high pressure cleaned to remove any dirt fragments that might contain Cape Tulip bulbs (or other bulb weeds) and

Table 1: Aspects and Impacts – Pinjarra Williams Road widening 71.62-81.7 SLK, Quinndanning

Aspect	Evaluation of Potential Impacts
	reduce the risk of bulbs spreading to other sites. (Appendix B).
Vegetation – dieback	A dieback survey of the project area was undertaken February 2010. The project area was identified as being uninterpretable and protectable (Refer Appendix F). Any vehicles, machinery or equipment should be free of soil and plant material prior to entering and leaving the project area.
Reserves / Conservation areas	There are three Timber Reserves vested with the Conservation Commission that are located adjacent to Pinjarra-Williams Road within the project area. There is also a conservation reserve located approximately 5.3 kilometres north east of the project area called the Mooradung Nature Reserve for the purpose of conservation of flora and fauna (R 32448) . The reserve is 631 Ha in size. There are no other adjacent or nearby reserves affected by this proposal.
Heritage (non-indigenous)	The Australian Heritage Places Inventory and the WA Heritage Register was consulted and no places of heritage significance were found to be present within the proposed works area.
Aboriginal heritage	An Aboriginal Heritage Survey (archaeological and ethnographic) was completed (March 2010) and there was found to be no sites of Aboriginal heritage significance within the project area.
Surface water/drainage	There are 2 ephemeral watercourses that cross the project area; Marradong Brook and another unnamed creek. The proposed works however will not disturb or interrupt any natural drainage and surface run-off patterns as existing culverts will be replaced and extended.
Wetlands	There are no wetlands within the vicinity of the project area. (Refer Appendix D)
Groundwater	No dewatering nor drainage modifications are required, hence no change to groundwater level or quality.
Noise and vibration	No major sensitive local receivers. Construction works would not be expected to significantly contribute to noise levels at the nearest sensitive receivers, provided works are limited to normal working hours. Vibration impacts to be dealt with through the construction process.
Visual amenity	The proposed works will result in moderate visual impacts during and after construction.
Public safety and risk	Provided traffic management and signage to Main Roads standards is employed, none of the proposed works present any significant hazards to public safety. The proposed works will serve to enhance public safety by improving road conditions.
Hazardous substances	Not relevant to the proposed works.
Contamination	Given the relatively superficial nature of the required earthworks, there appears to be a low risk of any significant contamination issues. The proposed works occur adjacent to farmland and timber reserves and there are no other known previous land use activities on or adjacent to the project area that have had the potential to create contamination, eg petrol station. Also the DEC Contaminated Sites Register was checked and it did not indicate the presence of any contaminated sites (Appendix F).
Salinity	Given the ironstone gravel soils are associated with a low risk of salinity and the linear clearing for road widening, this poses a low risk of increasing salinity on and off site (Appendix B – Land degradation assessment and salinity risk map)
Acid Sulphate Soils	The proposal will have nil to low risk of acid sulphate soils due to the ironstone gravel soils that predominate. Also there will be no excavating or dewatering of the site.
Statutory Land Use Planning	The proposed works are mostly within the existing road reserve. For the additional land required, an amendment will be required to the Peel Region Scheme.

8. DECISION TO REFER

Given the small scale of the project, the low significance of its impacts to the surrounding environment both at a local and national level and the environmental management measures proposed, the project does not require referral to the WA Environmental Protection Authority or the Commonwealth Department of the Environment, Water, Heritage and the Arts.

9. ENVIRONMENTAL MANAGEMENT PLAN

This section of the report (the EMP) has been developed for the project area following the completion of the above sections. The main aims of this EMP is to provide a management plan to assist in minimising the environmental impacts of the activities associated with the proposed works and identify who is responsible for the implementation of the management strategies.

This EMP will only address the actions already listed as well as any site-specific issues that were identified during the EIA. The project specific management measures identified within this EMP are in addition to the standard specifications used for Category 3 projects. The environmental management measures/conditions in Main Road's Specifications 203, 204, 301, 302 and 304 are still to be followed where applicable.

The areas that require special management will be addressed in terms of:

- area of management (eg vegetation);
- the timing of the various management requirements;
- the management objectives for each area;
- the management strategies that are necessary to minimise the impact;
- the person/s responsible for implementing the management action; and
- on whose advise or Main Roads requirement.

ENVIRONMENTAL MANAGEMENT PLAN					
Area of management	**Timing**	**Management objective**	**Management Strategy**	**Responsibility**	**Whose advice**
Vegetation Clearing - Record-keeping	Pre-construction	The project should maintain the required records related to clearing native vegetation under the purpose permit	Clearing: • a copy of the EIA & EMP (Minor projects) for small projects; • a map showing the location; • the size of the area cleared (in hectares); • the dates on which the clearing was done.	Project Manager	DEC
Vegetation - Clearing	Pre-Construction	Ensure that the overall objectives of the alignment and construction works are compatible with maintaining and, where possible, enhancing the biological integrity of the surrounding environment and minimising vegetation loss and degradation; and Ensure the retention of as many habitat trees, shrubs and vegetated corridors for fauna as possible particularly those identified from the cockatoo survey.	Selection of designs/locations that minimise adverse impacts on the biological environment.	Project Manager	Main Roads
			Construction works are to be undertaken in the drier months to reduce the potential for soil erosion due to vegetation removal and heavy rains.	Project Manager	Main Roads
Vegetation clearing	Pre-Construction & Post Construction	Ensure dieback and weeds are not spread as a result of clearing operations	• Remove any Cotton Bush in the alignment prior to clearing; • Apply standard weed hygiene measures for all earthworks in the area, including ensuring that plant and equipment brought on to the site is clean of soil. All machinery is required to be high pressure cleaned prior to entering the site to remove any dirt fragments that might contain Cape Tulip bulbs (or other bulb weeds) and reduce the risk of bulbs spreading as well as dieback to other sites.	Project Manager	DAF

Noise, Vibration and Dust	Construction	Ensure construction works do not become a nuisance to the public	Access to private property, appropriate traffic management measures and pedestrian access should be planned and implemented prior to the construction of works.	Contractor	Main Roads
			Any complaints regarding dust will be attended to as soon as possible.	Contractor/Project Manager	Main Roads
			Where it is found that trucks leaving the site are carrying excessive material onto sealed surfaces, these areas will be swept to reduce dust generation and maintain traffic safety.	Contractor	Main Roads
			Watering, the use of hydromulch or other forms of mulching to protect loose surfaces shall be used as mitigation measures	Contractor	Main Roads
Dieback	Construction	Ensure construction works do not contribute to the spread of dieback	As the project area occurs within a Protectable area (identified as both uninfested and uninterpretable) dieback free building materials will be required for construction.	Contractor	Main Roads
Pollution and Litter	Construction	Ensure that the construction of the proposal is managed to a standard that minimises any adverse impacts on the environment.	The designated servicing area will be bunded to contain any spills or leaks.	Contractor	Main Roads
			Emergency cleanup procedures shall be implemented in the case of any spillage. These will include control of spilled material and removal of contaminated soil to an approved site. The contractor shall ensure appropriate equipment is available at all times and shall notify the Superintendent's Representative of a spill.	Contractor	Main Roads
			All waste oil will be collected for recycling and any empty fuel/oil containers, used filters and waste hydraulic parts to be collected and stored in an allocated area then removed to an approved site.	Contractor	Main Roads
			Dumping or temporary storage of bitumen, asphalt, concrete or aggregate should only occur at	Contractor	Main Roads

			designated depots or controlled hardstands.		
			The project areas, including hardstand areas, will be kept in a tidy manner at all times.	Contractor	Main Roads
Aboriginal Heritage	Construction	Ensure that there is no unauthorised disturbance to Aboriginal heritage sites during construction.	If any materials of significance to Aboriginal people are discovered, works will immediately cease within 100m of the material and the site will be examined by a qualified archaeologist.	Contractor/Project Manager	DIA
			The Department of Indigenous Affairs will be notified in the event of any significant Aboriginal Heritage discovery.		
			If skeletal material is uncovered during works then the WA Police Service will also be advised immediately.		
Fire	Construction	Ensure that the fire risk associated with the construction of the proposal is minimised.	No fires shall be lit within the project area.	Contractor	Main Roads
			Machinery will be fitted with approved spark arresting mufflers.		
			A water tanker (or fire extinguishing equipment will be on site at all times)		
Rehabilitation	Post - Construction	Leave the project area free from debris and where possible rehabilitate using local species.	Replace the cleared trees as appropriate, with locally occurring natives.	Contractor	Main Roads
			All waste materials from the development are to be completely removed from the site upon completion of the development. Final clean-up shall be to the satisfaction of the Project Manager and the Site Superintendent.		

10. REFERENCES

"A Report on an Aboriginal Heritage Survey for road widening along the Pinjarra Williams Road 71.62 – 81.7 SLK, Marradong to Quindanning, Western Australia" - *A Report Prepared for GHD Pty Ltd upon behalf of Main Roads by Brad Goode and Associates Pty Ltd.*

Keighery BJ 1994, *Bushland Plant Survey.* "A Guide to Plant Community Survey for the Community" Wildflower Society of WA (Inc.), Nedlands.

11. APPENDIX A

LOW IMPACT ENVIRONMENTAL SCREENING CHECKLIST

Form No. 6707/001/01

Appendix H **Checklist - Low Impact Environmental Screening**

The Low Impact Environmental Screening Checklist is part of the environmental assessment and approval process, and in the procedures. It should be noted that the checklist does not address Aboriginal heritage issues. Please refer to Main Roads guideline *Aboriginal Heritage* for the heritage assessment process.

All projects are to be screened to identify those that are Low Impact, ie that will have a low impact on the environment and that can be adequately managed through standard contract clauses.

Projects that have "No" to **all** items are classed as Low Impact and should be implemented using standard contract clauses in the Tender Document Process.
Projects that have "Yes" to **any** item will require further environmental assessment and will be implemented using an Environmental Management Plan.
Tick "Yes" or "No" for every item. Circle the relevant part of the item.

Project Name: Pinjarra – Williams Road (Marradong to Quindanning) Widening (71.62 – 81.7 SLK)

ITEM NO.	ITEM	Y	N
1	New road or road reserve to be created or expansion of existing road reserve.		✓
2	Works require ground disturbance or clearing of native vegetation.	✓	
3	New, or expansion of existing, pits or quarries. (non-commercial sources)		✓
4	Adjoining sensitive land use. eg residential or hospital or education centre		✓
5	Passes over, adjoins or drains directly into a wetland or sensitive watercourse.		
6	Local natural drainage regime / hydrology will be changed.		✓
7	Within/immediately adjacent to surface/underground Public Drinking Water Source Area.		
8	Dewatering, or a new water bore.		✓
9	Known potential source of hazardous materials within or adjoining the road reserve. e.g. Acid Sulphate Soils, existing petrol station, industrial site or waste disposal site (landfill)		
10	Buildings will require demolition.		✓

Completed By: *Signature* _____ *Date* 10/8/10

Name CAICE BENZIE *Title* EA

To be reviewed by a Main Roads Environment Officer: *Signature* Della-Bona *Date* 11/3/10

Name Jeanette Della-Bona *Title* EO

Comments: _____

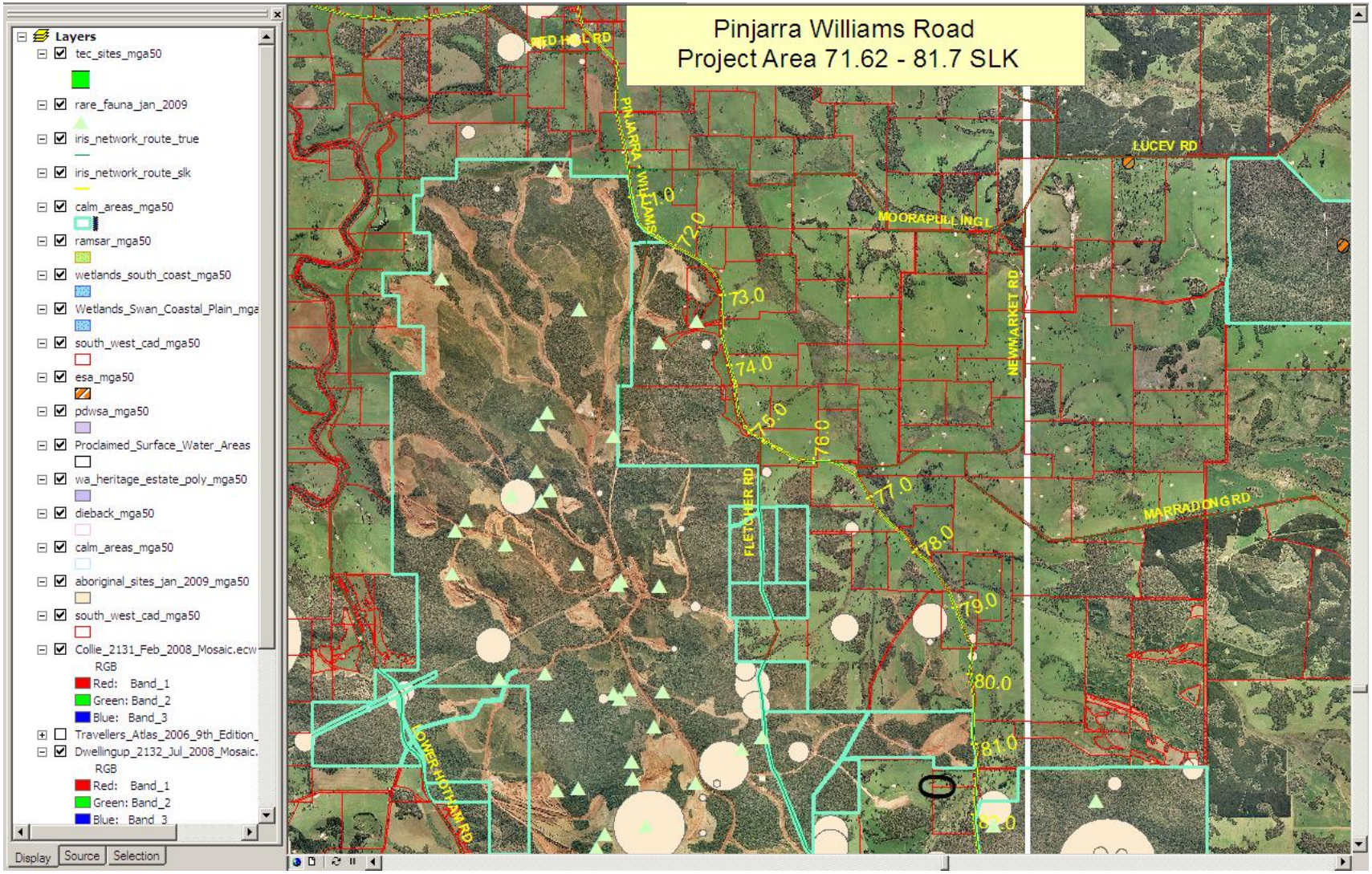
12. APPENDIX B

VEGETATION ISSUES

- **Main Roads ArcGIS data base**
- **Department of Environment & Conservation: Native Vegetation Map Viewer**
- **Department of Agriculture and Food –**
    - **WA Atlas (Salinity Risk)**
    - **Land Degradation Assessment**
    - **Weed advice**
        - **Cottonbush report**
        - **Cape tulips report**
    - **SLIP database search**
- **Main Roads Vegetation Clearing Assessment Report**
- **Department of Environment & Conservation correspondence re flora**
- **Pinjarra Williams Road Quindanning – targeted flora survey**
- **Cockatoo Survey Report**

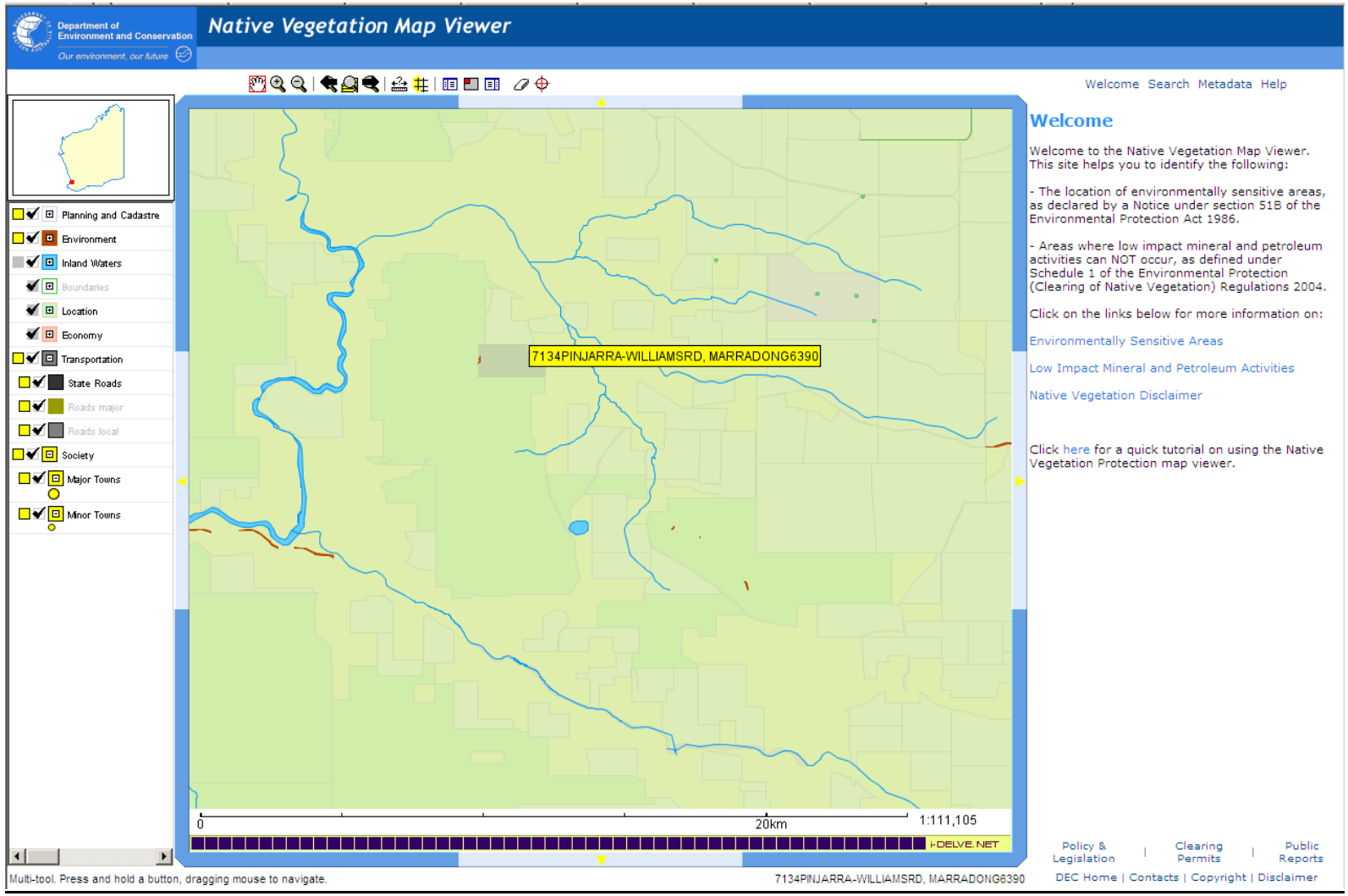
12.1 Main Roads ArcGIS data base

Main Roads data base search results for DEC environmental issues



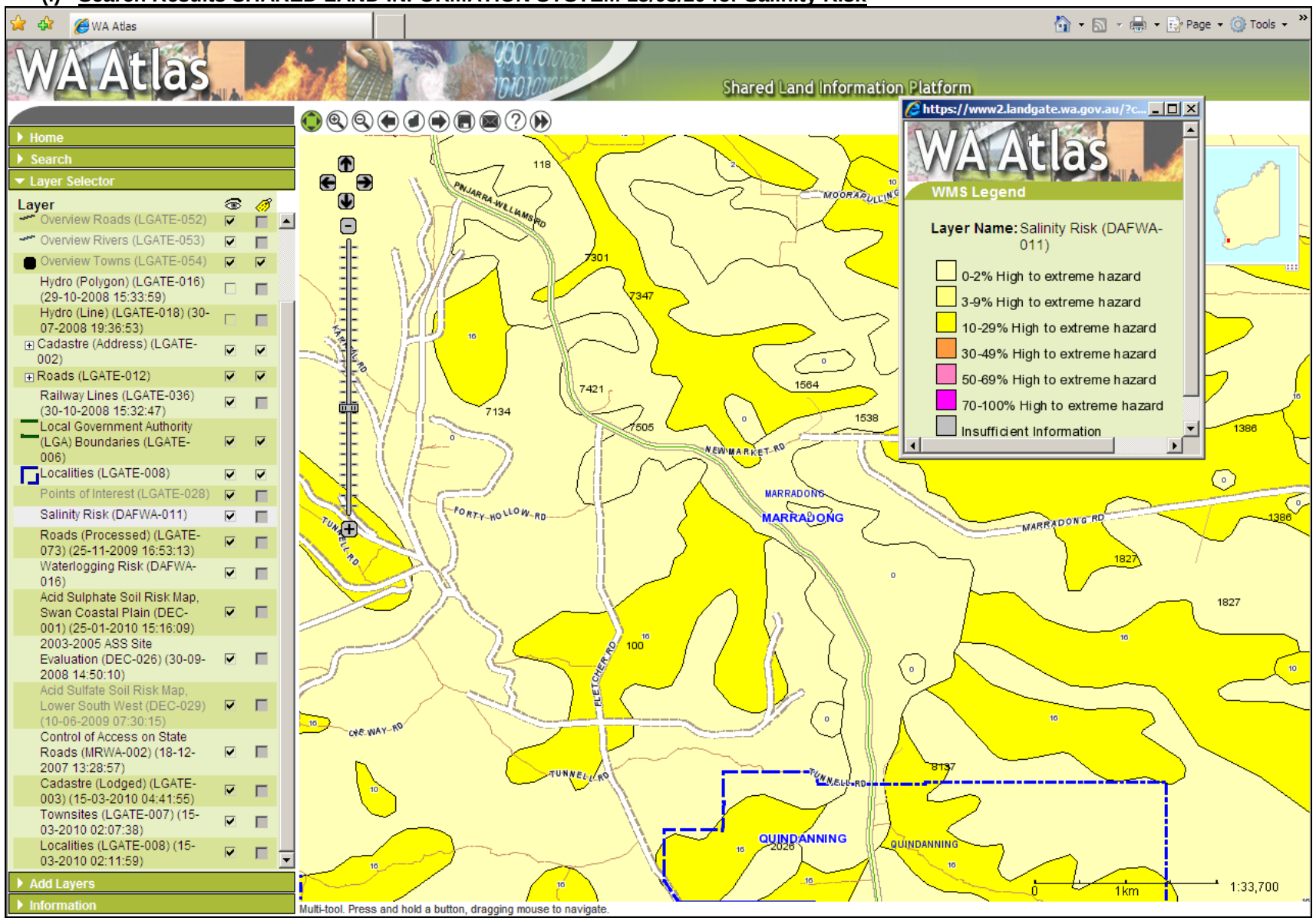
12.2 Department of Environment and Conservation: Native Vegetation Map Viewer

Department of Environment: Native Vegetation Map Viewer search results 23/02/10



12.3 Department of Agriculture and Food

(i) Search Results SHARED LAND INFORMATION SYSTEM 15/03/10 for Salinity Risk



12.4 Land Degradation Assessment

Department of Agriculture and Food

GOVERNMENT OF WESTERN AUSTRALIA

Your Ref:
Our Ref: DP_MR1

Date: 16th March 2010

LAND DEGRADATION ASSESSMENT – For clearing of 2.586 ha for road widening along Pinjarra Williams Road.

Applicant/Proponent: Main Roads WA

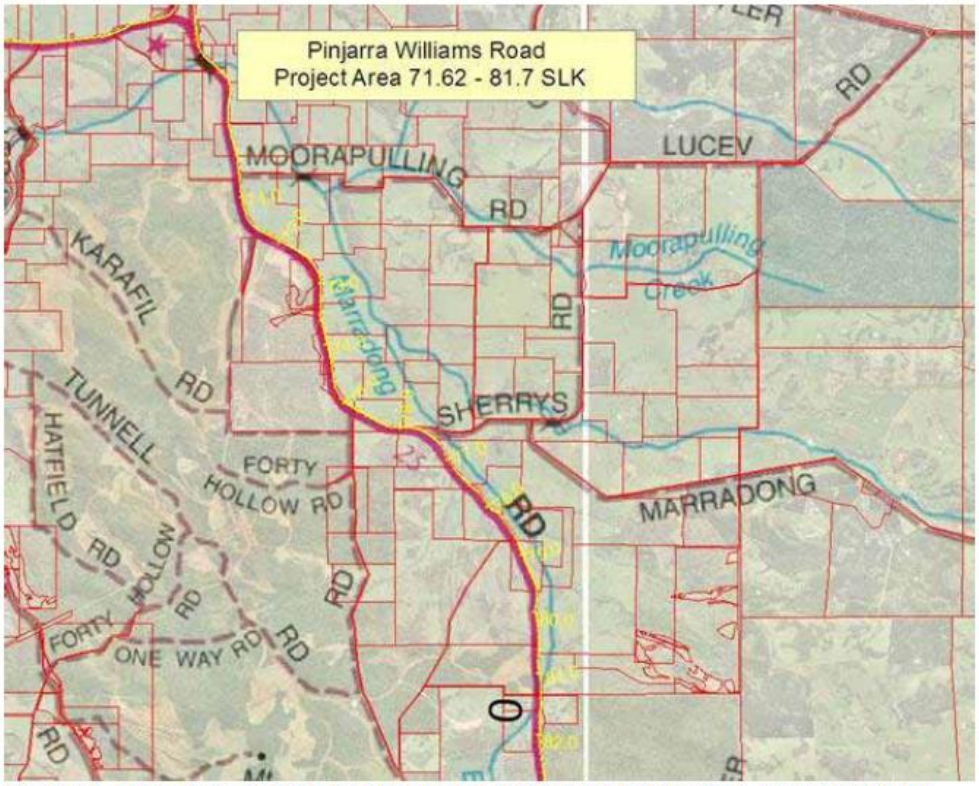


Figure 1. Map of area proposed to be cleared for road widening, approximately 2.586 ha.

1 PROPONENT AND PROPERTY DETAILS

1.1 Introduction

Main Roads Western Australia proposes to widen the Pinjarra – Williams Road for approximately 10 km. The project area commences at the Worsley bauxite mine access road 71.62 SLK and proceeds south towards Quindanning for approximately 7.32 km to 81.7 SLK along the Pinjarra - Williams Road. The works will involve creating a new seal with a minimum of 6 m clearance of vegetation from the new edge of seal.

DAFWA was requested to make comment on whether the clearing of 2.586 Ha in this area will impact salinity in this area.

1.2 Property location

The property is located within the Shire of Boddington, is a gazetted road known as Pinjarra – Williams Rd.

1.3 Property inspection

This report is based on a desktop assessment, no site visit has occurred.

2 PROPERTY AND CATCHMENT DESCRIPTION

2.1 Rainfall

Boddington rainfall is within the 900 – 850 mm isohyte.

2.2 Position in the landscape

The landscape of the immediate area is described as being gently inclined and contained within the Collie Basin. The Murray River is one of the few major rivers in close proximity to Perth which is devoid of dams for public water supply. It includes a catchment area including a large part of the wheatbelt and south-west of the state, draining from 450 mm/year average rainfall country in the east near Pingelly, westward through the high rainfall parts of the Darling Range around Dwellingup with an average rainfall of 1,300 mm/year. The Marradong Brook which flows adjacent to the proposed road clearing and construction works is a tributary of this river system.

2.3 Geology

This area lies within the Zone of Rejuvenated drainage east of the Darling Fault on the border of the Central (CAR) and South West Agricultural Regions (SWAR); these regions are underlain principally by crystalline basement rocks of the Yilgarn Craton, an ancient geological formation of the Archaean age (over 2.5 billion years old).

2.4 Landforms and soils

The land form is Michibin Subsystem (Quindanning) with this area generally moderate irregular valley slopes on Colluvium over granite, gneiss and sometimes dolerite in the Eastern Darling Range, Murray River Catchment. Brown deep loamy duplexes, yellow/brown deep sandy duplexes, grey deep sandy duplexes, red shallow loams and gravels. This area is surrounded by Coolakin Subsystem (Marradong) which consists of

Shallow minor valleys (5-20 m) with gentle (3-10%) to sometimes steep (30-40%) sideslopes on Alluvium and colluvium over granite, gneiss and occasionally dolerite; lateritic colluvium in the Eastern Darling Range, Murray River Catchment. Loamy gravels, duplex sandy gravels, brown deep loamy duplexes, brown loamy earths, deep sandy gravels and wet and semi-wet soils (sometimes saline) (McArthur *et.al.*, 1977).

2.5 Drainage

The Marradong Brook is one of the systems draining into the Hotham River; the Marradong Brook is on the eastern side of the road where the clearing is to occur. The road crosses the brook twice and situated no further than approximately 2km away at the furtherest point from the road.

The Hotham River and the Williams River are the two major tributaries that flow into the start of the Murray, which then weaves through the Darling Scarp and passes through the town of Pinjarra. It is joined by the Dandalup River along the Swan Coastal Plain and then feeds into the Peel Inlet in Mandurah before the water meets the ocean.

2.6 Vegetation

Vegetation here includes jarrah forest and jarrah and marri woodland. Wandoo forest and woodland with Rock Sheoak, Jam and Grasstree understory. Wandoo woodland with some Jarrah, Marri and York Gum; mixed shrub understory.

According to a desktop search of DEC's Threatened Flora Database and the WA Herbarium's Flora base by Nature Conservation Officer Paul Tholen from DEC Perth Hills District (2/3/10) the proposed upgrade of Pinjarra-Williams Road occurs within the Northern Jarrah Forest and across the Coolakin, Dwellingup, Michibin, Williams and Yalanbee (Y5) vegetation Complexes

The area under application is 2.586 Ha. The Vegetation Systems associated with these proposed works include Bannister 3 which retains 57% of its pre-european extent, of which 67% is retained within DEC managed lands; Bannister 4 retaining 35% of which 44% is retained within DEC managed lands and West Darling 3 retaining 87% of the pre-european extent of which 88% is retained within DEC managed lands (DEC, extracted from the assessment for clearing application).

3 SUITABILITY OF LAND FOR PROPOSED USE

This parcel of land is a linear section designated as a major traffic use and would be deemed suitable for the land use as gazetted.

4 ASSESSMENT OF ON SITE AND OFF SITE LAND DEGRADATION RISKS

4.1 Salinity

The Hotham-Williams-Murray Rivers have been identified as one of the most important catchments in the south west region for river salinity recovery. The Murray River alone contributes 60% of the total flow for the Peel-Harvey Estuary and represents the largest influence on this internationally-significant Estuary's ecology.

Clearing of any remnant native vegetation incrementally increases the risk of salinity, however linear clearing for road widening poses a low risk of increasing salinity on and off site.

4.2 Eutrophication

Clearing linearly through this landscape for the purpose of road widening and upgrading will not impact significantly on eutrophication on or off site. Low risk.

4.3 Wind erosion

Not applicable. Low risk.

4.4 Water erosion

Erosion and sediment control measures may be temporary or permanent. The selection of controls will be site dependent and related to site conditions, duration of construction and design criteria as per Main Roads WA standards.

Temporary measures once designed will be required to be implemented and maintained during construction. They will provide temporary protection whilst construction is progressing and can be upgraded to permanent structures where deemed necessary after construction is completed. Permanent measures can then be installed to provide for permanent drainage control, erosion and/or sedimentation control post construction to Main Roads WA standards. Low risk.

4.5 Waterlogging and flooding

Rainfall in southwestern Australia is strongly concentrated in the winter months, and thus flooding tends to be mostly a winter phenomenon. Few parts of the country are immune from flooding, whether it is localized flash flooding from intense thunderstorms, or more widespread and longer-lived inundations resulting from heavy rain over the catchments of established river systems. During significant floods lives can be lost, stock losses may be in the tens of thousands, and damage to homes, businesses, roads, etc can run into hundreds of millions of dollars. Low to medium risk as Main Roads WA has procedures and protocols to manage these incidents.

5 SUMMARY

This road widening of Pinjarra – Williams Road poses a low risk to eutrophication, erosion and waterlogging/flooding to the surrounding land and river systems.

Clearing of any remnant native vegetation incrementally increases the risk of salinity, however linear clearing for road widening poses a low risk of increasing salinity on and off site as drainage implemented to Main Roads WA standards will increase runoff and therefore contribute fresh water to Marradong Brook. The sealed surface and improved drainage will reduce risk of recharge to groundwater.

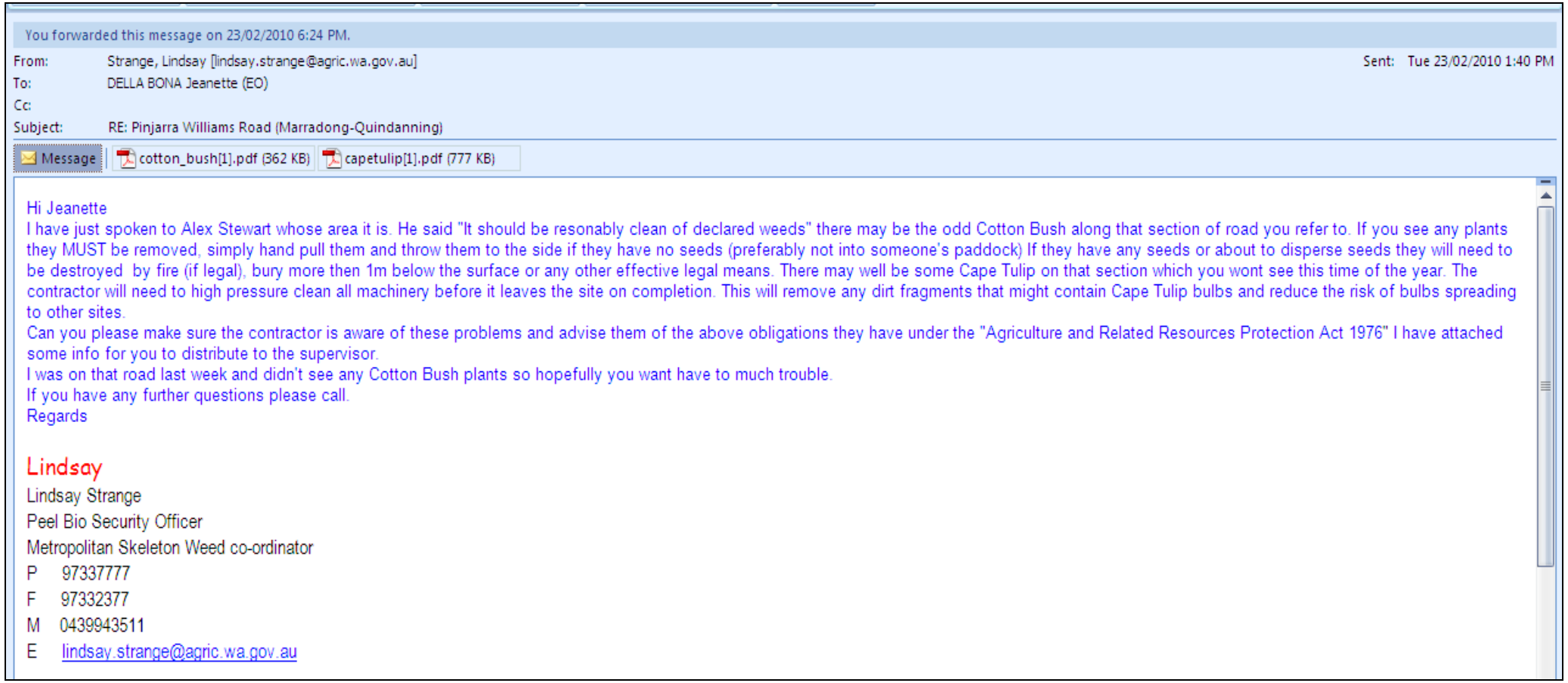
6 REFERENCES

McArthur, W.M., Churchward, H.M. and Hick, P.T. (1977). Landforms and soils of the Murray River catchment area of Western Australia. Management Land Resources Management Series No. 3. CSIRO Division of Land Resources.

Schofield, N. J, Ruprecht, J. K and Loh, I. C, (1988). The Impact of Agricultural Development on the Salinity of Surface Water Resources of South West Western Australia, Western Australian water Authority.

Damian Priest
NRM Development Officer
Department of Agriculture and Food, Western Australia
Northam

12.5 Advice from Lindsay Strang: Peel Bio Security Officer 23/02/10



You forwarded this message on 23/02/2010 6:24 PM.

From: Strange, Lindsay [lindsay.strange@agric.wa.gov.au] Sent: Tue 23/02/2010 1:40 PM
To: DELLA BONA Jeanette (EO)
Cc:
Subject: RE: Pinjarra Williams Road (Marradong-Quindanning)

Message | cotton_bush[1].pdf (362 KB) | capetulip[1].pdf (777 KB)

Hi Jeanette
I have just spoken to Alex Stewart whose area it is. He said "It should be resonably clean of declared weeds" there may be the odd Cotton Bush along that section of road you refer to. If you see any plants they MUST be removed, simply hand pull them and throw them to the side if they have no seeds (preferably not into someone's paddock) If they have any seeds or about to disperse seeds they will need to be destroyed by fire (if legal), bury more then 1m below the surface or any other effective legal means. There may well be some Cape Tulip on that section which you wont see this time of the year. The contractor will need to high pressure clean all machinery before it leaves the site on completion. This will remove any dirt fragments that might contain Cape Tulip bulbs and reduce the risk of bulbs spreading to other sites.
Can you please make sure the contractor is aware of these problems and advise them of the above obligations they have under the "Agriculture and Related Resources Protection Act 1976" I have attached some info for you to distribute to the supervisor.
I was on that road last week and didn't see any Cotton Bush plants so hopefully you want have to much trouble.
If you have any further questions please call.
Regards

Lindsay
Lindsay Strange
Peel Bio Security Officer
Metropolitan Skeleton Weed co-ordinator
P 97337777
F 97332377
M 0439943511
E lindsay.strange@agric.wa.gov.au

12.6 Cotton bush control report

Department of Agriculture and Food
Government of Western Australia

Declared plant in Western Australia

Cotton bush, narrow leaf cotton bush (*Gomphocarpus fruticosus*)

Declaration

(Code: C= City; S=Shire; T=Town)

Category : P1; P4
Location : For the municipal districts of Albany (C), Augusta-Margaret River (S), Beverley (S), Boddington (S), Boyup Brook (S), Bridgetown-Greenbushes (S), Brookton (S), Bunbury (C), Busselton (S), Capel (S), Collie (S), Corrigin (S), Cranbrook (S), Cuballing (S), Cunderdin (S), Dardanup (S), Denmark (S), Donnybrook-Balingup (S), Dowerin (S), Esperance (S), Goomalling (S), Harvey (S), Kellerberrin (S), Kondinin (S), Koorda (S), Kulin (S), Lake Grace (S), Mandurah (C), Manjimup (S), Mount Marshall (S), Murray (S), Nannup (S), Narrogin (S), Northam (S), Northam (T), Pingelly (S), Plantagenet (S), Quairading (S), Ravensthorpe (S), Serpentine-Jarrahdale (S), Tammin (S), Toodyay (S), Trayning (S), Wandering (S), Waroona (S), Wickepin (S), Williams (S), Wyalkatchem (S), York (S).

Category : P1; P3
Location : For the municipal districts of Broomehill (S), Dumbleyung (S), Gnowangerup (S), Jerramungup (S), Katanning (S), Kent (S), Kojonup (S), Tambellup (S), West Arthur (S), Woodanilling (S).

Cotton bush Control Codes	
P1 **REQUIREMENTS** Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P3 **REQUIREMENTS** Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • within 100 metres inside of the boundaries of the infestation • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Properties with less than 5 hectares of infestation must treat the entire infestation. Of the remaining infested area:- Where plant density is 1-10 per hectare treat 100% of infestation. Where plant density is 11-100 per hectare treat 50% of infestation. Where plant density is 101-1000 per hectare treat 10% of infestation. Treatment must be done prior to seed set each year. Additional areas may be ordered to be treated.
P4 **REQUIREMENTS** Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • within 100 metres inside of the boundaries of the infested property • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
Special considerations	In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.

Control Method

Recommended herbicides	:	• When actively growing - spring to December **Glyphosate** **Triclopyr**

Herbicide	:	**Glyphosate** (various trade names)
Active ingredient and Group	:	360, 450, 490/500 and 540 g/litre and 680 g/kg glyphosate
Rate of product per hectare	:	1:100 for 360 g/L formulation
Amount of product per 10 litres water	:	• 100 mL for 360 g/L formulation • 80 mL for 450 g/L formulation • 70 mL for 490/500 g/L formulation • 65 mL for 540 g/L formulation 50 g for 680 g/kg formulation
Rate of product per hectare		Not Recommended
Wetting agent dilution		Wetting agent and/or summer spraying oil may be beneficial
Time of application		When actively growing. September - December before fruit forms.
Remarks	:	This is effective on mature bushes, regrowth and seedlings, provided good coverage is achieved.Where low volume/low pressure pumps are being used the rates should doubled.
More information and other control methods	:	• Slash established bushes during winter, and burn, cultivate or grub seedlings and regrowth. • Roundup Biactive® or Razor® preferred treatment in wet areas or along water courses near shallow water. • The addition of 1 g of metsulfuron per 100 L of water has also given improved control.

Herbicide	:	**Garlon™ 600** (various trade names)
Active ingredient	:	600 g/litre triclopyr
Amount of product per 10 litres water	:	30 mL
Rate of product per hectare	:	Not Recommended
Wetting agent dilution	:	Use crop-oil such as Uptake® @ 500 mL 100 L, or DC-Trate @ 1 L / 100 L
Time of application	:	Spring - December
Remarks	:	Use in place of glyphosate when annual pastures are still growing to avoid damage to grasses.
More information and other control methods	:	Grazon™ DS is also reasonably effective but further work is required. Dicamba is effective on seedlings.

Department of Agriculture and Food
Government of Western Australia

Declared plant in Western Australia

Weed Description

Family : **Asclepiadaceae**
Form : **Shrub – Perennial**
Status : **Present in WA**

An erect slender short-lived shrub 1-2 metres high, with narrow opposite leaves, and bladder-like fruit. All parts of the plant exude a milky white sap when damaged. It reproduces by seed and suckers.

Stems : Pale green, 60-180 cm covered with short whitish downy hairs when young.

Leaves : Dull green, occasionally with shiny upper surface. They are 5-12 cm long, 6-18 mm wide tapering to a point and are opposite each other in pairs.

Flowers : White or creamy with 5 fringed waxy lobes turned sharply outwards. They are formed in a loose drooping cluster of 3-10 flowers in the leaf axils.

Fruit : Inflated pod, egg shaped, tapering to a point, inflated pod 6 cm long, 2-2.5 cm wide covered with long soft bristles (1 cm long). Attached to the plant by an 'S' shaped stalk.

Seeds : Contained within a thin walled sack that is separated from the outer wall by an air space. Brown coloured, flattened and egg shaped about 6 mm long and 3 mm wide with a tuft of silky hairs about 3 cm long at one end.

Other relevant information related to this topic:

- Quarantine WA
- Permitted and quarantine species list
- Narrow-leaf cotton bush (Farmnote 43/03)
- Permit for minor off-label-use of a registered agvet chemical product (Permit number – per9655)
- Off-label permit (olp) for use of a registered agvet chemical product (Permit number - per4590)

12.7 Cape tulip report

Department of Agriculture and Food

Farmnote

Note: 317
Replaces Note 100
July 2008

Cape tulips

Chris Hawkins, Moora District Office and Sandy Lloyd, South Perth

What you need to know about Cape tulip

Cape tulip is the common name applied to two toxic plants native to South Africa. These are the one-leaf Cape tulip (*Moraea flaccida*, formerly known as *Homeria flaccida*) and the two-leaf Cape tulip (*M. miniata*, formerly known as *H. miniata*). Like many other serious weeds, Cape tulips were introduced to Australia as garden plants because of their attractive flowers and hardy nature. They soon jumped the garden fence and now both are common and widespread in the south-west of Western Australia and are weeds in South Australia, Victoria and New South Wales. One-leaf Cape tulip is also found in Tasmania and New Zealand. The genus *Homeria* was added to the US Federal Noxious Weeds list (http://plants.usda.gov) in May 2000.

Cape tulips are members of the iris family, Iridaceae, a large family with both native and exotic species in Western Australia. Examples of other weedy species are freesia (*Freesia* hybrid), some gladiolus (e.g. *Gladiolus caryophyllaceus* and *G. undulatus*) and watsonias (*Watsonia* spp.) which are all native to South Africa.

One-leaf and two-leaf Cape tulip are declared plants in Western Australia and their import into this State is regulated. Several other *Moraea* species have been found in Western Australia. Of these, the most common and widespread is thread iris (*Moraea setifolia*, formerly known as *Gynandriris setifolia*) which is found from the Geraldton area to the south coast. In addition, *Moraea aristata, M. fugax, M. lewisiae, M. ochroleuca, M. pavonis* and *M. vegetata* have all been recorded as garden escapees in Western Australia. *M. setifolia* and *M. lewisiae* (formerly known as *Hexaglottis lewisae*) are known to be poisonous, with symptoms similar to Cape tulip poisoning. However, it would be wise to regard all *Moraea* species as toxic.

A heavy invasion of one-leaf Cape tulip

Figure 2. Flowering one-leaf Cape tulip

Why Cape tulips matter

Both one-leaf and two-leaf Cape tulips are serious weeds of pasture. Animals will selectively graze clovers and other more palatable species, and this allows Cape tulip to flourish. They contain toxic chemicals called glycosides which affect the heart. Symptoms of poisoning in cattle include loss of appetite, abdominal pain, stiffness of the hind legs, diarrhoea, general depression, and weakness that may advance to convulsions or paralysis. Death may occur within hours of consuming the plant, or over several days. At post-mortem examination there is usually evidence of gastro-enteritis, with reddening of the abomasum (true stomach), and longitudinal red striping of the caecum and terminal large bowel. The heart may show haemorrhages on the inside and outside surfaces.

Cattle are most commonly affected when stock unaccustomed to the plant are placed on heavily infested pastures. About a kilogram of fresh leaf material is enough to cause death overnight. Sheep are rarely affected, although they are susceptible to the toxins. Placing very hungry sheep on infested green or dry pasture may result in poisoning. The plant remains toxic

Figure 4. Corm of two-leaf Cape tulip, with massed cormils. Each cormil is potentially a new plant.

Figure 3. Flowering two-leaf Cape tulip

even when dry, so contaminated hay can also be a problem. There is no treatment readily available. Prevent poisoning by avoiding contact with the plants. Always seek veterinary advice when livestock show unusual symptoms and/or unexplained deaths occur.

Cape tulips can be difficult and expensive to eradicate. Some herbicides effective in controlling Cape tulip also damage pasture legumes. Research is continuing into economically viable means of control, including biological control.

What to look for

One-leaf Cape tulip, as the name suggests, typically has only one leaf per plant. The leaves are 1 to 2 cm wide and can be up to 1 m long. The erect flowering stem can reach up to 60 cm in height. The flowers are usually orange to salmon pink with a yellow centre, but occasionally plain yellow. The small brown seeds are produced in a three-valved capsule up to 5 cm long. The underground corm has a light brown fibrous covering.

Two-leaf Cape tulip is very similar in appearance to one-leaf, but has 2 or 3 leaves per plant. Two-leaf Cape tulip does not produce seeds but produces a large number of small cormils around the parent corm, and in the angle where the leaves join the stem. The underground corm has a hard black covering.

Life history of Cape tulips

Cape tulips prefer heavier soils, but will grow in sand. The heaviest infestations tend to be found on clay or loam in the earliest settled areas in the Swan and Avon Valleys, though infestations extend from the Geraldton area through the south-west to Esperance and the Goldfields.

Figure 5. Blanket wiper technique for selective application of herbicide to Cape tulip in pasture. Note the height of wiper is above level of other plants, to minimise pasture damage.

Cape tulips are found on agricultural land (especially permanent pastures), roadsides, wasteland and in remnant bushland. The corms and cormils are spread by cultivation, and by earthworks such as road grading. They do not usually invade waterlogged sites, though both species can survive periodic inundation. Cape tulip corms and cormils can be spread by floodwaters.

Both seeds and corms of one-leaf Cape tulip emerge in autumn after rain. Depending on the season, up to 60% of corms can remain dormant in the soil. Dense infestations can have almost 7,000 corms per square metre. Flowering takes place in spring. Plants do not flower until they are two or three years old.

Two-leaf Cape tulip has a similar life cycle, emerging in autumn and flowering in spring. Two-leaf Cape tulip does not produce seeds but produces cormils on the stem. In dense infestations there can be up to 700,000 cormils per square metre. Cormils can remain dormant for up to eight years.

What you can do about Cape tulips

The dormancy associated with both Cape tulip species can lead to disappointment with control efforts. If a good kill is achieved in a year when many plants are dormant, there may be many more plants present the following season. Persistence is the key in reducing density of Cape tulip infestations. Ask your agribusiness consultant, local Biosecurity Officer or landcare coordinator for assistance in preparing a weed management plan. See Farmnote 213 *Control of Cape Tulip in Pasture* and Farmnote 75/2005 *Blanket wipers for tall weed control*.

Small landholders can also contact the Small Landholder Information Service for advice on weed control, pasture management, property planning and other relevant matters. (Tel: 9733 3333, Email: small_landholder@agric.wa.gov.au) or see www.agric.wa.gov.au and search for "small landholder". In addition, owners of small landholdings will find the free publication Bulletin 4686 *The Land is in your hands* a useful source of information.

Practice good biosecurity to avoid introducing Cape tulip to your property and to avoid poisoning livestock. Take particular care to buy hay that does not contain Cape tulip or other unwanted weeds. It can be an

Figure 6. Thread iris, Moraea setifolia

Figure 7. Moraea lewisiae

Figure 8. Chincherinchee, Ornithogalum thyrsoides

offence to sell or transport hay or other materials containing declared pests — offences can be reported to the nearest office of the Department of Agriculture and Food.

Do not allow contractors with dirty machinery to work on your property — if necessary provide a wash-down area so they can clean their equipment. If you already have Cape tulip, do not allow it to spread from your property. Learn and map where infestations are located to avoid spreading Cape tulip by cultivation. Include weed infestations in farm mapping and planning. If you can, always work from clean to dirty areas. Wash down machinery before moving it to clean areas, as Cape tulip and many other weeds are known to spread in soil. Use effective control techniques, including herbicides, to reduce the size of Cape tulip infestations.

Some landholders have expressed concern about using 'toxic' chemicals on pastures; however, remember that Cape tulip can be deadly to livestock and the longer its control is delayed, the more it will spread.

When choosing plants for your garden, avoid buying species that are toxic and/or have weed potential. Mail order catalogues may be convenient but some offer for sale toxic weeds such as chincherinchee (*Ornithogalum thyrsoides*). If you have any questions about suitable garden plants for your farm, your local landcare or catchment group may be able to provide advice. Garden-notes on weedy bulbs and garden plants and Bulletin 4641 *Harmful garden plants in Western Australia* are available from the Pest and Disease Advisory Service (Tel. 1800 084 881). Accredited nurseries should also be able to provide advice.

For identification of weed specimens, please take a sample to your nearest Department of Agriculture and Food office, or post it to *AGWEST* Plant Laboratories at Locked Bag 4, Bentley Delivery Centre WA 6983.

Further reading

- Everist, SL (1974) *Toxic plants of Australia*, Angus and Robertson. London. Revised edition 1981 (out of print).
- Hussey, BMJ, Keighery, GJ, Dodd, J, Lloyd, SG and Cousens, RD (2007) *Western Weeds – a guide to the weeds of Western Australia,* 2nd Edition, Weeds Society of WA, Perth.
- Moore, J and Wheeler, J (2008) *Southern Weeds and their control* (2nd Edition). Department of Agriculture and Food.
- Parsons, WT and Cuthbertson, EG (2000) *Noxious Weeds of Australia*. CSIRO Publishing.

Two very useful webpages for weed information are the Weeds CRC webpage www.weedscrc.org.au and the Weeds Australia webpage www.weeds.org.au

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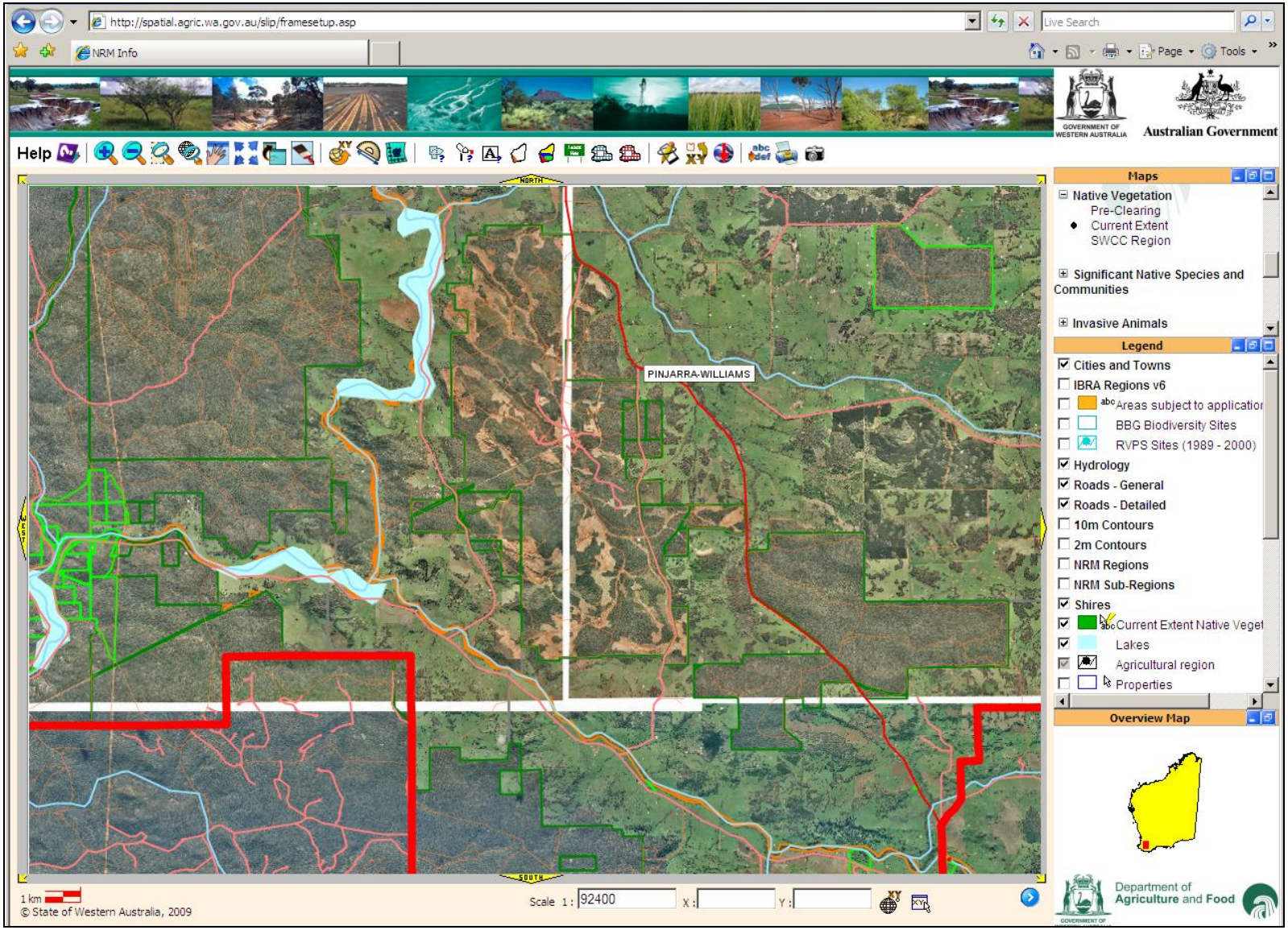
12.8 Department of Agriculture: Food Shared Land Information Platform (SLIP)

database search to confirm association types to be cleared 23/02/10



http://spatial.agric.wa.gov.au/slip/custom/showvegetation.asp?map=17&leid=2218&thematicid=0&keyvalue=80100441

Vegetation Map Unit

Map Unit Number: **80100441**
Spatial Mix: **pure**
Number of Vegetation Types: **1**

Vegetation Types

Type	Type Description Number	Description	Environmental Descriptor	NVIS Lv2 Structural Formation	NVIS Lv3 - Broad Floristic Formation
1047	1	**Medium woodland; marri & wandoo**	**BANNISTER**	**Woodland**	**Eucalyptus woodland**

http://spatial.agric.wa.gov.au/slip/custom/showvegetation.asp?map=17&leid=2218&thematicid=0&keyvalue=80100431

Vegetation Map Unit

Map Unit Number: **80100431**
Spatial Mix: **pure**
Number of Vegetation Types: **1**

Vegetation Types

Type	Type Description Number	Description	Environmental Descriptor	NVIS Lv2 Structural Formation	NVIS Lv3 - Broad Floristic Formation
886	1	**Medium forest; jarrah-marri**	**MENZIES**	**Open forest**	**Eucalyptus open forest**

http://spatial.agric.wa.gov.au/slip/custom/showvegetation.asp?map=17&leid=2218&thematicid=0&keyvalue=80100433

Vegetation Map Unit

Map Unit Number: **80100433**
Spatial Mix: **mosaic**
Number of Vegetation Types: **9**

Vegetation Types

Type	Type Description Number	Description	Environmental Descriptor	NVIS Lv2 Structural Formation	NVIS Lv3 - Broad Floristic Formation
888	1	**Medium forest; jarrah-marri**	**DARLING - DALE - Massive gravels with sandy loam matrix on the highest ground**	**Open forest**	**Eucalyptus open forest**
889	2	**Medium forest; jarrah-marri**	**DARLING - DALE - Upper slopes and ridges**	**Open forest**	**Eucalyptus open forest**
890	3	**Medium forest; jarrah-marri**	**DARLING - DALE - Sandy gravels on mid and lower slopes**	**Open forest**	**Eucalyptus open forest**
891	4	**Medium forest; jarrah-marri**	**DARLING - DALE - Lower and middle slopes of valleys with superficial wash of gravel and kaolinitic clay**	**Open forest**	**Eucalyptus open forest**
892	5	**Medium forest; jarrah-marri**	**DARLING - DALE - Lower and middle slopes with good brown loam soil**	**Open forest**	**Eucalyptus open forest**
893	6	**Medium forest; jarrah-marri**	**DARLING - DALE - Fertile loams on slopes of main river valleys**	**Open forest**	**Eucalyptus open forest**
894	7	**Medium forest; jarrah-marri**	**DARLING - DALE - Gravelly sands, transitional between swamps and gravelly slopes**	**Open forest**	**Eucalyptus open forest**
895	8	**Medium forest; jarrah-marri**	**DARLING - DALE - Winter-wet sandy loams on lower slopes and valley floors**	**Open forest**	**Eucalyptus open forest**
896	9	**Medium forest; jarrah-marri**	**DARLING - DALE - Seasonally waterlogged sandy loams with hardpan on lower slopes and valley floors**	**Open forest**	**Eucalyptus open forest**

12.9 Main Roads Vegetation Clearing Assessment Report

This guideline has been prepared to assist MRWA in addressing condition 7 "Assessment of Clearing Impacts" under Clearing Permit CPS 818/4.

1. AREA UNDER ASSESSMENT DETAILS

Proponent details

Proponent's name:	**MRWA**
Contacts	Name: Jeanette Della-Bona Phone: 9725 5661 Fax: 9725 5666 Email: jeanette.dellabona@mainroads.wa.gov.au

Property details

Property:	71.62 - 79 SLK Pinjarra - Williams Road, Marradong to Quindanning, Shire of Boddington
Colloquial name:	

Area Under Assessment

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:	Site Plan Attached
2.586 Ha	628	Mechanical	Widening and upgrade of Pinjarra – Williams Road	Yes ☒ No

2. BACKGROUND

Existing environment and information

Description of the native vegetation under application

Site Visit Undertaken	☐ Yes ☒ No	**Fauna / Flora Survey Undertaken**	☒ Yes ☐ No
Site Report Attached	☒ Yes ☐ No	**Fauna / Flora Survey Report Attached**	☒ Yes ☐ No
Site Photos Attached	☒ Yes ☐ No	**Other Relevant References Attached**	☒ Yes ☐ No

Vegetation Complex	Clearing Description	Vegetation Condition	Comment
According to a desktop search of DEC's Threatened Flora Database and the WA Herbarium's Flora base by Nature Conservation Officer Paul Tholen from DEC Perth Hills District (2/3/10) the proposed upgrade of Pinjarra-Williams Road occurs within the Northern Jarrah Forest and across the Coolakin, Dwellingup (D$), Michibin, Williams and Yalanbee (Y5) vegetation Complexes.	The clearing under application is in a mostly undisturbed area of native remnant vegetation. The purpose of the clearing is to widen and improve the Pinjarra – Williams Road. The disturbance will be limited to clearing for the single carriageway with 6 m lateral clearance from the painted edgeline. The area under application is 2.586 Ha. The Vegetation Systems associated with these proposed works include Bannister 3 which retains 57% of its pre-european extent, of which 67% is retained within DEC managed lands; Bannister 4 retaining 35% of which 44% is retained within DEC managed lands and West Darling 3 retaining 87% of the pre-european extent of which 88% is retained within DEC managed lands.	The area under application is mostly 5-6 (Degraded to Completely Degraded) on the eastern side; some areas adjacent to forest on the western side could be given a rating of 4 (Good) (according to Keighery, 1994 ranking) .	The floral survey targeting priority flora was conducted on the 22/03/10 by Nicole Seimon and Associates. The following species were targeted: *Calytrix simplex* subsp. *simplex* (P1), *Stylidium marradongese* (P3), *Tetratheca pilifera* (P3) and *Templetonia drummondii* (P4)

3. ASSESSMENT OF APPLICATION AGAINST CLEARING PRINCIPLES

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments **Proposal is not likely to be at variance to this Principle**

The application is for the widening and upgrade of the Pinjarra Williams Road from 71.62 – 81.7 SLK requiring the clearing of approximately 2.586 Ha of native vegetation. The vegetation under application is classified as largely 5-6 Degraded to Completely Degraded on the eastern site with some areas adjacent to state forest on the western side a rating of 4 - Good. Also Siemon noted the vegetation as "degraded"

It was confirmed by the DEC that the Vegetation Systems associated with these proposed works include Bannister 3 which retains 57% of its pre-european extent, of which 67% is retained within DEC managed lands; Bannister 4 retaining 35% of which 44% is retained within DEC managed lands and West Darling 3 retaining 87% of the pre-european extent of which 88% is retained within DEC managed lands.

The upgrade of the road therefore occurs in native vegetation complex that meet the formal reserved target for vegetation protection, and is generally degraded in nature therefore is not likely to be at variance to this Principle.

Methodology DEC Perth Hills District, Paul Tholen, Nature Conservation Officer (March, 2010)
Nicole Siemon and Associates (March 2010)
Site inspection Peter Swanson, Main Roads Environment Officer (November 2009)

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments **Proposal is not likely to be at variance to this Principle**

Within the shire of Boddington there have been recorded 8 threatened species and 8 migratory species of fauna.

A cockatoo survey was undertaken January 2010 to identify the presence of any threatened cockatoo species, habitat and foraging trees. The following species are known to occur in the area and were targeted during the survey: Carnaby's Cockatoo *Calyptorhynchus latirostris* (Vulnerable), Baudin's Cockatoo *Calyptorhynchus baudinii* (Endangered) and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Endangered under *WA Wildlife Conservation Act 1950* and Vulnerable under the *Environment Protection Conservation and Biodiversity Conservation Act 1999)* (Refer to Appendix B).

The Project Manager has taken into consideration the results from this survey and realigned the works to avoid clearing of the 2 significant trees and also to minimise clearing of foraging trees that were identified from the survey. This has resulted in a total of approximately 70 trees out of the total 628 trees to be cleared that have been identified as foraging trees for these species, ie 0.07 Ha of foraging trees to be removed and no habitat trees to be removed. This amount falls below the 1 ha limit that DEWHA sets for the clearing of foraging habitat ie in terms of what would trigger national environmental significance *(pers. comms. Nigel Rowe, Feb. 2010).*

The vegetation under application is 2.586 Ha of degraded native vegetation spread over 10 kilometres of road reserve. There is a lack of understorey within the applied area which would limit the habitat potential for ground dwelling fauna species such as the Quenda (*Isoodon obesulus fusciventer,* P5), Brush-tailed Wallaby (Macropus Irma, P4), Chuditch (*Dasyurus geoffroii*, Vulnerable) and Woylie (*Bettongia penicillata ogibyi*, P5). Also as Chuditch has a large home range (males 15km^2, females 3-4km^2), this clearing will have a minimal impact on the species. Mature trees can also be utlitised for habitat by the Red-tail Phascogale (P3).

The Red-tailed Phascogale *(Phascogale calura)* is listed as Endangered under the *EPBC Act (1999)*. This species has preferred habitats of *Allocasuarina* woodlands with hollow-containing eucalypts (e.g. *Eucalyptus wandoo*) and *Gastrolobium spp*. Given the very narrow and degraded nature of the road reserve however, it is not likely that this fauna will be impacted by the clearing. Also the clearing of any mature wandoo trees will be avoided where at all possible, and may be retained in some areas through the use of a wire rope barrier.

Other migratory bird species listed on the DEWHA website are listed as "over-fly" marine area.

Methodology Black Cockatoo Surveys of Roadside Vegetation for Realignment works on Section of Pinjarra – Williams Road R.E. & C Johnstone and T. Kirkby (January, 2010) (Refer Appendix B)

DEWHA EPBC Act Protected Matters Report 10/12/09 and Biodiversity Species Profile and Threats Database

(Red-tailed *Phascogale calura*)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments **Proposal is not likely to be at variance to this Principle**

A desk-top search of DEC's Threatened Flora Database and the WA Herbarium's Flora base indicated that although No Declared Rare flora species were recorded alongside or within 200m of the 10km of roadside subject to this proposal, five species of Priority flora were found to potentially occur within close proximity and in the same vegetation complexes though which the road widening is to occur.

DEC required that Main Roads further investigate the possible occurrence of threatened flora along the section of proposed widening and upgrading of the Pinjarra – Williams Road prior to road works taking place by a employing a qualified botanist to inspect the site. The species to be targeted were *Calytrix simplex* (Not threatened) to rule out *Calytrix simplex sp.* (P1) as they look very similar; and also the occurrences of *Stylidium marradongese* (P3), *Tetratheca pilifera* (P3) and *Templetonia drummondii* (P4) The survey was completed Mach 2010 refer Appendix B. No taxa of the genera *Calytrix, Tetratheca* or *Templetonia* were found. Residue of the *Stylidium* was searched for. In the opinion of experienced botanists (NSA P/L) the probability that *Stylidium marradongese* occurs in the study area is highly unlikely and if present, it would be restricted to the intact jarrah forest margins if present.

Methodology Referral to Rare and Priority Flora surveys conducted by DEC-Busselton since pre-1999 (Appendix B).
Consultation with DEC Busselton (Botanist - Andrew Webb, 11/6/08)

DEC correspondence (Appendix B)

(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.

Comments **Proposal is not likely to be at variance to this Principle**

No Threatened Ecological Communities (TEC) were identified in or adjacent to study area.

Methodology DEC correspondence (Appendix B)
Main Roads ArcGIS database search (Appendix B)

(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.

Comments **Proposal is not likely to be at variance to this Principle**

It was confirmed by the DEC the proposed upgrade of Pinjarra- Williams Road occurs within the Northen Jarrah Forest and across the Coolakin, Dwellingup (D4) Michibin, Williams and Yalanbee (Y5) vegetation Complexes. The Vegetation Systems associated with these proposed works include Bannister 3 which retains 57% of its pre-european extent, of which 67% is retained within DEC managed lands; Bannister 4 retaining 35% of which 44% is retained within DEC managed lands and West Darling 3 retaining 87% of the pre-european extent of which 88% is retained within DEC managed lands.

Therefore according to DEC, the proposed upgrading occurs in native vegetation complex that meets the formal reserved target for vegetation protection.

Methodology DEC correspondence re flora (refer Appendix B)

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments **Proposal may be at variance to this Principle**

There are no wetlands in the vicinity of the site. Marradong Brook an ephemeral watercourse crosses the Pinjarra-Williams Road as well as another unnamed creek. The associated vegetation with these watercourses however is very degraded and narrow (within the road reserve), and essentially consists of typha weed. It is proposed that the more degraded side (west) side of the road shall be cleared.

Methodology

- Commonwealth Department of Environment, Water, Heritage and the Arts mapping tool were consulted on sensitive water resources to determine whether the project area supported, or was

adjacent to, any significant lakes, rivers or wetlands or proclaimed areas.

- Main Roads ArcGIS database search waterways and wetlands (Appendix B)
- Department of Water correspondence (Appendix D)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments **Proposal is not likely to be at variance to this Principle**

The soils within the project area which mainly comprise the Dwellingup (D) and Coolakin (Ck) lateritic soils that contain sands and gravels with also some Michibin (Mn) containing yellow duplex soils and some rock outcrop. These ironstone gravel soils are associated with a low risk of salinity and have nil to low risk of acid sulphate soils. It is therefore not considered likely that the proposed clearing would result in any significant increase in salinity or have an impact on acid sulphate soils.

The main land degradation risk associated with the removal of vegetation on the identified soil type is considered to be water erosion, however given the area under application is limited to 2.586 Ha over 10km, within a narrow linear road reserve, it is not likely to result in appreciable water erosion.

Given the above, it is not considered likely that the proposed clearing would result in appreciable land degradation.

Methodology SLIP Acid Sulphate Soils Risk Map Swan Coastal Plain
Churchward, H.M. & McArthur, W.M., (1978) Department of Conservation and Environment, Darling System, Landforms and Soils – Pinjarra Sheet, Division of Land Resources Management, CSIRO, Perth, Western Australia.

(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.

Comments **Proposal is not likely to be at variance to this Principle**

There are three Timber Reserves vested with the Conservation Commission that are located adjacent to Pinjarra-Williams Road. There is also a conservation reserve located approximately 5.3 kilometres north east of the project area called the Mooradung Nature Reserve for the purpose of conservation of flora and fauna (R 32448). The reserve is 631 Ha in size. There are no other adjacent or nearby reserves affected by this proposal.

Methodology DEC managed land database search in Main Roads ArcGIS

(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.

Comments **Proposal is not likely to be at variance to this Principle**

Consultation with the Department of Water (DoW) revealed that there were no groundwater issues in the project area ie no Public Drinking Water Source Areas or Country Area Water Supply (CAWS) areas. DoW also noted that there were no significant wetlands or waterways located along the alignment.

There are 2 small degraded ephemeral surface water drainage lines that cross the road within the project area ie Marradong brook. Advice from the Department of Agriculture and Food (DAF) has indicated that the road widening project poses a low risk to eutrophication and water logging to the surrounding land and river systems. They also advise that since the clearing is of a linear nature, the road widening, poses a low risk of increasing salinity on and off site.

Due to the size and nature of the proposed works, and that works will take place most likely in dry conditions (early April) it is unlikely that the quality of surface or groundwater would be deteriorated.

Methodology Consultation with Department of Water (Appendix D)
Consultation with Department of Agriculture and Food (Appendix B)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments **Proposal is not likely to be at variance to this Principle**

Due to the linear nature of the clearing of 2.586 Ha over 10 km (ie contained within a narrow, linear road reserve) and the timing of the clearing operations (ie early April) it is not considered likely that the proposed

clearing of vegetation would impact on peak flood height or duration.

Methodology Advice from Department of Agriculture and Food (Appendix B)

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Comments

Native title has not been determined as yet over this area although there has been an application by the Gnaala Karla Booja (WC98/58) under the Native Titles Act 1993.

Methodology National Native Title Tribunal (www.nntt.gov.au)

4. Assessor's recommendations

List of Principles seriously at variance, at Recommendation variance or maybe at variance

The following clearing principle may be at variance:

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

This PEIA has been compiled as a condition of the Main Roads Clearing Permit (818/4).

5. OFFICER PREPARING REPORT

Jeanette Della-Bona
Title: Project Environment Officer
South West Region
Main Roads Western Australia
Phone: 9725 5661
Date: 1 April 2010

12.10 DEC Correspondence

Government of **Western Australia**
Department of **Environment and Conservation**

File 09/3981
Document No. BIO# 4448
Resp. Officer PDOE DELLA BONA

Your ref: MRSW M 1209
Our ref: 2005F179V01
Enquiries: Paul Tholen
Phone: 9295 9106
Fax: 9295 9101
Email: paul.tholen@dec.wa.gov.au

Jeanette Della-Bona
Environment Officer
Main Roads – South West Region
Robertson Drive,
PO Box 5010,
Bunbury WA 6231

MAIN ROADS W.A.
BUNBURY
5 MAR 2010
RECEIVED

Attention: Jeanette

Proposed Road Works: Pinjarra-Williams Road Moorapulling Road to Zilko Road

I refer to your correspondence of 17 November 2009, seeking comments on the above Proposed Road Works. The Department of Environment and Conservation (DEC) provides the following advice:

Current state of Pinjarra-Williams Road

It has been identified that the Pinjarr-Williams Road, section between Moorapulling Road and Zilko Road requires hazard reduction maintenance (approximately 20 km in length). The proposal is to minimise clearing of vegetation, however in some cases both sides of the road will be cleared up to a width of 6 meters from the *new edge seal.*

Clearing Permit:

It has been recognised that Main Roads has a statewide purpose permit which covers general clearing for road widening; however where clearing has the potential to impact threatened flora, the proposal may be at variance to principal "A" and therefore the holder of the permit will need to seek submissions from the Native Vegetation Conservation Branch (NVCB) of DEC.

Potential impacts upon identified threatened flora:

A desktop assessment has identified records of Priority flora located within the vicinity of the proposed road works. The vast majority of this threatened flora is concentrated in vegetation surrounding Mount Saddleback, which is within the same vegetation complex (Coolakin) as where the proposed road works are to take place.

The upgrade of the road may be at variance to principal "A" of Native Vegetation Protection legislation which relates to the taking of threatened flora namely: *Calytrix simplex* subsp. *simplex* a Priority 1 species, which is recorded in the Coolakin vegetation complex.

Priority One - Poorly Known: taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey

Reduced Road length requiring maintenance:

Recent correspondence from Jeanette Della-Bona (28 January 2010) indicates the length of road subject to maintenance has been reduced to an 8 km length from the Worsley Bauxite Mine Access Road to Quindanning. This section has a higher concentration of threatened flora within close proximity than has the southerly section, with the majority of the road being across the Coolakin vegetation complex.

Perth Hills District
51 Mundaring Weir Road, MUNDARING WA, 6073
Ph: (08) 9295 9100 Fax: (08) 9295 9101
www.dec.wa.gov.au

Summary/Recommendations

DEC recommends the Department of Main Roads further investigate the possible occurrence of threatened flora along the section of Pinjarra-Williams Road as detailed above, prior to road works taking place. A flora survey will need to be carried out by a qualified botanist at an appropriate time of year in accordance with EPA Guidance Statement 51.

Results of the flora survey will need to be submitted to the Native Vegetation Conservation Branch for assessment and further comment.

Should you have any queries regarding this advice please contact Paul Tholen on: 9295 9106.

Yours sincerely

Stefan de Haan
District Manager
Perth Hills District

2 March 2010

RESULTS OF ASSESSMENT
Comments on assessment:

A desktop search of DEC's Threatened Flora Database and the WA Herbarium's Flora base indicated that although No Declared Rare flora species were recorded alongside or within 200 meters of the 20.06 km of road subject to this proposal, five species of Priority flora occur within close proximity to the proposed program of works and in the same vegetation complexes through which the road widening is to occur.

The species of Priority flora that could potentially occur on either side of the road include: *Senecio leucoglossus* a Priority 4 species found within the Michibin Complex; and *Calytrix simplex* subsp. *simplex* (P1), *Styliduim marradongense* (P3); *Tetratheca pilifera* (P3) and *Templetonia drummondii* (P4), which occur within the Dwellingup D4 Complex.

The Environmental Protection Authority's, *"Guidance for the Assessment of Environmental Factors", 'Level of assessment for Proposals Affecting Natural Areas Within the System 6 Region and Swan Coastal Plain", No 10 2006.* specifically notes, " The National Objective sand targets for Biodiversity Conservation 2001-2005 (Commonwealth of Australia 2001a) recognise that the retention of 30%, or more, of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected. This percentage level of retention is also adopted in the EPA's Position Statement No 2 on environmental protection of native vegetation in Western Australia (EPA 2000)."

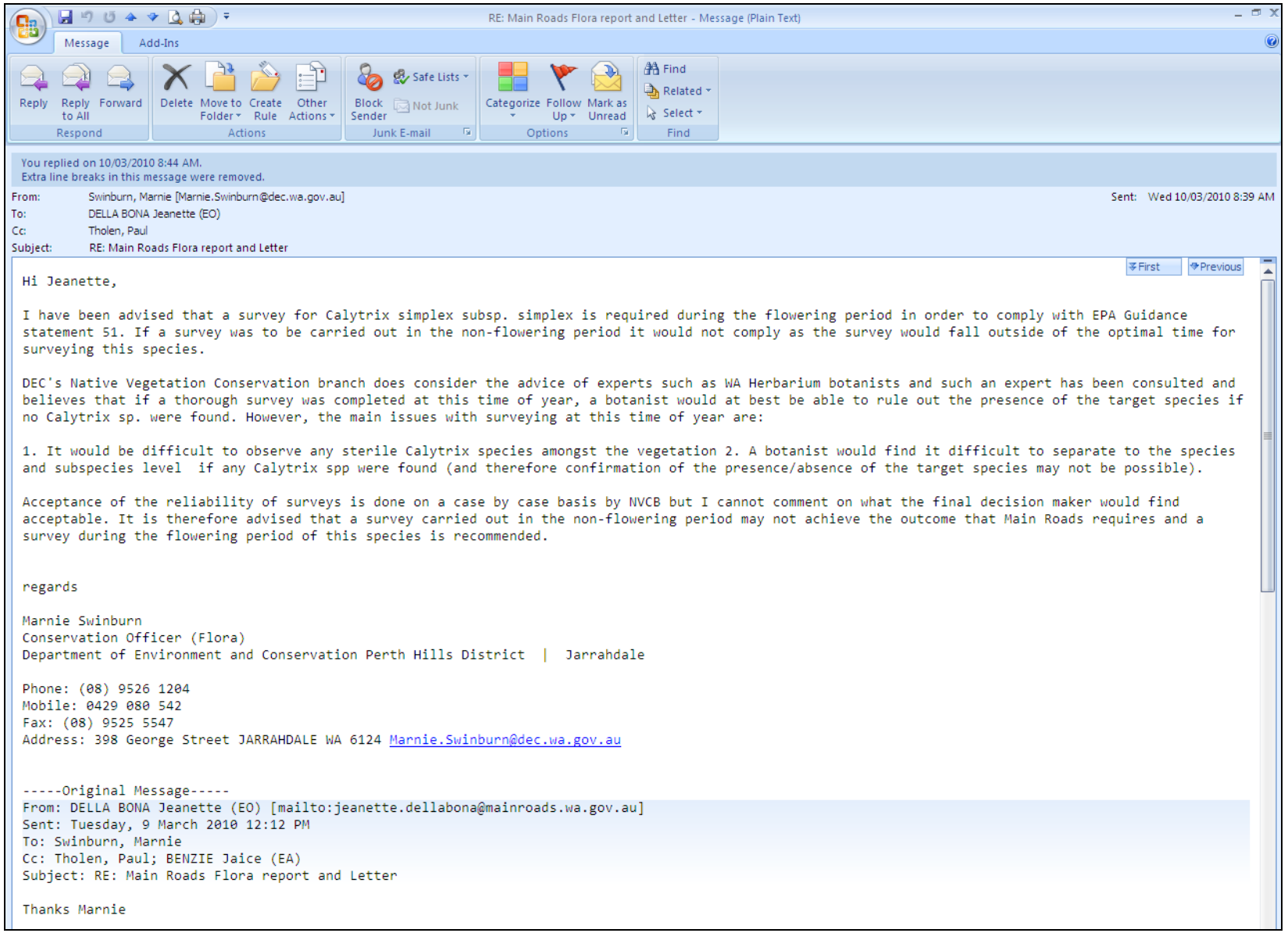
- The proposed upgrade of Pinjarra-Williams Road, occurs within the Northern Jarrah Forest and across the Coolakin, Dwellingup (D4), Michibin, Williams and Yalanbee (Y5) vegetation Complexes. The Vegetation Systems associated with this Program of Works include Bannister 3 which retains 57% of its pre-european extent, of which 67% is retained within DEC managed lands; Bannister 4 retaining 35% of which 44% is retained within DEC managed lands and West Darling 3 retaining 87% of the pre-european extent of which 88% is retained within DEC managed lands. DEC has been advised that this program of works involves an upgrade of existing roads and there will be no significant clearing involved.

The upgrade of the road occurs in native vegetation complex that, as outlined above, meets the formal reserved target for vegetation protection; however the proposed maintenance may be at variance to principal "A" of Native Vegetation Protection legislation which relates to the taking of threatened flora namely: *Calytrix simplex* subsp. *simplex*, which is recorded in the Coolakin vegetation complex surrounding Mount Saddleback.

Priority One - Poorly Known: taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey

DEC recommends the Department of Main Roads further investigate the possible occurrence of threatened flora along the section of Pinjarra-Williams Road as detailed above, prior to road works taking place. The flora survey will need to be carried out by a qualified botanist at an appropriate time of year in accordance with EPA Guidance Statement 51.

Signature:	Paul Tholen	Nature Conservation Officer	2/3/2010
Signature:	Stefan de Haan	District Manager	2/3/2010


RE: Main Roads Flora report and Letter - Message (Plain Text)
Message
Add-Ins
Reply
Reply to All
Forward
Delete
Move to Folder
Create Rule
Other Actions
Block Sender
Safe Lists
Not Junk
Categorize
Follow Up
Mark as Unread
Find
Related
Select
Respond
Actions
Junk E-mail
Options
Find
You replied on 10/03/2010 8:44 AM.
Extra line breaks in this message were removed.
From: Swinburn, Marnie [Marnie.Swinburn@dec.wa.gov.au]
Sent: Wed 10/03/2010 8:39 AM
To: DELLA BONA Jeanette (EO)
Cc: Tholen, Paul
Subject: RE: Main Roads Flora report and Letter
First
Previous
Hi Jeanette,
I have been advised that a survey for Calytrix simplex subsp. simplex is required during the flowering period in order to comply with EPA Guidance statement 51. If a survey was to be carried out in the non-flowering period it would not comply as the survey would fall outside of the optimal time for surveying this species.
DEC's Native Vegetation Conservation branch does consider the advice of experts such as WA Herbarium botanists and such an expert has been consulted and believes that if a thorough survey was completed at this time of year, a botanist would at best be able to rule out the presence of the target species if no Calytrix sp. were found. However, the main issues with surveying at this time of year are:
1. It would be difficult to observe any sterile Calytrix species amongst the vegetation 2. A botanist would find it difficult to separate to the species and subspecies level if any Calytrix spp were found (and therefore confirmation of the presence/absence of the target species may not be possible).
Acceptance of the reliability of surveys is done on a case by case basis by NVCB but I cannot comment on what the final decision maker would find acceptable. It is therefore advised that a survey carried out in the non-flowering period may not achieve the outcome that Main Roads requires and a survey during the flowering period of this species is recommended.
regards
Marnie Swinburn
Conservation Officer (Flora)
Department of Environment and Conservation Perth Hills District | Jarrahdale
Phone: (08) 9526 1204
Mobile: 0429 080 542
Fax: (08) 9525 5547
Address: 398 George Street JARRAHDALE WA 6124 Marnie.Swinburn@dec.wa.gov.au
-----Original Message-----
From: DELLA BONA Jeanette (EO) [mailto:jeanette.dellabona@mainroads.wa.gov.au]
Sent: Tuesday, 9 March 2010 12:12 PM
To: Swinburn, Marnie
Cc: Tholen, Paul; BENZIE Jaice (EA)
Subject: RE: Main Roads Flora report and Letter
Thanks Marnie

12.11 Flora Survey by Nicole Siemon and Associates

Pinjarra-Williams Road, Quindanning

Targeted flora survey Main Roads

March 2010

Nicole Siemon and Associates PL
PO Box 529
Dunsborough 6281

Table of contents

1.0 INTRODUCTION

1.1 Background

Main Roads Western Australia commissioned Nicole Siemon and Associates PL to undertake a targeted vegetation survey. The survey area included degraded road verge and bushland adjoining the Pinjarra-Williams Road south from the Worsley Saddleback Bauxite Mine entry road for a distance of 10 kilometres towards Quindanning. The works will involve creating a new seal with a 6-metre clearance of vegetation from the new edge of seal.

This survey focused exclusively on the four Priority taxa and is intended to facilitate acceptance of a clearing application for road widening works along the stretch.

1.2 Purpose

The Department of Environment and Conservation identified that the upgrade of the road may be at variance to principal 'A' of Native Vegetation Protection legislation, which relates to the taking of threatened flora (DEC Ref: 2005F179V01).

The purpose of this study was to determine whether or not four priority taxa occurred in the area. Because of the timing of the survey, thorough surveying for targeted species was the principal focus. Three of the targeted taxa are inconspicuous low perennial shrubs and the fourth taxon is a geophytic herb. The potential difficulties with surveying in late March is that perennial shrubs have usually ceased flowering and cryptic geophytes have no above-ground shoots. Without flowers it is impossible to identify to species and subspecies level with certainty, and should the verge vegetation be rated as excellent to very good condition, it may be difficult to locate the targeted taxa.

1.3 Rare and Priority flora

Species of flora and fauna are afforded Rare or Priority conservation status where their populations are restricted geographically or subject to threatening processes. The state Department of Environment and Conservation recognises these threats of extinction and consequently applies regulations towards population and species protection (Atkins 2008).

Declared Rare Flora species are gazetted under subsection 2 of section 23F of the Wildlife Conservation Act 1950 [WA] and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 23F of the Wildlife Conservation Act 1950 [WA] defines "to take" as "… to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora to cause or permit the same to be done by any means."

When taxa do not meet the criteria for listing as Declared Rare Flora, Priority Flora conservation listing can be conferred by the Western Australian Department of Environment and Conservation (Atkins 2008) and be managed under state guidelines according to their priority status. Priority Flora are currently poorly known and under consideration for declaration as 'rare flora', but are in urgent need of further survey (Priority one to three) or require monitoring every 5-10 years (Priority four).

The four taxa surveyed for were:

Calytrix simplex subsp. simplex (P1)	Small shrub, about 0.2 m high, with purple flowers between Oct–Nov.
Stylidium marradongense (P3)	Erect perennial, herb, 0.15–0.5 m high, Leaves adpressed to stem, lanceolate, 0.25-0.4 cm long, 0.6-1.3 mm wide, apex mucronate, margin hyaline or margin hyaline and ciliate, glabrous. Inflorescence racemiform. Fl. white, pink, Sep–Nov. Sand over laterite. Jarrah-Marri forest.
Tetratheca pilifera (P3)	Prostrate or ascending shrub, 0.1 – 0.4 (–0.6) m high. Fl. yellow, brown, purple, Aug–Sep. Lateritic soils.
Templetonia drummondii (P4)	Spreading shrub, 0.1–0.3 m high. It has purple flowers between August – October and grows in gravelly soils.

1.4 Limitations

The survey for the three perennial shrubs could be undertaken with some confidence however it is impossible to confidently search for residue of the geophytic herb.

Typically survey for priority flora is required during the flowering period in order to comply with EPA Guidance statement 51, which requires survey during the optimal time for this species. If surveys are carried out in the non-flowering period,

acceptance of the botanical survey results is up to the discretion of the Department of Environment and Conservation's Native Vegetation Conservation Branch.

DEC's Native Vegetation Conservation Branch does consider the advice of experts such as WA Herbarium botanists and such an expert has been consulted (Marnie Swinburn, email 2010) believes that if a thorough survey was completed at this time of year, a botanist would be confident that an inability to locate plants of *Calytrix* would suggest that the species was absent from the target survey area.

2.0 METHODS

2.1 Flora

The Western Australian State Herbarium was visited on the 18th March 2010 to review, photograph and photocopy pressed specimens of the four target taxa. Every specimen was reviewed and key characteristics noted.

On the 19th and 20th March three Botanists from NSA PL completed 1.5 field days covering a total of 10 km on both sides of the road. The survey area was traversed on foot. The width of verge assessed ranged from 1.5 m to more than 7 m wide. Where there was no boundary fencing and better quality bushland, surveying was widened to more than 15 m from the existing fencelines. The flora was systematically assessed for plant specimens requiring further identification.

2.2 Limitations

While it is recognised that the timing of the survey excludes finding flowering specimens, it was considered that their characteristic vegetative growth forms would make the plants stand out from the extremely dry annual grasses that dominate. As mentioned above, the survey in relation to the *Stylidium* has serious limitations.

3.0 RESULTS

3.1 Potential Priority Flora

Because of the degraded nature of the road reserve vegetation, it was possible to traverse on foot the entire survey area. The dominance of exotic annual grass species in particular, made any perennial vegetation extremely conspicuous. Perennial vegetation including shrubs less than 0.5 m tall occurred in less than 5% of the total survey area.

No taxa of the genera *Calytrix*, *Tetratheca* or *Templetonia* were found. The search undertaken by the three botanists for the conditions was intensive and all botanists undertaking the survey have confidence that the three perennial shrub taxa do not occur in the study area. Residue of the *Stylidium* was searched for. In the opinion of NSA PL the probability that *Stylidium marradongense* occurs in the study area is highly unlikely and if present, it would be restricted to the intact jarrah forest margins if present.

4. SUMMARY

In summary no Priority species pursuant to Subsection 2 of Section 23F of the Wildlife Conservation Act 1950 [WA] and listed by the Department of Environment and Conservation in the correspondence with Main Roads WA were located during the survey of Pinjarra-Williams Road widening Project Area.

The intensity of the survey was appropriate for the site and there is confidence with the results. In the opinion of NSA PL, widening of the Pinjarra-Williams Road for safety reasons will not impact on any threatened flora.

5. LIST OF PERSONNEL

The following personnel from NSA PL Environmental Consulting were involved in this project:

Principal Consultant	Nicole Siemon
Senior Contracting Botanist	Adrienne Markey
Research Assistant	Pauline Robinson

12.12 Cockatoo Survey by R.E & C Johnstone & T Kirkby

COCKATOO SURVEY REPORT
BLACK COCKATOO SURVEYS OF ROADSIDE VEGETATION FOR REALIGNMENT WORKS ON SECTION OF
PINJARRA – WILLIAMS ROAD.

R.E. & C. JOHNSTONE AND T. KIRKBY.

Scope and Approach

The purpose of this survey was to assess roadside vegetation along a 10 kilometre section of Pinjarra – Williams Road, defined by SLKs (71.6 to 79) to identify any feeding, breeding and roosting sites for three species of black cockatoos listed under the Federal *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.* The species involved are Carnaby's Cockatoo *Calyptorhynchus latirostris,* Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso.*

A reconnaissance of the area was carried out on 18th December 2009 and the site was visited on 16th and 17th January 2010. Trees with large hollows deemed 'significant' trees were inspected with binoculars for signs of use by cockatoos e.g. wear around hollows, chewing, scarring and scratch marks on trunks and branches. Trees deemed 'significant' were also scratched and raked with a pole to flush any sitting birds from hollows and we listened for calls of chicks from within hollows.

All trees with nest hollows or possible or potential nest hollows were logged with GPS pick up. We also searched for any old or recent evidence of cockatoos feeding in the area and for evidence of roost sites (feathers and droppings etc.). Some roadside verges in this area contain important feeding habitat for black cockatoos and road widening has the potential to affect feeding resources for birds breeding or migrating in this region.

SPECIES BACKGROUND INFORMATION

Carnaby's Cockatoo *Calyptorhynchus latirostris*

Listed as Schedule 1 (Endangered) under the Western Australian Wildlife Conservation Act, and as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999.*

Distribution

Endemic to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noogar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Coondingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Status

This species is a postnuptial nomad, tending to move west after breeding. For example; birds breeding in Badgingarra, Dandaragan and Moora regions tend to move west after breeding into higher rainfall areas especially the near-coastal *Banksia* scrubs e.g. at Wanagarren Nature Reserve, Nilgen Nature Reserve and Yanchep area, then south onto the southern Swan Coastal Plain including the Perth metropolitan area, Lake Clifton and Myalup. It is uncommon to common in the subhumid zone and wetter parts of the semiarid zone, scarce and patchily distributed in the drier parts of its range (north of Arrowsmith Lake and east of Marchagee, New Norcia, Toodyay, Tarin Rock and Lake Magenta) and scarce to moderately common in deep south-west (south of Margaret River, Nannup and Bridgetown and east of Albany).

Usually in pairs or small flocks, also large flocks (up to 6000) in non-breeding season (late spring to mid-winter), especially at *Banksia* scrubs and pine plantations on the Swan Coastal Plain. Because of the large-scale post-war clearing of semiarid sandplains, this species has declined in much of the wheatbelt. There has been an apparent shift in its breeding range further west and south since the middle of last century with a more rapid increase in the past 10-30 years into the Jarrah – Marri forests of the Darling Scarp and in the Tuarts of the Swan Coastal Plain.

Breeding Requirements

Carnaby's Cockatoo display strong pair bonds and mate for life. They nest mainly in hollows of smooth-barked eucalypts especially Salmon Gum *Eucalyptus salmonophloia* and Wandoo *Eucalyptus wandoo* but nests have also been found in other eucalypts including York Gum *Eucalyptus loxophleba,* Flooded Gum *Eucalyptus rudis,* Tuart *Eucalyptus gomphocephala* and the rough-barked Marri *Corymbia calophylla.* On the Swan Coastal Plain most nests are in Tuart.

Judging from breeding records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain.

Breeding success is largely dependent on suitable feeding habitat adjacent to the nest site to provide the necessary food for the survival of the chick

Diet

Feeding mainly on the seeds and flowers of a wide range of proteaceous species (*Hakea, Banksia, Grevillea* and *Dryandra),* also seeds and flowers of *Eucalytpus, Corymbia* and *Callistemon,* seeding *Allocasuarina , Pinus,* corkscrew grass, wild raddish, canola, lupins, fruiting almonds and macadamia and insect larvae (Johnstone and Storr 1998 and Storr-Johnstone Bird Data Bank).

Feeding Areas

Carnaby's Cockatoo forages in a wide range of habitats including proteaceous scrubs and heaths, eucalypt woodlands and forests, plantations of *Pinus,* open farmlands and urban gardens.
The recovery plan for Carnaby's Cockatoo highlights the importance of protecting and regenerating vegetation remnants and corridors within breeding areas.

Baudin's Cockatoo *Calyptorhynchus baudinii*

Listed as Schedule 1 (Endangered) under the Western Australian Wildlife Conservation Act, and as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999.*

Distribution

Endemic to the south-west of Western Australia, confined to the humid and subhumid zones, ranging north to Gidgegannup and Hoddy Well, east to Wundowie, Mt Helena, Christmas Tree Well, Boyagin

Rock, Wandering, Williams, Kojonup, near Cranbrook, King River and west to the Swan Coastal Plain including West Midland, Byford, Serpentine, North Dandalup, Waroona, Yarloop, Wokalup, Yalgorup, Bunbury, Dunsborough, Leeuwin – Naturaliste National Park and Augusta; also the Stirling and Porongurup Ranges and east along the south coast to Waychinicup (Johnstone and Storr 1998, and Johnstone and Kirkby 2006).

Status

Baudin's Cockatoo is also a postnuptial nomad, movements including visits between March and September to central and northern Darling Scarp (e.g. Collie, Crossman, North Dandalup, Serpentine, Wungong Dam, Araluen, Mundaring and Gidgegannup) and some mostly eastern parts of the Swan Coastal Plain (e.g. Maida Vale, Byford, Mundijong, Serpentine, North Dandalup, Lake Clifton, Bunbury and Capel). It is scarce to moderately common (most numerous in deep south-west during spring breeding season September – December and in northern Darling Scarp during autumn – winter (April – August). Usually in small flocks (up to 30) occasionally in larger flocks (up to 50) or aggregations (up to 1200) at drinking sites or roosts. It has declined greatly in the last 50 years, its low rate of reproduction (0.6 chick per year) precluding it from replacing the large number shot by orchardists and those lost through other causes e.g. habitat destruction. Over a quarter of its original habitat has been cleared for agriculture.

Breeding Requirements

The breeding requirements of this species are still poorly known. Breeding recorded in the south-west, north to Serpentine and east to Kojonup, Albany (possibly further east to about Waychinicup), also unconfirmed reports from near Bunbury. They nest mainly in hollows of Karri *Eucalyptus diversicolor* and Marri *Corymbia calophylla* but nests have also been found in other eucalypts including Jarrah *Eucalyptus marginata,* Wandoo *Eucalyptus wandoo* and Tuart *Eucalyptus gomphocephala* (Storr-Johnstone Bird Data Bank).

Following breeding the birds leave the nesting areas and cockatoos from wide-ranging areas amalgamate to form large foraging flocks.

Diet

Forage at all levels in forest, attracted to flowering and seeding Marri *Eucalyptus calophylla,* also *Banksia* (especially *B. grandis, B. littoralis, B. ilicifolia*), *Hakea* to seeding *Erodium botrys, Pinus* (rarely) and to fruiting apples and pears and strip bark and wood from trees, especially dead trees in search of insect larvae.

Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Listed as Schedule 1 (Endangered) under the Western Australian Wildlife Conservation Act, and as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999.*

Distribution

Endemic to the south-west of Western Australia. This subspecies occurs in the humid and subhumid south-west mainly the hilly interior, north to Gingin (formerly to Dandaragan), Gidgegannup, and east to Mt Helena (formerly Toodyay), Chidlow, Wooroloo, Wundowie, The Lakes, Christmas Tree Well, Bannister (formerly to Wandering), Mt Saddleback, Kojonup, Rocky Gully, the upper King River and Porongurup Range.

Status

It was formerly common, but is now rare to uncommon and patchily distributed over a range which has become markedly reduced. Usually in pairs or small flocks, seldom large flocks (up to

200). Estimate of total population 10 – 15,000 birds but breeding population is small possibly only 10 – 20 %.

Breeding

Breeding recorded from February to December (with a peak between October and December, also a peak in some years in April - May).

Nesting in large hollows of Marri *Corymbia calophylla,* Jarrah *Eucalyptus marginata,* Wandoo *Eucalyptus wandoo,* Bullich *Eucalyptus megacarpa* Tuart *Eucalyptus gomphocephala* and Karri *Eucalyptus diversicolor.* Clutch one (rarely 2) and only the female incubates and broods. Incubation period 29 – 31 days and nestling period 75 – 85 days (Johnstone 1997). Most pairs appear to breed every second year.

Diet

Feeding mainly on the seeds of Marri, Jarrah, Blackbutt, Karri, Sheoak (*Allocasuarina fraseriana*) and Snottygobble (*Persoonia longifolia*).

DISCUSSION AND RESULTS

Critical or important breeding a feeding habitat for Carnaby's and Baudin's Cockatoos is often difficult to designate accurately, mainly because both species move over long distances and now depend partly on altered landscapes. Also Carnaby's Cockatoo has expanded its breeding range southwards and westwards over the past 50 years into parts of the Darling Range.

The nearest breeding sites for Carnaby's Cockatoo are near Boddington and Bannister Hill and the nearest for Baudin's Cockatoo is the Serpentine region (Johnstone – Kirkby data).

The Forest Red-tailed Black Cockatoo is largely sedentary and there are small fragmented populations in the Bannister, Boddington and Williams regions.

Significant trees

One probable cockatoo nest hollow was located in a dead Marri at UTM 453125 6355910 (a chewed and worn hollow) and two Wandoo trees at UTM 451779 6356899 contained hollows of suitable size for cockatoos (see spreadsheet). It is most likely that the Marri hollow has been used by Forest Red-tailed Black Cockatoos but some Carnaby's Cockatoos are also present in this area during their breeding season.

Judging from our survey some sections of the verge with Marri contain important foraging habitat for Forest Red-tailed Black Cockatoos and Baudin's Cockatoos (see spreadsheet). Both old and recent evidence of feeding by Forest Red-tailed Black Cockatoos was recorded in sections of the verge. Only old evidence of feeding was recorded for Baudin's Cockatoo indicating that the birds were foraging in these areas during their north-south migration periods but are not resident in the area. Evidence of feeding on *Dryandra sessilis* and *Eucalyptus wandoo* nectar by white-tailed black cockatoos (Carnaby's or Baudin's) was also recorded in several areas (see spreadsheet).

Conclusion

The clearing of some sections of the verge could impact on the availability or quality of feeding and breeding habitat for black cockatoos especially Forest Red-tailed Black Cockatoos and Baudin's Cockatoos and could cause a decline in populations. The clearing of sections of the verge could have a significant impact under the guidelines of the EPBC Act (1999) on the survival of these listed species.

Management Recommendations

Retain if possible the nest hollow in Marri at UTM 453125 6355910 and two Wandoo trees with potential nest hollows at UTM 451779 6356899.

Retain where possible any areas with large Marri and Wandoo trees and prevent a decline in foraging habitat to insure the persistence of all three black cockatoos in the area.

Impact of clearing could be reduced by re-vegetating disturbed areas with plants that will provide future food resources for these cockatoos e.g. *Corymbia, Dryandra, Banksia* and *Eucalyptus.*

16-17 January 2010 Red tailed black cockatoo "Vulnerable"

Location		UTM (Wgs84)		General Comments
Pinjarra- Williams Rd	Boddington	454148	6352123	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees.
Pinjarra- Williams Rd	Boddington	454150	6353251	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454139	6353232	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454154	6353961	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454176	6351794	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454193	6351714	Several calling
Pinjarra- Williams Rd	Boddington	454149	6351810	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454149	6351973	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454149	6351911	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454132	6351716	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	454127	6354097	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees.
Pinjarra- Williams Rd	Boddington	454131	6354183	Recent and old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	453946	6354709	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	453125	6355910	Eight perched in Wandoo (*Eucalyptus wandoo*)
Pinjarra- Williams Rd	Boddington	452535	6356662	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	451413	6357068	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Both sides of road
Pinjarra- Williams Rd	Boddington	451354	6357102	Recent and old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	451228	6357176	Old evidence of feeding on seeds from Marri (Corymbia calophyla).
Pinjarra- Williams Rd	Boddington	451194	6357197	Recent evidence of feeding on seeds from Marri (*Corymbia calophyla*). Both sides of road, several trees
Pinjarra- Williams Rd	Boddington	451074	6357275	Recent and old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	451006	6357313	Old evidence of feeding on seeds from Marri (Corymbia calophyla).

Pinjarra- Williams Rd	Boddington	450938	6357399	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	450846	6357590	Recent and old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	450791	6357984	Recent evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra- Williams Rd	Boddington	450788	6358305	Three birds calling
Pinjarra- Williams Rd	Boddington	450788	6358305	Single bird calling
Pinjarra- Williams Rd	Boddington	450776	6358042	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees.
Pinjarra- Williams Rd	Boddington	449802	6350031	Recent evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees.
Pinjarra- Williams Rd	Boddington	449698	6360080	Recent evidence of feeding on seeds from Marri (*Corymbia calophyla*). Large amount from several trees on both sides of road.

COCKATOO SURVEY REPORT Baudin's cockatoo (long bill) "Vulnerable"

Location		UTM (Wgs84)		General Comments
Pinjarra-Williams Rd	Boddington	454189	6352056	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454193	6352894	Old evidence of feeding onseeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454154	6352970	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454150	6352086	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454150	6353251	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	454139	6353232	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	454135	63533199	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	454151	6353050	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	454180	6351860	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	454149	6351911	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454132	6351716	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454111	6353839	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	454127	6354097	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees

Pinjarra-Williams Rd	Boddington	454127	6354097	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Several trees
Pinjarra-Williams Rd	Boddington	453946	6354709	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	453832	6354984	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	452598	6356569	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	451228	6357176	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	451006	6357313	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	450809	6357870	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Both sides of road.
Pinjarra-Williams Rd	Boddington	450805	6357957	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	450791	6357984	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	450776	6358042	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*). Both sides of road.
Pinjarra-Williams Rd	Boddington	450802	6358003	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).
Pinjarra-Williams Rd	Boddington	449726	6360052	Old evidence of feeding on seeds from Marri (*Corymbia calophyla*).

COCKATOO SURVEY REPORT

Carnaby's cockatoo (long bill) "Endangered"

Location		UTM (Wgs84)		General Comments
Pinjarra- Williams Rd	Boddington	454150	6353251	Single bird calling

White tailed black cockatoo (species not identified)

Location		UTM (Wgs84)		General Comments
Pinjarra- Williams Rd	Boddington	454176	6351947	Old evidence of feeding from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454185	6351890	Recent evidence of feeding on nectar from Wandoo (*Eucalyptus wandoo*)
Pinjarra- Williams Rd	Boddington	454194	6351761	Recent evidence of feeding on nectar from Jarrah (*Eucalyptus marginata*)
Pinjarra- Williams Rd	Boddington	454204	6351654	Old evidence of feeding from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454226	6351572	Recent evidence of feeding from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454230	6351465	Old evidence of feeding from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454243	6351397	Old evidence of feeding from *Dryandra sessilis*

Pinjarra- Williams Rd	Boddington	454201	6351437	Old evidence of feeding from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454180	6351602	Recent evidence of feeding seeds from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	454149	6351911	Recent evidence of feeding seeds from *Dryandra sessilis*
Pinjarra- Williams Rd	Boddington	450888	6357485	Recent evidence of feeding on nectar from Jarrah (*Eucalyptus marginata*)
Pinjarra- Williams Rd	Boddington	450813	6357829	Recent evidence of feeding on nectar from Jarrah (*Eucalyptus marginata*)

Significant Trees

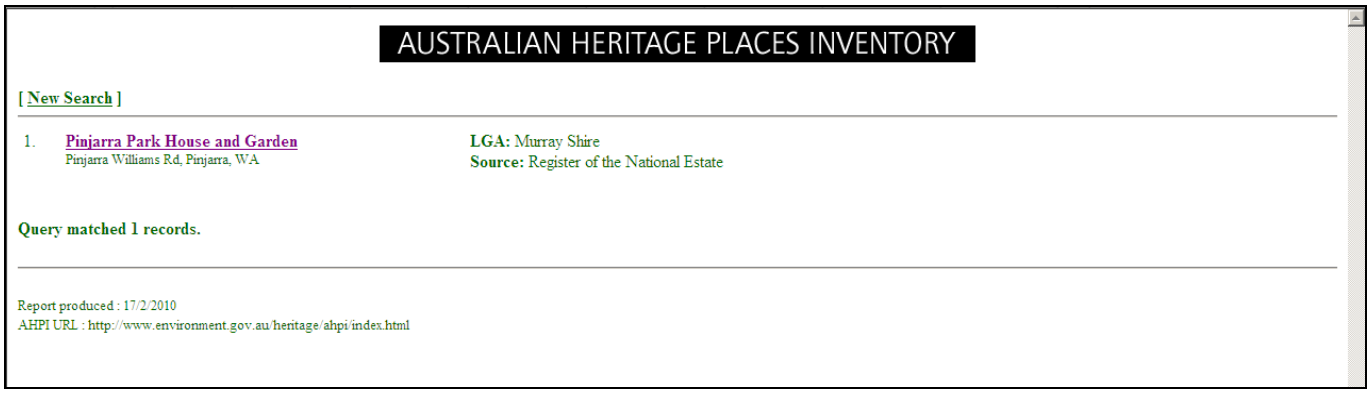
Location		UTM (Wgs84)		General Comments
Pinjarra- Williams Rd	Boddington	453125	6355910	Chewed and worn hollow in dead Marri (*Corymbia calophyla*)
Pinjarra- Williams Rd	Boddington	451779	6356899	Two Wandoo, both with a hollow of suitable size for black cockatoos but none show any signs of use.

13. APPENDIX C

HERITAGE DATABASES

- **Australian Heritage Places Inventory**
- **Western Australian Heritage Council Register**
- **Department of Indigenous Affairs Heritage Enquiry System**

Australian Heritage Places Inventory database search 17/02/10



AUSTRALIAN HERITAGE PLACES INVENTORY

[New Search]

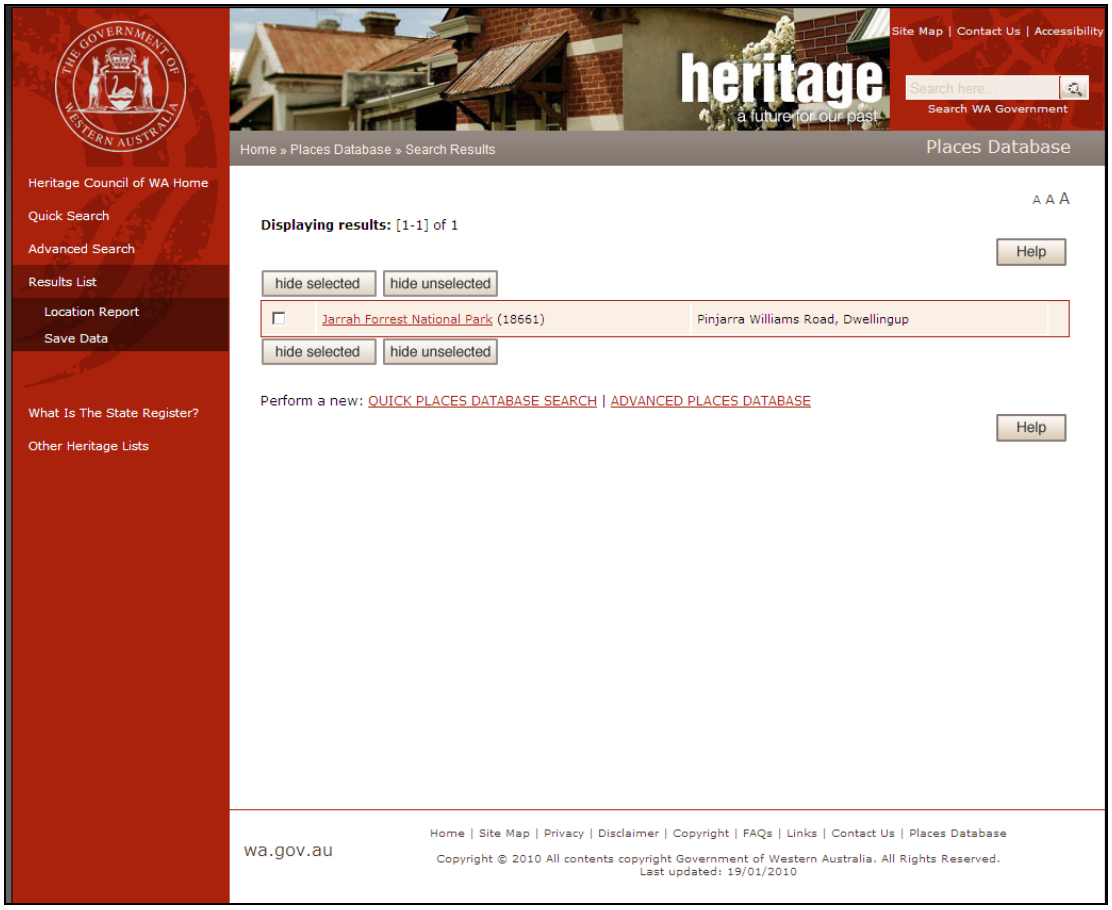
1. Pinjarra Park House and Garden
Pinjarra Williams Rd, Pinjarra, WA

LGA: Murray Shire
Source: Register of the National Estate

Query matched 1 records.

Report produced : 17/2/2010
AHPI URL : http://www.environment.gov.au/heritage/ahpi/index.html

Western Australian Heritage Council Places Database Search 17/02/10



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Search here...
Search WA Government
Home » Places Database » Search Results
Places Database
Heritage Council of WA Home
Quick Search
Advanced Search
Results List
Location Report
Save Data
What Is The State Register?
Other Heritage Lists
A A A
Displaying results: [1-1] of 1
Help
hide selected | hide unselected
Jarrah Forrest National Park (18661) | Pinjarra Williams Road, Dwellingup
hide selected | hide unselected
Perform a new: QUICK PLACES DATABASE SEARCH | ADVANCED PLACES DATABASE
Help
wa.gov.au
Home | Site Map | Privacy | Disclaimer | Copyright | FAQs | Links | Contact Us | Places Database
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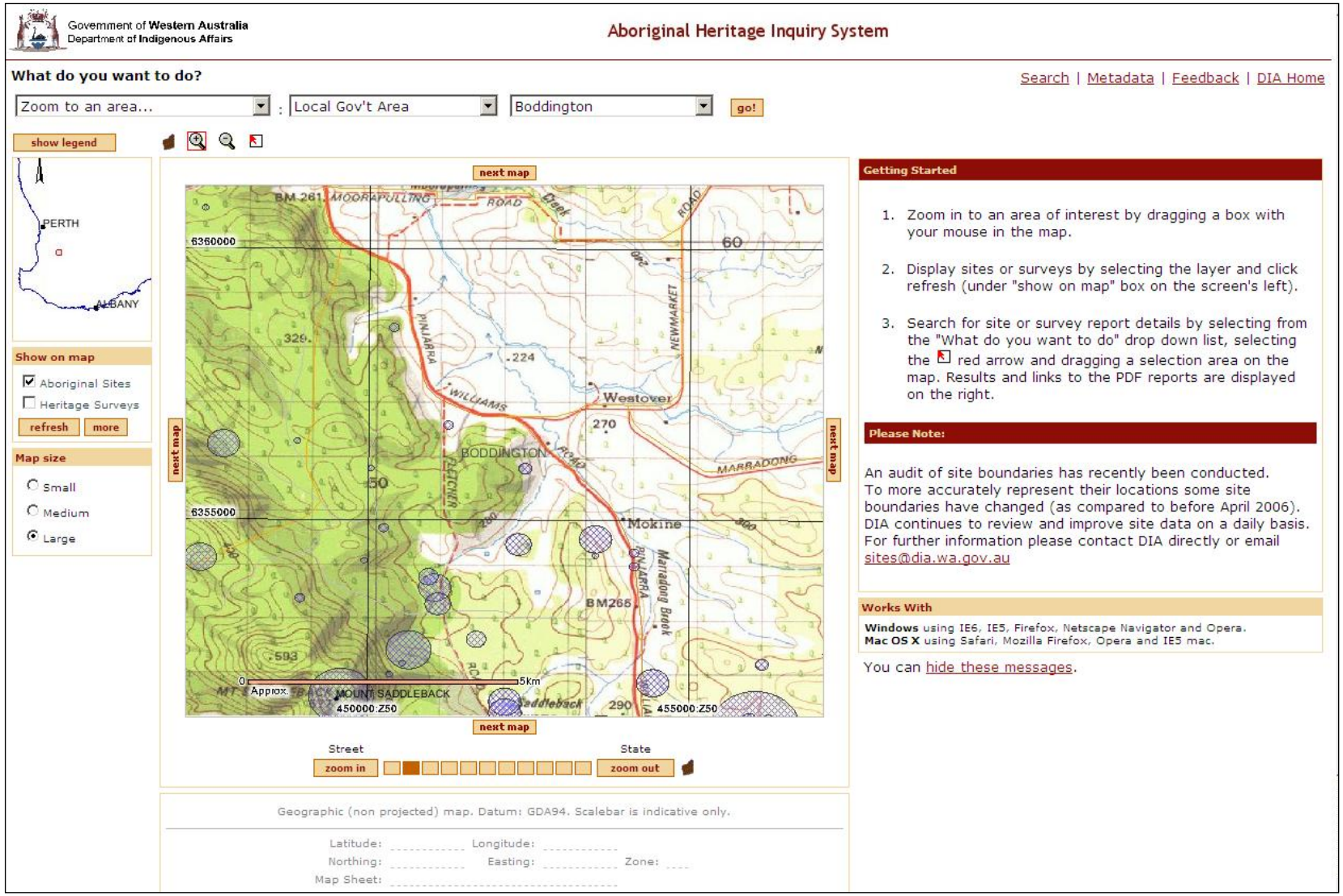
Last updated: 19/01/2010

Aboriginal Heritage Inquiry System database search database 17/02/10



14. APPENDIX D

SENSITIVE WATER RESOURCES DATABASES

- **Department of Water: Country Area Water Supply Area**
- **Department of Water: Public Drinking Water Source Area**
- **Significant Wetlands / Waterways**

You replied on 25/02/2010 2:25 PM.

From: DUNN Brett [Brett.Dunn@water.wa.gov.au] Sent: Thu 25/02/2010 7:44 AM
To: DELLA BONA Jeanette (EO)
Cc:
Subject: RE: Pinjarra-Williams Road

Hi Jeanette,

My apologies in not responding to your query yesterday, I was out of the office all day.

The area contained within the figure is not located in a Public Drinking Water Source Area or Country Area Water Supply Area. There are also no significant wetlands or waterways located along this alignment.

Please feel free to contact me if you require anything further.

Kind Regards,

Brett Dunn
Senior Natural Resource Management Officer
Department of Water
Kwinana Peel Region
PH: (08) 9550 4202
Email: brett.dunn@water.wa.gov.au

Hi Jeanette,

If you are replacing existing infrastructure over the creek eg replacing culverts or modifying an existing crossing you would not need a Bed and Banks Permit.

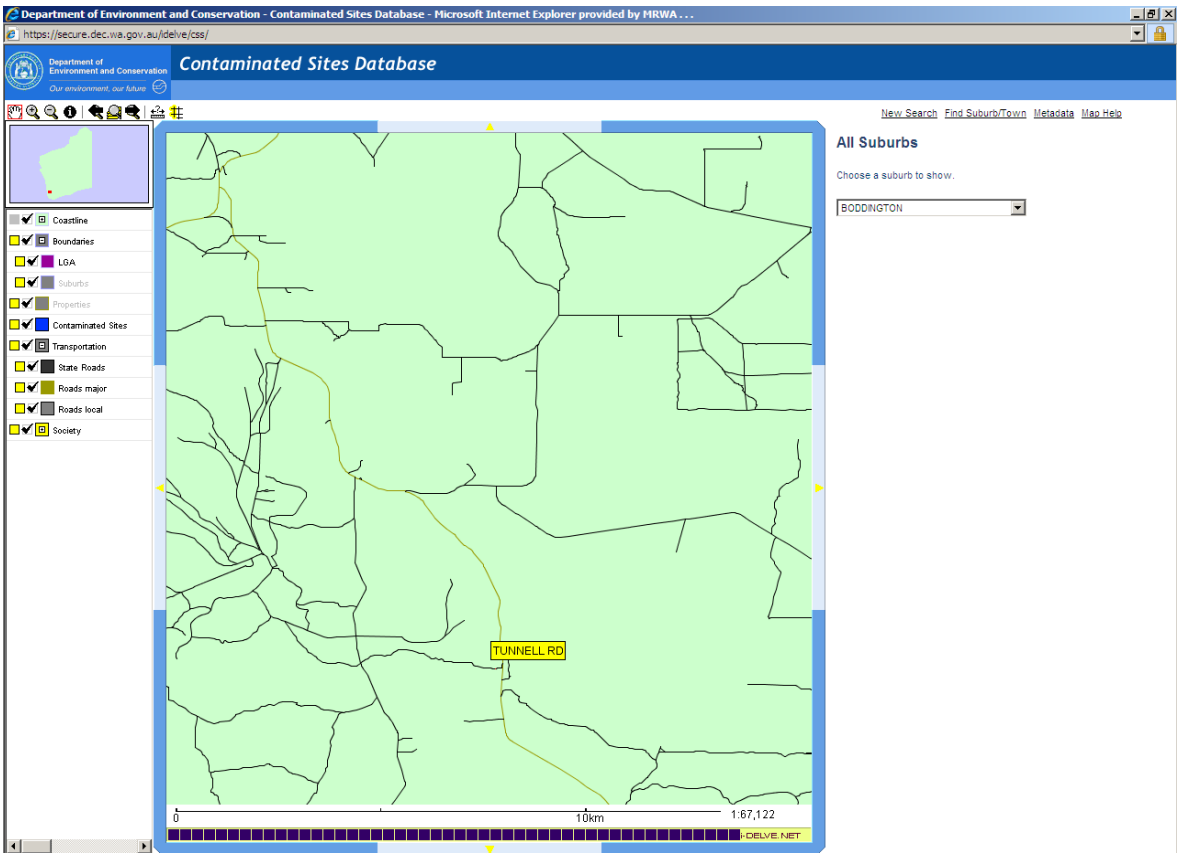
Cheers,

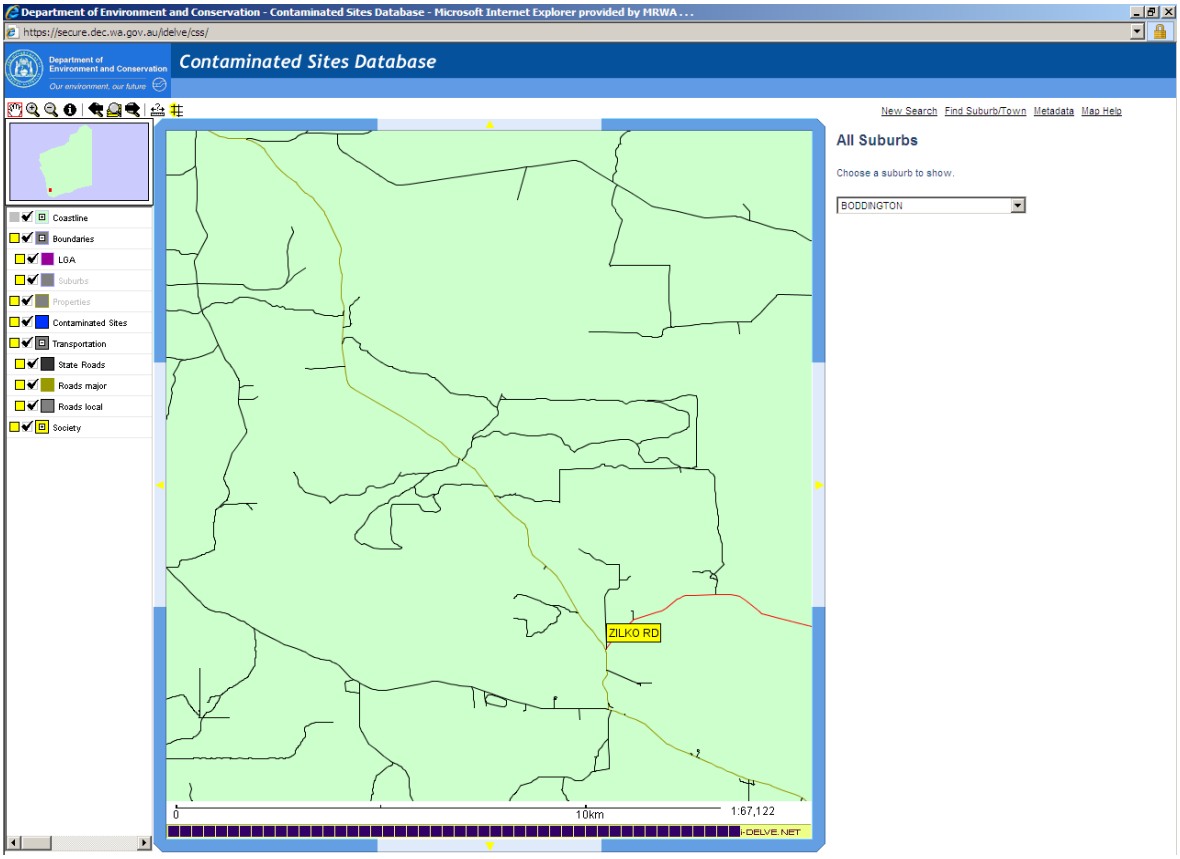
Brett Dunn
A/Program Manager – Urban Water Management
Department of Water
Kwinana Peel Region
PH: (08) 9550 4202
Email: brett.dunn@water.wa.gov.au

15. APPENDIX E

DEPARTMENT OF ENVIRONMENT CONTAMINATED SITES REGISTER

(December 2009)


Department of Environment and Conservation - Contaminated Sites Database - Microsoft Internet Explorer provided by MRWA . . .
https://secure.dec.wa.gov.au/idelve/css/
Department of Environment and Conservation
Our environment, our future
Contaminated Sites Database
New Search
Find Suburb/Town
Metadata
Map Help
All Suburbs
Choose a suburb to show.
BODDINGTON
Coastline
Boundaries
LGA
Suburbs
Properties
Contaminated Sites
Transportation
State Roads
Roads major
Roads local
Society
TUNNELL RD
0
10km
1:67,122
IDELVE.NET


Department of Environment and Conservation - Contaminated Sites Database - Microsoft Internet Explorer provided by MRWA . . .
https://secure.dec.wa.gov.au/idelve/css/
Department of Environment and Conservation
Our environment, our future
Contaminated Sites Database
New Search
Find Suburb/Town
Metadata
Map Help
All Suburbs
Choose a suburb to show.
BODDINGTON
Coastline
Boundaries
LGA
Suburbs
Properties
Contaminated Sites
Transportation
State Roads
Roads major
Roads local
Society
ZILKO RD
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10km
1:67,122
IDELVE.NET

16. APPENDIX F

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Dieback Assessment 2010

Department of
Environment and Conservation

Our environment, our future

Phytophthora Disease Interpretation Report
Main Roads Western Australia
Pinjarra Williams Road Roadworks

FOREST MANAGEMENT BRANCH
Department of Environment and Conservation
Release 1.00
25 November 2010

1. INTRODUCTION

1.1 Background

Phytophthora dieback disease caused by the pathogen *Phytophthora cinnamomi (P.c.)* is a major threat to the biodiversity of south-western Australia. The spread of this water mould is facilitated by the movement of soil infested with spores, particularly under warm, moist conditions. Consequently, a major component in the strategy to constrain this disease involves managing access and soil-disturbance activities within native vegetation. Knowledge of the occurrence of the disease in the landscape is therefore an essential prerequisite to formulating suitable hygiene management practices.

Interpretation and mapping of the presence of *Phytophthora cinnamomi* was undertaken for Main Roads Western Australia (MRWA) for the purpose of proposed roadworks along the Pinjarra Williams Road between Marradong and Quindanning. This work was completed on 28 January 2010 by Disease Hygiene Officers Dayne Ivandich and Julie Cox from the DEC Forest Management Branch, Bunbury.

1.2 Location and Size of Areas

The area of interpretation along the Pinjarra Williams Road comprised road reserve between Marradong and Quindanning. The section of road is 26 kilometres in length and the total area interpreted is 128.3 hectares. Interpretation was completed on 28 January 2010.

1.3 Historical land use and past disturbance

Quindanning Block Compartment 3 was interpreted in June 2008 and re-checked in May 2009 by DEC interpreters. The section of this coupe adjacent to Pinjarra Williams Road was found in both instances to be uninfested with *P.c*.

The most recent prescribed burn in this area was in the 2002/ 2003 fire season.
This area of interpretation is within the 700- 800mm rainfall zone.

2 METHODS

2.1 Interpretation

Field interpretation followed the standard methods and operating procedures described in the document titled “Volume 2 - *Phytophthora cinnamomi* and disease caused by it: Interpreter guidelines for detection, diagnosis and mapping” (CALM 2001).

Background information was sought through DEC records prior to engaging in field work.

The presence of the disease was determined through observation and sampling of recently-dead indicator species (flora that is susceptible to infection with the pathogen).

Non-differential, hand-held global positioning system (GPS) receivers were used for navigation and to record survey boundaries and waypoints within the areas.

2.2 Demarcation

The uninterpretable category was demarcated using 25mm “Tiger” tape (black and pink stripes) with the knots facing towards the uninterpretable category.

2.3 Soil and plant sampling

One soil and tissue sample was taken from a recent *Banksia grandis* death at GDA position E 457331 N6348194.

Picture 1. Banksia grandis specimen sampled for infection with *P.c*.

This was sent to the Vegetation Health Service (VHS) at DEC in Kensington for diagnostic baiting for the presence of the *P.c*. pathogen.

2.4 Mapping

The field observations, boundaries, waypoints and survey data were downloaded into a Geographic Information System from a Global Positioning System unit (GPS) to generate a map of *Phytophthora cinnamomi* occurrence map for the area.

3 RESULTS

3.1 DISEASE DISTRIBUTION

No symptoms or evidence of *Phytophthora cinnamomi* were found in the surveyed area.

Category	**Area (ha)**
Uninfested	27.9
Infested	0.0
Uninterpretable	100.4
Unmappable	0.0
Total	**128.3**

3.2 SAMPLE RESULTS

No result has yet been received for the sample taken (as of 8 February 2010), however it is considered unlikely to be P.c. due to the location and lack of chronology of deaths.

4 DISCUSSION

4.1 DISEASE EXPRESSION

There was no disease expression apparent, and no evidence of the disease was found along the area of interpretation. Areas of low rainfall are less likely to become infested with *P.c.* as conditions are less favorable for the survival of the disease pathogen.

The major vegetation complexes found in the project area, as described by J. Havel and L. Mattiske, were Michibin, Yalanbee and Coolakin.

The Michibin vegetation type occurred in the low lying watercourses and was typified by an overstorey of *Eucalyptus loxophleba* (York Gum) and *Allocasuarina huegeliana*, with a variable understorey that includes *Typha orientalis*.

Picture 2. Roadside Michibin Vegetation Type.

Picture 3. Close up of Michibin understorey.

Higher in the profile the Yalanbee vegetation community was the predominant vegetation type as found in the Quindanning Forest Block. The overstorey is dominated by *Eucalyptus marginata* (Jarrah) with an admixture of *Corymbia calophylla* (Marri). The understorey is sparse being represented by *Banksia grandis*, *B. sessilis* and an assorted shrub and herb layer.

Picture 4. Roadside Yalanbee Vegetation Type.

Picture 5. Yalanbee Vegetation Type.

The Coolakin vegetation type had a variable overstorey of Jarrah and *Eucalyptus wandoo* (Wandoo) with a sparse and variable understorey including assorted *Hakea* and *Acacia* species.

Picture 6. Coolakin Vegetation Type. Minesite Intersection.

Picture 7. Saddleback

The Michibin and Coolakin vegetation communities contain insufficient indicator species to enable reliable interpretation and as such are uninterpretable.
The Yalanbee vegetation type contained an adequate representation of healthy indicator species (*Banksia grandis, B. sessilis, Hibbertia sp*.) and lacked any discernible disease symptoms and was interpreted as uninfested.
Mature tree deaths were apparent at the entrance to the Saddleback Minesite (see Picture 7) but these were outside the project area and were not intensively investigated. The cause of these deaths may not be disease related.

4.2 Recommendations

4.3 HYGIENE MANAGEMENT

Any vehicles, machinery or equipment should be free of soil and plant material prior to entering the protectable areas. 'Clean on Entry' (COE) points should be established to move between categories. Cleaning down at an appropriate location on leaving the area will also help prevent the potential spread of disease and weeds.

Applying and maintaining hygiene standards for activities in the area will greatly reduce the risk of spreading or introducing the disease. Apply and maintain hygiene standards for movement of vehicles along all of the current forest tracks and any construction activities.

5 CONCLUSION

The Pinjarra Williams Road between Marradong and Quindanning was interpreted on 28 January 2010 by Disease Hygiene Officers Dayne Ivandich and Julie Cox from DEC for the presence of the soil borne *Phytophthora cinnamomi* pathogen.
No evidence of the disease was found along the area surveyed. This was attributable to the low rainfall providing dry conditions not favourable for the survival of the pathogen. Disease symptoms were difficult to detect due the relatively low number of susceptible species in the study area.

Two maps have been prepared to show disease boundaries. These maps are valid until 28 January 2013. As *Phytophthora cinnamomi* has the ability to spread autonomously and through vectors such as machinery, vehicles and animals, the map boundaries should be re checked if the maps are more than 1 year old (28 January 2011). A full interpretation is to be done after three years (28 January 2013), if there are continuing or new activities within the coupe boundaries.

Dayne Ivandich

Disease Hygiene Officer

FMB Bunbury

8 February 2010

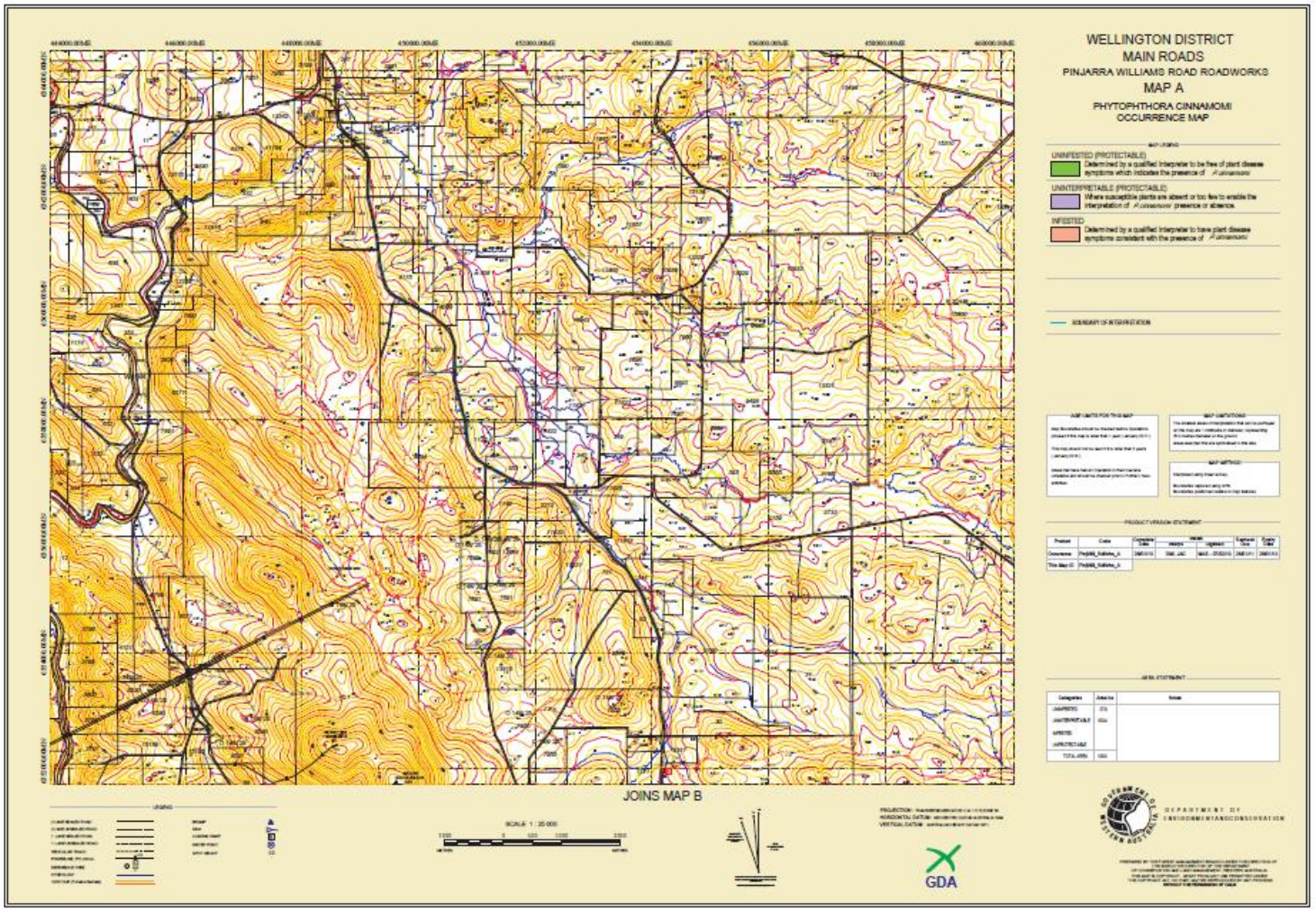
6 REFERENCES

Department of Conservation and Land Management (2000) *Phytophthora cinnamomi* and disease caused by it. Volume I Management Guidelines

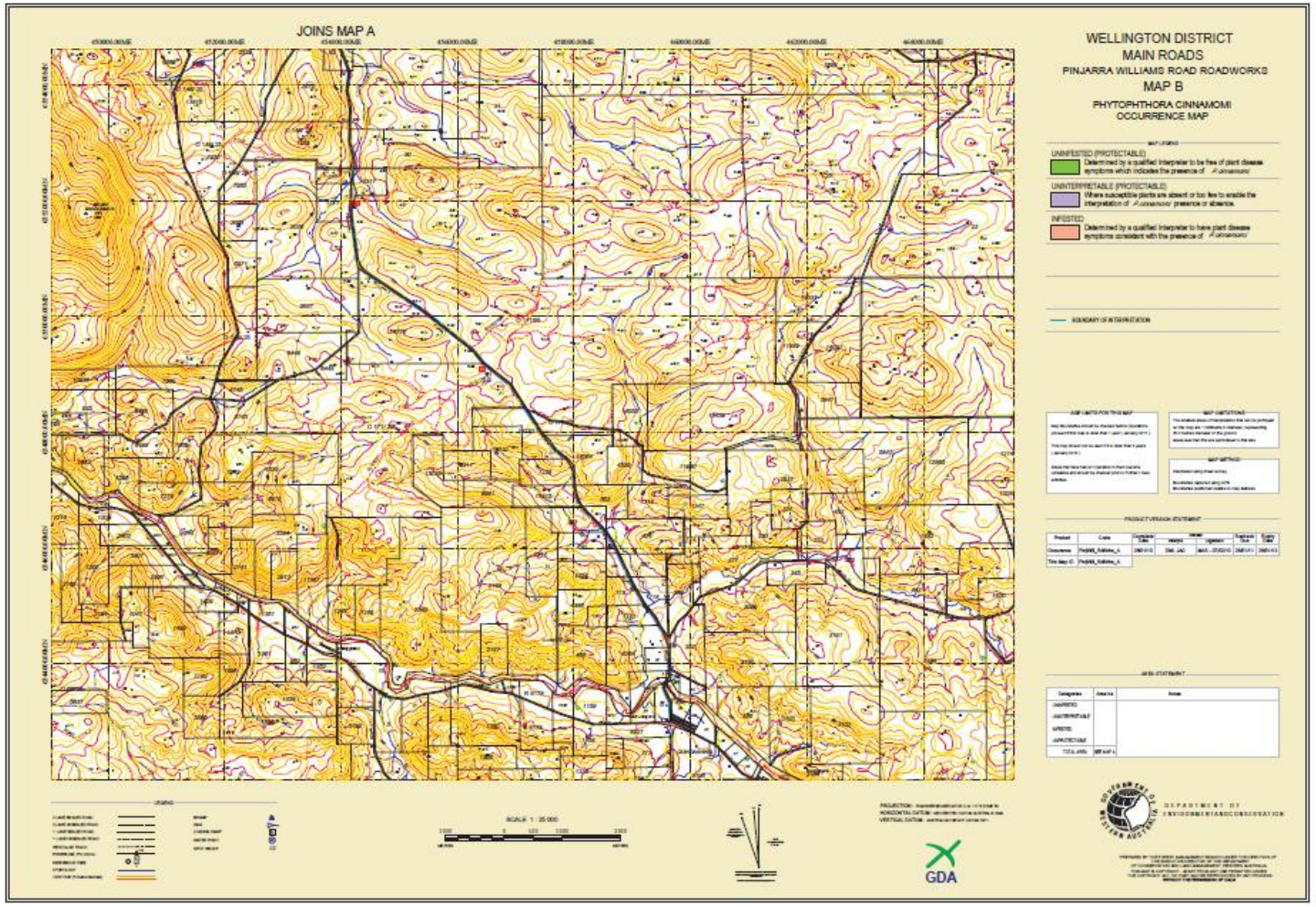
Department of Conservation and Land Management (2001) *Phytophthora cinnamomi* and disease caused by it. Volume II Interpreter guidelines for detection, diagnosis and mapping

Havel, J.J. (1975) Site Vegetation Mapping in the Northern Jarrah Forest (Darling Range). 2. Location and Mapping of Site-Vegetation Types.

Botanic Gardens Trust Sydney NSW. Armillaria root Rot – fact sheet. http://www.rbgsyd.gov.au/information_about_plants/pests_diseases/fact_sheets/armillaria_root_rot



Note: for original hard copy of *Phythopthora cinnamomi* maps please refer to TRIM (hard file) container 09/4265



Note: for original hard copy of *Phythopthora cinnamomi* maps please refer to TRIM (hard file) container 09/4265

17. APPENDIX G

DEPARTMENT OF THE ENVIRONMENT, WATER RESOURCES,

Heritage & Arts

Protected Matters Report

EPBC ACT PROTECTED MATTERS REPORT 10 December 2009 19:07

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

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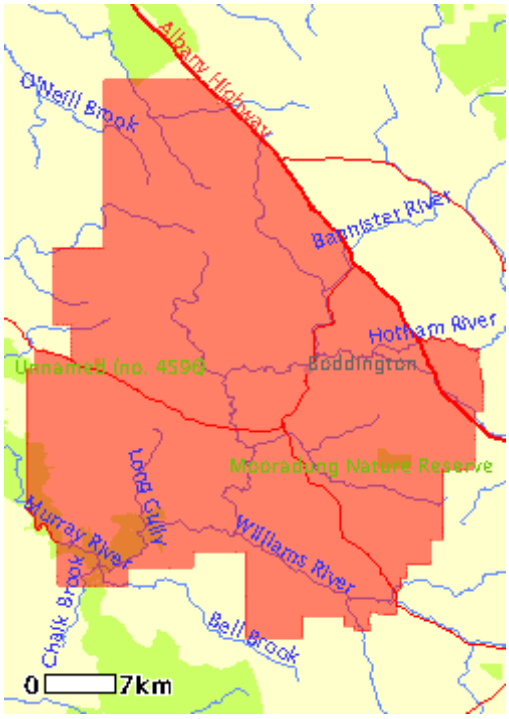

Search Region: BODDINGTON, WA

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	3
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	8
Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information] (Ramsar Sites)	
BECHER POINT WETLANDS	Within same catchment as Ramsar site
FORRESTDALE & THOMSONS LAKES	Within same catchment as Ramsar site
PEEL-YALGORUP SYSTEM	Within same catchment as Ramsar site

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Bettongia penicillata ogilbyi	Endangered	Species or species habitat known to

Woylie		occur within area
Dasyurus geoffroii Chuditch, Western Quoll	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale	Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka	Vulnerable	Species or species habitat may occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl	Migratory	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Other Matters Protected by the EPBC Act		

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster	Listed	Species or species habitat likely to

White-bellied Sea-Eagle		occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area

Commonwealth Lands [Dataset Information]

Unknown

Extra Information

State and Territory Reserves [Dataset Information]

Lane Poole Conservation Park, WA

Lane Poole Miscellaneous Conservation Reserve, WA

Monadnocks Miscellaneous Conservation Reserve, WA

Mooradung Nature Reserve, WA

Un-named (No. 4596) Miscellaneous Conservation Reserve, WA

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

South-west WA RFA, Western Australia

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium

- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

18. APPENDIX H

SITE PHOTOGRAPHS

Plate 1: Example of typical vegetation in the project area.

Plate 2: Example of typical vegetation in the project area. Note narrow road verge (approx 22m wide)

Plate 3: Example of vegetation typical within the project area.

Plate 4: 2 *Eucalyptus wandoo* trees planned to be protected and have installed wire rope barrier