GREAT NORTHERN HIGHWAY

3 Bridges Project (formerly 7 Bridges) Environmental Impact Assessment and Management Plan

Prepared for:

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Acknowledgments

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PROPONENT INFORMATION

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1 Executive Summary

1.1 BACKGROUND

Main Roads Western Australia (MRWA) is proposing to upgrade and realign three sections of the Great Northern Highway between Halls Creek and the Victoria Highway Turnoff in the East Kimberley district. The proposed works are aimed at reducing road closures in the monsoon season and improving the serviceability of this section of the Perth to Darwin National Highway. By improving the serviceability of each section this will have economic benefits by reducing transport delays as well as providing safety benefits and improving the reliability of road access to and from the towns in the east Kimberley.

Construction of the Dunham River section is scheduled for May to November 2006 with the Telegraph Creek and Fletcher's Creek floodways tentatively scheduled for construction in 2007, subject to MRWA project approval.

A preliminary environmental impact assessment (PEIA) was conducted to determine the likelihood of the project requiring referral to the Environmental Protection Authority. The primary environmental constraint requiring referral identified in the PEIA was an Aboriginal Heritage Site located in the Dunham River Bridge area.

The key recommendations of the PEIA were that a vegetation and flora survey be conducted to confirm the absence of rare flora, and that the Department of Indigenous Affairs (DIA) and Kimberley Land Council be consulted with reference to the registered Site at Dunham River Bridge.

Table 1.1 Key recommendations of the PEIA report

A reconnaissance vegetation survey, with the opportunistic monitoring of fauna, is conducted in the areas of proposed works prior to commencement.
Consultation with the DIA and Kimberley Land Council representatives in the East Kimberley district to provide detailed ethnographic and archaeological information on the Aboriginal Heritage site in question;
Contact with the appropriate aboriginal Elders representing the Native Title Claimants to inform them of the nature and scope of proposed works;
Consultation with the mining tenement holder at the Fletchers Creek Floodway site to provide notification of the proposed works;
Consultation with local communities to notify them of MRWA's upgrade and realignment proposal, and to receive feed back on concerns/other issues; and
That consultation with MRWA Environment Branch is undertaken to ensure all necessary to approvals for clearing from the Department of Environment are obtained prior to commencement of works.

In April 2005, a flora survey of the Fletchers Creek, Telegraph Creek and Dunham River alignments and associated borrow pits was conducted by Astron Environmental. This survey confirmed the findings of the PEIA that there are no Declared Rare or Priority Species in the proposed impact areas.

Table 1.2 Key project characteristics

Element dimensions	Descriptions
Road dimensions	Approximately 11.1km of realigned road at 3 locations
Road descriptions	Two lane highway
	Two lane concrete Bridge at Dunham River
	Two lane concrete bridges at Fletchers Creek floodway and Telegraph Creek floodway
Borrow Pit Material Search Area#	Dunham River Bridge (5 potential borrow pit locations)-275.4ha#
	Fletchers Creek floodway (8 potential borrow pit locations)-37.3 ha#
	Telegraph Creek floodway (5 potential borrow pit locations, 1 sand)-34.9 ha#
	Note an old pit may be reopened at:
	Fletchers Creek (1 pre-existing borrow pit)
	Actual area and number of borrow pits to be determined prior to construction
Estimated Borrow Pit Area	Dunham River Bridge (6 potential borrow pits)-30 ha
	Fletchers Creek floodway (8 potential borrow pits)- 15 ha
	Telegraph Creek floodway (5 potential borrow, 1 sand)-15 ha
	Note an old pit will be reopened at:
	Fletchers Creek (1 pre-existing borrow pit)
Vegetation cleared	Estimated maximum of 104.3 ha consisting of
	33.3 ha for road realignments*Note this includes approximately 4 ha of the Dunham Alignment which was previously disturbed (pre 1960's GNH alignment)
	1 ha for temporary road diversion at Telegraph Creek
	10 ha for construction camp^
	60 ha borrow pits and sand-extraction^#
	* Calculated at a maximum clearing width of 30m. It is not necessary that this area will all be cleared.
	^ Estimate only.
	# Total search area for potential borrow pits. Actual locations will be refined prior to project commencement. Areas of known and potential Gouldian Finch nesting sites and those areas identified as having cultural significance as a result of consultation with Native Title Claimants have been excluded from search areas.

1.2 OPTIONS CONSIDERED

For each site several construction options were considered. The do nothing option was not considered to be a realistic option due to the access, safety and economic benefits provided by the construction options.

For each of the three sections, the preferred construction options have been chosen as they reduce the length of construction, which as well as reducing costs also limits the area of disturbance. The preferred Dunham River realignment option follows the path of the previously used GNH route and reduces the need to undertaken clearing of a new area by approximately four hectares.

1.3 APPROVALS REQUIRED

Advice has been provided by the EPA Service unit that due to the extent of clearing involved in the project, this project should be referred for assessment. The disturbance of part of a registered aboriginal site is also triggers referral.

An application to disturb part of the registered Nganjuwarrm – Dunham River aboriginal heritage site is required under Section 18 of the *Aboriginal Heritage Act 1972*.

Permits to disturb bed and banks are required for the construction works associated with the Dunham River Bridge, Fletchers Creek floodway and Telegraph Creek Floodway.

An abstraction licence will need to be obtained from the DoE as groundwater abstraction will be required for construction and dust suppression purposes.

Consultation with the DoE's Native Vegetation Section and MRWA Environmental Branch has determined that a permit to native vegetation is not required as long as the current Main Roads application for a purpose permit is approved by DoE prior to the commencement construction.

1.4 VEGETATION AND FLORA

Fletchers Creek and Telegraph Creek floodway upgrades and realignments are located in the Fitzgerald Botanical District. This district is characterised by communities with a curly spinifex ground layer on siliceous rocks, some tall-grass savannah woodland on basic volcanics, short-grass savannah on dry calcareous plains, and tree steppe on plains.

The Dunham River Bridge realignment is located in the Gardner Botanical District, which is characterised by mainly tropical high-grass savannah with a tree layer, forming savannah woodland (Beard 1979).

Thirteen CALM listed Priority species have previously been identified within the co-ordinates. A possible further eighteen Priority species have been shown to have been opportunistically collected from within the area, as recorded in the West Australian Herbarium database supplied by CALM.

No Declared Rare or Priority Flora Species were recorded during the field surveys and no CALM listings were identified for the three survey areas. Twenty-nine weed species were recorded during the survey. three declared plants as listed in the *Agricultural and Related Resource Protection Act*, 1976 as updated in 2000, were found during the survey. These are *Calotropis procera* (calotrop), *Jatropha gossypifolia* (bellyache bush) and *Sida acuta* (spineyhead sida) are each listed as P1 in the Act, meaning they cannot be introduced or spread.

A permit to native vegetation is not required as long as the current Main Roads application for a purpose permit is approved by DoE prior to the commencement construction.

1.4.1 Management commitments

Table 1.3 Management commitments for vegetation and flora

How	By Whom	To the satisfaction of
A formalised Weed Management Plan (refer to section 7.3.8) will be developed.	MRWA	Dept of Agriculture
A formalised Weed Management Plan (refer to section 7.3.8) will be implemented.	Contractor	MRWA
Where possible seed will be collected from cleared areas for use in rehabilitation.	Contractor	MRWA
Revegetation with local provenance species (where possible) shall take place.	Contractor	MRWA
Revegetation of redundant cleared areas will be undertaken	Contractor	MRWA
Rehabilitation success will be monitored for a minimum of two years following completion of the works.	Contractor	MRWA
Weed monitoring and eradication will be undertaken for a minimum of two years following project completion.	Contractor	MRWA

1.5 THREATENED FAUNA

A search was of the Department of Conservation and Land Management's Threatened Fauna Database and the Threatened Ecological Communities database was undertaken for the study area. This search identified that there were four Schedule 1 listed species, three Schedule 4 listed species, three Priority 3 listed species which may potentially occur within or adjacent to the project area (Appendix A). No threatened ecological communities were identified.

A fauna survey was conducted in October 2005 to determine the presence of the threatened fauna species that were identified and their habitat including the Gouldian Finch. The survey concluded that although the Gouldian Finch was present at the Dunham River project area it could potentially use any of the project areas for foraging and it was highly unlikely that any other threatened species inhabit the project area (Western Wildlife, 2005).

Gouldian Finches (*Erythura gouldiae*) are known to occur at material search area number 1 (located approximately 7.2 km south of material search area 6) in the Dunham River project area in March 2005 (Gordon Graham, pers. comm.). Gouldian Finches are listed as Schedule 1 under the *Wildlife Conservation Act 1950* and an Endangered species under the *Environmental Protection and Biodiversity Conservation Act 1999*. This species was also observed along the Dunham River realignment during the fauna survey.

1.5.1 Management commitments

Table 1.4 Management commitments for fauna

How	By Whom	To the satisfaction of
Areas of known and potential Gouldian Finch habitat at the Dunham River site (all of potential Borrow Material Search Area (PBMSA) 1 and parts of PBMSA 10) will not be cleared.	Contractor	MRWA
Clearing will be minimised to avoid unnecessary damage to fauna habitat including hollow bearing trees (living or dead) including potential Gouldian Finch hollows adjacent to Dunham River PBMSA 2.	Contractor	MRWA
Fauna protection measures, including no feeding, no pets, and no fire arms or traps allowed will be enforced for the projects duration	Contractor	MRWA
Tree trunks/hollow logs suitable for fauna refuge are to be returned to rehabilitated areas	Contractor	MRWA

1.6 THREATENED COMMUNITIES

A search was undertaken for the study area of the Department of Conservation and Land Management's Threatened Ecological Communities database. There are no known occurrences of threatened ecological communities present within or adjacent to the project area.

No management commitments apply.

1.7 CLEARING

The expected maximum area required to be cleared is 104.3 ha, this includes construction camp, diversions, borrow pits and sand excavations. The preferred realignments have been selected on the basis of the shortest routes possible which has the additional benefit of minimising disturbance of areas. This area also includes 4 ha of previously disturbed area at Dunham Construction distance for the three road areas is 11.1km and a construction width of 30m. The borrow pit material search area is the total area of potential borrow pits. Refer to Table 1.2 for a breakdown of areas.

1.7.1 Management commitments

Table 1.5 Management commitments for clearing

How	By Whom	To the satisfaction of
Areas of known Gouldian Finch breeding sites (Material Search Area 1) will not be cleared.	Contractor	MRWA
Stands of woodland will be worked around where possible (i.e. in borrow areas) Clearing will be minimised to	Contractor	MRWA

How	By Whom	To the satisfaction of
avoid unnecessary damage to fauna habitat including hollow bearing trees (living or dead)		
Clearing will be minimised in all instances. Areas to be cleared will be clearly marked and communicated to project personnel.	Contractor	MRWA
Stands of woodland will be worked around where possible (i.e. in borrow areas)	Contractor	MRWA
Clearing of borrow pits, borrow pit access roads and work areas will be minimised.	Contractor	MRWA
Cleared vegetation will be stockpiled and used for rehabilitation wherever possible	Contractor	MRWA
Cleared vegetation to be stockpiled at locations to be nominated by the Principal contractor and approved by the MRWA and used for rehabilitation.	Contractor	MRWA
Most cleared vegetation used for rehabilitation will be mulched prior to deployment.	Contractor	MRWA
Remaining larger branches and logs will be returned to cleared areas	Contractor	MRWA
Revegetation with local native species will be undertaken.	Contractor	MRWA
Prior to clearing seed will be collected from vegetation and will be stored for future rehabilitation.	Contractor	MRWA
Following construction, cleared areas will be rehabilitated. Any damage to vegetation, landforms and habitat will be rehabilitated.	Contractor	Project Manager
Rehabilitation success will be monitored for a minimum of 2 years following completion of the works.	Contractor	Project Manager

1.8 RESERVES AND CONSERVATION AREAS

No reserves or conservation areas are close to the proposed works. The Purnululu National Park is located 30 km to the east of the proposed Fletchers Creek floodway realignment, however there will be no impact from this project on the National Park.

Pastoral stations, conservation reserves, mining tenements and reserves for the use and benefit of aboriginal inhabitants occupy a large percentage of the area of the east Kimberley, including land adjacent to the proposed upgrade and realignment sites. The estimated 104.3 ha of clearing required for project will impact on the pastoral stations, however as all disturbed areas associated with construction or the current alignment areas will be rehabilitated it is believed the impact will be of a short term duration. Table 1.5 describes the commitments related to clearing and rehabilitation which will be applied.

Therefore no additional management recommendations are required for the management of reserves and conservation areas in association with the current proposal.

No additional management commitments apply.

1.9 SURFACE HYDROLOGY AND WETLANDS

A search of the Department of Environment (DoE) database was conducted to identify wetlands within the study area. No wetlands or hydrological surface features requiring environmental management were identified in the project area. No management recommendations are required.

The Dunham River, Fletcher's Creek and Telegraph Creek are all proclaimed under the *Rights in Water and Irrigation Act 1914* as part of the Ord River and Tributaries Catchment Area. This proclamation implies that permits will need to be obtained to interfere with the beds and banks of a watercourse for each proposed crossing. In case water is extracted for construction purposes, a license to extract water is also required.

1.9.1 Management commitments

Table 1.6 Management commitments for surface hydrology and wetlands

How	By Whom	To the satisfaction of
A permit to interfere with the bed and banks of a watercourse will be obtained for the Dunham River, Fletcher's Creek and Telegraph Creek crossings.	MRWA	DoE
If surface water is to be extracted for construction purposes, a license to take water will be obtained prior to the works commencing.	MRWA	DoE
Vegetation clearing along major creek lines will be minimised, as large trees stabilise the bed and banks of creeks	Contractor	MRWA
Detailed design shall include incorporating the following into box culvert design for the two floodways (Refer 7.7).	Contractor	MRWA
Alteration to surface flows and drainage should also be reduced by minimising road embankment heights and managing road runoff to avoid direct drainage into waterways.	Contractor	MRWA
Channel beds will be stabilised and controlled by using rock riffles or bed logs. The bed and banks up and downstream of the crossing will be protected.	Contractor	MRWA
Any hazardous chemicals or fuels and oils will be stored at least 100 m from any drainage lines, creeks or rivers.	Contractor	MRWA
Should there be a need to stockpile road construction or landscaping materials, appropriate bunds and drains would be required to be constructed to prevent run-off into drainage lines in the event of heavy rain.	Contractor	MRWA
Best practice management guidelines for stormwater management as prescribed by the DoE will be followed.	Contractor	MRWA
Rehabilitated areas will be contour ripped and other erosion control measures adopted if required so that sediment loss from site to waterways is minimised.	Contractor	MRWA

1.10 GROUNDWATER

Considering that no major drainage modifications or dewatering operations are proposed, minimal impact is expected on groundwater levels or quality. Consultation with the Department of Environment confirmed this finding (pers. comm. Eugene Chee - Natural Resources Management Office, DoE). However, the area of proposed

works falls within an area proclaimed under the Rights *in Water and Irrigation Act 1914* (RIWI Act). This Act requires a licence to be obtained from the DoE for the abstraction of surface and/or groundwater if necessary for the proposed works.

1.10.1 Management Commitments

Table 1.7 Management commitments for Groundwater

How	By Whom	To the satisfaction of
Obtain licence for abstraction of groundwater if required for construction.	MRWA	DoE

1.11 PUBLIC WATER SOURCE AREAS

No Public Water Source Areas were identified in the area (*pers. comm*. Eugene Chee - Natural Resource Management Officer, DoE).

No management commitments apply.

1.12 ACID SULPHATE SOILS

The proposed works are not located in areas susceptible to acid sulphate soils.

No management commitments apply.

1.13 SALINITY

No salinity issues were identified as being associated with the proposed works.

No management commitments apply.

1.14 ABORIGINAL HERITAGE

1.14.1 Aboriginal sites

The Department of Indigenous Affairs (DIA) Register System identified two registered Aboriginal Site within the area through which the proposed Dunham River realignment passes. The disturbance of the Nganjuwarrm – Dunham River aboriginal heritage site within a project area is a trigger for formal referral to the Environmental Protection Authority (EPA). An application to disturb this site will be made under Section 18 of the *Aboriginal Heritage Act 1972*.

Consultation with the Native Title claimants for the borrow material search areas associated with the Dunham River, Telegraph Creek and Fletcher's Creek areas was undertaken in May 2005 (Miln Walker and Associates Pty Ltd, 2005). In response to this consultation the borrow pit material search areas were reduced and some excluded completely to avoid any areas where clearance to undertake work was not given by the Native Title claimants.

1.14.2 Native title

A search of Native Title using the NNTT GIRO database of the Register of Native Title Claims and the Schedule of Applications identified one application for

Determination of Native Title within the study area, namely the Miriuwung Gajerrong Claim (WC 94/2). The claim encompasses the Dunham River Bridge realignment site. MRWA has liaised with elders of this claimant group to determine necessary management commitments.

1.14.3 Management commitments

Table 1.8 Management commitments for Aboriginal Heritage Sites and Native Title

How	By Whom	To the satisfaction of
MRWA will liaise with the DIA regarding the registered Aboriginal Site near the proposed Dunham River Bridge realignment and make an application to disturb this site.	MRWA	DIA
Depending on the outcome of this consultation, a consultant may need to be engaged to conduct a full ethnographic and archaeological survey of the project area.	MRWA	DoE, DIA
MRWA will liaise with Aboriginal Elders to determine necessary management measures regarding the Dunham River Bridge realignment.	MRWA	Elders
If during construction, any materials of potential significance are discovered, works will cease and the project manager and Aboriginal Affairs Department will be notified.	Contractor	Project Manager, Aboriginal Affairs Department

1.15 EUROPEAN CULTURAL HERITAGE

No sites of European cultural heritage are impacted upon in the proposed floodway upgrades and realignments. However the historical Dunham River crossing will be retained although it is not currently listed on any heritage listings.

Table 1.9 Management commitments for European Cultural Heritage

How	By Whom	To the satisfaction of
The historical Dunham River crossing site will not be disturbed	Contractor	MRWA

1.16 NOISE AND VIBRATION

Noise and vibration will occur during construction. As there are no noise sensitive premises located within the vicinity of the project area, increases to noise and vibration due to construction and potential increases in traffic are not considered significant. As 65% of the existing pavement has been classified in fair/poor condition in need of major reconstruction, improvements in the road pavement will reduce noise and vibration.

Management commitments

Table 1.10 Management commitments for noise and vibration

How	By Whom	To the satisfaction of
Water construction areas; confine large dust generating work to off-peak traffic times.	Contractor	MRWA
Construction will be restricted to daylight hours where possible.	Contractor	MRWA

1.17 VISUAL AMENITY

There will be minimal impact to visual amenity, as the view for road users will not change significantly. Land clearing will have a short term visual amenity impact during the construction phase, though revegetation and vegetation regrowth will minimise this long term impact.

1.17.1 Management Commitments

Table 1.11 Management commitments for visual amenity

How	By Whom	To the satisfaction of
A revegetation program with endemic species is recommended following construction	MRWA	DoE

1.18 NOISE, VIBRATION, DUST AND AIR EMISSIONS

As per the MRWA Environmental Guideline on Air Quality, there is no requirement for an air quality assessment, because:

- The proposed realignments will not result in a traffic flow increase exceeding 15,000 vehicles a day; and
- There are no residences within 200m of the proposed realignments.

1.18.1 Management commitments

Table 1.12 Management commitments for atmospheric emissions

How	By Whom	To the satisfaction of
Construction equipment will be maintained in good working order.	Contractor	MRWA
Dust control measures will be applied during construction (i.e. watering, staged vegetation clearing, stockpile management) (refer to section 7.16).	Contractor	MRWA
Fire control measures will be applied during construction	Contractor	MRWA, Bush Fires Board

1.19 PUBLIC SAFETY AND RISK

The proposed realignment should improve overall public safety and risk by creating a horizontal alignment that has gentler curves and better sight distance, significantly reducing the risk to drivers.

During construction, public health and safety may be at risk if works are not communicated adequately.

1.19.1 Management commitments

Table 1.13 Management commitments for public safety and risk

How	By Whom	To the satisfaction of
Construction works schedule will be communicated to local stakeholders.	Contractor	Local Government Authority, local land users.
Appropriate traffic management and signage of the works ahead shall be in place at all times.	Contractor	MRWA
Maintaining tidy worksite, which is free of debris;	Contractor	MRWA
Appropriate fencing will be installed as required;	Contractor	MRWA
The use of rigid barriers and supports where required;	Contractor	MRWA

1.20 CONTAMINATED SITES

No contaminated sites or potential sources of contamination were found within the area of proposed road works.

Spills during construction have the potential to create contaminated areas.

1.20.1 Management commitments

Table 1.14 Management commitments for contaminated sites

How	By Whom	To the satisfaction of
Construction equipment will be maintained in good working order and will be checked for leaks on a regular basis.	Contractor	MRWA
Regular vehicle servicing shall be undertaken at designated areas, at least 100 m away from watercourses.	Contractor	MRWA
Fuel and oils will be stored in accordance with AS 1940.	Contractor	MRWA
All oil contaminated waste shall be disposed of by a licensed contractor.	Contractor	MRWA
Approved spill cleanup procedures shall be in place.	Contractor	MRWA
Spills and/or other pollution incidents will be reported immediately.	Contractor	DoE, Water Corporation, Project Manager

1.21 LAND USE

Much of the Fletchers Creek Floodway is located within land gazetted for the highway realignment. The road deviates out of this zone for the northern most third of the Fletcher Creek Section.

No management commitments apply.

1.22 SOCIAL IMPACT

The completed project will have a positive benefit by reducing road closures in the monsoon season and improving the serviceability of this section of the Perth to Darwin National Highway. By improving the serviceability of each section this will have economic benefits by reducing transport delays as well as providing safety benefits and improving the reliability of road access to and from the towns in the East Kimberley.

During construction the clearing associated with the proposed upgrade and realignment works may temporarily impact on the operations of adjacent pastoral stations, on an existing mining tenement holder. It would be beneficial to undertake public consultation as an information session and to seek comments from adjacent station owners, mining tenement holders and the local community in the Shire of Wyndham – East Kimberley and the Shire of Halls Creek on the proposed project layout. This consultation would include discussion of any factors that may have not been considered during the planning process.

However, as the realignment will reduce journey times, improve the serviceability of the GNH and reduce the likelihood of flood events closing the Highway, it is unlikely that there will be significant public opposition to the proposal.

The Great Northern Highway will remain open during the construction phase. Road work will be restricted and dust suppression will be undertaken.

1.22.1 Management Commitments

Table 1.15 Management commitments for social impact

How	By Whom	To the satisfaction of
Ensure Great Northern Highway remains open during construction phase.	Contractor	Site Supervisor
Most road work activity will be undertaken in daylight hours where possible.	Contractor	Site Supervisor
Dust will be suppressed as detailed in Section 7.13.	Contractor	Site Supervisor
Public consultation with local stakeholders shall be undertaken once the final layout is confirmed.	MRWA	Local stakeholders

1.23 WASTE MANAGEMENT

Construction waste, domestic waste, waste grease, oils and septage waste will be generated during the project. Where possible waste will be recycled, other wastes shall be disposed of at a licensed waste disposal site or at a site agreed by the Local Government Authority. Waste oils will be recycled; no rubbish shall be burned or buried.

1.23.1 Management Commitments

Table 1.16 Management commitments for waste management

How	By Whom	To the satisfaction of
Manage waste in an approved manner in accordance with Local Government requirements (refer to section 7.19).	Contractor	MRWA, Local Government

1.24 EQUIPMENT

Plant, vehicles and equipment can transport weeds or leaks of hydrocarbons, therefore all equipment, plant and vehicles must be clean prior to commencement of works. A suitable site shall be nominated for cleaning down and approved by the Site Supervisor. All vehicle servicing and refuelling shall be undertaken at designated areas with the exception of breakdown maintenance. These must be at least 100 m from any waterway or wetland. Storage of fuels and oils shall be in accordance with AS 1940.

1.24.1 Management Commitments

Table 1.17 Management commitments for equipment

How	By Whom	To the satisfaction of
Use and maintain equipment to eliminate the spread of weeds or the occurrence of hydrocarbon spills (refer to section 7.20)	Contractor	MRWA
Ensure vehicle servicing and refuelling areas are at least 100m from any waterway or wetland.	Contractor	MRWA

1.25 INDUCTION AND TRAINING

Table 1.18 Management commitments for induction and training

How	By Whom	To the satisfaction of
Provide induction to personnel prior to them commencing work on site outlining the relevant commitments made in this plan	Contractor	MRWA
Ensure toolbox meetings address relevant commitments of this plan	Contractor	MRWA

1.26 EMERGENCY PLANNING

Emergency plans outlining response to potential emergency events shall be developed and tested within one month of project start up and results recorded. Material safety data sheets are required to be maintained for all chemicals. Fire extinguishers and spill kits are also required where appropriate.

1.26.1 Management Commitment

Table 1.19 Management commitments for emergency planning

How	By Whom	To the satisfaction of
Maintain an emergency plan and ensure adequate equipment and training is provided.	Contractor	MRWA
Test emergency plan within one month of project start up and record results.	Contractor	MRWA
OSH aspects will be managed in accordance with the OSH Act and Regulations	Contractor	MRWA
Maintain spill kits on servicing/refuelling vehicles, major plant and within workshops. These will include absorbents and appropriate containers or bags.	Contractor	MRWA
Fire extinguishers will be kept on all vehicles and workshops.	Contractor	MRWA
Spill kits will be inspected weekly and fire extinguisher six monthly.	Contractor	MRWA
Personnel will be trained in the use of spill kits and fire extinguishers.	Contractor	MRWA

1.27 ENVIRONMENTAL INCIDENT MANAGEMENT

The contractor will contain, clean up and dispose of any spills and remove contaminated soils for appropriate disposal. Pollution and spills of oils and other chemicals must be reported to the DoE on (08) 9222 7123 or after hours (free call) 1800 018 800.

Incident reports containing date, time, chemical name, volume, location, area affected, actions taken to clean up site and prevent recurrence shall be maintained.

All project and administration areas are to be cleaned up and all rubbish removed. The site shall be left in a clean and tidy condition at completion.

1.27.1 Management Commitments

Table 1.20 Management commitments for environmental incident management

How	By Whom	To the satisfaction of
Manage environmental incidents effectively and in a timely manner. Leave site in clean and tidy condition after the completion of site works.	Contractor	MRWA
Ensure incident reports are produced which include date, time, chemical name, volume, location, area affected, actions taken for clean up and preventative actions.	Contractor	MRWA
Report spills of oils, fuel and other chemicals immediately to the DoE on 9222 7123 or after hours	Contractor	MRWA

1.28 FIRE MANAGEMENT

Fire prevention is required to ensure that the project does not cause fires which may burn the surrounding vegetation, including the area of known Gouldian Finch habitat which is located approximately 7 km south of the proposed Dunham River realignment.

1.28.1 Management Commitment

Table 1.21 Management commitments for fire management

How	By Whom	To the satisfaction of
All machinery to have spark arrestors fitted to the exhaust system	Contractor	MRWA
All vehicles and plant to be fitted with fire extinguishers.	Contractor	MRWA
Water tankers, equipment and personnel trained to fight fires in the work areas, will be provided.	Contractor	MRWA

1.29 MONITORING, AUDITING AND PERFORMANCE

Weekly inspections and a schedule to monitor and audit the requirements of Section 7 of this EIA will be documented. An incidents and complaints register will be maintained.

1.29.1 Management Commitments

Table 1.22 Management commitments for monitoring, auditing and performance

How	By Whom	To the satisfaction of
Develop and implement a documented monitoring and auditing schedule	Contractor	MRWA
Maintain an incidents and complaints register	Contractor	MRWA
Conduct documented weekly inspections	Contractor	MRWA

2 Introduction

Kellogg Brown & Root (KBR) was appointed by Main Roads WA (MRWA) to undertake an environmental impact assessment (EIA) for a proposed project to upgrade and realign sections of the Great Northern Highway between Halls Creek and the Victoria Highway Turnoff. The proposed works are aimed at improving the serviceability of this section of the Perth to Darwin National Highway. This is to be achieved by reducing the frequency of road closures due to annual flooding events at selected bridge and floodway crossings.

2.1 PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT

In January 2005, KBR completed a Preliminary Environmental Impact Assessment (PEIA) for the proposed works. The PEIA was based on information obtained from a desktop assessment of existing database records, information provided by MRWA, State Government Departments and key stakeholder groups, and literature available in the public domain.

The primary objective of the PEIA was to identify the environmental constraints associated with the proposed works to allow a determination of the need for referral of the project to the Environmental Protection Authority (EPA). The report provided a basis for discussion with the EPA about the need to refer the proposal for statutory approval.

The key findings of the PEIA in terms of the Statutory Approvals likely to be required by the proposed works are summarised in Table 2.1 below.

Table 2.1 Clearances required under legislative provisions

Act	Trigger Action	Approval required	Agency
Aboriginal Heritage Act 1972	Proposal may affect any Aboriginal heritage site	The Nganjuwarrm – Dunham River Site Aboriginal Heritage Site encompasses the Dunham River Bridge GNH realignments. It contains ceremonial, mythological, painting, engraving, a quarry and artefacts/scatter heritage. Dunham River Ford site contains artefact/scatter site. Section 18 referral required as this site will be disturbed. Consultation with native title claimants regarding borrow material search areas has determined areas which are not to be disturbed by the project and MRWA has committed to not disturbing these areas.	Department of Indigenous Affairs

Act	Trigger Action	Approval required	Agency
Heritage of Western Australia Act 1990	Proposal may affect a registered site or a place subject to a Heritage Agreement.	Not required. MRWA has also committed to retaining the old GNH Dunham River Crossing site located to the west of the proposed realignment.	Heritage Council of Western Australia
Environmental Protection Act 1986 *Environmental protection Clearing of Native Vegetation Regulations 2004*	Clearing or destruction of native vegetation.	A clearing permit is not required if the purpose permit covers this project and is in place prior to construction	Department of Environment (Native Vegetation Protection Section)
Environmental Protection Act 1986	Part IV: Environmental Impact Assessment	Informal advice from the EPA Service Unit advised that referral to the EPA may be required due to the area of clearing involved in this project. Disturbance of part of a registered aboriginal site may also trigger referral.	Environmental Protection Authority
Environmental Protection and Biodiversity Conservation Act 1999	Potential impact on Gouldian Finch and it's habitat (particularly nesting sites)	Referral to not is required as there is limited impact of the project on the Gouldian Finch – the project has been determined not to be a controlled action	Federal Department of Environment and Heritage
Waterways Conservation Act 1976	Proposal is sited on specified waters and associated land that is subject to a management program.	Not required as trigger actions are not relevant to this project.	Department of Environment
Rights in Water and Irrigation Act 1914 (Section 17)	Proposal will interfere with the bed or banks of a watercourse.	Permit to interfere with bed and banks of a watercourse will be required.	Department of Environment
	Proposal to take water from proclaimed groundwater or surface water areas	If abstraction of surface or groundwater is required for construction, a permit as specified under the *Rights in Water and Irrigation Act 1914* will be required.	

The PEIA concluded that the proposed works associated with the upgrade and realignment of the Great Northern Highway between Victoria Highway Turn Off and Halls Creek had minimal impact upon the environmental factors investigated in the study.

The specific recommendations of the report were:

- A reconnaissance vegetation survey, with the opportunistic monitoring of fauna, is conducted in the areas of proposed works prior to commencement. This would provide more detailed information on the presence or absence of Declared Rare Flora and threatened ecological communities;
- Consultation with the DIA and Kimberley Land Council representatives in the East Kimberley district to provide detailed ethnographic and archaeological information on the Aboriginal Heritage site in question;
- Contact with the appropriate aboriginal Elders representing the Native Title Claimants to inform them of the nature and scope of proposed works; and
- Consultation with the mining tenement holder at the Fletchers Creek Floodway site to inform of the proposed works;
- Consultation with local communities to notify them of MRWA's upgrade and realignment proposal, and to receive feed back on concerns/other issues; and
- Consultation with MRWA Environment Branch to ensure that all processes necessary to obtain approvals for clearing from the Department of Environment are obtained prior to commencement of works.

Subsequent to the PEIA it was identified that a fauna survey of the project area was also required.

2.2 FLORA SURVEY

Thirteen CALM listed Priority species have previously been identified within the search co-ordinates. A possible further 18 Priority species have been shown to have been opportunistically collected from within the area, as recorded in the Western Australian Museum database supplied by CALM.

In April 2005, a reconnaissance flora survey with opportunistic monitoring of Fauna was carried out by Astron Environmental at the three study sites. The objective of this survey was to confirm the absence of Declared Rare Flora as recorded in CALM database searches, and to identify any rare fauna encountered in the survey area.

No Declared Rare or Priority Flora Species were recorded during the field surveys and no CALM listings were identified for the specific floodway survey areas. The findings of the flora survey are discussed in detail in Section 4.4.3 below.

2.3 SCOPE OF REPORT

The scope of services of this environmental impact assessment and environmental management plan has been determined by the results of the preliminary environmental impact assessment and flora survey, relevant statutory obligations and the requirements of regulatory authorities including the Environmental Protection Authority and the Department of Environment and Heritage.

Accordingly, this document will address the following items:

- A determination of the key environmental aspects to be considered;
- The identification and prediction of the potential environmental impacts associated with the proposal;

- The assessment of significance of environmental impacts associated with the proposal;
- Stakeholder consultation to determine their project specific requirements;
- The provision of necessary information to the MRWA Project Manager to obtain approvals and licences required under legislative provisions, including, but not limited to:
  - *The Environmental Protection Act 1986;*
  - *The Environmental Protection (Clearing of Native Vegetation) Regulations 2004;*
  - *The Environmental Protection and Biodiversity Conservation Act 1999;*
  - *The Conservation and Land Management Act 1984;*
  - *The Rights in Water and Irrigation Act 1914;*
  - *The Wildlife Conservation Act 1950; and*
  - *The Heritage of Western Australia Act 1990.*
- The provision of clear and auditable environmental management commitments to avoid or minimise significant environmental impacts;
- The provision of an EIA report suitable for inclusion in the referral documentation for submission to the EPA to meet the requirements of Part IV of the EP Act.

3 Description of the proposal

3.1 OVERVIEW

The proposed works involve the upgrade and realignment of two floodway sections and a bridge section of the Great Northern Highway (GNH) between Halls Creek and the Victoria Highway Turnoff. Two floodway sites, Fletchers Creek Floodway (2939.8 SLK) and Telegraph Creek Floodway (3000.1 SLK) have been identified in a minor upgrade strategy. Major upgrade and realignment works are proposed at the Dunham River Bridge crossing between 3094 and 3102 SLK. The three areas of proposed works are shown in Figure 3.1.

The GNH forms part of the National Highway linking Perth to the north of the State and the Northern Territory. The corridor for the highway has existed since the Halls Creek gold rush era in the late 1800's, with the first major upgrading works (single lane seal) to service motorised traffic occurring during the 1950-60's period. Improved culverts, single lane bridging and road widening to a two lane seal was completed in the 1970's.

The rapid growth in the mining, cattle, tourism, horticulture and agriculture industries in the region has resulted in increased traffic volume along the Highway. The Highway forms a crucial economic link for these industries, and is the primary access route for the East Kimberley district. Annual road closures have resulted from wet season rains at the Dunham River crossing and at several of the other floodway sites identified in the proposed upgrade. Changes in road design requirements prepared by the Commonwealth Government specifically for development of the National Highway have also been put in place. This has resulted in a current need to upgrade substandard road geometry for the Highway and where needed, upgrade all single lane bridges to two lane structures.

The Highway presents a continuous section with no side or local road intersections. The minimum width for the National Highway route is 10.0m, with a seal width of 8.0m (7.0m roadway with 0.5m sealed shoulders).

3.2 LOCATION

The proposed upgrades and realignments are located in the Shire of Wyndham – East Kimberly and the Shire of Halls Creek. The Dunham River Bridge Crossing, which is approximately 85 kilometres south of Wyndham, and Telegraph Creek Floodway are in the Shire of Wyndham - East Kimberley. The Fletcher's Creek Floodway is located in the Shire of Halls Creek.

3.3 BENEFITS

The completed project will have a positive benefit by reducing road closures in the monsoon season and improving the serviceability of this section of the Perth to Darwin National Highway. By improving the serviceability of each section this will have economic benefits by reducing transport delays as well as providing safety

benefits and improving the reliability of road access to and from the towns in the East Kimberley.

3.4 FLOODWAY SITES

3.4.1 Realignment

Two floodway sites at Fletchers Creek and Telegraph Creek, south of the Dunham River Bridge Crossing have been identified for realignment, as identified in Figure 3.1. It is proposed to replace the existing floodway crossing at each site, as depicted in Figures 3.2 and 3.3. These sites are:

3.4.2 Realignment options

Fletchers Creek floodway, 2939.8 SLK. Four realignment options have been identified:

- Existing Highway Alignment – Due to inferior geometry of curves immediately north of the floodway, bridge and approaches will require major reconstruction to achieve minimum radius curves.
- Realignment Option 1 – The option is located 80 metres upstream from the floodway, with a construction length of approximately 3.0 kilometres.
- Realignment Option 2 – This option is located 80 metres upstream from the floodway, with a construction length of approx. 2.5 kilometres.
- Realignment Option 3 – This option is located 650 metres upstream from the floodway, with a construction length of approx. 4.7 kilometres.

Realignment Option 2 is the preferred option as it is the shortest bridge and most cost effective option.

Telegraph Creek Floodway, 3000.1 SLK. The realignment is located 60 metres upstream from the existing floodway crossing, with a construction length of approx. 2.2km. No other options were considered.

Nine borrow pits have been identified by MRWA as potential sources of road building material for Fletchers Creek. These sites are identified on Figure 3.2.

Seven borrow pits have been identified by MRWA as potential sources of road building material for Telegraph Creek. These sites are identified on Figure 3.3.

3.5 DUNHAM RIVER BRIDGE SITE

3.5.1 Realignment

As the Dunham River section of the GNH contains a single lane bridge with deficient road geometry at bridge approach, ageing seal and formation conditions and high susceptibility to flooding and road closure, the following improvements are proposed:

- Construct a new two lane concrete bridge over the Dunham River.
- Realign the Highway to improve the deficient road geometry immediately south of the existing Dunham River Bridge.

- Realign the road to provide increased overtaking opportunity in accordance with the recommended NAASRA standard 1988a.

3.5.2 Realignment Options

Four realignment options have been proposed, as shown in Figure 3.4.

- Realignment Option 1 is 7.8km long and it follows the existing highway with improved corner geometry on the southern approach to the Bridge.
- Realignment Option 2 is 7.2km long and it diverts from the existing highway in a northerly direction at 3095.3 SLK.
- Realignment Option 3 is 7.0km long and it diverts in a northerly direction from the existing Highway at 3094.8 SLK.
- Realignment Option 4 is 6.4km long, following the previous GNH alignment.

MRWA has identified Realignment Option 1 as the preferred alignment, as it has the shortest bridge length and is the most cost effective option.

Borrow material search areas are locations that have been identified as potential locations of borrow pits. Borrow pit sites will be selected from within these borrow material search areas. Presently it is estimated that approximately 60ha of the borrow material search areas will be required.

After consultation with relevant stakeholders, five borrow material search areas out of the original ten search areas have been identified by MRWA as potential borrow pits for sources of road building material. These sites are identified on Figure 3.4. The five areas were excluded due to the presence of known Gouldian Finch habitat (one search location) or areas where access was not given by the Native Title claimants.

3.6 TIMING AND STAGING OF THE PROJECT

Tables 3.1 and 3.2 outline the anticipated timing and staging of the 3 Bridges project.

Table 3.1 Dunham River Bridge Project timing

Task	Duration	Start	Finish
Planning, Design & Documentation	6 months	June 05	November 05
Contract Award Phase	3 months	January 06	March 06
Construction Phase	6 months	April/May 2006	October 2006

Table 3.2 Telegraph Creek and Fletchers Creek Project timing

Task	Duration	Start	Finish
Planning, Design & Documentation	6 months	June 07	November 07
Contract Award Phase	3 months	January 08	March 08
Construction Phase	6 months	April/May 08	October 08

Note timing for Telegraph Creek and Fletcher's Creek is indicative only as internal financial approvals are yet to be obtained.

4 Existing environment

4.1 CLIMATE

The Kimberley Region has an arid to semi-arid monsoonal type climate with two dominant seasons separated by short transitional periods. Hot, humid and high rainfall conditions characterise a 'tropical summer' season, extending over the months from November to April. From May to October the Kimberley is influenced by high pressure systems that brings the dry season, typified by sunny days and cooler nights. The average annual rainfall at Wyndham is 770mm and 544mm at Halls Creek, which places the project area in the Kimberley low rainfall zone of between 500mm and 700mm.

Extreme weather events are a component of the Kimberley climate. Tropical cyclones and tropical storms can bring heavy and sustained rainfall, particularly during the months leading up to the tropical summer season. It is common for a significant amount of an area's annual rainfall to be recorded in one single event, leading to extensive flooding of rivers, creeks and roadways. The Dunham River Bridge section and proposed floodway upgrades covered in this study are subject to flooding on an annual basis, resulting in road closure in the wet season. At present the Great Northern Highway closes for an average of seven days during the wet season causing safety issues and economic losses. By improving the serviceability of each section this will reduce road transport delays and provide safety benefits.

4.2 LANDFORMS, SOILS AND GEOLOGY

The geology of the Dunham River Bridge realignment region is Proterozoic rocks of the Kimberley basin, mainly sandstones, shales and volcanics. The topography of the region is varied, mainly of rugged sandstone plateaux and ranges, also with stripped and alluvial plains (Beard 1979). The geomorphology is defined as elevated non-lateritic plain (grey soils of heavy texture), interior fluvial plains, and interior swamp plains. The region is largely drained by ephemeral stream lines of the internally draining streams; the distributary system is flooded for prolonged periods after heavy rain, the braided streams for short periods, and the nearly flat plains may be waterlogged but not flooded for short periods (CSIRO 1970).

The geology of the six floodway upgrades and realignments from 2870 to 3000 SLK is mainly siliceous rocks, Proterozoic sandstones, Archaean granite, shale and acid volcanics. The topography of the region is rugged ranges and hills of the Kimberley Foreland and portion of the Kimberley plateau (Beard 1979).

4.3 HYDROLOGY

The rugged topography and high wet season rainfall of the East Kimberley region result in a large network of creek and river systems during summer months. Many of these creek systems are waterless during the dry season. The Dunham River is a major drainage system of the East Kimberley region with numerous tributaries. There are no

registered protected wetlands within the project area. Refer to Figure 3.1 for the location of major rivers within the project areas.

4.4 VEGETATION AND FLORA

4.4.1 General

The Fletchers Creek and Telegraph Creek study areas are located in the Fitzgerald Botanical District and in close proximity to the southern boundary of the Gardner Botanical District. Considering its marginal location, these areas contain transitional features of both districts. The Fitzgerald District is comprised mainly of savannah woodland or tree savannah (Beard 1979). While Eucalypt species dominate the tree layer in the north, other scattered tree species, such as *Adansonia gregorii, Gyrocarpus americanus, Lysiphyllum cunninghamii* and *Petalostigma pubescens*, become more incorporated towards the south of the district. The grass layer is dominated by curly Spinifex, *Triodia* species, on siliceous rocks while tall grass *Chrysopogon, Sorghum, Aristida, Sehima* in savannah woodland on basic volcanics and short bunch grass savannah with *Brachyachne, Enneapogon* on calcareous plains (Beard 1990). Areas of shale within the Fitzgerald district have been described as supporting tree steppe and grass steppe (Wheeler *et al*. 1992). Around 50% of the vascular plants and naturalised plants or weeds occurring in the Kimberley region identified by Wheeler *et al.* (1992) are found within the Fitzgerald Botanical District.

The Fletchers Creek alignment is in the northern section of the Bow River Hills region. The area is characterized with low tree savannah, predominantly comprised of low *E.brevifolia* woodland over a *T.bitextura* grassland (Beard 1979). Varying amounts of short bunch grasses, including *Enneapogon spp., Aristidia contorta, Sporobolus australasicus* and *Chrysopogon spp* also occur.

The Telegraph Creek alignment is located in the southern extreme of the Kimberley Foothills Region with stony, sands and sandy loams associated with sandstone ridges. The vegetation forms alternating patterns of low-trees (*Eucalyptus brevifolia*), curly spinifex savannah (*Triodia bitextura ex. Plectrachne pungens)* on ridges with tall bunch grass (*Chrysopogon fallax)* savannah woodland (*Eucalyptus tectifica- E. grandifolia*) in valleys. The study area is close to the northern end of the Bow River Hills Region where ridges with granite are typically covered with *E. brevifolia* low-tree savannah over mixed understorey of curly Spinifex and short bunch grasses (Beard 1979).

The Dunham River area is located in south-eastern portion of the Northern Botanical Province as defined by Beard (1979). More specifically, Dunham River alignment and borrow pits are located within the south-eastern part of the Gardner Botanical District very close to the border of the Hall District, and as such the area exhibits features of both districts. The topography of the Gardner Botanical District is varied; mainly rugged with sandstone plateaux and ranges with stripped and alluvial plains supports predominately savannah woodland (Wheeler et al 1992). Tall grass with scattered trees occur on cracking clay plains, tree steppe on shale and eucalypt woodland on laterite residuals (Beard 1979). More specifically, the study site is located within the Kimberley Foothills Region with stony, sands and sandy loams associated with sandstone ridges.

The vegetation forms alternating patterns of low-trees (*Eucalyptus brevifolia*), curly spinifex savannah (*Triodia bitextura ex. Plectrachne pungens*) on ridges with tall bunch grass (*Chrysopogon fallax*) and savannah woodland (*Eucalyptus tectifica- E. grandifolia*) in valleys (Beard 1979). On basalt areas, the grass layer is dominated by species of *Sehima, Chrysopogon, Themeda, Heteropogon, Sargo* (was *Sorghum*) and *Plectrachne* (Wheeler et al 1992). The Kimberley Foothills Region also extends into the Fitzgerald District.

The predominant vegetation of the Hall district, which borders the study site, is shrub – tree steppe, with the grass layer dominated by Triodia species (Beard 1979). The tree steppe contains occasional to sparse trees of *Eucalyptus* species, whilst the shrub steppe has occasional shrubs of *Acacia, Grevillea* and *Hakea*. The Hall district also contains some areas of tree savannah, predominantly in the Ord plains and Osmond Range. The tree layer within the savannah is dominated by Eucalyptus species, whilst the grass layer contains predominantly *Aristida* and *Chrysopogon* species, but also sometimes species from the genera *Sehima*, *Themeda* and *Sorghum*. Those areas of cracking clay within the Hall district generally support a treeless savannah dominated by *Astrebla* species.

Previous vegetation, flora, fauna and geographic studies in the project area in addition to the flora surveys conducted by Astron Environmental mentioned above have included:

- Kimberley Bridges Project, Environmental Impact Assessment and Management Plan (1512 – 2876 SLK), prepared by Astron Environmental 2003;
- Kimberley, Vegetation Survey of Western Australia, prepared by Beard, J.S 1979;
- CSIRO Land Resource Series (1970), Lands of the Ord-Victoria area Western Australia and the Northern Territory;
- Bureau of Mineral Resources (1971), Lissadell Western Australia 1:250,000 Geological Series - Explanatory Notes.

4.4.2 Vegetation types

Vegetation surveys of the proposed realignments were carried out during April-May 2005 (Astron Environmental, 2005).

Within the Fletchers Creek and Telegraph Creek study area, thirteen (13) detailed vegetation associations were described for Fletchers Creek floodway alignment within five main habitats, and nine (9) detailed vegetation associations were described for Telegraph Creek floodway alignment within four main habitats and. For the Dunham River Alignment, nineteen (19) detailed vegetation associations with six main habitats were described. These are described below with introduced species marked with as follows (*).

Fletchers Creek Floodway Alignment

Three major and two minor habitats were recorded along the alignment. The major (more extensive) habitats included:

- Very gently sloping plains and flood plains with red silts and small stones, gradually becoming more alluvial grey silty loam near to Fletchers Creek.

- Riverine - Fletchers Creek
- Disturbed road verge (a linear strip c. 20 out from the edge of the road).

Two minor habitats included:

- Minor drain lines
- Rocky hill slope with rocky outcrops

The twelve vegetation associations found in these habitats are presented in Figure 4.1 and are described below according to habitat.

Plains (Gently Sloping Plains and Flood Plain)

Flood Plain

- **Fp1** Low woodland (10-30% <10m) of *Corymbia confertiflora*, *Lysiphyllum cunninghamii*, *Hakea arborescens* over mixed grassland. This occurs on a low flood plain with grey alluvial silty soil and small stones south of Fletchers Creek.
- **Fp2** Low woodland (10-30% <10m) of *Corymbia confertiflora*, *Lysiphyllum cunninghamii*, *Hakea arborescens* over dense herbland. Creek floodplain paralleling river on north side of Fletchers creek.

Gently Sloping Plains

- **Sp**1 Very open low woodland (2-10% <10m) of *Corymbia opacula* (sterile) over tall grassland. This vegetation type occurs for the majority of the alignment on the southern side of Fletchers Creek, from where the floodplain terminates to the creek bank. It appears that much of this part of the alignment south of the river (west side of road) has been previously impacted by an old track and a fenceline.
- **Sp2** Grassland of *Heteropogon contortus*. This red silty plain with small stones and fragments occurs north of Fletchers creek.
- **Sp3** Low woodland (10-30% <10m) of *Lysiphyllum cunninghamii* over open low shrubland and tall grassland. This vegetation type occurs at the northern end of the alignment.

Riverine

- **Ri 1** Open forest of *Eucalyptus camaldensis* with *Terminalia platyphylla*, *Melaleuca leucadendrum*, *M. nervosa* over closed heath. This major creekline runs parallel to the eastern side of the road along southern end of alignment (opposite the floodplain described above).
- **Ri2** Mixed woodland to forest of *Terminalia platyphylla*, *Eucalyptus camaldulensis*, *Melaleuca leucadendron* on over low shrubland and tall dense grassland. This vegetation association occurs along the southern bank of Fletchers creek at the proposed alignment crossing.
- **Ri3** Open forest of *Melaleuca leucadrendron* with *Eucalyptus camaldulensis,* Ficus *coronata, Terminalia platyphylla* over shrubland and mixed grassland. This

vegetation occurs along the bank on the north side of Fletchers Creek at the crossing.

Disturbed Road Verge

- **Dis1** Open low shrubland of **Aerva javanica*, *Stylosanthes *hamata* over tall grassland. This vegetation type occurs within existing disturbed road verge, 15 m out from bitumen.

Rocky Hill Slopes with Outcrops

- **Hs1** Open low woodland (2-10% <10m) of *Eucalyptus brevifolia* with *Cochlospermum fraseri* over open tall shrubland and mixed tall grassland. This vegetation is associated with a low rocky hill slope with outcrop that parallels the road verge at the southern end of the alignment.
- **Hs2** Very open low woodland of *Eucalyptus brevifolia*, *Grevillea pyramidalis*, *G. dimidiata* over mixed grassland. This vegetation occurs on a rocky hill slope with outcrop towards north end of alignment where road and alignment meet. It occurs on the western extremity of the alignment and it is unlikely it will be disturbed.

Minor Drainage Lines

- **Md1** Low woodland of *Eucalyptus confertiflora, Lysiphyllum cunninghamii* over mixed open low shrubland and tall grassland. Minor narrow floodway that intercepts road alignment.

Apart from the disturbed road verge itself, it is estimated that 50% of the remaining proposed alignment habitats appear to have been disturbed in the past.

Telegraph Creek Floodway Alignment

Four different habitats were identified along the proposed alignment, one of which only narrowly intercepted the area.

The three larger habitats included:

- Disturbed areas. This includes the disturbed road verge and road reserve for approximately 15 m in from the existing road and what appears to be a previously scraped area.
- Gently sloping plain or flats on both sides of the creek. This includes areas of natural scald.
- Riverine: Telegraph creek banks and bed

The minor habitat included:

- Minor shallow drainage lines.

Within these, 9 vegetation associations were identified, three of which were previously disturbed, three were on the plains gently sloping toward the creek, one includes Telegraph Creek and two were associated with minor drainage lines. These are presented in Figure 4.2.

Disturbed Habitat

- **Dis1** Low open shrubland (2-15% <1m) of **Aerva javanica*, **Stylosanthes hamata* over mixed grassland. This vegetation consists of several weed species and invading natives and occurs along the road verge and for 15 m into the road reserve along most of the alignment.
- **Dis2** Low shrubland (10-30% <1m) of **Stylosanthes hamata* over mixed grassland. This vegetation occurs on a previously borrowed area of pink silty sands, on the north side of Telegraph Creek.
- **Dis3** Mixed tall grassland of *Heteropogon, Chrysopogon* and *Aristida* species. This site has been previously disturbed some time ago and a very old track runs through it parallel to the existing road.

Gently Sloping Plains

- **Sp1** Open low woodland (2-10% <10m) of Eucalyptus brevifolia, *Cochlospermum fraseri, Grevillea dimidiata* over open shrubland. This vegetation occurs on a very gently sloping plain with red silty loam with areas of stony overlay, north and south sides of Telegraph Creek.
- **Sp2** Open low woodland (2-10% <10m) of *Lysiphyllum cunninghamii* with *Corymbia opaca, Eucalptus brevifolia, Cochlospermum fraserii* over shrubland and hummock grassland. This association is located on the north side of Telegraph creek.
- **Sp3** Low annual grassland of *Xerolchloa laniflora* over ephemeral and annual herbland. Nearer to Telegraph Creek, the plain vegetation becomes interrupted with areas, some reasonably large, of flood scald.

Riverine Vegetation - Telegraph Creek

- **Ri1** Mixed low open forest (30-70% <10m) of *Terminalia platyphylla* with *Eucalyptus camaldulensis, Lophostemmon grandiflorus subsp riparius*, *Adansonia* gregorii over shrubland and mixed grassland. This riparian vegetation occurs along the banks of and on remnant islands within Telegraph Creek, on grey silts and creekbed sands.

Minor Drainage Lines

- **Md1** Small grove of low woodland (10-30% <10m) of *Dolichandrone heterophylla* over dense grassland. Minor shallow drainage line intercepting alignment, north side Telegraph Creek.
- **Md2** Low woodland (10-30% <10m) of *Lysiphyllum cunninghamii* with *Hakea lorea, Eucalpytus pruinosa and Corymbia opaca* over mixed tall grassland. Shallow drainage zone with deeper silty soils on the north side of Telegraph Creek.

Telegraph Creek Borrow Pits

The vegetation types in the three surveyed borrow pit areas comprise:

- Open low woodland;

- Low woodland;
- Low annual grassland; and
- Woodland to open forest.

The vegetation types have been described in more detail in the vegetation survey reports (Worley Environmental 2005). The location of the borrow pits is illustrated in Figure 3.3.

Borrow pit 3 contains some very large, old boabs *(Adansonia gregorii),* that stabilise the creek bed.

Dunham River Realignment

Four major (more extensive) habitats included:

- Riverine – this includes both the banks, bed and outer banks of the Dunham River
- Floodway – seasonally damp, low area
- Floodplain – associated with the outer reaches of the river and associated branches
- Gently sloping plain or flats on both sides of the river. This includes both silt and gravel areas, loamy clay areas and patches of natural scald.

The two minor habitats include:

- Swamp – small semi permanent swamp with black clay intercepting the alignment
- Low rise within the alignment at the southern end.

The vegetation associations are described below and shown in Figure 4.3. Details of each association sampled are given in the Astron Environmental Flora Survey.

Riverine

River Bed and Banks

- **Ri1** Flood degraded low woodland (10-30% <10m) with some dense thickets (30-70%) of *Lophostemmon grandiflorus subsp riparius* over tall shrubland (in patches) *Melaleuca ? nervosa, Acacia colei, A. trachycarpa* over very open low grassland (2-10%) *Brachyachne convergens, Cynodon dactylon*. (Site 4)
- **Ri2** Woodland (10-30% >10m) of *Eucalyptus camaldulensis* with low woodland of *Lophostemmon grandiflorus subsp riparius* and *Terminalia platyphylla* over high shrubland (10-30%) to open scrub (30-50% >2m) *Acacia colei, Acacia holosericea, A. trachycarpa, Melaleuca ?nervosa, Flueggea virosa* over dense grassland of **Urochloa mosambicensis* and herbs. (Site 3)
- **Ri3** Low woodland to open forest (10-30/40% <10m) of *Lophostemmon grandiflorus subsp riparius* with *Melaleuca leucadendra* over open mixed grassland of *Paspalidium juliflorum, Bothriochloa bladhi subsp bladhi* and *Cynodon dactylon*. (Site 14)

Outer River Banks

- **Rb1** Low mixed woodland to open forest (10-30%/40% <10m) of *Lysiphyllum cunninghamii Eucalyptus camaldulensis*, with occasional *Terminalia platyphylla, Corymbia confertiflora,, C. greeniana* over low open shrubland (2-10% 1m) of *Carissa lanceolata, Grewia retusifolia* over tall mixed grassland (30- 70%) of *Sarga plumosum, S. timorense Chrysopogon spp, Dicanthium fecundum, Heteropogon contortus* over open herbs (2-10%). (Site 1)
- **Rb2** Woodland (10-30% >10m) of *Eucalyptus camaldulensis* over open heath (30-70% 1-2m) of *Flueggea virosa* over dense grassland of *Eulalia aurea* with *Dicanthium fecundum*. (Site 15)

Floodway

- **Fw1** Mixed low open forest (30-70% <10m) including *Owenia vernicosa, Grevillea pteridifolia, Petalostigma pubescens, Melaleuca nervosa, Melaleuca leucadrendra* occasional Pandanus spiralis over high shrubland 10-30% 2m) of *Acacia platycarpa* over mixed tall grassland of *Chrysopogon spp, Eragrostis speciosa* over sedgeland of *Fimbristylis caespitose, Actinoschoenus sp* "D" Flora of Kimberley, over lianes *Premna acuminata*, **Passiflora foetida, Dioscoria sp*. (Site 11)

Flood Plains

- **Fp1** Mixed woodland (10-30% >10m) (sometimes 40%) of *Eucalyptus E sp E*. (Flora of the Kimberley) (aff papuana), *Corymbia confertiflora, C. greeniana* over open shrubland (2-10% 1m) of *Carissa lanceolata* and *Grewia retusifolia* over dense (70-100%) tall grassland of *Sarga spp, Chrysopogon fallax, Dicanthium fecundum* over open herbs (2-10%). (Site 2)
- **Fp2** Low woodland (10-30% <10m), sometimes dense (30-50%) of *Eucalyptus pruinosa, Terminalia platyptera,* with occasional *Corymbia confertiflora* over tall shrubland (10-30% 2m) of *Acacia colei* with *Carissa lanceolata* over mixed tall grassland of *Sarga/Chrysopogon spp*, with liane *Uraria cylindvacea*. (Site 5)
- **Fp3** Low woodland (10-30% <10m) of *Lysiphyllum cunninghamii* with occasional *Terminalia platyphylla, Dolichandrone heterophylla, Terminalia canescens* over high shrubland (10-30% 2m) of *Acacia colei, Acacia holosericea* and *Carissa lanceolata* over mixed tall grassland of *Chrysopogon fallax, Sarga plumosum, Aristida hygrometrica, A. inaequilglumis.* (Site 10)
- **Fp4** Open low woodland (2-10% <10m) to low woodland (10-30% <10m) of *Lysiphyllum cunninghamii* with occasional *Eucalyptus pruniosa, Grevillea striata* over very open low shrubland (2-10%) *Carissa lanceolata* over tall mixed grassland. Some scald patches with *Brachyachne convergens, Trianthema oxycalyptra, Ptilotus spicatus.* (Sites 9 & 9a)

Plains

- **Pl1** Woodland (10-30% >10m) of *Eucalyptus pruinosa, Terminalia platyptera, Corymbia greeniana,* over low open forest of *Terminalia cancescens* over open low shrubland (2-10% <1m) of *Gossypium australe* over dense tall grassland of *Sarga* and *Chrysopogon* species over open herbland (2-10%). (Site 6)

- **Pl2** Low woodland (10-30% <10m) to Low open forest (30-70% <10m) of *Terminalia canescens, Eucalyptus pruinosa, Terminalia platyptera, Melaleuca miniata* (on low area) with frequent *Grevillea striata* over low shrubland (10-30% 1m) of *Carissa lanceolata* over mixed tall grassland of *Sarga plumosum*, *Chrysopogon fallax, Heteropogon contortus, Sehima nervosa*. (Site 6i)
- **Pl3** Tall grassland of *Sarga plumosum, Chrysopogon fallax* over low grassland of *Eriachne glauca*. There are scattered (<2%) *Lysiphyllum cuninghamii*. Includes areas of scald with low grassland of *Brachyachne convergens*. (Site 7)
- **Pl4** Open (2-10% <10m) to low woodland (10-30% <10m) of *Lysiphyllum cunninghamii* and *Eucalyptus pruinosa* with occasional *Corymbia opaca* over scattered to open (2-10% 1m) low shrubland of *Carissa lanceolata* over tall grassland of *Sarga plumosum* over low grassland *Dicanthium sericeum subsp sericeum* over mixed herbland. (Site 13a)
- **Pl5** Mixed low woodland (10-30% <10m), sometimes open forest (to 40%) of *Terminalia platyptera* with *Eucalyptus pruinosa*, *Corymbia opaca*, *C. confertiflora*, *Lysiphyllum cunninghamii* over open low shrubland (10-30% 1-2m) of *Carissa lanecolata* and *Gossypium australe* over tall grassland and herbs. Isolated *Calotropis procera*. (Site 13c)
- **Pl6** Mixed low woodland (10-30% <10m) to open forest (40%) of *Lysiphyllum cunninghamii* with *Terminalia platyptera* over open low shrubland (10-30% 1-2m) of *Carissa lanecolata* and *Gossypium australe* over tall grassland and herbs. (Site 13d)

Low Rise

- **Lr1** Low woodland (10-30% <10m) of *Terminalia canescens* with *Cochlospermum fraseri* and occasional *Owenia vernicosa*, *Hakea arborescens, Lysiphyllum cunninghamii* over tall grassland of *Chrysopogon fallax, Sarga spp, Sehima nervosum.* (Site 12)
- **Lr2** Woodland (10-30% >10m) of mixed *Corymbia confertiflora, Terminalia hadleyana, Owenia vernicosa, Erythophleum chlorostachys* over tall grassland of *Sarga/Chrysopogon spp, Heteropogon contortus, Sehima nervosum*. (Site 12a)

Swamp

- **Sw1** Annual open heath (70-90%) of *Aeschynomene indica* over dense grassland (70-100%) of *Eriachne glauca* with *Bothriochloa ewartiana, Dicanthium spp* and sedgeland of *Cyperus microstachyos, Fimbristylis caespitose, F. littoralis, F. microcarya* (Site 8).

4.4.3 Flora

Survey results

A total of one hundred and fifty-two (152) taxa at Telegraph Creek (Appendix 1a of the vegetation survey report) and 153 taxa at Fletchers Creek (Appendix 1b of the vegetation survey report) were recorded during the field survey, with a combined total of two hundred and seven (207) taxa. The combined taxa of 207 for both sites represented 49 families. The most commonly recorded family at both sites was

Poaceae (grasses) with 35 species recorded at Telegraph and 36 at Fletchers Creek. The second most commonly recorded family was the Papillionaceae (peas) with 19 species at both sites.

Grasses, *Heteropogon contortus, Chrysopogon fallax, Sarga plumosum* and the *Aristida* species were the most abundant plant species at both sites. The low tree, *Lysiphllum cunninghamii* was the most abundant tree species at Fletchers Creek being recorded at 12 sites followed by *Eucalyptus brevifolia* at 7 sites. At Telegraph Creek *Lysiphyllum cunninghamii* was only recorded from one site, where *Erythrophleum chlorostachys* was recorded from 9 sites but was not present at Fletchers Creek. *Eucalyptus brevifolia* was recorded from 4 sites at Telegraph Creek.

A total of two hundred and sixty-four (264) taxa were recorded along the proposed Dunham road alignment, representing fifty-eight (58) families. The most commonly recorded family was Poaceae (grasses) with 58 species. The second most commonly recorded family was the Papillionaceae (peas) with 25 species followed by Myrtaceae (eucalypts) with 19 species, then Euphorbiaceae (spurges) and Cyperaceae (sedges) each with 13 species. The most commonly recorded genera were *Corymbia, Eucalyptus* and *Cyperus* each with 6 species.

Grasses, *Heteropogon contortus, Chrysopogon fallax, Sarga plumosum* were the most abundant plant species along the entire alignment. *Lysiphyllum cunninghamii* was the most abundant tree species being recorded at 11 sites followed by *Terminalia canescens* at 9 and *Eucalyptus brevifolia* at 7 sites.

A total of 227 taxa were recorded from within the 8 borrow pits surveyed representing sixty (60) families at the Dunham River Site.. The most commonly recorded family was Poaceae (grasses) with 47 species. The second most commonly recorded family was the Papillionaceae (peas) with 20 species followed by Myrtaceae (eucalypts) with 16 species, then Cyperaceae (sedges) with 13 species. The most commonly recorded genera was *Cyperus* with seven species followed by *Corymbia*, with 6 then *Grevillea*, *Acacia* and *Euphorbia* each with 5 species.

Grasses, *Heteropogon contortus, Chrysopogon fallax, Sarga plumosum* were the most abundant plant species along the entire alignment. *Lysiphyllum cunninghamii* and *Terminalia canescens* were the most abundant tree species, both being recorded at 12 sites. The low shrub *Carissa lanceolata* was recorded from 7 sites and *Acacia colei* from 6 sites.

Rare and Priority Species

Database search

The presence of rare or priority flora in the vicinity of the study area was initially assessed by interrogation of the databases for Threatened (Declared Rare) Flora (DRF), Threatened Ecological Communities (TEC), Western Australian Herbarium Specimens and the Declared Rare Flora List (2005), held by the Department of Conservation and Land Management. The search specified the region from Dunham River Bridge to Halls Creek between the co-ordinates of 16° 04’ – 18° 16’ S and 127° 39’ – 128° 25’ E. Due to the requirements of the original study, this search region was larger in scope and area than the three study areas covered in this report. However, all

three study areas fall within the search area co-ordinates, and all species identified in CALM records apply.

The CALM *Threatened (Declared Rare) Flora* database and the *Declared Rare and Priority Flora List* (CALM 2005) identifies species that are considered to be under threat of extinction and prioritises these species based on the degree of that threat. The *Declared Rare and Priority Flora List* is covered under the *Wildlife Conservation Act, 1950*.

Thirteen Declared Rare or Priority Flora were identified in the CALM threatened flora database for the Fletchers Creek, Telegraph Creek or Dunham River areas. Details for each of these species are given in Table 4.1. The WA Herbarium database also identified a number of Priority species, as shown in Table 4.2. A possible further eighteen Priority species have been shown to have been opportunistically collected from within the area according to this database. These are shown in Table 4.3.

Table 4.1 Priority Flora Species for Study Area (CALM Declared Rare and Priority Flora List 2005)

Species / Taxon	Conservation Code
Goodenia lunata	Priority 1
Trianthema kimberleyi	Priority 1
Triumfetta saccata	Priority 1
Paspalidium retiglume	Priority 2
Andersonia auriculata	Priority 2
Fimbristylis sieberiana	Priority 3
Goodenia crenata	Priority 3
Rhynchosia sp. Bungaroo Creek	Priority 3
Trachymene dusenii	Priority 3
Alexgeorgea ganopoda	Priority 3
Gonocarpus simplex	Priority 3
Meeboldina thysanantha ms	Priority 3
Tyrbastes glaucescens	Priority 3

Table 4.2 Priority Species listed in the Western Australian Herbarium Database, GNH Halls Creek to Victoria Highway turn-off.

Species	Priority Code	Site description
Eucalyptus ordiana	*P2*	*On sandstone hillside with NW aspect.*
Eucalyptus ordiana	*P2*	
Eucalyptus ordiana	*P2*	*On steep granite slope, W facing, quartzite rock higher.*
Eucalyptus ordiana	*P2*	
Eucalyptus ordiana	*P2*	
Boronia jucunda	*P1*	*Among quartzite rocks on brink of escarpment overlooking S side of the gorge.*
Eucalyptus ordiana	*P2*	*Growing on steep, rocky, W-facing slope.*
Eucalyptus ordiana	*P2*	*On skeletal soil on steep SW quartzite slope.*
Goodenia crenata	*P3*	
Eucalyptus ordiana	*P2*	*Half way up steep E facing slope of granite hill, skeletal sandy soil between boulders.*

Table 4.3 Priority Flora opportunistically collected from within the area of interest which may potentially occur within the Study Area.

Species / Taxon	Conservation Code
Acacia setulifera	Priority 1
Boronia jucunda	Priority 1
Goodenia byrnesii	Priority 1
Nicotiana heterantha	Priority 1
Blumea pungens	Priority 2
Boronia minutipinna	Priority 2
Eucalyptus ordiana	Priority 2
Grevillea psilantha	Priority 2
Triodia bunglensis	Priority 2
Triumfetta aspera	Priority 2
Brachychiton tuberculatus	Priority 3
Fuirena incrassate	Priority 3
Glycine falcate	Priority 3
Goodenia sepalosa var glandulosa	Priority 3
Phyllanthus aridus	Priority 3
Pityrodia oblique	Priority 3
Rhynchosia sp Bungaroo	Priority 3
Grevillea miniata	Priority 4

Priority 1 Species are taxa which are known from one or a few (generally <5) populations which are under threat. Priority 2 species are taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat. Priority 3 species are taxa which are known from several populations, and the taxa are not believed to be under immediate threat. Priority 4 species are taxa which are considered to have been adequately surveyed and which, whilst being rare are not currently threatened by any identifiable factors. Although there is currently no statutory restriction on the destruction of Priority species (apart

from regulations imposed as an environmental condition under Part IV of the *Environmental Protection Act, 1986*), a set procedure for the destruction of any populations of Priority Flora species must be followed. This involves counting and recording all occurrences of Priority and Rare flora within proposed development areas and reporting the numbers to CALM. Vouched specimens should also be lodged with CALM where possible (Astron Environmental 2005).

Survey results

No Declared Rare or Priority species were recorded from either the Fletchers Creek or Telegraph Creek alignments or the Telegraph borrow pits surveyed. One species found, *Goodenia sepalosa* subsp *sepalosa,* is a close relative to the Priority 3 species, *Goodenia sepalosa* subsp *glandulosa*. However the specimen collected from Fletchers Creek did not have the glandular hairs which distinguish the Priority species.

Priority 2 species, *Eucalyptus ordiana* has been collected from the Fletchers Creek vicinity from similar habitat to the low sandstone ridges of Hs1. However fruits and old buds were found for specimens on the alignment and they were identified as *E. brevifolia*.

No Declared Rare or Priority species were recorded from the Dunham River realignment or the borrow pits surveyed. One species found at sites 1 (Rb1) and 5 (Fp2), *Goodenia sepalosa subsp sepalosa* is a close relative to the Priority 3 species, *Goodenia sepalosa subsp glandulosa*. However, as with the specimen identified at Fletchers Creek, the glandular hairs which distinguish the Priority species were not present.

Several species from the genera *Goodenia, Fimbristylis, Trianthema, Rhynchosia* and *Paspalidium* – all of which are on the Priority list, but close examination revealed that none of the relevant Priority species were included.

One non-priority species, *Uraria cylindvacea,* was found to be beyond its usual range (but in typical habitat type). It is believed this is a result of lack of detailed botanical survey the area generally. It occurs along the alignment and only a small, relatively narrow area will be cleared through the population.

Weeds

Twenty-nine weed species were recorded during the survey for Fletchers and Telegraph Creek. Three Declared Weeds as listed in the *Agricultural and Related Resource Protection Act, 1976* as updated in 2000, were found during the survey. These were *Calotropis procera* (calotrop)*, Jatropha gossypifolia* (bellycache bush) and *Sida acuta* (spineyhead sida). These are each listed as P1 in the Act, meaning their introduction and spread is prohibited.

Eighteen (18) weed species were recorded from the proposed Dunham River alignment and twelve (12) from the borrow pits. Two Declared Weeds category P1 were found during the survey including *Calotropis procera* (calotrop) and *Sida acuta* (spineyhead sida). Both species were only recorded once, at site 3 (Rb2) in the outer river bed of the Dunham River. *Calotropis procera* was also found in previously borrowed areas of Borrow Pits 8 and 10.

Weeds were most commonly found on disturbed areas, namely along road verges, along the edges of creeks, especially in the vicinity of the road, and on previously borrowed areas. The composition of the vegetation within the disturbed areas surveyed is significantly different from that observed in the surrounding undisturbed vegetation.

Table 4.4 Weeds recorded along the Dunham River, Fletchers and Telegraph Creek Alignments and their Ratings as given by CALM or in the *Agricultural and Related Resources Protection Act 1976*, updated 2004)(Worley Astron, 2005)

Genus Species	Common Name	Rating	Comment
Cenchrus ciliaris	Buffel Grass	High	Very widespread in the Kimberley and Pilbara, acceptable as a fodder grass.
Cenchrus setiger	Birdwood Grass	High	As for buffel grass
Chloris barbata		Low	Common along road verges and other disturbed areas in Kimberley & Pilbara.
Chloris virgata		Low	As for *C. barbata*
Aerva javanica	Kapok Bush	High	Common on disturbed areas, especially sandier soils and road verges in the Kimberley & Pilbara.
Trianthema portulacastrum	Black Pigweed	Moderate	Found in the Kimberley and Pilbara on wasteland, seriously invades moist cultivated soils.
Acacia farnesiana	Mimosa Bush	High	Now naturalised in tropical regions. Forms dense spiny thickets.
Senna occidentalis	Coffee Senna	Moderate	Found on disturbed sites in the Kimberley. Does not yet occur in the Pilbara.
Crotalaria juncea	Sunnhemp	Low	Found on disturbed sites in the Kimberley, also found near Port Hedland. Not widespread in the Pilbara.
Crotalaria goreensis	Gambia pea	Low	Naturalised in the North and East Kimberley on disturbed sites
Stylosanthes hamata	Carribean Stylo	High	Widespread on road verges and cultivation channels in the Kimberley. Recently introduced to the Pilbara where it is rapidly spreading.
Tribulus terrestris	Bindii	Low	Widespread in disturbed areas in the Kimberley & Pilbara. Burrs are a nuisance.
Euphorbia hirta	Strawberry Weed, Asthma plant	Moderate	Found in the Kimberley on alluvial soils, usually associated with some moisture. Found commonly on garden lawns in the Pilbara.
Euphorbia heterophylla	Mole plant	Low	A garden escape from Broome and Kununurra – on disturbed moist sites
Passiflora foetida subsp *hispida*	Wild Passionfruit	High	Common along river/creek banks, especially when disturbed. Has spread and increased significantly in the past 10 years in both the Kimberley & Pilbara.
Calotropis procera	Calotrope, Rubber Tree	P1 High	Widespread on disturbed or degraded areas in the Kimberley. Does not yet occur in the Pilbara.
Citrullus colocynthis	Wild or Camel Melon	Low	Widespread on disturbed areas – occurs throughout the State.
Digitaria ciliaris	Summer Grass	Low	Annual with spreading stems 20 – 80 cms tall. Weed of crops and disturbed sites
Echinochloa colona	Awnless barnyard grass	Low	Widespread weed of creeks and swamps and irrigated crops in Kimberley & Pilbara
Alternanthera pungens	Khaki weed	Low	Found in seasonally moist habitats in verges, wasteland and new river margins
Jatropha gossypifolia	DNW Bellyache Bush	P1, P3 Mod	Weed of grazed Woodlands, creeklines and wasteland in the Kimberley
Sida acuta	DNW	Mild	Common weed on wasteland and creek banks in the

Genus Species	Common Name	Rating	Comment
	Spinyhead Sida	P1	Kimberley
Hyptis suaveolens	Mint Weed	Moderate	Fast growing herb found in dense clumps along roadsides, overgrazed pastures, stockyards and creeklines in the tropics
Pennisetum pedicellatum subsp *unispiculum*	Kikuyu	Moderate	Naturalised in disturbed areas throughout the Kimberley
Stylosanthes humilis	Townsville Stylo	Mild	Widespread in wasteland and along creeks in the Kimberley
Tridax procumbens	Tridax	Moderate	Naturalised in disturbed areas around settlements in the Kimberley
Melochia pyramidata	Melochia	Mild	A weed of rivers, creeks and irrigated crops in the Kimberley and Pilbara
Physalis minima	Chinese Lanterns Wild Gooseberry	Moderate	Common throughout the Kimberley including Ord Irrigation area
Bidens bipinnata	Beggar Ticks	TBA	Widespread weed from Kimberley to Kalbarri
Urochloa mosambicensis	Sabi grass	Moderate	
Clitoria ternatea	Butterfly pea	Moderate	

4.5 FAUNA

A search was of the Department of Conservation and Land Management's Threatened Fauna Database and the Threatened Ecological Communities database was undertaken for the study area. This search identified that there were four Schedule 1 listed species, three Schedule 4 listed species and three Priority 3 listed species which may potentially occur within or adjacent to the project area (table 4.5 and Appendix A). No threatened ecological communities were identified.

A number of matters of National Environmental Significance were also identified (Appendix B). EPBC Act listed threatened species are noted in Table 4.5.

Consultation with CALM officers in Kununurra confirmed that Gouldian Finches (*Erythura gouldiae*) were identified at material search area number 1 (located approximately 7.2 km south of material search area 6) in the Dunham River project area in March 2005 (Gordon Graham, pers. comm.). The presence of Gouldian Finches in the area was most likely due to the majority of the area not having been burnt for five years and some for ten years or more. It also contains good remnant areas of perennial grasses and flowering *Triodia sp*.which are generally absent in that area and the eucalypts in the area would also serve as breeding areas for Gouldian Finches – very similar to areas in the O'Donnell Ranges were Gouldian Finches have been observed nesting.

On the basis of this advice and the aboriginal consultation undertaken, borrow material search area 1 will be excluded from the search pit locations. Refer to Figure 4.4 which shows the excluded borrow material search areas.

Table 4.5 Threatened and Priority Fauna Species (CALM Threatened and Priority Fauna Database (December 2005) and EPBC Act (June 2005))

Species / Taxon	Conservation Code
Gouldian Finch *(Erythura gouldiae)*	Schedule 1 - CALM, Endangered - EPBC Act
Australian Painted Snipe *(Rostratula australis)*	Schedule 1 – CALM, Vulnerable –EPBC Act
Red Goshawk *(Erythrotriorchus radiatus)*	Schedule 1 - CALM
Mouldingia orientalis (Land snail) *(Mouldingia orientalis)*	Schedule 1 - CALM
Peregrine Falcon (*Falco peregrinus*)	Schedule 4 - CALM
Burdekin Duck (*Tadorna radjah rufitergum*)	Schedule 4 - CALM
Purple-crowned Fairy-wren *Malurus coronatus coronatus*	Priority 4 – CALM, Vulnerable -EPBC Act
Freshwater Sawfish *(Pritis microdon)*	Vulnerable –EPBC Act

Note: The priority species from the CALM Threatened Fauna Database are listed in Appendix A.

EPBC Act listed migratory species are listed in Appendix B.

5 Environmental aspects

The following section describes the environmental aspects of the Great Northern Highway 3 Bridges project. Table 5.1 summarises the environmental aspects and details the EPA objectives.

Table 5.1 Summary of Environmental Aspects and EPA Objectives

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Environmental Management	Predicted Outcome
BIOPHYSICAL					
Flora	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	No priority species or TEC's were identified. A number of declared weed and other introduced plant species were found. Overall remnant vegetation was in varying condition.	Introduction and spread of weeds. Clearing outside of clearing boundaries.	Shortest routes selected and disturbed areas utilised where possible to minimise area of disturbance. Minimum area cleared. No priority species or TEC's were identified. A weed management plan is recommended to be prepared and implemented by the construction contractor.	Weed spread minimised. Vegetation rehabilitated where possible.
Fauna	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	Gouldian Finch and its habitat confirmed as present in the immediate area. A number of threatened fauna species and migratory species may be present in the area.	Project no longer directly impacts on known Gouldian Finch habitat. Fire could impact on habitat of Gouldian Finch.	Clearing will be limited to minimise potential impacts on fauna. Borrow pits, access tracks and redundant areas of road will be rehabilitated to provide habitat for fauna. Apply fire prevention and response measures for duration of project.	Short-term loss of habitat which will be replaced by rehabilitated sections of superseded road. No impact on known Gouldian Finch habitat. No long term impact on priority fauna or other fauna.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Environmental Management	Predicted Outcome
Reserves and Conservation Parks	To protect the environmental values of areas identified as having significant environmental attributes.	No reserves have been identified as being directly impacted by the proposed works.	Negligible impact on conservation value of reserves.	No management commitments required to meet EPA objective	No management commitments required to meet EPA objective
Water Quality (Surface water & Groundwater)	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	Project crosses Dunham River, Telegraph Creek, Fletcher's Creek. Dunham river is a tributary of the lower Ord river. The creeks are tributaries of the Bow River and Ord River respectively both of which lows into Lake Argyle. No other wetlands in the area.	Groundwater will be abstracted for dust suppression and other construction activities.	Design bridge, floodways and road sections so that surface water (including creek and river flows are not adversely affected resulting in increased turbidity. Rehabilitate disturbed areas prior to wet season to minimise sediment transport. Maintain equipment to minimise spills. Chemical storages and equipment servicing and refuelling to be undertaken at least 100 metres from creeks and rivers	
Acid Sulphate Soils (Land, terrestrial)	To maintain the integrity, ecological functions and environmental values of the soil and landform.	ASS is not found to be present in the project area.	No impacts anticipated.	Acid sulphate soils not predicted to be found in the area. No management actions recommended.	EPA objective met.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Environmental Management	Predicted Outcome
POLLUTION MANAGEMENT					
Noise & vibration.	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.	The surrounding land-use is pastoral with the Dunham River bridge close to the Woolah aboriginal community	Noise levels are expected to increase during construction works. Vibration may also be produced and be a nuisance to residents.	Implement noise and vibration minimisation techniques during construction.	Noise and vibration can be managed to meet EPA's objective.
Dust	Ensure that the dust levels generated by the proposal do not adversely impact upon welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards.	The surrounding land-use is pastoral with the Dunham River bridge close to the Woolah aboriginal community	Dust is expected to be produced during construction, however dust mitigation practices will be used and should minimise the amount of dust generated.	Implement dust minimisation techniques which will include: watering of construction areas and limiting areas that are cleared.,	Dust can be managed to meet EPA's objective.
Air emissions (Air Quality)	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	The surrounding land-use is pastoral with the proposed Dunham River Bridge realignment located approximately 20 km north of the Woolah aboriginal community	The impact is predicted to be minimal as traffic flows are not expected to increase significantly	Standard construction management techniques such as regular machinery maintenance and inspection will be employed to minimize air emissions of machinery during construction.	Air emissions can be managed to meet EPA's objective.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact	Environmental Management	Predicted Outcome
SOCIAL SURROUNDINGS					
Aboriginal & Cultural Heritage	To ensure changes in the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	Two registered aboriginal heritage sites were identified. Consultation with Aboriginal Elders identified several material search areas at Dunham River and Fletchers Creek which will no longer will be used as sources of borrow material. No registered European cultural sites were identified. The site of the original Dunham river crossing will be adjacent to the new Dunham River crossing.	Two known aboriginal site will be impacted. The site of the original Dunham river crossing will not be disturbed by the new Dunham River crossing.	A section 18 application (under Aboriginal Heritage Act) will be made to disturb this site. Avoid damage to previously unidentified heritage sites if these are encountered. The site of the original Dunham river crossing will not be disturbed by the new Dunham River crossing.	Impact on one aboriginal site. Approval to disturb will be made. No impact on areas and items of European Heritage. Compliance with relevant heritage legislation.
Visual Amenity	To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable.	Road realignment confined to lower lying section of landscape. No impact on hills or ranges.	No significant impact on visual amenity compared with the existing alignment of the three sections.	Appropriate construction road design, management and reinstatement of vegetation in Accordance with Section 8 of this EIA document.	Long term impacts prevented, EPA objective met.

5.1 IMPACT ON VEGETATION

5.1.1 Declared Rare and Priority Flora

Interrogation of CALM databases for Declared Rare and Priority flora did not identify any of these species for the project areas, though the Western Australian Herbarium records did identify numerous Priority species that have been opportunistically collected within the project coordinate area (refer to Section 4.4.3).

In May 2003, Astron Environmental conducted a flora survey as part of an environmental impact assessment for a road upgrade project for an area of the GNH south of the current proposed works, from 2824 to 2876 SLK. This field survey did not find any DRF or TECs in the study area.

The flora survey by Astron Environmental (2005) did not identify any Declared Rare or Priority species from either the Fletchers Creek, Telegraph Creek or Dunham River alignments and associated borrow areas surveyed. No species listed under the Federal Environmental Protection and *Biodiversity Conservation Act 1999* were identified during the flora survey (2005). Consequently, impacts on DRF are not expected as a result of the proposal.

5.1.2 Threatened Ecological Communities

As part of the preliminary environmental impact assessment, a search was undertaken for the area of proposed works in the Department of Conservation and Land Managements threatened ecological communities (TEC) database and the Department of Environment and Heritage Protected Matters Database. Neither search identified any TEC within or adjacent to the project area. The flora and vegetation assessment carried out by Astron Environmental in May 2005 also did not identify any TEC in the project area. Therefore as no impacts on TEC are predicted as a result of the proposed works no management commitments are required.

5.1.3 Weed Management

Twenty-nine weed species were recorded in the Fletchers Creek and Telegraph Creek sections during the May flora survey (see Section 4.4.3). Three of these species were Priority 1 Declared Plants, including *Calotropis procera* (caltrop), *Jatropha gossypifolia* (Bellyache bush) and *Sida acuta* (spinyhead sida). Eighteen weed species were recorded in the Dunham River area, including the two P1 Declared Plants *Calotropis procera* (caltrop) and *Sida acuta* (spinyhead sida). Priority one declares that the movement of plants or their seeds within the State is prohibited, including movement of contaminated machinery and produce.

Declared Plants and environmental weeds were most commonly found in disturbed areas, namely along road verges and along the edges of creeks, and especially in the vicinity of the road and on previously borrowed areas. The composition of the vegetation within the disturbed areas surveyed is significantly different from that observed in the surrounding undisturbed vegetation. Vegetation condition in these disturbed areas is described as good through to degraded.

Activities associated with road construction could spread existing weed populations into new areas, particularly if seeds are washed into drainage pathways, were they may be distributed to relatively undisturbed areas in adjacent creeks and waterways. Construction activities that have the potential to spread weeds include machinery, plant and personnel movement, vegetation clearing and disturbance, topsoil disturbance, and soil and fill importation contaminated with weed seeds. Additionally, the success of establishing plants for landscaping purposes following construction would be hindered by unchecked weed growth.

A weed management plan is to be prepared and implemented by the construction contractor that will minimise the potential for weed spread, particularly with regard to the management of the Declared Plant species. Key points to be addressed in this plan may include:

- minimum disturbance and clearing were practicable to avoid suitable weed proliferation conditions;
- measures to prevent plants, seeds and topsoil being moved to non-infested areas;
- brush down or clean down of vehicles, machinery and personnel working in identified infested areas prior to working in uninfested areas;
- vehicle brush down/wash down to remove vegetative matter and soil at prior to entry for all incoming vehicles;
- the use of clean 'weed free' fill and road building material for construction;

Such a weed management plan will limit the introduction of new weed species and reduce the potential for spread of existing weeds.

5.1.4 Clearing

Clearing impacts on vegetation

Vegetation clearing presents one of the primary environmental impacts associated with the proposed works. Clearing of remnant vegetation will be required for the new alignments at Fletchers Creek, Telegraph Creek and Dunham River, and for the associated borrow areas. The amount of clearing required for the re-alignments will vary according to site specific characteristics, though clearing to a 30 metre road corridor according to MRWA specifications is allowed for. The exact area to be cleared for route alignments and borrow areas will be determined in final design, following final route selection. MRWA also needs to determine the depth and areal extent of proposed borrow areas to determine the amount of vegetation clearing needed to source the required quantities of road building materials. The best estimate at this stage of investigations is that a maximum area of 104.3 ha will be cleared (refer to Table 1.2 for details).

Vegetation clearing will be required in a range of habitats, from disturbed areas, to gently sloping plain to flood plain to riverine habitats, as shown in Figures 4.1 to 4.3. The loss of individual plants and vegetation units and loss of fauna habitat will be direct impacts of vegetation clearing. Secondary effects may include an increased risk of wildfire through movement of personnel and machinery. There is frequently a close correlation between increased human activity and changes in fire regimes, which may contribute to the degradation of natural ecosystems. Vegetation clearing also presents

an increased risk of vegetation degradation through the introduction of weeds. Activities associated with construction such as disturbance, excavation and movement of personnel and machinery can provide ideal conditions for the colonisation of weed species (refer to section 5.1.3*)*.

An assessment of the 3 Bridges Project against the 10 principles of clearing was undertaken (refer to Table 5.2). Some clearing of the banks of Dunham River, Fletchers Creek and Telegraph Creek for realignment is required. If Borrow Material Search Area 3 at Telegraph Creek is developed, this may also result in clearing of riparian vegetation.

MRWA will include minimum clearing protocols as part of final design to minimise potential impacts associated with clearing. Where vegetation clearing occurs, removal of mature trees should be minimised and vegetation clearing limits will be clearly established as part of the final project design. Areas outside the project area will not be disturbed as part of the proposed works.

Table 5.2 Assessment of project against 10 principles of clearing

Clearing Principle	Yes/No
Does the area to be cleared comprise a high level of biological diversity?	No
Does the area to be cleared comprise the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia?	No- one of the Dunham Borrow Pit Material Search areas with known Gouldian Finch presence was excluded from proposal
Does the area to be cleared include, or is necessary for the continued existence of, rare flora?	No
Does the area to be cleared comprise the whole or a part of, or is necessary for the maintenance of, a threatened ecological community?	No TEC's were identified in project area from CALM database search or field investigation.
Is the area to be cleared significant as a remnant of native vegetation in an area that has been extensively cleared?	No – at one of the Dunham Borrow Pit Material Search areas which mostly hasn't been burnt for over five yeas (some over ten years) has been excluded from the proposal
Does the area to be cleared occur within, or in association with, an environment associated with a watercourse or wetland?	Yes- clearing of 30 metre width on each bank of Dunham River, Fletchers Creek and Telegraph Creek. Part of Borrow Pit Material Search Area 3 covers Telegraph Creek
Is the clearing of the vegetation likely to cause appreciable land degradation?	No
Is the clearing of the vegetation likely to have an impact on the environmental values of any adjacent or nearby conservation area?	No - provided environmental management commitments are adhered to.
Is the clearing of the vegetation likely to cause deterioration in the quality of surface or underground water?	No - provided environmental management commitments are adhered to.
Is the clearing of the vegetation likely to cause, or exacerbate, the incidence or intensity of flooding?	No

Provided that the environmental management recommendations described in the EMP are followed, it is expected that impacts of proposed works on vegetation can be effectively managed. The proposal should cause minimal cumulative impact to the overall vegetation communities and biodiversity represented in the area.

Clearing permit

An exemption held by MRWA, presently applies to clearing activities that are required for road widening and realignment projects where the clearing has been completed before 8 January 2006, however clearing will occur after this date. The exemption covers all clearing activities that are required to deliver the road project such as:

- clearing for the construction footprint;
- clearing to search for road base materials;
- extracting road base materials;
- constructing temporary vehicular tracks;
- construction work camps;
- clearing for stockpile areas; and
- establishing new sightlines.

No declared rare or priority flora, or fauna or ESA's were identified in the project area.

Advice from the Native Vegetation Protection Section and MRWA Environmental Branch was that the proposed road realignment works will not require a clearing permit as the current purpose permit application will include the works at Dunham River, Telegraph Creek and Fletchers Creek.

The proposal involves the construction of two new floodways and a bridge which will involve modification to stream beds and banks and will therefore require a clearing permit. Additionally, MRWA also will obtain a permit to disturb bed and banks as modification of stream beds and banks, as required under the *Rights in Water and Irrigation Act 1914*.

5.1.5 Dieback

Consultation with CALM did not identify dieback within the study area. The pathogen that causes dieback (*Phytopthora cinnamomi*) has been identified in irrigated areas in the Kimberley district, though no known occurrences of the pathogen exist outside of these irrigated areas. The proposal is not in the vicinity of any irrigated areas. Additionally, species typically susceptible to the pathogen are not common in the study area. Dieback was not assessed as an issue for the proposal (*pers.comm*. Kevin Veer, Abe Van der Sande, CALM).

5.2 IMPACTS ON FAUNA

A search of the Department of Conservation and Land Management's Threatened Fauna Database did not identify any known occurrences of threatened fauna within or adjacent to the project area. A previous EIA by Astron (2003) in an adjacent study area confirmed this finding.

A search of the Environmental Protection and Biodiversity Conservation (EPBC) register held by the Department of the Environment and Heritage identified a number of species that constitute Matters of National Environmental Significance within the

project areas. At the Fletchers Creek site, four threatened species and six migratory species have habitat that may occur within the project area. Threatened species include the Gouldian Finch, Purple-crowned Fairy-wren, the Australian Painted Snipe and the Freshwater Sawfish.

At the Telegraph Creek site, four threatened species and seven migratory species have habitat that may occur within the project area. Threatened species include the Gouldian Finch, Purple-crowned Fairy-wren, the Australian Painted Snipe and the Freshwater Sawfish. The Dunham River site also has four threatened species and ten migratory species listed as having habitat that may occur within the project area. Threatened species include the Gouldian Finch, Purple-crowned Fairy-wren, the Australian Painted Snipe and the Freshwater Sawfish. The results of the EPBC searches are included in Appendix B.

Additionally, known habitat of the Gouldian Finch has been identified in the Dunham River (Gordon Graham, pers. comm.). On the basis of this advice this area has been excluded as a potential source of borrow material.

A fauna survey was commissioned to confirm the presence/absence of these species in the project areas and was undertaken in September 2005 by Western Wildlife.

The survey indicated that at the borrow material search area 2 at Dunham River there were some larger trees with hollows adjacent to the site that may be potential Gouldian Finch breeding habitat. Borrow material search area 10 also contained a few trees with terminal hollows that may be suitable for Gouldian Finch breeding. Other than these two potential borrow pit sites, no other sites contained habitat that would support the Gouldian Finch, or the Purple-crowned Fairy-wren, Australian Painted Snipe or Freshwater Sawfish.

The conclusion of the survey indicates that the Freshwater Sawfish, Purple-crowned Fairy-wren and Painted Snipe are all highly unlikely to occur in the vicinity of any of the study sites due to the lack of suitable habitat. The report also concluded that the Gouldian Finch may potentially use any of the study sites as foraging habitat, but is highly unlikely to be breeding on most sites. It is therefore recommended that referral to the DEH is not required for this project. MRWA has committed to avoiding areas of known or potential breeding sites.

Although impact on habitat critical for the survival of any threatened fauna that may exist in the project area is unlikely, vegetation clearing may have impacts on fauna habitat in general. Minimal vegetation clearing and practices to minimise impacts on fauna will be incorporated into a construction EMP.

Additionally, it is recommended that revegetation be carried out on completion of works to offset potential loss of fauna habitat. MRWA have committed to ripping and revegetating the redundant sections of road after they are replaced by the road realignments. Management recommendations for the protection of fauna and fauna habitat are described in Section 7.3 and Section 7.4 below.

5.2.1 Referral to the DEH

The application of the EPBC Act Administrative Guidelines on Significance to the proposal did not identify any significant impact on fauna species, provided that environmental management commitments for the protection of fauna as specified in

the construction EMP (including avoiding disturbing known and potential areas of Gouldian Finch nesting sites) are followed.

5.3 RESERVES AND CONSERVATION AREAS

Pastoral stations, conservation reserves, mining tenements and reserves for the use and benefit of aboriginal inhabitants occupy a large percentage of the area of the east Kimberley, including the current project area. The surrounding land uses of the proposed GNH upgrades are:

- Fletchers Creek Floodway - Mabel Downs Station and Mining Lease M80/180 - held by Kimberley Nickel Mines Pty Ltd;
- Telegraph Creek Floodway - Lissadell Station;
- Dunham River Bridge realignment - Doon Doon Station.

The Purnululu National Park is located 30 km to the east of the Fletchers Creek Floodway. No reserves vested with the Department of Conservation and Land Management are located sufficiently close to the project area to be impacted by this project.

5.4 SURFACE HYDROLOGY AND WETLANDS

The proposed works are associated with waterways, namely the Dunham River, Fletchers Creek and Telegraph Creek. None of these waterways have special conservation status such as that afforded under the wild rivers classification (*pers.com* Mike Brainbridge, DoE). However, as waterways, floodway and bridge works should consider the DoE guidelines for the management of beds and banks. A permit will be required to be obtained from the DoE under section 17 of RIWA for the disturbance of beds and banks of the three waterways in the project area.

Dunham River is a tributary of the Ord River, entering it approximately two kilometres downstream of the Kununurra Diversion Dam. Telegraph creek is a tributary of the Bow River which discharges into Lake Argyle and Fletchers Creek is a tributary of the upper section of the Ord River which discharges into Lake Argyle. Consequently any discharges from construction works may reach either Lake Argyle or the Lower Ord, both of which are Ramsar wetlands.

Consultation with the Department of Environment did not identify any registered wetlands in the project area, noting also that limited mapping information is available for the Kimberley district. Interrogation of aerial photography and information provided by the DoE in Kununurra confirmed the absence of wetlands in the study area (*pers. comm*. Leith Boyer DoE).

The Department of Environment advises that box culvert design should replicate the natural channel shape and size (using a multi-cell box culvert formation) and provide access for aquatic and terrestrial fauna. This design will include recessing one of the box culverts nearest to the bank by approximately 150mm below the bed of the stream to provide sufficient depth and reduced velocities to allow faunal movement. Velocities may be further reduced by roughening the base of the recessed culvert, for example by adhering rock spalls to the base.

It is expected that surface water will not be abstracted for this project however a permit from the Department of Environment under Section 5C of the *Rights in Water and Irrigation Act 1914* will be obtained if abstraction of surface water is required as part of construction and dust suppression activities (refer to section 7.8 below). There may be alterations to surface drainage and run-off due to the road realignments. It is recommended that surface drainage considerations and the principles of water sensitive design should be adopted in the design of roads and crossings, so as to minimise alterations to surface flows and erosion. This will include the management of road runoff to avoid direct drainage into adjacent waterways, by directing runoff to vegetated roadside soakage swales or bio-filters, or by indirect discharge to the waterways via overland flow through vegetated buffers. The bed and banks up and downstream of floodway crossings and bridge sites be protected, for example by applying riprap as recommended by DoE.

Any hazardous chemicals or fuels and oils will be stored at least 100m from waterways to minimise the risk of these chemicals entering waterways. Best Management Practices for controlling waste, chemical spills, erosion and polluted run-off during road construction and maintenance will be followed, as described in the DoE Stormwater Management Manual for Western Australia, particularly Chapter 7 Non-structural Controls and Chapter 9 Structural Controls to manage litter, hydrocarbons, sediment and other pollutants (DoE 2003). The DoE also advises to refer to the Water Quality Protect Note Roads in Sensitive Environments (DoE 2004). In addition, should there be a need to stockpile road construction or landscaping materials, appropriate bunds and drains will be required to be constructed to prevent run-off into drainage lines in the event of heavy rain.

Provided these measures are incorporated into detailed design, no significant impacts on surface hydrology and wetlands are expected to result from the proposed works.

5.4.1 Referral to EPA

The presence of wetlands within the area of proposed works is a trigger for formal referral of the project to the EPA. Given that no defined wetlands were identified within the area formal referral is not likely to be required in relation to wetlands.

5.4.2 Referral to DEH

A search of the Environmental Protection and Biodiversity Conservation (EPBC) register held by the Department of the Environment and Heritage identified Fletchers Creek, Telegraph Creek and Dunham River project areas as being within the catchment of two Ramsar Wetlands, Lake Argyle and Lake Kununurra, and the Ord River Floodplain (refer to Appendix B*)*.

The significance of the proposal on Ramsar Wetlands was assessed using the EPBC Act Administrative Guidelines on Significance, as specified by the DEH. According to these guidelines, an action has, will have, or is likely to have a significant impact on the ecological character of a declared Ramsar wetland if it does, will, or is likely to result in any of the following:

- areas of the wetland being destroyed or substantially modified, or

- a substantial and measurable change in the hydrological regime of the wetland for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland, or
- the habitat or lifecycle of native species dependant upon the wetland being seriously affected, or
- a substantial and measurable change in the physio-chemical status of the wetland for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or
- an invasive species that is harmful to the ecological character of the wetland being established in the wetland.

As stated previously the project areas are located within the margins of the catchments for two Ramsar Wetlands. Provided that the environmental management commitments for the protection of wetlands specified in the construction EMP are applied, none of the criteria for significant impact outlined above apply to the proposal, and the referral to the DEH in relation to wetlands will not be required. Management commitments for wetland protection are specified in Section 7.8 below.

5.5 GROUNDWATER

Fletchers Creek and Telegraph Creek Floodways fall within a surface water area for the Rights *in Water and Irrigation Act 1914* (RIWI Act), as shown in Appendix A. This Act requires a licence to be obtained from the Department of Environment for the abstraction of surface and/or groundwater depending on the area. As abstraction of groundwater is required for the proposed works, such as for dust suppression of road base compaction, then a permit from the DoE will be required. Minimal impact is expected on groundwater quality or levels from proposed works due to the short term impact of the groundwater abstraction.

5.6 PUBLIC WATER SOURCE AREA

No Public Water Source Areas were identified in the project area (*pers. comm*. George Foulsham - Natural Resource Management Officer, DoE). Public Drinking Water Access Areas occur at Halls Creek, Kununurra and Moochalabra, all of which are well outside of the study area, as shown in Appendix D.

5.7 ACID SULPHATE SOILS

Acid sulphate soils is the common name given to naturally occurring soil and sediment containing iron sulphides generally associated with soil units in wetland and estuarine areas. Iron sulphides form in a layer of waterlogged soil or sediment, and are benign in their natural state. When disturbed and exposed to air they oxidise and produce sulphuric acid, iron precipitates, and concentrations of dissolved heavy metals such as aluminium, iron and arsenic (Department of Environment 2003; WAPC, 2003).

The project does not fall within the mapped areas of acid sulphate soils (DoE 2003, WAPC 2003). As excavation below five metres AHD and dewatering is not planned to occur during works, either Actual Acid Sulphate Soils (ASS) or Potential Acid

Sulphate Soils (PASS) are not expected to be disturbed. Impacts associated with acid sulphate soils are not predicted from this proposal.

5.8 SALINITY

Apart from roads and infrastructure associated with roads such as verges, culverts and drainage, the surrounding environment in which the proposed project is located consists of relatively undisturbed remnant vegetation. No agricultural activities occur in the area that may affect salinity levels of groundwater or waterways (*pers.com* Paul DeValley, Department of Agriculture). Consultation with the DoE confirmed that no salinity issues are associated with the waterways potentially impacted upon in the proposed works.

It is unlikely that the proposed works will have impacts on salinity. Dewatering will be required as part of proposed works, however no long term alterations to groundwater or water table levels are predicted. There may be alterations to surface drainage and run-off due to road realignment and bridge works. Detailed design will take into account surface drainage and design the road in such a way as to minimise changes to surface flows.

5.9 ABORIGINAL HERITAGE

5.9.1 Aboriginal sites

A search of the Department of Indigenous Affairs (DIA) Register identified two registered Aboriginal Site within the Dunham River project area (refer to Appendix E). No sites of Aboriginal Heritage were identified within the Fletchers Creek of Telegraph Creek project areas. The Nganjuwarrm – Dunham River site, Site No KO2923, is a Ceremonial site with mythological repository, modified tree, painting, engraving, quarry and artefacts/scatter present. The Dunham River Ford site, Site No K02756 is an artefact scatter site. Both sites encompasses an area through which the Dunham River realignments pass.

The Department of Indigenous Affairs (DIA) Register System identified one registered Aboriginal Site within the area through which the proposed Dunham River realignments pass. The presence of Aboriginal Heritage Sites within a project area is a trigger for formal referral to the Environmental Protection Authority (EPA). Consultation with the DIA indicated that further advice should be sought from the DIA Heritage Consultant for the East Kimberley Region to provide guidance on the type of information necessary for a Section 18 referral.

MRWA engaged an ethnographic and archaeological survey consultant to consultation with other affected parties concerning Aboriginal Heritage. This work identified some borrow material search areas which were excluded from the potential borrow material search areas.

As a result, there will be an impact on at least one of two known ethnographic or archaeological sites and consequently Section 18 referral under the *Aboriginal Heritage Act 1972* is required. This is likely to trigger referral under Part V of the *Environmental Protection Act 1986*.

5.9.2 Native Title

KBR commissioned a search of Native Title Claims for the project area by the National Native Title Tribunal (NNTT). The search used the NNTT GIRO database of the Register of Native Title Claims and the Schedule of Applications. One application for Determination of Native Title covers the study area, namely the Miriuwung Gajerrong Claim (WC 94/2). The claim encompasses the Dunham River Bridge realignment site, as shown in Table 5.9.2. Further details are provided in Appendix F.

Table 5.3 Native title search results

Native Title Tribunal Number	Federation Court Number	Name	Tribunal Database	Registered Test Status	Registration Date
WC 94/2		The Murriuwung People, The Gajerrong People	Register of Native Title Claims	Identified for Registration Test, Pre-Notification	26/05/1994

The preliminary environmental impact assessment recommended that the Elders of this claimant group and the Kimberley Land Council be consulted with regard to the nature and scope of the proposed works. As per a request from MRWA, this consultation was to be undertaken by MRWA, and as such it is outside the scope of the report.

5.10 EUROPEAN CULTURAL HERITAGE

A search of the Australian Heritage Places Inventory and the Heritage Council of Western Australia Inventory did not identify any sites of European Cultural Heritage within the vicinity of the proposal. No impacts on European Heritage are expected. The old Dunham River crossing is not listed on any Heritage Register although Main Roads propose to retain this site.

5.11 NOISE, VIBRATION, DUST AND AIR EMISSIONS

Noise and vibration and dust levels along Great Northern Highway and borrow areas at Fletchers Creek, Telegraph Creek and Dunham River can be expected to increase during construction works. Vegetation clearing for route alignments and borrow areas, compaction of soil and road building material, and heavy machinery movement are likely to be the main source of noise and vibration.

As no noise sensitive premises are located in the vicinity of proposed works, impact on adjacent land users is not predicted. There are however potential impacts for surrounding vegetation, fauna and passing traffic. Noise and vibration management commitments as specified in a construction EMP are likely to adequately manage these impacts (refer to Section 7.16*).*

Construction methods that minimise the generation of dust shall be employed by the construction contractor. Sources of dust generation are likely to include vegetation clearing, grading, compaction of soil and road building material and machinery and vehicle movement. Excessive dust causes a hazard to public traffic, as well as a potential detrimental effect on nearby vegetation and fauna. Dust suppression methods will include, watering of construction areas, roads, streets and other areas

immediately adjacent to works and confining works that generate large amounts of dust to non-peak traffic periods and periods of low wind speed.

There may be other air emissions such as machinery and plant exhaust associated with construction activities. These impacts are likely to be effectively managed by standard construction management techniques such as regular machinery maintenance and inspection. The impact of air emissions from traffic on the project area following construction is predicted to be minimal, as traffic flows are not expected to increase significantly as a result of the works.

As 65% of the existing pavement has been classified in fair/poor condition in need of major reconstruction, improvements in the road pavement have a positive impact by reducing noise and vibration.

5.12 VISUAL AMENITY

There will be minimal impact to visual amenity as a result of the proposed works. As the adjacent land uses are pastoral leases and mining leases, the primary visual amenity impacts will be on road users. The view for road users will not change significantly as a result of the works.

Land clearing and other construction activities will have a short term visual amenity impact during the construction, though revegetation and vegetation regrowth will minimise this long term impact. A revegetation program with endemic species is recommended following construction, particularly where significant batter and banks are incorporated into final design.

5.13 PUBLIC SAFETY AND RISK

The proposed works will improve overall public safety by replacing floodways with bridges at Fletchers Creek and Telegraph Creek and upgrading the bridge at Dunham River.

Replacing floodways with bridges will increase the serviceability of the Highway, reduce the number of days of road closure due to flooding, and decrease the risk of flood induced accidents at crossings. Additionally, an improved pavement, road width, drainage and corner geometry will result from proposed works at these sites.

When completed the proposed project will reduce the risk of flooding impacts on vehicle drivers. If not managed correctly a risk to the public could be posed during construction, from machinery and vehicle movement, dust generation and traffic disruption. Provided that traffic management and signage is undertaken to Main Roads Western Australia standards, none of the proposed works present significant hazards to public safety.

6 Environmental management

The following section describes the environmental management procedures recommended for the proposal.

6.1 INDUCTION AND TRAINING

The contractor is to ensure that all personnel and subcontractors receive a standardised environmental induction which addresses the requirements of this plan and relevant legal requirements.

Toolbox meetings will include an environmental component where environmental requirements are reinforced.

Equipment operators will hold current and correct tickets to operate machinery.

Records of inductions and toolbox meetings will be kept.

6.2 VEHICLE ACCESS

All vehicles shall be restricted to the works areas and to existing tracks.

6.3 IMPACT ON VEGETATION

6.3.1 Clearing

For this project, clearing of vegetation within the work areas will require the removal of mature trees, shrubs and smaller vegetation. The implementation of minimum clearing protocols is to be part of final design to minimise clearing impacts. Where vegetation clearing occurs, removal of mature trees should be minimised and vegetation clearing limits should be clearly established as part of the final project design.

Cleared vegetation shall be stockpiled at locations to be nominated by the Principal contractor and approved by MRWA and used for rehabilitation. Cleared vegetation used for rehabilitation shall be mulched prior to deployment. Where possible larger branches and logs will be returned to cleared areas to create fauna habitat.

6.3.2 Clearing boundaries

Areas to be cleared and their boundaries will be clearly marked. Areas outside the project area must not be disturbed as part of the proposed works.

This information will be communicated to all personnel performing the clearing activities.

6.3.3 Reuse of vegetation

The Contractor shall use as much cleared vegetation as possible wherever practicable for rehabilitation. Tree trunks which are suitable for use for fauna refuge are to be returned to rehabilitated areas.

Burning of vegetation is not permitted within the works area.

6.3.4 Damage to vegetation, landforms or habitat

Any damage cause by the Contractor to vegetation, landforms or fauna habitat outside the work areas will be rehabilitated immediately. Remedial work shall be carried out under the direction of an approved and professionally qualified environmental consultant. The work shall involve whatever tasks are required, or recommended by the environmental adviser in order that the damaged areas are restored to pre-existing condition within the shortest possible time. Examples of particular tasks include deep ripping or hand scarifying and raking of wheel tracks and compacted soil, reinstatement of rocks or stones, planting of seeds or seedlings together with subsequent nurturing, repairs to foliage or root systems of trees and shrubs, and reinstatement of fauna habitat.

To promote responsible practice and ensure that unplanned disturbance is quickly rectified an internal project bonding system will be implemented. In the event that an incident involving environmental damage is identified, the Principal shall withhold payment of monies due to the Contractor on the basis of a performance undertaking until the damage is made good. The amount of performance undertakings shall be determined as follows:

- for damaged trees greater that 3 m in height: $1,000,
- for damaged trees and shrubs up to 2 m in heights; $500 each, and
- for damaged understorey (i.e. vegetation less than 1 m), open soil areas, rock faces and landforms and habitat in general, $10/m^2. In the case of vehicle wheel track damage the areas shall be calculated as the product of the distance path travelled and the width of the vehicle.

The minimum undertakings applicable to any particular occurrence of damage will be $5,000.

6.3.5 Declared Rare Flora (DRF)

No Declared Rare of Priority Flora were identified within the project area, and no management commitments for DRF are specified.

6.3.6 Threatened Ecological Communities

As no TECs were identified, no impacts on TECs are expected as a result of the proposal and no management commitments are specified.

6.3.7 Weed Management

Weeds can out compete the local native species and reduce the habitat value.

Twenty-nine weed species were identified in the study area, as described in Section 5.1.3. Three of these species are listed as category P1 (declared plants) in the *Agricultural and Related Resource Protection Act 1976*, meaning they cannot be introduced or spread. These include *Calotropis procera* (calotrop), *Jatropha gossypifolia* (bellyache bush) and *Sida acuta* (spineyhead sida). A weed management plan is recommended to be prepared and implemented by the construction contractor that will minimise the potential for weed spread, particularly with regard to Declared Plants.

The following management procedures will be implemented to minimise the potential for spread of Declared Plants and environmental weeds:

- Declared weed infestations will be treated prior to clearing;
- The extent of the weed infestations noted above should be re-evaluated prior to earthmoving activity;
- Minimum disturbance and clearing where practicable to avoid creating conditions suitable for weed proliferation;
- Measures to prevent plants, seeds and topsoil being moved to non-infested areas;
- Brush down or clean down of vehicles, machinery and personnel working in identified infested areas prior to moving to uninfested areas;
- Vehicle brush down/wash down to remove vegetative matter and soil prior to entry for all incoming vehicles;
- No weed infested soil material or road building material shall be imported into the area as fill;
- Exploration of soils should be avoided in those areas affected by infestation;
- Where weeds require control adjacent to creeks or wetlands a 'frog friendly' herbicide shall be used.

Such a weed management plan will limit the introduction of new weed species and reduce the potential for spread of existing weeds.

6.3.8 Dieback

Dieback was not identified within the project area, and no management commitments apply.

6.3.9 Revegetation, redundant cleared areas

Revegetation of redundant cleared areas within the work areas shall be undertaken on completion of road works and will utilise, wherever practicable, local native species.

Redundant areas of old road alignment will be ripped and revegetated. This will offset some of the clearing required for the new alignment.

6.4 PROTECTION OF FAUNA

MRWA will comply with the provisions of the *Wildlife Conservation Act 1950*, and shall exercise care during the course of the works to avoid unnecessary damage to native fauna.

MRWA will ensure that the Contractor implements the following procedures to minimise the impact on fauna:

- Areas of known or potential Gouldian Finch nesting sites will not be disturbed as part of this project (i.e. Material Search Area 1 at the Dunham river site will not be developed);
- Vegetation clearing will be kept to a minimum where practicable. Existing cleared areas, edges of road reserves and degraded areas will be used as a priority for on-site buildings, stockpile and storage areas;
- Any hollow logs will be preserved for return to disturbed areas, and some trunks and branches will be placed in small piles as fauna habitat. The Contractor shall ensure that no dead, standing or fallen timber is unnecessarily removed;
- Fauna will not be fed or deliberately encouraged to frequent work areas;
- Firearms and traps or their use are not permitted on site;
- Pets are not permitted on site.

6.5 TOPSOIL MANAGEMENT

Topsoil shall include surface soil and vegetative matter stripped and windrowed or stockpiled after cleaning for later respreading. Topsoil windrows and stockpiles shall be to a maximum height of 1 m to maximise the benefits gained from direct return of the constituent seeds and micro-organisms.

MRWA will also ensure that topsoil from areas identified as weed infested will not be returned.

6.5.1 Removal of topsoil

Prior to commencement of earthworks, the Contractor shall remove topsoil to a maximum depth of 100 mm from within the areas affected by the earthworks. The topsoil may be deposited in windrows parallel to the road within the limits of clearing or may be carted to designated spoil sites.

6.5.2 Removal of subsoil

If subsoil is present this will be removed and stockpiled in a manner which allows return.

6.6 BORROW PITS

Borrow pits will be reinstated and/or constructed in accordance with MRWA Specification 303 which outlines requirements such as batter angles, pit shaping, order of spreading and topsoil ripping.

Completion criteria will be established in accordance with MRWA Specification 304.

6.7 RESERVES AND CONSERVATION AREAS

No conservation areas or reserves were identified in the project area, and no management commitments apply.

The old Dunham River Crossing which adjacent to the proposed Dunham River Bridge is not listed on any heritage registers.

6.8 SURFACE HYDROLOGY AND WETLANDS

The project area lies within an areas designated under the *Rights in Water and Irrigation Act 1914* (refer to Appendix C). As abstraction of groundwater is required for the proposed works, such as for dust suppression or road base compaction, a permit from the Department of Environment under Section 5C of the *Rights in Water and Irrigation Act 1914* will be obtained.

The project also involves the disturbance of the beds and banks of three waterways, Fletchers Creek, Telegraph Creek and the Dunham River. As such a permit will be obtained from the DoE, also under Section 17 of the *Rights in Water and Irrigation Act 1914*.

The Department of Environment advises that box culvert design if used in floodway construction should replicate the natural channel shape and size (using a multi-cell box culvert formation) and provide access for aquatic and terrestrial fauna. This design may include recessing one of the box culverts nearest to the bank by approximately 150mm below the bed of the stream to provide sufficient depth and reduced velocities to allow faunal movement. Velocities may be further reduced by roughening the base of the recessed culvert, for example by ensuring that the rock spalls are firmly fixed to the base. MRWA will utilise this approach for floodway drainage.

There may be alterations to surface drainage and run-off due to realignments, floodway and bridge construction. Surface drainage considerations and the principles of water sensitive design will be adopted in the design of roads and crossings, so as to minimise alterations to surface flows and erosion. This will include the management of road runoff to avoid direct drainage into adjacent waterways, by directing runoff to vegetated roadside soakage swales or bio-filters, or by indirect discharge to the watercourse via overland flow through a vegetated buffer. The bed and banks up and downstream of the crossing will be protected, for example by applying riprap.

Any hazardous chemicals or fuels and oils will be stored at least 100 metres from drainage lines, creeks or rivers to avoid drainage into surface waters. Practices for controlling waste, chemical spills, erosion and polluted run-off during road construction and maintenance, will follow the Stormwater Management Manual for Western Australia, in particular Chapter 7 (Non-structural Controls) and Chapter 9 (Structural Controls) to manage litter, hydrocarbons, sediment and other pollutants (DoE, 2003).

Consideration of the requirement of the DoE Water Quality Protection Note: Roads in Sensitive Environments (July, 2004) will be made during the design phase. In addition, should there be a need to stockpile road construction or landscaping materials and construction of appropriate bunds and drains to prevent run-off into drainage lines in the event of heavy rain. Provided these measures are incorporated

into detailed design, no significant impacts on surface hydrology and wetlands are expected to result from the proposed works.

6.9 GROUNDWATER

Impacts on local groundwater levels or quality are not expected to result from the proposal. However, as the project lies within an area designated under the *Rights in Water and Irrigation Act 1914,* a permit from the Department of Environment under Section 17 of the Act will be sought for any abstraction of surface or groundwater required for the proposed works, such as for dust suppression of road base compaction.

6.10 PUBLIC WATER SOURCE AREA

No Public Water Source Areas were identified in the project area and no management commitments apply.

6.11 FIRE MANAGEMENT

During the dry season, fires can burn large areas if they are not controlled appropriately. As a result, actions should focus on fire prevention rather than mitigation.

Fire prevention measures will include:

- All machinery is to have spark arrestors fitted to the exhaust system.
- All vehicles and plant is to be fitted with fire extinguishers.
- Provision of water tankers, equipment and training of personnel to fight any fires that commence in the work areas.
- Operations will conform to the Local Government Authority, CALM and Bush Fires Board (BFB) requirements for fire prevention.

6.12 ACID SULPHATE SOILS

Actual Acid Sulphate Soils or Potential Acid Sulphate Soils were not identified within the project area. No management commitments for the disturbance of acid sulphate soils apply.

6.13 SALINITY

The proposal is not expected to have any impacts on salinity, and no environmental management commitments apply.

6.14 ABORIGINAL HERITAGE

6.14.1 Aboriginal sites

Two aboriginal sites are known to the Aboriginal Affairs department to occur within the Dunham Project area. The Department of Indigenous Affairs (DIA) Register System identified two registered Aboriginal Site within the area through which the proposed Dunham River realignment passes. The disturbance of the Nganjuwarrm –

Dunham River aboriginal heritage site within a project area is a trigger for formal referral to the Environmental Protection Authority (EPA). An application to disturb this site will be made under Section 18 of the *Aboriginal Heritage Act 1972*.

At Telegraph Creek and Fletchers Creek no sites have been previously recorded.

Consultation with native title claimants was undertaken on behalf of MRWA (Miln Walker and Associates, 2005) regarding the borrow pit sites. This consultation identified exclusions zones at Dunham River and Fletcher's Creek. MRWA will ensure that no work associated with the project will be undertaken in those areas identified as exclusion zones.

6.14.2 Native Title

MRWA has requested that all consultation and management measures be negotiated by MRWA with the appropriate Native Title groups. Recommendations for native Title are not within the scope of this report.

6.15 EUROPEAN CULTURAL HERITAGE

No sites of European Cultural Heritage were identified in the project area and no management commitments apply.

6.16 NOISE, VIBRATION, DUST AND AIR EMISSIONS

To minimise the impact of noise and vibration impacts, the majority of construction will be undertaken during daylight hours. However some night work is likely to be required (i.e. for activities such as concrete pours).

Sources of dust generation are likely to include vegetation clearing, grading, compaction of soil and road building material and machinery and vehicle movement. Excessive dust will have impacts upon adjacent vegetation and is a hazard to public traffic.

Construction methods that minimise the generation of dust will be employed. Dust suppression methods will include:

- The area exposed to dust generation will be minimised during the course of the project, through staged clearing and construction;
- Watering of construction areas, temporary roads and other areas immediately adjacent to works. All exposed areas including temporary detours, will be kept moist to minimise dust emissions from the project or associated works. Water tankers, sprinklers or other approved method shall be used;
- In dry conditions, water spraying will be carried out during construction activities at least four times per day;
- Gaseous emissions such as machinery and plant exhaust associated with construction activities will be managed by standard construction management techniques including regular machinery maintenance and inspection;

6.17 VISUAL AMENITY

Minimal impact on visual amenity is expected for road users. As a precaution, the following visual mitigation measures will be implemented during construction:

- Limit the removal of vegetation beyond the road clearing zone;
- Limit the duration of disturbance;
- If necessary, stockpile topsoil in rows no more than 1m in height and replace on disturbed areas as soon as practicable;
- Replace disturbed soil and rock back in a manner which replicates the existing soil profile;
- Limit construction access roads;
- Selectively spray for weeds;
- Revegetate batters as soon as practical;
- Retain vegetation where possible.

6.18 CONTAMINATED SITES

No previous land uses that may have led to soil contamination were identified in the project area. No management commitments apply.

6.19 WASTE MANAGEMENT

Waste generated will include construction waste, domestic waste, waste grease, oils, and septage waste.

6.19.1 Solid waste

Consideration shall be given to recycling waste materials where appropriate. Where this is not practicable all items of waste (rubbish) resulting from the works including plant maintenance, shall be disposed of at the nearest licensed waste disposal site or at a site agree by the Local Government Authority.

No rubbish shall be burned or buried on site.

6.19.2 Liquid waste

Waste oils will be captured and recycled.

6.20 EQUIPMENT

If not properly addressed, equipment which is brought to site can transport weeds or leak oils and greases to the environment. Also vehicle servicing will be necessary outside of permanent workshop areas.

6.20.1 Pre-start checks

To prevent the introduction of weed species to and minimise the occurrence of hydrocarbon leaks all vehicles, plant and equipment shall be clean prior to commencement of work on the project.

Cleaning operations shall be conducted at a suitable location or locations nominated by the Contractor and approved by MRWA.

Records of vehicle, plant and equipment inspections will be kept.

Prestart checks which include presence of leaks or spills shall be undertaken for all equipment and the recorded. On discovery of a leak, vehicles will cease operation until repairs occur.

6.20.2 Equipment servicing

With the exception of breakdown maintenance, vehicle servicing will be undertaken at areas designed by the contractor. These areas will be at least 100 metres from any waterway or wetland. Vehicle refuelling will be undertaken at least 100 metres from any waterway or wetland.

All fuels, oils and chemicals will be stored in accordance with AS 1940.

All hydrocarbon contaminated rags, filter cartridges and other material shall be accounted for and returned to the workshop for disposal. These will be returned for recycling or disposed of in a location agreed by the Local Government Authority.

In the event of fuel or oil spillage, the spill will be contained and moped up. Contaminated solids will be excavated and for removed disposal in a manner and location agreed by the Local Government Authority.

6.21 POLLUTION AND SPILL EVENTS

Pollution and spills of oils and other chemicals will be reported immediately to the appropriate authority by telephoning the Department of Environment (DoE) on (08) 9222 7123 or after hours (free call) 1800 018 800.

6.22 PUBLIC SAFETY AND RISK

Appropriate traffic management during construction to Main Roads standards will include, ‘good housekeeping’, appropriate fencing, the use of rigid barriers and supports where required and appropriate signage.

6.23 EMERGENCY PLANNING

Despite the control measures established for minimising spills and fire prevention which are outlined above. Emergency plans and training are required to contain and minimise the impact of any emergency.

An emergency plan outlining the required response to potential emergency events which may impact on the environment will be established.

This emergency plan will be tested within one month of project start up and the results recorded.

Material safety data sheets (MSDS) will be maintained for all chemicals adjacent to where they are stored.

Spill kits will be maintained on service/refuelling vehicles, major plant and within workshops. Contents shall include absorbent products and appropriate containers or bags.

Fire extinguishers shall be kept on all vehicles and in all workshops

The spill kits will be inspected weekly and fire extinguishers six monthly.

Personnel will be inducted in the location and use of spill kits and fire extinguishers.

6.24 ENVIRONMENTAL INCIDENT MANAGEMENT

Pollution events or other incidents impacting on the environment shall be reported immediately to the appropriate authority by telephoning the DoE on (08) 9222 7123 or after hours (free call) 1800 018 800.

Incident reports will be produced which include: date and time of event, chemical name, volume, location, area affected, actions taken to clean up site and prevent recurrence.

6.24.1 Decommissioning

All project administration and workshop infrastructure will be removed or rehabilitated (i.e. access roads). All project and administration areas will be cleaned up and all materials and litter associated with the project will be removed and disposed of appropriately. The site will be left in a clean and tidy condition after completion of site works.

Redundant bridges and floodways will be left in situ.

6.25 MONITORING, AUDITING AND PERFORMANCE

A monitoring and auditing schedule addressing the above requirements will be documented.

A complaints and incident register will also be maintained.

Weekly inspections of construction areas will be undertaken utilising a checklist and all records will be kept.

6.26 REPORTING

Compliance with these requirements will be reviewed by the Main Roads Project Manager and unless otherwise specified exceptions will be reported fortnightly to Main Roads Environmental Branch.

6.27 SOCIAL IMPACT

Social impact shall be minimised by ensuring the existing Great Northern Highway remains open during the construction phase. It is anticipated that most construction activity will be undertaken in daylight hours; however some night work is likely to be required (i.e. for activities such as concrete pours). Dust resulting from construction activity will be suppressed as detailed in Section 6.16.

7 Environmental management commitments

7.1 INDUCTION AND TRAINING

Commitment	MRWA will ensure that all personnel and subcontractors receive a standardised environmental induction which addresses the requirements of the EMP and relevant legal requirements.
Action	• Provide induction, • Regular toolbox meetings will be held which include coverage of environmental issues.
Objective	Protect the environment through awareness & training.
Location	Prior to work commencement, on-site
Timing	Prior to and during construction.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.2 VEHICLE ACCESS

Commitment	All vehicles to be restricted to existing tracks and area of works.
Action	• All vehicles to be restricted to existing tracks and area of works. • All vehicles will be cleared prior to commencement of work on site (refer 7.28)
Objective	Protect the environment from unnecessary degradation.
Location	All area of works
Timing	Construction.
Responsible party	Construction contractor/Site supervisor.
Requirement / Consultation	None

7.3 IMPACT ON VEGETATION

7.3.1 Clearing and clearing boundaries

Commitment	Minimise environmental impacts associated with vegetation clearing.
Action	• Establish minimum clearing protocols and clearly define clearing limits • Areas to be cleared to be clearly marked • Areas outside project area will not be disturbed • Clear establishment of clearing limits • Minimum clearing of mature trees and shrubs • Stands of woodland community will be avoided if possible • Return of trees and shrubs to site to protect rehabilitated areas from erosion, enhance revegetation and fauna habitat • Non-disturbance of areas outside the project area
Objective	Minimise impact on vegetation of clearing.
Location	All area of works.
Timing	Prior to commencement of clearing.
Responsible party	Construction contractor/Site supervisor.
Requirement / Consultation	None

7.3.2 Reuse of vegetation

Commitment	As much cleared vegetation as possible will be used for rehabilitation.
Action	• Tree trunks/hollow logs suitable for fauna refuge are to be returned to rehabilitated areas. • Most of the cleared vegetation used for rehabilitation will be mulched prior to deployment. • Remaining larger branches and logs will be returned to cleared areas
Objective	Encourage effective revegetation of cleared or disturbed areas.
Location	All area of works.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.3.3 Revegetation

Commitment	Revegetation of redundant cleared areas within the work areas shall be undertaken on completion of road works.
Action	• Where possible seed will be collected from cleared vegetation for use in rehabilitation • Revegetation with local provenance species (where possible) shall take place. • Rehabilitation success will be monitored for a minimum of two years following completion of the works.
Objective	Revegetate project areas to a satisfactory state on completion of the project.
Location	Throughout the study area.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.3.4 Damage of vegetation, landforms or habitat

Commitment	No damage to vegetation, landforms or habitat adjacent to the project area will occur as a result of this project.
Action	• Any damage cause by the Contractor to vegetation, landforms or fauna habitat outside the work areas shall be rehabilitated. • Remedial work shall be carried out under the direction of an approved and professionally qualified environmental consultant. The work will involve whatever tasks are required, or recommended by the environmental consultant in order that the damaged areas are restored to pre-existing condition within the shortest possible time. Examples of particular tasks include deep contour ripping or hand scarifying and raking of wheel tracks and compacted soil, reinstatement of rocks or stones, planting of seeds or seedlings together with subsequent nurturing, repairs to foliage or root systems of trees and shrubs, and reinstatement of fauna habitat. • In the event that an incident involving unplanned environmental damage by a contractor is identified, the Principal shall withhold payment of monies due to the Contractor on the basis of a performance undertaking until the damage is made good. The amount of performance undertakings will be determined as follows: o for damaged trees greater that 3 m in height: $1,000, o for damaged trees and shrubs up to 2 m in heights; $500 each, and o for damaged understorey (i.e. vegetation less than 1 m), open soil areas, rockfaces and landforms and habitat in general, $10/m^2. In the case of vehicle wheel track damage the areas shall be calculated as the product of the distance path travelled and the width of the vehicle; • The minimum undertakings applicable to any particular occurrence of damage shall be $5,000.
Objective	Protect vegetation, landforms and soils from damage.
Location	All area of works.
Timing	Construction.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.3.5 Declared Rare Flora

No management commitments apply.

7.3.6 Threatened Ecological Communities

No management commitments apply.

7.3.7 Weed Management

Commitment	Minimise the spread of existing weed species and the introduction of new weed species into the project area. Particular attention is to be paid to spread of the Priority 1 Declared Weeds.
Action	• Identify key construction activities likely to spread weeds including: o Machinery, plant and personnel movement; o Vegetation clearing and disturbance; o Top-soil disturbance; o Soil and fill importation contaminated with weed seeds. • Implement a weed management plan for each area including, but not limited to, the following commitments: o An identification kit of key weed species to be provided to construction personnel; o Undertake minimum disturbance and clearing were practicable to avoid suitable weed proliferation conditions; o Brush down/wash down vehicles to remove vegetative matter and soil at prior to entry for all incoming vehicles; o Brush down or clean down of vehicles, machinery and personnel working in identified infested areas prior to working in uninfested areas; o The use of clean 'weed free' fill and road building material for construction. • Weed monitoring and eradication will be undertaken for a minimum of 24 months following project completion.
Objective	Reduce the spread of weeds currently found in the project area and ensure new weed species are not introduced into the area.
Location	Throughout the project area. Hygiene points for incoming vehicle inspection and cleaning at site entry points.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.3.8 Dieback

No management commitments apply.

7.4 PROTECTION OF FAUNA

Commitment	Comply with provisions of the *Wildlife Conservation Act 1950, Environmental Protection and Biodiversity Conservation Act 1999* and avoid unnecessary damage to native fauna and their habitat.
Action	• Areas of known and potential Gouldian Finch habitat at the Dunham River site (all of potential Borrow Material Search Area (PBMSA) 1 and parts of PBMSA 10) will not be cleared. • Clearing will be minimised to avoid unnecessary damage to fauna habitat including hollow bearing trees (living or dead) including potential Gouldian Finch hollows adjacent to Dunham River PBMSA 2. • Prioritise use of existing cleared areas, edges of road reserves and degraded areas for on-site buildings, stockpile and storage areas. • Preserve hollow logs for return to disturbed areas. Place trunks and branches in small piles as fauna habitat. • Ensure no dead, standing or fallen timber is unnecessarily removed. • Fauna should not be fed or deliberately encouraged to frequent work areas. • Firearms, traps and pets are not permitted on site.
Objective	Avoid unnecessary damage to native fauna.
Location	All areas where clearing is required.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.5 TOPSOIL MANAGEMENT

Commitment	Topsoil, including surface soil and vegetative matter will be stripped, collected and stored for later respreading.
Action	• Prior to commencement of earthworks, topsoil to a depth of 50mm within the areas affected by the earthworks is to be removed. • Place topsoil in windrows parallel to the road or within designated spoil sites. • If subsoil is present it shall be removed and stockpiled for return. • Rehabilitation will be undertaken so that potential for erosion via excessive flow velocities is minimised (including contour ripping)
Objective	Manage topsoil so it can be used for rehabilitation of disturbed areas.
Location	All areas where clearing is required.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.6 BORROW PITS

Commitment	Construct and rehabilitate borrow pits in accordance with MRWA Specifications 303 and 304.
Action	• Construct borrow pit in accordance with MRWA Specification 303. • Completion criteria are established in accordance with MRWA Specification 304.
Objective	Minimise damage to the environment from the construction of borrow pits.
Location	Borrow pits.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.7 RESERVES AND CONSERVATION AREAS

No management commitments apply.

7.8 SURFACE HYDROLOGY AND WETLANDS

Commitment	Minimise any impact on adjacent waterways.
Action	• Detailed design to implement impact minimisation measures in all work associated with Fletchers Creek, Telegraph Creek, and Dunham River. This shall include incorporating the following into box culvert design for the two floodways: • Minimise back water flows and implement erosion control measures in box culvert design; • Natural channel shape and size (using a multi-cell box culvert formation) to provide access for aquatic and terrestrial fauna will be replicated; • Recessing one of the box culverts nearest to the bank by approximately 150mm below the bed of the stream to provide sufficient depth and reduced velocities to allow fauna movement will occur. • Alteration to surface flows and drainage will also be reduced by minimising road embankment heights and managing road runoff to avoid direct drainage into waterways. • Where required channel beds will be stabilised and controlled by using rock riffles or bed logs. The bed and banks up and downstream of the crossing will be protected. • Any hazardous chemicals or fuels and oils will be stored at least 100 metres from drainage lines creeks or rivers to avoid drainage into surface waters. • Refuelling will be undertaken at least 100 metres from drainage lines creeks or rivers, should there be a need to stockpile road construction or landscaping materials, appropriate bunds and drains would be required to be constructed to prevent run-off into drainage lines in the event of heavy rain. • Best practice management guidelines for stormwater management (chapters 7 and 9) as prescribed by the DoE will be followed. • Rehabilitated areas will be contour ripped and other erosion control measures adopted if required so that sediment loss from the site to waterways is minimised. • The requirements of the DoE Water Quality Protection Note: Roads in sensitive environments will be considered.
Objective	Protect waterways by minimising impact.
Location	All project area adjacent to waterways.
Timing	Construction.
Responsible party	Construction contractor/Site Supervisor.

Requirement / Consultation	A permit will be obtained to disturb beds and banks of a waterway from the DoE, under *Rights to Water and Irrigation Act 1914.* An abstraction permit will be obtained from the DoE if the abstraction of surface water is required for construction.

7.9 GROUNDWATER

Commitment	Minimise any impact on groundwater.
Action	• An application will be made for a permit the abstraction of groundwater for project construction and dust suppression purposes.
Objective	Protect groundwater by minimising impact.
Location	Where groundwater is abstracted.
Timing	Construction.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	An abstraction permit will be obtained from the DoE for the abstraction of groundwater.

7.10 PUBLIC WATER SOURCE AREA

No management commitments apply.

7.11 FIRE MANAGEMENT

Commitment	Ensure appropriate fire prevention measures are taken.
Action	• All machinery to have spark arrestors fitted to the exhaust system • All vehicles and plant to be fitted with fire extinguishers. • Water tankers, equipment and personnel trained to fight fires in the work areas, will be provided. • MRWA will ensure that the project conforms to the Local Government Authority, CALM and Bush Fires Board (BFB) requirements for fire prevention.
Objective	Protect project and surrounding areas from fire.
Location	All project areas.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.12 ACID SULPHATE SOILS

No management commitments apply.

7.13 SALINITY

No management commitments apply.

7.14 ABORIGINAL HERITAGE

7.14.1 Aboriginal sites

Commitment	Liaise with DIA and KLC for the satisfactory management of aboriginal significance.
Action	• MRWA has liaised with the KLC regarding the registered Aboriginal Site near the proposed Dunham River Bridge realignment. • MRWA will apply to disturb part of the registered Nganjuwarrm – Dunham River aboriginal heritage site under Section 18 of the *Aboriginal Heritage Act 1972*. • MRWA will liaise with Aboriginal Elders to determine necessary management measures regarding all three realignment. • MRWA will contact DIA immediately if any sites of Aboriginal heritage are found.
Objective	Minimise impacts on sites of aboriginal significance.
Location	Project area
Timing	Construction
Responsible party	Main Roads Project Manager, Construction Manager
Requirement / Consultation	DIA/KLC

7.14.2 Native Title

Commitment	To take into account native title considerations.
Action	• Consultation with the KLC, Bullardong and Bullaruks people prior to construction.
Objective	Ensure native title areas are treated as required.
Location	Project area with areas of native title within or on the boundary of them.
Timing	Prior to construction.
Responsible party	Main Roads WA
Requirement / Consultation	Consultation with the KLC, Bullardong and Bullaruks people prior to construction.

7.15 EUROPEAN CULTURAL HERITAGE

Commitment	Minimise the impact on historical Dunham River crossing (although it is not listed on any heritage register).
Action	• The historical Dunham River crossing site will not be disturbed
Objective	No adverse effects on the historical Dunham River crossing
Location	Dunham River Bridge realignment works.
Timing	During construction.
Responsible party	Construction contractor.
Requirement / Consultation	MRWA

7.16 NOISE, VIBRATION, DUST AND AIR EMISSIONS

Commitment	Minimise the impact of noise, vibration, dust and air emissions during construction.
Action	• Implement noise, vibration and dust minimisation techniques that may include, but not be limited to: • Watering of construction areas, roads, streets and other areas immediately adjacent to works; • Confining works that generate large amounts of dust to non-peak traffic periods; • Providing adequate signage of works in progress. • Standard construction management techniques to minimise air emissions of machinery during construction, such as regular machinery maintenance and inspection.
Objective	No adverse effects on the environment or public from noise, dust or vibration.
Location	All construction works.
Timing	During construction.
Responsible party	Construction contractor.
Requirement / Consultation	MRWA

7.17 VISUAL AMENITY

No management commitments apply.

7.18 CONTAMINATED SITES

Commitment	Minimise the likelihood of site contamination
Action	• Construction equipment will be maintained in good working order and will be checked for leaks on a regular basis. • Regular vehicle servicing shall be undertaken at designated areas, at least 100 m away from watercourses.
Objective	No adverse effects on the environment from hydrocarbon or chemical spills
Location	All construction works.
Timing	During construction.
Responsible party	Construction contractor.
Requirement / Consultation	MRWA

7.19 WASTE MANAGEMENT

Commitment	Manage waste in an approved manner in accordance with Local Government requirements.
Action	• No rubbish shall be burned or buried on site. • Recycle waste materials where possible.
Objective	Manage waste in an environmentally responsible and approved manner.
Location	All project areas where waste is generated.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.20 EQUIPMENT

Commitment	Use and maintain equipment to eliminate the spread of weeds or hydrocarbon spills.
Action	• All vehicles, plant and equipment will be cleared prior to commencement of work on site. • Maintain records of vehicle, plant and equipment inspections. • Ensure all materials imported to site are weed free. • All vehicle servicing to be undertaken in designated areas. These shall be at least 100 metres from any waterway or wetland. • Vehicle refuelling shall be undertaken at least 100 metres from any waterway or wetland. • Prestart checks including presence of leaks or spills shall be undertaken for all equipment and recorded. • All fuels, oils and chemicals are to be stored in accordance with AS1940. • All hydrocarbon contaminated rags, filter cartridges and other material will be returned to the workshop. • These materials will be recycled or disposed of in a manner and at a location approved by the Local Government Authority. • In the event of a spill of fuel, oil or chemical it will be contained, removed and disposed of in a manner and location agreed in writing by the Local Government Authority.
Objective	Minimise the potential for degradation of the environment from spills or contamination.
Location	All vehicles, plant and equipment.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	Local Government Authority

7.21 PUBLIC SAFETY AND RISK

Commitment	Minimise risk to the public associated with the proposed works.
Action	• Implement traffic management and signage to Main Roads Western Australia standards. This may include, but not be limited to: • Maintaining a tidy worksite, which is free of debris; • Installation of appropriate fencing; • The use of rigid barriers and supports where required; • Appropriate signage will be installed.
Objective	Minimise risk to the public associated with proposed works.
Location	All construction works.
Timing	During construction.
Responsible party	Construction contractor.
Requirement / Consultation	Not required.

7.22 EMERGENCY PLANNING

Commitment	Ensure adequate emergency response.
Action	• Maintain an emergency plan and ensure adequate training is provided. • Test emergency plan within one month of project start up and record results. • Maintain material safety data sheets (MSDS) for all chemicals adjacent to where they are stored. • Maintain spill kits on servicing/refuelling vehicles, major plant and within workshops. These will include absorbents and appropriate containers or bags. • Fire extinguishers will be kept on all vehicles and workshops. • Spill kits will be inspected weekly and fire extinguishers six monthly. • Personnel will be inducted in the location and use of spill kits and fire extinguishers.
Objective	Protect personnel and the environment in emergency situations.
Location	Vehicles, plant, equipment, workshops and chemical storage.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.23 ENVIRONMENTAL INCIDENT MANAGEMENT

Commitment	Manage environmental incidents effectively and in a timely manner. Report spills as required. Leave site in clean and tidy condition after completion of site works.
Action	• Immediately report pollution events or other incidents impacting the environment to the DoE (08) 9222 7123 or after hours (free call) 1800 018 800. • Ensure incident reports are produced which include date, time, chemical name, volume, location, area affected, actions taken for clean up and preventative actions. • Clean up all areas and dispose of litter appropriately.
Objective	Leave project area in clean and tidy condition on completion of project. Manage incidents in an effective way which minimises harm to the environment. Meet Legislative requirements for reporting of spills and environmental incidents.
Location	All areas of works.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	Report incidents to the DoE as required.

7.24 DECOMMISSIONING

Commitment	Minimise impact of redundant road and temporary infrastructure works.
Action	• All project and workshop infrastructure will be removed (i.e. buildings) or rehabilitated (i.e. hardstands). • All materials and litter associated with the project will be removed and disposed of appropriately. • The site will be left in a clean and tidy condition after completion of site works. • Redundant sections of road will be rehabilitated and revegetated (Refer to sections 7.3.3 and 7.3.4) • Redundant bridges and floodways will be left in situ.
Objective	Minimise long-term impact of redundant road and temporary infrastructure works by rehabilitating them.
Location	All areas of redundant works (except for floodways and bridges)
Timing	Rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.25 MONITORING, AUDITING AND PERFORMANCE

Commitment	Ensure all above requirements are met through appropriate monitoring and auditing of performance.
Action	• Develop and implement a documented monitoring and auditing schedule. • Maintain a complaints register. • Conduct weekly inspections of construction areas using a checklist and maintain records of inspections.
Objective	Monitor and audit performance to ensure compliance with requirements.
Location	All areas of works.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.26 REPORTING

Commitment	Ensure reporting requirements are met
Action	• Review compliance with requirements and report exceptions fortnightly.
Objective	Ensure all reporting requirements are met.
Location	All areas of works.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

7.27 SOCIAL IMPACT

Commitment	Minimise social impact of works.
Action	• Ensure Great Northern Highway remains open during construction phase. • Road work activity shall be restricted to between 6.00am and 6.00pm. • Dust will be suppressed as detailed in Section 7.16.
Objective	Minimise social impact of works.
Location	Great Northern Highway.
Timing	Construction/rehabilitation/revegetation.
Responsible party	Construction contractor/Site Supervisor.
Requirement / Consultation	None

8 Public consultation

Stakeholder Contacted	Date	Outcome(s)
Environs Kimberley (Ms Maria Mann)	04/2005 and 06/2005	Ms Mann expressed a broad concern about the incremental destruction of habitat in the Kimberley by a variety of land uses and the absence of representation of these habitats in formal reserves. As requested, maps showing the existing and proposed alignments and topography were supplied to Ms Mann. Ms Mann also requested the opportunity to inspect the route as well to be informed of the details of any traditional owner concerns.
SEEKS	06/2005	KBR has attempted to contact SEEKS on Ms Manns advice. Contact has not been made to date.
Native Title Claimants	05/2004	Visit to Dunham River, Telegraph Creek and Fletchers Creek to establish that clearance could not be given for several borrow material search areas at Dunham River and Fletchers Creek. These areas have been removed from potential areas where borrow material would be sourced.

9 Consultation with regulatory stakeholders and approvals obtained

Environmental Attribute	Regulatory Stakeholder Contacted	Date	Outcome(s)
Declared Rare and Priority Flora	Conservation and Land Management (CALM)	11/2004	Identification of potential Declared Rare and Priority Flora within project area (database search).
TEC's	Conservation and Land Management (CALM)	11/2004	Identification of potential threatened ecological communities within project area.
Weed Management	Department of Agriculture Kununurra District Office and head Office	12/2004	Potential of declared plants and environmental weeds were identified in the project area.
Clearing	Department of Environment (DoE) (Sarah McEvoy), MRWA Environment Branch (Paul West), EPA Service Unit (Mark Jefferies)	04/2005, 05/2005 and 06/2005	Guidelines for obtaining clearing permits, grounds for exemptions etc. DoE Native Vegetation Protection Section stated that a clearing permit is not required if the area is included on the purpose permit application. EPA Service Unit recommends that based on the extent of the clearing, consistent with previous determinations that a formal assessment of clearing is required.
Dieback	CALM, Head Office and Kununurra Regional Office	05/2005	Kevin Veer and Abe Van der Sande advised that no dieback was present in the project area.
Fauna	Conservation and Land Management (CALM), DEH Phil Hambley	11/2004, 06/2005 & 07/2005, 10/2005	Identification of rare fauna in project area. Correspondence with Gordon Graham identified an area of known Gouldian Finch habitat. The area where the Gouldian Finch was identified has been removed from the proposal area. Fauna survey conducted to confirm the presence of rare fauna species and habitat, survey concluded that there is potential habitat present but it is highly unlikely Gouldian Finch are breeding in the sites. Consider secondary impacts (i.e. noise) on Gouldian Finch. No habitat for other rare species present in the study area. Project does not require referral to the DEH.
Reserves and Conservation Areas	MRWA, Department of Industry and Resources Tengraph database, Department for Planning and Infrastructure (DPI), Department of Land and Information (DLI), CALM and the Public Transport Authority (PTA).	11/2004	Identification of all relevant reserves in the project area (from database searches).
Surface Hydrology and Wetlands	Department of Environment (DoE), Head Office, Kununurra Office	05/2005	Mike Brainbridge advised that no waterways impacted by proposed works have special conservation status. Identification of issues specifically relating to floodway and bridge sites, including requirements pertaining to the RIWI Regulations. Permits to disturb bed and banks will be required.
Groundwater	Department of Environment (DoE), Head Office, Kununurra Office	05/2005	Conversation with Eugene Chee identified groundwater background research and issues for project area.
Public Water Source Area	Department of Environment (DoE)	05/2005	Conservation with Eugene Chee and George Goulsham identified no Public Water Source Areas in the project area.

Environmental Attribute	Regulatory Stakeholder Contacted	Date	Outcome(s)
Acid Sulphate Soils	Department of Environment (DoE) Kununurra Office, Dept of Agriculture Kununurra Office	05/2005	No specific data was available for project area. Leith Bowyer advised that no ASS is believed to be present in area.
Salinity	Dept of Agriculture Kununurra, DoE Kununurra	05/2005	Paul DeValley did not identify any salinity issues in project area.
Aboriginal Heritage			
Aboriginal Sites	Department of Indigenous Affairs (DIA)	11/2004	Aboriginal heritage database search identified Dunham river site. MRWA undertook consultation with Native Title Claimants and removed several Material Search areas from proposal at Dunham River and Fletchers Creek.
Native Title	National Native Title Tribunal (NNTT), DIA	11/2004	NNTT database search.
Cultural Heritage	Heritage Council of WA, National Trust of Australia (WA), Australian Heritage Commission	11/2004	Identification of European heritage sites within project area (database search)
Noise, Vibration and Dust	MRWA	11/2004	Conversation with the MRWA Project Manager to obtain noise, vibration and dust information associated with the project.
Public Safety and Risk	MRWA	11/2004	Obtained information on traffic management guidelines for construction works.
Contaminated Sites	DoE	11/2004	No known contaminated sites were identified in the project area.

10 Recommendations

10.1 GENERAL

The proposed works associated with the upgrade of the Great Northern Highway between Halls Creek and the Victoria Highway Turnoff have been assessed as having a minor impact upon environmental factors investigated in this study, conditional on the implementation of a construction environmental plan, the findings of a fauna survey and recommendations of the EPA with regard to Aboriginal Heritage Sites.

No species of Declared Rare of Priority Flora (DRF) or threatened ecological communities were identified in databases searches within the project area. Several Priority species were identified in databases and in the flora survey, though there is no legislative requirement for the avoidance of these species. Provision for the protection of Priority Flora species is recommended to be specified in the construction EMP.

Numerous rare fauna species were identified in EPBC Register searches. A fauna survey was conducted to identify if habitat or species are present within the project area. The survey concluded that it is highly unlikely that the Gouldian Finch is breeding in the study area but could use any of the sites for foraging. The survey also concluded that the other species identified are highly unlikely to occur in the vicinity of any of the study sites are not likely to be present due to the absence of suitable habitat. Additionally, given that the proposed works are primarily confined to three bridge sites and associated diversions, the impact can be effectively managed by fauna protection measures specified in a construction EMP. The need for referral to the EPA and to the DEH is not required for this factor as the report indicates that with the exception of the Gouldian Finch threatened species are highly unlikely to be present in the project area. A number of management commitments have been made to minimise the project's impact on the Gouldian Finch.

One registered Aboriginal Heritage Sites were identified within the project area. MRWA commissioned an aboriginal heritage impact assessment for the Dunham River, Telegraph Creek, Fletchers Creek and Aboriginal Heritage issues and revised the borrow pit search areas at Dunham River and Fletcher's Creek in response to the feedback obtained.

The management of short term environmental impacts that will arise in the construction phase are to be addressed in a construction EMP addressing those relevant requirements which are specified in this document.

10.2 REFERRAL TO THE ENVIRONMENTAL PROTECTION AUTHORITY

This Preliminary Environmental Impact Assessment identifies the following potential triggers requiring formal referral of the project to the EPA under the *Environmental Protection Act 1986* (Main Roads Environmental Guideline Environmental Assessment and Approval, 2002):

1. Disturbance of either of the two aboriginal heritage sites located within the vicinity of proposed works at Dunham River Bridge.
2. Presence of Rare Fauna
3. Extent of clearing.

10.2.1 Aboriginal Heritage

Two aboriginal Heritage Sites were identified in a DIA database search. The disturbance of the registered Nganjuwarrm – Dunham River aboriginal heritage site and the disturbance of this is a trigger for formal referral to the Environmental Protection Authority (EPA). An application to disturb part of this site will be made under Section 18 of the *Aboriginal Heritage Act 1972.*

MRWA commissioned the Aboriginal Heritage consultation and in response to this consultation regarding the potential borrow material search areas and have reduced the borrow pit material search areas in the Dunham River and Fletchers Creek sites to avoid those areas where clearance was not given by the Native Title claimants.

Consultation with the DIA has indicated that further advice should be sought from the DIA Heritage Consultant for the Fitzroy Crossing Region to provide guidance on the type of information necessary for a referral under the *Environmental Protection Act* 1986. The Heritage Consultant for the East Kimberley region is Madge Schwede, Perth DIA office.

10.2.2 Presence of Rare Fauna or Flora

A number of Declared Rare and Priority Flora were identified in CALM databases searches, though none of the Priority Species were identified in the Flora Survey. The presence of Priority species do not require referral to the EPA only consultation with CALM. To date only one priority flora species has definitely been recorded in the area. A number of rare fauna species were identified in the project area in the Federal EPBC and in the CALM database searches. Consultation with CALM identified the presence of Gouldian Finch habitat and nesting sites in the area. Based on this information, the Gouldian Finch nesting sites have been excluded from the area of proposed works.

A fauna survey was commissioned to verify the presence/absence of these species within the area of proposed works. If any rare fauna species listed under the *Environmental Protection Act 1986* are identified, referral to the EPA for rare fauna is likely to be required. However, given the known area of Gouldian Finch nesting site has been excluded from the area of proposal, referral is not required based on the available information.

10.2.3 Area of clearing

The extent of clearing has been identified by the EPA Service Unit as a likely trigger for referral. This appears to be the only issue which triggers referral as the two other potential triggers are well managed. Other relevant factors which are likely to be of interest to the EPA Service Unit have been addressed by this report.

10.3 REFERRAL TO THE DEPARTMENT OF THE ENVIRONMENT AND HERITAGE

A search of the EPBC Register identified vulnerable, endangered and migratory fauna species in the project area. A fauna survey was commissioned to verify the presence of these species and concluded that it was highly unlikely that the species identified are present within the project area. The proposed works are primarily confined to two floodways and one bridge site and associated realignments and the impact on all EPBC listed and other species is likely to be effectively managed by fauna protection measures specified in a construction EMP.

The Gouldian Finch, is a listed Endangered species under the *Environmental Protection and Biodiversity Conservation Act 1999*.

EPBC searches also located the proposal within the catchment of two Ramsar Wetlands, Lake Argyle/Lake Kununurra, and the Ord River Floodplain. Initial consultation with the DEH indicated that as the proposed works are located on the boundaries of these catchments and are of a minor scale, formal referral to the DEH is not likely to be required on these grounds (*pers. comm.* Phil Hambley DEH*)*. The DEH's primary issue of concern was erosion from site impacting on river systems. This issue can be readily managed by minimising clearing areas and rehabilitation of cleared areas prior to commencement of wet season. Subsequent consultation with the DEH suggested that referral may be warranted depending on secondary impacts of project (i.e. noise) on the Gouldian Finch) (*pers. comm.* Phil Hambley DEH*)*. As areas of known and potential Gouldian Finch nesting sites have been excluded from the project area it has been determined that the project is a not a controlled action and therefore referral is not required for this species and

10.4 PERMITS FROM THE DEPARTMENT OF ENVIRONMENT

A number of permits will be required to be obtained from the DoE, under the *Rights in Water and Irrigation Act 1914*. This will include a permit for the disturbance of beds and banks for the proposed works at Fletchers Creek, Telegraph Creek and Dunham River, as well as a permit for the abstraction of groundwater for construction and dust suppression purposes.

As long as the purpose permit application currently with the DoE includes the areas of proposed works a permit to clear native vegetation is not required (Sarah McEvoy, pers. comm.). Note that this purpose permit will need to be approved by the DoE before clearing can commence.

10.5 SPECIFIC RECOMMENDATIONS

Specific recommendations for the upgrade of the Great Northern Highway between Halls Creek and the Victoria Highway Turnoff are as follows:

- MRWA will ensure that a fauna survey is conducted to verify presence of rare fauna identified in desktop analysis (including the Gouldian Finch) and assess the potential impact of the proposal on fauna species;
- An application to disturb part of the Nganjuwarrm – Dunham River aboriginal heritage site will be made under Section 18 of the *Aboriginal Heritage Act 1972*.

- MRWA does not need to make an application for a permit to clear native vegetation to the DoE Native Vegetation Protection Unit for the clearing which is required as part of the bridge, floodways and road realignment works as long as it is within the scope of the purpose permit application which MRWA has submitted to DoE;
- MRWA will ensure that permits are obtained from the Department of Environment for the modification of beds and banks for all waterways where construction is planned;
- MRWA will apply for permits for the abstraction of groundwater and surface water where this is required for construction and dust suppression;
- MRWA will consider the measures for the protection and preservation of beds and banks as specified in the DoE Water Quality Protection Note, Roads in Sensitive Environments in detailed design;
- MRWA will refer this project to the EPA for assessment due to the extent of the area of clearing;
- Referral to the DEH is not required based on the results of the fauna survey, whereby it was concluded that it is highly unlikely that the Freshwater Sawfish, Purple-crowned Fairy-wren or the Painted Snipe occur within the vicinity of the project area due to lack of habitat. And although the Gouldian Finch may use any of the sites for foraging, it is highly unlikely to be nesting on most sites. Those sites where nesting is known to or may occur have been excluded from the project area;
- Consultation with local communities is undertaken to notify them of MRWA's upgrade and realignment proposal, and to receive feed back on concerns/other issues;
- Consultation with the Main Roads Environment Branch will be undertaken to ensure that the purpose permit which includes clearing associated with this project is obtained prior to commencement of works.

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and Fletcher's Creek along the Great Northern Highway as part of the 7 Bridges Project.

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Appendix A

CALM DRF, RARE FAUNA AND TEC SEARCH RESULTS

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
DECLARED RARE AND PRIORITY FLORA LIST
19 July 2004

SPECIES / TAXON	CONS CODE	CALM REGION	DISTRIBUTION	FLOWER PERIOD
Eucalyptus ceracea	R	K	NW of Wyndham, King George River	Aug-Nov
Fimbristylis sieberiana	3	P,K	Hamersley Range, Millstream, Fitzroy Crossing, King Leopold Range, Halls Creek, Little Sandy Desert	-
Goodenia brachypoda	1	K	Carlton Hill, Wyndham, Augustus Is	Sep
Goodenia crenata	3	K	Tanami Desert, Glass Hill, Bedford Downs Stn, Ellenbrae, Nicholson, Halls Creek, Slately Creek	May-Jul
Goodenia lunata	1	K	Halls Creek	Jul
Paspalidium retiglume	2	K,P	Halls Creek, Chichester Range	
Trachymene dusenii	3	K,*	Halls Creek, Springvale Stn, Northern Territory	
Trachymene oleracea subsp. sedimenta	1	K	Napier Range, Wyndham	May
Trianthema kimberleyi	1	K	Fitzroy Crossing - Halls Creek (Christmas Creek Station)	Mar
Triumfetta rubiginosa	2	K	Prince Regent River Reserve, Wyndham	Aug

Hi Crispin

I refer to your request of 3rd December 2004 for information on threatened ecological communities occurring within the following search boundary: -16.1133406, 128.3533333 and -16.1912133, 128.40427088. Please ensure that the coordinates are provided in decimal degrees for future searches.

A search was undertaken for this area of the Department's Threatened Ecological Communities database. Please note that there are no known occurrences of threatened ecological communities recorded within this boundary.

Attached also are the conditions under which this information has been supplied. The information supplied should be regarded as an indication only of the threatened ecological communities that may be present.

It would be appreciated if any occurrences of threatened ecological communities encountered by you in the area could be reported to this Department to ensure their ongoing management.

An invoice for $110 (including GST) for the supply of this information will be forwarded.

Regards

Melissa

Melissa Hoskins
WA Threatened Species and Communities Unit
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Christine Freegard christinef@calm.wa.gov.au

Crispin Underwood
KBR (Kellogg Brown & Root) Pty Ltd
PO Box 7779
CLOISTER SQUARE WA 6850

Dear Mr Underwood

REQUEST FOR THREATENED FAUNA INFORMATION

I refer to your request of 9 December for information on threatened fauna occurring in the vicinity of the Great Northern Hwy between Wyndam and Halls Creek.

A search was undertaken for this area of the Department's Threatened Fauna database, which includes species which are declared as '*Rare or likely to become extinct* (Schedule 1)', '*Birds protected under an international agreement* (Schedule 3)', and '*Other specially protected fauna* (Schedule 4)'. Attached are print outs from these databases where records were found.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the sixth point that refers to the requirement to undertake field investigations for the accurate determination of threatened fauna occurrence at a site. The information supplied should be regarded as an indication only of the threatened fauna that may be present.

An invoice for $150.00 (plus GST), being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of threatened fauna encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss threatened fauna management, please contact my Senior Zoologist, Dr Peter Mawson on 08 93340421.

Yours sincerely

……
for Keiran McNamara
EXECUTIVE DIRECTOR

10 December, 2004

16.02 °S 127.39 °E / 18.22 °S 128.87 °E Great Northern Hwy S of Wyndham & N of Halls Creek

*	Date	Certainty	Seen	Location Name	Method

Schedule 1 - Fauna that is rare or is likely to become extinct

Erythrotriorchus radiatus — Red Goshawk — *1 records*

A rare inhabitant of well-wooded country, this species nests in large trees and preys largely on birds but also on reptiles and mammals.

1992	2	1	Lake Argyle	

Rostratula benghalensis australis — Australian Painted Snipe — *2 records*

A rare summer visitor to the watered areas of the north-west and swamps on the Swan Coastal Plain.

1991	1	3	Saw Ranges	Day sighting
1996	1	1	Kingston Rest	Day sighting

Erythrura gouldiae — Gouldian Finch — *6 records*

This species of finch inhabits savanna woodlands around permanent waters and has declined dramatically across its range.

1989	1	1	Purnululu National Park	Day sighting
1995	1	1	Durack River	Day sighting
1996	1	6	Saw Ranges	Day sighting
2000	1	2	Argyle Diamond Mine	Day sighting
2001	1	3	Argyle Diamond Mine	
2001	1	4	Argyle Diamond Mine	

Mouldingia orientalis — Mouldingia orientalis — *2 records*

Inhabits limestone hillocks west of Lissadel Homestead. The former range is thought to have been significantly reduced by the flooding of the Ord River valley to form Lake Argyle.

1996	1		Lissadel
1996	1		Lissadel

Schedule 4 - Other specially protected fauna

Falco peregrinus — Peregrine Falcon — *10 records*

This species is uncommon and prefers areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land.

1989	1		Purnululu National Park	Day sighting
1989	1		Purnululu National Park	Day sighting
1989	1		Purnululu National Park	Day sighting
1989	1		Purnululu National Park	Day sighting
1999	1	2	Kingston Rest	Day sighting
2000	1	2	Argyle Diamond Mine	
2000	1	4	Argyle Diamond Mine	
2001	1	1	Argyle Diamond Mine	
2002	1	1	Purnululu National Park	
2003	1	1	Argyle Diamond Mine	

Tadorna radjah rufitergum — Burdekin Duck — *1 records*

This uncommon species inhabits freshwater lagoons and river pools and occurs along the middle and lower Ord River.

1998	1	1	Argyle Diamond Mine	Day sighting

Crocodylus johnstoni — Freshwater Crocodile — *1 records*

This species is generally confined to permanent freshwater rivers, lagoons and billabongs and lays its eggs in sandbanks.

16.02 °S 127.39 °E / 18.22 °S 128.87 °E Great Northern Hwy S of Wyndham & N of Halls

*	*Date*	*Certainty*	*Seen*	*Location Name*	*Method*
	2000	1	6	Argyle Diamond Mine	Day sighting

Priority One

0 records

Priority Two

0 records

Priority Three

Petropseudes dahli **Rock Ringtail Possum** *2 records*

This species lives exclusively in rocky outcrops preferring areas with deeply fissured rock and large boulders.

1989	1	1	Osmand Valley	
1989	1	0	Purnululu National Park	Scats

Wyulda squamicaudata **Scaly-tailed Possum** *1 records*

This species of possum lives in rugged rocky country often associated with rainforest patches.

1917	1	1	Violet Hill	Caught or trapped

Prymnbriareus nimberlinus **Prymnbriareus nimberlinus** *1 records*

This species of land snail is known to occur on El Questro Station.

1988	1		Durack Range	

Priority Four

Hydromys chrysogaster **Water-rat (Rakali)** *1 records*

This species occurs in waterways and wetlands that support its main prey items such as molluscs and crustaceans.

1989	1		Texas Downs	

Leggadina lakedownensis **Lakeland Downs Mouse (Kerakenga)** *11 records*

This secretive species is known to occur in the Pilbara and the Kimberley. Its populations rise and fall dramatically, probably in response to climatic fluctuations and availability of seeds.

2000	1	6	Argyle Diamond Mine	Caught or trapped
2000	1	12	Argyle Diamond Mine	Caught or trapped
2000	1	1	Argyle Diamond Mine	Caught or trapped
2000	1	2	Argyle Diamond Mine	Caught or trapped
2000	2	1	Argyle Diamond Mine	Caught or trapped
2000	1	1	Argyle Diamond Mine	Caught or trapped
2003	1	3	Argyle Diamond Mine	
2003	1	1	Argyle Diamond Mine	
2003	1	9	Argyle Diamond Mine	
2003	1	3	Argyle Diamond Mine	
2003	1	2	Argyle Diamond Mine	

16.02 °S 127.39 °E / 18.22 °S 128.87 °E Great Northern Hwy S of Wyndham & N of Halls

*	Date	Certainty	Seen	Location Name	Method
Falco hypoleucos				**Grey Falcon**	*4 records*
A nomadic species inhabiting lightly timbered riverine plains.					
	1989	1		Purnululu National Park	Day sighting
	1989	1		Purnululu Conservation Reserve	Day sighting
	1989	1		Texas Downs	Day sighting
	1989	1		Purnululu National Park	Day sighting
Ardeotis australis				**Australian Bustard**	*7 records*
This species is uncommon and may occur in open or lightly wooded grasslands.					
	1989	1		Purnululu National Park	Day sighting
	1989	1		Purnululu Conservation Reserve	Day sighting
	1989	1		Purnululu National Park	Day sighting
	1998	1	81	Kingston Rest	Day sighting
	2003	1	1	Argyle Diamond Mine	
	2003	1	1	Argyle Diamond Mine	
	2003	1		Argyle Diamond Mine	
Burhinus grallarius				**Bush Stonecurlew**	*2 records*
A well camouflaged, ground nesting bird which prefers to 'freeze' rather than fly when disturbed. It inhabits lightly timbered open woodlands.					
	1989	1		Purnululu National Park	
	1999	1		Kingston Rest	Heard
Phaps histrionica				**Flock Bronzewing**	*1 records*
This species is gregarious and occurs in treeless or sparsely wooded grassy plains within reach of open water.					
	1986	1	10		Day sighting
Heteromunia pectoralis				**Pictorella Mannikin**	*8 records*
	1989	1		Purnululu National Park	Day sighting
	1989	1		Purnululu National Park	Day sighting
	1989	1		Purnululu National Park	Day sighting
	1989	1		Purnululu National Park	Day sighting
	1996	1		Saw Ranges	Day sighting
	2003	1	2	Argyle Diamond Mine	
	2003	1	10	Argyle Diamond Mine	
	2003	1	11	Argyle Diamond Mine	
Malurus coronatus coronatus				**Purple-crowned Fairy-wren (western**	*4 records*
This subspecies is found in riverine habitats but has become very rare in the Kimberley.					
	1971	1	8		
	1980	1		Marella Gorge	Day sighting
	2000	1	1	Purnululu National Park	
	2001	1		Lake Argyle	

16.02 °S 127.39 °E / 18.22 °S 128.87 °E Great Northern Hwy S of Wyndham & N of Halls

*	*Date*	*Certainty*	*Seen*	*Location Name*	*Method*

Neochima ruficauda subclarescens **Star Finch (western)** *6 records*

A nomadic species inhabiting grasslands and eucalypt woodlands near water.

1996	1		Saw Ranges	Day sighting
1999	1	100	Kingston Rest	Night sighting
1999	1		Kingston Rest	Day sighting
2001	1	6	Argyle Diamond Mine	
2003	1	2	Argyle Diamond Mine	
2003	1	5	Argyle Diamond Mine	

Priority Five

0 records

***** Information relating to any records provided for listed species:-
Date: date of recorded observation
Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.
Seen: Number of individuals observed.
Location Name: Name of reserve or nearest locality where observation was made
Method: Method or type of observation

Appendix B

EPBC REGISTER SEARCH RESULTS

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

8 June 2005 14:11

EPBC Act Protected Matters Report

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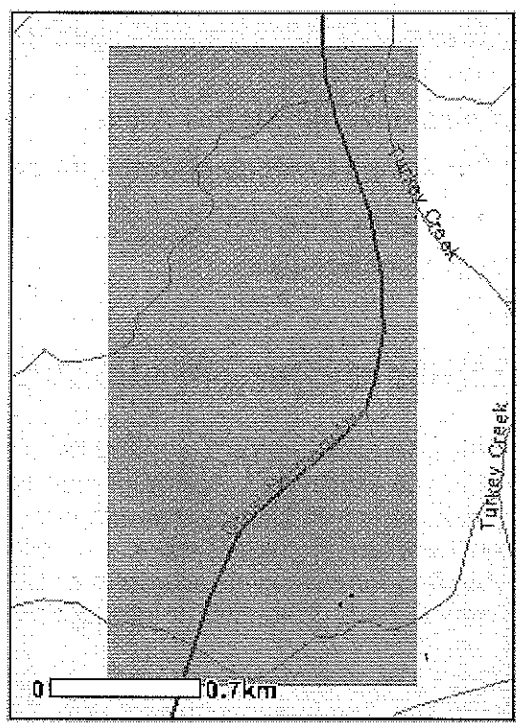

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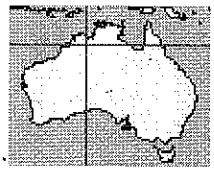

Summary

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.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	2
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	4
Migratory Species:	6

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.

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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.

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http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	11
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:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information]
(Ramsar Sites)

LAKE ARGYLE AND LAKE KUNUNURRA	Within same catchment as Ramsar site
ORD RIVER FLOODPLAIN	Within same catchment as Ramsar site

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Erythrura gouldiae Gouldian Finch	Endangered	Species or species habitat may occur within area
Malurus coronatus coronatus Purple-crowned Fairy-wren (western)	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Sharks		
Pristis microdon * Freshwater Sawfish	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Erythrura gouldiae Gouldian Finch	Migratory	Species or species habitat may occur within area

Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area

Migratory Wetland Species

Birds

Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	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		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
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
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly marine area	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area

Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile	Listed	Species or species habitat may occur within area

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. Environment Australia 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.

Last updated:

Department of the Environment and Heritage
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

8 June 2005 14:03

EPBC Act Protected Matters Report

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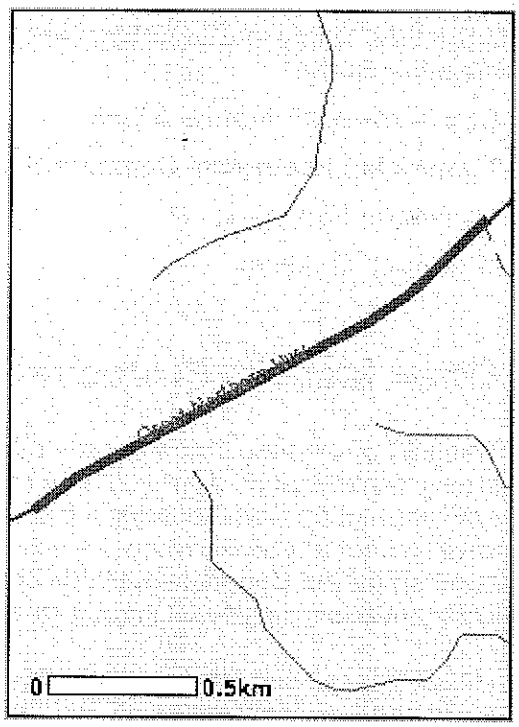

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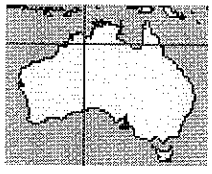

Summary

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Migratory Species:	7

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Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

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Migratory Marine Species		
Reptiles		
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- 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

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- New South Wales National Parks and Wildlife Service
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- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
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- 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.

Last updated:

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GPO Box 787 Canberra ACT 2601 Australia

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Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

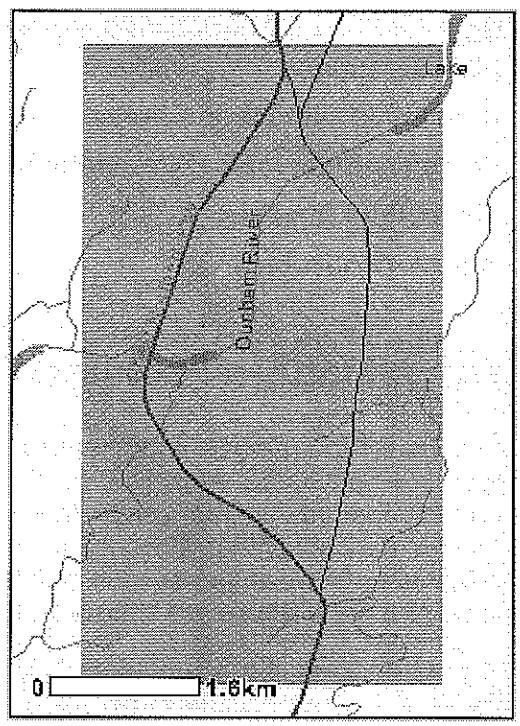
8 June 2005 13:55

EPBC Act Protected Matters Report

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.

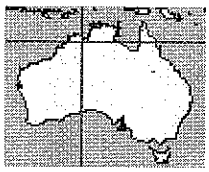
The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html



Search Type: Area

Buffer: 0 km

Coordinates: -16.12358,128.35908, -16.18707,128.35908, -16.18707,128.39443, -16.1235,128.39443



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.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	2
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	4
Migratory Species:	10

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.deh.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.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	14
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:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information]
(Ramsar Sites)

LAKE ARGYLE AND LAKE KUNUNURRA	Within same catchment as Ramsar site
ORD RIVER FLOODPLAIN	Within same catchment as Ramsar site

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Erythrura gouldiae Gouldian Finch	Endangered	Species or species habitat may occur within area
Malurus coronatus coronatus Purple-crowned Fairy-wren (western)	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Sharks		
Pristis microdon * Freshwater Sawfish	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Coracina tenuirostris melvillensis Melville Cicadabird	Migratory	Species or species habitat may occur within area

Erythrura gouldiae Gouldian Finch	Migratory	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow	Migratory	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Species		
Reptiles		
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Migratory	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
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
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly marine area	Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole	Listed - overfly marine	Species or species habitat may occur within area

	area	
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile	Listed	Species or species habitat may occur within area
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Listed	Species or species habitat likely to occur within area

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.

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

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Last updated:

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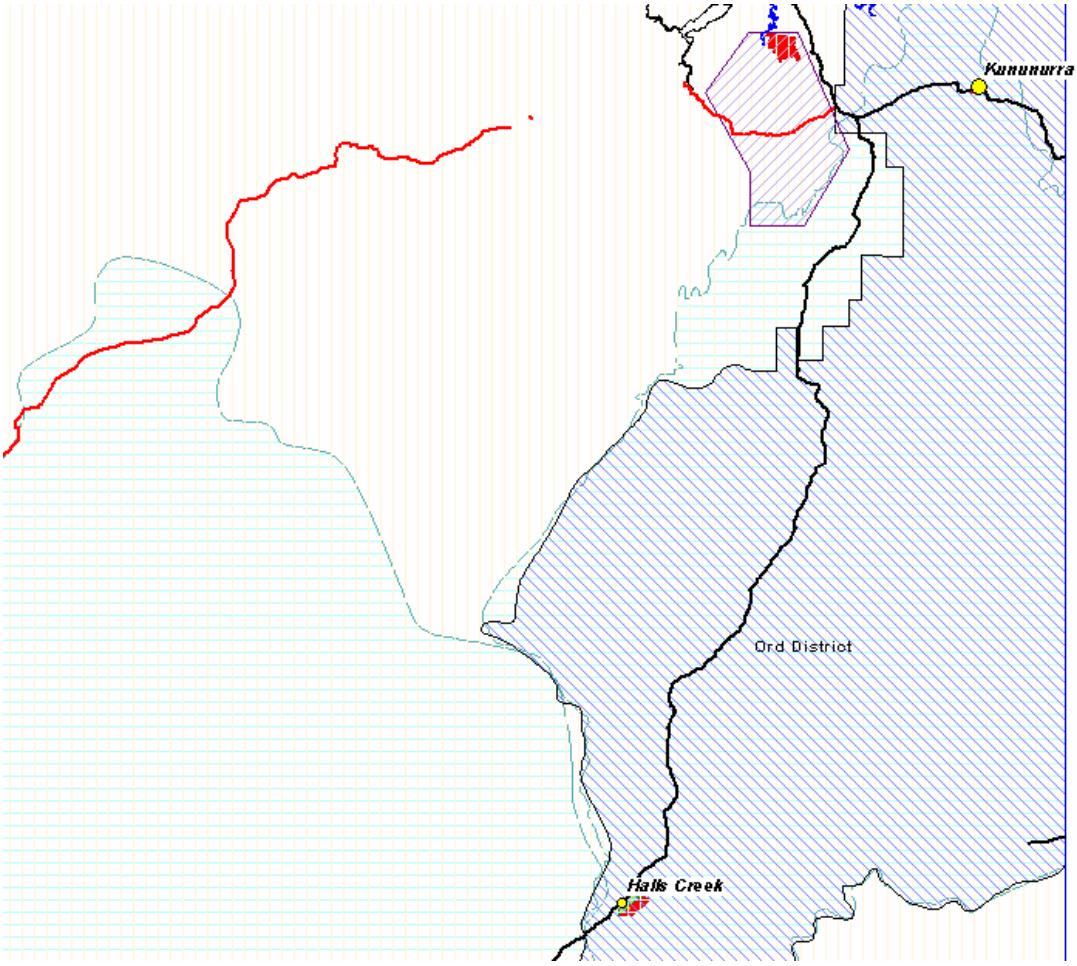
Appendix C

RIGHTS IN WATER AND IRRIGATION AREAS

Proclaimed areas under the Rights in Water and Irrigation Act 1914.

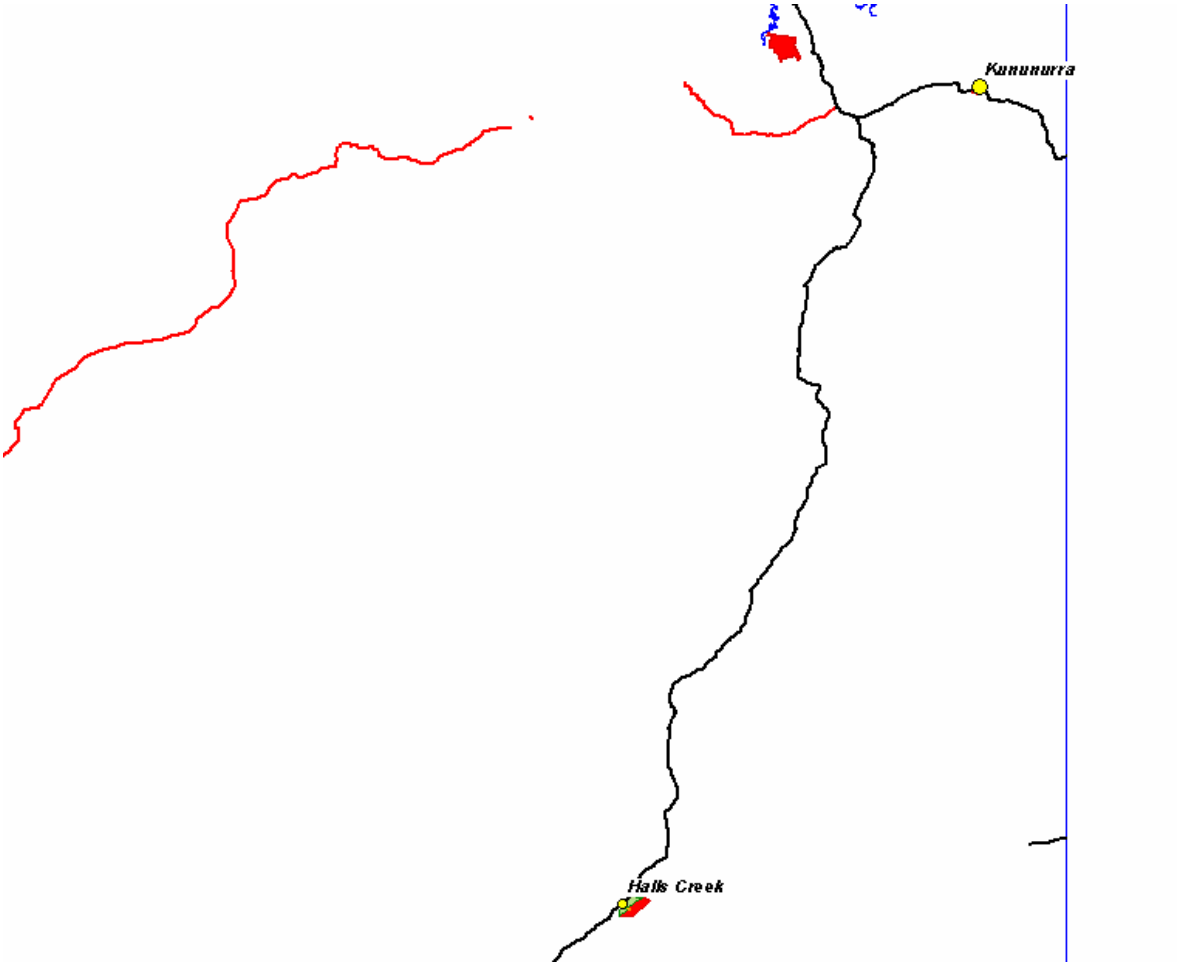


- Major Town/City (>5000)
- Town (>500)
- Highway
- Main Road
- WA Coastline - DoE
- RiWI Act, Surface Water Areas - WRC 18/10/02
- RiWI Act, Irrigation Districts - WRC 13/3/02
- Plan in preparation.
- RiWI Act, Areas - WRC 05/04/02
- Policy Use - P1
- Policy Use - P2
- Policy Use - P3

Appendix D

PUBLIC DRINKING WATER SUPPLY AREAS

Public Drinking Water Source Areas shown in red and green. There is one located at Moochalabra and another at Halls Creek.



Appendix E

ABORIGINAL HERITAGE - DIA REGISTER SEARCH RESULTS

Department of Indigenous Affairs
Government of Western Australia

REGISTER OF ABORIGINAL SITES

Reference No: RPGSR 142479

Search Criteria

MGA Coordinates (Zone 52)
Easting: 430850 Northing: 8218413
Easting: 436322 Northing: 8218413
Easting: 436322 Northing: 8209815
Easting: 430850 Northing: 8209815

Disclaimer

Aboriginal sites exist that are not recorded on the Sites Register, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Legend

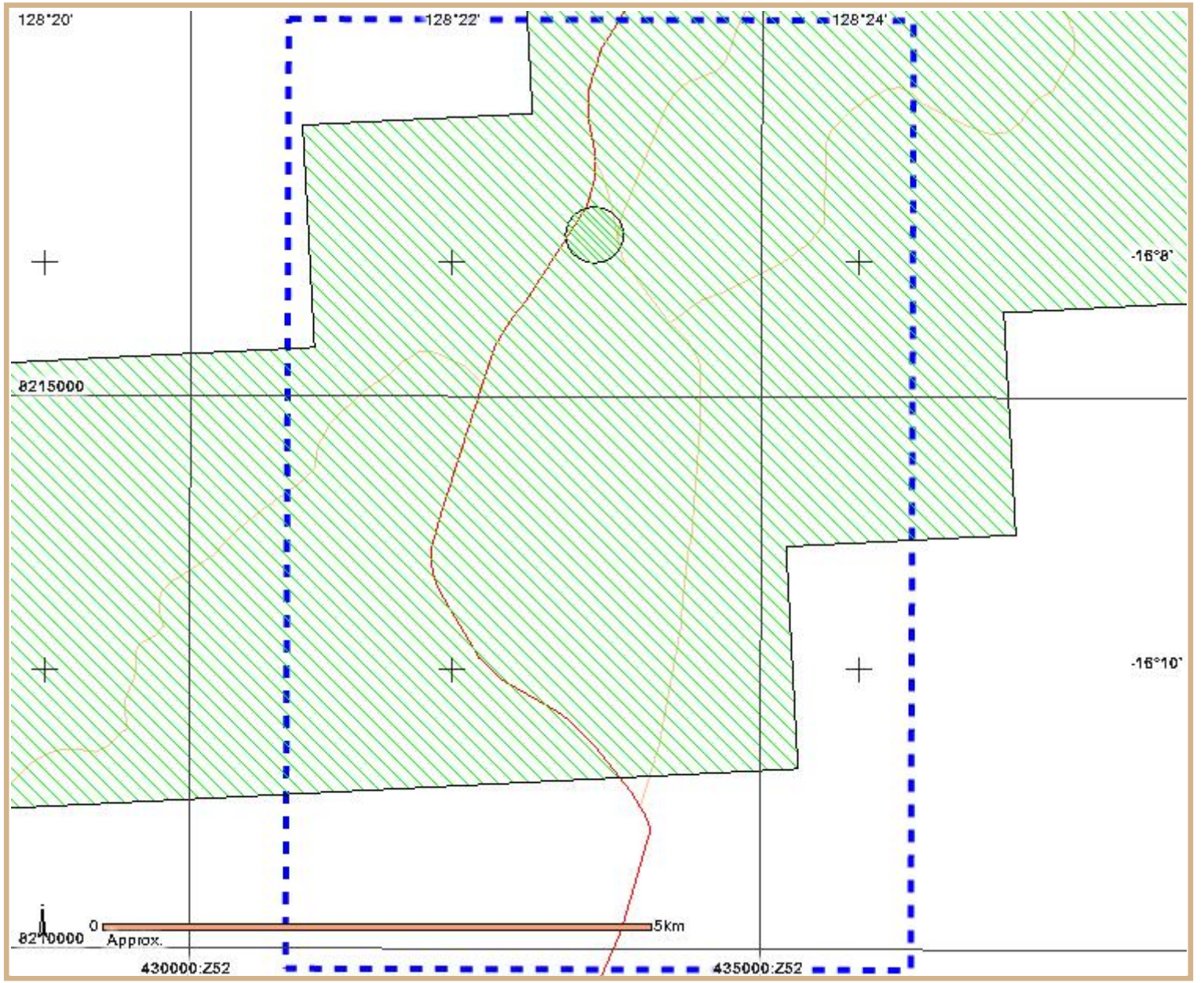
Restriction	Status	Access
N No Restriction	I Interim Register	C Closed
M Male Access Only	P Permanent Register	O Open
F Female Access Only	S Stored Data	V Vulnerable

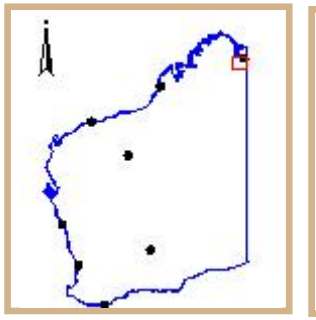
Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

Reliable – The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
Unreliable – The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
12452	I	O	N	DUNHAM RIVER FORD	Artefacts / Scatter			-16.1311 S / 128.3784 E, 433534mE 8216465mN Zone 52 [Reliable]	K02756
15152	P	C	N	NGANJUWARRM - DUNHAM RIVER	Ceremonial, Mythological, Repository / cache, Modified Tree, Painting, Engraving, Quarry, Artefacts / Scatter	Ochre	*Registered Informant names available from DIA.	-15.9699 S / 128.5075 E, 447298mE 8234335mN Zone 52 [Reliable]	K02923

REGISTER OF ABORIGINAL SITES
SITE SEARCH MAP





Legend

- Selected Site
- Town
- Map Area
- Search Area

2 Aboriginal Heritage Sites found in Polygon

MGA Coordinates (Zone 52)
Easting: 430850 Northing: 8218413
Easting: 436322 Northing: 8218413
Easting: 436322 Northing: 8209815
Easting: 430850 Northing: 8209815

Appendix F

NATIVE TITLE - NNTT SEARCH RESULTS

SEARCH RESULTS

Prepared for Kellogg Brown and Root Pty Ltd

Geospatial Job: 2004/3129

Search Area: Great Northern Hwy within an area defined by coordinates.

Requested by: Crispin Underwood

Date: 16 December 2004

DISCLAIMER

This information product has been created to assist in understanding the spatial characteristics and relationships with native title matters and is intended as a guide only. Spatial data used has been sourced from the relevant custodians in each jurisdiction. The Registrar, the National Native Title Tribunal and its staff and officers and the Commonwealth, accept no liability and give no undertakings, guarantees or warranties concerning the accuracy, completeness or fitness for purpose of the information provided.

NOTES FOR INTERPRETING THE RESULTS

The search is based on the external boundary of the application or agreement. To determine whether any search area is subject to claim, determination or agreement, you need to refer to the accompanying extracts and associated documents. An "*explanation of terms*" follows the search results.

Results of spatial analysis as at 20 December 2004

Register of Native Title Claims

Search Area	Tribunal Number	Fed Court Number	Name	Reg Test Status	Registration Date
Great Northern Hwy	WC94/011	WG6007/98	Purnululu	Accepted	27/03/1995
Great Northern Hwy	WC99/044	WG6182/98	Malarngowem	Accepted	04/02/2000

Note – both of these application boundaries either overlap or run along side the Great Northern Hwy (see diagram below).

Schedule of Applications - Federal Court

Search Area	Tribunal Number	Fed Court Number	Name	Application Type	Reg Test Status
Great Northern Hwy	WC94/011	WG6007/98	Purnululu	Claimant	Accepted
*Great Northern Hwy	WC97/079	WG6199/98	Jiddingarri	Claimant	Not Accepted
Great Northern Hwy	WC99/044	WG6182/98	Malarngowem	Claimant	Accepted

* Note – WC97/79 is within the area defined by the coordinates; however its western boundaries do not come within 18kms of the Great Northern Hwy (see diagram below).

There is **NO** overlap with any determination of native title as per the **National Native Title Register**.

There is **NO** overlap with any registered indigenous land use agreements as per the **Register of ILUAs**.

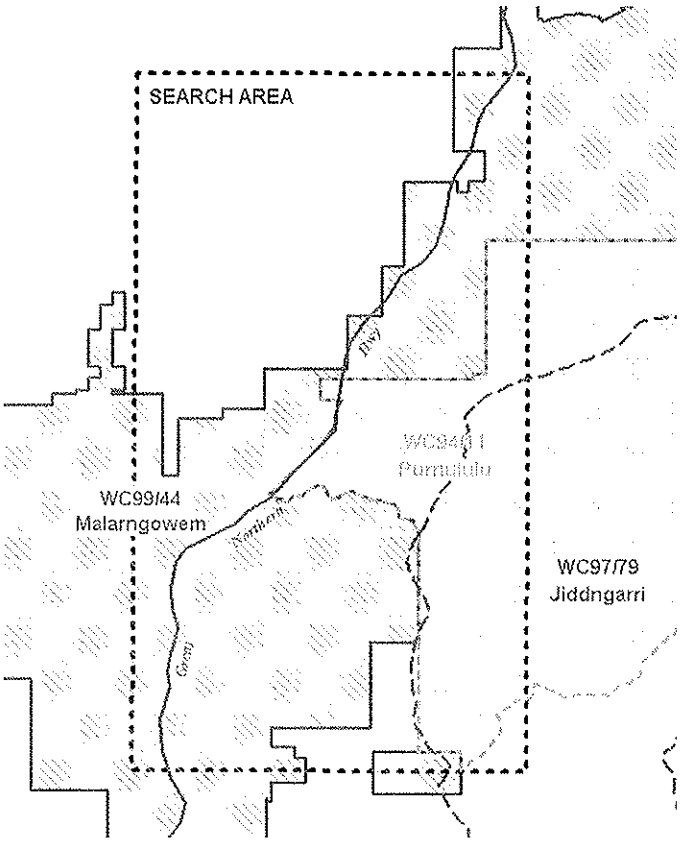
There is **NO** overlap with any indigenous land use agreements **notified (but not registered)** by the Tribunal.

Representative Aboriginal and Torres Strait Islander Body Area

Search Area	% of Area within RATSIB Area	Name
Great Northern Hwy	100.00	Kimberley Land Council Aboriginal Corporation

Local Government Area

Search Area	% of Area within LGA	Name
Great Northern Hwy	78.33	Shire of Halls Creek
Great Northern Hwy	21.67	Shire of Wyndham-East Kimberley



DATA STATEMENT

Prepared by Geospatial Services, National Native Title Tribunal.

Spatial analysis based on native title boundary data compiled by the National Native Title Tribunal or sourced from the Land Claims Mapping Unit (DLI, WA) data set. Attribution maintained by NNTT.

Non Freehold data sourced from Dept of Land Information, WA (May 2003).

EXPLANATION OF TERMS

National Native Title Register (NNTR)	Contains determinations of native title where native title does and does not exist in a particular area of land or waters.
Register of Native Title Claims (RNTC)	Contains claimant applications which have passed the Registration Test and those applications filed before 30/09/1998 that are still undergoing the Registration Test.
Schedule of applications – Federal Court	Contains active applications and non finalised determinations before the Federal Court.
Register of ILUAs	Contains indigenous land use agreements (ILUAs) that have been accepted for registration
Notified applications for indigenous land use agreements	Contains applications for ILUAs which have been notified but not yet registered
Area (sq km)	Total area of the Search Area (in sq km)
Tribunal Number	National Native Title Tribunal reference number (including identifier to record part applications)
Fed Court Number	Federal Court reference number
Name	Application or agreement name
Determination Date	Date on which the determination was made
Registration Date	Date on which the application was first placed on the Register of Native Title Claims with regard to its current 'registered' status or date on which an ILUA was registered
Reg Test Status	Registration test status (e.g. Accepted for registration, Currently identified for Reg. Test, Not currently identified for Reg. Test)
Application Type	Claimant, non-claimant or compensation
ILUA Status	In notification, notified, Registered