**ASSESSMENT REPORT 56**

# VICTORIA HIGHWAY UPGRADING TO IMPROVE FLOODING IMMUNITY

Department of Planning and Infrastructure

## ENVIRONMENTAL ASSESSMENT REPORT

## AND

## RECOMMENDATIONS

**ENVIRONMENT PROTECTION AGENCY PROGRAM**

**October 2006**

epa northern territory program

Northern Territory Government
Department of Natural Resources, Environment and the Arts

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# Abbreviations

| | |
|---|---|
| AAPA | Aboriginal Areas Protection Authority |
| ATTOC | Annual Average Time of Closure (refers to the amount of time that a road or highway is closed) |
| Ch. | Chainage (refers to distance along a road from a known reference or datum point) |
| Cwlth | Commonwealth |
| DEH | Department of the Environment and Heritage |
| DPIE | Department of Infrastructure, Planning and Environment |
| DPI | Department of Planning and Infrastructure |
| DPIFM | Department of Primary Industry, Fisheries and Mines (formerly part of the Department of Business, Industry and Resource Development) |
| DHCS | Northern Territory Department of Health and Community Services (formerly THS) |
| DPI | Northern Territory Department of Planning and Infrastructure |
| EPA Program | Environment Protection Agency Program |
| EMP | Environmental Management Plan |
| EPBC | *Environment Protection and Biodiversity Conservation Act 1999* (Australian Government) |
| GNP | Gregory National Park |
| ha | hectares |
| IUCN | International Union for the Conservation of Nature (and Natural Resources) |
| kL/d | Kilolitres per day = 1000 litres per day |
| m | metres |
| MAGNT | Museum and Art Gallery of the Northern Territory |
| NLC | Northern Land Council |
| NRETA | Northern Territory Department of Natural Resources, Environment and the Arts |
| NOI | Notice of Intent |
| NT | Northern Territory |
| OFC | Optic Fibre cable |
| PER | Public Environmental Report |
| NTPWS | Northern Territory Parks & Wildlife Conservation Service |
| RFT | Request for Tender |
| TPWC Act | Territory Parks and Wildlife Conservation Act (NT) |
| Vpd | Vehicles per day |

# EXECUTIVE SUMMARY

This report assesses the environmental impacts of the proposal by Department of Planning and Infrastructure (the proponent), for the *Victoria Highway Upgrading to Improve Flooding Immunity* (Victoria Highway Upgrade) road project. The proposal is located near the Victoria River, Northern Territory between 185km to 220km west of Katherine and involves the upgrading of a total of 16.6km of the highway. The project would involve:

- Construction of new bridges and minor realignments of the highway at Victoria River, Joes Creek, Lost Creek and Sandy Creek;
- Raising of two highway sections (total ~1.7km);
- Construction of two (x 2km) passing lanes;
- Strengthening and widening of ~ 15.5km of highway; and
- Access to gravel and fill materials.

This Assessment Report reviews the Public Environmental Report (PER) and the proponent's Supplement to the PER. Information, comments and advice provided by Northern Territory Government agencies and previous studies undertaken in the region have also been used in preparation of this report.

Environmental assessment is the process of defining those elements of the environment that may be affected by a development proposal and of determining the significance, risk and consequences of the potential impacts of the proposal. Recommendations arising from the assessment address methods to mitigate these impacts or strengthen commitments.

**Major Issues**

The principal environmental issues associated with the proposal are:

- The location, assessment, development and rehabilitation of fill and gravel extraction sites;
- The potential impacts on threatened fauna species in particular the purple-crowned fairy-wren;
- The potential impacts on significant vegetation communities, in particular the biologically rich cane grass habitat that supports populations of the purple-crowned fairy-wren and a number of other conservation significant species;
- Impacts of construction activity on soils and erosion and sediment control;
- Weed management; and
- Monitoring, auditing and ensuring the contractor implements and complies with all requirements arising from the PER, Assessment Report and Environmental Management Plan.

**Conclusions**

The outcome of the environmental impact assessment for this proposal is that the Environment Protection Agency Program is reasonably confident that ultimately the Upgrade can be managed in an environmentally appropriate manner, however information that allows such a conclusion to be reached has not yet been presented. In particular information pertaining to the assessment of the gravel and fill extraction sites has not been provided.

Given that the final location and assessment of the gravel and fill extraction sites for the project has not been included as part of this assessment process, the EPA Program requires

that once the final locations are known and assessments are conducted, the information is provided to the EPA Program to complete its assessment of that component of the project.

Upon receipt of this information, the EPA Program can complete its assessment of the project. The final location and assessment of the gravel and fill extraction sites for the project will be subject to review to the satisfaction of the relevant Northern Territory Government agencies prior to approval of works.

Based on its review of the PER and the proponent's response to submissions from relevant Northern Territory Government agencies the Environment Protection Agency Program considers that the rest of the project can be managed without unacceptable environmental impacts. This is provided that the environmental commitments and recommendations detailed in the PER, the Supplement, this Assessment Report and in the final RFT are implemented and managed under the environmental Management Plan (EMP) for the project and are subject to regular compliance auditing and reporting.

## List of Requirements and Recommendations

**REQUIREMENT (Information to be provided prior to approval of works in those areas)**

**Requirement 1.**

**The proponent is to provide the location and assessment results, potential environmental and heritage impacts and mitigation measures for the gravel and fill extraction sites to the EPA Program for final assessment of this component of the project.**

**RECOMMENDATIONS**

### Recommendation 1

**The proponent shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards:**

- **identified in the Victoria Highway Upgrading to Improve Flooding Immunity, Public Environmental Report and Supplement to the Public Environmental Report; and**
- **recommended in this Assessment Report (No. 56).**

**All safeguards and mitigation measures outlined in the Public Environmental Report and Supplement are considered commitments by Department of Planning and Infrastructure and are included in Appendix 1 of this report.**

### Recommendation 2

**In accordance with clause 14A of the *Environmental Assessment Administrative Procedures (1984)*, the proponent must advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required. In the event that the project does not commence within five years, the project is to be reconsidered as to whether a new assessment is required.**

**The proponent is to provide details of the gravel and fill extraction sites to the EPA Program for final assessment of this component of works. Details are to include: location, assessment results, potential environmental impacts and proposed impact mitigation measures.**

### Recommendation 3

**An Extraction Pit Management Plan that includes compliance with Land Clearing Guidelines and a Rehabilitation Strategy incorporating relevant industry 'best practice' guidelines (the "Blue Book") must be submitted as part of the information required by Requirement 1.**

### Recommendation 4

**Access roads are to be constructed according to the mitigation measures listed in section 3.4.6 of the Supplement and location and management details provided in the information requested by Requirement 1.**

### Recommendation 5

**The EPA Program recommends that the use of the RG3 gravel extraction site only be considered as a last option.**

### Recommendation 6

**The location, specific management and rehabilitation measures of the access track must be provided to the EPA Program in the event RG3 is used for gravel extraction.**

### Recommendation 7

**Specific rehabilitation clauses and excavation designs are to be provided to the EPA Program for review as part of the information requested under Requirement 1.**

### Recommendation 8

**On award of the contract, DPI is to specify in the contract, timing for construction works in cane grass habitat to ensure construction activities do not occur during the purple-crowned fairy-wren breeding season.**

### Recommendation 9

**As part of the Environmental Management Plan, the Contractor is required to appoint a specialist biologist (as agreed to by the Biodiversity Conservation Unit, of the NT Department of Natural Resources, Environment and the Arts for undertaking environmental management for the duration of project works (2006 – 2009), to advise on fairy-wren habitats and to audit and report on this component of works.**

**The contractor's Environmental Management Plan incorporating recommendations to mitigate fauna impacts made in the PER and Appendix D of the PER (HLA Report), must be submitted to the EPA Program for approval prior to commencement of works.**

### Recommendation 10

**The proponent is to implement mitigation measures and work in conjunction with rangers from Gregory National Park to address key processes threatening habitats of the purple-crowned fairy-wren, namely aiming to :**

- **Reduce damage by grazing cattle to cane grass habitat;**
- **Reduce weed invasion to riparian and cane grass habitat; and**
- **Reduce 'hot-burn' fire damage by altering fire regimes.**

**The re-location of individual purple crowned fairy wrens is not supported.**

**Recommendation 11**

**Areas rehabilitated with cane grass are to be monitored and reported annually for at least three years and on completion of works to determine the success of transplanting in a compensatory area. Monitoring reports are to be provided to the Department of Natural Resources, Environment and the Arts and other relevant stakeholders.**

**Recommendation 12**

**Cane grass distribution and purple-crowned fairy-wren individuals and groups must be monitored annually during April – May for at least the first three years post construction and the results reported to the Department of Natural Resources, Environment and the Arts, as per recommendation from the HLA Report (Appendix D, PER),**

**Recommendation 13**

**Cane grass habitats are to be extended or created nearby to offset areas of this habitat type being destroyed by the proposal. Offset areas are to be at least double the impacted areas of cane grass, and be included where possible into areas protected by long-term management. Transplanting proposals should be supported by local cane grass seed collections, propagation and plantings or direct seeding as appropriate, in consultation with the Department of Natural Resources, Environment and the Arts and Greening Australia.**

**Recommendation 14**

**Prior to removing fences around revegetation areas, assessment of the success of establishment of transplanted cane grass areas should be carried out by a suitably qualified person and the results submitted in a report to the Department of Natural Resources, Environment and the Arts.**

**Recommendation 15**

**Feral animal management incorporating mitigation measures outlined in the PER (App.D and s4.4.6) are to be included as a specific implementation measure in the Environmental Management Plan. The proponent must liaise with Parks and Wildlife Service, and the Department of Natural Resources, Environment and the Arts, on a feral animal control program within the Gregory National Park for a minimum of three years as a positive offset measure to road works impacts.**

**Recommendation 16**

**The planning stage is to ensure sufficient timing is allocated for the biologist to detect the presence of conservation significant fauna and the implementation of appropriate mitigation measures prior to any road work construction activities commencing in the area.**

**Recommendation 17**

**The mitigation measures recommended to prevent aquatic fauna impacts are to be included as part of the project Environment Management Plan. If RG3 is the chosen gravel extraction site the six recommendations made in the aquatic faunal report (de Lestrang & Wedd, 2005) are to be incorporated into the final Environmental Management Plan.**

**Recommendation 18**

**The establishment of the construction camp must aim to remain within existing cleared areas of the Victoria River Inn to minimise additional vegetation clearance. Any further clearing should be in accordance with the NT *Land Clearing Guidelines***

**(NRETA, 2006) principles. The EPA Program recommends that rehabilitation procedures for any works required within the lands of the Victoria River Inn are consistent with the Department of Planning and Infrastructure's Specifications and are agreed to by the Department of Natural Resources, Environment and the Arts.**

### Recommendation 19

**As per Requirement 1, floristic surveys are to be conducted in gravel and fill extraction areas to provide information on sensitive vegetation communities and the presence and absence of threatened species. Comment should be provided on how this information has been used in determining the gravel and extractive sites, and on the appropriateness of proposed native vegetation clearing at the proposed sites.**

### Recommendation 20

**All clearing of native vegetation should be compliant with the NT *Land Clearing Guidelines* (2006) and in a manner that will minimise adverse environmental impacts. A Vegetation Management Plan is to be submitted as part of the final Environmental Management Plan.**

### Recommendation 21

**Special reference to the extent and level of allowed vegetation disturbance is to be emphasised by the proponent in the Request for Tender, on construction plans, at pre-tender meetings and any sensitive habitats must be flagged in the field to avoid accidental extension of vegetation clearing.**

### Recommendation 22

**The proposed erosion and sedimentation mitigation measures made in the PER and Supplement are to be incorporated in the Request for Tender document as specific clauses that the contractor must develop. The final Erosion and Sedimentation Control Plan must be submitted to the satisfaction of the Department of Natural Resources, Environment and the Arts and EPA Program.**

### Recommendation 23

**The proponent will be responsible for monitoring and maintaining soil erosion and sedimentation controls beyond the contractor's 12 months Defects Liability period after completion of works for a minimum of 3 years post completion or until areas are monitored and reported as stable.**

### Recommendation 24

**As part of the Environmental Management Plan, a Weed Management Plan incorporating the Department of Natural Resources, Environment and the Arts recommendations from the Supplement (s2.6.16) is to be submitted as part of contractual conditions.**

### Recommendation 25

**Washdown facilities on-site are to be established, clearly defined and their use enforced as part of the Weed Management Plan. Strict management guidelines are to be assigned and closely monitored to prevent these sites becoming a source of future weed infestations.**

### Recommendation 26

**Weed control is to occur for at least three years post construction, to maximise the re-establishment of high quality cane grass habitat, as per recommendations in the HLA Report (PER, App.D).**

**Recommendation 27**

**The proponent is to consult with the NT Department of Business, Economic and Regional Development to ensure that targeted employment and training programs are provided to local indigenous groups prior to commencement of works.**

**Recommendation 28**

**The proponent liaise with park rangers from the Gregory National Park on the establishment of public education boards promoting the importance of cane grass habitat and ways to observe the birds without disturbing their habitat.**

**Recommendation 29**

**The proponent undertake a monthly site audit and any non-conformances with EMP committments be reported to the EPA Program stating response actions and effectiveness of the Corrective Action Requests.**

**Recommendation 30**

**Environmental Management Plans covering construction of the Victoria Highway Upgrade project are to be submitted to the EPA Program for approval prior to commencement of construction. Any proposed EMP amendments once works have begun should be submitted to the EPA Program for approval. In preparing each management plan, the proponent is to include any additional measures for environmental protection and monitoring contained in this Assessment Report and recommendations made by the Northern Territory Government with respect to the proposal. The plans are to be referred to relevant NT Government Agencies for review prior to finalization. The plans will form the basis for approvals and licences issued under relevant NT legislation.**

# 1 Introduction and Background

This report assesses the environmental impact of a proposal by Department of Planning and Infrastructure (DPI) to upgrade the Victoria Highway between 185km to 200km west of Katherine. The project would involve the construction of new bridges and minor realignments at the Victoria River, Joe Creek, Lost Creek and Sandy Creek bridge sites, raising of two sections of the highway and the construction of two passing lanes. A total of 16.6km in a corridor of 36km of the Highway would be involved and strengthening and widening of 15.5km of road would be undertaken. The project would occur in specific phases over 2006 to 2009, including design, a tender process, pre-construction, construction and post-construction.

Department of Planning and Infrastructure ('the proponent') proposes to undertake works at eight construction sites along the Victoria Highway (Table 1.1 & Fig. 1.1, PER). Other specific sites impacted by the proposal would include areas proposed as sources of gravel and fill (extraction areas), water, associated construction sites and depots and various road strengthening and widening locations.

This Environmental Assessment Report is based on a review of the Public Environmental Report (PER), comments from NT Government agencies on the PER, and the Supplement to the PER prepared in response to those comments during the assessment process.

## 1.1 Environmental Impact Assessment Process

Environmental impact assessment is based on adequately defining those elements of the environment that may be affected by a proposed development, and on evaluating the significance, risks and consequences of the potential impacts of the proposal at both local and regional levels. This Assessment Report describes the adequacy of the PER and Supplement submitted by DPI in achieving these objectives. The report also evaluates the adequacy of the commitments and environmental safeguards proposed by the proponent in order to avoid or mitigate potential impacts associated with the proposed Victoria Highway Upgrade.

Where it is determined through the environmental assessment process that the potential impacts associated with aspects of the proposal can be adequately managed through the strategies presented by the proponent in the PER, these strategies are supported in the Assessment Report. Where it is determined that the potential impacts cannot be adequately managed through the safeguards presented by the proponent, additional safeguards are recommended to ensure that should the proposal be approved, it can proceed in an environmentally acceptable manner. The safeguards may be implemented at various levels within the planning framework of the project and include (but are not limited to):

- design and layout of facilities or infrastructure;
- management of construction activities and timing of construction activities; and
- management of rehabilitation works.

A list of commitments made by the proponent in the PER and Supplement, in response to submissions from the NT Government is provided in Appendix 1. These commitments, along with the recommendations made in this report form the basis of advice to the NT Minister for

Natural Resources, Environment and Heritage on the environmental issues associated with the project and are to inform a decision as to whether or not the project should proceed.

## 1.2 Environmental Impact Assessment History

DPI lodged a Notice of Intent (NOI) with the Department of Natural Resources, Environment and the Arts in June 2005, proposing the upgrade of the Victoria Highway from CH185km to CH220km to improve flooding immunity.

In October 2005, the NT Minister for Natural Resources, Environment and Heritage determined that the proposal would require assessment under the *Environmental Assessment Act* at the level of a Public Environmental Report (PER). The proponent referred the project to the Australian Government Department of the Environment and Heritage (DEH) under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.* The Australian Government determined that the proposal constituted a Controlled Action under sections 18 and 18A (listed threatened species and communities) of the EPBC Act and included the listed vulnerable purple-crowned fairy-wren and Freshwater sawfish. The Australian and NT Governments agreed that the project would be assessed in accordance with the Bilateral Agreement between the Australian and Northern Territory Governments.

Draft guidelines covering issues to be addressed in the PER were developed by the NT EPA Program and Australian Government DEH. The Draft Guidelines were subject to a statutory 14 day public review period in November 2005. Guidelines for the PER were finalised in December 2005, taking into account submissions and comments from various members of the public and NT Government agencies. The NT Minister for Natural Resources, Environment and Heritage directed the proponent to prepare the PER addressing matters set out in the final guidelines.

DPI submitted a PER on the Victoria Highway Upgrade to the NT EPA Program and Australian Government DEH in June 2006. The PER underwent a statutory public exhibition period of 28 days from the 16 June 2006 to 14 July 2006. No public submissions were received. The PER was also circulated to NT Government advisory bodies for review and comment. These submissions were provided to the proponent at the close of the review period. A list of respondents to the PER and issues raised in their submissions can be found in the proponent's Supplement to the PER (Appendix A, Supplement).

The proponent prepared a Supplement to the PER addressing issues raised in the Government submissions. The Supplement was submitted to the EPA Program on 19th September 2006 and was circulated to the NT Government agencies and the DEH for review and comment. Following the review of the Supplement and additional information, this Assessment Report was prepared to report on the outcomes of the environmental assessment process, and to make recommendations on the environmental issues associated with the proposal, for consideration by the Minister.

Once the Minister for Natural Resources, Environment and Heritage has considered and agreed to the findings of this Assessment Report, it will be forwarded to the Australian Government Minister for Environment and Heritage. The Minister (or his delegate) will consider the findings presented in this Assessment Report when determining whether to issue an approval under the EPBC Act. The Australian Government has 30 business days in which to issue an approval once it has received this Assessment Report and a notice issued by the Northern Territory's Minister for Natural Resources, Environment and Heritage, as required under Section 130 (1B) (b) of the EPBC Act.

## 1.3 Regulatory Framework

The NT Government has jurisdiction over environmental and other legislation relating to the proposed construction works and sites of the Victoria Highway Upgrade. The Australian Government administers the EPBC Act, which applies to the project because it was deemed to have the potential to cause significant impacts on threatened species and communities listed under the Act. Therefore, environmental assessment was undertaken in accordance with the requirements of both the Northern Territory *Environmental Assessment Act (1982)* and the Australian *Environment Protection and Biodiversity Conservation Act (1999).* As the proposal is deemed a controlled action under the EPBC Act, approval will be required from the Australian Government Minister for the Environment and Heritage (or his delegate).

The *National Land Transport Act 2005* (Commonwealth) applies to this project, and forms part of the basis for the proposed upgrading of the Victoria Highway. The *Native Title Act 1993* does not directly affect the proposal and the project would be addressed in conjunction with the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cwlth). Where necessary, licenses, permits and approvals applicable or required under these Acts must be obtained by the contractor undertaking the works.

Any sites of gravel or fill extraction that are outside the road corridor would be subject to requirements of the *Mining Management Act (1990)* and the *Mining Act (1980)*. Water extractions outside of a mining lease require licencing under the *Water Act (1992) and Water Regulations (1992).*

# 2 THE PROPOSAL

The Victoria Highway Upgrade project has the objective to reduce road closure times due to flooding events and to bring the Victoria Highway more in line with national highway standards elsewhere in Australia. Flooding of the highway has a significant economic impact, with loss of road connectivity between east and west Australia resulting in a direct, adverse impact on freight and tourist use of the Highway.

The proposal aims to upgrade the road access to a 1 in 20 year storm event to lower the Average Annual Times of Closure (AATOC) at the Victoria River, Joe Creek, Lost Creek and Sandy Creek crossings. The AATOC would be reduced from 96 hours/year, 16hours/year, 45 hours/year and 10 hours/year to six hours/year for each of Victoria River, Joe Creek and Lost Creek crossings, and 8 hours/year for Sandy Creek. This would result in considerable improvement in access and safety to road users. Table 1 lists the key project characteristics.

**Table 1: Key Project Characteristics**

| Element | Description |
|---|---|
| Construction duration | Largely conducted during dry seasons 2006 – 2009 |
| Locality | Sections of the Victoria Highway between 185km to 200km west of Katherine |
| Operation life of proposal | Ongoing |
| Maximum area of disturbance | 72.05ha along 16.6km of the Highway + 10 ha for gravel extraction, processing and stockpiling + 30 ha fill extraction areas |
| Components | ▪ Pre-construction Activities<br>▪ Construction of four new bridges and realignments at Victoria River, Joe Creek, Lost Creek and Sandy Creek bridge sites<br>▪ Raising two sections of Highway<br>▪ Construction of two passing lanes<br>▪ Operation of fill and gravel extraction areas<br>▪ Water sources for roadwork use |
| Traffic Volume | ▪ 200 vehicles per day (vpd) dry season 2004, 30 – 70 vpd wet season<br>▪ 190 vpd expected to occur during wet season after upgrade. |
| Gravel Requirements | 50,000 $m^3$ |
| Fill Requirements | 350,000$m^3$ |

Facilities associated with the road construction works would include those listed below:

- Extraction areas;
- Water bores;
- Accommodation, work camps, plant and equipment depots;
- Lay-down, stockpile and storage areas; and

- Construction precincts, access roads and detours.

The proposal would consist of eight construction impact areas along the road located on the Victoria Highway, between Ch 185km and 220km. The maximum impact area for all the eight sites would be 72.05ha (hectares) along 16.6km of the Highway. Additional disturbance from gravel and fill extraction areas would total no more than 40 ha. Approximately 15.5km of the Highway within the project area would undergo strengthening and widening within the existing disturbance corridor of the Highway. Table 2 summarises the sites, proposed works and impact areas.

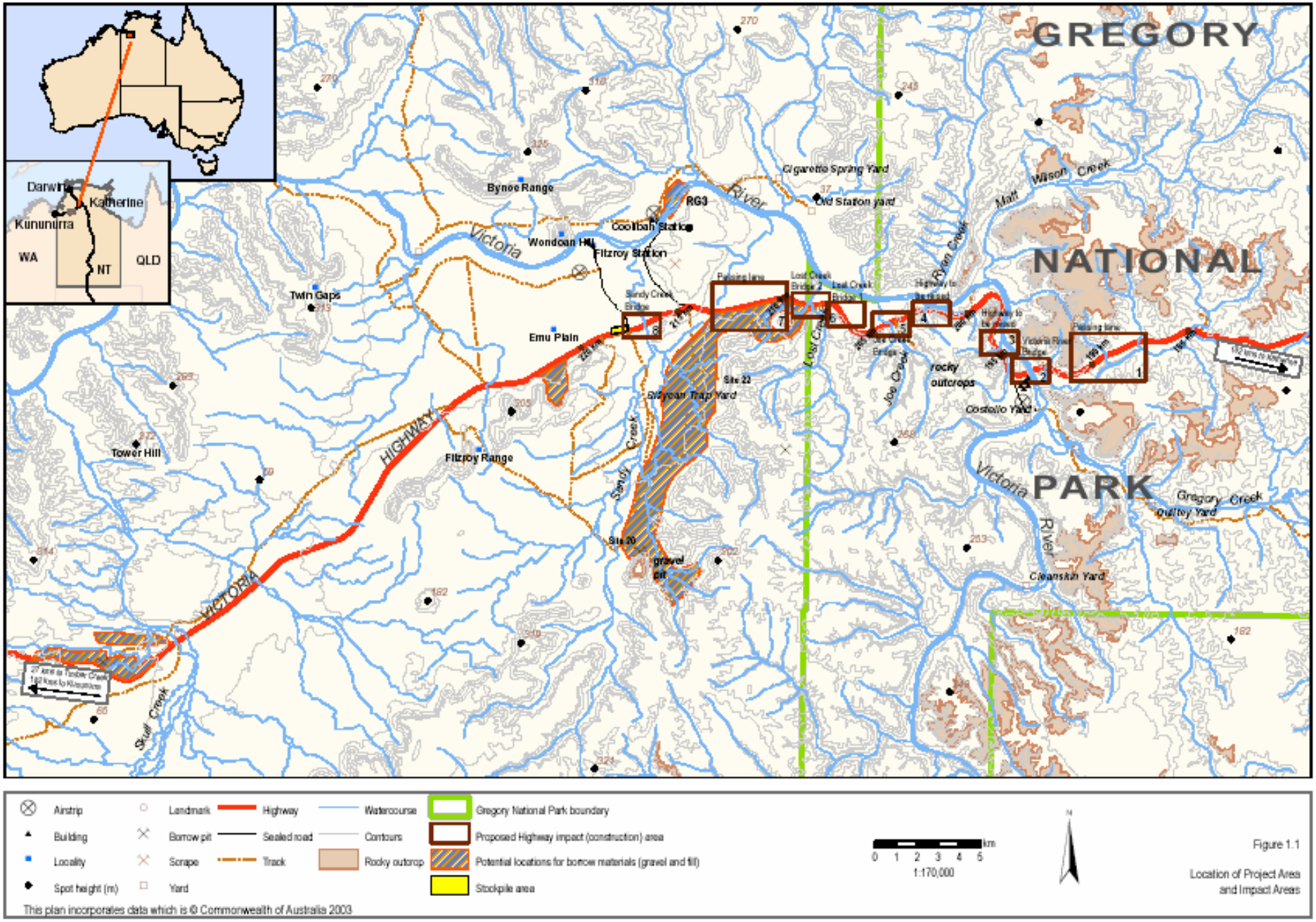
**Table 2: Proposed Victoria Highway Impact Areas[11]**

| Site | Works | Chainage | Maximum corridor length (km) | Maximum impact width (from existing road centreline) | Maximum impact area (ha) |
|---|---|---|---|---|---|
| Site 1 | Widening of road to provide passing lane (i.e.3 lanes) | Ch 186.2 – 189.2km | 3.0 | 30m one side only | 9.0 |
| Site 2 | Victoria River – new bridge & realignment | Ch 192.8 – 195.2km | 2.4 | 15-60m downstream side;<br>0-30m upstream side | 12.6 |
| Site 3 | Highway to be raised | Ch195.5 – 196.5km | 1.0 | 15-40m both sides | 6.0 |
| Site 4 | Highway to be raised | Ch202.3 – 2.2.9km | 0.6 | 15-45m downstream side;<br>15-50m upstream side | 3.75 |
| Site 5 | Joe Creek – new bridge & realignment | Ch203.5 – 205.4km | 1.9 | 15-60m downstream side;<br>15-30m upstream side | 8.2 |
| Site 6 | Lost Creek – new bridge & realignment | Ch 206.7 – 209.7km | 3.0 | 15-45m downstream side; 15-80m upstream side | 16.4 |
| Site 7 | Widening of road to provide passing lane, i.e. 3 lanes | Ch210.5 – 213.5km | 3.0 | 30m one side only | 9.0 |
| Site 8 | Sandy Creek – new bridge & realignment | Ch 216.6 – 218.3km | 1.7 | 15m downstream side;<br>15-50m upstream side | 7.1 |

Detailed design and documentation of the project would be undertaken by DPI to ensure all requirements from the PER and Assessment Report are addressed during the design phase. The footprint of the proposed project is shown in Figure 1.

[1] **Source:** Table 2.1 – PER

**Figure 1 - Location of proposed project area and impact areas (Fig 1.1, PER)**



## 2.1 Construction Preparation Activities

Pre-construction phases would involve surveying and pegging the road and bridge worksites and delineating all avoidance ("no-go") areas. These would be marked on construction drawings and subsequently in the field. The contractor would establish offices and accommodation areas within lands of the Victoria River Inn. The proponent proposes that the area of clearing would approximate the area of each project component with a total disturbance of 112 hectares (including disturbance from gravel and fill extraction areas).

## 2.2 Road Construction

Road construction works would be conducted during the dry season to minimise delays owing to flooding. No earthworks or vegetation clearance would be undertaken during the wet season. Adequate erosion control measures to minimise potential erosion impacts must be in place prior to the wet season. Most of the works are anticipated to occur over two dry seasons (2007 and 2008) with the contractor suspending major soil disturbance or earthwork activities during the wet season.

## 2.3 Bridge Construction

The key construction component for bridges is establishing a solid foundation for the bridge structures. Bridge construction would commence with the construction of either spread footings or bored piles as foundations. The geotechnical conditions at Victoria River and Joe Creek are suited for spread footings where rock is trimmed to establish horizontal surfaces on which a reinforced concrete slab is placed. Bored pile foundations may be applicable to Lost and Sandy Creeks where rock would be used as the base for the bridge foundation sites and covered by surface soil.

The construction sequence for the upper part of the bridge would consist of:

1. Pile caps of reinforced concrete being built on top of constructed foundations;
2. Piers built from the pile cap to a cross-head;
3. Beams then placed on top of the cross-head;
4. The bridge deck is constructed;
5. Kerbs bridge and guard rails are constructed; and
6. Surfacing, usually asphalt is then applied to the top of the bridge deck.

## 2.4 Construction materials and equipment

Construction materials and equipment are to be provided by the contractor. A range of large-scale earthmoving and road works machinery and operations would be utilised including:

Various capacity trucks (single units and road trains);

- Bulldozers;
- Excavators;
- Backhoes;
- Water trucks;
- Compressors;
- Front-end loaders;
- Graders;
- Rollers;

- Smaller items of plant to suite specific jobs;
- Large cranes for bridge works; and
- On-site concrete batching plants

## 2.5 Borrow pit and borrow areas (gravel and fill sources)

It should be noted that the specific gravel and fill extraction areas have not been submitted within the PER process due to clearances from the Aboriginal Areas Protection Authority (AAPA) not yet being granted for proposed areas. An estimated 50,000$m^3$ of gravel and 350,000$m^3$ of fill would be required for the project to supply the raising of the road and road strengthening works.

A large amount of fill would be required to raise the road above its current level in the following six areas:

- Site 2 (Victoria River) – to be raised approximately 7.0m above the existing bridge
- Site 3 – to be raised approximately 3.9m above existing pavement
- Site 4 – to be raised approximately 2.1m
- Site 5 (Joe Creek) – to be raised approximately 2.0m
- Site 6 (Lost Creek) – to be raised approximately 7.0m
- Site 8 (Sandy Creek) – to be raised approximately 1.9m

The process of identifying possible gravel/fill sources requires AAPA inspections and clearances be obtained for specific areas. Approval to access extraction sites is also required from the Northern Land Council (NLC) if the pits are located on Aboriginal owned land. Once approval is obtained, material can be tested. Heritage and environmental clearances (flora and fauna) must also be obtained.

DPI proposes that the contractor source fill and gravel material from existing and new sites in the project area. At the time of preparation of the Supplement, several areas of possible fill and gravel material had not been cleared or assessed by the AAPA, or had been rejected for use due to their proximity to sensitive areas. Consequently, the search, clearance and testing process for suitable gravel/fill sites is continuing.

### *2.5.1 Gravel*

The term gravel refers to the upper-most layers of the road that provides strength to carry traffic loads. An estimated 50,000$m^3$ of gravel would be required within a two year commencement of construction. The area required for gravel extraction, processing and stockpiling would be approximately 10ha. Table 2.2 (PER) lists potential sources of gravel and rock material suitable for pavement construction. DPI's preferred extraction area at the time of the PER was "little Italy" (PER, Table 2.2, area 3), however clearances are still required before selection can be finalised. DPI has indicated since the PER was issued an increasing unlikelihood was emerging that site RG3 (Victoria River channel bed site) would be finally selected for gravel extraction.

### *2.5.2 Fill*

Fill is soil and rock material used to build up the base or form of a construction site. The fill requirements for the project are estimated at 350,000$m^3$ . The fill is proposed to be extracted from an area of 25-30 ha near Sandy and Skull Creeks (Figure 1).

## 2.6 Operation of extraction areas

DPI Specifications[2] relating to gravel and fill extraction set out current best practice standards of operation, according to the "Blue Book" (Landcom, 2004) and are required to be followed by operators contracted by the DPI. The operation, management and rehabilitation of extraction areas would be in accordance with the DPI Specification 'Miscellaneous Provisions" (App.B, PER).

The extraction and processing of source gravel material would involve:

- Vegetation clearance from the site and its stockpiling for later re-spreading;
- Removal of topsoil to a minimum of 100mm depth and stockpiling;
- Excavation and stockpiling of target material;
- Loading and carting of target material directly to the worksite for placement; and
- Ripping / scarifying the excavation site after use, followed by the re-spreading of topsoil and cleared vegetation to promote rehabilitation.

The steps involved in extracting fill material would follow a similar process.

## 2.7 Water Sources

During the road works project a total of approximately 200kL/d (thousand litres per day) of water would be required for all aspects of construction and domestic use. The likely duration of this demand would be for seven days per week, up to ten months per year and over two dry seasons. The contractor would obtain water from existing or new bores or from the Victoria River when sufficient flow exists. River extraction would be limited to less than 20% of surface flow. The contractor's use of water would be regulated and managed by the Natural Resource Management (NRM) group of the Northern Territory Department of Natural Resources, Environment and the Arts (NRETA). The contractor would be required to undertake monitoring and assessment of any impacts of the water extraction. An extraction licence would be required from NRETA.

## 2.8 Accommodation, work camps and plant and equipment depots

DPI would require the contactor to establish the construction camp at the Victoria River Inn precinct. The establishment of these facilities would involve erection of transportable buildings and establishment of minor infrastructure such as fenced and locked compounds. It is expected that any small field depots would be established within the construction area footprint approved by DPI. Storage and stockpile areas would be on new road alignments leading to the new bridges and no additional areas would be cleared for these storage areas.

[2] The Department of Planning and Infrastructure maintains a series of master specifications which are used in the preparation of contract documents for the construction and maintenance of Government infrastructure throughout the Northern Territory.
The master specifications, which cover infrastructure, road works, and power and water, are edited to contain the latest updates in both policy and regional requirements to ensure that assets constructed for the Northern Territory Government reflect best industry standards.
These can be accessed at: http://www.dpi.nt.gov.au/whatwedo/techspecs/index.html

## 2.9 Rehabilitation of sites

DPI Specifications prescribe standard methods for the rehabilitation of sites during and following road works (Table 5.2, PER). The contractor would be required to prepare a Vegetation Management Plan and draft Rehabilitation Plan for the DPI prior to construction. Plans would be audited by the DPI.

## 2.10 Protection of Aboriginal Sacred Sites

DPI would be responsible for obtaining AAPA works clearance certificates for the contractor, who would be required under the Environment Management Plan (EMP) to then ensure Sacred Sites are not impacted by the work. DPI's Sacred Site protection requirements are provided in the PER (AppB, s2.12).

## 2.11 Issues not included in this environmental impact assessment

The location of gravel and fill extraction sites, as well as their assessment, appropriate clearance, operation and rehabilitation have been identified as potential causes of major environmental impacts associated with the Upgrade project. It should be noted that issues associated with the final location and assessment of the gravel and fill extraction sites associated with this project are not within the scope of the current environmental assessment process. It is a requirement that this information be submitted to the EPA Program to complete its assessment of that component of the project. Section 4.2 of this report discusses further this aspect of the project. Recommendations from this report (56) are to be addressed within the additional information to be submitted to the EPA Program.

# 3 Regional setting

The Victoria Highway Upgrade project is located in the vicinity of the Victoria River, between Chainages (Ch) 185km to 220km as measured west from Katherine (Figure 1). The nearest population centres are small with the Victoria River Inn situated west of the Victoria River bridge. From the Victoria River bridge, Coolibah and Fitzroy stations are ~12km west, Katherine 194km east, and Timber Creek is 82km west.

The Victoria River has a catchment area of 77 230km$^2$, located in a subtropical, monsoonal climate. The vegetation of the Highway corridor contains a number of vegetation communities identified as common and widespread throughout the Top End (DPI, 2005) and include *Eucalyptus/Corymbia* dominated communities and *Terminalia arostrata* woodlands with *Chrysopogon fallax* (Golden beard grass) (Figure 4.2, PER). The area proposed for development is adjacent to the Gregory National Park and includes habitats that have been impacted by varying degrees of human disturbance, such as the Highway, pastoral activities and associated tracks and roads, introduced and pest plants, feral animals (43% of mammal species observed) and fire. Twenty-four fauna species listed under the EPBC Act and the *Territory Parks and Wildlife Conservation Act* schedules are known to occur in the project area, and are listed in Table 4.3 of the PER.

## 3.1 Land Use

The road easement along the section of the proposed Highway Upgrade is 100m wide and is owned by the NT government and managed by DPI. The corridor has been used for road construction, maintenance and management for over 30 years.

Seventy-one percent of the road reserve is located adjacent to the Gregory National Park, administered by Northern Territory Parks and Wildlife Service. Beyond Chainage 210km, the land tenure adjacent to the Highway includes Aboriginal land, pastoral leases and private freehold land.

## 3.2 Climatic Conditions

The Upgrade area is located in a subtropical, monsoonal climate with distinct wet and dry seasons. The region receives an annual average rainfall of 938.5mm for (gauge at Timber Creek, 82km west), 85% of which falls between December and March. The highest rainfall events typically occur during storms in the late wet season and during periods of cyclonic depressions. Stream-flow in the Victoria River is highly variable due to thunderstorm activity, cyclones, and monsoonal rainfall.

The highly variable nature of the environment, especially the occurrence of extreme rainfall events in the wet season influences the time available for much of the construction program and availability of and access to sites and resources.

## 3.3 Physical Environment

The proposed Upgrade area traverses undulating terrain largely associated with the foot slopes of rocky escarpments, riparian flood plains and drainage depressions of the Victoria River and its tributaries. The soils are principally skeletal soils of the Pinkerton land system. Alluvial soils are associated with the Victoria River and heavier, cracking clays are associated with the section of the Highway around Lost Creek.

## 3.4 Biological Environment

The vegetation communities that occur in the area around the proposed Upgrade are common throughout the Top End with dominant vegetation communities comprising:

- *Eucalyptus tecifica* (Northern Box), *Corymbia terminalis* (Bloodwood) woodland with *Sehima nervosum* (White Grass), *Chrysopogon fallax* (Golden Beard Grass) grassland understorey;
- *Corymbia dichromophloia* (Variable-barked Bloodwood), *Eucalyputs miniata* (Darwin Woolly Butt) low open woodland with *Triodia pungens* (Curly Spinifix) open hummock grassland understorey;
- *Terminalia arostrata* (Nutwood) low open woodland with *Chrysophogon fallax* (Golden Beard Grass), *Dicanthium* (Bluegrass) grassland understorey
- *Eucalyptus microtheca* (Coolibah) open woodland with *Sehima nervosum, Panicum decompositum and Chrysopogon fallax* grassland. (Wilson *et. al.,* 1990).

In addition to these broadscale communities, there are areas of *Chionachne cyathopoda* and/or *Mnesithea rottboellioides* tall grassland (cane grass) associated with the flood plain woodland of the Victoria River and its tributaries.

The proposed project area and region provide a range of habitats that support a number of fauna species. Recorded species include 38 mammals (six introduced), 147 birds (one introduced), 51 reptiles (one introduced) and 20 amphibians (one introduced). Approximately 40 species of fish and elasmobranches (rays) have been also been recorded in the Victoria River system.

Six pest mammal species were recorded during surveys of the proposed project area. Key areas and species of conservation significance are summarised below.

### *3.4.1 Flora of Conservation Significance*

The NT Herbarium Holtze specimen database was used to search species of IUCN conservation significance within the proposed highway Upgrade area. A total of 13 species of IUCN conservation significance were identified of which two are Vulnerable, six Near Threatened and five Data Deficient (Table 1, Appendix D, PER). The majority of the species inhabit sandstone escarpments, plateaux and gorges (cliffs, scarps, hillcrests, hill slopes, foot slopes, drainage lines, seepage areas) and are not located in the near vicinity of the proposed Upgrade project.

Five species of IUCN conservation significance are endemic to the NT, three of which are Near Threatened including *Melaleuca triumphalis, Stenostegia congesta* and *Isotropsis sp.* Joe Creek. The two species of highest threatened status (Vulnerable) include *Gleichenia sp.* Victoria River and *Adiantum capillus-veneris* and are restricted to habitats on permanent springs at bases of sandstone cliffs.

The vegetation in the proposed project area shows a high level of endemism with 11% of the recorded species being endemic to the NT. Fourteen plant species that are endemic to the NT were recorded in the proposed project area. The flora assessment undertaken by the NT Herbarium concluded that species of IUCN conservation significance that may occur within and in the vicinity of the proposed Upgrade project (alluvial plains and river valleys), occur in habitats that are widespread and common in the NT with no anticipated threat from the project (Lewis *et al.,* 2006).

### *3.4.2 Significant Fauna*

Thirty-eight mammal species, 147 bird species, 51 reptile species, 20 amphibian species and 40 species of fish have been recorded in the Victoria River area. A number of species listed as threatened under NT legislation and nationally significant species have been recorded or are potentially present in the project area and region (Table 4.3 PER). These, with their status include:

- Bare-rumped sheath tail bat (*Saccolaimus saccolaimus nudicluniatus)*- status: critically endangered;
- Gouldian finch (*Erythura gouldiae)* – Endangered;
- Purple-crowned fairy-wren (*Malurus coranatus coranatus)* – Vulnerable;
- Star finch (Neochmia ruficauda clarescens – Near threatened;
- Freshwater whip ray (*Himantura chaophrya)* – Data deficient;
- Freshwater sawfish (*Pristis microdon)*- Vulnerable;
- Dwarf sawfish (*Pristis clavata)* – Vulnerable;
- Angalarri grunter (*Scortum neili)* – Vulnerable; and
- Speartooth sharks (*Glyphis* spp. *(*sp. A and sp. C) – Critically Endangered and Endangered.

Thirteen species covered by the migratory and listed marine provisions of the EPBC Act denoting species of recognized national significance occur in or near the project area. These are the:

- Magpie goose (*Anseranas semipalmata)* – Listed marine;
- Fork-tailed swift (*Apus pacificus)* – Listed marine;
- Great egret (*Ardea alba)* – Listed marine;
- Cattle egret (*Ardea ibis)* – Listed marine;
- Oriental plover (*Caradrius veredus*) – Migratory wetland; listed marine;
- Oriential pratincole (*Glareola maldivarum)* – Migratory wetland; listed marine;
- White-bellied sea-eagle (*Haliaeetus leucogaster*) – Migratory; listed marine;
- Rainbow bee-eater (*Merops ornatus*) – Listed marine;
- Little curlew (*Numenius minutes)* - Migratory wetland; listed marine;
- Derby white-browed robin (*Poecilodryas superciliosa ceriniventris*) – Migratory;
- Australian painted snipe (*Rostratula australis)* – Vulnerable; listed marine;
- Painted snipe (*Rostratula benghalensis)* – Migratory marine;
- Freshwater crocodile (*Crocodylus johnstonii)* – Listed marine; and
- Estuarine crocodile (*Crocodylus porosus*) – Migratory, listed marine.

A further eight species that are classified as threatened or near-threatened under the *Territory Parks and Wildlife Conservation Act 2000* (TPWC Act) have been recorded in the proposed project area (Horner and Archibald, 2005). These are the:

- Flood plain monitor (*Varanus panoptes);*
- Bush stone-curlew *(Burhinus grallarius);*
- White-quilled rock-pigeon (*Petrophassa albipennis)*;
- Red-tailed black-cockatoo (*Calyptorhynchus banksii);*
- Yellow-rumped manikin (*Lonchura flaviprymna);*
- Ningbing false Antechinus (*Antechinus ningbing);*
- Western chestnut mouse (*Pseudomys nanus*); and
- Pale field-rat *(Rattus tunneyi).*

### *3.4.3 Introduced Flora and Fauna*

A total of 25 introduced plant species have been recorded in the proposed project area of which 10 are declared weeds under the *Northern Territory Weeds Management Act 2001*. Table 4.2 (PER) lists the declared (indicating eradication, spread controlled and further introductions are to be prevented) and environmental weeds known from the study area and the proponent has identified the following as species are of greatest risk:

- Rubber bush (Calotropis procera);
- Parkinsonia (Parkinsonia aculeatea);
- Devil's claw (*Martynia annua*);
- Noogoora burr (Xanthium strumarium);
- Bellyache bush (*Jatropha gossypifolia*); and
- Wild passion fruit (*Passiflora foetida)* particularly in cane grass areas.

The high number of introduced species is likely to be associated with disturbed ground such as pastoralist activities and along roadsides. Although wild passion fruit is not a declared weed, its presence in the cane grass areas has the potential to impact on fauna habitat.

A number of pest species were recorded during surveys of the proposed project area. These include:

- feral cattle (*Bos Taurus*);
- water buffalo (*Bubalus buabalis*);
- horse (Equus caballus);
- cat (Felis catus);
- feral pig (Sus scrofa) ;
- black rat (Rattus rattus); and
- cane toad (Bufo marinus).

The black rat was identified as a key threat to the vulnerable purple-crowned fairy-wren and other bird species. The cane toad is a threatening agent for many fauna species due to its ability to poison animals that prey upon it and to out-compete native fauna. Cattle, feral cattle and buffalo were identified as causing major impacts on cane grass habitat due to grazing and wallowing (HLA Report, 2005).

## 3.5 Cultural Environment

The main Aboriginal groups of the region are the Ngaliwurru and Wardaman people. The Ngaliwurru people are associated with country south of the Victoria River from Timber Creek to the Victoria Highway Inn and to the southern side of the Stakes Range. The Wardaman people are linked to country east of the Victoria River – north and south of the Victoria River Inn.

Aboriginal archaeological sites have been recorded adjacent to sections of the Victoria Highway, with some sites recorded in the study area. No sites exist at the four bridge crossing sites and the Aboriginal Areas Protection Authority (AAPA) has issued approvals for the road alignment including bridge locations.

## 3.6 Socio-economic

The road easement along the Highway to be upgraded by this proposal is 100m wide and is owned by the NT government and managed by DPI. The key stakeholders are users of the

Highway and those landholders and managers adjacent to the Highway and its proposed impact areas.

The Victoria Highway is a primary route for tourist, freight and defence transport in the region. Tourism is a significant component of Highway use, especially in the dry season, when 20% of the total road volume are vehicles towing caravans. Many potential visitors are discouraged from visiting during the wet season due to the potential for road closures from flooding. Other users include maintenance crews of the main trunk Optic Fibre Cable (OFC) which is the key carrier of north-south telecommunications. The upgrading of bridges and pavement would provide much higher flood protection for transport using the road and allow for enhanced regular heavy truck movements and tourist access during the wet season.

The socio-economic issues relating to the project include:

- Economic benefits of reducing closure of Highway due to flooding. These delays and weight restrictions that may be required to protect saturated pavements result in direct impact on freight and tourist movements;
- Employment and training opportunities – maximum local employment and business opportunities would be established;
- Gregory National Park uses and users – management of access to visitor facilities and adjoining properties during construction would be required; and
- Disruptions and road closures may affect adjoining property owners and managers.

# 4 Environmental Impact Assessment

## 4.1 Introduction

The purpose of this Assessment Report is to evaluate the environmental protection measures of the project proposal and to determine whether the proposal can proceed without unacceptable environmental impacts. This is done by identifying all potential environmental impacts and evaluating the corresponding safeguards or mitigation measures suggested by the proponent. Where the proposed safeguards are considered insufficient, or where a safeguard is significantly important, recommendations are made in this Report to complete or emphasise those commitments made by the proponent.

The environmental acceptability of this project is based on consideration of the following information from the PER and Supplement:

- adequacy of information outlining the proposal (particularly which structures or activities are likely to impact the environment);
- adequacy of information on the existing environment (particularly environmental sensitivities);
- adequacy of information on the range and extent of potential impacts; and
- adequacy of the proposed safeguards to avoid or mitigate potential impacts.

The outcome of the environmental impact assessment for this proposal is that the Environment Protection Agency Program is reasonably confident that ultimately the Upgrade can be managed in an environmentally appropriate manner, however information that allows such a conclusion to be reached has not yet been presented. In particular information pertaining to the assessment of the gravel and fill extraction sites has not been provided.

Given that the final location and assessment of the gravel and fill extraction sites for the project has not been included as part of this assessment process, the EPA Program requires that once the final locations are known and assessments are conducted, the information is provided to the EPA Program to complete its assessment of that component of the project.

Consequently, the gravel and fill extraction sites and associated issues are considered to be outside the scope of the current environmental assessment process. Upon receipt of this information, the EPA Program can complete its assessment of the project. The final location and assessment of the gravel and fill extraction sites for the project will be subject to review to the satisfaction of the relevant Northern Territory Government agencies prior to approval of works.

Based on its review of the PER and the proponent's response to submissions from relevant Northern Territory Government agencies the Environment Protection Agency Program considers that the rest of the project can be managed without unacceptable environmental impacts. This is provided that the environmental commitments and recommendations detailed in the PER, the Supplement, this Assessment Report and in the final RFT are implemented and managed under the environmental Management Plan (EMP) for the project and are subject to regular compliance auditing and reporting.

Each recommendation (in **bold**) is preceded by text that identifies concerns, suggestions and undertakings associated with the project. For this reason, the recommendations should **not** be considered in isolation.

Subject to fulfillment of Requirement 1 and subject to decisions that permit the project to proceed, the primary recommendations of this assessment are:

**Recommendation 1**

**The proponent shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards:**

- **identified in the Victoria Highway Upgrading to Improve Flooding Immunity, Public Environmental Report and Supplement to the Public Environmental Report; and**
- **recommended in this Assessment Report (No. 56).**

**All safeguards and mitigation measures outlined in the Public Environmental Report and Supplement are considered commitments by Department of Planning and Infrastructure and are included in Appendix 1 of this report.**

**Recommendation 2**

**In accordance with clause 14A of the *Environmental Assessment Administrative Procedures (1984)*, the proponent must advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required. In the event that the project does not commence within five years, the project is to be reconsidered as to whether a new assessment is required.**

The principal environmental issues associated with the proposal are:

- The location, assessment, development and rehabilitation of fill and gravel extraction sites;
- The potential impacts on threatened fauna species, in particular the purple-crowned fairy-wren;
- The potential impacts on significant vegetation communities, in particular the biologically rich cane grass habitat that supports populations of the purple-crowned fairy-wren and a number of other conservation significant species;
- Impacts of construction activity on soils and erosion and sediment control;
- Weed management; and
- Monitoring, auditing and ensuring the contractor implements and complies with all requirements arising from the PER, Assessment Report and Environmental Management Plan.

The remainder of Section 4 deals with issues raised in the government submissions to the PER and the proponent's commitments to environmental management provided within the PER and Supplement. In addition, recommendations to strengthen environmental management strategies and safeguards are presented. The Supplement adequately addressed some issues which require no further discussion. The outstanding environmental issues that remain are addressed below or are required to be provided to the EPA Program as additional information to complete the assessment.

## 4.2 Road Gravel and Fill Material Extraction Pits

Gravel is required for road construction projects for use in the upper-most road layers, to provide strength to carry traffic loads. A total of 50,000$m^3$ of gravel would be required for the Upgrade project to raise the level of the highway as well as for strengthening, widening and maintenance activities. The extraction, processing and stockpiling of this quantity of gravel would result in a disturbance area of approximately 10 ha and is likely to involve:

- Vegetation clearance from the site and its stockpiling for later re-spreading during rehabilitation;
- Removal of topsoil to a minimum of 100mm depth and stockpiling;
- Excavation of material to be pushed up into stockpiles;
- Loading and carting of gravel material directly to the worksite for placement; and
- Ripping / scarifying the excavation site after use, followed by the re-spreading of topsoil and cleared vegetation to promote rehabilitation.

Screening and crushing of materials and blending of various material types to produce gravel material of a required quality may also occur as part of the above process.

Fill consisting of soil and rock material is used in road construction to build up the base of formation of construction sites. Approximately 350,000$m^3$ of lower grade fill material would be required for the construction of the bridge approaches and raising of the highway. This material can be excavated from lower areas of terrain and transported directly to the worksite. A maximum area of 30 ha disturbance may be involved and would entail a similar process to the gravel extraction pits (excluding screening, crushing and blending activities).

### *4.2.1 Location and Assessment of Extraction Sites*

Gravel and fill extraction has been identified as a potentially significant environmental impact associated with the Upgrade project. A number of submissions highlighted difficulties in assessing potential environmental impacts of extraction when the exact locations of the sites had not been identified.

After the submission of the PER, the AAPA prohibited excavation on the foothills of area 3 (Table 2.2, PER), known as "little Italy" and provided significant restrictions on access to other nominated areas in the Sandy and Skull Creek areas. The proponent was then unable to identify suitable alternative source locations for the gravel and fill extraction prior to the lodgment of the Supplement.

The proponent advised in the Supplement that the choice of gravel and fill extraction areas would initially depend on negotiations with the Northern Land Council and Traditional Owners, followed by outcomes of additional archaeological, biological and geotechnical investigations.

The proponent provided details (Supplement s3) on the process of selecting gravel and fill extraction areas. The EPA Program is satisfied that the proponent will work with other clearance specialists (eg flora and fauna experts and archaeologists) as part of the selection process for possible extraction areas. Once these preliminary clearances are obtained, the proponent would commission full archaeological, flora and fauna surveys of the selected areas and provide the results, and details of proposed management strategies to the EPA Program for final assessment prior to any excavation works occurring.

**Requirement 1.**

**The proponent is to provide details of the gravel and fill extraction sites to the EPA Program for final assessment of this component of works. Details are to include:**

**location, assessment results, potential environmental impacts and proposed impact mitigation measures.**

As part of the Request for Tender, the contractor should include an Extraction Pit Management Plan that includes:

- Compliance or otherwise with Land Clearing Guidelines in relation to setbacks off riparian habitats; and
- Rehabilitation strategy to be implemented upon completion of material removal.

The proponent provided additional detail in the Supplement on the excavation and rehabilitation of extraction areas, utilising relevant industry guidelines such as the "Blue Book[3] ". The measures described in this document are recognised within the industry as 'best practice' and provide an appropriate basis for environmental management of construction sites.

**Recommendation 3**

**An Extraction Pit Management Plan that includes compliance with Land Clearing Guidelines and a Rehabilitation Strategy incorporating relevant industry 'best practice' guidelines (the "Blue Book") must be submitted as part of the information required by Requirement 1.**

### *4.2.2 Operation of gravel/fill extraction sites*

While the specific proposed extraction sites have not yet been identified, the proponent outlined criteria associated with the location of extraction sites (Supplement, s 3.4.6). These include:

- Location of extraction area needs to be as close as possible to the Victoria Highway to reduce the extent of access roads and consequent environmental impacts;
- Extraction area is to be above the influence of flooding;
- Extraction site is to be capable of being drained into local drainage systems (with appropriate sedimentation controls); and
- Extraction site should minimise the area of disturbance, implying deeper extractive layers of material.

When final gravel/fill extraction sites are identified, the proponent will need to demonstrate how the selected sites conform to the above criteria (Requirement 1).

[3] *Managing Urban Stormwater, Soils and Construction Vol 1, 4th Edition*

#### *4.2.2.1 Access Roads*

NRETA provided the comment that all access roads to extraction and gravel pit sites should be closed and rehabilitated on completion of the project. In the supplement, the proponent advised that access roads into and out of the excavation sites would need to accommodate triple road trains and would be constructed to:

- Provide for preferably grades of less than 4%;
- Widths of 7m clear carriageway with provision of rudimentary drainage beyond that;
- Provision for silt and erosion controls;
- Wide curve radii;
- Flat creek crossings, with rocky bases to provide for wet weather access; and
- Roads would be gravel surface unless sub grade was particularly weak and would need dust control for fine surface material.

DPI have committed to locating excavation areas as close as practicable to the Highway, to minimise the length of access roads (refer section 4.2.2). The EPA Program requires that once the final gravel and fill extraction areas are known, the final location, management and rehabilitation of these access roads be addressed as part of the additional information to be provided to the EPA Program (Requirement 1), incorporating mitigation measures listed in section 3.4.6 of the Supplement.

**Recommendation 4**

**Access roads are to be constructed according to the mitigation measures listed in section 3.4.6 of the Supplement and location and management details provided in the information requested by Requirement 1.**

#### *4.2.2.2 Clearing of Vegetation*

Vegetation clearing would be required from the excavation sites and access roads. The proponent has stated that there will be contractual safeguards to prevent over-clearing (clearing would be limited only to actual excavation site and access roads) and that a DPI Surveillance Officer would be present to over-see the process. The proponent has also committed to the following:

- Vegetation would be pushed to boundaries and stockpiled for later re-distribution during rehabilitation;
- No shrubs or trees would be burned; and
- Should a significant stand of trees be encountered within the excavation area, they would be left standing together with a sufficient buffer of undisturbed soil to ensure their survival (DPI's environmental provisions prohibit excavation inside the drip line of trees).

The EPA Program supports the above mitigation measures as well as those listed in sections 4.2.3, 4.2.4 in the PER for management of extraction pit impacts.

### *4.2.3 Potential Gravel Site RG3*

The potential gravel extraction site RG3 was highlighted as a major potential impact associated with the Upgrade project. The RG3 site is a dry gravel bar adjacent to the Victoria

River channel bed, 5 km along the Coolibah Station access road (Fig. 1). The key impacts associated with gravel extraction from this site were discussed in section 4.2.3 (PER) and include:

- Changes to the hydrology of the Victoria River, including accelerated erosion and deposition sites and associated impacts to threatened species (freshwater sawfish);
- Introduction and assisted dispersal of pest plant materials and animals;
- Changes to the habitat diversity and abundance of fauna;
- Vegetation clearance to enable access to gravel sources and for crushing and blending plant and equipment; and
- Impacts on cultural heritage sites.

Concern was raised regarding extraction works interfering with flows in the watercourse or riverbank and that riverbank erosion may result. Subsequent discussions with the proponent have indicated that it is increasingly unlikely that site RG3 would be used for gravel extraction due to other preferred sites. In the event that RG3 is used, the proponent explains that excavation would not occur within the water flow area and a buffer zone of 25m between the river flow and excavation would be maintained.

The proponent has committed to extracting gravel in accordance with gravel extraction guidelines (Landcom, 2004) to ensure river bed or bank erosion or changes to river bed geomorphology does not occur. A detailed study of the Victoria River to determine the amount, replenishment and type of material present at RG3 was undertaken (Appendix C, PER). The results indicate that near RG3, a bed load transport movement of 360,000$m^3$/year could be expected, indicating that the 50,000$m^3$ of gravel extracted could be easily replenished. However, the proponent has not clarified whether the disruption of loose gravel would mobilise other sediments and cause environmental impact. While it is recognised that the finer component would be backfilled into the extraction site, sediments may mobilise because of the extraction and further environmental and archaeological assessment and management recommendations specific to the site would need to be provided as part of the information requested by Requirement 1.

In the Supplement, the proponent has committed to developing specific clauses for operation and rehabilitation of gravel extractions sites in conjunction with the EPA Program once areas are identified. At the stage of the Supplement, the proponent has repeatedly indicated that it is unlikely that the RG3 gravel extraction site would be used. While the mitigation measures listed in section 4.2.3 (PER) have been developed to protect the specific local environment, it is the EPA Program's preference that this site not be used for gravel extraction. The EPA Program agrees with the proponent that it would need careful planning and execution to avoid downstream bed and bank erosion and preserve the existing ecosystem (Table 2.2, PER). In the unlikely event RG3 is selected, full details of environmental and archaeological assessment and management recommendations specific to the site should be undertaken and provided to the EPA Program prior to any commencement of works, as per Requirement 1.

**Recommendation 5**

**The EPA Program recommends that the use of the RG3 gravel extraction site only be considered as a last option.**

In the supplement, the proponent clarifies that an access track to the RG3 site would need to traverse one bank of the river however the track location would be chosen to minimise bank disturbance (ie where the bank is shallow and low). The proponent commits to rehabilitating the access track between seasons and following completion of works to prevent erosion. The rehabilitation would include earthworks to replace the excavated bank and placement of firm materials (rock, rubble, timber) to limit erosion in the area (Section 2.6.4, PER).

**Recommendation 6**

**The location, specific management and rehabilitation measures of the access track must be provided to the EPA Program in the event RG3 is used for gravel extraction.**

### *4.2.4 Rehabilitation*

Gravel and fill excavation is expected to occur over two dry seasons with progressive rehabilitation carried out to allow for germination and growth during the first wet season. The EPA Program questioned whether more rehabilitation details would be provided in the Request for Tender (RFT) document (Appendix B, PER) to the contractor to ensure satisfactory rehabilitation of extraction sites. The proponent responded that the practices identified in the RFT would be specific rehabilitation clauses appropriate to the extraction sites once those sites are identified. These clauses may include the contractor to provide rehabilitation techniques to include details such as:

- Re-distributing stripped topsoil and overburden evenly over the entire area;
- Deep ripping of the area to encourage moisture retention and seed entrapment;
- Details of re-spreading of trees and vegetation; and
- Details for seeding with approved mixes of grasses, shrubs and trees.

In addition, regular maintenance inspections by DPI personnel would be conducted with appropriate recording to identify and rectify problems including:

- Any areas of erosion/sediment deposition;
- Poor vegetative cover;
- Breached diversion banks;
- Blocked drains;
- Slumped batters;
- Sediment basins requiring repair or de-silting;
- Management of sediment basins for three months into the operational period or until formerly bare and disturbed surfaces are 70% revegetated (to ensure water quality issues are not disregarded at the completion of construction); and
- Effective conversion of sediment basins to "spill" basins and their subsequent maintenance.

The EPA Program supports the above rehabilitation procedures outlined in section 3 of the Supplement and once the gravel extraction areas are known, the specific rehabilitation clauses to be submitted in the RFT should be distributed to the EPA Program. While it is not feasible for long term monitoring of rehabilitation to be included as a contractual requirement, the proponent will be required to commit to post completion of works rehabilitation monitoring to ensure successful establishment as part of DPI's Auslink Corridor Maintenance program.

**Recommendation 7**

**Specific rehabilitation clauses and excavation designs are to be provided to the EPA Program for review as part of the information requested under Requirement 1.**

### *4.2.5 Cultural and Heritage Impacts*

The proposed gravel and fill extraction areas are yet to be clearly identified to allow for appropriate archaeological surveys of the areas. However, as discussed in section 4.2.1, further studies would be undertaken during the geotechnical assessments phase of the project. The proponent has committed to also undertaking further surveys if works are required

outside the 50m zone from the centerline of the Victoria Highway from chainages 185km to 220km.

All archaeological and heritage assessments undertaken will be forwarded to the EPA Program. Table 5.11 (PER) details proposed environmental management strategies to protect potential aboriginal, historical and cultural heritage sites or artifacts during construction.

## 4.3 Biological Environment

### *4.3.1 Purple-crowned fairy-wren*

The presence of the listed vulnerable purple-crowned fairy-wren was identified as one of the major potential environmental impacts for the project and also contributed to the proposal being determined as a Controlled Action (listed threatened species and communities) under the EPBC Act. The wren occupies cane grass (*Chionachne cyathopoda* and *Mnesithea rottboellioide)* habitat and a survey conducted by the proponent identified seven sites along the project as containing resident populations for the purple-crowned fairy-wren (Table 4, Appendix D, HLA Report, 2005). The greatest number of birds was recorded at Victoria River, Lost Creek and an unnamed creek. Under the then proposed construction program, at least 19 groups of fairy-wrens and 52 individuals would be displaced and probably perish (HLA, 2005).

In the PER, the proponent has demonstrated commitment to minimise impacts to these species with reassessment of proposed alignments for construction of the four bridges. For example, the greatest numbers of fairy-wren individuals were recorded on the downstream side of Last Creek (refer table 5, HLA Report 2005). As a result, the location of the bridge at Lost Creek was revised from the downstream side (where fairy-wren cane grass habitat is most prevalent) to the upstream side where these is virtually no cane grass present (Supplement, s2.6.9). This has reduced the potential cane grass disturbance and avoided potentially impacting 16 fairy-wren individuals (Table 5, HLA Report, 2005).

In addition, the proponent has committed to provide the contractor with detailed management measures, incorporating specific activities for certain times so that road works impacts to the fairy-wren are minimised. For example, the timing of disturbance to cane grass habitat would not occur during the breeding season July to September. Such planning would ensure that road works activities are less likely to disrupt breeding during that year.

**Recommendation 8**

**On award of the contract, DPI is to specify in the contract, timing for construction works in cane grass habitat to ensure construction activities do not occur during the purple-crowned fairy-wren breeding season.**

The proponent has incorporated the recommended impact mitigation measures listed in the HLA Report 2005 (section 6.2 & section 4.4.5 PER). The proposed mitigation methods to minimise impact on cane grass habitat and the purple-crowned fairy-wren include:

- Investigation of possible opportunities for protection of cane grass areas near the project;
- Rehabilitation of old areas of road by transplanting cane grass clumps removed from the sites of the new bridges;
- Enhancement of sparse areas of cane grass by addition of transplanted cane grass clumps;
- Development of a species-specific management plan as part of the EMP including:
    - Contingency measures to manage sightings of the wren within impact areas during construction;

    - Education of the workforce on the importance of the species and its habitat;
    - Rehabilitation of cane grass habitat that have been disturbed by temporary road works;
    - Transplanting of cane grass clumps to other areas to improve existing habitat quality prior to commencing construction;
    - Erosion control of stream banks to increase cane grass re-establishment;
    - Construction of an access track to site, including clearing of vegetation to enable construction; and
    - Weed control, particularly in areas of cane grass rehabilitation and transplantation.
- Investigation of exclusion of stock and large feral animals; and
- Control of feral animals managed through the NT Parks and Wildlife service.

As part of the contractual conditions, the contractor would be required to employ a suitably qualified person (as agreed to by Biodiversity Conservation Unit, NRETA), for undertaking environmental management of the project to ensure impacts are minimised for all conservation significant fauna species.

The EPA Program considers that the above mitigation measures should be firm commitments (rather than "investigations") and be reflected in the final Rehabilitation and Management Plan for cane grass habitat and purple-crowned fairy-wren populations as part of the contractor's Environmental Management Plan. The EPA Program is satisfied that the mitigation measures listed in the PER and employment of a specialist biologist to advise on fairy-wren habitats and audit conformance of the contractor's EMP, would ensure impacts to this species and other conservation significant fauna species are appropriately managed.

**Recommendation 9**

**As part of the Environmental Management Plan, the Contractor is required to appoint a specialist biologist (as agreed to by the Biodiversity Conservation Unit, of the NT Department of Natural Resources, Environment and the Arts for undertaking environmental management for the duration of project works (2006 – 2009), to advise on fairy-wren habitats and to audit and report on this component of works.**

**The contractor's Environmental Management Plan incorporating recommendations to mitigate fauna impacts made in the PER and Appendix D of the PER (HLA Report), must be submitted to the EPA Program for approval prior to commencement of works.**

*4.3.1.1 Re-location of purple-crowned fairy wren*

Comments on the PER questioned whether the identified pairs of purple-crowned fairy-wrens known in certain impacts areas could be captured using mist nets and re-located to more distant or unoccupied patches of suitable habitat. The proponent sought specialist advice from NRETA regarding capturing and relocating these birds and were advised that relocation would cause too much stress on the bird (Horner, pers. comment Sept 2006). The proponent considers that if the birds relocate voluntarily, they are more likely to find suitable uncontested habitat.

Given that there are no documented cases of successful re-location of the purple-crowned fairy-wren, the EPA Program questions whether re-location effort would result in a positive outcome. The re-location of species would need to ensure the wrens are released in a habitat not already fully occupied by other wrens because relocation may result in the animal not being able to find suitable shelter, being stressed by aggressive interactions with its own kind,

or displacing a resident animal. Any relocation effort would also require long-term monitoring to determine survival rates of re-location.

Since relocation of a territorial species such as the purple-crowned fairy-wren is likely to result in its death, the EPA Program encourages the proponent to implement the mitigation measures in conjunction with rangers from Gregory National Park that address the key threatening processes to the species, namely:

- Reduce damage by grazing cattle to cane grass habitat;
- Reduce weed invasion to riparian and cane grass habitat; and
- Reduce fire damage by altering fire regimes.

The re-location of individual fairy-wrens is not supported by the EPA Program or DEH and the alternative mitigation measures that address key threatening processes to the species (PER and HLA Report, 2005) are to be implemented in preference to any re-location effort.

**Recommendation 10**

**The proponent is to implement mitigation measures and work in conjunction with rangers from Gregory National Park to address key processes threatening habitats of the purple-crowned fairy-wren, namely aiming to :**

- **Reduce damage by grazing cattle to cane grass habitat;**
- **Reduce weed invasion to riparian and cane grass habitat; and**
- **Reduce 'hot-burn' fire damage by altering fire regimes.**

**The re-location of individual purple crowned fairy wrens is not supported.**

### *4.3.2 Cane grass habitat*

In the Upgrade project area, relatively large areas of cane grass areas are present at the Victoria River Bridge, Lost Creek Bridge and on the river bank adjacent to the proposed gravel site RG3 on Coolibah Station. The cane grass habitat was identified as the most biologically rich (species diversity and abundance) with 33 species of terrestrial vertebrates recorded – 15 of which were only recorded in that habitat. The existing cane grass areas between Lost Creek and Victoria River access road were also identified as core breeding area for the purple-crowned fairy-wren.

The extent of cane grass habitat to be removed by the proposal is estimated to be a maximum of five hectares – a significant reduction of proposed clearance that was originally estimated as 16ha (Table 4, HLA Report 2005). Further correspondence from the proponent indicates that the area of disturbance for the construction of Victoria River and Lost Creek bridge has been further reduced to a total area of 2.5 hectares (email correspondence 5th October, 2006). In cane grass areas, the proponent has committed to ensuring the actual boundaries of clearing are nominated on construction plans, flagged in the field and closely monitored under the construction contractor's Environmental Management Plan (Supplement, s2.8.4).

Another mitigation measures proposed by the proponent was to transplant healthy clump specimens within impacted areas to increase the density of approximately five hectares of cane grass as compensatory habitat. In the Supplement, the proponent made the note that cane grass habitat appears to be seasonally dependent with the density and area of suitable cane grass habitat significantly increasing following the above average 2005-06 wet season – without undertaking a single positive strategy to protect or propagate the cane grass. Although the extent of natural re-growth would most likely outweigh any proposed plantings

of compensatory habitat, the EPA Program supports this mitigation measure – particularly in the event of a poor wet season or damage that may be incurred from flooding, fire or cattle. The proponent has committed to the transplanting of cane grass in liaison with representatives from the "Caring for Country" group in Timber Creek and advice sought from Greening Australia (Katherine).

The EPA Program requests the proponent to provide a report on the methodology and outcomes of the five-hectare cane grass compensatory area to relevant government agencies and to make the results publicly available on the DPI web site. The HLA Report also recommended that cane grass distribution and purple-crowned fairy-wren individuals and groups be monitored annually during April – May for at least the first three years post construction (section 6.3, HLA Report 2005). The EPA Program supports this recommendation although acknowledges it would be beyond the scope of the construction contract. Consequently, this long term monitoring should be made as part of DPI's Auslink Corridor Maintenance program (the annual maintenance program that provides Federal funds for routine maintenance projects along National Highway Route) to provide evidence that the upgrade project has not resulted in long term impacts to the fairy-wren species.

**Recommendation 11**
**Areas rehabilitated with cane grass are to be monitored and reported annually for at least three years and on completion of works to determine the success of transplanting in a compensatory area. Monitoring reports are to be provided to the Department of Natural Resources, Environment and the Arts and other relevant stakeholders.**

**Recommendation 12**
**Cane grass distribution and purple-crowned fairy-wren individuals and groups must be monitored annually during April – May for at least the first three years post construction and the results reported to the Department of Natural Resources, Environment and the Arts, as per recommendation from the HLA Report (Appendix D, PER),**

**Recommendation 13**
**Cane grass habitats are to be extended or created nearby to offset areas of this habitat type being destroyed by the proposal. Offset areas are to be at least double the impacted areas of cane grass, and be included where possible into areas protected by long-term management. Transplanting proposals should be supported by local cane grass seed collections, propagation and plantings or direct seeding as appropriate, in consultation with the Department of Natural Resources, Environment and the Arts and Greening Australia.**

### *4.3.3 Fencing of Revegetation Areas*

One of the suggested mitigation measures to reduce impacts to the purple-crowned fairy-wrens was the fencing of the road reserve boundary to prohibit cattle and feral pigs from entering cane grass areas. Subsequent discussions by the proponent with NT Parks and Wildlife Service have indicated that fencing may not be appropriate due to:

- Ability to access sites for fire control;
- Maintenance of the fences following floods; and
- Costs of erecting large lengths of fencing in areas not impacted by the project works.

In the Supplement, the proponent has committed to transplant cane grass from areas that will be cleared during construction to areas that have low density of cane grass or where none currently exists but is of suitable habitat (refer section 4.3.2). The proponent has committed to fence newly transplanted areas with stock-proof fencing until the cane grass has sufficiently established and this is to be done in consultation with the NT Parks and Wildlife Service for areas within Gregory National Park. The EPA Program notes that lay down fencing could be used in areas prone to flooding. Following the satisfactory establishment of cane grass, the fences would be removed to avoid on-going maintenance issues.

**Recommendation 14**
**Prior to removing fences around revegetation areas, assessment of the success of establishment of transplanted cane grass areas should be carried out by a suitably qualified person and the results submitted in a report to the Department of Natural Resources, Environment and the Arts.**

### *4.3.4 Feral Animals*

The fauna impact assessment identified twelve pest species recorded in the nearby Gregory National Park with six pest mammal species recorded in the study area (DPI 2005, HLA 2005, Horner & Archibald 2005). These species included:

- feral cattle (*Bos Taurus*);
- water buffalo (*Bubalus buabalis*);
- horse (Equus caballus);
- cat (Felis catus);
- feral pig (*Sus scrofa);* and
- black rat (Rattus rattus);

Cane toads (*Bufo marinus*) also occur in the region and have been subsequently recorded in large numbers at all fauna assessment sites. The project has the potential to increase the abundance and dispersal of the cane toad and other pest species – particularly if construction activities encourage their breeding.

The fauna impact surveys conducted for the PER indicated that grazing and wallowing of buffalo and feral cattle is detrimental to cane grass habitat. The EPA Program recognises that feral animal control is an issue beyond the scope of this project alone; however encourages the proponent to work with the Gregory National Park rangers during and after the proposed road works to control feral buffalo, cattle and pigs. Therefore, a management program for the effective control of introduced pests within the project area should be a specific implementation measure in the Environmental Management Plan

In order to provide ongoing management of remaining cane grass habitats from feral animals, a positive offset program to control feral animals by means of aerial shooting is supported by NT Parks and Wildlife Service. The feral animal control program is to be undertaken by experienced NT Parks and Wildlife staff. Such a program will require funding for three years and then could be continued by NT Parks and Wildlife Service after that time.

**Recommendation 15**
**Feral animal management incorporating mitigation measures outlined in the PER (App.D and s4.4.6) are to be included as a specific implementation measure in the Environmental Management Plan. The proponent must liaise with Parks and Wildlife Service, and the Department of Natural Resources, Environment and the Arts, on a feral**

**animal control program within the Gregory National Park for a minimum of three years as a positive offset measure to road works impacts.**

### *4.3.5 Terrestrial Fauna*

Table 4.3 (PER) lists the threatened fauna species of conservation significance listed under the EPBC Act and TPWC Act. A comment was received regarding the impacts of the project on non-threatened fauna species. The proponent responded that additional studies would be undertaken on the specific effect on threatened and non-threatened fauna species once the actual locations of gravel extraction areas are clearly defined (refer 4.2.1).

The PER states that while most of the conservation significant species are unlikely to occur in the project area, the final Environmental Management Plan would include mitigation measures for these species that would be implemented if they are recorded during construction. The EPA Program recommends that the suitably employed biologist be allowed sufficient time to record the presence of any significant fauna species and implement appropriate mitigation measures in areas planned for road works prior to any construction disturbance.

The EPA Program is satisfied that the implementation strategies and measures of the draft EMP (Table 5.3, PER) will address the fauna management requirements in the final EMP to be submitted to NRETA and EPA Program for review and approval prior to the commencement of any works. The proponent needs to be aware that the Biodiversity Conservation Division of NRETA have launched a draft proposed changes to the Threatened Species List of the NT and this revised list should be referred to in the contractor's EMP (http://www.nt.gov.au/nreta/wildlife/threatened/publicconsultation/index.html#changes)

**Recommendation 16**
**The planning stage is to ensure sufficient timing is allocated for the biologist to detect the presence of conservation significant fauna and the implementation of appropriate mitigation measures prior to any road work construction activities commencing in the area.**

### *4.3.6 Aquatic Fauna*

Impacts to aquatic fauna were identified in the PER process to occur either from proposed extraction of gravel from the Victoria River site RG3 or from the construction of the bridge over the Victoria River site (the other three bridge locations are dry over the dry season). A fauna survey was conducted by de Lestrang and Wedd in November 2005 to ascertain the presence of threatened or endangered species of freshwater elasmobranchs (sawfish, sharks and rays). A follow-up post-wet season aquatic fauna was conducted following the 2005/06 wet season to describe seasonal change in aquatic fauna and was included in Appendix B of the Supplement.

Although no elasmobranches were recorded during the post wet season survey and only the freshwater whipray (*Himantura chaophraya)* in the post wet season survey, the occurrence of sawfish (*Pristis microdon* and *P. clavata)* are known in the upper reaches of the Victoria River (Thorburn *et al.,* 2002). The aquatic fauna report indicates any impact to the aquatic fauna community by the proposed works would be of minor local significance if:

- Excavation is carried out greater than 25m from the existing river channel;
- Extraction occurs in the dry season;
- Area is rehabilitated to allow existing river flows to be maintained;

- Depressions are removed to allow water to drain freely to the river channel; and
- Small areas of vegetation along the water that are potential freshwater crocodile and turtle nesting sites, are avoided.

The proponent has accepted these recommendations which will be included in the project EMP to be implemented as part of contractual conditions.

While the likelihood of sawfish presence is considered low (given that only one whip ray was captured over two intensive sampling periods), if the species is detected during construction, the proponent has committed to seek advice and assistance from the Department of Primary Industry, Fisheries and Mines (DPIFM) to relocate the species to an area not affected by the Victoria River bridge construction (refer section 2.3.1, Supplement, 2006). The proponent should also consult with the Biodiversity Conservation Unit, NRETA should any threatened aquatic fauna species be detected, and to obtain an approval permit prior to any re-location efforts. The EPA Program notes that the proponent has committed to the appointment of a specialist biologist to advise on environmental management of the project who should assist in the detection and possible re-location requirements of sawfish in the area.

**Recommendation 17**

**The mitigation measures recommended to prevent aquatic fauna impacts are to be included as part of the project Environment Management Plan. If RG3 is the chosen gravel extraction site the six recommendations made in the aquatic faunal report (de Lestrang & Wedd, 2005) are to be incorporated into the final Environmental Management Plan.**

### *4.3.7 Flora Impacts – Vegetation Clearing*

Concern was raised on the extent of vegetation clearing required for excavation areas and the construction camp, stockpile and storage areas. In the Supplement the proponent clarified that while the precise location of excavation areas are unknown (see section 4.2.1), the volume of required excavation has decreased since submission of the PER (80,000$m^3$ gravel to 50,000$m^3$ and 430,000$m^3$ fill to 350,000$m^3$) and total disturbance would remain below 40 hectares. This issue will be subject to further assessment as per section 4.2.

The proponent has clarified in the Supplement that the contractor would be directed under the terms of specification to establish the construction camp within the lands of the Victoria River Inn, under a commercial agreement with the Inn Manager. This area has been previously cleared of native vegetation although some further clearing of existing vegetation may be required. The EPA Program recommends that any further clearing be in accordance with *Land Clearing Guidelines* (NRETA, 2006) principles. There would be no additional areas cleared of vegetation for storage areas as storage of bridge building materials would occur on new road alignments leading to the new bridges.

The proponent clarified that the extent and nature of rehabilitation would be dependent on the agreement between the contractor and Inn manager with written approval of rehabilitation measures from the Inn manager required prior to final payment to the contractor. The EPA Program recommends that rehabilitation procedures for any works required within the lands of the Victoria River Inn are at least consistent with DPI's Specifications and are agreed to by DPI and the EPA Program.

**Recommendation 18**

**The establishment of the construction camp must aim to remain within existing cleared areas of the Victoria River Inn to minimise additional vegetation clearance. Any further clearing should be in accordance with the NT *Land Clearing Guidelines* (NRETA, 2006) principles. The EPA Program recommends that rehabilitation procedures for any works required within the lands of the Victoria River Inn are consistent with the Department of Planning and Infrastructure's Specifications and are agreed to by the Department of Natural Resources, Environment and the Arts.**

The vegetation assessment of the project area and region has been based on broad scale vegetation mapping information from NRETA (1:1 000,000). Comments received on the PER indicated the data presented in the PER was not sufficient to identify the potential impacts on flora of conservation significance as a result of gravel extraction and therefore additional floristic surveys would be required (refer section 4.2.1). In the Supplement the proponent has committed to commissioning flora surveys of final gravel and fill extraction areas to substantiate the assessment of Lewis *et al.* (2006) which will be addressed as part of the Environmental Management Plan. These floristic surveys are to provide information on sensitive or significant vegetation communities and the presence/absence of rare, endangered or threatened species. The surveys should enable comment on the appropriateness of native vegetation clearing at those proposed sites (refer Recommendation 3).

**Recommendation 19**

**As per Requirement 1, floristic surveys are to be conducted in gravel and fill extraction areas to provide information on sensitive vegetation communities and the presence and absence of threatened species. Comment should be provided on how this information has been used in determining the gravel and extractive sites, and on the appropriateness of proposed native vegetation clearing at the proposed sites.**

Although 13 flora species were recognised as significant, the majority of the associated habitats are confined to locations not proposed for development and therefore no substantial impact is anticipated. The area proposed for development is 80 hectares and located in areas already impacted by human disturbance (eg highway corridor and pastoralism). The following mitigation measures were proposed by the proponent:

- The extent and level of disturbance, particularly in restricted vegetation communities, will be limited to that only necessary to complete the works – clearing undertaken by contractor would be monitored by both the contractor's quality assurance plan and DPI Supervisors;
- Vegetation outside the impact corridor will not be disturbed;
- Weeds will be controlled;
- The old road and bridge sites will be rehabilitated and appropriately revegetated with local indigenous species similar to adjoining vegetation;
- Rehabilitation and revegetation works will be implemented during or directly after construction – all gravel/fill pits will be rehabilitated in accordance with DPI's standard Specification (PER –App.B, s3 and Supplement s3);
- Rehabilitated and revegetated areas will be monitored on a regular basis during construction and for one year following construction; and
- Following 12 months post construction, DPI will be responsible for monitoring and maintaining rehabilitation sites if required.

The recommendation from the flora survey (Lewis *et a.*, 2006), was that the clearing of native vegetation is compliant with the NT *Land Clearing Guidelines* (2006)

(http://www.nt.gov.au/nreta/naturalresources/nativevegetation/clearing/guidelines/pdf/landclearargdlns_2006). While the clearing of native vegetation provisions do not apply to roads, the guidelines should be used by the contractor to guide how vegetation clearing can be conducted in a manner that will minimise adverse environmental impacts. Such environmental impacts that may result due to land clearing include land degradation and loss of biodiversity by increased soil erosion, increased weed infestation, disturbing the natural cycling of nutrients within the environment, damaging and destroying native wildlife corridors and reducing water quality. Aspects such as site selection, operation techniques (including timing, felling and ongoing management) and the need for erosion and sediment control measures must be considered in the planning stage (NT *Land Clearing Guidelines*, 2006).

**Recommendation 20**
**All clearing of native vegetation should be compliant with the NT *Land Clearing Guidelines* (2006) and in a manner that will minimise adverse environmental impacts. A Vegetation Management Plan is to be submitted as part of the final Environmental Management Plan.**

The EPA Program questioned how the extent and level of disturbance in restricted vegetation communities would be minimised to that area only necessary to complete works. The proponent responded that precise definition of available areas for disturbance would be shown on the construction plans, sensitive habitats would be flagged in the field and regular site communication to avoid accidental extension of these disturbed areas would prevent unnecessary clearing.

**Recommendation 21**
**Special reference to the extent and level of allowed vegetation disturbance is to be emphasised by the proponent in the Request for Tender, on construction plans, at pre-tender meetings and any sensitive habitats must be flagged in the field to avoid accidental extension of vegetation clearing.**

## 4.4 Erosion and Sediment Control

Alluvial soils associated with the Victoria River and heavier, potentially cracking clays around Lost Creek have high erodibility when disturbed (Stewart, 1970). The potential impacts implied thus include:

- Loss of soil, seed bank, nutrients and soil fauna;
- Development of unstable erosion surfaces and accelerated erosion; and
- Generation of nuisance dust from exposed and disturbed surfaces.

The proponent has acknowledged that adequate stabilisation and prevention measures are required to minimise accelerated erosion risks. The mitigation measures indicated by the proponent in the PER and Supplement to minimise soil loss are as follows:

- Most earthmoving would be undertaken during the dry season and specific erosion control measures would be addressed in the contractor's Erosion Management Plan;
- Surface water run-off would be managed to prevent potential accelerated soil erosion incidences;
- Construction activities would be managed to avoid or minimise accelerates soil erosion; and

- Dry exposed surfaces would be watered for dust control.

The EPA Program questioned the proponent on how surface water run-off would be managed to prevent accelerated soil erosion. In the Supplement, the proponent committed to submit a clause in the Request for Tender to ensure contractors address and control run-off issues. In addition, the proponent proposed adding further specific erosion and sedimentation measures to the RFT requiring the contractor to develop an erosion and sediment control plan describing the following:

- Erosion and sediment control measures required before clearing and grubbing;
- How upstream water would be managed so that it is not polluted by construction activities;
- Scour protection measures for haul roads and access tracks when these are an erosion hazard;
- Methods for stabilizing temporary drains;
- Methods to minimise erosion during construction of embankments;
- Methods for constructing batters to assist retention of topsoil on batter slopes;
- Methods for stabilizing temporary drains;
- Methods for maintenance of erosion and sediment control basins;
- Detail of inspection and maintenance program for all anti-erosion and sediment controls; and
- Measures to minimise erosion and control sedimentation from stockpiles.

The EPA Program supports the above measures to be added to the RFT and is satisfied that with implementation of the erosion and sediment control plan and regular inspection and maintenance programs, erosion issues can be adequately managed. It is important to note that "good practice" extends beyond the preparation of an erosion and sediment control plan and it is equally important that the plan be appropriately implemented and monitored, and the monitoring results be used to improve implementation or revise the plan if required in response to identified issues.

**Recommendation 22**

**The proposed erosion and sedimentation mitigation measures made in the PER and Supplement are to be incorporated in the Request for Tender document as specific clauses that the contractor must develop. The final Erosion and Sedimentation Control Plan must be submitted to the satisfaction of the Department of Natural Resources, Environment and the Arts and EPA Program.**

The EPA Program notes that the contractor will have a contractual obligation to monitor and repair any erosion issues that may occur 12 months after completion of works. In the Supplement, the proponent indicated that DPI would be responsible for monitoring and maintaining soil erosion and sedimentation controls beyond this period. The EPA Program recommends that this monitoring program should be detailed to allow sufficient review of the effectiveness of erosion and sediment control of the project.

**Recommendation 23**

**The proponent will be responsible for monitoring and maintaining soil erosion and sedimentation controls beyond the contractor's 12 months Defects Liability period after completion of works for a minimum of 3 years post completion or until areas are monitored and reported as stable.**

## 4.5 Weed Management

Road construction activities have the potential to introduce new weeds and assist the dispersal of existing weeds. NRETA provided comment that the proponent is to use the current list of NT declared weeds (including Gamba grass) and that contractors should ensure that preventative weed control is carried out where required prior to beginning road works. The potential for infestation by Gamba grass (*Andropogon gayanensis)* is high and it recommended that all disturbed areas are monitored during the wet season (when no contractors are on site) for potential weed infestations and appropriate control measures are taken. The proponent has noted that these requirements will be in the Request for Tender and DPI is to enforce the Specification requirements under contractual conditions.

The main area of risk in spreading weeds will be associated with the fill and gravel extraction areas. A Weed Control Management Plan would be an obligation under the construction contract and would include recommendations made by NRETA to:

- Minimise risk of weed seed spread by sourcing fill/gravel from areas of no weed incursions or by controlling weeds prior to setting of seed (ie during the preceding wet season);
- Destroy weeds prior to any vegetation clearance;
- Regularly monitor extraction areas and access tracks for new weed incursions;
- Wash down all vehicles, plant and equipment at a commercial facility before they are brought onto the project site;
- Demonstrate post construction that areas of weed infestation have not increased as a result of construction activity, prior to any signing off signifying that works are completed;
- Inclusion of Mission grass and *Hyptis suaveolens* as Class B Declared Weeds present in the project;
- Propose control measures for the 2006-07 wet season (October 2006 – May 2007) to prevent seed production, including at extraction pit locations;
- Acknowledgement that any fill, gravel or vegetation containing weed species seeds should not be moved from one location to another;
- Remove weeds prior to disturbance and use clean machinery;
- Control any new weed incursions as soon as practical; and
- Clearly define wash down facilities with strict management guidelines, assigned and monitored by the appropriate party.

**Recommendation 24**
**As part of the Environmental Management Plan, a Weed Management Plan incorporating the Department of Natural Resources, Environment and the Arts recommendations from the Supplement (s2.6.16) is to be submitted as part of contractual conditions.**

The EPA Program notes that the mitigation measure of washdown of vehicles at commercial washdown facilities is not adequate as transporting machinery may result in contamination and weed seed spread along roadsides.

**Recommendation 25**
**Washdown facilities on-site are to be established, clearly defined and their use enforced as part of the Weed Management Plan. Strict management guidelines are to be assigned**

**and closely monitored to prevent these sites becoming a source of future weed infestations.**

In the PER (s4.4.3), the proponent has committed to develop and implement a Weed Management Plan for construction and one year post construction. The proponent has also committed to control of weeds in cane grass rehabilitation areas. The recommendation made in the HLA Report is for weed control to continue after the road works and rehabilitation is completed, for at least three years, with particular emphasis on control of Noogoora Burr. This should also be implemented by the proponent.

**Recommendation 26**
**Weed control is to occur for at least three years post construction, to maximise the re-establishment of high quality cane grass habitat, as per recommendations in the HLA Report (PER, App.D).**

## 4.6 Social Impact

The EPA Program acknowledges that the proposal has positive support from various government agencies. Tourism NT notes the proposal would decrease the annual average times of road closure at the Victoria River, Joe Creek, Lost Creek and Sandy Creek and therefore reduce the likelihood of stranded travelers at the Victoria River Inn. The upgrade would improve visitor access to the region in the wet season and increase visitation in the traditional low season and reduce the impacts of seasonality on tourist businesses. Other agencies commented that the project would improve road safety, reduce flood impact and benefit business and industry in the region including Kununurra and Ord River Irrigation Area region.

As indicated in the PER, the proponent would commit to maintaining communication with the Department of Defence to minimise the impact of road construction activities on the mobilisation of the Bradfield Field Training Area. The proponent would also need to work in partnership with other Northern Territory Government agencies to ensure that targeted employment and training programs are provided early as possible to maximise local employment.

**Recommendation 27**
**The proponent is to consult with the NT Department of Business, Economic and Regional Development to ensure that targeted employment and training programs are provided to local indigenous groups prior to commencement of works.**

As a result of the highway upgrade and potential increase in visitor numbers to the region, the EPA Program strongly recommends the proponent coordinate public education on the protection of cane grass habitat and the purple-crowned fairy-wren, as recommended in the HLA report (2005). Rather than just focusing on the potentially impacting activities of the road works, the proponent should also take the opportunity to initiate public education based on the findings for this formal assessment process. For example, the HLA Report (2005), suggests information boards at the Old Victoria River Crossing camp site and Roadhouse should be established, interpreting the importance of cane grass and suggesting ways that fairy-wrens can be observed without disturbing the habitat [HLA Report, (2005), s6.5].

**Recommendation 28**
**The proponent liaise with park rangers from the Gregory National Park on the establishment of public education boards promoting the importance of cane grass habitat and ways to observe the birds without disturbing their habitat.**

## 4.7 Monitoring, Auditing and Reporting

The regular monitoring and auditing of activities to allow assessment of contractor conformance with the EMP will form an integral role in managing environmental impacts. The EPA Program questioned the frequency of project reviews and who would be responsible for undertaking the audits. DPI responded that project reviews would occur at the 50% and 90% stages of completion. Environmental design reviews could occur at these points. Monthly site audits would also be undertaken by the Superintendent's full time surveillance staff against a checklist developed specifically for the project. In addition, the contractor's EMP would include a schedule of environmental audits and reporting to DPI and the EPA Program.

Regular supervision by DPI and the specialist biologist employed for the duration of the project should ensure the contractor complies with the EMP. The proponent would issue Corrective Action Request (CARs) where there are identified non-conformances with the EMP. The EPA Program requests that the audit reports and any non-conformances of the EMP are reported to the EPA Program.

**Recommendation 29**
**The proponent undertake a monthly site audit and any non-conformances with EMP committments be reported to the EPA Program stating response actions and effectiveness of the Corrective Action Requests.**

### *4.7.1 Environmental Management Plans*

The (draft) management plans outlined in the PER included the following issues applicable to the project:

- Erosion and Sediment Control Plan
- Vegetation Management Plan
- Weed Management Plan
- Rehabilitation and Management Plan for cane grass habitat and purple-crowned fairy-wren
- Extraction Pit Management Plan

These management plans will need to be revised to incorporate the additional measures for environmental protection and monitoring that are contained in this Assessment Report. The management plans will be used for implementing management and monitoring commitments made by the proponent in the PER and the recommendations detailed in this Assessment Report. Further to these amendments, the EMPs will be working documents for the duration of the project and will require continual review in light of operational experience, monitoring results and changed circumstances.

**Recommendation 30**

**Environmental Management Plans covering construction of the Victoria Highway Upgrade project are to be submitted to the EPA Program for approval prior to commencement of construction. Any proposed EMP amendments once works have begun should be submitted to the EPA Program for approval. In preparing each management plan, the proponent is to include any additional measures for environmental protection and monitoring contained in this Assessment Report and recommendations made by the Northern Territory Government with respect to the proposal. The plans are to be referred to relevant NT Government Agencies for review prior to finalization. The plans will form the basis for approvals and licences issued under relevant NT legislation.**

# 5 References


De Lestang, P. & Wedd, D. (2005) *Aquatic Fauna Survey of Proposed Road Pavement Quarry RG3, Victoria River, Northern Territory,* Department of Primary Industry, Fisheries and Mines, Department of Natural Resources, Environment and the Arts.

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HLA-Envirosciences Pty Ltd (2005), *Purple-crowned Fairy-wren Habitat Survey 185 – 220km, Victoria Highway*, Appendix D, PER.

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Northern Territory Planning Scheme (2006), *Land Clearing Guidelines*, Technical Report No. 27/2002, Department of Natural Resources, Environment and the Arts.

Stewart, G.A. (1970), Soils of the Ord-Victoria Area. In *Lands of the Ord-Victoria Area, Western Australia and Northern Territory,*Land Research Series No. 28.

# Appendix 1

The following table summarises the key commitments and statements of proposed preventative and management measures made by the Department of Primary Industry (DPI) in the PER and Supplement to the PER. While not all preventative and management measures proposed by the proponent have been detailed in this table, all commitments and measures proposed, along with the recommendations in this Assessment Report must be fulfilled by the proponent for the project to be implemented in an acceptable manner. These commitments and management measures are to be managed under the project's Management Plans within the contractor's Environmental Management Plan.

| **Commitment/Safeguard** | **Section** | |
|---|---|---|
| | **PER** | **Supplement** |
| **Planning** | | |
| Proponent shall ensure the proposal is implemented in accordance with the environmental commitments identified in the PER, Supplement, subsequent correspondence and recommendations in this Assessment Report. | | |
| Proposed changes to the project to be referred to Minister for determination under the *Environmental Assessment Act.* | | |
| Detailed design and documentation of the road and bridge works will be undertaken by DPI, which will ensure all requirements arising from the PER are addressed during the design phase | 2.4.3 | 2.8.1 |
| **Landform** | | |
| Cut faces will be constructed to minimise the potential for accelerated erosion and catastrophic failure of the slope. This will include selecting a cut slope (batter slope) that will be stable in the type of parent rock or soil material that comprises the cut face. Additional geotechnical assessment of these areas will be undertaken by the contractor | 4.2.1 | |
| At the top of all cut slopes, a cut-off table drain will be constructed to intercept water that would otherwise flow over the slope and cause accelerated erosion. The drain will redirect water away from cut face of slope and may be lined with non-erosive materials (eg rock or an erosion control material such as bio-degradable matting). The ends of the drain will be "flared: to divert and disperse water along the contour of the slope. If this is not possible, the outlet will have a protective layer of rock over soil surface to prevent erosion. | 4.2.1 | |
| The width of fill sites and fill better slope will be largely controlled by proximity of Restricted Work Areas associated with Sacred Sites. If the slope becomes to steep to be stabilised with conventional rehabilitation techniques, specific engineering solutions (eg. retaining walls, gabions, rock armouring, geo grid, crib walling) will be required. | 4.2.1 | |
| All bare areas and slopes will be revegetated using native plant species from the local area as part of the construction programme – will involve maintaining stockpiles of vegetation and topsoil cleared from each construction area | 4.2.1 | |
| | | |
| | | |
| **Soils** | | |
| Most earthmoving will be undertaken during the dry season and specific erosion control measures will be addressed in the contractor's Erosion Management Plan | 4.2.2 | |
| Surface water run-off will be managed to prevent potential accelerated soil erosion incidences | 4.2.4 | |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| Construction activities will be managed to avoid or minimise accelerated soil erosion, particularly in areas of high soil erodibility (eg unconsolidated alluvium adjacent to Victoria River) | 4.2.4 | 2.8.10 |
| Dry, exposed surfaces will be watered to prevent dust generation | | |
| Contractor will be required to develop an Erosion and Sediment Control Plan as part of the EMP | | 2.8.10 |
| DPI will be responsible for monitoring and maintaining soil erosion and sedimentation controls beyond the contractor 12 months defects liability for a minimum of 3 years post completion or until areas are reported stable | | |
| **Gravel Borrow Material – Terrestrial and Riparian Sources** | | |
| The outcomes of additional archaeological, biological and geotechnical investigations for potential terrestrial and riparian gravel sources are to be provided to the EPA Program when available | 4.2.3 | |
| Gravel extraction from the river bed, if undertaken in accordance with gravel extraction guidelines, will not cause river bed or river bank erosion or changes to river bed geomorphology in the long term. | 4.2.3 | |
| Material sourced from existing and new terrestrial quarry sites will be extracted and rehabilitated by the contractor in accordance with DPI's environmental management Specification for borrow materials extraction area rehabilitation. | 4.2.3 | |
| The proponent is to provide details on how the location of gravel and fill areas fulfil the constraints outlined in section 3.4.6, Supplement | | 3.4.6 |
| River bed material will be extracted in accordance with accepted standards and published guidelines | 4.2.3 | |
| If RG3 is used, recommendations made by NRETA and other relevant government agencies regarding extraction of gravel from the site will be implemented | | 2.8.11 |
| Extraction of river bed material will only be conducted in the dry season and extraction will not be within 25m of river banks | 4.2.3 | 2.3.1 |
| The maximum depth of excavation will not be greater than 1m and will follow natural river bed contours, and slopes on excavations will not be steeper than 4:1 (H/V). | 4.2.3 | |
| Material will be extracted following natural contours to ensure that river bank and bed stability is not adversely affected. Impacts to outer bends of the river will be avoided so that natural flow areas are preserved. | 4.2.3 | |
| Channel bed deposits will be mined selectively and carefully and impacts will be managed by:<br>– Avoiding all archaeological sites and biologically sensitive areas along the banks that will be marked in the field and maps as "no go" areas<br>– Recording the profile and characteristics of the proposed excavation sites by survey plans and photographs prior to excavation to use as a baseline for rehabilitation of sites<br>– Not quarrying deposits on the channel bank, some of which are relatively stable<br>– Not making holes that could induce turbulence<br>– Creating a smooth profile and outline of the final excavated shape<br>– Avoiding pools and riffles and all biologically sensitive areas<br>– Constructing the excavated shape to mimic the original shape to ensure river stability and biological function | 4.2.3 | |
| All extraction areas will be graded to ensure water drains freely and does not form pools | | |
| Hydraulic function (water flow characteristics) in the river will be maintained to avoid downstream erosion and ensure nil or minimal impact on the eosystem | 4.2.3 | |
| All borrow sites will be operated and managed using best practice techniques and the extraction site and disturbed areas will be rehabilitated using best practice techniques. | 4.2.3 | |
| If underlying tenure of gravel sites is freehold, the proponent is to acquire an EMP or EML before removing material | | 2.3.2 |
| Any listed sites for gravel and fill extraction outside the road corridor fall within the *Mining Management Act* and *Mining Act* | | 2.3.2 |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| Access roads are to be constructed according to mitigation measures listed in Supplement and location and management details provided in the EMP for review by the EPA Program | | 3.4.6 |
| If RG3 site is used, a survey to identify any turtle and crocodile nests will be undertaken, identified by flagging and avoided by ensuring that excavation does not occur within a suitable distance (to be advised by Biodiversity Unit, NRETA) | | 2.3.1 |
| **Fill (soil) Extraction Material** | | |
| Fill material will be sourced to a maximum depth of 2m, from an area of 25-30ha. | 4.2.4 | |
| Undertake further assessment of potential environmental impacts of the proposed use of the areas as sources of borrow material | 4.2.4 | |
| Provision to the EPA of the results for all of the surveys and development of specific management measures | 4.2.4 | |
| Extraction of fill material carried out in accordance with DPI environmental Specifications for borrow pits and rehabilitation | 4.2.4 | 2.8.12 |
| Operation and management of borrow sites using best practice techniques | 4.2.4 | |
| Rehabilitation of borrow sites using best practice techniques | 4.2.4 | 2.8.7 |
| Commitment to long term monitoring of extraction sites to be made as part of DPI's Auslink Corridor Maintenance program | | 2.8.5 |
| **Construction Camp and Rehabilitation** | | |
| DPI to ensure via its contract specification and ongoing compliance audits that the contractor complies with all relevant acts | | 2.4.1 |
| DPI to ensure contractor conducts an assessment on the sewage treatment plant at the Victoria River Inn prior to requesting approval from the Katherine West Health Board | | 2.4.2 |
| Potable water requirement to be included in requirements for the establishment of the camp area nad included in the construction specification | | 2.4.3 |
| DPI to specify in construction contract specification that contractor establishes the camp within the area of the Victoria River Inn. | | 2.3.3 |
| As part of the DPI contract specification, DPI will require that the Inn manager signs off that the camp area has been satisfactorily rehabilitated before final contract payments are made | | 2.3.3 |
| **Hydrology and Water Quality** | | |
| An EMP will be developed, implemented and audited for all of the project. A key plan in the EMP will be management of accelerated erosion by the contractor in accordance with DPI's contract Specification. | 4.3.1 | |
| The main construction activities that cause surface disturbance will be undertaken during the dry season | 4.3.1 | |
| Stabilisation, rehabilitation and revegetation of disturbed areas will be undertaken progressively following construction | 4.3.1 | |
| The management measures provided in section 2.8.6 of the Supplement are to be implemented for construction of the Victoria River Bridge | | 2.8.6 |
| **Flood Events** | | |
| A schedule of construction activities and timing will be developed by the contractor to determine what activities (if any) can safely be undertaken during higher risk periods for flooding | 4.3.2 | |
| Weather reports will be monitored during the wet season to determine the potential for flood events to occur in the near future | 4.3.2 | |
| **Remnant pools and surface water** | | |
| Within the tributaries of the Victoria River, no remnant pool will be used as a source for construction water | 4..3.3 | |
| Within the Victoria River, water may be obtained for construction purposes when the water level in the river provides sufficient capacity – requiring approval from Advisory and Regulatory Services (Water), NRETA | 4.3.3 | |
| Remnant pools in watercourses will not be used as a source on construction water and will be established as a condition of contract | 4.3.3 | |
| Water from any remnant pools of water adjacent to construction sites will be "No-go" areas and be established as a condition of contract | | |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| The contractor is required to obtain approval from NRETA to extract water from any source as part of DPI's standard construction contract conditions | 2.6.4 | |
| **Underground water resources** | | |
| An assessment of existing bore quantity, quality and drawdown effects for any bores proposed to be used is to be undertaken by the construction contractor | 4.3.4 | 2.8.13 |
| The contractor will consult with and seek approval from NRETA regarding extraction rates, licensing requirements, contamination prevention measures and conditions of extraction for sourcing construction water from underground water sources | | 2.8.3 |
| DPI will work with NRETA regarding bore locations, ownership and flow rates before any bores are used | | 2.6.5 |
| **Vegetation communities of conservation significance** | | |
| Extent and level of disturbance will be limited to that only necessary to complete the works | 4.4.1 | |
| Vegetation outside the impact corridor will not be disturbed | | 2.8.14 |
| Weeds will be controlled – removal of Noogora burr in cane grass communities not impacted by construction | | 2.8.17 |
| The old road and bridge sites will be rehabilitated and appropriately revegetated with local indigenous species similar to the adjoining vegetation | | |
| Rehabilitation and revegetation works will be implemented during or directly after construction in accordance with DPI's standard Specification for this | | |
| Rehabilitated and revegetated areas will be monitored on a regular basis during construction and for one year following construction. The Proponent to monitor rehabilitated areas of cane grass annually for at least 3 years and a report provided to NRETA and other relevant stakeholders | | |
| DPI to transplant cane grass from areas cleared during construction into areas which have low density of cane grass. Advice will be sort from Greening Australia and new transplanted areas fences with stock-proof fence until cane grass has established sufficiently (1 – 2 wet seasons) Increase density of 5 ha cane grass as compensatory habitat | | 2.6.10, 2.8.17 |
| A suitably qualified person to assess the establishment of transplanted cane grass areas and submit monitoring report to NRETA prior to removing fences around revegetation areas | | 2.6.10 |
| In areas of environmental significance (such as cane grass), the actual boundaries of clearing will be nominated on construction plans and closely monitored under the EMP | | 2.8.4 |
| When preferred gravel and fill borrow areas are identified and agreed by AAPA, surveys for Near Threatened and Data Deficient plant species, as defined by the TPWC Act, will be undertaken prior to construction works | 4.4.2 | |
| If these surveys identify areas of threatened plant species, these areas will be avoided | 4.4.2 | |
| The establishment of construction camp to remain within existing cleared areas and where additional vegetation clearance is required; the contractor to obtain necessary permits. Vegetation Management Plan to be submitted as part of the EMP will be subject to EPA Program and other relevant agency review | | 2.6.6 |
| Clearing of native vegetation is compliant with NT Land Clearing Guidelines | | |
| **Weeds** | | |
| DPI's policy for weeds management will provide the basis for the management actions with strict requirements for machinery cleanliness when entering and working adjacent to National Parks | 4.4.3 | |
| Declared and environmental weeds will be identified and areas of infestation will be marked in the field and on construction maps prior to construction | | |
| Weed management plan will be developed in consultation with staff of the NTPWS at Timber Creek to assist in identifying best management and preferred practices for the control of weed species | | |
| Weed management plan will accord with the weed management priorities and actions developed for the Gregory National Park | | |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| Weed management plan will be developed and implemented for construction whilst these areas are operational and for one year post-construction, for species and populations considered to be moderate to high risk weeds. | | |
| Weed management plan will address issues of plant, equipment and personal hygiene to eliminate the transfer of weed material | | |
| Weed Management Plan will be included as an obligation under the construction contract incorporating the recommendations made in the Assessment Report | | 2.6.13, 2.6.16 |
| As per recommendation of HLA Report, 2005, weed control to occur for at least three years post construction to maximise the re-establishment of cane grass habitat | | |
| Post construction areas of weed infestation should be marked on maps to demonstrate weed infestation has not increased as a result of construction activity prior to signing off completion of works | | 2.8.15 |
| **Fauna species** | | |
| Minimise disturbance impacts to areas of cane grass | | |
| Gravel will not be extracted from any permanent pool within the Victoria River | | |
| Only those materials within the raised channel bed deposit may be extracted | | |
| Extraction of gravel from Victoria River site RG3 occurs in dry season | | |
| Area is rehabilitated to allow existing river flows to be maintained | | |
| Depressions caused by works are removed to allow water to drain freely to the river channel | 4.4.4 | |
| Small areas of vegetation along the water edge, which are potential freshwater crocodile and turtle nesting sites, are avoided. | | |
| An end of wet season aquatic fauna survey will be undertaken and additional management strategies will be developed based on the outcomes of the survey | | |
| A dry season fauna survey will be undertaken laster in 2006 to assess seasonal variation of habitats and species composition. | | |
| Development of specific mitigation measures to be incorporated in the construction environmental management plan based on the outcomes of the assessment | | |
| Minimisation of the impact on vegetation (ie habitat) to that area necessary to complete works. | | |
| Any processing sites, stockpile and blending sites at RG3 will not be located in or adjacent to areas of cane grass. | | |
| Investigation of possible opportunities for protection of cane grass areas in the near vicinity of the project | | |
| Investigation of fencing of the road reserve boundary to prohibit cattle and feral pigs from entering cane grass areas along the reserve | | |
| Rehabilitation of old areas of road by transplanting cane grass clumps removed from the sites of the new bridges | | |
| Enhancement of sparse areas of cane grass by the addition of transplanted cane grass clumps | | |
| Development of a species-specific management plan as part of the EMP including those recommendations made on page 4.34 PER. | | |
| Investigation and where practical, implementation of the exclusion of stock and large feral animals, which may involve fencing of cane grass habitat areas, both inside and outside the road reserve, and particularly adjacent to major watercourses | | |
| Control of feral animals such as buffalo, cattle and pigs during construction (proposed to be managed through the NTPWS). | | |
| Contractor to employ a suitably qualified person (as agreed by the Biodiversity Conservation Unit, NRETA) for undertaking environmental management of the project. | 4.4.5 | 2.6.16 |
| Extent and level of disturbance will be limited to that only necessary to complete works | | |
| Known nesting trees for white-bellied sea-eagles will be avoided by clearing activities where possible | | |
| Construction activities will be undertaken in a manner that ensures disturbance producing activities are completed efficiently to minimise the duration of impacts | | |
| Stringent development and implementation of strategies will be undertaken to ensure that water pollution is prevented | | |
| Removal and relocation of crocodiles from worksites may be undertaken if required | | |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| Areas will be rehabilitated to allow the existing flow regime to be maintained and to eliminate depressions and abrupt changes in the contour of the river bed (RG3) | | |
| Construction activities within the Victoria River will be undertaken outside the potential spawning season (ie beginning of wet season) where practical | | |
| Stringent development and implementation of strategies will be undertaken to ensure that water pollution is prevented. | | |
| Construction activities within the Victoria River will be restricted to a time of year that minimises additional pressures on individual species, as determined by survey and consultation with experts | | |
| As part of the EMP, a species-specific management plan will be developed that includes contingency requirements if the species is recorded during construction. If necessary, re-location of individual away from construction areas may be undertaken under an approval permit. | | |
| Sufficient timing in the planning stage will be required for the biologist to detect presence of conservation significant fauna and implementation of appropriate mitigation measures prior to commencement of activities | | |
| Should the *Pristis* (sawfish) spp. Be found during construction, DPI will seek advice and assistance from DPIFM, NRETA to relocate the species to an area not affected by bridge construction | | 2.3.1 |
| Additional surveys will be undertaken on the specific effect on threatened and non-threatened fauna species once the actual locations of extraction areas are clearly defined | | 2.6.8 |
| The re-location of individual purple-crowned fairy-wrens is not supported and alternative mitigation measures listed in the PER and HLA Report, 2005 are to be implemented in preference to any re-location efforts | | |
| **Pest Animal Species** | | |
| Construction management for pest animal species will be incorporated into the EMP to minimise the risk on construction activities spreading pest animals | 4.4.6 | |
| Wastes (particularly food) will be appropriately managed to minimise potential benefits to black rat populations | | |
| Natural predators of rats (eg owls, snakes and goannas) will be allowed to remain in project area | | |
| Plant and equipment hygiene will be maintained to prevent accidental transportation of cane toads | | |
| Approved traps and effective cane toad disposal will be used | | |
| Feral animal management incorporating mitigation measures outlined in Appendix D and PER will be included as a specific implementation measure in the EMP | | |
| **Air Quality, Noise and Vibration** | | |
| Complaints register will be kept and actioned immediately by contractor | 4.5 | |
| Vibration impacts on OFC signal will be monitored by Telstra | | |
| OH & S requirements for working in dusty areas will be enforced by contractor | | |
| TMP will establish safe travel requirements for construction works and general road users | | |
| Earthworks will be watered to ensure compaction and control dust generation | | |
| Access roads to borrow pits and other construction sites will be watered to ensure adequate dust suppression | | |
| Active borrow areas will be sprayed with water to reduce possibility of dust emissions | | |
| Re-instatement and revegetation works will be undertaken in all disturbed areas | | |

| Commitment/Safeguard | Section | |
|---|---|---|
| | PER | Supplement |
| Vegetation cleared as part of roadworks will be used during revegetation, either whole or mulched | | |
| **Waste Management** | | |
| Demolition of old bridges and salavage of materials – if they cannot be recycled, they will be buried in old borrow pits | | |
| Domestic waste will be buried in a pit and covered daily by an earth layer | | |
| All liquid and hard wastes would be removed from the field and returned to the depot with spill kits a component of all in-field service vehicles | | |
| Major services and repairs would only be undertaken at the depot | | |
| Waste Management plan will be part of EMP and illegal dumping and littering prohibited. | | |
| DPI will advise contractor about any specific requirements for waste disposal | | |
| Any solid waste disposal sites would follow NT EPA Program *Guidelines for the Siting, Design, & Management of Solid Waste Disposal Sites in the NT.* | | |
| On-site sewage and sullage treatement systems will comply with the management of wastewater according to the NT *Code of Practice for Small On-site Sewage and Sullage Treatment Systems and Disposal or Reuse of Sewage Effluent* and the *Public Health Act.* | | |
| **Environment Management Plans, Monitoring and Reporting Strategies** | | |
| DPI to liaise with park rangers from Gregory National Park on establishment of public education boards promoting the importance of cane grass habitat and ways to observe the purple-crowned fairy-wren with disturbing the habitat | | |
| Issues discussed in 2.6.16 Recommendations to be addressed in an Environmental Management Plan | | 2.6.16 |
| DPI to provide full time site surveillance so that the contractor's EMP is constantly monitored for conformance | | 2.8.1 |
| Monthly site audits to bu undertaken by the Superintendents full time surveillance staff | | 2.8.21 |
| Contractor's EMP to include a schedule of environmental audits | | 2.8.21 |
| Environmental Management Plan to be submitted to the EPA Program for approval prior to commencement of construction | | |