Chapter 11

Parks, Reserves and Areas of High Conservation Value

PACIFIC **ALUMINIUM**

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11 Parks, Reserves and Areas of High Conservation Value

Areas of high conservation value are typically identified by governments, scientists, Aboriginal traditional owners and private land owners from a number of criteria relating to the habitats, assemblages of species, communities or landscapes they support. These areas with high conservation value are acknowledged as 'special' on the basis of particularly high biodiversity in a particular area, unique assemblages of species, or other significant features/characteristics. Frequently, these sites also hold important recreational and cultural values.

In some cases, the conservation value of these areas has been formally recognised by their inclusion in protected areas, such as National Parks, reserves and the two Indigenous Protected Areas (IPAs) in north-eastern Arnhem Land. In other cases, they have been included on lists of nationally or internationally significant wetlands or bird habitat. Many of these have also been deemed, by the NT Government to be "Sites of Conservation Significance," on the basis of five criteria: presence of Threatened species, wildlife aggregations, wetlands, endemic species and botanical significance.

Sites of Conservation Significance are not specifically protected by law but have been identified by the Northern Territory Government for the purposes of prioritising planning for off-reserve conservation activities.

This Chapter describes the conservation and cultural values associated with these areas and their management priorities. An assessment is made in how project specific management actions would align with management plans and programs for these areas.

11.1 NATIONAL PARKS AND RESERVED AREAS

The alignment of the pipeline corridor was selected to avoid existing national parks and reserves, and none would be directly impacted by pipeline construction activities. The nearest national park or reserve to the proposed pipeline corridor is Cutta Cutta Caves Nature Park, approximately four kilometres north of the pipeline near KP10 (Figure 11-1). Other parks and reserves in the region (from west to east) and their approximate distances from the pipeline are:

- Nitmiluk (Katherine Gorge) National Park (20 km).
- Kintore Caves Conservation Reserve (27 km).
- Kakadu National Park (65 km).
- Elsey National Park (36 km).
- Limmen National Park (92 km).

Kakadu National Park is the most significant National Park in the region and is classified as a World Heritage Site by the United Nations Educational Scientific and Cultural Organisation (UNESCO). Kakadu is also an internationally designated RAMSAR site. The 292,800 ha Nitmiluk National Park is owned by the Jawoyn Aboriginal people and is jointly managed with the Parks and Wildlife Commission of the Northern Territory. The park is classified as an IUCN Category II – National Park, designated for its ecological integrity and on the basis that it provides spiritual, scientific, educational, recreational and visitor opportunities (DSEWPaC 2013b). Cutta Cutta Caves Nature Reserve was designated as a nature park in 1979 and provides habitat for a range of species particularly those associated with chemically weathered limestone (karst) landscape (PWC 2012). Kintore Caves Nature Reserve includes caves of scientific and archaeological significance. The caves contain an Aboriginal art gallery consisting of paintings and engravings (DLPE 2012).

The Warddeken and Djelk Indigenous Protected Areas are 76 and 66 km, respectively, northwest of the pipeline (Dhimurru and Laynhapuy IPAs are discussed in Section 11.2).

The environmental noise assessment (Appendix L) indicates sensitive receptors beyond 2 km were not considered for assessment as modelling indicated that noise levels would be within guideline limits at these distances. Although not specifically addressing potential impacts on Cutta Cutta Caves Nature Reserve, the vibration assessment indicated any blasting along the ROW would be within acceptability criteria at a distance of 1.5 km from the ROW (Appendix L). Requirements for blasting are subject to detailed geotechnical investigation and should blasting be proposed in proximity to Cutta Cutta Cave Nature Reserve, further vibration assessment would be conducted. Dust from construction along the ROW would be unlikely to impact any National Park or Reserve. The Air Quality Assessment (Appendix G) indicates that air quality goals for particulates would be likely achieved at distances less than 1 km downwind (either perpendicular or parallel with ROW).

No significant increase in visitation numbers at Cutta Cutta Caves Nature Park or other Parks in the region would be expected during the construction period. The construction workforce would be scheduled to a roster of 28 days on/9 days off, fly-in, fly-out, leaving little recreational time for workers in the region.

11.2 INDIGENOUS PROTECTED AREAS

11.2.1 Description

The pipeline corridor passes through two IPAs in the far northeast of the East Arnhem Region, within 150 km of Nhulunbuy and the Gove Peninsula: Dhimurru IPA and Laynhapuy IPA (Figure 11-1). IPAs are not formally declared under Northern Territory or Commonwealth Government national park legislation but represent a significant commitment by Aboriginal land owners to manage their lands to protect their conservation values. Powers for the control of activities on IPAs are sourced from the underlying land tenure (Aboriginal freehold secured through the *Aboriginal Land Rights (Northern Territory) Act 1976.* Approvals for installation and operation of the pipeline would therefore have to be secured through the NLC, which administers Aboriginal lands included in both IPAs.

All IPAs form part of Australia's National Reserve System. In declaring their lands as IPAs, the Traditional Owners receive financial and technical support from federal and NT government conservation agencies to assist in their management.

Dhimurru IPA (KP550 – KP600)

The Dhimurru IPA was declared by the Dhimurru Land Management Aboriginal Corporation in November 2000 (and recognised by the federal government, DSEWPaC, on 1 December 2000) and is an IUCN *Category V – Protected Area managed mainly for landscape/seascape conservation and recreation*. The IPA covers 920 km^2 of coastline and hinterland country on the western edge of the Gulf of Carpentaria, within the traditional lands of the Yolngu people. It covers approximately 101,000 ha, of which 9,000 ha is marine estate (DAC 2008). The Dhimurru IPA does not include the town of Yirrkala, the Marrngarr Community or the bauxite mine and alumina refinery on the Gove Peninsula.

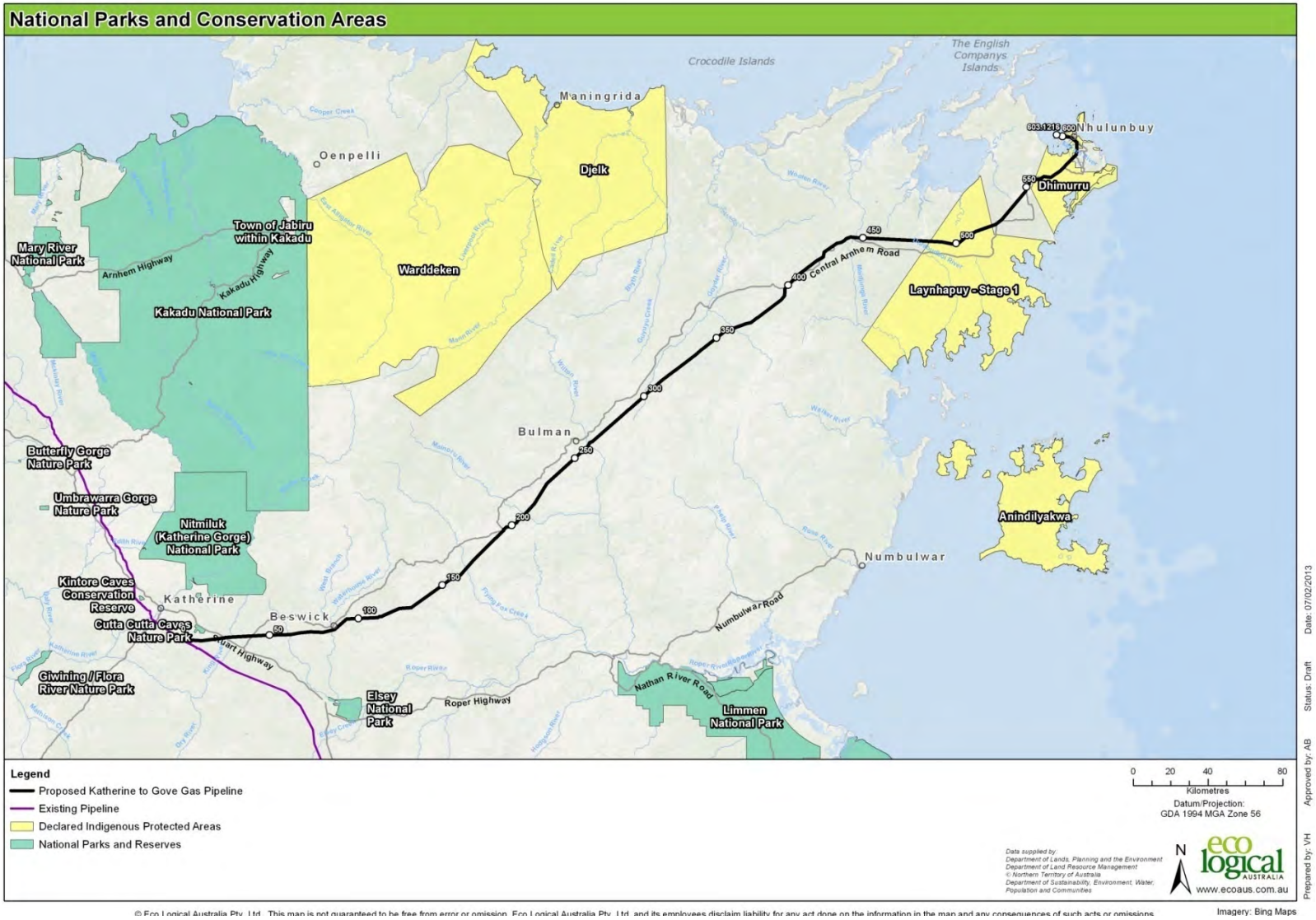

Figure 11-1: National Parks, Reserves and Conservation Areas in the KGGP Project Area.

The Dhimurru Aboriginal Corporation (DAC) manages the IPA according to the *Dhimurru IPA Plan of Management, 2008-2015* (DAC 2008). One of the key objectives in creating the IPA was to deal with risks to the natural and cultural values of the area from growing numbers of visitors and Nhulunbuy's expanding population, including damage to fragile dune and beach zones from vehicles causing erosion and destroying wildlife habitats. The Plan of Management identifies the following as key natural heritage values to be protected:

- High plant biodiversity, with a large number of endemic plant species (found only within the IPA).
- Intact faunal assemblages, including representatives of species not recorded from protected areas elsewhere in the NT.
- The Arnhem Coast bioregion, which is not included in any other protected area of the NT and therefore has a high priority for conservation.
- The Quaternary dune system, which is the largest example of this geological feature on the NT mainland.
- Significant feeding habitat and nesting sites for sea birds and for several threatened species of marine turtles.

The focus of management approaches is to avoid or minimise threats from overuse and inappropriate use and other risks are associated with weeds and feral animals.

The most significant risk to the natural assets within the IPA is considered to be from overuse and inappropriate use arising from visitor and recreational activities. The primary mechanism to manage use is through administration of a permit system for visitors, which allows visitors access to designated recreation areas. Permit arrangements enable closure of areas for cultural reasons as well as for seasonal wildlife management reasons, such as turtle nesting season.

A number of perennial watercourses are included in the Dhimurru IPA, including Wonga Creek (drains to Port Bradshaw, on the south-eastern shore of the Gove Peninsula), the Latram River and Giddy River (both drain to Melville Bay). Crystal Springs, in the upper (inland) catchment of Wonga Creek, has particular importance as a sacred site close to Gapuru (Memorial Park), which has a campsite adjacent to numerous freshwater rock pools.

The Plan of Management divides the IPA into four management areas:

1. Northern beaches area.
2. Yarrapay.
3. Manydjarraarrnga-Nanydjaka.
4. Southern coastal and inland waterways.

The pipeline corridor passes through the Northern beaches area, Manydjarraarrnga-Nanydjaka, and Southern coastal and inland waterways (Figure 11-2). Each management area has its own visitor conditions (e.g. day use only, camping, fishing, 4WD on designated tracks, etc.).

The weed species posing the greatest threat to the Dhimurru IPA is Perennial Mission Grass, which displaces native species and greatly increases fuel loads, promoting more frequent and hotter fires and extending the length of the burning season. Traditional burning techniques are used to manage fire, which protect the high biodiversity of the IPA.

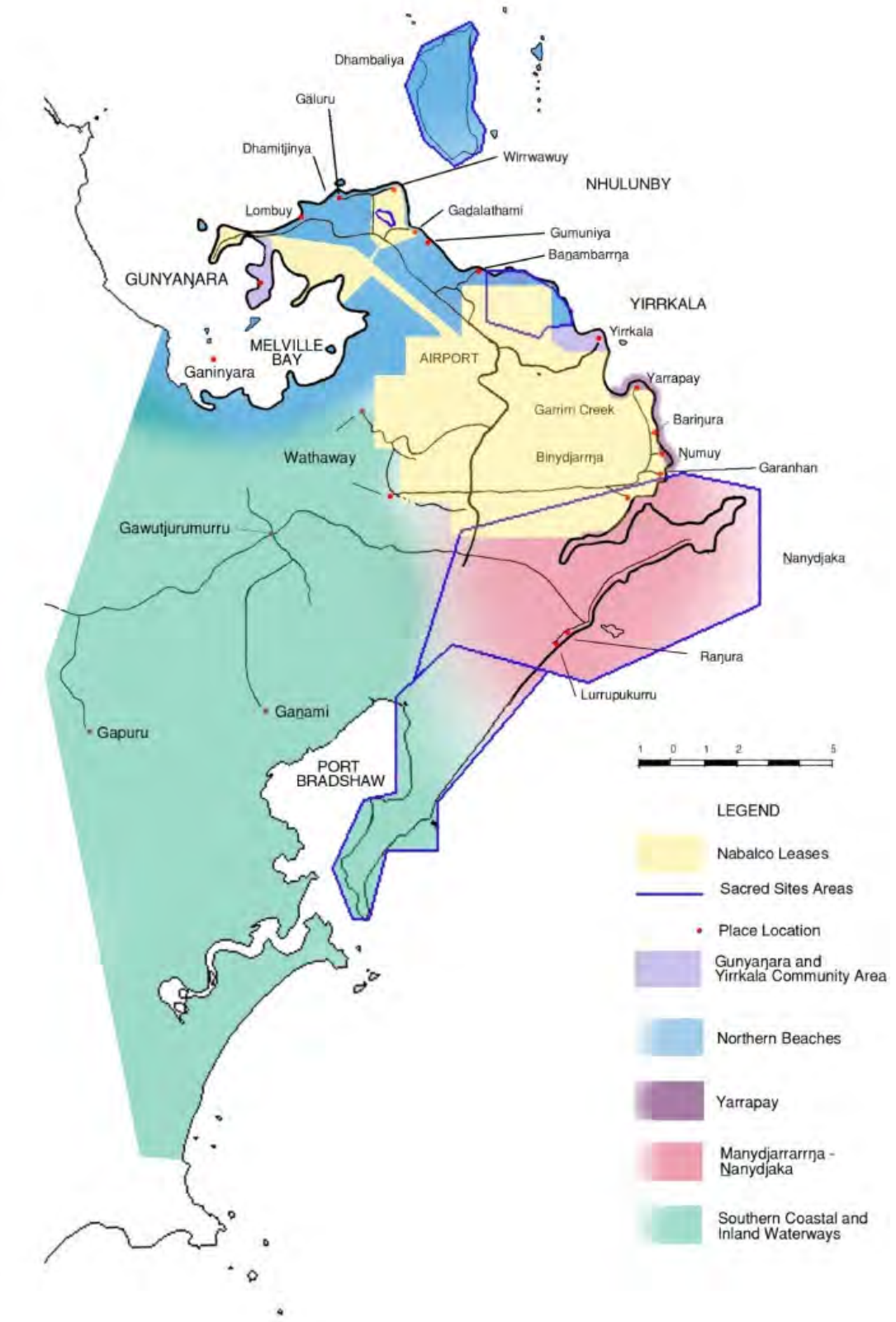

Figure 11-2: Dhimurru IPA management units (Source: Dhimurru IPA Management Plan - reproduced with permission from the Dhimurru Aboriginal Corporation www.dhimurru.com.au)

The two key feral species are pigs and buffalo, which trample and damage vegetation, water holes and coastal swamps. The Plan of Management commits to maintaining and improving control of weeds and feral animals. Management plans developed for the KGGP Project would reflect consultation with the DAC to ensure that management actions were consistent with the Dhimurru Plan of Management and its targeted component plans to deal with specific issues, including feral animals and control of weeds and fire.

Laynhapuy IPA (KP480 – KP520)

The Laynhapuy IPA was declared by the Laynhapuy Homelands Association Incorporated (LHAI) in September 2006, and is an IUCN *Category VI – Protected Area managed mainly for the sustainable use of natural ecosystems*. This category recognises that the natural environment and rare flora and fauna are virtually intact, in addition to the area containing internationally-significant wetlands and coastal landforms.

The Laynhapuy IPA is larger than the Dhimurru IPA, covering 6,900 km^2 of land and 630 km of coastline, including the northern half of the Blue Mud Bay coastline. By mid-2013, the Laynhapuy IPA is expected to be substantially expanded to include12,000 km^2 of land and 7,500 km^2 of sea, and the updated Plan of Management, covering the whole area, will be released at that time (David Preece, IPA Manager. *Pers. comm. 15 March 2013*).

The Laynhapuy IPA is administered by the Laynhapuy Homelands Association Incorporated (LHAI), with most of the on-the-ground management done by the Yirralka Rangers.

The April 2006 Management Plan for the Laynhapuy IPA recognises both the natural and cultural values and discusses arrangements for managing visitors and helping Yolngu communities be involved in tourism, including planning for commercial activities. Harvesting bush foods/bush medicines and sale of wildlife; hunting safaris; aquaculture; and harvesting of feral animals such as water buffalo are some of the potential commercial enterprises based on the living resources in the IPA. The Plan also outlines joint management opportunities to work with the Dhimurru IPA rangers and Anindilyakwa Rangers from Groote Eylandt and nearby islands.

The Action Plan describes actions in the following key management areas:

- Managing visitors.
- Protecting cultural sites.
- Plants and animals (terrestrial biodiversity).
- The Sea and coast.
- Economic development.
- Building capacity (education and training).

In addition to the Laynhapuy IPA Management Plan, the Yirralka Rangers are implementing two management programs for feral animals:

- Management Program for the Water Buffalo in the Laynhapuy IPA, 2009-2014.
- Management Strategy for Feral Pigs in the Laynhapuy IPA, 2009-2011, with funding from the NT and Australian Governments.

The LHAI considers the feral pig management strategy to be still current, and its activities have been integrated into an updated action plan for feral animal management (David Preece, DHAI Pers. Comm. April 2013).

Conservation values of the Laynhapuy IPA include the following:

- Coastal vegetation comprising well-developed heathlands, mangroves and saline flats, with extensive floodplain and wetland areas.
- Inland areas where the dominant vegetation type is savannah eucalypt woodland, with smaller areas of monsoon rainforest and freshwater vegetation.
- The coastline and islands, which contain significant marine turtle breeding habitats as well as significant seabird breeding, feeding and roosting habitats (ANU 2008).

The Yirralka Rangers undertake similar management activities to the Dhimurru Rangers, including

- Eradication of Yellow Crazy Ants.
- Control of feral pigs and buffalo.
- Fire management.
- Weed control.
- Collection of marine debris.
- Collection of 'ghost nets'.
- Collecting data on marine and terrestrial living resources, to assist with their sustainable usage, protection and management, including turtle and dugong.

Similar to the Dhimurru IPA, the key management concern is from overuse or unauthorised access, including into Aboriginal sacred sites and other 'no go' areas. The Management Plan included establishing an access permit system similar to that run by the DAC, including mechanisms for permits for Nhulunbuy residents, short-term visitors, and commercial operations.

The plan includes establishing protocols with the Traditional Owners and NLC for coordinated management of authorised visitors and increasing patrols to detect and turn back unauthorised visitors, as well as monitoring visitor impact. As indicated above for the Dhimurru IPA, powers for the control of activities on IPAs are sourced from the underlying land tenure (Aboriginal freehold secured through the Aboriginal *Land Rights (Northern Territory) Act 1976.* Approvals from the NLC would have to be obtained by Pacific Aluminium for installation and operation of the pipeline.

11.2.2 Potential impacts of construction and operation

Installation of the KGGP through both IPAs and, to a lesser degree, routine maintenance and testing over its operational life, have the potential to impact the management of IPAs. The key potential impacts of concern are as follows:

- Introduction and/or spread of exotic plant and animal species (weeds and feral animals), including Mission Grass, Gamba Grass, and Yellow Crazy Ants.
- Clearance of native vegetation and impacts on sensitive habitats and threatened species.
- Disturbance to aquatic habitats and associated changes to recreational values.
- Increased incidence of inadvertent fires, and impacts on flora, fauna, habitats and water quality.
- Increased numbers of authorised visitors into IPAs and resultant impact on natural values.
- Unauthorised access or interference with Aboriginal sacred sites.
- Interference with existing use of and activities within the IPAs from dust or noise generated from construction.

The assessment of risks and proposed management and mitigation measures to biophysical, cultural and social factors that relate to the values in and around the project area, including those within IPAs have been considered in Chapter 5 (Risk Assessment) and addressed in detail in their relevant factor-specific chapters in this Draft EIS.

The relevant chapters addressing potential impacts regarding these general conservation and cultural values include:

- Vegetation (Chapter 8).
- Terrestrial and Aquatic Fauna (Chapter 9).
- Matters of National Environmental Significance (Chapter 10).
- Landform and soils (Chapter 6).
- Water Resources (including watercourses, waterholes and wetlands) (Chapter 7).
- Air Quality (Chapter 12).
- Aboriginal and Historic Cultural Heritage (Chapter 13).
- Land Use, Infrastructure and Amenity Considerations (Chapter 14).

The following describes potential impacts that are most relevant to the management activities currently applied to the IPAs, as expressed through management plans and ranger programs.

Impacts on recreation and cultural values

The key concerns of the DAC and LHAI, in relation to potential impacts from the KGGP project on the recreation and cultural values (and related natural values) of each IPA, are expected to relate to:

- Increased demand for access to the IPAs by construction (primarily) and maintenance workers on their days off, and the impact of increased visitor numbers on the natural values of the IPAs.
- Increased unauthorised visitation onto IPA lands, including trespass onto Aboriginal sacred sites resulting from construction workforce or from the community utilising improved and new access tracks for the pipeline corridor.
- Impacts from increased numbers of visitors or unauthorised access, including the introduction and spread of weeds and feral animals (including Yellow Crazy Ants).
- Altered habitat quality associated with important recreation and cultural sites, for example Wonga Creek and Crystal Springs.

The KGGP would cross the upper reaches of Wonga Creek and its catchment, which contains Gapuru (a popular recreational site) and an Aboriginal sacred site at Crystal Springs (adjacent to Gapuru and less than 10 km from the proposed pipeline) (Figure 11-3).

A construction camp is also proposed approximately 2-2.5 km west of Wonga Creek (KP548). DAC and LHAI are concerned about disturbance of aquatic habitats or deleterious impacts on a number of environmental values of Wonga Creek or its catchment, including water quality, stability of banks, and the introduction or spread of exotic plants and animals (including the Yellow Crazy Ant), from a substantial increase in numbers of approved visitors or trespassers associated with the KGGP project. Any perceivable impact on Crystal Springs would be unacceptable to the traditional owners of the land.

Dust and noise from construction activities also have the potential to diminish recreational use and enjoyment of sites within the IPAs.

Potential to introduce and spread exotic species (weeds and feral animals)

There is potential for the construction activities and longer term existence of the KGGP to introduce or exacerbate the spread of weeds or feral animals within the IPAs. Project-specific programs to manage or control weeds or feral animals could interfere with or be inconsistent with existing effective monitoring and management programs for fire, weeds, pigs, buffalo and Yellow Crazy Ants by IPA land managers.

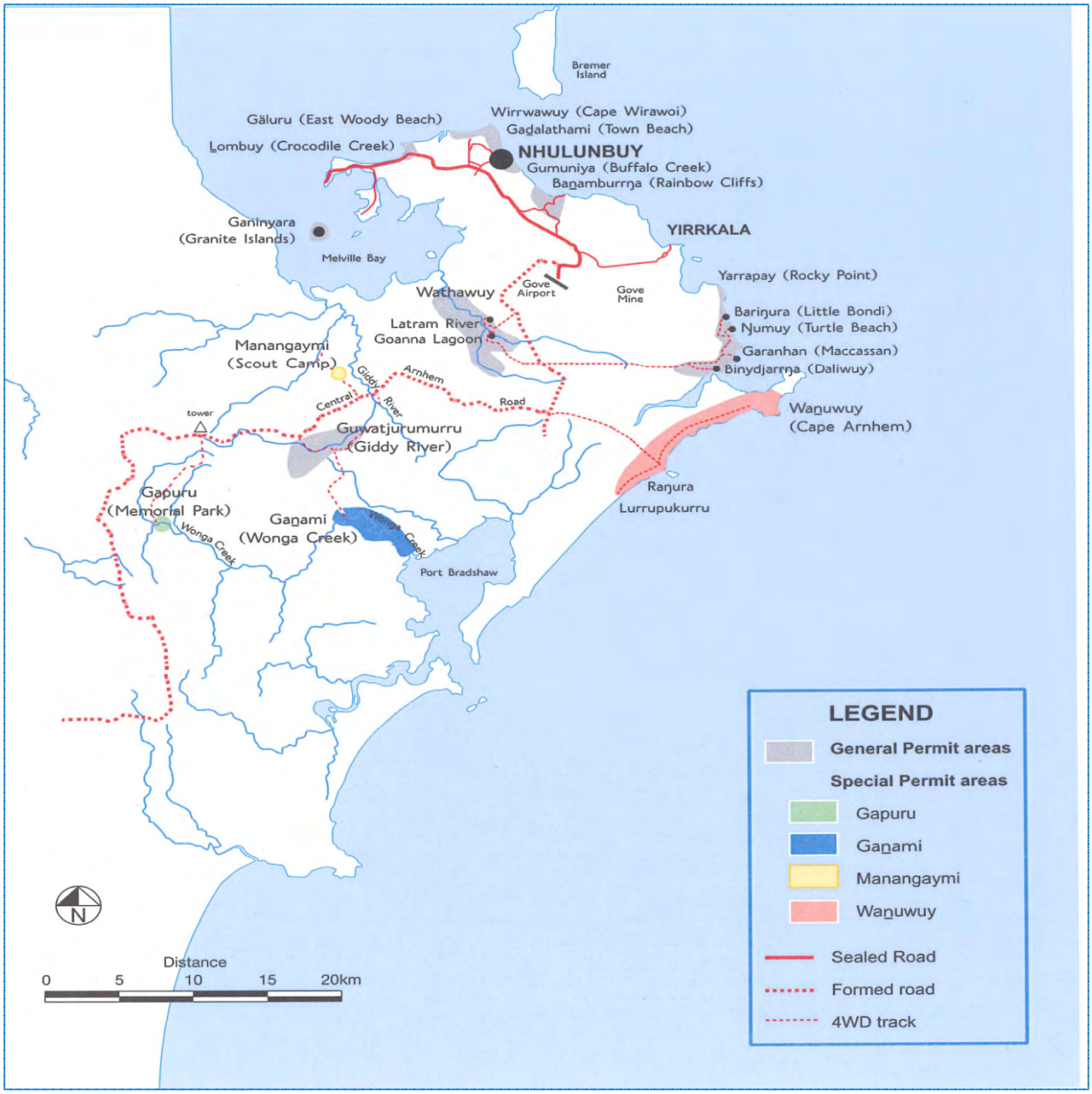

Figure 11-3: Recreational sites and watercourses in Dhimurru IPA (Source: Dhimurru IPA Management Plan - reproduced with permission from the Dhimurru Aboriginal Corporation www.dhimurru.com.au)

The Dhimurru and Yirralka Rangers have for many years implemented monitoring and eradication programs to deal with a range of weed and feral species. They have been particularly successful in eradicating a large number of Yellow Crazy Ant infestations, and the program is progressively eliminating remaining colonies. Construction activities could potentially interfere with this program by, for example, restricting access of Rangers when and where they need to treat colonies.

Pigs and Buffalo are still significant problems in both IPAs, and the Yirralka Rangers are implementing management plans tailored to each of these species. The introduction and spread of weeds in the IPAs (particularly Gamba Grass and Mission Grass) have the capacity to substantially alter existing vegetation communities, and have the secondary potential of promoting intense, hot fires causing widespread damage to fauna habitats and individual fauna.

Impacts on fire management regimes

The KGGP Project would not require controlled burning in the pipeline corridor. Risk of additional burning in the IPAs from construction activities is limited to inadvertent or accidental ignition of fires from vehicles, construction equipment or workforce activities, and the potential effects of increased grassy weeds on fire extent and frequency.

Impacts on the Gove Crow Butterfly

The DAC has been involved in investigating the status of the endemic Gove Crow Butterfly (Endangered, EPBC Act; Near Threatened, TPWC Act) which occupies rainforest habitat when adjacent to eucalypt/paperbark woodland associated with permanent creeks or seepages (detailed in Chapter 10). Disturbance of rainforest habitats or spread of Yellow Crazy Ants through construction activities has the potential to reduce habitat availability or quality for this species.

11.2.3 Mitigation responses and predicted environmental outcomes (post-mitigation)

Measures to mitigate potential impacts on biophysical, cultural and social values within the IPAs are dealt with more generally within the relevant chapters of the Draft EIS, as set out in section 11.2.2.

Coordination of management efforts

Of critical importance to the management of these impacts, in the context of maintaining the ecological and cultural integrity of the region's two IPAs, is that proposed mitigation for the KGGP project would need to be consistent with the well-established management approaches and programs run by the DAC and LHAI. These measures have been particularly effective in managing issues such as weeds, feral animals, fire, and access to culturally and environmentally sensitive areas.

Measures proposed to promote consultation, collaboration and coordination between the implementation of project-specific mitigation measures and the management plans and programs delivered by IPA managers include:

- Specific consultation and input from the DAC and LHAI on the Environment Management Plan for the KGGP Project.
- Continuing funding by Pacific Aluminium of the collaborative Yellow Crazy Ant eradication program within the Gove region (DAC and CSIRO).
- Opportunity for Dhimurru and Yirralka Rangers to participate in project-specific environmental controls such as weed management and rehabilitation.
- Establishment of clear and agreed processes that enable DAC and LHAI to rapidly bring issues to the Proponent's attention during the construction period.
- Opportunity for Dhimurru and Yirralka Rangers to participate in ongoing monitoring of the effectiveness of rehabilitation of disturbed areas and agreed processes to support the DAC and LHAI to bring issues of concern to the Proponent's attention during operation of the KGGP.

Recreational and cultural values

Appropriate management measures for the construction of watercourse crossings using HDD for all flowing watercourses would reduce the potential for construction to adversely affect aquatic habitat or water quality. HDD avoids direct and indirect disturbance of water courses. Should Wonga Creek in the Dhimurru IPA be flowing at the time of construction, HDD would be employed to avoid impacts on Gapuru (Memorial Park) recreational area and nearby sacred site at Crystal Springs. Conventional trenching techniques would be used if Wonga Creek had no flow at the time of construction. In that circumstance, the profile of the watercourse would be returned to preconstruction condition and rehabilitation measures (described in Chapter 2) would ensure the stability of the bank. No impacts on Gapuru (Memorial Park) recreational area and nearby sacred site at Crystal Springs are envisaged using either of the two construction techniques. If, however, Wonga Creek is in flow and HDD cannot be done (e.g. drilling hits impenetrable rock, under the riverbed), then a reactive monitoring program would be developed in consultation with DAC, for early detection and mitigation of excessive addition of sedimentation to Wonga Creek.

Increased visitation of recreational sites within the IPAs by the construction workforce would be unlikely, and access would be managed through the Cultural Heritage Management Plan, which would reflect the preferences of the DAC and LHAI for either issuing permits or banning access (Appendix O). The construction workforce for the KGGP would be employed on a roster of 28 days on / 9 days off using fly-in, fly-out arrangements. Each shift would be 12 hours. This would be expected to leave limited opportunity for visitation of recreational or other sites within the IPAs. Accommodation for workers would be provided at construction camps and induction procedures and the Cultural Heritage Management Plan would reinforce understanding of restricted work areas (to avoid Aboriginal sacred sites) and permit requirements for visiting recreational areas.

The project includes maintenance of a vehicle access track along the corridor, following rehabilitation; however, this would be restricted to a single 4WD track, interrupted by watercourses along the way, to ensure the track would not encourage public use. The pipeline corridor would not be driveable for its entire length within the IPA because of the presence of watercourses and would therefore not become an alternative road. Construction access tracks would be either rehabilitated or if required for ongoing access to the pipeline, consultation would occur with the DAC and LHAI to identify appropriate measures to be employed to discourage unauthorised access.

Exotic species (weeds and feral animals)

The KGGP Project has a significant potential to introduce and spread weed species, causing reduced habitat quality and increased fire risks within the IPAs, particularly for Perennial Mission Grass and Gamba Grass. The risks associated with spread of weeds during construction would be addressed through the Weed Management Plan developed in consultation with the DAC and LHAI and aimed at coordinating with existing programs run by the Dhimurru and Yirralka Rangers (e.g. the DAC *Weeds Management Strategy*). Elements of the Weed Management Plan would include not allowing vehicles, equipment or materials into the project area until or unless they have been assessed as weed free and establishing wash-down or blow-down pads for inspection, cleaning and treatment of vehicles, equipment and materials. Coordinated procedures for weed monitoring and eradication with the project area would be established. With mitigation, the potential impacts of weed spread would be reduced to an acceptable level.

Introduced species management would be focussed on ensuring that existing colonies of Yellow Crazy Ant are not assisted in their spread or introduced to new areas within the IPA. The greatest risk of spread would be from September to November (at the tail end of the construction period), when the new queens are dispersing. At all other times, an entire colony would need to be dispersed and/or translocated, and this is not likely. Risks are therefore highest if soil is carted from an infested area. This is not considered likely from construction within the ROW but could occur if borrow pits were established in areas subject to infestation. Localised works present a low risk. Known colonies of Yellow Crazy Ants have been mapped and would be included on the project GIS system to ensure that borrow pits and any other works requiring transport of soil are avoided. This would be supported through the Introduced Species Management Plan that will include measures including wash-down or blow-down procedures for vehicles and equipment in high risk areas and training for personnel in identification of the ant species. This would be coordinated with the existing DAC and LHAI Yellow Crazy Ant eradication programs. With mitigation measures in place, the potential impacts of spread of Yellow Crazy Ants would be acceptably reduced.

Gove Crow Butterfly

The ROW has been sited to avoid known important habitat and/or populations of the Gove Crow Butterfly. No rainforest habitat (when adjacent to eucalypt/paperbark woodland associated with permanent creeks or seepages), which is the preferred habitat of the species, is to be cleared in either IPA. For these reasons, the KGGP project is not expected to have an impact on the Gove Crow Butterfly.

Fire Ignition

Neither construction of the KGGP nor maintenance of the ROW would require controlled burning. Risks of inadvertent ignition from vehicles, equipment and the workforce would arise and be managed through a Fire Management Plan for the project which would include fitting of spark arrestors on all earth moving equipment, establishment of fire response units and induction programs for the workforce. With mitigation in place, the KGGP Project is not expected to significantly alter fire regimes in the IPAs.

Table 11-1 summarises the mitigation approaches for potential impacts of particular significance to the two IPAs.

Table 11-1: Potential impacts and mitigation outcomes for management of Indigenous Protected Areas

POTENTIAL IMPACT	PROPOSED MITIGATION (ACTION)		ANTICIPATED EFFECT OF MITIGATION
	AVOIDANCE	MINIMISATION	
Disturbance to recreation or cultural sites from increased or unauthorised visitation, or impact on water quality of flowing watercourses, if trenching method is used	HDD used for river Crossing at Wonga Creek if flowing at time of construction	• Induction program and CHMP to reinforce restricted work areas and permit requirements • Shift arrangements significantly limit recreation time available to workforce. • Access track along ROW interrupted by river crossings – not drivable for entire length. • Construction access tracks rehabilitated or • Access controls established for workers required long term.	• No significant increase to visitation of recreation sites. • Any visitation to recreation sites is permitted. • No impact on water quality of Wonga Creek and consequently to Gapuru (Memorial Park) recreational area and nearby Crystal Springs. • Vehicle access to the ROW will be limited and controlled.

POTENTIAL IMPACT	PROPOSED MITIGATION (ACTION)		ANTICIPATED EFFECT OF MITIGATION
	AVOIDANCE	MINIMISATION	
Reduction in habitat quality from spread of Yellow Crazy Ants		• Plant, vehicles, equipment and materials will be required to be certified weed and pest free prior to being brought into the project area. • Systems will be established for reporting of new weed infestations, and Cane Toad and Crazy Ant sightings.	No introduction or spread of ants from vehicles or equipment; therefore, no reduction in habitat quality anticipated.
Reduction in habitat quality from increased fire	• Open ground fires will be prohibited throughout the entire area (except for fire training purposes) • A coordinated approach to bush-fire control will be developed with relevance to surrounding stakeholders • All plant and equipment will be maintained and operated to comply with relevant fire safety standards • Fire not to be used to clear vegetation. • Induction and training of workers.	• Fire fighting equipment will be maintained and operated to comply with relevant fire safety standards • Fire breaks will be maintained around above ground ancillary infrastructure • A fire response unit with trained fire fighters will be readily available at all locations during construction •	No inadvertent ignition of fires, or rapid response to prevent spread; therefore, no reduction in habitat quality anticipated from fires.
Reduction in habitat quality from spread of weeds		• Introduced flora monitoring and control will be undertaken if necessary (refer to Introduced flora control) if introduced flora distribution and abundance encroaches on listed threatened and conservation significant species and vegetation communities • The distribution and abundance of target weed species within the project area will be mapped, recorded, internally reported and monitored • New infestations will be reported as they are discovered	No introduction or spread of weeds from vehicles or equipment; therefore, no reduction in habitat quality from weeds is anticipated.

POTENTIAL IMPACT	PROPOSED MITIGATION (ACTION)		ANTICIPATED EFFECT OF MITIGATION
	AVOIDANCE	MINIMISATION	
		• Hygiene measures will be implemented • Induction and training of workers • Plant, vehicles, equipment and materials will be required to be certified weed and pest free prior to being brought into the project area	
Loss of habitat for Gove Crow Butterfly	Known populations and important habitat has been avoided by ROW		No disturbance to populations or habitat of Gove Crow Butterfly

11.2.4 Summary – predicted environmental outcome

After mitigation is applied, the construction and operation of the pipeline are expected to result in no unacceptable impacts on the conservation values or key management programs and objectives of the Dhimurru and Laynhapuy IPAs. Construction and operational activities for the KGGP would be consistent with targeted management plans. All project management plans would be developed in consultation with the DAC and LHAI, to ensure they are consistent with and support the on-going environmental management programs for fire, weeds, and feral animals conducted by the Dhimurru and Yirralka Rangers.

Pacific Aluminium and Alcan Gove Pty Limited have a long history of supporting such programs. Clear and agreed processes would be established for DAC and LHAI to bring issues to the Proponent's attention during the construction period and ongoing participation of the respective ranger groups in monitoring rehabilitation of disturbed areas would enable feedback and corrective action to be initiated.

11.3 OTHER AREAS OF RECOGNISED CONSERVATION VALUE

11.3.1 Sites of Conservation Significance: Gove Peninsula and North-east Arnhem Coast

The NT Government has identified and listed 67 'Sites of Conservation Significance' (SOCS) throughout the NT, because they have outstanding national and/or international conservation significance (Ward and Harrison 2009). They are characterised by a combination of the following values:

- A concentration of threatened species.
- A concentration of endemic species (species found nowhere else).
- Large aggregations of wildlife (such as nesting colonies of waterbirds).
- Include extensive wetlands.
- Diverse botanical values.

The NT Government used nationally or internationally-recognised criteria to assign “International” or “National” significance to a site, or, if widely-recognised criteria were not available, knowledge of recognised local and regional experts was used. Many sites in the NT are already formally listed under national or international programs, for their high conservation significance (e.g. wetlands of international importance, such as Arafura Swamp, and other sites subject to international agreements, e.g. Japan Australia Migratory Bird Agreement). Where a site is rated as being of international significance for one or more of the five criteria above, the overall significance rating of the site is designated “international.” Similarly, where a site is not of international significance but rated as of national significance for at least one of the criteria, the overall significance rating of the site is National significance.

Figure 11-4 indicates the location of SOCS in the general region in which the pipeline is proposed.

The SOCS have no legal status or protection but function to identify biodiversity ‘hotspots’ for the purposes of prioritising research, planning and management attention.

The pipeline would pass through only one Site, Gove Peninsula and North-east Arnhem Coast, which includes all of the Dhimurru IPA and approximately 25% of the Laynhapuy IPA (the north-eastern portion). The easternmost 53 km or so of the pipeline (approximately KP550 – KP603) would be within this SOCS.

The remaining SOCS are at least 18 km from the proposed pipeline corridor (Figure 11-4).The Gove Peninsula and North-east Arnhem Coast SOCS is 150 km from north to south and covers an area of approximately 2,280 km^2.

The Gove Peninsula and North-east Arnhem Coast SOCS has International Significance because of the following ecological values:

- Two ‘Vulnerable’ plant species on the NT List of Threatened Species (but not on EPBC list) reported from this site, including:
    - *Hernandia nymphaeifolia.*
    - *Pternandra coerulescens.*
- Twelve threatened vertebrate faunal species (with EPBC Listing: TPWC Act Listing), including:
    - Partridge Pigeon *Geophaps smithii* (Vulnerable: Vulnerable).
    - Red Goshawk *Erythrotriorchis radiatus* (Vulnerable: Vulnerable).
    - Brush-tailed Rabbit-rat Conilurus penicillatus (Vulnerable: Endangered).
    - Golden Bandicoot *Isoodon auratus* (Vulnerable: Endangered).
    - Northern Brush-tailed Phascogale *Phascogale pirata.*
    - Northern Hopping-mouse *Notomys aquilo* (Vulnerable: Vulnerable).
    - Northern Quoll *Dasyurus hallucatus* (Endangered: Critically Endangered).
    - Merten's Water Monitor *Varanus mertensi* (Not listed: Vulnerable).
    - Flatback Turtle *Natator depressus* (Vulnerable: Data Deficient).
    - Green Turtle *Chelonia mydas* (Vulnerable: Least Concern).
    - Hawksbill Turtle *Eretmochelys imbricata* (Vulnerable: Data Deficient).
    - Olive Ridley Turtle *Lepidochelys olivacea* (Endangered; Vulnerable).
- One threatened invertebrate faunal species
    - Gove Crow Butterfly *Euploea alcathoe enastri* (EN [EPBC Act). Restricted to NE Arnhem Land (Braby 2007a and b).

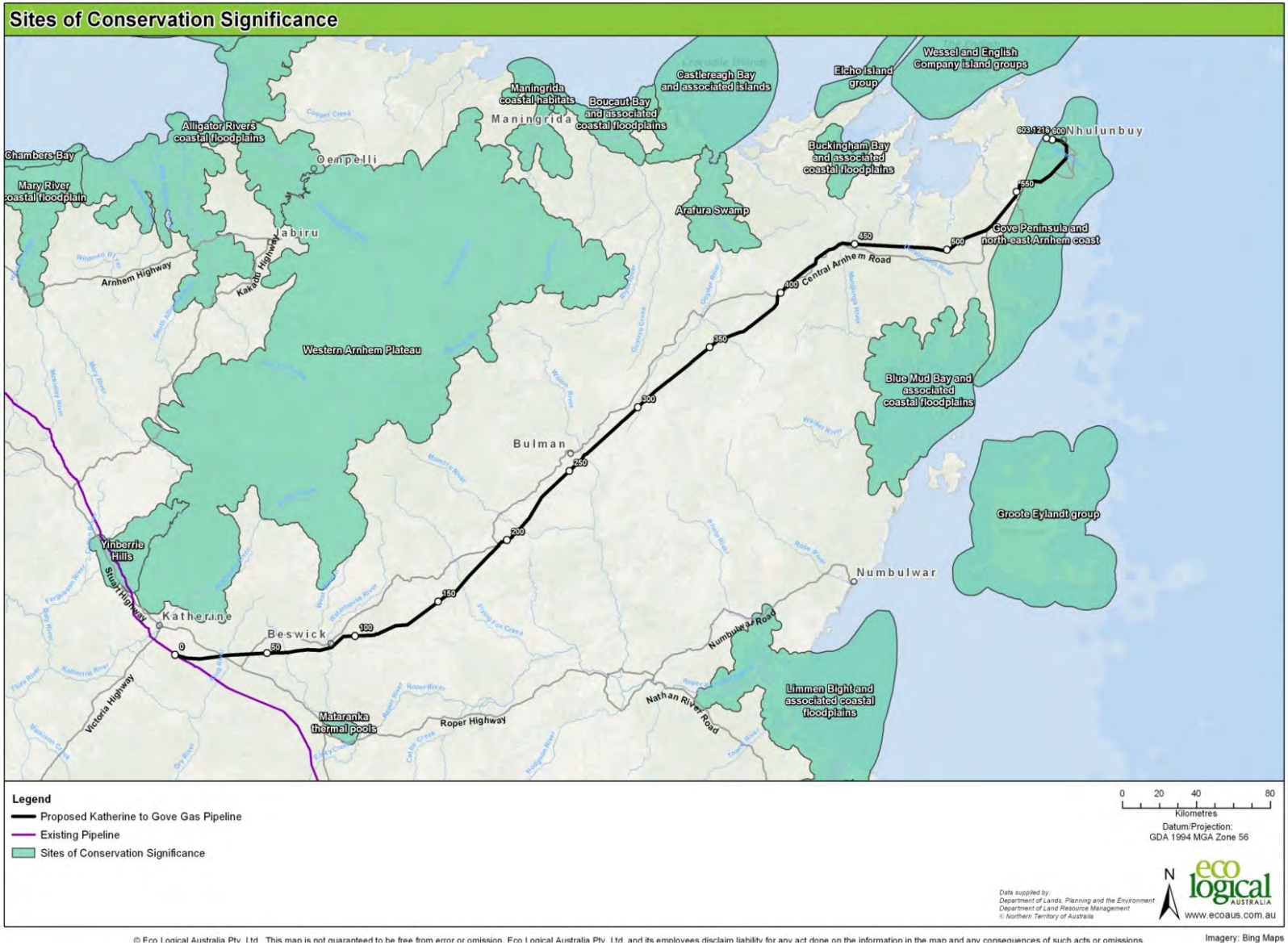

Figure 11-4: NT Sites of Conservation Significance

A number of these species (Brush-tailed Rabbit-rat, Northern Brush-tailed Phascogale, Golden Bandicoot, Red Goshawk, Partridge Pigeon) have not been recorded from mainland NE Arnhem Land since the 1970s (Gambold et al. 1995), and may not persist here. The persistence of Northern Quoll within the site since the arrival of the Cane Toad is unknown.

The Gove Peninsula and North-east Arnhem Coast SOCS is also regionally significant, because of its numerous endemic species:

- The plant *Solanum yirrkalense* is known only from this site (and is listed as Data Deficient in the NT List of Threatened Species).
- The Gove Crow Butterfly is currently known only from six locations, and three are within the SOCS, all associated with monsoon vine forest or tall mixed paperbark forest with rainforest elements in the understorey (Braby 2007a and b).
- The site includes 8 vertebrate and 52 plant species endemic to the NT.
- The site includes 2 vertebrate and 20 plant species that are, within the NT, restricted to the Arnhem Coast bioregion.

The key management issues affecting this SOCS (detailed in the DLRM Information Paper for this Site) include:

- Infestation by the exotic Yellow Crazy Ant.
- Damage from Water Buffalo.
- Potential introduction and spread of weeds from disturbed areas.
- Changed (and more destructive) fire regimes.
- Impact of commercial fishing and marine debris on marine turtles.
- Feral cats, dogs, horses, and pigs.

The relevant chapters in this Draft EIS addressing potential impacts of construction and operation of the KGGP Project in respect of the ecological values and management issues relevant to the Gove Peninsula and North-east Arnhem Coast SOCS include:

- Vegetation (Chapter 8).
- Terrestrial and Aquatic Fauna (Chapter 9).
- Matters of National Environmental Significance (Chapter 10).

Chapter 17 details the management framework to be applied to the project and Appendix O (Environmental Management Plan) provides specific environmental management commitments to mitigate potential impacts relevant to the SOCS.

After mitigation is applied, the construction and operation of the pipeline is expected to result in negligible impacts on the conservation values of the Gove Peninsula and North-east Arnhem Coast SOCS.

11.3.2 Sites of Conservation Significance: Arafura Swamp

The Arafura Swamp is a large freshwater wetland covering an area of approximately 700 km^2 (Harrison *et al.* 2009). It is within the broad floodplain of the Goyder and Gulbuwangay Rivers, and abuts the tidally-influenced coastal plain of Castlereagh Bay in the north (Arafura Sea) (Figure 11-4).

The extensive perennial swamps (fed by springs along the Goyder River) and lack of a continuous river channel to the sea is considered unique in the Top End. Much of the swamp is covered by paperbark

forest and woodland, and, by the end of the wet season, the Swamp can be as large as 1,300 km^2, making it one of the largest wooded swamps in the NT (DSEWPaC 2013d).

The NT Government has designated Arafura Swamp as a Site of Conservation Significance (with an International Significance rating) because of its size and importance to very large populations of waterbirds (at times, over 300,000 birds), including Black-necked Stork (Jabiru), Brolga, Radjah Shelduck, and Royal Spoonbill. Brennan et al (2003) completed an assessment of the Arafura Swamp against criteria for listing it as a wetland of international importance under the Ramsar Convention, and found that it satisfies Criteria 1-7.

The Swamp is also of National Significance, because of its numerous rainforest patches occur around the margin of the swamp, and several threatened species are reported from the Site, including (EPBC Act listing; NT TPWC Act listing):

- Partridge Pigeon *Geophaps smithii* (Vulnerable: Vulnerable).
- Northern Quoll *Dasyurus hallucatus* (Endangered: Critically Endangered).
- Merten's Water Monitor *Varanus mertensi* (Not listed: Vulnerable).

Arafura Swamp has great cultural significance to the Aboriginal Traditional owners of the area (the Yolngu).

The catchment of the Arafura Swamp is relatively undisturbed and in good condition; however, degradation is occurring at the swamp/estuarine interface. The key management issues are:

- Fires – the site is vulnerable to extensive wildfires lit by unauthorised people during dry periods.
- Weeds – Two Weeds of National Significance (*Mimosa pigra* and Olive Hymenachne; and
- Saltwater intrusion – from trampling and damage to fragile banks and waterways in the northern part of the swamp from grazing cattle.

The upper reaches of the Arafura Swamp (i.e. furthest inland, upstream) are more than 20 km from the pipeline corridor at the closest point (Figure 11-4) and greater during the dry season, when the majority of construction works for the pipeline would occur. The KGGP is proposed to cross the catchment of the Arafura Swamp (Goyder River catchment, between KP360-KP435).

Given the distance of pipeline construction from the Arafura Swamp, direct impacts would be negligible. Potential impacts from construction of the KGGP within the Arafura Swamp catchment relate to two of the key management issues for the swamp (fire and weeds). These potential impacts are dealt with in Chapter 8**.** Chapter 17 details the Management Framework to be applied to the project and Appendix O provides specific environmental management commitments to mitigate potential impacts relevant to the Arafura Swamp.

After mitigation is applied, the construction and operation of the pipeline is expected to result in negligible impacts on the conservation values of the Arafura Swamp.