

TIWI ISLANDS FORESTRY PROJECT

ENVIRONMENTAL ASSESSMENT REPORT AND RECOMMENDATIONS

by the
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EXECUTIVE SUMMARY

This report assesses the environmental impact of the development of a forestry plantation project on the Tiwi Islands by the Tiwi Land Council in conjunction with Sylvatech.

The initial stage involves an area of 2,700 ha. The final objective is to establish approximately 30,000 ha of hardwood plantations on a seven year rotation for the purpose of producing woodchips for export. Additional data are required to adequately assess the impact of the expanded forestry program beyond the initial stage.

The bulk of the plantation area will be established on dry sclerophyll forest sites with some areas on open plains; existing pine plantations will be replanted as they are harvested.

The main plantation area will be established within the western third of Melville Island. While the exact locations are not yet detailed, the overall plantation will probably be in discontinuous units, each with a net planted area of 2,000 - 4,000 ha.

In future, a mill for chipping of the harvested logs and a port for export of the material from the Island may be required. These proposals will require separate consideration.

This Report reviews the Environmental Impact Statement, and incorporates information and advice provided by Northern Territory Government agencies and by Environment Australia.

Environmental impact assessment is the process of defining those elements of the environment which may be affected by a development proposal and of determining the significance, risk and consequences of the potential impacts of the proposal.

Major Issues

The principal environmental issues identified with the proposal to develop locations on the Tiwi Islands for forestry are:

1. Potential loss of local and regional biodiversity with consequent reduction in the conservation values of the Tiwi Islands;
2. Impacts on threatened species of flora and fauna and on wildlife habitat corridors;
3. Management of erosion and soil conservation;
4. Water quality and water resource management;

The potential benefits associated with the proposal include:

1. Increased employment opportunities;
2. Economic returns for the local community;
3. Incentives for enhanced land management, particularly fire and weed control, in areas currently not being managed.

The net benefit of the plantations as a carbon sink for greenhouse gases is still to be quantified.

It is considered that all significant environmental issues associated with the proposed project have been adequately identified, although some issues remain to be addressed through implementation of the recommendations in this report.

It is considered that adequate information exists for the initial plantation area of 2,700 ha to proceed. The further development up to 30,000 ha of plantations will require the preparation of a Strategic Plan and subordinate operational plans, incorporating the additional data requirements identified in this report, before it could be considered that “each matter...considered to be capable of having a significant effect on the environment, (has been) fully examined and taken into account..” (section 4, *Environmental Assessment Act*).

SUMMARY OF RECOMMENDATIONS

Recommendation 1

The proponent shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards contained in the EIS and as recommended in this assessment report.

Recommendation 2

Before any development beyond the establishment of a 2,700 ha plantation, the proponent shall provide details to the Northern Territory Minister for the Environment of all proposed infrastructure and project components to allow an assessment of environmental impact to be made.

Recommendation 3

Before any development beyond the initial 2,700 ha plantation stage, the proponent shall prepare a Strategic Plan to the satisfaction of the Northern Territory Minister for the Environment which outlines environmental commitments and management guidelines covering the overall concept of a broad scale plantation project. Prior to any disturbance, an Operation Plan shall be developed to the satisfaction of the Northern Territory Minister for the Environment for each individual area proposed for plantation which addresses the specific requirements for each area.

Recommendation 4

Project management should be in accordance with the Northern Territory Forestry Plantation Code of Practice being developed by the Department of Primary Industry and Fisheries.

Recommendation 5

Vegetation clearing shall be in accordance with Clearing Guidelines being developed by the Department of Lands, Planning and Environment.

Recommendation 6

A mechanism for monitoring and enforcing compliance with environmental requirements and safeguards needs to be established and agreed between the Tiwi Land Council, the lessees and the Northern Territory Government.

Recommendation 7

The identification and management of sensitive areas potentially impacted by plantation areas needs to be addressed in the context of regional biodiversity and in liaison with the relevant Northern Territory Government agencies. The distribution and requirements of sensitive environments (including rainforests, mangroves, riparian strips and treeless plains), discussion of the possible impacts of the project upon these and an outline of steps taken to ensure their adequate regional protection should be documented in the Strategic Plan.

Recommendation 8

Before any expansion beyond 2,700 ha of plantation, an assessment of the potential impacts on regional biodiversity is required to the satisfaction of the Northern Territory Minister for the Environment, which includes:

- **a collation of existing information on the ecology and conservation values of the Tiwi Islands, specifically including maps of the distribution of known threatened plant and animal species, their habitat requirements, and an indication of the significance of the project area to these species; and identification and evaluation of areas of high conservation value (e.g. treeless plains);**
- **plant and animal inventories of the project area (specifically including comprehensive surveys of each of the proposed plantation blocks), with special reference to the occurrence, abundance and habitat requirements of threatened species; and**
- **fine-scale vegetation mapping of the project area and surrounds, to calculate the proportional extent of loss of particular vegetation types or habitats due to project activities, and to design and locate buffer strips, wildlife corridors and similar protective measures.**

Recommendation 9

A specific process and detailed environmental criteria for selecting plantation sites need to be determined and agreed between the relevant Northern Territory Government agencies, the Tiwi Land Council and the lessees. Some key environmental issues to be considered include:

- **threatened species and communities;**
- **sensitive areas;**
- **groundwater and surface water issues; and**
- **soil conservation issues.**

Recommendation 10

The protection and management of the nominated monsoon vine thicket patches should be specifically addressed as part of the management of sensitive areas within the Strategic Plan.

Recommendation 11

Conservation plans are required for each of the threatened flora and fauna species potentially affected by the project, which include information on the effects of the project on species distribution and abundance, methods of ameliorating this loss, and a clear procedure for ongoing monitoring. Threatened species should include those included on Schedule 1 of the Commonwealth *Endangered Species Act* and those considered threatened at the Territory level. Conservation plans should be consistent with any existing Recovery Plans completed or under development.

Recommendation 12

Further surveys are required to identify habitat trees and nest sites, and territories for the Red Goshawk, the Melville Island subspecies of the Masked Owl and Partridge Pigeon, Butler's Dunnart, the False Water-rat and the Bare-rumped Sheath-tail-bat in and around potential plantation areas. If any are found, mitigation measures should be developed for their long term protection.

Recommendation 13

The corridor area should be further investigated to ascertain the significance and extent of the corridor's function as part of the Strategic Plan. Any significant wildlife corridor should be excluded from plantation development.

Recommendation 14

Appropriate guidelines for the determination of buffer widths to protect sensitive communities, water courses and rare species should be developed in the Strategic Plan.

Recommendation 15

Management principles need to be developed within the Strategic Plan to address issues such as weed control. The potential for hybridisation of *Acacia mangium* and *A. auriculiformis* and the likely impact that this may have on local biodiversity should be addressed. Strategies to prevent this should be developed within the Strategic Plan.

Recommendation 16

The results of the Department of Lands, Planning and Environment's water study should be progressively incorporated into a suitable water quality management program for both surface water and groundwater to be outlined in the Strategic Plan. Water quality programs for baseline and ongoing monitoring should be conducted in accordance with an approved program. Requirements of the Department of Lands, Planning and Environment should be incorporated into site selection guidelines in the Strategic Plan.

Recommendation 17

The impact of groundwater extraction and groundwater use by the plantation on water sensitive communities should be monitored as part of the monitoring program outlined in the Strategic Plan.

Recommendation 18

The erosion and mitigation measures outlined in Appendix 5 of the EIS and the requirements of the Department of Lands, Planning and Environment for soil conservation should be incorporated into management guidelines. These management guidelines should be incorporated into the Strategic Plan and into site selection guidelines presented in the Strategic Plan. The results of the Natural Heritage Trust funded studies for soil conservation and land use planning should be progressively incorporated into a suitable soil conservation management program.

Recommendation 19

A contingency plan should be prepared to address environmental risks associated with project failure, the impact of wildfire, cyclones, inadequate growth or any other matter which may lead to a potential environmental impact.

Recommendation 20

The proponent should develop a fire management plan in consultation with the Bushfires Council. This plan should become part of the Strategic Plan.

Recommendation 21

Site selection criteria should consider the need to ensure that adequate surveys for sites of heritage significance have been undertaken.

Recommendation 22

The proponent shall prepare an Environmental Monitoring Program to the satisfaction of the Northern Territory Minister for the Environment which would form part of the Strategic Plan. The Program should include details of the parameters to be monitored, the criteria proposed, and an outline of response protocols and remediation techniques. The Program should contain reporting procedures to the relevant Northern Territory Government agencies and to the Tiwi Land Council.

Recommendation 23

The proponent shall prepare an Environmental Audit Program to the satisfaction of the Northern Territory Minister for the Environment based on design advice provided by relevant Northern Territory Government agencies. The audit shall be conducted by an independent accredited environmental auditor. The results of any audits shall be forwarded to the Northern Territory Minister for the Environment, the Commonwealth Minister for the Environment and the Tiwi Land Council. The Program shall be reviewed at intervals of no more than three years.

1. INTRODUCTION AND BACKGROUND

This report assesses the environmental impact of the development of extensive forestry plantations on the Tiwi Islands. It is proposed that an initial 2,700 ha be planted with *Acacia mangium* or *Eucalyptus 'urograndis'* on a seven year rotation. An eventual plantation of about 30,000 ha is planned. Seedlings for plantation establishment would be sourced from a nursery set up on Melville Island. The development would involve clearing of extensive areas of native vegetation and the upgrading and/or establishment of a suitable road network for access. All sites are located on Aboriginal land held under the Commonwealth *Aboriginal Land Rights (Northern Territory) Act*.

1.1 Environmental Assessment Process

Environmental impact assessment is based on adequately defining those elements of the environment which may be affected by a proposed development, and on quantifying the significance, risks and consequences of the potential impacts of the proposal at a local and regional level.

The Environmental Impact Statement (EIS) provides a description of the existing environment in the area and the proposed operations, and evaluates the environmental impacts and proposed mitigating measures to minimise the expected impacts.

This report assesses the adequacy of the document in achieving the above objectives, and evaluates the undertakings and environmental safeguards proposed by the proponent to mitigate the potential impacts.

The safeguards may be implemented at various levels within the planning framework of a project. These include, but are not limited to:

1. Site selection;
2. Design and layout of facilities;
3. Management of construction activities;
4. Processes used in operations and facilities (i.e. inputs and outputs); and
5. Management of operations, processes and facilities.

The contents of this report form the basis of advice to the Northern Territory Minister for the Environment on the environmental issues associated with the project.

1.2 Environmental Assessment History

The Tiwi Land Council lodged a Notice of Intent (NOI) on 14 January 1998, proposing the development of plantation forestry for fibre and associated facilities at Melville Island. The proponent for the project is the Tiwi Land Council in conjunction with Sylvatech Ltd. The proposal was considered to have a number of environmental implications and therefore would normally be subject to the requirements of the *Environmental Assessment Act* and Administrative Procedures. In this case, no decision under Northern Territory legislation is required for the project to proceed. However, under the Act, the Minister has a responsibility to ensure "that each matter ... considered to be capable of having a significant effect on the environment, is fully examined and taken into account..." (Section 4, *Environmental Assessment Act*). An assessment process was therefore adopted to ensure that the proposal was fully examined. The Department of Lands, Planning and Environment provided advice to the Tiwi Land Council on the appropriate content and format for an environmental impact study.

On 25 March 1999, the Tiwi Land Council provided the Northern Territory Minister for the Environment with a copy of an Environmental Impact Statement (EIS) prepared in relation to the proposed forestry project.

The EIS has been circulated to the Department of Primary Industry and Fisheries, the Parks and Wildlife Commission of the Northern Territory and the Department of Lands, Planning and Environment. Environment Australia was also provided with a copy.

The Tiwi community has been extensively consulted and there is strong support for the economic benefits generated by the project.

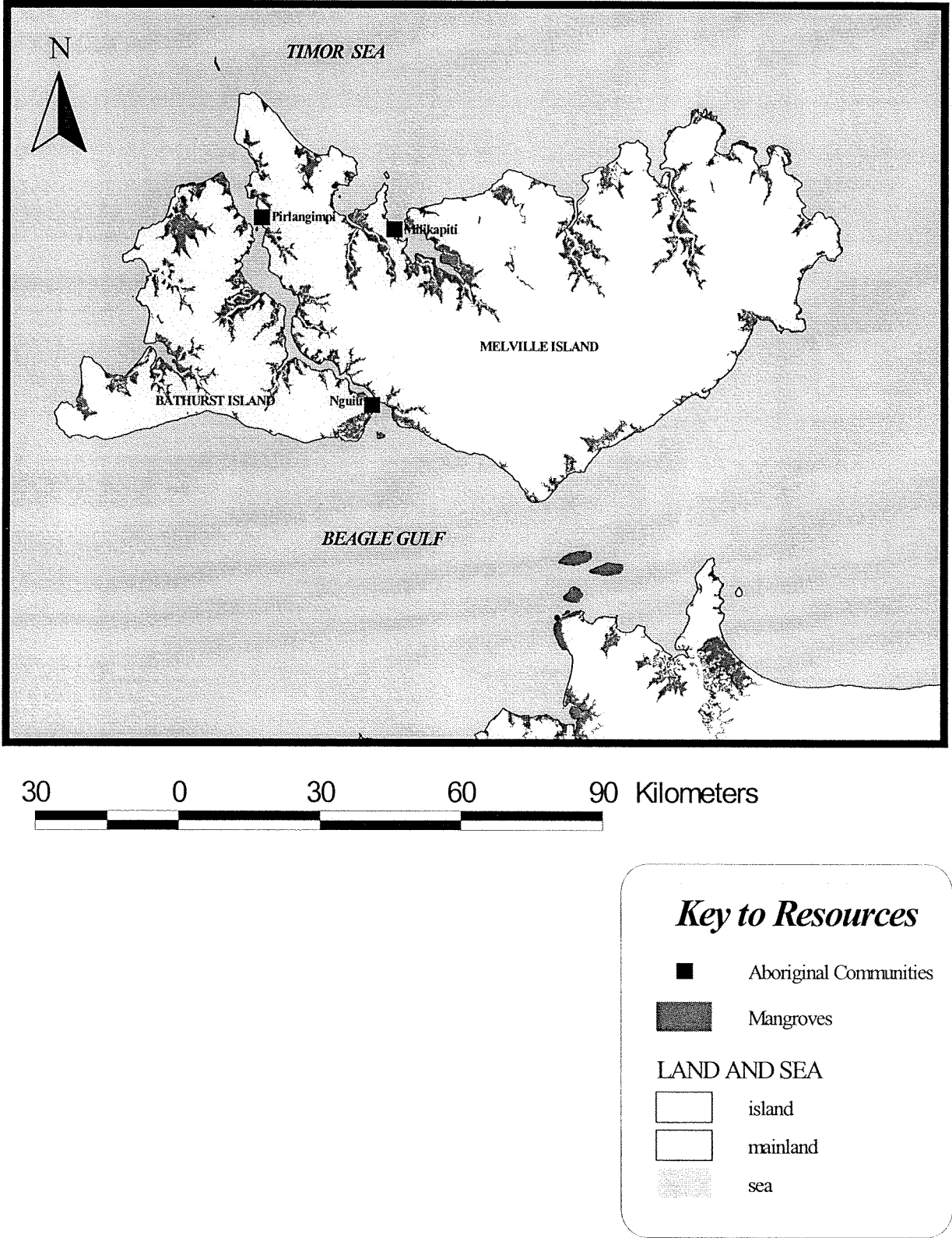
1.3 Scope of the Assessment

This report assesses the environmental impacts of the establishment of plantations as detailed below. Any proposal for further development is subject to the recommendations contained in this report.

2. THE PROPOSAL

The initial development comprises the establishment of 2,700 ha of either *Acacia mangium* or *Eucalyptus 'urograndis'* to be grown for fibre production on Melville Island, one of the Tiwi Islands (Figure 1), with an eventual plantation of approximately 30,000 ha to be grown on a seven year rotation.

Figure 1: Location Map for Tiwi Islands Forestry Project



Melville Island is located approximately 60 km north of Darwin, Northern Territory. *Pinus caribaea* plantations of about 2,200 ha have been established on Melville Island with the first significant plantings dating from the mid-1960s. These will continue to be managed for forest production. A further 1,700 ha of Cypress Pine (*Callitris intratropica*) have been established. However, these have not had adequate growth rates and will be harvested and then re-established as either *Acacia mangium* or *Pinus caribaea* after evaluation. An experimental area of 200 ha of *A. mangium* was established with 1997/98 as part of a research program. Earlier small research plantings of *A. mangium* date from the mid 1980s.

The major components of the initial plantation development for Melville Island are:

- Assessment of the topography, hydrology, soils and vegetation of the proposed planting areas in the year prior to planting.
- Designation of potential planting areas and, specifically, delineation of areas not to be planted based on selection criteria.
- Location and preparation of additional road requirements and firebreaks. Main roads and existing roads, will be gravelled to maintain safe all-weather access. The plantation and associated infrastructure will require the upgrading of 140 km of existing roads and, under one option, the development of up to 53 km of new main roads depending on the type of plantation program selected.
- Clearing and mulching or burning of existing vegetation of the proposed planting area during the dry season. The possibility of harvesting native forest will be investigated subject to a market.
- Preparation of the soil for planting by ploughing, ripping or mounding depending on the soil characteristics. This preparation is undertaken using methods such as contour ripping to minimise erosion and water pollution and will be undertaken in the dry season.
- Control of weed development using weedicides prior to planting. A broad scale chemical treatment will only be used at the commencement of a rotation, that is, once every six to seven years.
- Establishment and maintenance of a seedling nursery on approximately two hectares of land producing up to 5.5 million *Acacia mangium* each year. The material being used is genetically selected and has high growth rates. The nursery will be maintained on the Tiwi Islands using local labour.
- Planting of seedlings at 1,100 stems/ha early in the wet season. Additional spot treatments with weedicide may be applied if there is rapid weed development.
- Application of fertiliser to each individual tree consisting of approximately 250 g of diammonium phosphate applied in two slits next to the tree to minimise leaching and runoff. The fertilisation application will vary according to site and as any nutrient limitations become apparent.
- It is expected that there will be total vegetation cover six months after planting and such development will limit soil erosion and weed growth.
- As the stand develops, the trees will be assessed for a further possible application of fertiliser, using foliage chemical analyses. Nutrient deficiencies would dictate the type of fertiliser used in a broadcast application.

- Trees would be mechanically harvested at six to seven years, chipped on site and barged from the island for export. The site will be prepared using systems to minimise disturbance and replanted to either the same species or higher quality long term crops.
- A monitoring program and environmental management system will be established.

3. ENVIRONMENTAL ASSESSMENT

3.1 *Introduction*

The information provided in the EIS has been assessed and then used, along with comments from advisory bodies, to determine the adequacy of the information provided by the proponent and the accuracy and acceptability of predicted impacts and safeguards. Comments and recommendations are then made.

It is acknowledged that during implementation of proposals outlined in the EIS, flexibility is necessary and desirable to allow for minor and non-substantial changes to the design and specifications which have been examined as part of this assessment. It is considered that subsequent statutory approvals for this project could make provisions for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

It is important for interpretation purposes that the recommendations (in **bold**) are not considered in isolation, as the text identifies concerns, suggestions and undertakings associated with the project.

Subject to decisions which permit the project to proceed, the primary recommendation of this assessment is:

Recommendation 1

The proponent shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards contained in the EIS and as recommended in this assessment report.

3.2 *Issues*

3.2.1 Major Environmental Issues

The principal environmental issues identified with the proposal for the Tiwi Islands Forestry Project and the construction of associated infrastructure to support the project are:

1. Potential loss of local and regional biodiversity with consequent reduction in the conservation values of the Tiwi Islands;
2. Impacts on threatened species of flora and fauna and on wildlife habitat corridors;

3. Management of erosion and soil conservation;
4. Water quality and water resource management;

3.2.2 General

It is considered that inadequate consideration has been given to some aspects of the development, and some issues have not been satisfactorily addressed. Particular issues are discussed within their appropriate section.

Environment Australia raised the following areas for which additional information may be required:

- the lack of a clear description of project details and associated infrastructure and developments;
- no economic justification for proposed plantation (including scale); and
- insufficient consideration of alternatives to the project (including the “no-development” option).

The chipping mill and port facilities will require separate environmental impact assessment under the Northern Territory *Environmental Assessment Act*. The recent enactment of the Commonwealth *Environment Protection and Biodiversity Conservation Act* may have implications for future components of the project when it comes into effect.

Recommendation 2

Before any development proceeds beyond the establishment of a 2,700 ha plantation, the proponent shall provide details to the Northern Territory Minister for the Environment of all proposed infrastructure and project components to allow an assessment of environmental impact to be made.

A Strategic Plan is required to outline environmental commitments and management guidelines in respect of the overall concept of a broad scale plantation project. Operation Plans will then be required to address specific requirements to develop and manage each discrete plantation area, applying the principles developed in the Strategic Plan. The requirements of the Northern Territory Government agencies in regard to such matters as water resources, soil conservation, threatened species and sensitive areas should be incorporated into site selection guidelines in the Strategic Plan.

Recommendation 3

Before any development beyond the initial 2,700 ha plantation stage, the proponent shall prepare a Strategic Plan to the satisfaction of the Northern Territory Minister for the Environment which outlines environmental commitments and management guidelines covering the overall concept of a broad scale plantation project. Prior to any disturbance, an Operation Plan shall be developed to the satisfaction of the Northern Territory Minister for the Environment for each individual area proposed for plantation which addresses the specific requirements for each area.

A Northern Territory Draft Forestry Plantation Management Code of Practice is being developed by the Department of Primary Industry and Fisheries. The code is written to be consistent with criteria set under the National Forest Policy Statement.

Recommendation 4

Project management should be in accordance with the Northern Territory Forestry Plantation Code of Practice being developed by the Department of Primary Industry and Fisheries.

A draft document is being prepared by the Natural Resources Division of the Department of Lands, Planning and Environment to provide criteria for clearing of vegetation under the proposed Land Resources Conservation Bill.

Recommendation 5

Vegetation clearing shall be in accordance with Clearing Guidelines being developed by the Department of Lands, Planning and Environment.

The environmental responsibilities, obligations and undertakings of the lessees need to be clearly differentiated from those of the Tiwi Land Council.

Recommendation 6

A mechanism for monitoring and enforcing compliance with environmental requirements and safeguards needs to be established and agreed between the Tiwi Land Council, the lessees and the Northern Territory Government.

3.2.3 Biodiversity

There is a significant potential for this project to adversely impact on the local and regional biodiversity values of the Tiwi Islands. The Tiwi Islands are considered to be a bioregion in their own right, albeit with some similarities with the flora and fauna of Coburg Peninsula. The eucalypt forests of Melville Island, which are proposed to be the major vegetation type cleared, have been identified in previous research by the Conservation Commission of the Northern Territory (now the Parks and Wildlife

Commission of the Northern Territory) as being extensive, botanically rich, and likely to provide habitat for rare or threatened fauna. The other vegetation type considered for plantation establishment, treeless plains, is noted to be of high conservation value and is currently not represented in any Territory Conservation reserve. The conservation assets of the Tiwi Islands are valued by the Territory community and Australians as a whole, as well as by the Tiwi people.

The EIS has not properly assessed the impact of the proposed forestry project on the biodiversity of the Tiwi Islands. The Tiwi Islands Forestry project proposes potentially major changes in regional conservation values which are not balanced by enhanced conservation on the remainder of the Islands. The EIS does not refer to an existing large body of published papers on the ecology of the Tiwi Islands, or attempt to place the loss of habitat associated with the proposed project in context with an assessment of the overall biodiversity values of the Islands. It is therefore not possible to undertake an effective evaluation of the loss of conservation values as a result of forestry development.

The proponent should liaise with the Parks and Wildlife Commission of the Northern Territory to determine the current extent of data and to ensure that all available studies on the ecology of the Tiwi Islands are accessed.

There appears to be no analysis of the impact of island vegetation on the ecology of sand dune and mangrove communities. It is recognised that these communities appear stable in spite of significant changes to island vegetation through human land use. However, the impact of the plantation vegetation on these communities may be considerably different to that of the current vegetation. Planning Option 2 (concentrated planting) would be of great concern in this regard. The high conservation value of treeless plains is not explicitly acknowledged as a constraint to development within the main body of the EIS.

The EIS does not adequately address identification of, and management procedures for, sensitive environments.

Recommendation 7

The identification and management of sensitive areas potentially impacted by plantation areas needs to be addressed in the context of regional biodiversity and in liaison with the relevant Northern Territory Government agencies. The distribution and requirements of sensitive environments (including rainforests, mangroves, riparian strips and treeless plains), discussion of the possible impacts of the project upon these and an outline of steps taken to ensure their adequate regional protection should be documented in the Strategic Plan.

There are a number of inconsistencies in the EIS in the treatment of biodiversity issues which should be clarified, including:

- The commitment on page 32 that the proposal will not disturb vegetation types with high conservation value is not consistent with the statement (p. 19) that “the open plains are of interest for plantations due to ease of planting” and suggests establishment of plantations on 3,000 ha of these. Treeless plains are of considerable conservation significance and are currently not reserved in the Northern Territory.
- Appendix 3 provides contradictory information on the total area of eucalypt forests on the Tiwi Islands, noting that these comprise 79% of the total area of the islands (Appendix 3, pp. 2, 26) whereas in the body of the main report (e.g. p. 18) the percentage is claimed to be 68%. These discrepancies are substantial and significant when considering the regional impact of the plantation.

The inconsistencies relating to the treatment of treeless plains and eucalypt forests should be clarified and the biodiversity issues examined in a Regional Biodiversity Study.

Recommendation 8

Before any expansion beyond 2,700 ha of plantation, an assessment of the potential impacts on regional biodiversity is required to the satisfaction of the Northern Territory Minister for the Environment, which includes:

- **a collation of existing information on the ecology and conservation values of the Tiwi Islands, specifically including maps of the distribution of known threatened plant and animal species, their habitat requirements, and an indication of the significance of the project area to these species; and identification and evaluation of areas of high conservation value (e.g. treeless plains);**
- **plant and animal inventories of the project area (specifically including comprehensive surveys of each of the proposed plantation blocks), with special reference to the occurrence, abundance and habitat requirements of threatened species; and**
- **fine-scale vegetation mapping of the project area and surrounds, to calculate the proportional extent of loss of particular vegetation types or habitats due to project activities, and to design and locate buffer strips, wildlife corridors and similar protective measures.**

A key to the minimisation of environmental impacts associated with the Tiwi Islands forestry project is the establishment of appropriate site selection criteria. Environmental risk can be minimised through the selection of appropriate sites, the criteria for which can be modified according to site characteristics and experience. The EIS does not provide sufficient detail of exact areas to be cleared and planted or of site selection criteria to be used. For example, Appendix 5 notes that all soil types other than red earths are unsuitable for plantation development. This does not appear to be explicitly acknowledged as a constraint elsewhere in the EIS.

Recommendation 9

A specific process and detailed environmental criteria for selecting plantation sites need to be determined and agreed between the relevant Northern Territory Government agencies, the Tiwi Land Council and the lessees. Some key environmental issues to be considered include:

- **threatened species and communities;**
- **sensitive areas;**
- **groundwater and surface water issues; and**
- **soil conservation issues.**

3.2.4 National Estate Values

The proposed development is unlikely to impact upon identified or potential indigenous or historic National Estate values. However, should a loading port facility be developed, the proponent would need to address any potential impact on the Fort Dundas site.

Before any development of a chipping mill or port facilities, the proponent should undertake an assessment of the potential impacts and any amelioration required on National Estate values as part of an environmental impact assessment.

There are a number of monsoon vine thicket patches on Melville Island that have been nominated for listing on the Register of the National Estate. Preliminary assessment of these areas suggest that they possess National Estate values that would make them suitable for inclusion on the Register of the National Estate. There is potential for the proposed project to adversely affect these significant vegetation communities.

Recommendation 10

The protection and management of the nominated monsoon vine thicket patches should be specifically addressed as part of the management of sensitive areas within the Strategic Plan.

3.2.5 Vegetation and Threatened Flora

It is considered that the treatment of this issue in the EIS and within the Appendices is unsatisfactory. Field surveys comprised three days in the mid-dry season which is not adequate to assess likely impacts. The EIS has not attempted to determine whether the threatened species listed actually occur on areas proposed for development as plantations and appears to believe such information is unavailable. The Parks and Wildlife Commission of the Northern Territory maintains a spatial database of plant records, which provides accurate location records of threatened flora species of

Melville Island. The habitat associations of species listed as threatened are readily identified by botanists familiar with Top End flora. The major source of information on threatened plants in the Northern Territory (Leach *et al.* 1992, *Northern Territory plant species of conservation significance*) is not cited. The EIS suggests that “no rare or endangered plant species or communities will be directly affected by the plantation, primarily on the basis that site selection criteria and survey process will eliminate those areas from consideration” (p. 42). This is not considered to be an acceptable management strategy.

The issue of the collation of existing data on ecology and threatened flora species should be undertaken as outlined in Recommendation 8 and in consultation with the Parks and Wildlife Commission of the Northern Territory.

Recommendation 11

Conservation plans are required for each of the threatened flora and fauna species potentially affected by the project, which include information on the effects of the project on species distribution and abundance, methods of ameliorating this loss, and a clear procedure for ongoing monitoring. Threatened species should include those included on Schedule 1 of the Commonwealth *Endangered Species Act* and those considered threatened at the Territory level. Conservation plans should be consistent with any existing Recovery Plans completed or under development.

3.2.6 Threatened Fauna

The fauna impact assessment is not considered adequate to properly determine the impact of the proposal on several species of fauna threatened at a national and Territory level as a result of the limited surveys undertaken, the poor overall state of knowledge of the fauna of the Tiwi Islands and a number of errors and inconsistencies in the EIS and appendices.

There are a number of inconsistencies, omissions and errors in the fauna impact assessment including:

- “No native species endemic to the Tiwi Islands have been reported” (p. 19, A4-21). A number of invertebrates, such as the dragonfly *Nososticta taracumbi*, is known to be restricted to the Tiwi Islands.
- The EIS states that the Red Goshawk is not listed in the Commonwealth *Endangered Species Protection Act* (A4, p. 27). This species is listed as Vulnerable in this Act.
- The EIS considers that the dunnart *Sminthopsis butleri* “is not expected to be significantly affected by the current proposed development as its known habitat preference is exclusive of the habitat types that will be affected by this proposal” (A4, p. 30). This species is known from eucalypt forests on the Tiwi Islands.

- The EIS states that previous data on Tiwi wildlife have only been collected during the dry season as for the current study (A4, p. 6). A major survey of wildlife of Tiwi rainforests occurred in the wet season.
- The False Water-rat is stated as occurring only in mangroves (A4 - p. 31). This species is reported from a broad range of grasslands and sedgeland in the Northern Territory.
- There is no discussion of the likely impact on amphibians of the use of weedicides and other chemicals (A4, p. 25), although such use may have major detrimental effects.

Species listed on Schedule 1 of the Commonwealth *Endangered Species Protection Act* which are potentially impacted by the proposed development are:

| Scientific name | Type | Common name | Listing |
|---|--------|---|------------|
| <i>Sterna albifrons</i> | Bird | Little Tern | Endangered |
| <i>Erythrorchis radiatus</i> | Bird | Red Goshawk | Vulnerable |
| <i>Geohaps smithii smithii</i> | Bird | Partridge Pigeon | Vulnerable |
| <i>Tyto novaehollandae melvillensis</i> | Bird | Masked Owl (Melville Island subspecies) | Vulnerable |
| <i>Saccolaimus saccolaimus</i> * | Mammal | Bare-rumped Sheath-tail-bat | Endangered |
| <i>Mesembriomys macrurus</i> ** | Mammal | Golden-backed Tree-rat | Vulnerable |
| <i>Xeromys myoides</i> | Mammal | False Water Rat | Vulnerable |

* Bat Action Plan recommendation for listed under the *Endangered Species Act*

** Record to be confirmed

The project is not considered likely to have a significant impact on the Little Tern or Golden-backed Tree-rat which occur in mangrove/coastal habitat types that will not be disturbed by the proposal. The eucalypt forests of the Tiwi Islands are a major stronghold for the vulnerable Red Goshawk, the vulnerable subspecies of Masked Owl, the vulnerable subspecies of Partridge Pigeon and Butler's Dunnart (considered as vulnerable in Maxwell *et al.* 1996; *The Action Plan for Australian Marsupials and Monotremes*). The habitat of the False Water-rat may be affected on plantations which occur on treeless plains. The presence of the Bare-rumped Sheath-tail-bat needs to be confirmed.

Recommendation 12

Further surveys are required to identify habitat trees, nest sites and territories for the Red Goshawk, the Melville Island subspecies of the Masked Owl and Partridge Pigeon, Butler's Dunnart, the False Water-rat and the Bare-rumped Sheath-tail-bat in and around potential plantation areas. If any are found, mitigation measures should be developed for their long term protection.

In summary, the EIS does not provide specific information on the likely impacts of the project and notes the lack of data on the several species of threatened fauna. It is not possible to conclude, as the EIS does (p. 44), that "no rare or endangered species will be directly affected".

The issue of the collation of existing data and the preparation of conservation plans on threatened fauna species should be undertaken as outlined in Recommendations 8 and

11, and in consultation with the Parks and Wildlife Commission of the Northern Territory.

The EIS has not adequately discussed the impact of the proposal on the wildlife habitat corridor identified in the preliminary fauna assessment. The corridor lies between the Bremer, Moonganunu and Mirrapaka Creeks on the south coast of Melville Island and Maxwell Creek on the north coast of the Island. A Red Goshawk was sighted in this area and the bat call frequency and species richness recorded in this corridor was exceptionally high.

Recommendation 13

The corridor area should be further investigated to ascertain the significance and extent of the corridor's function as part of the Strategic Plan. Any significant wildlife corridor should be excluded from plantation development.

3.2.7 Buffer Areas

The EIS is inconsistent in its prescriptions for retention of buffer strips. In addition, no basis or justification for the various proposals is given. For example, the EIS proposes a buffer strip of 30 m for vegetation types with high conservation value such as the monsoon vine thicket patches (p. 32). This is considered inadequate to protect these patches from uncontrolled fire.

A minimum buffer width of 100 m is recommended, and buffer widths should be adjusted from this minimum to meet the ecological needs of flora and fauna, to assist in soil conservation and to protect water bodies based on water body size and morphology. Buffer zones should take into account proposed chemical application methods viz. aerial versus ground application.

Recommendation 14

Appropriate guidelines for the determination of buffer widths to protect sensitive communities, water courses and rare species should be developed in the Strategic Plan.

3.2.8 Weeds

A major concern arising from the EIS was the ability of *Acacia mangium* to spread into native vegetation. It is noted that *A. mangium* hybridises with *A. auriculiformis*, a naturally occurring species on Melville Island. It is considered that *A. mangium* could become a weed unless sterile forms of the species are used, or stringent monitoring is carried out in areas where fertile forms are used to determine invasiveness. In addition, the application of large quantities of fertiliser is likely to encourage the growth of other weeds. Further advice should be sought from the Department of Primary Industries and Fisheries on weed management.

Recommendation 15

Management principles need to be developed within the Strategic Plan to address issues such as weed control. The potential for hybridisation of *Acacia mangium* and *A. auriculiformis* and the likely impact that this may have on local biodiversity should be addressed. Strategies to prevent this should be developed within the Strategic Plan.

3.2.9 Water Management

The EIS identifies that water quality and quantity are major issues and that the protection of creeks is important. The document notes that concentrated plantations (Option 2) will affect runoff and groundwater quality, and that the higher water demand will potentially reduce streamflow and groundwater availability. Although these issues have been identified, they have not been satisfactorily addressed, primarily because of the lack of existing information on the water resources of the Tiwi Islands.

A Natural Heritage Trust Project “The Tiwi Islands Water Study” commenced in June 1999 to redress this paucity of data and is scheduled to run for three years. The project, managed by the Natural Resources Division of the Department of Lands, Planning and Environment, is aimed at assisting the Tiwi Land Council to develop and apply on-ground solutions to the often conflicting needs of development and maintenance of traditional lifestyles in terms of water resources. The results will provide the information the Land Council requires to adequately consider water quality and quantity issues on the Islands. The area proposed for development will be the area studied during the first year of the study. The Department of Lands, Planning and Environment has identified the need to stage the development to ensure that results are available for effective management.

Recommendation 16

The results of the Department of Lands, Planning and Environment’s water study should be progressively incorporated into a suitable water quality management program for both surface water and groundwater to be outlined in the Strategic Plan. Water quality programs for baseline and ongoing monitoring should be conducted in accordance with an approved program. Requirements of the Department of Lands, Planning and Environment should be incorporated into site selection guidelines in the Strategic Plan.

Pirlangimpi is currently reliant on Bluewater Creek for its water supply as it does not have groundwater supplies because of unsuitable geology. The EIS does not clearly state the source of water for the seedling nursery, the proposed workers’ camp and for fire control. Under the *Water Act* pumping of a river or creek other than for riparian rights requires a licence to take or use water. Groundwater drilling must be undertaken by a driller licensed under the *Water Act*.

The effect of increased water use by plantations on shallow water aquifers is untested. There is a possibility of reduced stream flow, specifically in Bluewater Creek. Depending on siting, there may also be the potential for contamination of Bluewater Creek from fertilisers and herbicides used both in the nursery and in the main plantation. In addition, water-sensitive communities may be adversely affected by drawdown. The gauging station on Bluewater Creek should be used to determine baseline water quality, and monitor flows and water quality for the Pirlangimpi water supply.

Recommendation 17

The impact of groundwater extraction and groundwater use by the plantation on water sensitive communities should be monitored as part of the monitoring program outlined in the Strategic Plan.

3.3.10 Soils

The project area is subject to large seasonal variations in rainfall, a significant cyclone risk and heavy erosion. The potential for heavy erosion is noted to negate the benefits of the high phosphorus sorption capacity of the local soils to some extent. These factors mean that without proper management, soil erosion and sedimentation could pose a significant environmental risk.

The report is considered to be thorough in identifying the relevant aspects of soil conservation, e.g. soil types, erodibility, the need for buffers for soil stability. Erosion and sedimentation mitigation measures are adequately covered in Appendix 5 of the EIS. If these measures are implemented, they will largely satisfy soil conservation issues within the plantation sites. A summary of commitments outlined in Appendix 5 is shown in the appendix to this Assessment Report. Given the minimum size of the blocks (2,500 ha), some additional measures may be required.

The Department of Lands, Planning and Environment is currently running the Natural Heritage Trust-funded project “Addressing Land Degradation and Implementing Land Use Planning: Tiwi Islands”. The Department has stated a need to stage development to ensure that data are available to assist planning and decision-making.

Firebreaks may need surface drainage works (cross falls, cross banks, mitre drains) if these also serve as access tracks. They may also require broad-based drains in some areas. In some areas, excess water flows may need to be directed into buffer areas. Main road construction will need to take account of long term drainage and maintenance requirements, and should follow ridges where possible and avoid creek crossings. Borrow pits used in roading should be rehabilitated in accordance with Department of Lands, Planning and Environment guidelines.

Recommendation 18

The erosion and mitigation measures outlined in Appendix 5 of the EIS and the requirements of the Department of Lands, Planning and Environment for soil conservation should be incorporated into management guidelines. These management guidelines should form part of the Strategic Plan, particularly the site selection guidelines presented in the Strategic Plan. The results of the Natural Heritage Trust funded studies for soil conservation and land use planning should be progressively incorporated into a suitable soil conservation management program.

3.2.11 Rehabilitation and Environmental Risk

It is noted that the proponent considers that rehabilitation will be unnecessary because of the long term nature of the project. There is no discussion of contingencies if the plantation is terminated prematurely.

The EIS does not consider the possibility of inadequate growth of plantation species, or that the occurrence of fires or cyclones may lead to a demand for increased area for plantations, with a concomitant increase in environmental impact.

Recommendation 19

A contingency plan should be prepared to address environmental risks associated with project failure, the impact of wildfire, cyclones, inadequate growth or any other matter which may lead to a potential environmental impact.

The long term rehabilitation objectives are not stated in the EIS. These objectives, as well as evidence of these being agreed to by the Tiwi Land Council, should be included in the Strategic Plan.

3.2.12 Fire Management

The objectives of fire management and prevention in the highly flammable plantations may not be consistent with the protection of ecological systems of adjacent communities. The EIS (p. 6, 37) proposes fire control in an unspecified area around the plantations, a management regime which may have substantial impacts on surrounding areas. These potential impacts have not been addressed within the EIS. In addition, traditional burning practices appear to be incompatible with plantation requirements. It is important with joint land users that a consistent and cooperative fire management plan is adhered to by both parties. This will ensure that neither land use will impact unnecessarily on, or place in danger, the other through uncontrolled or unplanned burning, or through the build up of fuel.

Recommendation 20

The proponent should develop a fire management plan in consultation with the Bushfires Council. This plan should become part of the Strategic Plan.

3.2.13 Heritage

There is no evidence in the EIS that heritage issues have been examined in relation to the forestry project. No sites protected under the *Heritage Conservation Act* may be disturbed without the consent of the Minister.

A mechanism for ensuring that archaeological heritage considerations are fully examined as part of the site selection procedures is needed.

Recommendation 21

Site selection criteria should consider the need to ensure that adequate surveys for sites of heritage significance have been undertaken.

3.2.14 Monitoring

An Environmental Monitoring Program needs to be developed as part of the Strategic Plan. Areas for consideration include:

- Establishment of parameters to be monitored
 - ♦ water quality - nutrients, chemical residues, turbidity;
 - ♦ water quantity - groundwater table and stream flows;
 - ♦ sediment movements in plantations;
 - ♦ road condition and sediment loss;
 - ♦ spread of weeds and exotic species beyond plantations;
 - ♦ stand growth and nutritional status.
- The setting of limit criteria for parameters to be monitored.
- The determination of response protocols and remediation techniques for unacceptable levels or events.

The Monitoring Program should be reviewed annually to ensure the relevance of the parameters and to remove or add parameters as the project develops. The emphasis should be on those parameters which act as early warning indicators of ecosystem malfunction.

The proponent should consult with relevant Northern Territory Government agencies regarding the design of the Program.

Annual reports should be submitted to the Tiwi Land Council and to relevant Northern Territory Government agencies to ensure sustainable management of the forestry project.

Recommendation 22

The proponent shall prepare an Environmental Monitoring Program to the satisfaction of the Northern Territory Minister for the Environment which would form part of the Strategic Plan. The Program should include details of the parameters to be monitored, the criteria proposed, and an outline of response protocols and remediation techniques. The Program should contain reporting procedures to the relevant Northern Territory Government agencies and to the Tiwi Land Council.

3.2.14 Environmental Audit

An Environmental Audit Program should be established in conjunction with Northern Territory Government agencies. It should allow for a triennial review of the environmental effects of any components of the project, and should take into account the information derived from the Environmental Monitoring Program.

Audits should be conducted by an independent accredited environmental auditor engaged by the proponent. Northern Territory Government agencies are available to provide advice on the design of audits.

The proponent should provide the results of any audit to relevant Northern Territory Government agencies and to the Tiwi Land Council for review and comment.

Environmental Australia has requested that it receive the results of environmental audits for review and comment.

Recommendation 23

The proponent shall prepare an Environmental Audit Program to the satisfaction of the Northern Territory Minister for the Environment based on design advice provided by relevant Northern Territory Government agencies. The audit shall be conducted by an independent accredited environmental auditor. The results of any audits shall be forwarded to the Northern Territory Minister for the Environment, the Commonwealth Minister for the Environment and the Tiwi Land Council. The Program shall be reviewed at intervals of no more than three years.

4. CONCLUSION

It is considered that all significant environmental issues associated with the proposed project have been adequately identified, although some issues remain to be addressed through implementation of the recommendations in this report.

It is considered that adequate information exists for the initial plantation area of 2,700 ha to proceed. The further development up to 30,000 ha of plantations will require the preparation of a Strategic Plan and subordinate operational plans, incorporating the additional data requirements identified in this report, before it could be considered that “each matter...considered to be capable of having a significant effect on the environment, (has been) fully examined and taken into account..” (section 4, *Environmental Assessment Act*).

APPENDIX

COMMITMENTS TAKEN DIRECTLY FROM THE APPENDIX 5 TEXT

Appendix

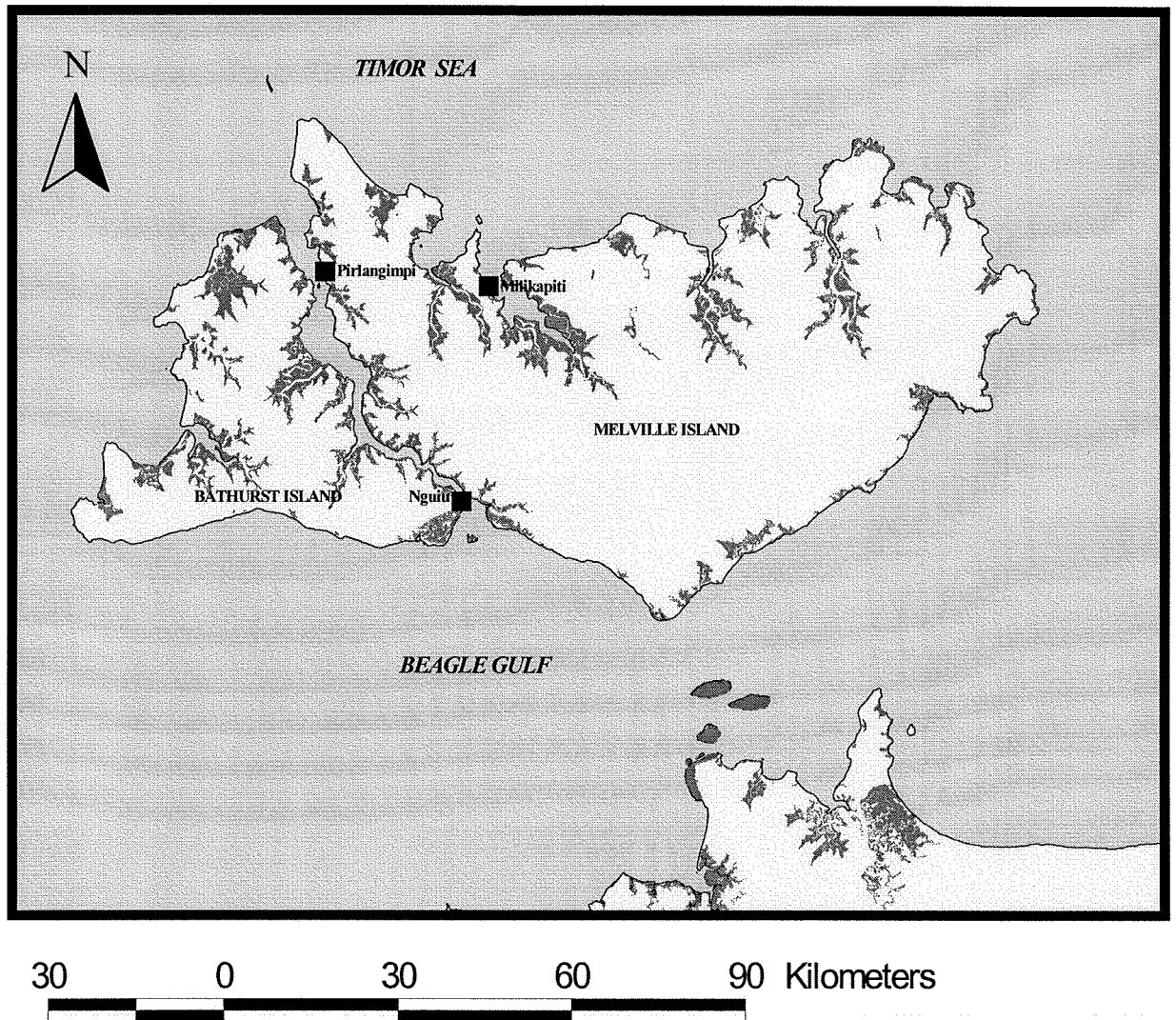
Commitments taken directly from the Appendix 5 text

| Reference | Commitments |
|----------------|---|
| App. 5 p 14 | <p><u>Soil suitability</u> Red soils are suitable for plantation development due to their efficient drainage capacity and low erodibility. All other soils are unsuitable for plantation development. The planting of imperfectly drained yellow soils will only be considered in order to consolidate blocks of red soils. Poorly drained and in many cases waterlogged grey soils found in Rugged, Mirikau and Moonkinu Land Systems, will not be planted.</p> |
| | <p><u>Soil surveys</u> Soil surveys will be conducted at an intensive level (minimum 1:10,000 scale) in order to “fine tune” plantation sites thereby maximising the area being planted in the desirable red soil types and minimising the area being planted to the unsuitable yellow and grey soils.</p> |
| | <p><u>Buffers</u> All plantation sites will be located at least 500 m away from major drainage depressions and creeks creating a vegetated buffer zone between receiving waterways and disturbed areas within the plantation. The vegetated zones will act as effective sediment control areas.</p> |
| App. 5 p 15 | <p><u>Topography</u> Accurate topographical surveying will be undertaken on all the proposed plantation sites prior to initiating the design orientation and configuration of individual sites.</p> |
| | <p>Topographic plans will be produced at a scale of 1:4000 with a one metre contour interval which will assist in promoting effective design of each plantation site.</p> |
| | <p>Each plantation will be designed with full regard for the existing topography. Rather than designing the plantation “on the square” (without regard to the topography), each site will be orientated so that tree rows will be approximately parallel to the contour.</p> |
| | <p><u>Runoff</u> The discharge runoff of each row will be disposed of into undisturbed vegetation at non-scouring velocities beyond the boundaries of the plantation prior to entering natural watercourses.</p> |
| | <p><u>Slope grades</u> Where practicable, each row will be constructed with a grade of not less than 1% or not more than 3%.</p> |
| | <p>The plantation rows will not be designed with grades that decrease sharply resulting in deposition of soil particles which may promote the overtopping of rows.</p> |
| | <p><u>Carbon levels</u> Every effort will be made to minimise the negative impact of operations on</p> |

| Reference | Commitments |
|-----------------|--|
| | organic carbon levels. Burning will be limited to the initial afforestation operations and excluded from subsequent reafforestation operations. Mechanical operations such as cultivation which reduce soil organic matter levels will be minimised. |
| App. 5 p 16 | Pruning of trees will be conducted four months after planting. All pruned material will remain in the inter row areas. During harvest operations, all tops, branches, foliage and bark will be well distributed over the site in order to maximise its rapid decomposition thereby increasing organic carbon levels in the soil surface. |
| | <u>Monsoonal climate</u> Operations will be managed to work with the prevailing tropical monsoonal climate. Mechanical operations such as cultivation and harvesting will be undertaken during dry season in order to minimise soil compaction and disturbance of organic matter. Mechanical operations during periods of intense monsoonal rain (ie. December to March) will be minimised. Planting will be undertaken in December so that soil conditions are still sufficiently dry to allow for reasonable mechanical access whilst minimising soil disturbance, compaction and degradation. |
| | <u>Soil disturbance</u> The use of systemic herbicides, both during the pre-planting and post planting periods will reduce the requirements of weed control, thereby minimising soil disturbance. |
| | <u>Diversion banks</u> Where practicable and appropriate, diversion banks will be constructed above plantation sites to redirect any extraneous run-on water around the disturbed plantation sites. |
| | The diversion bank spillways will discharge to stable, vegetated water disposal areas adjoining the plantation sites. |
| | The banks will be designed and constructed in accordance with Australian Rainfall and Runoff (1998) and will be trafficable to 4WD vehicles and all cultivation, planting, maintenance and harvesting equipment. |
| | <u>Access tracks</u> A substantial access track system will be developed between and within plantation sites. All tracks will have at least a slight grade to allow free surface drainage and to avoid excessive ponding in wheel tracks. Generally, the grade of each track will be less than 5°. However, short lengths of steeper grade may be needed to negotiate difficult sections or to take advantage of favourable terrain. |
| App. 5 p. 17 | Effective surface drainage will be implemented on tracks to control runoff, preventing it from concentrating and reaching erosive speeds. Crossfall drainage will be constructed on the surface of all tracks so that there is sufficient slope to cause water to flow across and off the surface rather than along it. Earth windrows which may develop at construction at the down slope side of the track will be removed. |
| | Where runoff cannot be controlled with crossfall drainage, cross banks will be constructed as an effective means of baulking runoff and directing it |

| Reference | Commitments |
|----------------|---|
| | across the track surface. Cross bank spacing along each track will be tempered by experience of construction personnel and will also depend on the location of stable and clear outlet points. The outlet site of each cross bank will be selected so that runoff will spill into undisturbed vegetation and cannot flow back onto the track. |
| App. 5 p 18 | <p><u>Surface water monitoring</u></p> <p>A surface water monitoring program will be established to gauge the effectiveness of all erosion and sediment control measures implemented at the plantation sites and to ensure that the project does not negatively impact on the quality of receiving waters within and surrounding the project area.</p> |
| | All water quality parameters (pH, conductivity, turbidity, dissolved oxygen, temperature, alkalinity, nitrate/nitrite, total nitrogen, filterable phosphorus, total phosphorus and trace metals) will be analysed on a quarterly basis from samples taken at strategic locations in the Melville Island creek system. |
| | The results, together with interpretation and comparison with historical monitoring, will be presented to the Tiwi Land Council and all other relevant statutory authorities. |

Figure 1: Location Map for Tiwi Islands Forestry Project



Key to Resources

■ Aboriginal Communities

■ Mangroves

LAND AND SEA

□ island

□ mainland

■ sea