Tropical Timber Plantations Pty Ltd

Beagle Bay

Big Tree Country

Conceptual Closure Plan

16/02/2005

ecologia

ENVIRONMENT

Document Status						
Rev No.	Author	Reviewer/s	Date	Approved for Issue		
				Name	Distributed To	Date
A	T. Harries	S. Jarvis	08/02/05			
B	T. Harries	G. Connell	13/02/05			
C	B. Barnett	J. Brennan	14/02/05			
0	B. Barnett			G. Connell	Public Release	16/02/05

Restrictions on Use

This report has been prepared specifically for Tropical Timber Plantations Pty Ltd. Neither the report nor its contents may be referred to or quoted in any statement, study, report, application, prospectus, loan, or other agreement document, without the express approval of Tropical Timber Plantations Pty Ltd and/or *ecologia* Environment.

ecologia Environment

76 Thomas Street

WEST PERTH WA 6005

Phone (08) 9322 1944

Fax (08) 9322 1599

Email: ecologia@ecologia.com.au

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

Tropical Timber Plantations Pty Ltd (TTP) is seeking to develop a tropical timber plantation project comprising varied timber species in the locality of Beagle Bay in the West Australian Kimberleys. This Conceptual Closure Plan covers the decommissioning and rehabilitation of the proposed TTP *Big Tree Country* Plantation Project.

TTP has commissioned *ecologia* Environment *(ecologia*) to prepare this Conceptual Closure Plan in order to comply with the commitments given in the Public Environmental Review for this same project. This Plan identifies the closure principles that will guide the management of water resources, landforms, revegetation and infrastructure throughout the operation life of the plantation project.

This plan is to be utilised when initiating either partial or full project closure, including the event of project failure. Closure of a project is an ongoing process, with the specific requirements for closure changing with new circumstances and as such this plan is designed to be flexible, and will undergo periodic review.

Monitoring is an integral part of project closure to assess the effectiveness of closure methods and the level of rehabilitation completion. Monitoring programs will include:

- Applicable site investigations (hydrological, geological, flora and fauna, etc);
- Regular inspections to assess closure plan implementation and to identify off-site impacts;
- Revegetation and rehabilitation assessment, to monitor the re-establishment of vegetation on disturbed areas, and to include weed monitoring; and
- Regular assessment of public safety.

It is the aim of this closure plan to highlight the obligations, resources and methods required for successful closure of the proposed TTP *Big Tree Country* Plantation Project.

1.0 INTRODUCTION

In 2003, Tropical Timber Plantations Inc. (TTP) was founded as a joint venture agreement between Beagle Bay Community Inc. and Capricorn Timber Pty Ltd, in order to establish a timber plantation of Teak (*Tectona grandis)*, Indian Rosewood (*Dalbergia latifolia)*, Indian Sandalwood (*Santalum album)* and African Mahogany (*Khaya senegalensis)* within the Beagle Bay Aboriginal Reserve in West Australia (Figure 1.1). The project is known as the Beagle Bay *Big Tree Country* Plantation Project. A trial plantation for this project was established in 2001, with results indicating that this venture would be both economically viable and environmentally sustainable. Development of the existing site is proposed to commence in 2005, with annual plantings of 300 ha to be undertaken over a three-year period (Figure 1.2), and the current life of the project being estimated at 20 years.

1.1 Document Purpose

Preparation of the Conceptual Closure Plan initiates the process for the identification of future land uses and the development of agreed completion criteria with identified stakeholders. The development of a Conceptual Closure Plan ensures that closure issues are addressed as the project progresses, and provides a tool for the determination of the financial provision required for closure.

This Plan covers all aspects of the decommissioning and rehabilitation of the TTP project, which consists of removal of plantation facilities, supporting infrastructure, and effective land rehabilitation.

It proposes guiding methodologies for decommissioning, rehabilitation and closure of the TTP project, and provides a basis for a 'walk away' strategy. This Plan covers the possibility of project failure, and will be subject to periodic review to ensure that it is accurately aligned with stakeholder opinion, current work methods, and corporate and legislative requirements.

This Plan should be used in conjunction with internal TTP documents regarding decommissioning and rehabilitation, specifically the applicable procedures of the Beagle Bay Plantation Project Environmental Management System and its various registers.

1.2 Closure Plan Review

The expected timeframe of plantation operations within this stage of the project is approximately 20 years, with the envisaged completion year being 2025. It is anticipated that new operational experience, monitoring and evaluation of results will enable ongoing revision and continuous improvement of this document. This will be reviewed and updated on a regular basis, to ensure ongoing compliance with changing stakeholder expectations, legal obligations, work practices and company policy. The revision of the Conceptual Closure Plan should take the following factors into consideration:

- Consultation and feedback from stakeholders;
- Technical investigations conducted to see if post-closure objectives are achievable, including any relevant studies conducted for similar facilities;
- Changes in the plantation project such as changes to operational life, project expansions or early decommissioning;
- Changes in operational or management styles;
- Results from site specific monitoring programs, such as changes in groundwater quality; and

- Changes in legislation and guidelines.

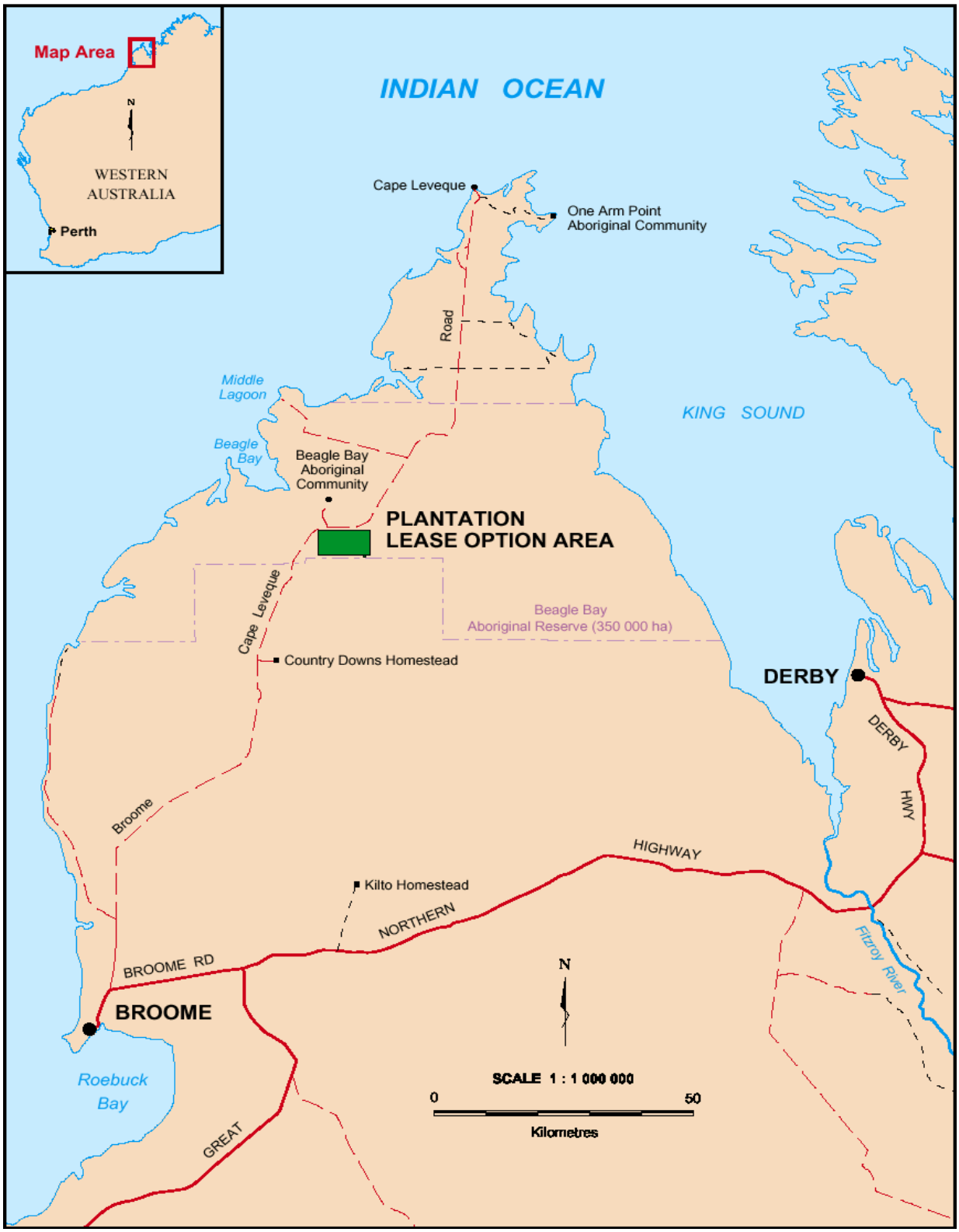
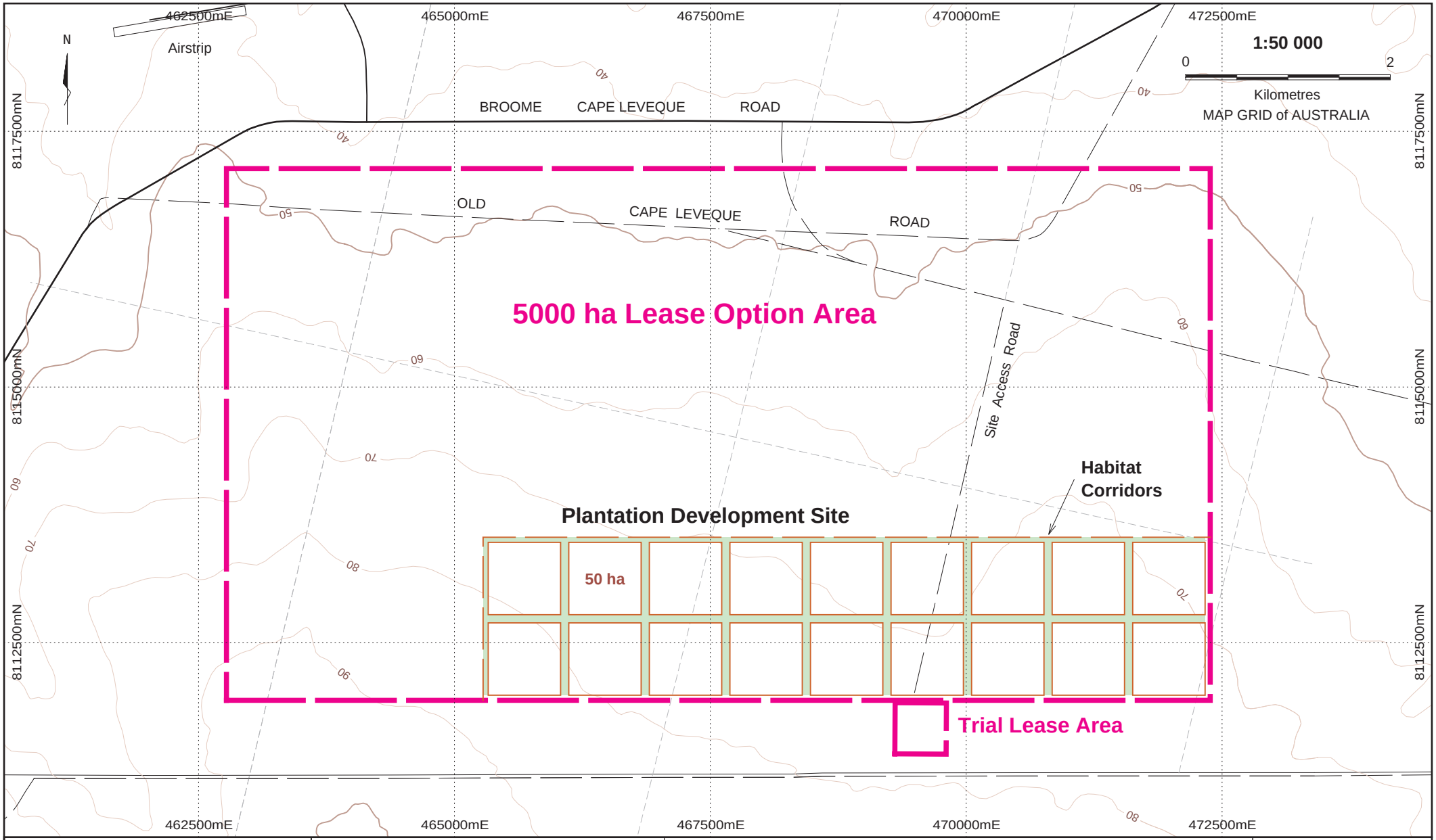


Table 1.1 Location of the Plantation Area within the Dampier Peninsula



JOHN BRENNAN AND ASSOCIATES Project Managers	Client: TROPICAL TIMBER PLANTATIONS PTY LTD	PLANTATION DEVELOPMENT PLAN 50 ha PLOT WITH 80m WIDE HABITAT CORRIDORS	Date: 14 February 2005
			Scale: 1: 50 000
	Project: BEAGLE BAY PROJECT PROPOSED STAGE 2 EXPANSION		Figure No. 1.2
Author: J.B. / S.C. — Drawn: S.Coleman		A4	Plan No. BB-009

2.0 EXISTING ENVIRONMENT

2.1 PHYSICAL ENVIRONMENT

2.1.1 Climate

The Dampier Peninsula has a distinct tropical climate with a wet season from December to March in which almost all the annual rainfall is received and humidity is high (Kenneally *et al.* 1996). Precipitation across this district is thus distinctly seasonal, with Beagle Bay itself receiving an average annual rainfall of some 725 mm (Bureau of Meteorology 2003) and monsoonal cyclonic weather systems are frequently exhibited.

The tropical climate regime needs to be taken into account when adopting this closure strategy as it impacts the timing of rehabilitation activities and water management.

2.1.2 Topography

Comprising predominantly of gently undulating Pindan sandplains, the Dampier Peninsula is bordered by a coastline of outcrops, dunes, beaches and mudflats. With a low land profile the TTP project lies approximately 70 m above sea level, with a uniformly flat landscape that rises gently southward.

2.1.3 Geology and Soils

The principal tectonic unit of the area is the Fitzroy Trough, a major subdivision of the greater sedimentary Canning Basin. The area is underlain by approximately 8,000 m of sedimentary rocks including several extensive sandstone formations. No faulting or folding has been observed in the rock formations of the Dampier Peninsula.

The dominant soil profile in the area is the Yeeda Land System (Speck *et al.* 1964), comprising of low lying Quaternary sandplains or relatively low hills, predominated by deep red sandy soils of the Cockatoo family more commonly known as Pindan.

2.1.4 Hydrology

The project site is underlain by the largely unconfined Broome Sandstone aquifer, the water table of which lies approximately some 55 m below the surface at the TTP site. The water table does rise closer to the surface further north toward nearby Bobby's Creek, with natural ground water discharge occurring through pressurised spring formations, and at other sites scattered throughout the region.

Groundwater in the aquifer flows north towards Bobby's Creek drainage system and has a relatively low salinity being less than 250 mg/L (total dissolved salts).

Groundwater in the Broome aquifer originates from rainfall infiltration. Very substantial groundwater resources (100 GL/a) are estimated to occur in the region (Allen *et al.* 1992), with the average annual recharge to the aquifer at the site estimated to be at around 11 % (Rockwater 2004a).

The proposed plantation will require an initial maximum irrigation demand of 4.5 GL/a for the planned 900 ha Stage 1 development area to be extracted from the underlying Broome aquifer. Following extensive monitoring and recording of sites established by the proponents, their consultants and the DoE, the project may then be expanded to utilisation of a maximum

of 7.1 GL/a (Stage 2) provided that it can be demonstrated that no deleterious effects will occur.

Effective decommissioning of these bores, if required, will be one of the major steps required in the successful closure of the project.

There is no permanent surface water within the project area, and such waters across the peninsula as a whole are restricted to sub-coastal creeks, drainage valleys and seasonal swamps.

2.1.5 Fire Regime

Fire regimes are changing markedly on the Dampier peninsula, with a greater propensity for hot, intensive and broad-scale late dry season fires. In 1995 approximately 27 % of the Kimberley was affected by fire, and this increased to 34 % in 2000 (Climate Action Network Australia 2003).

The desired fire-regeneration cycle in Pindan generally spans five to seven years, and if a low- to moderate fire regime (4 – 7 years) is maintained in a tropical savannah, woody vegetation will remain structurally stable (Russell-Smith *et al.* 2003; Start 2003; Williams *et al.* 2003).

The development of the plantation has the potential to influence fire regimes, through vegetative fragmentation, fire suppression activities and the use of flammable materials. Given that fire frequency is a controlling element affecting vegetation in the region, project effect on fire may influence the local conservation value and vegetative significance of the area.

2.2 BIOLOGICAL ENVIRONMENT

2.2.1 Vegetation and Flora

The TTP Plantation Project area falls within the Dampier Peninsula Botanical sub-district and comprises ubiquitous savannah (Pindan) woodland. A total of 203 taxa of vascular flora from 56 families and 117 genera were collected during the study of the Lease Option Area and surrounds by *ecologia* (2004a) with the vegetation of this survey area being generally in excellent to pristine condition. No species of Declared Rare Flora (DRF) or Priority flora status were recorded within the plantation site, and as such the conservation significance of the plantation at the State level is considered negligible.

2.2.2 Fauna

A recent terrestrial vertebrate fauna survey was conducted on the environs of the project area (*ecologia*, 2004b). Of the species that may potentially occur in this location, 54 % were recorded during the current survey.

During the fauna survey two species listed under international agreements, the Rainbow Bee-eater *Merops ornatus* and Fork-tailed Swift *Apus pacificus* and two priority fauna species, the Australian Bustard *Ardeotis australis* and Bush Stone-curlew *Burhinus grallarius* were recorded. Additionally, a range of endangered, vulnerable, rare and priority species have the potential to inhabit this area, and these are listed in the PER for this Plantation Project.

Several feral species inhabit this area, including the cat *Felis catus* and Donkey *Equus asinus.*

2.3 Aboriginal Heritage and Land Use

2.3.1 Prior Land Use and Land Condition

The Project Area is contained within the 350,000 ha Aboriginal Reserve vested in the Aboriginal Lands Trust and leased by the Beagle Bay Community Inc. TTP has negotiated a sub-lease over a 25 ha trial site with the Beagle Bay Community Inc, the terms of the sublease being a period of five (5) years, commencing from the 1st January 2001. Under this same lease agreement TTP has secured a 5000 ha/ 50 year lease option with the Beagle Bay Community Inc.

Land condition of the project area prior to the commencement of project activities demonstrated little evidence of cattle grazing or other landuse disturbance, and no weed species were found during botanical surveys of the area.

2.3.2 Aboriginal Heritage

There have been a number of archaeological sites recorded within the Dampier Peninsula as a result of previous surveys and independent research. These sites have been registered with the Department of Indigenous Affairs (DIA). A search of the DIA sites database resulted in a listing of 21 sites, none of which are within the proposed project area.

Although there are currently no listed heritage sites within the Plantation Project area, TTP have a provided a commitment to the Beagle Bay aboriginal community to consider aboriginal heritage issues appropriately at all stages of the projects life, and concurrently abide by all stipulations of the *Aboriginal Heritage Act 1972*. If any heritage areas or artefacts are identified during any phase of this project, work surrounding the area with cease immediately and the Department of Indigenous Affairs will be notified for further advice.

Custodians of the Beagle Bay Community will examine the project area for anthropological, ethnographic and archaeological sites prior to initial clearing, and will evaluate the state of any such sites upon project closure.

3.0 CLOSURE OBJECTIVES

Planning for closure seeks to address the social, environmental, economic and safety aspects of closure. Closure processes should occur in a planned, sequential, and cost-effective manner and should ensure that full ecosystem function is achieved following closure. The aim of closure is to; prevent or minimise long-term environmental impacts and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives (ANZMEC 2000).

When seeking to initiate closure of the plantation and its associated infrastructure, several key issues need to be addressed concerning the long term implications of site condition including:

- Public safety;
- The possibility of off-site impacts;
- The applicability of final landforms and their stability;
- Erosion and dust control;
- Surface and groundwater hydrology;
- Remediation of contaminated areas;
- Re-establishment of the original flora and fauna and their associated habitat;
- Resolution of aboriginal heritage issues; and
- Ongoing monitoring to assess closure performance.

A successfully decommissioned project will be one with a post-plantation landform that is safe, stable, non-erodable, and well integrated into the surrounding environment. Such a closure plan and its requirements will be an integral component to TTP operations, should be technically, economically and socially feasible, and will require regular review to keep it effective and relevant.

The closure objectives for the project may include:

- Removal of all project plantation tree species;
- Removal of all weed species;
- Decommissioning and/or sealing of all bores on site;
- Necessary remedial actions to ensure public safety is retained;
- Rehabilitation of all disturbed areas including roadways and car parks;
- Removal of infrastructure and facilities;
- Remediation of contaminated areas;
- Relevant monitoring and reporting activities;
- Compliance with EPA project objectives; and
- Agreement on post land use condition.

It is pertinent to note that at this stage of planning, the Beagle Bay Community intend to take over the project and site facilities at the expiration of the lease.

4.0 LEGAL OBLIGATIONS

To ensure that the closure of the TTP Plantation Project and associated infrastructure meets all legal requirements, a review was undertaken to identify legislation and guidelines applicable to this closure. As part of the revision of the Closure Plan during the projects life, legislation and other obligations will be regularly reviewed to identify any new requirements.

4.1 Legal Requirements

There are no legal requirements regarding closure for this project at the time of writing this document as the project has not yet received EPA approval.

All relevant legislation must be abided by in full; a list of applicable legislation to this project has been compiled as Table 4.1, although legislative responsibilities may not necessarily be limited to these legal documents.

Additional general requirements include that TTP be subject to all reporting, auditing and governance procedures, that closure avoids state liability by employing appropriate management practices, and that this Plan has been signed-off by the Department of Environment.

4.2 Legislation of Relevance

The following legislation was deemed relevant to the plantation closure and has been taken into account when developing this Conceptual Closure Plan.

Table 4.1: Legislation relevant to the TTP Plantation Project

Legislation	Responsible Government Agency
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	Department of Environment and Heritage
Native Title Act 1993	National Native Title Tribunal
State	
Aboriginal Heritage Act 1972	Department of Indigenous Affairs
Conservation and Land Management Act 1984	Department of Conservation and Land Management
Contaminated Sites Act 2003	Department of Industry and Resources
Environmental Protection Act 1986	Department of Environment
Heritage of Western Australia Act 1990	Heritage Council of Western Australia
Rights in Water and Irrigation Act 1914	Department of Environment

Legislation	Responsible Government Agency
Soil and Land Conservation Act 1945	Department of Agriculture
Timber Industry Regulations Act 1926	Department of Conservation and Land Management
Wildlife Conservation Act 1950	Department of Conservation and Land Management

4.3 Guidelines and Codes of Practice

The Guidelines and Codes of Practice outlined below are also applicable to the plantation project and this Conceptual Closure Plan:

- AS 4708 (Int) - 2003: The Australian Forestry Standard;
- AS 4708 Supplement 2 (Int) - 2003: The Australian Forestry Standard - Guidance for Medium and Large Plantation Ownerships;
- Code of Practice for Timber Plantations in Western Australia;
- Guidelines for Plantation Fire Protection 2001;
- Water Quality Protection Note - Chemical Spills-Emergency Response Planning (DoE);
- Safety Code for Western Australian Logging Operations;
- Forest Management Regulations 1993; and
- Standard for Decommissioning test holes, partially completed bores and completed bores (DoE).

4.4 TTP Internal Documentation

All elements of the TTP EMS must be met during closure. Relevant procedures are:

- PO21 – Weed Management;
- PO23 – Rehabilitation Procedure;
- PO25 – Waste Management; and
- PO26 – Hydrocarbon Control.

5.0 CONSULTATION REQUIREMENTS

5.1 Consultation Objectives

Stakeholder consultation is considered to be a key component of effective planning for project closure. Effective stakeholder consultation will ensure that a realistic perception of stakeholder expectations is achieved; making it more likely that sufficient financial provision will be available for closure activities, and will maintain strong relationships with stakeholders.

5.2 Identification of Stakeholders

The following is a list of key stakeholders for the TTP project:

5.2.1 Government Stakeholders

- Aboriginal Lands Trust
- Australian Greenhouse Office
- Broome Shire
- Department of Business, Industry , Resources and Development. N.T.
- Department of Industry and Resources
- Department of Conservation and Land Management
- Department of Environment
- Department of Indigenous Affairs
- Environmental Protection Authority
- Forest Products Commission

5.2.2 Non-Government Stakeholders

- Australian Conservation Foundation
- Beagle Bay Burrdunk Inc
- Beagle Bay Community Inc
- Broome Growers Association
- Environs Kimberley
- Kimberley Primary Industry Association
- Kimberley Regional Fire Management Project
- Kimberley Land Council

5.3 Consultation Process

Consultation with stakeholders will occur throughout the operational life of the plantation project. Effective consultation will include:

- Liason with all parties identified in this report and other parties interested in this project over its duration;
- A clearly identified process and set of objectives for consultation;
- A well targeted communication strategy;
- The allocation of adequate resources: time, money, and personnel; and
- A clear commitment from the CEO and senior management.

Beagle Bay Community Inc is the key mechanism for consultation with the Beagle Bay community and the primary avenue for the public to provide opinion on this project and its components. It is envisaged that this group will provide feedback on closure planning throughout the life of the project.

6.0 COMPLETION CRITERIA

6.1 Extent of Closure

Future land-use intentions may dictate the level of completion required for certain aspects of the project, and as such prior to implementation of this Conceptual Closure Plan, it must be determined to what extent facilities incorporated within this project, such as established bores, will be decommissioned. Consequently, a discussion of partial closure has been provided in Section 7.0 of this report to cater for a variety of possible completion outcomes.

6.2 Completion Criteria

Completion criteria are a set of project specific environmental indicators that once satisfied will ensure that successful rehabilitation of the project area has been achieved.

Determination and definition of completion criteria should be achieved through active consultation between TTP and relevant stakeholders, which have been listed for this project under Section 5.0. Consultation should be ongoing throughout the life of the Plantation Project, leading to completion criteria that are keep up to date with the project closure demands.

6.3 Critical Aspects

Development of proposed closure completion criteria for this project has required consideration of several aspects such as:

- Legislative and regulatory requirements;
- Erosion stability of final landforms and the overall sustainability of areas revegetated;
- The desires of stakeholders;
- Safety to the public; and
- Possible future land use objectives and requirements.

6.4 Project Completion Criteria

Proposed completion criteria are:

- Future land use requirements have been identified through consultation with project stakeholders, and agreed with relevant regulatory bodies;
- All evidence of plantation species and invasive weeds have been removed, including seed stock;
- Infrastructure that will not be needed for post project land use activities have been decommissioned, with materials disposed of appropriately;
- Revegetation has been conducted on all disturbed areas, with self perpetuating local native vegetation cover well established;
- Investigations conducted during decommissioning of infrastructure to determine location of contaminated sites, and these areas remediated and rehabilitated;
- Aboriginal heritage sites have been fully protected from damage;
- Potential for erosion is limited in post plantation landforms;

- Relevant legislative requirements and Ministerial commitments have been met;
- Closure of bores has been undertaken as per the DoE Standard for Decommissioning Test Holes, Partially Completed Bores and Completed Bores, and bores that are to remain active are capped;
- Agreed monitoring programmes implemented; and
- There are no areas or infrastructure that may compromise public safety, such as open bores.

6.5 Response to Project Failure

Closure of a project that has failed is likely to be sudden, and also hampered by a loss of desire to further the work of the project. However TTP must ensure that appropriate closure agenda detailed in this closure plan are still addressed.

Given the event of project failure, closure strategies outlined in Table 10.1 and commitments provided in the PER and the new sub-lease agreement with the BBC (yet to be negotiated) must be adhered to.

7.0 DECOMMISSIONING OF FACILITIES AND ASSOCIATED INFRASTRUCTURE

The closure of the TTP Plantation Project will likely occur in stages over the life of the plantation as timber stand requirements change and infrastructure becomes redundant. Closure will therefore be an ongoing process and will involve the removal of infrastructure and rehabilitation of areas, at various times, until the end life of the project is reached.

7.1 TTP Plantation Area

The TTP plantation area contains a range of facilities that may need to be removed, and cleared plantation lands that may need to be rehabilitated back to their initial state.

Agenda that must be addressed within the plantation itself include:

- Irrigation system to be removed;
- Rehabilitation of all disturbed and/or cleared areas;
- Removal of all elements of plantation species, including seed stock;
- Removal of all introduced weed populations, including seed stock;
- Remediation of any identified contaminated areas;
- Aboriginal or non-indigenous heritage areas affected restored to original state; and
- Unsealed roads / firebreaks within the plantation rehabilitated.

7.2 Associated Infrastructure

Associated infrastructure that may be decommissioned upon project closure includes:

- Accommodation village for 25 people. This includes fire and first aid response areas and attached grey water / sewerage facilities;
- Potting shed;
- Vehicle wash down bay;
- A nursery / shade house;
- A machinery / storage shed;
- The site office and car park;
- Small bore field comprising of 6 production bores and several monitoring bores;
- Firebreaks / unsealed roads surrounding the plantation area; and
- A private unsealed road from the Broome - Cape Leveque road to plantation office car park.

7.3 Partial Closure

The situation may arise upon project completion, where it may be desirable to leave some facilities and infrastructure intact in order to carry the projects capabilities over to a new owner, or to allow some aspects to remain functional for other uses. For example, production bores and access roads could be left available for use by local fire fighters. As such

production groundwater and monitoring bores may be decommissioned and sealed if the project is to be abandoned, or may be retained for use and capped.

Extension of the life of such facilities must:

- Be acceptable to the lessee of the reserved land and/or the Beagle Bay Aboriginal Community Inc and/or relevant State Government Departments;
- Be closed down to a stable form, as it may be sometime until the facility is utilised, taking into account possible property degradation and future environmental impacts; and
- Apply full public safety considerations.

8.0 CONTAMINATED SITES

Under the *Contaminated Sites Act 2003* a site is considered to be contaminated if it has a substance present at above background concentrations that presents, or has the potential to present, a risk of harm to human health, the environment or any environmental value.

As part of the decommissioning of infrastructure, a contaminated site assessment will be undertaken that incorporates the following:

- Investigation: determine the nature and extent of any soil and/or groundwater contamination;
- Assessment: evaluate the risks of any identified contamination to human health or the environment;
- Action Plan: develop and document an operations plan and implementation schedule which addresses all necessary activities including disposal of contaminated material, monitoring and criteria for completion;
- Consultation: discuss all aspects of the program and obtain agreement from DoE, together with other agencies as appropriate;
- Implementation: undertake all aspects of the program in compliance with the documented plan and any relevant standards such as AS 4482.1 – 1997 related to the sampling and investigation of contaminated soils;
- Validation: undertake monitoring and/or testing, using appropriate, recognised methods, to demonstrate reduction of contamination to an acceptable levels using an independent consultant; and
- Closure: Obtain regulatory signoff that the remediation process has been effective and the site is no longer contaminated.

Potential sources of contamination from the project are:

- Use of chemicals, such as fertilisers, pesticides and herbicides; and
- Use and storage of hydrocarbons such as fuels and oils.

9.0 FINAL LANDFORMS AND REHABILITATION

9.1 Final Landform Design and Use

The ideal final land use is to leave this area as close to pre-development condition as possible.

9.2 Rehabilitation Techniques

The primary goal of rehabilitation is to re-establish stable landforms with land uses similar to those prior to disturbance. The objective is to establish a self-sustaining system of quick growing native grasses for stability, with topsoils replenished with native shrub and mature tree seed stock, which is similar in diversity, density and potential cover to pre-disturbance conditions and consistent with ongoing land use objectives.

The general principle for closure of the TTP Plantation Project facilities will be to remove all facilities, structures and elements of plantation and invasive species populations, and re-profile the surface where practicable in preparation for rehabilitation. Once the surface has been re-profiled, the main tasks for rehabilitation will include:

- Deep ripping of compacted surfaces to promote water penetration, increase seed capture, reduce erosion and improve vegetation establishment;
- Spreading of stockpiled topsoil and vegetation debris;
- All plantation tracks are to be rehabilitated if not required post landuse;
- Consideration of drainage pathways to alleviate erosion potential
- Reseeding of local native plant species; and
- Planting of local native seedlings.

Rehabilitation should be undertaken as per TTP's internal EMS PO23 Rehabilitation Procedure.

9.3 Progressive Rehabilitation

It is proposed that surfaces no longer required for work activities will be progressively rehabilitated, using the methods of closure and rehabilitation listed above and in section 10.0. It is recommended that reassessment of closure requirements be conducted on a yearly basis.

10.0 SPECIFIC CLOSURE STRATEGIES

TTP Plantation Project infrastructure will be removed and rehabilitated upon completion of use. Specific closure strategies for the varied structures are outlined in Table 10.1 below.

Table 10.1 TTP Infrastructure Closure Strategies

Infrastructure Element	Closure Strategy
Production and Monitoring Bores	• Determine stakeholder requirement for the infrastructure; • Determine whether to decommission or transfer responsibility to another stakeholder; • Removal of infrastructure including removal and perforation of bore casing, application of sealing / fill material, and capping; and • Ensure that bores remaining in use are effectively capped.
Vehicle washdown bay	• Determine stakeholder requirement for the infrastructure; • Removal of infrastructure; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment; and • Rehabilitate as per Section 9.0.
Power Supply	• Determine stakeholder requirement for the infrastructure; • Remove power cables and associated infrastructure; • Reuse, recycle or dispose of components appropriately; and • Power for this project is sourced from the Beagle Bay power station.
Site office	• Determine stakeholder requirement for the infrastructure; • Removal of infrastructure; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment (if necessary); and • Rehabilitate land to prior use.
Sheds and Nursery	• Determine stakeholder requirement for the infrastructure; • Removal of infrastructure; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment; and

Infrastructure Element	Closure Strategy
	• Rehabilitate land to prior use.
Irrigation system	• Determine stakeholder requirement for the infrastructure; • Remove irrigation equipment including all lateral piping, drip emitters, VHF radio units, solar panels, sensors, flow meters and any other associated equipment; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment; and • Rehabilitate land to prior use.
Roads / fire breaks	• Determine stakeholder requirement for the infrastructure; • Determine wether to rehabilitate or transfer responsibility; • Remove all cattle grids, fences, signs and associated infrastructure; • Remove all drainage culverts, road embankments, floodways and water drainage infrastructures; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment; • Ensure that all pre-existing farm tracks and roads are intact; and • Rehabilitate land to prior use.
Accommodation village	• Determine stakeholder requirement for the infrastructure; • Determine wether to rehabilitate or transfer responsibility; • Dismantle and remove all associated sheds, accommodation units, office structures, cables, diesel tanks, water tanks, fire fighting facilities, sporting facilities, and other related infrastructure; • Disconnect/ remove communications; • Dismantle and remove all tanks, pumps, plumbing, pipes and associated sewerage infrastructure; • Break up all concrete footings, bunds and slabs and remove to general landfill, or bury in-situ approximately 1.5m below the surface; • Reuse, recycle or dispose of components appropriately; • Undertake contaminated sites assessment; • Remove all drainage associated infrastructure to allow free drainage and minimise interference with natural surface flows; and • Rehabilitate land to prior use.

11.0 MONITORING AND REPORTING

11.1 TTP Monitoring Commitments

As committed in the TTP EMS, monitoring of the following environmental aspects will take place across the life of the project:

- Weed Infestation and weed hygiene;
- Ground water use, ground water chemistry and soil chemistry;
- Pesticide and fertiliser application rates;
- Planting and harvesting statistics;
- Significant Flora and Fauna sightings; and
- Tree development and maintenance details.

Upon closure of the project, or of specific elements, monitoring will be carried out to ensure that decommissioning and rehabilitation meets the agreed final land-use and wishes of the lessor and vesting authority. The progression of decommissioned and rehabilitated areas will also be monitored during routine plantation inspections.

It is recommended that due to the seasonal nature of the regional climate, weed inspections and eradication be carried out after project closure, after the following wet season, and a third time after two more wet seasons have passed.

With regard to groundwater monitoring, TTP have provided the following specific commitments:

- *Wetland Groundwater Monitoring:* TTP will monitor groundwater levels within the Bobby's Creek wetlands to the north of the plantation.
- *Monitoring of Groundwater Dependent Ecosystems:* TTP will monitor Groundwater Dependent Ecosystems (GDEs) north of the project area, to ensure that groundwater extraction does not exacerbate natural variations in the height of the water table, leading to adverse impacts on these GDEs.
- *Groundwater and Irrigation:* TTP will implement a monitoring plan to ensure that groundwater levels are not significantly reduced and TTP will undertake research to more accurately determine tree water demand of the plantation species.

Other rehabilitative monitoring / inspection requirements include:

- Flora and fauna species diversity assessment;
- Weed monitoring;
- Revegetation seeding success and health
- Heritage site quality;
- Identification of off site impacts and erosion issues;
- Threats to public safety.

11.2 Reporting

Results of environmental monitoring are reported to senior management in regular meetings and to the relevant authorities in accordance with Ministerial and licence condition stipulations, once these have been issued. Annual reports will be submitted to the DoE, as stipulated in the GLOS (Rockwater 2004b).

12.0 CLOSURE COSTINGS

12.1 Cost Estimates

Costs associated are difficult to estimate given that closure will possibly not occur for a further 20 years. However, an approximate financial provision (at present costs) should be determined for decommissioning and rehabilitative costs, given the specific closure agenda listed in Table 10.1.

In order to keep costing estimates relevant, this closure plan should be updated regularly, with any changes in decommissioning or rehabilitative requirements being factored into future costing analysis. It is envisaged that the initial budget estimates for closure be developed during the first 3 years of the project

REFERENCES

Allen, A.D., Laws, A.T., Commander, D.P. (1992). *A review of the major groundwater resources in Western Australia.* Report to Kimberley Water Resources Development Office, December 1992, Water Corporation, Western Australia

ANZMEC (2000), Strategic Framework for Mine Closure. Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia. Canberra, ACT.

Bureau of Meteorology (2003) Available at World Wide Web URL: http://www.bom.gov.auClimate Action Network Australia (2003). Available At Wold Wide Web, URL: http://swiftek.modwest.com/cana/bush/rangelands.htm

ecologia Environment (2004a). Beagle Bay "Big Tree Country" – Flora Assessment Survey. Unpublished report for Tropical Timber Plantations Pty Ltd.

ecologia Environment (2004b). Beagle Bay "Big Tree Country" Tropical Timber Plantation– Fauna Assessment Survey. Unpublished report for Tropical Timber Plantations Pty Ltd.

Kenneally, K.F., Edinger, D.C. and Willing, T. (1996) *Broome and Beyond.* Department of Conservation and Land Management, Perth.

Rockwater Proprietary Limited (2004a) Beagle Bay Big Tree Country Plantation Project. Groundwater Assessment and Modelling to Support Groundwater Licence Application. Unpublished report for Tropical Timber Plantations Pty Ltd.

Rockwater Proprietary Limited (2004b) Beagle Bay Big Tree Country Plantation Project. Groundwater Licence Operating Strategy. Unpublished report for Tropical Timber Plantations Pty Ltd.

Russell-Smith, J., Whitehead, P.J., Cook, G.D. and Hoare, J.L. (2003) *Response of Eucalyptus-dominated savanna to frequent fires: Lessons from Munmarlary, 1973 – 1996.* Ecological Monographs. 73: 349 – 375.

Speck, N.H., Wright, R.L. and Rutherford, G.K. (1964) *General Report on Lands of the West Kimberley Area, W.A.* Land Research Series No. 9, CSIRO, Melbourne.

Start, A. (2003). *Fire management and healthy country in the Kimberley Region, Western Australia*. In: Kohen, J.L. (ed) Proceedings of the 2nd Biannual Kimberley Fire Forum. Kimberley Specialists.

Williams, P.R., Congdon, R.A., Grice, A.C. and Clarke, P.J. (2003) *Effect of fire regime on plant abundance in a tropical eucalypt savanna of north-eastern Australia.*