

Plantation Monitoring Plan

Bunbury Fibre Plantations

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Appendix 1 Example of generic PIR

1. Background

A monitoring plan is essential to ensure the proficient management of the Bunbury Fibre Pty Ltd plantation estate which includes patches of remnant vegetation. The Forest Stewardship Council (FSC) Forest Management Standard (Interim Standard FM-32 Australia, June 2008) requires that monitoring of the plantation estate be undertaken appropriate to the scale and intensity of forest management. The primary focus of the monitoring plan is to assess:

- the condition of the forest
- yields of forest products
- chain of custody
- management activities
- social and environmental impacts.

The primary stages of plantation development are critical to the overall performance of plantation growth; therefore, the success of the entire rotation requires early application of plantation monitoring and inspection procedures. This will also ensure that an objective basis for plantation performance is established early in the rotation and the procedure should be transparent and accessible. The document and the procedure should also be auditable under the auspice of the FSC standard.

2. Policy, purpose and procedure

2.1 Policy

This monitoring plan conforms to the Bunbury Fibre Plantation (BFP) development and maintenance policy, which outlines the requirement to proficiently manage the entire plantation estate, including native forest remnants, in accordance with the FSC standard.

2.2 Purpose

This document outlines BFP monitoring and inspection procedures for the plantation estate, along with instructions for completing the Plantation Inspection Report (PIR).

2.3 Procedure

On each occasion annual or biannual or more frequently if there is a threat to the plantation or surrounds that needs closer monitoring staff member visits a plantation, an inspection form should be completed, as this promotes efficient time management and develops the observational skills of the assessors. These skills are critical to ensure all inspections are uniform and are conducted at both a compartment and individual tree level. The frequency of inspections should ideally be monthly; however, this can change depending on the level of management intensity required. For example, in the event of insect attack, the frequency may be twice weekly, or when harvesting occurs, this may be daily.

2.3.1 Inspection methodology

Where possible, plantation inspections should be conducted in association with other tasks in a methodical manner. The route should be planned through the plantation to capture as many of the observable elements as possible. The critical elements are outlined in Section 3 and have been classified in two main areas;

- * Plantation performance elements

Plantation performance elements directly impact on plantation growth and performance and therefore affect the financial performance of plantations.

- * Broader management elements

Broader management elements are those elements that relate to infrastructure and outside factors that indirectly impact on the performance of plantations.

2.3.2 Sampling intensity

Once the plantation inspection route has been determined then a tour around the compartment boundary should be undertaken to gain an overview of the site. Then, with the aid of a four wheeled motor bike, the assessor should undertake inter-row inspections at a sampling intensity of one row in five (1:5) or approximately 5%. This intensity may change depending on the health of the plantation at the time.

2.3.3 Inspection equipment

The following equipment is recommended for use when undertaking plantation inspections;

- plantation management map showing compartments
- PIR
- all terrain vehicle (four wheel motor bike)

- clipboard
- 50 metre tape
- counter
- collection vials/labels
- digital camera
- whirling psychrometer
- wind metre
- GPS.

2.3.4 Personnel Protective Equipment (PPE)

The following personnel protective equipment is recommended for use when undertaking plantation inspections;

- motorcycle helmet
- high visibility vest
- goggles
- steel capped boots.

2.3.5 Data collection

During plantation inspection activities, care should be taken to record and sample any unique or abnormal features, which should be collected and stored in a vial for later analysis. The location of the feature should also be recorded using a GPS and marked on the plan. This procedure should also be adopted for insects and fungi observed during the inspection.

Destructive sampling is also an option that can be undertaken, particularly to determine the cause of tree death, which is often associated with observations of the root collar or individual roots.

2.3.6 Environmental issues

Observations relating to environmental issues often relate to the native forest remnants and should be recorded on the PIR. In addition, where there is a requirement to monitor native vegetation plots (as required under the standard and in a number of plantation management plans), then these results should be recorded and included on the PIR.

The monitoring of pesticide use and the potential for offsite flow is an important environmental element that requires diligent monitoring both at the early stages of plantation establishment and after any application of pesticide later in the rotation for the control of pests and disease. This requirement should be initiated when operations are undertaken only, not required as a routine requirement.

3. Monitoring elements rationale

3.1 Plantation performance elements

3.1.1 Seedling survival

The assessment of seedling survival is critical to the overall performance of plantations and must be undertaken regularly throughout the first two years of the plantation rotation. This is also important for quantifying any infill requirements post establishment.

3.1.2 Seedling, plant health and nutrition

This element requires ongoing assessment for the whole of plantation life until harvest. This is particularly relevant in regard to nutrition and impact of insects or disease.

3.1.3 Weed infestation

The assessment of weeds is important for the first 1-3 years of plantation growth, as any additional completion will limit both establishment and seedling growth.

3.1.4 Insect pests and disease

This element requires ongoing assessment for the whole of plantation life until harvest. Damage through foraging by insects, parrots and certain fungi can adversely impact tree growth and productivity.

3.1.5 Erosion

The assessment and monitoring of soil erosion is an important element as it has the potential to undermine both plantation access roads and destroy the mounds prepared to assist in plantation establishment and survival. In addition the offsite movement of water post spraying for weed control can adversely impact on neighbouring property

3.1.6 Soil disturbance

Soil disturbance created as result of plantation establishment and timber harvesting has the potential to contribute greatly to soil erosion and limit the productivity of the plantation. This is to compaction and the mixing of soil horizons which can adversely affect tree nutrition on areas disturbed.

3.1.7 Coppice management

The assessment of coppice is an optional element should this form of plantation regeneration be applied. The assessment will generally be in regard to the number of stems retained and their growth rates.

3.2 Broader plantation elements

3.2.1 Access

The inspection of plantation access roads, culverts and creek crossings is primarily related to safety issues, although serious erosion originating from mounding and access road construction can affect seedling survival in the early years of development.

3.2.2 Fire protection

The inspection of plantations in regard to fire protection and management is required by legislation in that plantation firebreaks have to be compliant with local government and FESA firebreak requirements. Non-compliance can lead to disputes with local governments and can incur costs for restitution if applied.

In addition, inspection assessors should also be on the lookout for any campfires in and around dams or water points and fires resulting from lightning strikes in adverse weather conditions.

3.2.3 Water quality monitoring

The requirement to monitor water quality is required to quantify if BFP activities adversely affect water quality management objectives set down in the *Australian Drinking Water Guideline Number 6* (National Health and Medical Research Council 2011). The company's standard operating procedure applies to the water sampling and monitoring within the temperate regions of plantation pulpwood areas managed by Bunbury Fibre.

3.2.4 Native vegetation monitoring (lease areas)

Where specified in the respective plantation management plans the monitoring of designated flora monitoring established in high value conservation forest areas should be undertaken as per the requirement outlined in the management plan. Photographic evidence should also be gathered at each plot for future reference and auditing purposes.

3.2.5 Vertebrate pests

When undertaking periodic inspections the presence or evidence of feral animal pests should also be noted and recorded. The primary species of concern are;

- European Fox
- Wild Pigs
- Rabbits

3.2.6 Security and infrastructure

Plantation security relates primarily to unauthorised access into the plantation by people and livestock and the following elements need to be considered:

- the adequacy or standard of perimeter fencing
- closure and standard of gates
- unauthorised livestock grazing
- illegal dumping of rubbish
- map tubes
- water points
- bridges and culverts
- shed buildings yard
- powerlines
- company signage.

3.2.7 Mapping/ record keeping

General vigilance of the accuracy of map features should be undertaken and any errors or comments recorded to be corrected on return to the office. The map feature will be outlined on the plantation management map and will involve some or all of the following;

- access points
- signage
- significant hazards
- road names
- restricted access points
- compartment numbers
- water points
- area and species within a compartment
- firebreak location and width
- powerlines, telephone cables underground pipelines etc

4. Plantation inspection report (PIR)

The PIR must be completed prior to leaving the plantation to maintain the required level of accuracy.

4.1 Plantation forest type

4.1.1 Plantation

Specify the plantation type and purpose, such as:

- *Eucalyptus globulus*, grown principally for the production of wood fibre

4.1.2 Native forest

- Native Flora
Note evidence of authorised disturbance to the native vegetation. Record flora monitoring plot data and photos as required under the respective plantation management plan.
- Native Fauna
Note any evidence of illegal hunting or poaching of species. Record occurrence of any known rare and endangered species.
- Vertebrate Fauna (feral animals)
- Catchment
Record and note any significant encroachment of salt intrusion within the native forest area.

4.2 Weather

Record a brief weather description at the time of inspection and record the following:

- temperature
- relative humidity
- average wind speed and direction
- amount of last rainfall.

4.3 Compartment

Record the compartment number and species inspected.

4.4 Survival

A sample plot intensity of one per every 10 hectares is the industry norm. The plots should comprise a 20 m radius which equates to a plot size of 0.1275 ha. The survival percentages can then be calculated and recorded in the PIR.

4.5 Health

Plantation health can be assessed as one of the following:

- good
- above average
- below average
- poor.

4.6 Weeds

The assessment of weeds can be undertaken as a percentage of the plot inspected and the following criteria apply:

- <5%
- 5 - 10%
- 10 - 20%
- 20 - 40%
- 40 - 60%
- >60%.

Weeds that are competing with the plantation species, along with any unusual or declared weeds should be recorded and samples collected for confirmation on returning to the office as per section 2.3.5.

4.7 Insect pests, parrot damage and disease

The presence and damage of insects or parrots must be recorded. The name of the insect species should also be recorded. In the event of observed fungal infestation, this must also be recorded along with the species (if known). Should the assessor not know the name of any of the pest species, samples must be taken as outlined in section 2.3.5.

4.8 Erosion and soil disturbance

Evidence of either of the above elements must be recorded throughout the life of the plantation and rectified where adverse impacts occur. Ideally photographic evidence should support the recorded information in the PIR

4.9 Mapping

All the information gathered by the assessor when undertaking a plantation inspection should be recorded on the plantation compartments maps. Photos should also be taken of all problem areas and retained with the PIR to assist in assessing the success or any recommended remedial actions taken to manage any issues recorded.

4.10 Recommendations

On completion of the plantation inspection and recording of findings, a series of recommended actions should be generated and recorded in the 'actions required' section of the PIR. The action required should include the following information:

- compartment location
- description of the task
- responsible person
- proposed implementation timeline
- completion date and impact of remedial action.

4.11 Example PIR

An example of a generic PIR is contained in Appendix 1.

5. Evaluation and audit

5.1 Review and evaluation

The plantation manager should regularly review and evaluate the outcomes of the plantation inspection report and ensure that timely remedial actions are applied when plantation management requirements are not met or audit corrective actions are prescribed. The preparation of an annual monitoring report is also a key mechanism to ensure the plantations and the native forests under the control of Bunbury Fibre Plantations are managed to a suitable standard.

The timeliness of the inspections and audits should also be reviewed by the plantation manager in line with the FSC standard and the code of plantation management

5.2 Updating of management plan

Any remedial actions or changes to the management resulting from monitoring activities should be incorporated into the plantation management plans via an annual review or as prescribed by the FSC standard.

5.3 Audit

All PIRs, annual plantation monitoring reports and plantation management plans should be available for audit by both internal company auditors and independent external auditors as required under the FSC standard.

5.4 Document control

Bunbury Fibre Plantations has a controlled document described as the "Forest Operations Manual" and this draft policy document once approved and endorsed by the Board of Directors will need to be incorporated into the manual.

Appendix 1

Example of generic PIR

Draft Plantation Inspection Report				
Plantation name				Inspected by
Year of Planting				Date
Compartment Number	Plantation species			
	Criteria	E Globulus		
Survival	>95%		Native Forest	
	90-95%			
	80-90%		Flora Plots	Photo plot details
	60-80%			
	20-60%			
	<20%			
Health	Good			
	above average			
	below average			
	poor			
Weeds	<5%		Fauna	record findings
	5-10%			
	20-40%			
	40-60%			
	>60%			
Mapping	insert item		Catchment	record findings
	insert item			
		Plantation performance		
Plant survival				
Plant health				
Weed infestation				
Insect pests				
Soil erosion / damage				
Parrot damage				
Disease				
Coppice				
		Broader mangement issues		
Access				
Fire management				
Water Quality				
Security infrastructure				
		General comments		
Compartment Number	Remedial actions	Responsible person	Implementation timeline	Date and action of remedial work completed