

10.0 Development of a Biodiversity Monitoring Plan

10.1 INTRODUCTION

Esso Highlands Limited will develop a Biodiversity Monitoring Plan to monitor the success of this Biodiversity Strategy. Monitoring Activities will be started during the later stages of construction and will be in addition to monitoring of environmental performance of the Project during construction that will be carried out under the ESMP.

The ESMP dictates monitoring requirements for Esso Highlands Limited and contractors and is the primary mechanism by which environmental performance of the Project will be monitored during construction. The core environmental monitoring under the ESMP focuses on ensuring mitigation measures are carried out and specified environmental standards are adhered to. The ESMP monitoring activities most relevant to biodiversity are concentrated in the Ecological Management Plan, the Water Management Plan, the Weed, Plant Pathogen and Pest Management Plan, the Erosion and Sediment Control Management Plan, the Reinstatement Management Plan, and the Induced Access Management Plan.

The Biodiversity Strategy Monitoring Plan is complementary to the biodiversity related monitoring activities documented in the ESMP and will determine, in the longer term, whether the objectives of the Biodiversity Strategy have been met. While monitoring under the ESMP is for construction, the Biodiversity Monitoring Plan will mostly be carried out during operations.

10.2 GOAL

The overall goal of the Strategy Biodiversity Monitoring Plan is to determine if the objectives of the Strategy have been met:

1. Maintain the ecological intactness of the Upstream Project Area.
2. Conserve the priority ecosystems.
3. Protect focal habitats.
4. Account for residual impacts.

If degree of success of objectives 1 to 4 (see Chapter 6) are to be usefully related to the Project's activities, it will be necessary to add a fifth objective:

5. Determine the extent to which the project design parameters were followed and mitigation measures duly implemented.

10.3 APPROACH

Monitoring is aimed at the three scales. For each value at each scale, a set of targets is defined, each with an end-point. The end points are based on predictions of the EIS assessment process.

It is impractical to develop an individual monitoring system for each of the many high biodiversity values in the Upstream Project Area. Instead a suite of five Programmed Monitoring Activities (PMAs) was conceived each designed to gather information for indicators for many targets, so that the least number of data-gathering activities can inform the maximum number of targets. One of the PMAs involves remote sensing, three involve regular collection of field data and one involves regular compilation of data from elsewhere. The PMAs are as follows and their relevance to the values and impacts presented in Table 10.1.

Table 10.1: Relationship of PMAs to impacts and values

	PMA 1 (Remote Sensing)	PMA 2 (ROW Aerial Reconnaissance)	PMA 3 (Regeneration Surveys)	PMA 4 (Access Monitoring)	PMA 5 (Results of Offset Programs)
RESIDUAL IMPACTS					
Habitat loss	X	X	X		
Edge effects in high-altitude karst		X	X		
Barrier and erosion impacts in high-altitude karst		X	X		
Barrier and erosion impacts in high cuttings		X	X		
Fire	X				
Introduction and spread of alien species and diseases		X	X		
Enhanced access	X	X		X	
VALUES					
Upstream Project Area					
Extensive intact forest	X	X	X		
High floristic diversity			X		
High faunal diversity			X (avifauna only)		
New species			X (avifauna only)		
Endemic species			X (avifauna only)		
Unique assemblages of species			X (avifauna only)		
Species of conservation concern			X (avifauna only)		
Biodiversity of importance to local communities for resource use and cultural and spiritual purposes			X (some birds and some flora of cultural value)		
Priority Ecosystems					
The Juha area	X	X	X		
Hides Ridge	X	X	X		
High-altitude forest above 1,800 meters on the Homa Deviation	X	X,	X		
Lake Kutubu Wildlife Management Area	X				X
Focal Habitats					
Caves		X			
Sinkhole swamps		X			
Upland streams		X			
Swamp forest		X	X		
Stream refuges in unstable landscapes		X			
Lowland rivers in stable landscapes		X			
Off-river waterbodies		X			
Habitats and flora and fauna of cultural significance		X			

PMA 1 Remote Sensing of Indirect Impacts – involves the use of remote sensing to determine to what extent the Project has facilitated or increased major or moderate indirect impacts and degradation within the Upstream Project Area. This PMA will also allow estimation of final forest losses after construction. The data gathered is generally status at a particular time but change analysis will be used to monitor forest loss and gain and thus provide some insight into forest cover dynamics.

PMA 2 Aerial ROW Surveys – gathers data on the condition of the whole ROW and Project roads, by regular aerial inspection. It is this PMA that will be used to regularly check focal habitats along the ROW and act as an early warning system for invasion and spread of alien species and diseases.

PMA 3 Regeneration Surveys – gathers data on the progression of successions and faunal communities upstream using permanent plots stratified by substrate, location and treatments and scored using a benchmarking system. This PMA is not to be confused with the monitoring to be undertaken as part of the Reinstatement Management Plan under the ESMP during construction under which vegetation cover will be measured quarterly (field operation). This PMA aims at assessing regeneration performance, a part of ecosystem function measure.

PMA 4 Road Record Assessment – monitors the use of Project roads and infrastructure in order to demonstrate that during operations their use remains restricted to Project activities only. It will be carried out by regular compilation of road use records from the Induced Access Management Plan.

PMA 5 Efficacy of Offset Projects – assesses the efficacy of the Biodiversity Offset Delivery Plan. It is realized by regular compilation, review and evaluation of monitoring results required by every offset project.

Details of the PMAs are presented in Appendix 8 and the targets and end points are given in Appendix 9.

Indicators are being developed simultaneously with the development of each PMA and will be refined as data from field monitoring trials becomes available. Some example indicators are presented in Appendix 9 but these are notional only and will be developed as field techniques are tested.

The monitoring will be designed to be practical and be able to be carried out by Operations staff. It will provide high-level information to detect major changes. It will be designed to avoid some of the mistakes commonly made by theoretical designs of monitoring, which ambitiously aim for monitoring to cover too much and provide definitive answers to what are fundamentally research questions while overlooking functionality and common sense.

10.4 ADAPTIVE MONITORING

Monitoring activities should adapt to changing circumstances and results of the monitoring itself. The key to effective adaptation of monitoring is to keep track of the changes that are made, and decide what kind of changes will allow continuity of effectiveness of the monitoring program and are permissible. Table 10.2 below provides a general guide to the Project's adaptive monitoring approach related to the Biodiversity Strategy.

Table 10.2: Suggested adaptation “rules” for the Biodiversity Strategy’s monitoring program (not exhaustive)

Activity	Permissible
Adding indicators.	Permissible.
Removing an indicator.	Permissible only when the indicator’s usefulness has ended.
Replacing an indicator with another.	Would generally not be permitted unless the link with the previous indicator is real and acceptable to management.
Changing timing of sampling in a PMA.	Could be permissible depending on reasons.
Adding a PMA.	Permissible.
Deleting a PMA.	Permissible once the consequences were understood and accepted.
Changing a data gathering method in a PMA.	Not permitted if it results in discontinuity of data by seriously changing the bias of the method.
Changing a particular designed spatial pattern of samples.	Generally not permitted. Depending upon the reason for the patterning, a case might be made for changing it. This would need investigating before changes are made.
Changing the number of samples for an indicator.	Would be undesirable but probably permissible since it would only change the confidence interval for an estimate.

10.5 NEXT STEPS

Remote sensing (PMA 1) will begin in 2011 but field monitoring for PMA 2 and PMA 3 will generally commence towards the end of the Project construction phase when most potential direct impacts have occurred. Starting the latter too early is likely to be inefficient as there remains strong likelihood of plots (PMA 3) established too early being compromised by construction and sections of the ROW may need to be revisited during construction for emergency works and/or reinstatement (PMA 2). Target milestones for development of the monitoring plan are as follows:

Development of indicators:

Indicators complete Q2 2011

Develop and test procedures for PMAs:

PMA 1 complete Q2 2011

PMA 2 complete Q2 2011

PMA 3 complete Q4 2011

PMA 4 complete Q4 2012

PMA 5 complete Methodology complete

Design monitoring management system:

System complete and ready for contracting Q4 2012