On-site Forest Restoration Plan

Project Number: 42916
31 January 2015

Sarulla Geothermal Power Development Project (Republic of Indonesia)

Prepared by Sarulla Operations Limited for the Asian Development Bank



Sarulla Geothermal Power Project

On-site Forest Restoration Plan

January 2015

Sarulla Operations Ltd

Mott MacDonald

Sarulla Geothermal Power Project

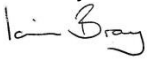
On-site Forest Restoration Plan

January 2015

Sarulla Operations Ltd

Mott MacDonald, Orchard Building, 1 Grange Road, #07-01, Singapore, 239693
T+65 6293 1900 F +65 6293 1911 W www.mottmac.com

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	01/-08/-2014	Iain Bray 	Mihai Coroi 	Euan Low	Draft for client review
B	12/01/2015	Francesco Ricciardi	Kirsty Haymon	Euan Low	Final version including client comments

Standard

Contents

Executive Summary

Mott MacDonald was commissioned by Sarulla Operations Ltd to assist with the preparation of an On-site Forest Restoration Plan at the Sarulla geothermal field in Pahae Julu and Pahae Jae districts, North Tapanuli Regency, Sumatra.

As part of the construction of the NIL Project Area a total of 92ha will be developed within the Western Batang Toru Forest Block. This will include five temporary construction areas which will not be required during the operational phase of the Project comprising a total of 33ha. These areas will be restored following construction in order to provide habitat for priority species of conservation value which were identified in the biodiversity action plan for the Project.

Five steps are outlined for the design of the On-site Forest Restoration Plan and to be followed during its implementation. These are to: 1) review the scope and activities; 2) review the legal framework and policy context of the restoration; 3) initiate a stakeholder participation process; 4) determine the methods to achieve and monitor biodiversity objectives; 5) record the on-site forest restoration plan and begin implementation.

The aim of the restoration will be to contribute to the overall no net loss of biodiversity as a result of the Project and a net gain for priority habitats and species of conservation value. The design of the restoration will comply with lender and legal requirements including the International Finance Corporation Performance Standard 6, Asian Development Bank Safeguards Policy Statement and Ministry of Forestry Borrow-to-use Permit. Consultation will be undertaken throughout the process with relevant stakeholders to ensure the objectives of the plan are met.

Further details of the restoration design are given where known and the plan will be updated as key steps in the process are completed.

1 Introduction

1.1 Overview

Mott MacDonald was commissioned by Sarulla Operations Ltd (SOL) to assist with the preparation and implementation of a Biodiversity Action Plan and Biodiversity Offset and Ecological Management Plan (BAP/BOEMP) (Mott MacDonald, 2014a) at the Sarulla geothermal field in the Pahae Julu and Pahae Jahe districts, North Tapanuli Regency, Sumatra in November 2013.

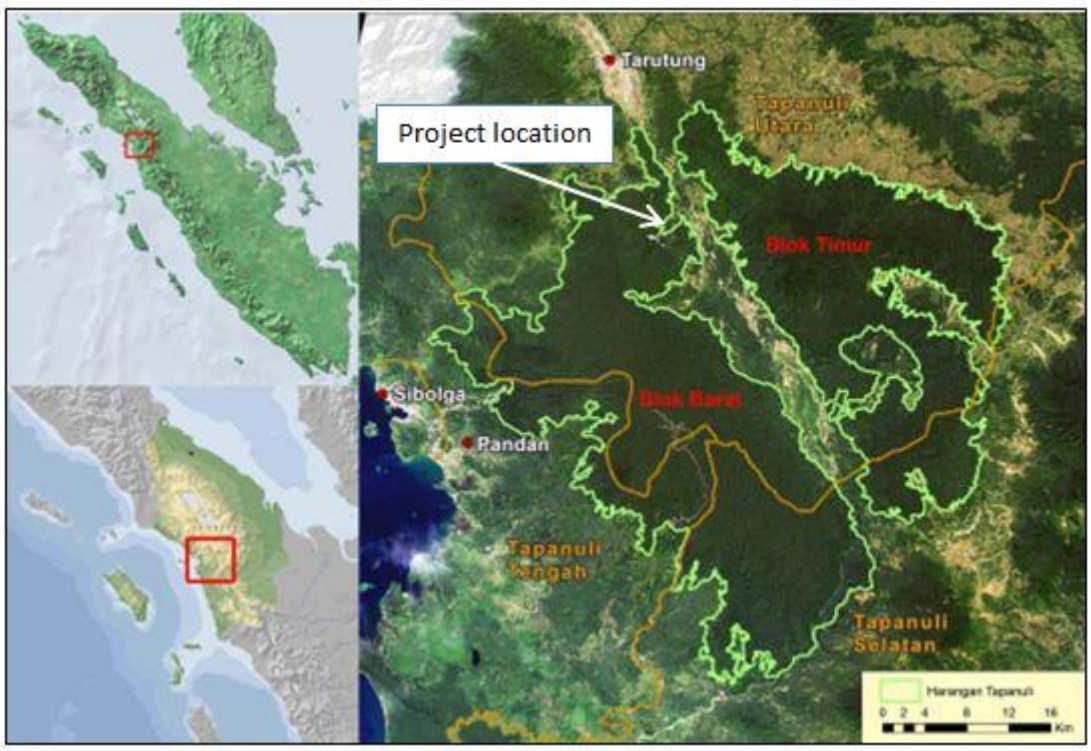
As part of the BAP/BOEMP (Action 4), SOL is required to produce an On-site Forest Restoration Plan (OnFRP) which details how areas used temporarily during construction will be restored to provide habitat for species of conservation priority identified within the Western Batang Toru Forest Block (WBTFB) within the vicinity of the NIL geothermal field ('NIL Project Area').

In addition, SOL is also required to produce an Off-site Forest Recreation Plan (OffFRP) as part of the BAP/BOEMP (Action 10). Further details of the design and implementation for this are given in separate document (Mott MacDonald, 2014b). This process will be undertaken in parallel to the OnFRP and some activities (in particular consultations) will be combined for efficiency and due to the shared objectives of both plans.

1.2 Project description

The Project comprises the development of two geothermal fields within the Sarulla valley: Silangkitang (SIL) and Namora I Langit (NIL) (see Figure 1.1). Each geothermal field will comprise the construction of new geothermal production and re-injection wells as well as power plants (one unit at SIL and two units at NIL). The two geothermal fields will be connected via an approximate 14km high voltage overhead transmission line.

Figure 1.1: Location of Sarulla Geothermal Power Project.



As part of construction of the NIL Project Area a total of 92ha will be developed within the WBTFB. This will include five temporary construction areas (TCAs) which will not be required during the operational phase of the Project comprising a total of 33ha. These areas will be restored to provide natural forest habitats contiguous with the remaining WBTFB.

1.3 Aims and Objectives

The overall aim of the BAP/BEOMP is to ensure that there will be no net loss of natural habitats and a net gain of priority species of conservation value as result of the Project. As part of this process, habitats temporarily affected by the Project will be restored in order to provide natural forest conditions similar to those which currently exist within the remaining WBTFB as well as suitable habitat for priority species identified within the BAP (Mott MacDonald, 2014a).

The aim of this OnFRP is to detail the design and implementation of the habitat restoration plan in accordance with the BAP/BOEMP (Mott MacDonald, 2014a). The steps required to achieve this are described in Chapter 2 with further details provided in Chapter 3. The latter will be updated in future revisions of this document or provided as supplementary appendices.

This overall process will be the responsibility on the SOL Biodiversity Team. The design of the OnFRP will be prepared in partnership with Mott MacDonald.

2 Steps for the design of the on-site forest restoration plan

This chapter outlines the steps which will be followed in order to design the On-site Forest Restoration Plan. The process is based on guidance given by the Business and Biodiversity Offsets Programme in the Biodiversity Offset Design Handbook (BBOP, 2012).

The five steps are described broadly in chronological order and the process is considered to be iterative where the completion of one step will help inform the next. However, where practical steps may be combined for efficiency and completed in parallel. Some steps have been completed or partially completed as part of the ESIA (SOL, 2013) and the BAP/BOEMP (Mott MacDonald, 2014a). However, these will be independently reviewed again as part of this process in order that it is clearly understood by all parties involved.

2.1 Step One: Define scope and activities

The first step of the process will be to define the scope of the on-site forest restoration plan and the main activities that will take place throughout the different stages of the programme. This will include identifying key 'milestones', and suitable entry points for the different required actions within the process. Responsibilities should first be determined within the SOL Biodiversity Team as to the coordination of the restoration plan and level of assistance, if required, from external ecological consultants.

2.2 Step Two: Review the legal framework, national guidance and policy context of restoration

The second step of the process will be to review the legal and policy context of the on-site restoration plan to ensure all requirements are understood and met. This process was completed as part of the ESIA (SOL, 2013) and BAP/BOEMP (Mott MacDonald, 2014a). This will include:

- Lender requirements to meet policy standards including the International Finance Corporation (IFC) Performance Standard 6 (PS6) and Asian Development Bank (ADB) Safeguards Policy Statement (SPS) 2009;
- Lender recommendations received during the consultation process of the ESIA (SOL, 2013) and BAP/BEOMP (Mott MacDonald, 2014a); and,
- Legal requirements such as Ministry of Forestry permit number SK.818/MENHUT-II/2013.
- National guidance on planting requirements such as Regulation of the Ministry of Forestry Number P.63/Menhut-II/2011.

2.3 Step Three: Initiate a stakeholder participation process

The third step of the process will be to identify the key stakeholders who will be involved in the on-site forest restoration plan. These are persons or groups who are affected by or can affect the outcome of the project as well as partners who will implement the plan. This will initiate an approach to participation as early as possible to learn about the goals and roles with respect to the plan, to begin identifying appropriate methods of engagement with these groups and to confirm any critical stages at which various stakeholders should be engaged in the restoration process.

2.4 Step Four: Determine methods to achieve and monitor biodiversity objectives

The fourth step will determine the methods that will be used to achieve and monitor the required outcomes of Steps One and Two. This will include a review of the existing ecological baseline data gathered for the ESIA (SOL, 2013), BAP/BOEMP (Mott MacDonald, 2014a) and the Specialist Biodiversity Survey (Birds, Plants and Herpetofauna) undertaken by SOL/PanEco in October 2014..

Once this has been achieved, relevant stakeholders (such as Department of Forestry and/or NGOs) will be contacted for consultation regarding planting and management schemes in order to ensure conformance with the objectives of the OnFRP. This will follow the government regulation document 'Guide to Planting Trees for the Holders of Borrow-and-Use Forest Permits with the Framework of Rehabilitating River Basin Areas (Regulation of the Forestry Minister No.P.63/Menhut-II/2011)'. Local community engagement will also be undertaken where possible, in particular for plant nursery management, site preparation and long-term management.

The planting and management scheme will then be used to predict the outcomes of the on-site forest restoration and to inform the design an appropriate monitoring programme. This will include key stages of habitat regeneration, management targets and re-colonisation of the TCAs by priority species of conservation value.

Details of the planting and management scheme as well as the monitoring programme will be agreed following regular consultation with all relevant stakeholders.

2.5 Step Five: Record the on-site forest restoration plan and begin implementation

The final step will be to record details of the restoration plan as outlined in Steps 1 – 4 above. In addition to outlining the methods for implementing the final plan, it will document the principal decisions made with respect to the design; explain the rationale for these decisions and how they were made. This will be used to communicate with the stakeholders. The final plan will also provide a detailed schedule for its implementation; a detailed budget required to carry out each stage and identify key personnel responsible in conducting all aspects of the work.

The final OnFRP will be included within future revisions of this document and supplementary reports.

3 On-site Forest Restoration Plan

This chapter details the on-going design and implementation of the OnFRP plan following the steps outlined in Chapter 2.

3.1 Step One: OnFRP scope and activities

Five TCAs will be used during the construction of the NIL Project Area which are located directly within or adjacent to the contiguous forest boundary of the WBTFB. These areas comprise a total of 33ha and will be restored as part of the OnFRP. The areas covered by of each of these TCAs and the dates for which they will no longer be used for construction ('release dates') are given in Table 3.1. These dates will form the basis to plan the pre- and post-construction schedule. The locations of the TCAs are given in Figure MMD-326959-EC-GIS-00-XX-0005 in Appendix A.

Table 3.1: NIL temporary construction areas.

Site name	Area (ha)	Release date
Borrow Area	9	TBC
Disposal Area 1	3	TBC
Disposal Area 2	13	TBC
Laydown Area 1	7	TBC
Laydown Area 2	1	TBC
Total	**33**	TBC

Source: SOL, 2014.

Based on the release dates given in Table 3.1 the schedule in Table 3.2 is proposed. The finalised dates and schedule will be confirmed will SOL in 2014.

Table 3.2: Schedule of works.

Activity	Reponsibilities[1]	Date*				
		Borrow Area	Disposal Area 1	Disposal Area 2	Laydown Area 1	Laydown Area 2
TCA Release		May 18	May 18	May 18	May 18	May 18
Step One: Review scope and activities	SOL/MM	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15
Step Two: Review legal and policy framework	SOL/MM	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15	Jan – Feb 15
Step Three: Initiate Stakeholder process	SOL/MM	March 15	March 15	March 15	March 15	March 15
Step Four: Methods and monitoring						
- Ecology baseline review	SOL/MM/PanEco	Feb 15	Feb 15	Feb 15	Feb 15	Feb 15
- Planting and management scheme	SOL	May 18	May 18	May 18	May 18	May 18
- Predicted outcomes of OnFRP	SOL	Feb – March 15	Feb – March 15	Feb – March 15	Feb – March 15	Feb – March 15
- Monitoring programme	SOL	May 18	May 18	May 18	May 18	May 18
Step Five: Record of OnFRP	SOL/MM	May 18 onwards	May 18 onwards	May 18 onwards	May 18 onwards	May 18 onwards

[1]SOL: Sarulla Operations Ltd; MM: Mott MacDonald. *Dates to confirmed with SOL in January 2015.

3.2 Step Two: Legal framework, national guidance and policy context of restoration

The Project is required to meet the international standards of the IFC, which is part of the World Bank Group, and those of the ADB. The international environmental and social safeguard policies of these organisations are outlined in Sections 3.2.1 and 3.2.2. The Project is also required under the Borrow-to-Use Permit of Forest Area No. SK.818/Menhut-II/2013 issued by the Ministry of Forestry to restore the forest used. Further details are given in Section 3.2.3.

3.2.1 International Finance Corporation Standards and Guidance

The IFC PS6 (IFC, 2012a) and Guidance Note 6 (IFC, 2012b) has been used on the Project as best practice and international standard. In accordance with IFC PS6, habitats are divided into modified, natural and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value. Within the Project critical habitat has been identified based on the following criteria:

- Habitat of significant importance to critically endangered and/or endangered species (IUCN Red List);
- Habitat of significant importance to endemic and/or restricted-range species;
- Highly threatened and/or unique ecosystems;
- Area associated with key evolutionary processes; and
- Internationally Recognised Area.

The IFC PS 6 states that in areas of critical habitat, the Borrower will not implement any project activities unless:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

A BAP is required for all projects located in critical habitat (IFC, 2012a) and is recommended for projects that have the potential to significantly impact natural habitat (IFC, 2012b). A BAP for this project was prepared in November 2013 and was updated (Revision E) in 2014 (Mott MacDonald, 2014a). Action 4 in the BAP requires the restoration of TCAs to mitigate the temporary loss of habitat during construction.

3.2.2 Asian Development Bank Standards

The ADB Safeguards Policy Statement (SPS) 2009 sets out policy principles and outlines the delivery process for ADBs safeguard policy in relation to environmental safeguards. The ADB has adopted a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. ADB staff will ensure that borrowers/clients comply with these requirements during project preparation and implementation.

The safeguard policies are operational policies that seek to avoid, minimise or mitigate the adverse environmental and social impacts of projects. The requirements for assessing and addressing biodiversity effects of projects are set out within ADB Safeguard Requirements 1: Environment, Section D8 'Biodiversity Conservation and Sustainable Natural Resource Management'. This document is included as an appendix to the SPS.

Section D8 requires the environmental assessment process to focus on the major threats to biodiversity and for the borrower/client to identify measures to avoid, minimize, or mitigate potentially adverse impacts and risks and, as a last resort, propose compensatory measures, such as biodiversity offsets, to achieve no net loss or a net gain of the affected biodiversity.

Obligations on the borrower/client differ depending on whether the habitat is classified as modified, natural or critical. For areas of critical habitat Paragraph 28 of the requirements state that no project activity will be implemented in areas of critical habitat unless:

- There are no measurable adverse impacts, or likelihood of such, on the critical habitat which could impair its high biodiversity value or the ability to function;
- The project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species or a loss in area of the habitat concerned such that the persistence of a viable and representative host ecosystem be compromised;
- For any lesser impacts, mitigation measures will be designed to achieve at least no net loss of biodiversity. They may include a combination of actions, such as post-project restoration of habitats, offset of losses through the creation or effective conservation of ecologically comparable areas that are managed for biodiversity while respecting the on-going use of such biodiversity by Indigenous Peoples or traditional communities, and compensation to direct users of biodiversity.

When the project involves activities in a critical habitat, ADB requires the borrower/client to retain qualified and experienced external experts to assist in conducting the assessment. This service has been provided by Mott MacDonald with respect to biodiversity since November 2013.

Following feedback from ADB on Revision D of the BAP/BOEMP in February 2014 and subsequent discussions on Revision E in June 2014, a recommendation was made that local community engagement should be at the core of the implementation of the OnFRP. This will be taken into consideration during the design of the plan and incorporated where possible.

3.2.3 Borrow-to-Use Permit of Forest Area No. SK.818/Menhut-II/2013

In August 2013 SOL was issued a permit by the Ministry of Forestry (no. SK.818/Menhut-II/2013) outlining approval for the 'borrow-to-use' of 295 ha of limited and fixed production forest for the construction of the Project. As part of the conditions of this permit, obligations were placed on SOL to undertake certain activities including the '*reclamation and reforestation in the forest area that is no longer functional without having to wait for the completion of the period for borrowing and use of the forest area'*. This represents the recreation of forest outside of the Project Area to offset that permanently cleared whilst the Project is in operation, as well as the restoration of areas temporarily used during construction. Overall, these areas combined will equate to a total area 295 ha.

With specific regard to the OnFRP, to the following activities will be taken into consideration in order to meet the obligations under the permit:

- 'Conduct planting of trees in the context of rehabilitating the river basin area with the ratio of 1:1';
- 'Empower the community members living in the area around the permit of use of the forest area';
- Follow Regulation of the Ministry of Forestry Number P.60/Menhut-II/2009 regarding Guidelines on Assessment of Successful Forest Reclamation;
- Follow Regulation of the Ministry of Forestry Number P.63/Menhut-II/2011 regarding Guidelines on Planting Trees for Holders of Permit for Borrowing and Use of Forest Areas in the context of Rehabilitation of the River Basin Area.

The full requirements of the Borrow-to-Use Permit will be determined through consultation with the Ministry of Forestry in order to ensure compliance. This will include forest recreation requirements outside of the Project Area as part of the Off-site Forest Recreation Plan.

3.3 Step Three: Key stakeholders

This step began with a review of existing stakeholder information gathered as part of the ESIA (SOL, 2013) and BAP/BOEMP (Mott MacDonald, 2014a). These included:

- Local government agencies (such as Forestry Department);
- Local and international biodiversity conservation non-governmental organisations (NGO);
- Local forest restoration NGOs;
- Local communities;
- Lender ecologists; and,
- External ecological consultants.

Table 3.3 below provides a proposed summary of the stakeholders who will be consulted as part of the OnFRP process. These will be confirmed with SOL in August 2014 and may be updated where appropriate as the OnFRP is implemented. All of these Consultees have been involved at some stage previously for the ESIA and BAP.

The OnFRP will be circulated to the key stakeholders and their comments will be incorporated into the later versions. Stakeholders who need to know about the OnFRP will be communicated with via appropriate

means (for example through face-to-face meetings, workshops, telephone and email).Partners will also be identified who will assist with the implementation of the OnFRP.

Table 3.3: Proposed list of stakeholders to be consulted as part of the OnFRP.

Stakeholders*	Role within OnFRP
SOL	
Site Biodiversity Team	Project leader involved in all steps Design and implementation of the planting and monitoring programme
External ecological consultant	
Mott MacDonald	Project assistance involved in all steps as required by SOL Biodiversity Team
Local communities	
Residents of the local villages within the Sarulla Valley adjacent to the Project	Provision of workers to assist with the planting and monitoring programme
Government department(s)	
Representatives of local government sub-district and regency (to be confirmed)	Consultation on legal obligations with the design and implementation
International, National and Local NGOs	
PanEco-SOCP-YEL	Expert advice and biodiversity surveys
Habitat Restoration NGO (expert advice)	Design and implementation of the planting and monitoring programme

*Stakeholders to be agreed with SOL in August 2014 and may be updated during implementation of OnFRP.

3.4 Step Four: Methods to achieve and monitor biodiversity objectives

Section 2.4 outlines four stages involved in determining the methods to achieve and monitor the biodiversity objects of the OnFRP. These are detailed in Sections 3.4.1 to 3.4.4 below.

3.4.1 Review of ecological baseline data to determine priority habitats and species

3.4.1.1 Summary of ecological surveys

Biodiversity surveys were undertaken to inform the ESIA (SOL, 2013) and BAP/BOEMP (Rev E) (Mott MacDonald, 2014a). Full details of the methods used are given in these documents. A brief summary is given below.

A biodiversity survey was undertaken by as part of the ESIA (SOL, 2013) and an assessment of the Project was carried out to IFC PS6 standards (see Chapter 3 and Annex E of the ESIA). This included the following:

- Flora and vegetation survey (including habitat mapping);
- Mammal survey (including bats);
- Bird survey;

- Reptile and amphibian surveys; and
- Invertebrates.

A further Habitat Condition Assessment was undertaken by Mott MacDonald in September 2013 (see Annex E of the ESIA, SOL, 2013) in order to assess the suitability of the habitats within the Project Area near NIL1 and WJP1 to support Endangered and Critically Endangered species.

Following these two assessments it was concluded that the Potential Critical Habitat is known, or has the potential, to support Endangered and Critically Endangered species. Therefore further species specific surveys were commissioned for SOL by Mott MacDonald in November 2013. These surveys were undertaken by PanEco-SOCP-YEL, a consortium of International and National NGOs operating in Batang Toru forest, between November 2013 and June 2014.

The PanEco-SOCP-YEL surveys initially comprised a rapid ecological assessment of the forest near NIL1 and WJP1 and were followed by more detailed surveys in June 2014 and October 2014. The surveys included the following methods; survey dates are given in brackets:

- Reconnaissance transect surveys for siamang, agile gibbon and Sumatran orang-utan (16 – 22 November 2013);
- Camera trapping for Sumatran tiger, Asian tapir and Malayan pangolin as well as marbled cat, Sumatran serow, sambar deer, Malaysian sun bear, binturong, slow loris and wild boar (16 November 2013 continuing until 30 June 2014);
- Remote Aerial Survey Using Unmanned Aerial Vehicles (UAVs) for detailed habitat mapping (20 – 22 November 2013);
- Orang-utan nest survey (June 2014);
- Fixed call count survey for siamang and agile gibbon (June 2014);
- Sun bear signs survey (June 2014);
- Plant Biodiversity Survey (October 2014);
- Bird Biodiversity survey (October 2014); and
- Herpetofauna (Amphibians/Reptiles) Biodiversity Survey (October 2014).

Gaps in the ecological baseline data were identified as part of the Critical Habitat Assessment undertaken as part of the BAP/BOEMP (Mott MacDonald, 2014a). Therefore further surveys for plants, birds, reptiles and amphibians have been carried out prior to the end of construction (in October 2014).The survey methods have been designed by the appointed biodiversity experts (PanEco-SOCP-YEL) and agreed by SOL/Mott MacDonald. The surveys have been undertaken by the biodiversity experts.

3.4.1.2 Summary of priority habitats

A detailed description of the habitats within the Project footprint and surrounding area to 500m is provided in the ESIA (SOL, 2013). A summary of the main habitats of conservation value and their IFC classification within the TCAs is provided in Table 3.4 below and their locations are shown on Drawing MMD-326959-EC-GIS-00-XX-0008 in Appendix A. It should be noted that the mixed forest and clearings within the

contiguous forest boundary are considered to be critical due to the presence of Critically Endangered and Endangered species. The mixed forest habitat is a priority under the BAP.

Table 3.4: Main habitats of conservation value identified in the Project Area within the contiguous forest boundary.

Habitat Type	IFC Category*	Conservation value	Area (ha)
Agricultural land dominated by rice paddy	Modified	Low	5.67
Mixed forest with varying densities of managed rubber and benzoin trees.	Modified	Medium	30.18
Clearings including existing access roads and previously developed land with low growing pioneer and scrub vegetation.	Modified	Low	2.94

*All habitats (excluding agricultural land) are considered to be critical due to the presence of Critically Endangered and Endangered species. Source: SOL, 2013.

3.4.1.3 Summary of priority species

A summary of the priority species for which the restored habitats within the TCAs will be designed to provide habitat for are listed in Table 3.5 below. This will be updated if additional Critical Habitat trigger species, following IFC PS6 assessment criteria (IFC, 2012), are found within the Project Area following further biodiversity surveys.

Table 3.5: BAP priority species.

Feature	Scientific Name	Status*
Sumatran tiger	*Panthera tigris sumatrae*	IUCN Critically Endangered; Sumatra endemic species
Sumatran orang-utan	*Pongo abelii*	IUCN Critically Endangered; Sumatra endemic species
Malayan pangolin	*Manis javanica*	IUCN Critically Endangered
Agile gibbon	*Hylobates agilis*	IUCN Endangered
Siamang	*Symphalangus syndactylus*	IUCN Endangered
Dark Red Meranti	*Shorea platyclados*	IUCN Endangered
Sumatran Laughingthrush	*Garrulax bicolor*	Sumatra Endemic Species
Sumatran Pitcher Plant	*Nepenthes tobaica*	Sumatra Endemic Species

* Status: IUCN Critically Endangered and Endangered species; Sumatra endemic species.

3.4.2 Planting and management scheme

The planting and management scheme will be completed following consultation with the specialist habitat restoration NGO and other relevant stakeholders. This will take in account the legal and lender requirements outlined in Section 3.2 as well as the provision of habitat for priority species outlined in Sections 3.4.1.2. This will be completed by SOL (in partnership with an external consultancy if required).

Under Regulation of the Ministry of Forestry Number P.60/Menhut-II/2009 regarding Guidelines on Assessment of Successful Forest Reclamation the following key requirements will be taken into consideration with respect to the OnFRP:

- 'Planting….shall preferably use endemic [native] wood species/typical tree species and multi-purpose tree species';
- An annual plan shall be produced including a 'description of location, size, tree species and quantities, facility/infrastructure, cost, timeline, implementation and reporting, along with a map with a minimum scale of 1:10,000'. This will also include a 'planting map for each [TCA] with a minimum scale of 1:5,000';
- The planting plan 'shall be assessed by the Head of BPDA and endorsed by the Head of regency/municipal office overseeing forestry';
- The holders of the permit 'shall have a working unit to handle the planting of trees'; and
- The working unit 'shall employ technical workers graduating from forestry/agricultural faculty during the period of time to plant trees'. Based on the size of the restoration this will be a minimum of one technical worker.

Under Regulation of the Ministry of Forestry Number P.63/Menhut-II/2011 regarding Guidelines on Planting Trees for Holders of Permit for Borrowing and Use of Forest Areas in the context of Rehabilitation of the River Basin Area the following key requirements will be taken into consideration with respect to the OnFRP:

- 'Implementation of evaluation on successful forest reclamation' will be based on the following criteria:
  - '*layout of the land*';
  - '*control of erosion and sedimentation*';
  - '*Re-vegetation or trees planting*';
  - '*Orderly arrangement of the land surface*'; and
  - '*Slope stability*'.
- The evaluation process will be based on monitoring surveys following methods outlined in the guidelines. This will include a sampling intensity of a minimum of 5% of the restored areas and will collect data sufficient to inform the described scoring system; and
- The OnFRP will aim to achieve a score of 'Good' (80 out of 100) within three years of start of the maintenance period.

3.4.3 Predicted outcomes of the OnFRP

The predicted outcomes of the OnFRP will be determined following confirmation of the planting and management scheme as well as consultation with other relevant stakeholders. This will include assessments/predictions at key time intervals following restoration (For example, in the first, fifth, tenth, fifteenth and twentieth years following planting). This will be completed by SOL (in partnership with an external consultancy if required).

3.4.4 Monitoring Programme

A monitoring programme will be designed following completion of Section 3.4.3. This will include monitoring of the planting schemes at the different TCAs as well as targeted biodiversity surveys for priority species of conservation value. This will also include comparisons of the results with the predicted outcomes as well as the mechanisms that will be put in to place to rectify issues affected the success of the programme. This will be completed by SOL (in partnership with an external consultancy if required).

The planting scheme will require monitoring and maintenance for a minimum of 10 years. The monitoring of priority species of conservation value will require monitoring for a minimum of 15 years or until at least the point where vegetation has regenerated sufficiently to permit re-colonisation.

4 References

BBOP (2012) Biodiversity Offset Design Handbook – Updated. Business and Biodiversity Offsets Programme. Available at http://bbop.forest-trends.org/pages/guidelines

IFC (2012a). Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

IFC (2012b). Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

Mott MacDonald (2014a) Biodiversity Action Plan & Biodiversity Off-set Management Plan. Mott MacDonald, Singapore.

Mott MacDonald (2014b) Off-site Forest Recreation Plan. Mott MacDonald, Singapore.

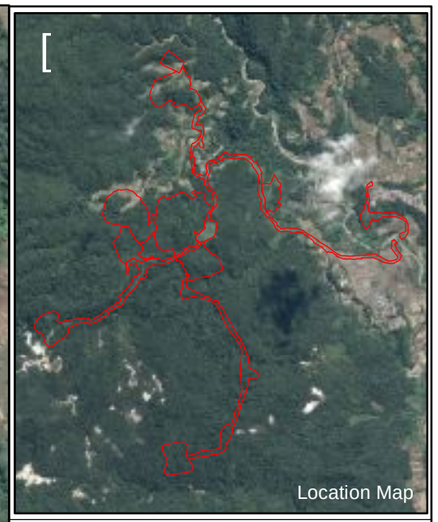
SOL (2013) Chapter 1 of Volume II: Environmental, Social and Health Impact Assessment (ESIA) Addendum. Available at http://www.adb.org/projects/42916-014/documents

Appendices

Appendix A. Drawings

A.1 Drawing MMD-326959-EC-GIS-00-XX-0005

A.2 Drawing MMD-326959-EC-GIS-00-XX-0008



Legend

- Site boundary
- Area of temporary habitat loss

Rev	Date	Description	Drawn	Ch'k'd	App'd
P1	10/07/2014	First Issue	IB	SH	KH

Mott MacDonald
Environment Division
Demeter House, Station Road
Cambridge, CB1 2RS
T +44 (0)1223 463 500
F +44 (0)1223 461 007
W www.mottmac.com

Project Title
Sarulla Geothermal

Drawing Title
Location of NIL infrasture and areas of temporary habitat loss to be restored after construction

Scale	MM Project No.	Status
1 cm = 77 meters	326959	REV

GIS File
Sarulla NIL area temporary habitat loss.mxd

Drawing No.
MMD-326959-EC-GIS-00-XX-0005

Rev
P1

Borrow area

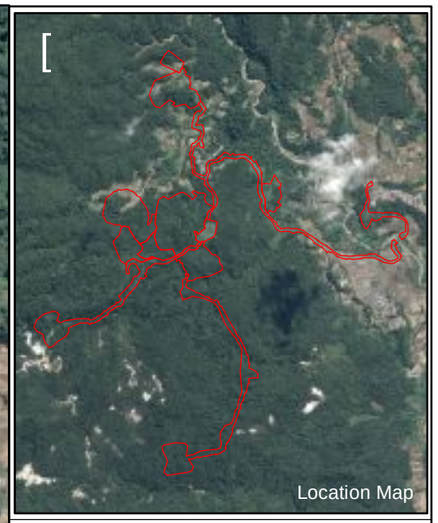
Disposal 2 area

Disposal 1 area

Laydown area 2

Laydown area 1

0 0.15 0.3 Kilometers



Legend

Temporary construction areas
Contiguous forest boundary

Habitats

Agricultural land
Clearance (including roads)
Mixed forest

Rev	Date	Description	Drawn	Ch'k'd	App'd
P1	22/07/2014	First Issue	IB	SH	KH

Mott MacDonald
Environment Division
Demeter House, Station Road
Cambridge, CB1 2RS
T +44 (0)1223 463 500
F +44 (0)1223 461 007
W www.mottmac.com

Project Title

Sarulla Geothermal

Drawing Title

Location of NIL infrasture, habitat types and areas of temporary habitat loss to be restored after construction

Scale	MM Project No.	Status
1 cm = 74 meters	326959	REV

GIS File

Sarulla NIL area temporary habitat loss and habitat type P1.mxd

Drawing No.	Rev
MMD-326959-EC-GIS-00-XX-0008	P1