Shwe Taung Cement Co., Ltd.

Cement and Coal Mine Concessions

Biodiversity Action Plan

October 2018

V.1.5

SHWE TAUNG
CEMENT CO.,LTD.

ERM

The business of sustainability

FINAL REPORT

Shwe Taung Cement Co., Ltd.

Cement and Coal Mine Concessions

Biodiversity Action Plan

October 2018

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v.1.5

Environmental Resources Management Siam Co. Ltd
179 Bangkok City Tower
24th Floor, South Sathorn Road
Thungmahamek, Sathorn
Bangkok 10120 Thailand
www.erm.com

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1.1	14/09/2017	Response to IFC comments on draft	SMC/DN	DN	PT
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		Item	Page	Article	Description

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Glossary of Terms

Additionality	Additionality means ensuring that biodiversity management measures undertaken as part of an offset strategy do not take the place of actions that are already funded.
Biodiversity Offsets	Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization and restoration measures have been taken.
Biodiversity Values	Biodiversity values means the values attached to particular biodiversity attributes by relevant local, national and international stakeholders.
Critical Habitats	Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.
Habitat	Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.
Like-for-like	The principle of "like-for-like or better" indicates that biodiversity offsets must be designed to conserve the same biodiversity values that are being impacted by the project (an "in-kind" offset).
Mitigation Hierarchy	Mitigation Hierarchy is defined as the application of measures to firstly avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. As a last resort, biodiversity offsets may be considered but only after appropriate avoidance, minimization, and restoration measures have been applied.
Natural Habitats	Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
Net Gain	Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated.
No-Net-Loss	No net loss is defined as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

1 *INTRODUCTION*

This Biodiversity Action Plan (BAP) has been prepared to assist Shwe Taung Cement (STC) comply with the requirements of the International Finance Corporation (IFC) Performance Standard (PS) 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources and the associated Environmental and Social Action Plan (ESAP) prepared for STC's operations.

The PS and ESAP require a number of specific management actions to be prepared to manage biodiversity and ecosystem service values at STC's sites, which are outlined and addressed in this BAP.

The BAP consolidates the biodiversity and ecosystem service mitigation actions as outlined in the Supplementary Environmental and Social Impact Assessment (ESIA) prepared by ERM (ERM 2017).

STC's operations referred to in this BAP and subject to the actions listed include:

- Cement production facility, including the extraction of raw materials (mud stone and limestone) and accommodation area located at Pyi Nyaung Village, Thazi Township in the Mandalay region of Myanmar (Limestone concession); and
- Coal mine developed in the Kalaywa Township of the Sagaing region of Myanmar (Coal mine concession).

1.1 *STRUCTURE OF THIS BAP*

The BAP includes the following components:

- STC Biodiversity and Ecosystem Services policy;
- STC Anti-illegal logging policy (ESAP item 16.);
- STC Zero tolerance policy for the possession of wildlife and forest resources (ESAP item 17.);
- Residual Impact Summary and No-Net-Loss/Net Gain Definition;
- Biodiversity Management Plan (BMP) for Limestone Concession and Coal Mine Concession (ESAP item 18.) including Biodiversity mitigation actions;
- Biodiversity Offset Management Plan (BOMP) for Limestone and Coal Mine Concessions including (ESAP item 18.) including biodiversity offset management actions; and
- Biodiversity Monitoring and Evaluation Plan (BMEP) (ESAP item 19.) for the BMP and BOMP.

1.2 *RELEVANT ESAP ACTIONS*

The following Environmental and Social Action Plan (ESAP) items are relevant to this BAP (***Table 1.1***). The ESAP items have been published by the IFC and disclosed on April 7, 2017.

Table 1.1 Relevant ESAP Actions

ESAP Item	Task	Indicator of Completion	Date	Section of this plan
14.	Develop and implement a policy that ensures no access at all times by non-authorized personnel and mechanized vehicles/equipment on company owned roads and areas under its control inclusive of the road to the coal mine so as to limit the potential for illegal loggers to access the company's concessions or adjacent areas via the concessions.	Evidence of effective access control points set up and check point statistics available. Submission of corporate policy. Policy implementation results as part of AMRs submitted.	31/12/2017 By March 31 of each year	*Section 5* of this plan
15.	Develop and implement a policy and associated systems and procedures inclusive of appropriate sanctions/contract termination actions that prohibit employees and/or contractors from possession, purchase, trade or collection of wildlife or forest resources that are legally protected, CITES listed, or classed as threatened by the IUCN Red List.	Submission of agreed policy, system and procedures. Evidence of effective staff and contractor training, implementation of system and procedures and monitoring statistic submitted as part of AMRs.	31/12/2017 By March 31 of each year	*Section 4* of this plan
16.	Commission a qualified independent consultant and/or organization/NGO to support development and implementation of the Biodiversity Action Plan (BAP) so as to achieve no net loss of Natural Habitats, and net gain of Critical Habitat values aligned with the Biodiversity Strategy as compiled in the ESIA. The BAP will include a Biodiversity Monitoring and Evaluation Plan (BMEP). Development and implementation of the BAP and BMEP will involve qualified independent consultants and supporting organization/NGOs.	Approved Terms of Reference / appointment of consultant. BAP and BMEP reviewed and approved by IFC. First BAP and BMEP implementation monitoring report by independent consultant; subsequent reports in AMRs	30/06/2017 30/11/2017 First report 31/03/2018; thereafter by March 31 of each year.	*Section 7.1* and *7.2* of this plan

1.3 CONSULTATION

ERM conducted consultation with Myanmar Government officials and NGOs in Myanmar in June 2017. ERM consulted with the following parties:

- Flora and Fauna International (FFI), Myanmar;
- Wildlife Conservation Society (WCS), Myanmar;
- International Union for the Conservation of Nature (IUCN) (Bangkok Office);
- Myanmar Ministry of Environmental Conservation and Forestry (MONREC);

- Mahamyaing Wildlife Sanctuary Forest Office; and
- Panlaung-Pyadalin Cave Sanctuary Forest Office.

Notes from this consultation are contained at *Annex A*.

Additional public consultation occurred in November 2017 with the following NGO parties:

- Flora and Fauna International Myanmar Office (face-to-face);
- World Wildlife Fund (WWF) (by email);
- Wildlife Conservation Society (WCS) (by email);
- International Union for the Conservation of Nature (IUCN) (by email); and
- Myanmar Centre for Responsible Business (MCRB) (face-to-face).

Written comments were received from FFI, WWF and WCS.

Consultation in November 2017 also occurred with the following Myanmar Government representatives:

- Nature and Wildlife Conservation Division of MONREC (NWCD);
- Ministry of Mines; and
- Forestry Department of MONREC.

Written comments were received from NWCD.

Consultation with in May 2018 occurred with FFI and NWCD regarding requirements of the BAP to establish the offset and financial mechanisms under Myanmar Legislation.

Consultation with NWCD regarding preparation of a Letter of Agreement ot implement the Biodiversity Offset.

Consultation with FFI and NWCD in October 2018 regarding reptile fauna within the Paunglaung Pyaladin Cave Wildlife Sanctuary and the extent of protection within the offset area.

Summaries of the results of consultation are contained in *Annex A*.

1.4 *INSTITUTIONAL FRAMEWORK*

The following institutional framework has been outlined to enable the definition of laws and policies that apply to this BAP.

Where relevant laws and policies contain provisions that are relevant to this BAP, they are included below the description. Relevant laws and policies are also referenced in the provisions of the BAP in *Chapters 5* and *6*.

1.4.1 *Relevant International Policy Frameworks*

This BAP has been prepared according to the Business and Biodiversity Offset Program (BBOP) Biodiversity Offset Design Handbook (BBOP, 2009)[1].

1.4.2 *Relevant International Agreements/Commitments*

In addition to national legislation, the Project will need to comply with a range of international standards, including the IFC Performance Standards (IFC PS), and the World Bank EHS Guidelines. The IFC Standards and World Bank Guidelines complement and reinforce national legislation and ensure the Project is conducted under best practices in a way that minimizes risks, impacts and ensures compliance and fair practices. The international performance standards and guidelines provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

CITES Convention

The CITES convention[2] (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Myanmar is a signatory of the CITES convention. There are 822 species listed on the CITES convention that have been recorded within Myanmar.

Convention on Biological Diversity

The Convention on Biological Diversity[3] (1992) (CBD) is an international treaty and includes the requirement for the development of a National Biodiversity Strategy and Action Plan (NBSAP) as well as legislative measures to manage biodiversity within countries bounds. Myanmar is a signatory to the CBD.

International Finance Corporation Performance Standards

The relevant IFC Performance Standards to this BAP are listed in ***Table 1.2***.

Table 1.2 IFC Performance Standards

Performance Standards	Objectives
Performance Standard 1 - Assessment and Management of Environmental and Social Risks and Impacts underscores the importance of managing social and environmental performance throughout the life of a project (any business activity	• *Impact identification and assessment.* To identify and assess social and environmental impacts, both adverse and beneficial, in the project's area of influence

[1] http://www.forest-trends.org/documents/files/doc_3126.pdf Retrieved 22 December 2017

[2] https://www.cites.org/eng/disc/what.php Retrieved 22 August 2017

[3] https://www.cbd.int/convention/ Retrived 22 August 2017

Performance Standards	Objectives
that is subject to assessment and management).	• *Mitigation.* To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment • *Stakeholder engagement.* To ensure that affected communities are appropriately engaged on issues that could potentially affect them • *Effective management.* To promote improved social and environment performance of companies through the effective use of management systems.
Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources recognizes that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development	• To protect and conserve biodiversity • To maintain the benefits from ecosystem services • To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities

1.4.3 *Relevant Laws in Myanmar*

The following laws are relevant to the establishment and management of biodiversity at the STC sites:

- Forest Law, 1992 and associated Forest Policy, 1995;
- Forest Department Notification No. 583/94;
- Community Forest Instruction, 1995;
- Protection of Wildlife and Conservation of Natural Areas Law No. 6/94;
- Burma Wild Life Protection Rules, 1941;
- National Biodiversity Strategy and Action Plan (NBSAP), 2012;
- Environmental Conservation Law, 2012; and
- National Environmental Policy, 1994.

Forest Law, 1992

The Forest Law, 1992 contains the requirements for the management of forest resources in Myanmar. It outlines the required administrative framework for the Government as well as outlining offences for extracting, moving, keeping in possession unlawfully any forest produce, including fauna and flora. For offences relating to teak trees the punishment is heavier. The Courts are empowered to confiscate all forest produce, vehicles, vessels, animals, machinery, tool and equipment in addition to the punishment for the related offence. Forest Officers are also empowered to take administrative actions in respect of forest produce seized.

The objectives of the Forest Law include to:

- Implement the forestry policy of the Government;
- Implement the environmental conservation policy of the Government;

- Promote public co-operation in implementing the forestry policy and the environmental conservation policy of the Government;
- Develop Myanmar's economy, satisfy public food, clothing, and shelter needs, and ensure enjoyment of the forests
- Carry out in accordance with international agreements relating to conservation of forests and of environment;
- Prevent the dangers of forest destruction and biodiversity loss, fire outbreaks, insect infestation, and plant disease;
- Simultaneously carry out natural forest conservation and forest plantations development; and
- Contribute towards the fuel requirement of the country.

The 1995 Forest Policy sets specific objectives and measures addressing environmental protection and management, reforestation, forest industry and trade, forest research, institutional strengthening, and people's participation and public awareness. The 1995 Policy identified six imperatives necessary to achieve Sustainable Forest Management (SFM) certification, which the government must give the highest priority, in order to achieve broader national goals and objectives. These imperatives are:

- Protection of soil, water, wildlife, biodiversity and environment
- Sustainability of forest resources to ensure perpetual supply of both tangible and intangible forest benefits for all generations
- Basic needs of the people for fuel, shelter, food and recreation
- Efficiency to harness, in a socio-environmentally friendly manner, the full economic potential of the forest resources
- Participation of the people in the conservation and utilization of the forests
- Public awareness about the vital role of the forests in the well-being and socio-economic development of the nation.

The Forest Policy states that Myanmar's protected area must cover at least 5% of the total land area of the country. This was revised in 2000, creating a thirty-year target of protecting 10% of total land area. Currently there are 39 protected areas covering an area of 38906.49 km^2 which equates to about 5.75% of the Myanmar's total land area.

The Nature and Wildlife Conservation Division (NWCD) have been set up within MONREC to administer protected areas in Myanmar. A specific procedure has been defined to guide additions to the protected areas in Myanmar. This procedure is shown in *Annex B*. This procedure is relevant to the additions to the protected area system that are proposed as an offset for the Limestone Concession.

Forest Department Notification 583/94:

The Forest Department Notification 583/94 outlines requirements for the Myanmar Government to comply with International Conventions in respect of the protection and conservation of wildlife, ecosystems and migratory birds.

Section (15) requires that the Director General shall, with the approval of the Minister determine and declare endangered species of wild animal which are to be protected according to the following categories, being:

(i) completely protected species of wild animals;
(ii) normally protected species of wild animals; and
(iii) seasonally protected species of wild animals.

Community Forest Instruction, 1994

This policy gives legal backing for rural communities to co-manage forests, so that economic development can expand throughout the country and provide basic needs to local communities, while encouraging active participation of rural populations and greater environmental conservation. The policy also encourages tree planting and reforestation in barren and degraded lands to help it reach its goal of net-forest growth over the next 30 years. The overall principles in the 1995 Community Forestry Instructions (CFI) are for local communities to fulfil basic livelihood needs while also reforesting degraded areas. This recognizes the rights of communities to have to have equitable use of forest adjacent to their villages because of its importance to their livelihoods. In addition, CFI law states that community forestry certificates can be issued to a forest user group (FUG) for a 30 years lease. To qualify for a community forestry certificate, a FUG must commit itself to manage the forest, according to the forest management plan they develop.

The use of CFI may occur within biodiversity offset areas in order to garner community support for the management of fauna and flora.

Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law 6/94

The Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law, provides for:

- A Committee for the Protection of Wildlife and Wild Plants and Conservation of Natural Areas, which is to serve as an advisory body to the Minister of Forestry; supervise implementation of the Law; give guidance in matters of research, conserving species in danger of extinction and international cooperation;
- Categories of 'natural areas' and zoological and botanical gardens, their declaration and uses;
- Categories of protected wild animals: protected, normally protected and seasonally protected;
- Hunting licences;
- Establishment of zoological and botanical gardens;
- Registration of ownership of completely protected animals or trophies thereof;
- Administrative actions;
- Appeals; and
- Offences and penalties.

The categories of so-called 'natural areas' are defined in the Law above as:

- Scientific Nature Reserve;
- National Park;
- Marine National Park;
- Nature Reserve;
- Wildlife Sanctuary;

- Geo-Physically Significant Reserve; and
- Other Nature Reserve Determined by the Minister.

Under the Law, the following actions are considered crimes: hunting without a license, breeding protected animals without permission, causing water and air pollution, poisoning water, possessing, selling, transporting or transferring wildlife or any part thereof without permission.

These provisions of the Law may be used by managers to enforce the requirements of any illegal activity that may occur within the Project areas and biodiversity offset areas.

Burma Wildlife Protection Rules, 1941

The Burma Wild life Protection Rules Act, 1941 regulates the taking of wildlife and the removal and export of Wildlife from Myanmar. The Act contains provisions for penalties to be applied. Note that the *Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law 6/94* appears to supersede this Act however the Act is listed under general Myanmar laws related to the conservation of biodiversity.

National Biodiversity Strategy and Action Plan (NBSAP)

The National Biodiversity Strategy and Action Plan (NBSAP) of Myanmar was adopted in 2012 and contains 10 strategic directions on the following themes: (i) strengthening conservation of priority sites; (ii) mainstreaming biodiversity into other policy sectors; (iii) implementing focused conservation actions for priority species; (iv) supporting local NGOs and academic institutions; (v) creating capacity to coordinate conservation investment in Myanmar; (vi) scaling up the implementation of in situ and ex situ conservation of agriculture, livestock and fisheries biodiversity and genetic resource management; (vii) expediting the process of implementing the national biosafety framework; (viii) promoting the initiative to manage IAS; (ix) facilitating the legislative process of environmental protection and environmental impact assessment; (x) enhancing communication, education and public awareness on biodiversity conservation.

Priority actions have been established for each strategic direction, as have the major agencies responsible for implementation. In addition, a set of 9 action plans, based on the above strategic directions, has been established for five-year periods toward the sustainable management of the following sectors: forests; wildlife conservation and protected areas; freshwater resources; coastal, marine and island ecosystems; land resources; agriculture, livestock and fisheries; ecotourism; environmental quality and biosafety; mineral resource utilization. The NBSAP has been aligned with the National Environmental Policy, Myanmar Agenda 21, and the National Sustainable Development Strategy.

The provisions of STC's Biodiversity Policy are required to be consistent with the Myanmar NBSAP.

Environmental Conservation Law, 2012

The Environmental Conservation Law (also known as the Pyidaungsu Hluttaw Law) No. 9/2012, implements the Myanmar National Environmental Policy. The Law contains provisions to manage environmental resources and enables MOCAF to: develop plans to protect the environment; prescribe environmental standards in relation to emissions and wastes; develop economic incentive mechanisms; environmental dispute resolution; management of hazardous waste; implementation of international agreements; development of a system of Environmental Impact Assessment; development of guidance in relation to the management of biodiversity, coastal environment, climate change and ozone depleting substances; develop polluter pays approaches; and the establishment of an Environmental Management Fund. An Environmental Impact Assessment Procedure was published by MONREC in January 2015.

National Environmental Policy (1994)

This Policy was drafted in 1994 to establish sound environment policies, utilization of water, land, forests, mineral, marine resources and other natural resources, in order to conserve the environment and prevent its degradation. Additional objectives of Myanmar's National Environmental Policy include achieving harmony and balance between its people, their cultural heritage, the environment and its natural resources. The Government of Myanmar is obliged to take environmental considerations into account when developing anything that may enhance the quality of the life of all its citizens.

2 *STC BIODIVERSITY AND ECOSYSTEM SERVICES POLICY*

The purpose of STC's Biodiversity and Ecosystem Services Policy (Policy) is to outline practical steps to assist the STC Group to meet obligations required by the IFC Performance Standards and associated Environmental and Social Action Plan (ESAP). The policy outlines the associated procedures and actions for biodiversity management at STC sites.

The following commitments are made by STC in relation to the management of biodiversity and ecosystem services:

- Reduce impacts of STC sites on biodiversity values to first avoid, then minimising where possible and then restore. As a last resort offset impacts;
- Assess and manage the values of nature for people at the project sites in conjunction with the community;
- Implement a zero tolerance policy against poaching and hunting for all STC Staff and Contractors;
- Implement a policy of "anti-illegal logging" in conjunction with the community and Myanmar Government;
- Respect the requirements of legally designated protected areas;
- Assess and manage Critical Habitats and Natural Habitats within STC controlled and managed areas in line with IFC PS6 requirements;
- Adopt practices that are practical and easily implementable whilst meeting the objectives of sustainably managing biodiversity; and
- Work with local communities and key stakeholders to restore biodiversity values.

The Policy is designed to apply to all STC sites, including new projects.

2.1 *SCOPE OF POLICY*

This Policy and the associated shall apply to all STC sites across the STC project life cycle, including

- Development sites (includes exploration and project developments);
- Operational sites;
- Those on care and maintenance; and
- Reclaimed mines and quarry sites.

Biodiversity management addresses the actions required to reduce the impacts on biodiversity values and ecosystem services, for example: biodiversity management; managed land clearance; prevention of water, air and soil pollution; and habitat restoration and progressive rehabilitation.

All STC employees, contractors and consultants undertaking work for or on behalf of STC shall comply with this Policy.

2.2 *POLICY REQUIREMENTS*

Risks to biodiversity values shall be assessed and documented in a Risk Register across the project life cycle for all STC sites.

Biodiversity risks must be assessed by:

- Developing baseline data on existing and new sites acquired by STC and ongoing monitoring on existing sites with respect to biodiversity values within the vicinity of STC sites that cover:
  - Fauna and flora of terrestrial and aquatic habitats;
  - IUCN Red List Species, National Conservation List Species and habitats of high biodiversity value;
  - Critical habitats;
  - Linkages with habitat corridors, protected areas, and key biodiversity areas;
  - Assessment of the human livelihood dependence (ecosystem services) upon biodiversity values;
  - Local communities knowledge of biodiversity values; and
  - Costs and benefits of ecosystem services for development sites.
- Determining the likely risk on biodiversity values posed by new projects based on an assessment of the sites likely impact on biodiversity values. The likely risk to biodiversity values must be based on the nature and extent of activities undertaken on the site during the project lifecycle; and
- Documenting the likely risks to biodiversity values in the Risk Register.

2.2.1 *Legal and Other Requirements*

Each STC site must comply with all applicable laws and other legal requirements and provide proof of such compliance as required.

Where applicable laws and other legal requirements do not require performance at least to the level of this Policy and/or to IFC PS6, activities must be conducted in a manner that is consistent with this Policy, taking into consideration any social and cultural sensitivity of communities.

Where an offset is required as a last resort to compensate for a project's residual impact, legal and financial mechanisms must be put in place to ensure the effective financing and management of the offset for at least as long as the project impacts endure.

2.2.2 *Objectives and Targets*

With a focus on continual improvement to avoid and mitigate against residual impacts on biodiversity values, all STC sites must:

- Develop site-specific applicable biodiversity objectives and performance targets;
- Review annually all site-specific biodiversity objectives and performance targets; and

- Confirm performance targets are consistent with STC biodiversity targets, once these are in place.

2.2.3 *Operational Control*

Biodiversity Values and Ecosystem Services for New Projects

The assessment of biodiversity values and ecosystem services for all new projects must:

- Apply the mitigation hierarchy, based on the baseline data and risk assessment, to avoid and mitigate against impacts to biodiversity values;
- Consider biodiversity offsets, as a last resort in cases where there is a residual impact following implementation of the mitigation hierarchy, to compensate for the potential loss of biodiversity values;
- Any biodiversity offset related to an STC project shall have an effective long-term financing and governance mechanism in place;
- Assess ecosystems services where they are likely to be impacted by the project; and
- Engage the community when assessing biodiversity values and ecosystem services.

Management of Biodiversity Values at Existing Sites

As part of the management of biodiversity values, all STC sites must:

- Develop management measures for biodiversity values that respond to identified risks and residual impacts;
- Support local, regional, national and international biodiversity management measures where appropriate;
- Integrate the assessment of biodiversity values and biodiversity management into the planning, decision making and reporting processes throughout the project lifecycle;
- Develop processes and procedures to manage unplanned conditions or unexpected impacts to biodiversity;
- Support ongoing management and research through publicly disclosing and disseminating biodiversity baseline and monitoring data and promoting practices and experiences in biodiversity assessment and management where appropriate;
- Manage biodiversity values through consultation, constructive relationships and partnerships with stakeholders, including the community and conservation NGOs; and
- Integrate biodiversity management within the Life of Asset (LoA) planning process and the site Closure Plan.

Development of Biodiversity Action Plan for STC sites

As part of the management of biodiversity values, STC sites must:

- Develop a Biodiversity Action Plan for sites with Critical Habitat or high risk Natural Habitats

- Develop a Biodiversity Action Plan based on biodiversity baseline data and risk assessment that includes management measures:
  - Defining Critical Habitats, Natural Habitats, habitat corridors and, where these are used, biodiversity offsets;
  - Implementation of weed and pest control programs;
  - Species recovery and habitat restoration;
  - Rehabilitation requirements;
  - Responses to impacts from contamination, soil, water, waste, air and other harmful substances;
  - Other measures necessary to manage biodiversity values.
- Links to social investment plans and/or partnerships with the community;
- Links to conservation partners active within affected landscapes, including conservation NGOs;
- Management of people, equipment and infrastructure;
- Assignment of clear accountabilities and responsibilities (resources and roles);
- Competence, training and awareness;
- Communication requirements;
- Legal requirements;
- Monitoring requirements; and
- Documentation, maintenance and retention requirements.

2.3 *MONITORING AND EVALUATION*

All STC sites must:

- Review and update the Biodiversity Action Plan annually;
- Regularly monitor biodiversity offset areas and areas of high biodiversity value within the Limestone and Coal Mine Concession included in the biodiversity action plan; and
- Regularly monitor status of IUCN Red List Species and National conservation list species present within the area of influence of the site.
- Regularly monitor and validate management measures as outlined in the Biodiversity Action Plan for Critical Habitats, Natural Habitats, protected areas, key biodiversity areas, biodiversity offsets, resilience of habitat restoration and rehabilitation programs based on agreed success criteria within the area of influence of the site;
- Regularly monitor and report on the implementation of the "no-poaching and no-hunting" and "anti-illegal logging" policy; and
- Establish data collection and reporting systems to meet both internal and external reporting requirements in relation to biodiversity baseline and monitoring data required for the annual STC Sustainability Report.

All requirements for monitoring and evaluation are outlined in the *Biodiversity Monitoring and Evaluation Plan* at *Section 8*.

3 *STC ZERO TOLERANCE POLICY ON POSSESSION OF WILDLIFE AND FOREST RESOURCES*

3.1 *POLICY REQUIREMENTS*

STC will commit to the following zero tolerance policy to possession of wildlife and forest resources for all operations:

All STC staff and contractors are strictly prohibited from the possession, purchase, trade or collection of wildlife or forest resources that are legally protected under Myanmar Law, are CITES[4] listed, or classed as threatened by the IUCN Red List[5].

The purpose of the policy is to prohibit the collection of wildlife and forest resources by STC staff and contractors.

3.2 *OPERATIONAL CONTROL*

STC shall implement the following actions in relation to the Policy:

- All staff must be educated during induction training and on an annual basis regarding STC's "no-poaching and no-hunting" policy;
- A register is to be kept of staff's completion of the training and any refresher training attended;
- All staff work agreements and Code of Conduct must contain a clause that states that the staff member agrees to comply with STC's "no-poaching and no hunting" policy;
- All STC properties are to have access control facilities at entrances;
- 24-hour vehicle inspections are to occur at the entrance of all STC controlled properties to detect fauna and flora. Thorough, random vehicle inspections are also to occur on a regular basis. Evidence of such inspections to be recorded and available for review;
- Where flora or fauna are identified during inspections, these are to be confiscated and photographed. Wherever possible, the flora and fauna are to be returned to their point of origin;
- Undertake ongoing monitoring to control access to STC sites. Inspections are to occur at least on a six (6) monthly basis to identify any unauthorised access. Boundary inspections may consist of physical inspections or aerial photographs/video taken from a drone;

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[4] CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

[5] Threatened species are considered to be listed as Critically Endangered, Endangered, Vulnerable, on the IUCN Red List of Threatened Species.

- Posters and signage are to be developed and placed at STC controlled properties stating the policy, outlining the species prohibited from poaching/hunting; and
- Staff identified to have participated in the possession, purchase, trade or collection of wildlife or forest resources will be dismissed from employment and not re-employed at any later date.

Species targeted for inspections are outlines in *Table 3.1*. This list is based on species that were detected on site. There may be other species that may be considered threatened or listed on CITES that may occur on the sites, including plants (e.g. orchids). Inspections should identify ANY flora and fauna being transported from the site and subsequent action taken as described above if they are detected being removed from the site. Inspections should include collection of supporting photographic evidence of any flora and fauna transported from the site.

Posters to apply the No Poaching – No Hunting Policy are contained at *Annex C*.

Table 3.1 Species Targeted for Wildlife Hunting/Poaching Inspections

SN	Species	Common Name	IUCN Listing/Endemism	CITES Listing	National Listing
Limestone Concession					
1	*Manis pentadactyla*	Chinese Pangolin	CR	Yes (App. I.)	CP
2	*Trachypithecus phayrei* spp. *shanicus*	Shan State Langur*	EN	Yes (App. II)	P
3	*Hoolock leuconedys*	Eastern Hoolock Gibbon**	VU	Yes (App. I)	P
4	*Nycticebus bengalensis*	Bengal Slow Loris	VU	Yes (App. I)	-
5	*Arctonyx collaris*	Hog Badger	VU	No	-
Coal Mine Concession					
1	*Manis pentadactyla*	Chinese Pangolin	CR	Yes (App. I.)	CP
2	*Hoolock hoolock*	Hoolock Gibbon**	EN	Yes (App. I.)	P
3	*Trachypithecus phayrei phayrei*	Phayre's Langur*	EN	Yes (App. II.)	P
4	*Cuon alpinus*	Dhole	EN	Yes (App. II.)	P
5	*Bos gaurus*	Gaur	VU	Yes (App. I.)	CP
6	*Nycticebus bengalensis*	Bengal Slow Loris	VU	Yes (App. I.)	
7	*Capriconis sumatraensis*	Southern Serow	VU	No	CP
8	*Naemorhedus baileyi*	Red Goral	VU	Yes (App. I.)	CP
9	*Ursus thibentanus*	Asiatic Black Bear	VU	No	P

1) National Listings are obtained from the Protected List of Wildlife (1994) with the following categories (i) Completely Protected; (ii) Normally Protected and (iii) Seasonally Protected.
2) * Classified under Forest Department Notification No. 583/94, II Protected Animals, Leaf-Monkeys
3) ** Classified under Forest Department Notification No. 583/94, II Protected Animals, Old World Monkeys

4 *STC ANTI-ILLEGAL LOGGING POLICY*

4.1 *POLICY REQUIREMENTS*

STC will commit to the following policy for all operations:

A "no access" rule is to be applied at all times to prohibit non-authorized personnel, their vehicles and/or any equipment used for illegal logging in all areas under STC control.

The purpose of the policy is to prevent access to illegal loggers accessing via STC's concessions and adjacent areas via the concessions (including protected areas).

4.2 *OPERATIONAL CONTROL*

STC shall implement the following actions in relation to the Policy:

- All staff must be educated during induction training and on an annual basis regarding STC's "anti-illegal logging" policy;
- A register is to be kept of staff's completion of the training and any refresher training attended;
- Local community forums are to occur on an annual basis to educate the local community on STC's policy;
- All staff work agreements and Code of Conduct must contain a clause that states that the staff member agrees to comply with STC's "anti-illegal logging" policy;
- All STC properties are to have access control facilities at site entrances;
- 24-hour vehicle inspections are to occur at the entrance of all STC controlled sites to detect the movement of vehicles and equipment. Thorough, random vehicle inspections are also to occur on a regular basis;
- Undertake ongoing monitoring to control access to STC sites. Inspections are to occur at least on a six (6) monthly basis to identify any unauthorised access; Boundary inspections may consist of physical inspections or aerial photographs/video taken from a drone;
- Posters and signage are to be developed and placed at STC controlled properties stating the policy, including in local villages;
- STC staff or contractor identified to have participated in illegal logging activities will be dismissed from employment and not re-employed at any later date; and
- STC is to refer any staff member of contractor identified of conducting illegal logging to relevant authorities for investigation.

Posters to apply the *STC Anti-Illegal Logging Policy* are contained at *Annex D*.

Species targeted for illegal logging activities are listed in *Table 4.1*. Other species may also be targeted for illegal logging activities within the sites and surrounds.

Table 4.1 Species targeted for illegal logging activity inspections

SN	Species	Common Name	IUCN Listing
Limestone Concession			
3	*Dalbergia oliveri*	Burmese Rosewood	EN
Coal Mine Concession			
5	*Dalbergia oliveri*	Burmese Rosewood	EN
6	*Dipterocarpus baudii*	-	CR
7	*Dipterocarpus costatus*	-	EN

Note: that there are no current flora listed under the Protected List of Wildlife 1994
http://www.fdMONREC.gov.mm/eng/protection/policy-laws-and-rules

5 BIODIVERSITY OFFSET DEFINITION

Residual impacts are significant project-related impacts to biodiversity and ecosystem services that might remain after on-site mitigation measures have been implemented. Under the IFC PS, significant residual impacts on Natural Habitats are required to be offset to achieve a no-net-loss of biodiversity values. Residual impacts to Critical Habitats are required to be offset to achieve a net-gain of biodiversity values. These residual impacts have been determined as required by IFC PS6 through the application of the Mitigation Hierarchy. Residual impacts on biodiversity values are assessed in the Supplementary ESIA for STC's Cement Plant and Associated facilities (ERM 2017).

5.1 RESIDUAL IMPACTS TO BIODIVERSITY VALUES

5.1.1 Habitat Values

The residual impacts to biodiversity largely relate to unavoidable habitat loss within the footprint of the Project. The Critical/Natural habitat lost is outlined in *Table 5.1* below. As outlined in the ESIA, calculations in relation to the requirement to achieve no-net-loss/net gain have been undertaken using an appropriate offset metric[6]. The estimated values of the required offset area are also show in the table.

Table 5.1 Habitat lost due to project activities and offset required to achieve NNL

Habitat Type	IFC Habitat Classification	Area	Required Offset Area
Limestone Concession			
Limestone Habitat	Critical Habitat	235.58ha	1,420ha
Forested Natural Habitat	Natural Habitat	32.59ha	127ha
Coal Mine Concession			
Forested Natural Habitat	Critical Habitat	899.95ha	5,420ha

5.1.2 Species Values

Significant residual impacts to species are primarily habitat loss impacts. On-site residual impacts from hunting and poaching, mortality (from vehicle/machinery strike) and changes in habitat quality were deemed to be sufficiently addressed through on-site management measures for both the limestone and coalmine concessions. No significant residual impacts are expected to remain after successful on-site mitigation.

[6] The required offset area has been determined using an averted loss metric with a compound interest rate of 1.35% and offset management period of 25 years. The full offset assessment can be found in *Supplementary ESIA for STC Cement Plant & Associated Facilities in Myanmar (06 April 2017), Section 1.3, Annex F-3.*

In relation to species identified as Critical Habitat species, the following species were assessed to trigger the Critical Habitat thresholds within IFC PS6. Offsets requiring Net Gain outcomes are required for these species. Most species are likely to be managed sufficiently through habitat-level conservation actions as part of an offset and hence do not require species-specific management actions. The exception to these is species where targeted hunting and poaching is occurring (e.g. Chinese pangolin, Western Hoolock Gibbon). The Critical Habitat species and the residual impact type are outlined in *Table 5.2*.

Table 5.2 Species Requiring Net-Gain Offsets

SN	Species	Common Name	IUCN Listing/Endemism	Key Residual Impacts
Limestone Concession				
1	*Manis pentadactyla*	Chinese Pangolin	CR	Habitat loss; hunting and poaching
2	*Trachypithecus phayrei* spp. *shanicus*	Shan State Langur	EN	Habitat loss
3	Snails: *Anauchen sp., Diplommatina sp. 3, Diplommatina sp. 4 and Diplommatina sp. 5 aff. crispata.*	-	Local endemic	Habitat loss
4	Flora: *Impatiens sp., Amorphophallus sp. and Arisaema sp.*	-	Local endemic	Habitat loss
5	Reptiles: *Cyrtodactylus shwetaungorm, and C. ywanganensis, and Hemidactylus sp. nov.*	-	Local endemic	Habitat loss
Coal Mine Concession				
1	*Manis pentadactyla*	Chinese Pangolin	CR	Habitat loss; hunting and poaching
2	*Hoolock hoolock*	Western Hoolock Gibbon	EN	Habitat loss; hunting and poaching
3	*Dipterocarpus baudii*	-	CR	Habitat loss

In relation to species that are not Critical Habitat species but are considered as species of concern by the project, a no-net-loss is to be achieved where feasible for these species as part of efforts to deliver no-net-loss for Natural Habitats. These species are listed below in *Table 5.3* and outline where specific management actions are required to be implemented at the offset sites.

Table 5.3 Species Requiring No-Net Loss offsets

SN	Species	Common Name	IUCN Listing/Endemism	Key Residual Impacts
Limestone Concession				
1	*Hoolock leuconedys*	Eastern Hoolock Gibbon	VU	Habitat loss; hunting and poaching
2	*Nycticebus bengalensis*	Bengal Slow Loris	VU	Habitat loss
3	*Arctonyx collaris*	Hog Badger	VU	Habitat loss
Coal Mine Concession				

SN	Species	Common Name	IUCN Listing/Endemism	Key Residual Impacts
1	*Trachypithecus phayrei phayrei*	Phayre's Langur	EN	Habitat loss
2	*Cuon alpinus*	Dhole	EN	Habitat loss
3	*Bos gaurus*	Gaur	VU	Habitat loss
4	*Nycticebus bengalensis*	Bengal Slow Loris	VU	Habitat loss; hunting and poaching
5	*Capriconis sumatraensis*	Southern Serow	VU	Habitat loss
6	*Naemorhedus baileyi*	Red Goral	VU	Habitat loss
7	*Ursus thibentanus*	Asiatic Black Bear	VU	Habitat loss
8	*Dipterocarpus baudii*		CR	Illegal Logging
9	*Gastrochilus calceolaris*		CR	Illegal Logging

5.2 *ACHIEVING NO-NET LOSS/NET GAIN*

Demonstration of the implementation towards the offset goals is provided within the monitoring and evaluation framework and the reporting mechanisms in the BAP, as per PS6 requirements.

Achieving no-net-loss for Natural Habitats has been calculated based on the averted loss metric. This metric calculates the area to be managed that would avert the background rate of that loss over the offset management period (25 years).

Achieving a No-net-loss (NNL) for Natural Habitat (and associated species of concern) and Net gain (NG) for Critical Habitat will be required to address the key residual impacts identified in the impact assessment phase and any additional/new threats identified at the chosen offset locations.

Generally, the offset goals can be achieved through a combination of the following:

- Demonstrated increases in species populations for Critical Habitat species within the areas managed;
- Demonstrated reduction in the impact of threats within offset areas (such as illegal logging, hunting and poaching);
- Improvements in the quality/condition of habitats for species against a baseline condition (considering background loss rates); and
- Demonstrated increases in the extent of habitats based on a baseline condition.

A summary of the residual impacts and key mitigation actions for habitats and species to achieve the offset goals are outlined in the BOMP (Section 7) and *Table 5.5*. Reference should be made to the specific management actions contained within the BOMP.

The monitoring and evaluation framework has been developed to set appropriate goals for habitats and species. These goals, recommended monitoring techniques, contingencies and reporting requirements are outlined in the BMEP for each offset site at *Section 8*. A summary of the monitoring KPIs are also outlined in *Table 5.5*.

5.3 *BIODIVERSITY OFFSET OPTIONS*

Two relevant protected areas for offsetting for the STC Project include: the Mahamyaing Wildlife Sanctuary and the Panlaung-Pyadalin Cave Wildlife Sanctuary. Further information on the assessment of adequacy and costs for management of the identified biodiversity offsets can be found in *Annex F-3* of the Supplementary ESIA (ERM 2017).

The Panlaung-Pyadalin Cave Wildlife Sanctuary was established in 2002 and is 334km^2 (33,400ha) in size. It is an IUCN Category IV Protected Area and is located 6km north of the Limestone concession. The Sanctuary contains limestone geology that is connected and considered ecologically equivalent to the limestone range associated with the STC Limestone Concession. During surveys undertaken for the Supplementary ESIA, snail and flora species were identified within the Sanctuary and the proposed concession that were the same species as those impacted by the Project. In addition to supporting ecologically equivalent values as the impact site, the Sanctuary also supports important cultural values and biodiversity values including habitat for the Asian Elephant, Banteng, Gaur, Clouded Leopard, Chinese Pangolin, Shan State Langur and Serow. It is listed as having an annual operation plan and management actions in place, however it is considered to be significantly underfunded. Threats identified include illegal logging and settlement encroachment.

The Mahamyaing Wildlife Sanctuary was established in 2002 and is 1180km^2 in size (111,900ha). It is an IUCN Category IV Protected Area and Important Bird Area (IBA) and is located 24km east of the Coal mine concession. It has important biodiversity values, including an important population of Eastern Hoolock Gibbon. Additional species present include the Chinese Pangolin, Banteng, Sambar Deer and Asiatic Wild Dog, Small Asian Mongoose, Wild Boar, Mongoose, Asian Elephant and Jungle Cat. The Sanctuary has not been appropriately gazetted under Myanmar law and has a draft management plan that has not been funded.

These offset sites were chosen in order to build the capacity of the protected area network in Myanmar. As outlined in Emerton et al (2015), significant future funding of the Myanmar reserve system is required to ensure adequate protection and conservation gains. Management of the existing reserve system as a biodiversity offset in the short to medium term will enable current funding shortfalls to be reduced. Offsetting within protected areas also builds on legal protections afforded by existing laws. The capacity of protected area managers can also be enhanced to tackle threats, building long term experience in protected area management.

The additional funding and resources provided as part of an offset must be additional to existing funding levels. It is also not intended that the existing funding provided by the Myanmar Government be reduced at the offset sites. In the long-term, it would be expected that the Myanmar Government would play a greater role in managing protected areas. Sustainable funding of the Myanmar protected area system should be pursued by the Myanmar Government, including considering developer contributions as a method to ensure future funding arrangements.

5.4 *BIODIVERSITY OFFSET DEFINITION*

5.4.1 *Offset management timeline*

As outlined in the Supplementary ESIA, offset management will occur for a period of at least 25 years, with ongoing in-kind support provided beyond that timeframe. This timeframe is equivalent to the remaining concession agreement period.

5.4.2 *Additionality*

It is noted also that both wildlife sanctuaries are significantly larger than the required offsets as defined by the offset metric. As a result of desktop review and consultation with conservation experts, it has been assessed that undertaking management of protected areas has potential benefits in comparison to establishing and managing new conservation areas in Myanmar given current conservation threats on private land.

Protected areas in Myanmar currently do not receive substantive funding to support ongoing management. Instituto Oikos and BANCA (2011) report that significant underfunding of protected areas has led to a long-term decline in the management of threats. Ongoing illegal logging, poaching, hunting and overuse of natural resources have seen the decline of habitat quality. Emerton et al (2015) report that protected area financing in Myanmar is currently limited due to significant budget shortfalls, narrow funding sources, uneven funding allocations and lack of capital spending. Emerton also recommends biodiversity offsets as an option to improve funding of protected areas in Myanmar.

Building capacity with government in managing protected areas within Myanmar is recommended by international NGOs (WCS and FFI) as likely to achieve gains in conservation through effective funding. The Myanmar Ministry of Forestry, Nature and Wildlife Conservation Division, has established administrative frameworks for Protected Areas. Relevant laws are established to enable gazettal of protected areas and the regulation and enforcement of forest and wildlife laws. On-site management resources such as staff, skills and capital equipment are currently under-resourced. Building on this framework is considered as an effective means to achieve required offset management. Such capacity building would be additional to current conservation efforts of Government and NGOs.

5.4.3 *Limestone Concession*

The biodiversity offset definition for the limestone concession is as follows:

- Addition of a minimum of at least 1420ha of limestone habitat to the Panlaung-Pyadalin Cave Wildlife Sanctuary;
- Contributions for the management of at least 127ha of forested habitat of the Panlaung-Pyadalin Cave Wildlife Sanctuary; and
- Species management actions for species listed as requiring specific offsets in *Tables 5.2* and *5.3* above.

Given the economies of scale and management requirements to achieve the offset, the management of the entire PPCWS will occur to achieve the required offset.

The location of the limestone identified to be subject to offset actions is shown in *Figure 5.1*.

5.4.4 *Coal Mine Concession*

The biodiversity offset definition for the coal mine concession is as follows:

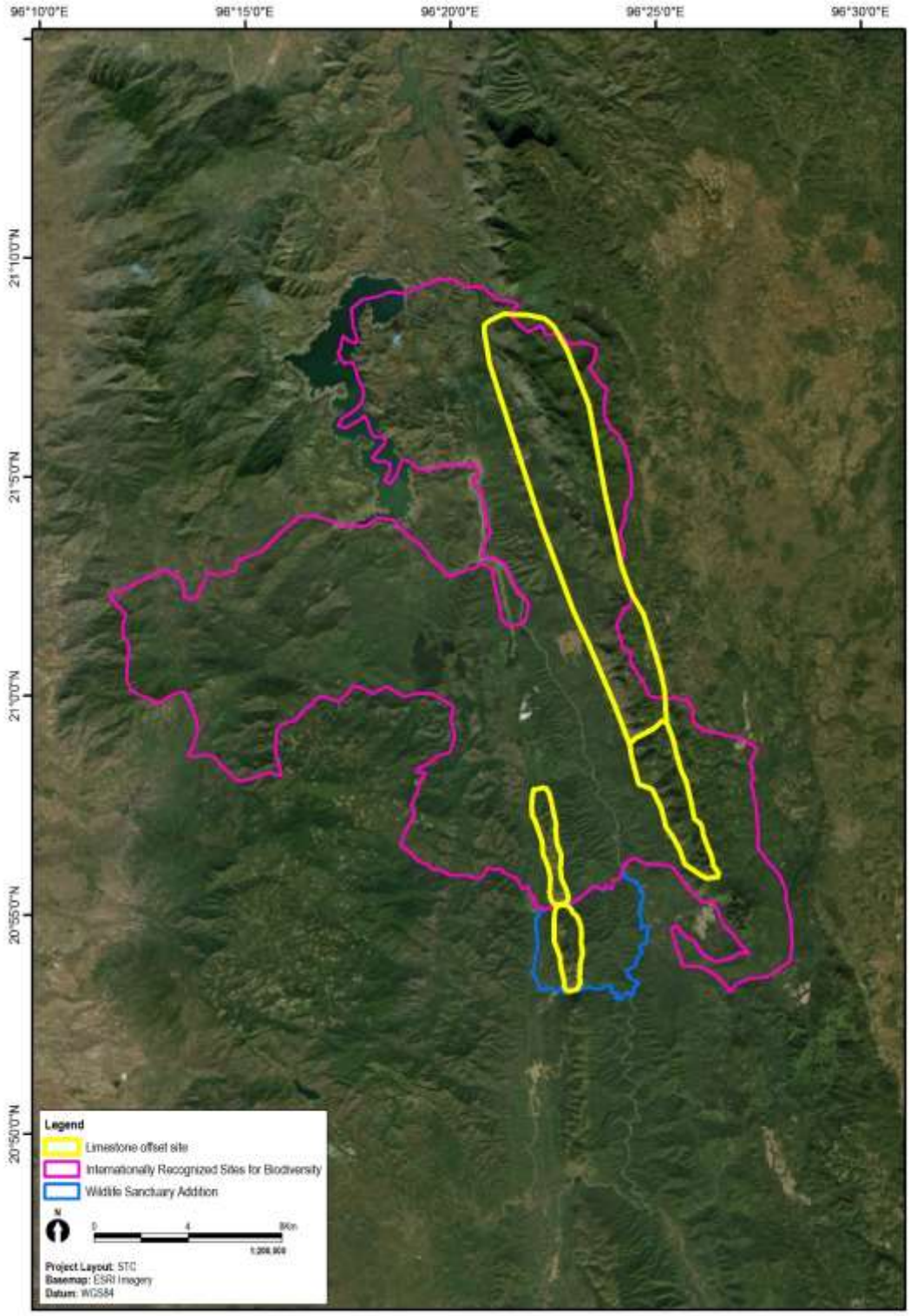
- Management of at least 5420ha of forested habitat within the Mahamyaing Wildlife Sanctuary; and
- Species management actions for species listed as requiring specific offsets in *Tables 5.2* and *5.3* above.

It should be noted that additional specific actions are required for the population of Western Hoolock Gibbon (*Hoolock hoolock*) located near the coal mine concession on the Western side of the Chindwin River as the species within the Mahamyaing Wildlife Sanctuary offset site is different, being the Eastern Hoolock Gibbon (*Hoolock leuconedys*). A specific offset for this species has been defined in the BOMP.

Given the economies of scale and management requirements to achieve the offset, the management of the entire MWS will occur as the required offset.

The specific requirements for implementing and delivering on offset management are outlined in the BOMP for both concessions in *Chapter 7*.

Figure 5.1 Limestone range components within the Paunlaung-Pyaladin Wildlife Sanctuary



5.4.5 *Offset Cost Analysis*

As outlined in guidance provided by the Business and Biodiversity Offset Program (BBOP 2012), the scale of offsets should be linked to the magnitude of residual impacts. The offset size of 6,967ha has been calculated to compensate for the residual impacts of the STC Project. However, the size of the offsets is much larger than the required offset (being a total of 145,300ha). This creates an equity issue in terms of defining how much conservation "effort" or cost is the responsibility of STC in managing these protected areas against what would be the responsibility of other stakeholders and the Myanmar Government. STC will also be required to demonstrate that the conservation actions being undertaken within the protected areas are meeting the offset goals (no-net-loss/net gain), meaning that the level of funding required will need to be sufficient over the offset management period to sustain required management actions. Adaptive management will need to be employed in order to focus conservation efforts.

ERM has completed a cost assessment to compare the costs associated with the management of the two protected areas (current and projected required actual costs) with the estimated costs of the management actions to manage the offset sites. The assessment is outlined in *Table 5.4*.

It should be noted that STC may be required to provide additional funds above the estimated level if monitoring and evaluation identify shortfalls in achieving the offset goals. Longer term protected area funding models will also need to be pursued by the Myanmar government to provide more certainty across the protected area system. Continued funding allocations after the 25 year offset period should also be considered by STC.

A summary of key offset management and monitoring actions to achieve NNL/NG for habitats and species is outlined in *Table 5.5*.

Table 5.4 Costs for Managing Panlaung-Pyadalin Cave Wildlife Sanctuary and Mahamyaing Wildlife Sanctuary as Offset Sites

			Current Protected Area Spend			Estimated Offset Management Cost*					Required Protected Area Cost			Deficit
	Offset Site	**Protected Area Size (A) ha**	**Actual Cost/ha (B)****	**Annual Cost (C) AxB=C**	**25 Year Cost (D) Cx25=D**	**Offset Size (E) ha**	**Offset Cost (F) $/ha/yr**	**Annual Offset Cost (G) ExF=G**	**25 year Offset cost (H) (D+G)x25= H**	**Total 25 year Cost (I) D+H=I**	**Annual Required Estimate (J) $/ha+**	**Annual Required Estimate (K) AxJ=K**	**Total Required spend (25 years) (L) Kx25=L**	**Total Cost Deficit (25 years) (M) L-I=M**
Scenario A	PPCWS													
	MWS													
	Totals													
Scenario B	PPCWS													
	MWS													
	Totals													

Notes:

* Based on estimation of actual costs of implementing the offset management actions contained in the BOMP

** Based on actual costs for management of the protected areas (provided during consultation, 2017)

\+ Based on the scenarios outlined in Emerton 2015 for protected area management in Myanmar:

(a) $x/ha for 75% staffing and basic management (Scenario A); or

(b) $x/ha for full staffing and improved management (Scenario B)

PPCWS – Panlaung-Pyadalin Cave Wildlife Sanctuary

MS – Mahamyaing Wildlife Sanctuary

Table 5.5 Summary of Key Offset Management and Monitoring Actions to Achieve NNL/NG for Habitats and Species

	Species	Common Name	Habitat Loss	Key Residual Impact	Offset Description	Offset Management Action Summary	Monitoring KPI
Limestone Concession							
Net Gain	*Manis pentadactyla*	Chinese Pangolin	32.59ha	• Habitat loss • Hunting and poaching	Management of at least 127ha of forested habitat required within the PPCWS.	• Population Census • Community Engagement • Patrols and Enforcement • Threat Reduction Campaigns • Wildlife Management Actions	• Annual population estimation • Implementation of management actions • Identification of threats and additional management actions
	Trachypithecus phayrei spp. *shanicus*	Shan State Langur	32.59ha	• Habitat loss			
	Diplommatina sp. 3, new sp.	-	235.58ha	• Habitat loss	Management of at least 1420ha of limestone habitat within the PPCWS (or addition of equivalent habitat to the PPCWS).	• Habitat protection and monitoring	• Annual fauna monitoring report • Annual population estimation • Implementation of management actions • Identification of threats and additional management actions (as required)
	Diplommatina sp. 4, new sp.	-	235.58ha	• Habitat loss			
	Diplommatina sp. 5, aff. *Crispate*	-	235.58ha	• Habitat loss			
	Anauchen new sp.	-	235.58ha	• Habitat loss			
	Cyrtodactylus shwetaungorm	-	235.58ha	• Habitat loss			
	C. ywanganensis	-	235.58ha	• Habitat loss			
	Hemidactylus sp. nov.	-	235.58ha	• Habitat loss			
No-Net-Loss	*Hoolock leuconedys*	Eastern Hoolock Gibbon	32.59ha	• Habitat loss • Hunting and poaching	Management of at least 127ha of forested habitat required within the PPCWS.	• Population Census • Community Engagement • Patrols and Enforcement • Threat Reduction Campaigns • Wildlife Management Actions	• Annual population estimation • Implementation of management actions • Identification of threats and additional management actions (as required)
	Nycticebus bengalensis	Bengal Slow Loris	32.59ha	• Habitat loss			
	Arctonyx collaris	Hog Badger	32.59ha	• Habitat loss			

	Species	Common Name	Habitat Loss	Key Residual Impact	Offset Description	Offset Management Action Summary	Monitoring KPI
Coal Mine Concession							
Net Gain	*Manis pentadactyla*	Chinese Pangolin	899.95ha	• Habitat loss • hunting and poaching	Management of at least 5420ha of forested habitat within the MWS.	• Population Census • Community Engagement • Patrols and Enforcement • Threat Reduction Campaigns • Wildlife Management Actions	• Annual population estimation • Implementation of management actions • Identification of threats and additional management actions (as required)
	Hoolock hoolock	Hoolock Gibbon	899.95ha	• Habitat loss • Hunting and poaching		• Specific Wildlife Sanctuary for identified population • Population Census • Community Engagement • Patrols and Enforcement • Threat Reduction Campaigns • Wildlife Management Actions	• Establishment of the Western Hoolock Gibbon Wildlife Sanctuary • Annual population estimation • Implementation of management actions • Identification of threats and additional management actions (as required)

	Species	Common Name	Habitat Loss	Key Residual Impact	Offset Description	Offset Management Action Summary	Monitoring KPI
No-Net-Loss	*Trachypithecus phayrei phayrei*	Phayre's Langur	899.95ha	• Habitat loss	Management of at least 5420ha of forested habitat within the MWS.	• Population Census • Community Engagement • Patrols and Enforcement • Threat Reduction Campaigns • Wildlife Management Actions	• Annual population estimation • Implementation of management actions • Identification of threats and additional management actions (as required)
	Cuon alpinus	Dhole	899.95ha	• Habitat loss			
	Bos gaurus	Gaur	899.95ha	• Habitat loss			
	Nycticebus bengalensis	Bengal Slow Loris	899.95ha	• Habitat loss • Hunting and poaching			
	Capriconis sumatraensis	Southern Serow	899.95ha	• Habitat loss			
	Naemorhedus baileyi	Red Goral	899.95ha	• Habitat loss			
	Ursus thibentanus	Asiatic Black Bear	899.95ha	• Habitat loss			
	Dipterocarpus baudii	-	899.95ha	• Habitat loss			• Success of propagation actions • Success of rehabilitation planting • Identification of threats and additional management actions (as required)
	Gastrochilus calceolaris	-	899.95ha	• Habitat loss			

Notes: PPCWS - Panlaung-Pyadalin Cave Wildlife Sanctuary
MWC - Mahamyaing Wildlife Sanctuary

6 *BIODIVERSITY MANAGEMENT PLAN*

6.1 *APPLICATION*

This Biodiversity Management Plan (BMP) applies to activities during both construction and operation at the STC Limestone and Coal Concessions.

6.2 *BIODIVERSITY MANAGEMENT ACTIONS*

Biodiversity management actions are proposed in the Supplementary ESIA prepared for the limestone and coalmine concession (ERM 2017). These mitigations and specific actions are to occur within the concession areas to reduce impacts to biodiversity values during the operation of the facilities.

The actions are to occur for the life of the concession agreement (25 years). The tasks, mitigation actions and responsibilities are outlined in *Table 6.1* below.

Both tables are outlined in accompanying Microsoft Excel spreadsheets to facilitate amendments and tracking of these actions by STC staff.

The timeline for implementation of biodiversity mitigation actions is shown in *Table 6.2*.

6.3 *MONITORING AND EVALUATION*

Monitoring and evaluation measures are to be implemented for all of the biodiversity mitigation actions are outlined the Biodiversity Monitoring and Evaluation Plan (BEMP) at *Section 8*.

6.4 *ROLES AND RESPONSIBILITIES*

To ensure action ownership, each measure has been assigned to a particular designation within STC. A list of responsible persons is provided in *Table 6.3*.

6.5 *BUDGET*

The following budget in *Table 6.4* has been estimated for the implementation of the *Biodiversity Mitigation Actions, Monitoring and Evaluation Plan.* All values are in 2017 United States Dollars. Future year allocations will need to be adjusted for inflation. All expenditure is estimated in addition to existing budget expenditure on relevant items.

6.6 *PLAN REVIEW AND UPDATE*

The BAP is to be reviewed and updated on an annual basis with consideration of changes to project operations or areas where refinement is required. Annual changes to the BAP must be approved by the Board of Members prior to implementation.

Table 6.1 Biodiversity Management Plan Actions

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
BMP1	Pre-Construction	General Planning & Management	All Environmental Aspects	Designate a Environment Process Senior Executive and set up an on-site SHE Team with minimum 3 personnel with responsibility for: I. Implementation of the BAP, including oversight corrective action and BAP implementation auditing; II. Coordination of stakeholder engagement between key personnel in STC with local communities and government officials as specified within the BAP III. Conduct annual reporting as specified within the BAP	STC to implement staffing requirements at both concessions within 3 months of approval of this BAP.	BOD (Board of Directors)
BMP2	Pre-Construction	General Planning & Management	All Environmental Aspects	STC to implement process for adaptive management measures where BAP measures require refinement or upon changes to its operations that might call for changes to the BAP.	See accompanying *Excel spreadsheet STC BAP V1.XLSX*	EHSS Department Environment Process Senior Executive Construction Manager
BMP3	Pre-Construction	General Planning & Management	Fauna Mortality	Develop protocols for the management of injured wildlife, which will include: I. Process of communication to forestry officers of injured wildlife. II. Recording procedures for injured wildlife/ investigations (Incident Reporting Mechanism). III. Identification of management of change measures necessary to reduce the risk of future events.	See *Annex E* for *Wildlife Incident Reporting Protocol*	Environment Process Senior Executive
BMP4	Pre-Construction	Incident Reporting	All Environmental Aspects	Establish a SHE and wildlife incident reporting mechanism for site staff. This reporting mechanism should have provisions for:	See *Annex E* for *Wildlife Incident Reporting Protocol*	Environment Process Senior Executive

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				I. SHE-related events; II. wildlife sightings and encountered roadkill; and III. poaching/illegal logging activity. As part of this mechanism, a recording and evaluation system, including collection of photographic evidence wherever possible, will be established and reviewed on a monthly basis.		
BMP5	Pre-Construction	General Planning & Management	All Environmental Aspects	Issue an environmental policy and rules for compliance by all employees and contractors. The policy will clearly spell out Do's and Don'ts within the project area, including prohibition of poaching, illegal logging and involvement in the wildlife trade.	See *Biodiversity and Ecosystem Service Policy* (*Section 1* of this BAP)	Environment Process Senior Executive EHSS Department
BMP6	Construction Operation	Awareness Training	Disturbance & Displacement of Wildlife	All construction personnel and STC staff will undertake biodiversity awareness training to raise their awareness of the: I. ecological sensitivity of the site, importance of forest habitats, protected and threatened plants and animals within the Project area; II. proper protocols to adopt when wildlife is encountered; III. need to be cautious when operating machinery to avoid injury/mortality to fauna; and IV. STC's zero tolerance policy to possession of wildlife and forest resources. This is applicable to both staff and contractors. Refresher training will be provided every year.	To be provided by third-party contractor	EHSS Department Environment Process Senior Executive Construction Manager
BMP7	Construction Operation	Penalisation	Disturbance & Displacement of Wildlife	Upon discovery of employees and/or contractors involvement in poaching, illegal logging and wildlife trade*, corrective measures will be taken	See *No-Hunting and No Poaching Policy* (See *Section 4* of this BAP);	Environment Process Senior Executive

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				where necessary including appropriate actions against infringements. STC to develop appropriate levels of penalisation against degree of infringement ranging from fines, suspension and employment termination, and reporting to local authorities for prosecution (for most severe cases). ** Punishable actions include the possession, purchase, trade or collection of wildlife or forest resources that are legally protected, CITES listed, or classed as threatened by the IUCN Red List.*	and *Anti-illegal Logging Policy* (See *Section 5* of this BAP) and *Annex C* and *D* for posters.	Security Supervisor SHE Corporate Manager Managing Director
BMP8	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Conduct biodiversity surveys by qualified experts for fauna and flora species of conservation value before expansion of quarry or factory footprint. Findings are to be communicated with the site team and appropriate actions taken where necessary to minimise impacts.	See *Wildlife Shepherding Protocol* (*Annex F*)	EHSS Manager or Environmental Manager Biodiversity Experts
BMP9	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Prior to the start of expansion of the mudstone quarry and coal mine, ensure that wildlife is shepherded from the Project area into adjacent refuge areas, and that temporary fencing/hoarding is erected around wildlife-cleared areas (if required) to limit access to fauna. Identified wildlife refuge areas include: I. Panlaung-Pyadalin Cave Wildlife Sanctuary, north of the concession (Limestone Concession Only); II. Adjacent forests outside the affected areas. Upon detection of any dead or injured animal, Environment Process Senior Executive and Construction Manager shall be notified and the action suspected to have caused the injury to be	See *Wildlife Shepherding Protocol* (*Annex F*)	Environment Process Senior Executive Construction Manager

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				suspended. An incident should be logged via an incident reporting mechanism, which includes photographic evidence wherever possible. Construction and expansion activities shall also precede with greater caution in the event that any injury to key terrestrial fauna (CH species triggers, in particular large mammals and primates) encountered within the site are avoided. Construction staff shall notify the Environment Process Senior Executive and Construction Manager.		Contractor
BMP10	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	General guidance to land clearance protocol: I. When planning for expansion, ensure land clearance is undertaken in a phased approach such that it complements wildlife shepherding activities. II. All proposed clearance areas will be marked in the field prior to any vegetation being cleared. The marking can use spray paint or marking tape. A briefing is to occur with personnel to outline the area proposed for clearing. III. An inspection is to occur following clearing to determine if clearing has been limited to the identified clearance area. Any clearing outside of the marked area is to be reported to the Environment Process Senior Executive and Construction Manager.	See *Wildlife Shepherding Protocol* (*Annex F*)	Environment Process Senior Executive Construction Manager Contractor
BMP11	Pre-Construction	Clearance	Disturbance & Displacement of Wildlife	Prior to wildlife shepherding activities, undertake a briefing with all involved personnel so they are aware of their roles and responsibilities; measures	See *Wildlife Shepherding Protocol* (*Annex F*)	Environment Process Senior Executive

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				to deal with injured wildlife; occupational health and safety requirements; and requirements regarding the prohibition of hunting/catching/taking of fauna and flora. This will include incident reporting measures to relevant forestry authorities and stakeholders, and the reporting of any individual suspected or caught with fauna and flora to the relevant authority. Random inspections of personnel arriving and leaving the Project area can be considered. Refresher training is to occur with new employees.		Construction Manager
BMP12	Pre-Construction	Biodiversity Offset Planning	Biodiversity Offset	A Biodiversity Offset Plan is to be prepared and implemented. The Offset Plan to be designed using participatory processes with Shwe Taung management, government officials, and local communities who will be included in the implementation as far as possible.	See *Section 7.3 Biodiversity Offset Management, Monitoring And Evaluation*	Offset Design: Administration and Communication Executive Offset Implementation: Environment Process Senior Executive
BMP13	Construction	Awareness Training	Disturbance & Displacement of Wildlife	Continue local community engagement with villages that the Project liaised with during the ESIA stage to: I. Continue raising awareness of the conservation value of the forest and surrounding areas; and II. encourage local people not to conduct illegal logging activities and poaching. This engagement program will be developed by STC and the NGO implementing partner, in	See *Annex G: Community Engagement Protocol*	Social Accountability Manager Environment Process Senior Executive NGO partner

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				consultation with, the local government and customary leaders. STC and the NGO implementing partner will engage communities formally to communicate and consult on developments within the Project relevant to them. Where appropriate, this engaegmnt can be completed in conjunction with engaegmnt in relation to the implementation of the BOMP. These meetings are to be formally minuted.		
BMP14	Construction Operation	Transportation	Invasive Species	Wheel wash bays installed at guardhouse at cement plant and entrance to coal mine and coal mine access road to remove dirt and plant material from vehicle wheels prior to entering and leaving project area. Inspections are to occur prior to any wheel washing. Only vehicles with visible material on them are to be subject o washing. Washing vehicles is to focus on the wet season when material is more likely to be attached to vehicles. Water from wheel wash bays should not be discharged directly into natural watercourses, but instead passed through the existing weir to remove suspended particles.	To be installed by STC.	Environment Process Senior Executive Security Supervisor
BMP15	Construction	Transportation	Fauna Mortality	Undertake regular monitoring of all access roads (including all quarries and the cement plant) to secure them from poaching activity.	See *No-Hunting and No Poaching Policy* (See *Section 4* of this BAP); and *Anti-illegal Logging Policy* (See *Section 5* of this BAP)	Security Supervisor
BMP16	All Phases	Transportation	Fauna Mortality	Continue to control access road users through use of security gates. Security gates are to be manned by at least 1 security officer 24 hours per day who will record the particulars (name, address, address,	See *No-Hunting and No Poaching Policy* (See *Section 4* of this BAP); and *Anti-illegal Logging*	Security Supervisor

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				vehicle registration number, personal identification number) of all vehicles who are allowed into the access road. Visitors must also be accompanied by a company representative at all times. The security officers should be trained to identify behaviour associated with poachers and vehicle searches. The security gate should be equipped with 24 hour CCTV cameras. Evidence of such inspections/ vehicle searches to be recorded and available for review.	*Policy* (See *Section 5* of this BAP)	
BMP17	Construction Operation	Fauna & Flora Surveys	Monitoring	Conduct regular monitoring of flora and fauna in Project areas. The surveys will be undertaken by experts with assistance (including guides) from local villages. The information collected is to be used as a basis for habitat and population management.	See *Table 7.2 Monitoring and Evaluation Requirements for STC Cement Concession*	Environment Process Senior Executive Biodiversity Offset Implementation Partner
BMP18	Operation	Fauna & Flora Surveys	Monitoring	Data from camera trap surveys, transects and community monitoring to be used to measure long term population changes and trends for key species (such as the Hoolock Gibbon, Shan Langur, Pangolin) within the project site. STC will liaise with local authorities and experts to provide any relevant ecological monitoring data to integrate in the long term monitoring and management of the broader area, the concession within Panlaung-Pyadalin Cave Wildlife Sanctuary, and with the other surrounding developments.	See *Annex H Biodiversity Survey Program*	EHSS Department Environment Process Senior Executive Process Senior Executive Biodiversity Experts

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
BMP19	All Phases	Fauna & Flora Surveys	Monitoring / Engagement	Set up a database following the pre-expansion monitoring work to store all biodiversity monitoring data. From this database: I. Prepare habitat maps and monitor changes within the project area using aerial imagery obtained via satellite or drone. II. As part of the evaluation of management action, analyse results of field surveys, biodiversity monitoring, and opportunistic sightings to understand more detailed and specific distribution of species. The database is to be shared between STC, forest department officials and ecologists upon approval of request. It is to be updated annually or when major findings from surveys call for updates.	See *Annex H Biodiversity Survey Program*	EHSS Department Biodiversity Experts Biodiversity Offset Implementation Partner
BMP20	Construction Operation	Awareness Training	Disturbance & Displacement of Wildlife	Put up and maintain information posters and literature in the STC site office to increase awareness of ecological issues affecting the Project.	See *No-Hunting and No Poaching Policy* (See *Section 4* of this BAP); and *Anti-illegal Logging Policy* (See *Section 5* of this BAP) and *Annex C* and *D* for posters.	Social Accountability Manager EHSS Department Environment Process Senior Executive
BMP21	Construction	Fauna & Flora Surveys	Fauna Mortality	Regular monitoring of project site and associated quarries for signs of potential wildlife conflict, illegal logging and poaching. Frequency of monitoring to increase if signs of these have been identified.	See *No-Hunting and No Poaching Policy* (See *Section 4* of this BAP); and *Anti-illegal Logging Policy* (See *Section 5* of this BAP)	Environment Process Senior Executive Security Supervisor
BMP22	All Phases	General Planning & Management	Fauna Mortality	Establish a communication system with the local authorities and report to authorities immediately any signs of illegal hunting and deforestation,	See *Annex E: Injured Wildlife Protocol* and *Annex G Community Engagement Protocol*	Environment Process Senior Executive Process Senior

S/N	Phase	Task	Aspect, Potential Impact /Issue	Required Mitigation	Implementation Requirements	Responsible Person For Ensuring Action Implementation
				wildlife conflict and forest fires within the project area. Furnish this report with photographic documentation where possible and the date and time of observation. Incident also to be recorded via STC's incident reporting mechanism.		Executive Security Supervisor
BMP23	Pre-Construction	Fauna & Flora Surveys	Invasive Species	Undertake surveys to identify locations where invasive species are particularly abundant and maintain an inventory. Where necessary, work with specialists to develop a plan to prevent invasive species introduction and/or proliferation due to Project activities. At areas deemed suitable, invasive species within natural habitats should be eradicated with the appropriate use of herbicides (in accordance with the safe use and label directions). Monitoring of invasive species is to occur within the Project Area on an annual basis. New infestations identified are to be controlled.	See *Annex I: Invasive Species Management Plan*	Environment Process Senior Executive Process Senior Executive
BMP24	Operation	General Planning & Management	Site rehabilitation	Rehabilitation of habitat will occur within the landscape disturbed by project operations. All rehabilitation is to occur using native indigenous species as appropriate. A nursery is to be established to propagate species. All rehabilitation is to be established in a progressive basis as quarrying activities occur. All rehabilitation will be monitored to determine the success/failure of different techniques. Rehabilitation will be adapted based on the results of the monitoring.	See *Annex J: Site Rehabilitation Plan*	Environment Process Senior Executive Process Senior Executive

Table 6.2 Timeline for the Implementation of Biodiversity Mitigation Actions

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
Item Ref	**ACTIVITY**	**Responsibility**	**Notes**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**
BMP1	Appointment of Environment Process Senior Executive	BOD (Board of Directors)	Within 1 month of acceptance of BAP actions	X																								
BMP2	Adaptive management measures (BAP review)	1. EHSS Department 2. Environment Process Senior Executive 3. Construction Manager	Ongoing throughout operations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP3	Protocol documentation (injured wildlife protocol)	Environment Process Senior Executive	Within 1 month of acceptance of BAP actions	X																								
BMP4	Protocol documentation (communication protocol)	Environment Process Senior Executive	Within 1 month of acceptance of BAP actions	X																								
BMP5	Issuance of environmental policy and briefing of all staff on the rules	1. EHSS Department 2. Environment Process Senior Executive	Within 1 month of acceptance of BAP actions	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP6	Biodiversity awareness training	1. EHSS Department 2. Environment Process Senior Executive 3. Construction Manager	Prior to commencement of works and for all new workers; refresher training to occur per annum basis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP7	Incident reporting log and documentation of follow-up actions	1. Environment Process Senior Executive 2. Security Supervisor 3. SHE Corporate Manager 4. Authorized STC senior staff	Upon acceptance of BAP actions	X																								
BMP8	Wildlife surveys	1. Environment Process Senior Executive 2. Biodiversity Experts	To be conducted prior to clearance	Not applicable, please refer to notes for specific timeline instructions																								
BMP9	Wildlife shepherding surveys	1. Environment Process Senior Executive	Daily following erection of fencing/ hoardings	Not applicable, please refer to notes for specific timeline instructions																								

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
		2. Construction Manager																										
BMP10	Development of land clearance protocol and implementation of actions	1. Environment Process Senior Executive 2. Construction Manager 3. Contractor	To be implemented during land clearance activities	Not applicable, please refer to notes for specific timeline instructions																							
BMP11	Clearance briefing	1. Environment Process Senior Executive 2. Construction Manager	Prior to wildlife shepherding activities, with refresher training to occur with new employees	Not applicable, please refer to notes for specific timeline instructions																							
BMP12	Biodiversity offset plan	Offset Design: Administration and Communication Executive Offset Implementation: Environment Process Senior Executive	To be prepared by end-2018	X																							
BMP13	Community Engagement	1. Social Accountability Manager 2. Environment Process Senior Executive	Engagement to be held on an annual basis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP14	Wheel wash bays	1. Environment Process Senior Executive 2. Security Supervisor	Monthly checks to ensure wheel wash bays are utilized	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP15	Access road monitoring	Security Supervisor	Daily monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP16	Access controls	Security Supervisor	Monthly checks of access logs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP17	Fauna and flora monitoring	1. Environment Process Senior Executive 2. Biodiversity Experts	Surveying, reporting and mapping to be undertaken (i) before construction; (ii) every 3 years after operations commence; and thereafter		X			X			X			X			X			X			X			X		X

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
BMP18	Assessment of monitoring data	1. EHSS Department 2. Environment Process Senior Executive 3. Process Senior Executive 4. Biodiversity Experts	Review to be conducted every 3 years, intensity of review may change based on findings		X			X			X			X			X			X			X			X		X
BMP19	Establishment of flora and fauna database	1. EHSS Department 2. Biodiversity Experts	After establishment, to be verified after pre-expansion monitoring work		X																							
BMP20	Placement of posters and literature	1. Social Accountability Manager 2. EHSS Department 3. Environment Process Senior Executive	Upon acceptance of BAP actions	X				X					X					X					X					X
BMP21	Monitoring for conflict, illegal logging and poaching	1. Environment Process Senior Executive 2. Security Supervisor	Monthly, intensity to increase based on findings	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BMP22	Establishment of a communication system with local authorities	1. Environment Process Senior Executive 2. Process Senior Executive 3. Security Supervisor	Upon acceptance of BAP actions	X																								
BMP23	Invasive species survey and management	1. Environment Process Senior Executive 2. Process Senior Executive	Management actions to be undertaken during construction and operation, map of invasive species aggregations to be generated by 2019		X	Not applicable, please refer to notes for specific timeline instructions																						
BMP24	Site Rehabilitation	1. Environment Process Senior Executive 2. Process Senior Executive	During construction and operation. Three (3) months after restoration activities: weekly inspections. One (1) year after restoration inspections: 3 monthly inspections.	Not applicable, please refer to notes for specific timeline instructions																								

Table 6.3 List of Responsible Persons

S/N	Designation	Role Description, in the context of the BMEP
Internal Parties		
1	Director, Board of Directors	Responsible for the establishment of the on-site SHE team, oversight of the action implementation progress against the BAP, and leadership of stakeholder engagement with local communities and government agencies.
2	EHSS Department Head	Responsible for adaptive management processes, developmental of environmental policies, training and infringement management
3	Environment Process Senior Executive	Responsible for day-to-day implementation of BAP measures on site during all project phases. Maintains coordination and oversight over all BAP communication protocols and incidents.
4	Construction Manager	Responsible for day-to-day implementation of BAP measures during construction activities, particularly land clearance activities.
5	Process Senior Executive	Responsible for day-to-day implementation of BAP measures during operational activities, particularly species surveys and reforestation activities.
6	Security Supervisor	Responsible for securing project site and resources from illegal activities.
7	Managing Director	Responsible for the final decision on the level of penalisation for employees and/or contractors involved in illegal wildlife activities.
8	Administration and Communication Executive	Responsible for the development and design of the Biodiversity Offset Plan, working in hand with the IFC, environmental consultant, and implementing NGO.
9	CSR Executive	Responsible for local community engagement coordination and planning.
External Parties		
10	Contractor	Responsible for day-to-day implementation of BMP measures on site during contracted activities.
11	Biodiversity Expert	Responsible for ecological monitoring of the site and capacity building.
12	Biodiversity Offset Implementation Partner	Responsible for assisting with the implementation of the BMP measures

Figure 6.1 Organogram Shwe Taung Cement Environment, Health, Safety and Social Department

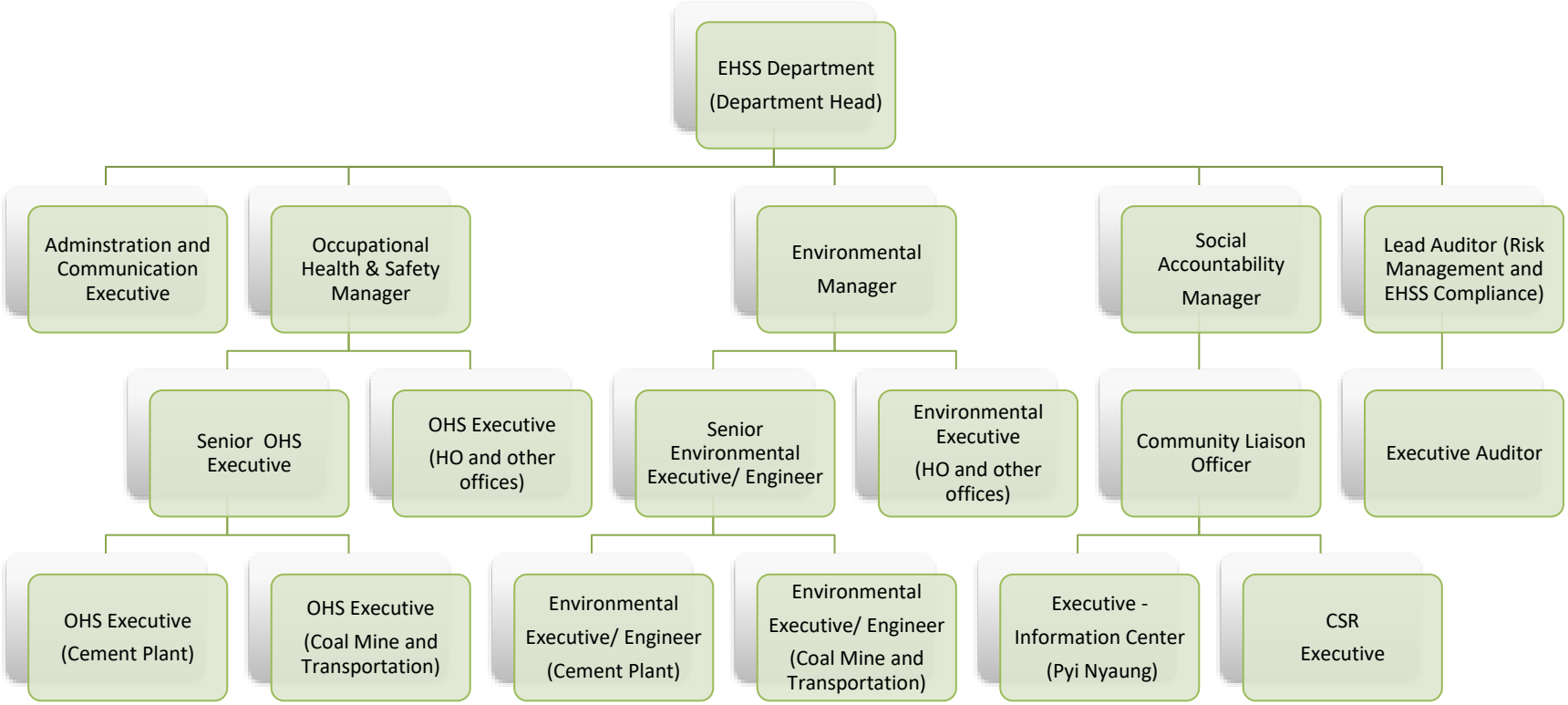


Table 6.4 Biodiversity Management Plan Budget (2017 US Dollar values)

S/N	Item	Year 1	Years 5, 10, 15, 20 & 25 (Per Year)	Years 2-4, 6-9, 11-14,16-19,21-24 (Per Year)	Total (25 Years)
BMP1	Appointment of Environment Process Senior Executive (one per site)				
BMP2	Adaptive management measures (BAP review) (5 year frequency)				
BMP3	Protocol for injured wildlife				
BMP4	Wildlife incident reporting mechanism				
BMP5	Environmental policy				
BMP6	Biodiversity awareness training				
BMP7	Incident reporting log and documentation of follow-up actions				
BMP8	Wildlife surveys				
BMP9	Wildlife shepherding surveys				
BMP10	Land clearance protocol				
BMP11	Clearance briefing				
BMP12	Biodiversity offset plan				
BMP13	Community Engagement				
BMP14	Wheel wash bays				
BMP15	Access road monitoring protocol				
BMP16	Access controls				
BMP17	Fauna and flora monitoring				
BMP18	Assessment of monitoring data				
BMP19	Establishment of flora and fauna database				
BMP20	Placement of posters and literature				
BMP21	Monitoring for conflict, illegal logging and poaching				
BMP22	Establishment of a communication system with local authorities				
BMP23	Invasive species survey and management				

S/N	Item	Year 1	Years 5, 10, 15, 20 & 25 (Per Year)	Years 2-4, 6-9, 11-14,16-19,21-24 (Per Year)	Total (25 Years)
BMP24	Site Rehabilitation (Excludes capital costs)				
	Sub Total (Per Year)				
	Total				

7 BIODIVERSITY OFFSET MANAGEMENT PLAN

7.1 APPLICATION

This Biodiversity Offset Plan applies to the biodiversity offsets for the limestone concession and coal mine concession. The biodiversity offsets are defined below.

7.2 LIMESTONE CONCESSION

The Panlaung-Pyadalin Cave Wildlife Sanctuary was established by notification no. 2/2002 (dated 18 March 2002). It is an IUCN Category IV Protected Area of 334km^2 (33,400ha) in size and is located 6km north of the Limestone quarry. It has important cultural values and biodiversity values including habitat for the Asian Elephant (recorded as locally extinct), Shan State Langur, Banteng, Gaur, Clouded Leopard and Serow. The Panglaung-Pyadalin Cave is a human archaeological heritage site. The location of the proposed offset site is shown in *Figure 7.1*.

7.2.1 *Habitat Management Actions*

The proposed offset site will consist of an addition of 1779ha of limestone habitat (1420ha required) to the Sanctuary and associated management funding. Given that the forested habitat of the Sanctuary is larger than the requirement to offset impacts to forested habitats (127ha), priority management actions are proposed to be funded within the existing Sanctuary boundary for 25 years to manage specific threats. These actions are outlined at *Table 7.1* below and are based on existing management actions proposed for the Sanctuary in the draft "Habitat Re-establishment Plan" (See *Section 7.3.2* below for a summary of this Plan).

The location of the biodiversity offset site and the proposed limestone range addition (Option A) is shown in *Figure 7.2*.

7.2.2 *Species Management Actions*

As outlined in *Section 5.1.2 Species Values*, it is requirement of IFC PS6 that management actions are applied in relation to species that have triggered Critical Habitat, or are species of concern within the Limestone Concession.

7.2.3 *Existing Management Arrangements*

Consultation with the management of the Panlaung-Pyadalin Cave Wildlife Sanctuary was undertaken by ERM in June 2017. The Sanctuary is currently managed by the Forestry Department, with two (2) offices located near to the Sanctuary. There is currently 40 staff with responsibility for the management of the Sanctuary. Currently, the focus of the staff has been on wildlife patrols. No capital equipment (such as patrol vehicles, uniforms or other equipment) is available for staff. No specific rehabilitation programs or species recovery programs are undertaken.

Ecological research has been undertaken in the Sanctuary by the National Institute of Biological Resources (NIBR), South Korea and Makino Botanical Garden-MBK, Japan. The purposes of this survey were to define the baseline biodiversity values of the Sanctuary. The results of the surveys were not available to ERM for review.

A *Habitat Re-establishment Plan* (MONREC 2017) for the Sanctuary has been prepared by the Forestry Department in January 2017. This plan outlines measures to re-establish habitats and conserve endangered species as well as to protect the Shan State Bent Toed Gecko (*Cyrtodactylus chrysopylos*) and limestone range within the Sanctuary. The Plan highlights that the key threats to biodiversity within the sanctuary include:

- Over extraction of forest resource;
- Squatting and pasturing;
- Bush fires; and
- Indirect causes such as over-exploitation of ecosystem services and lack of capacity to implement adequate management.

The Plan outlines a range of measures for a 10 year term (two 5 year periods) to reduce threats. The key measures include:

- Reestablishment of habitat: reestablishment of pastures (previously used by elephant population); creation of salt licks/pits; creation of ponds; reestablishment of forests in cleared areas; and reestablishment of orchid species;
- Protection and conservation: creation of core, buffer and recreation zones; Boundary preparation; regular patrols; and building conservation stations; prevention of fire; providing community awareness through education programs; setting sign posts; building patrol road; developing eco-tourism; distribution of high powered stoves; providing model mixed-crops forest; extending protected area; training and extending ASEAN heritage site;
- Organisational preparation: formation of oversight and implementation committee; cooperation for technical development; planning for 5 yearly activities and resourcing.

Certain actions have been utilised from this plan in the development of the Biodiversity Offset Management Actions. The actions chosen are primarily related to non-capital items such as education, patrols and enforcement.

7.3 *COAL MINE CONCESSION*

The Mahamyaing Wildlife Sanctuary was established in 2002 and is 1180km^2 in size (111,800ha). It is an IUCN Category IV Protected Area and Important Bird Area (IBA) and is located 24km east of the Coal mine site. It has important biodiversity values, including an important population of Chinese Pangolin, Eastern Hoolock Gibbon, Banteng, Sambar Deer and Asiatic Wild Dog, Small Asian Mongoose, Wild Boar, Mongoose, Asian Elephant and Jungle Cat. The location of the proposed offset site is shown in *Figure 7.3*.

7.3.1 *Habitat Management Actions*

The proposed offset site will consist of the management of 5,420ha of forested habitat within the Mahamyaing Wildlife Sanctuary. Given that the forested habitat of the Sanctuary is much larger than the requirement to offset impacts to forested habitats (111,900ha), priority management actions are proposed to be funded within the existing Sanctuary boundary for 25 years to manage specific threats. These actions are outlined at *Table 8.2* below.

The location of the biodiversity offset site and the proposed limestone range addition is shown in *Figure 7.1* and *7.2*. Note that the villages listed in the figures are listed in *Annex G*.

7.3.2 *Species Management Actions*

As outlined in *Section 6.1.2 Species Values*, it is requirement of IFC PS6 that management actions are applied in relation to species that have triggered Critical Habitat or are species of concern within the Coalmine Concession. In relation to species that are not Critical Habitat species but are species of concern, a no-net-loss is to be achieved for these species as part of efforts to deliver no-net-loss for Natural Habitats, where feasible. These species are listed below in *Table 7.1* and outline where specific management actions are required to be implemented at the offset sites.

7.4 *EXISTING MANAGEMENT ARRANGEMENTS*

Consultation with the management of the Mahamyaing Wildlife Sanctuary was undertaken by ERM in June 2017. The Sanctuary is currently managed by the Forestry Department, with one office located at Kalaywa.

There are currently an estimated 48 households within the Sanctuary who are currently undertaking a process to submit applications regarding future entitlements for land and forest products. Illegal logging was identified as a major threat, as is hunting and poaching occur for subsistence purposes. It is also likely that communities on the periphery of the Sanctuary will enter to extract resources. Current management is limited and no regular patrols or management occurs within the Sanctuary.

It is noted also that the mechanism to deem the land as a Wildlife Sanctuary under the Forest Act is in draft form. A recommendation to facilitate the gazettal of the Sanctuary is a specific offset action.

7.5 *BIODIVERSITY OFFSET MANAGEMENT ACTIONS*

The biodiversity offset management actions are contained in *Table 7.1*. The timeline for implementation of offset management actions is shown in *Table 7.2*.

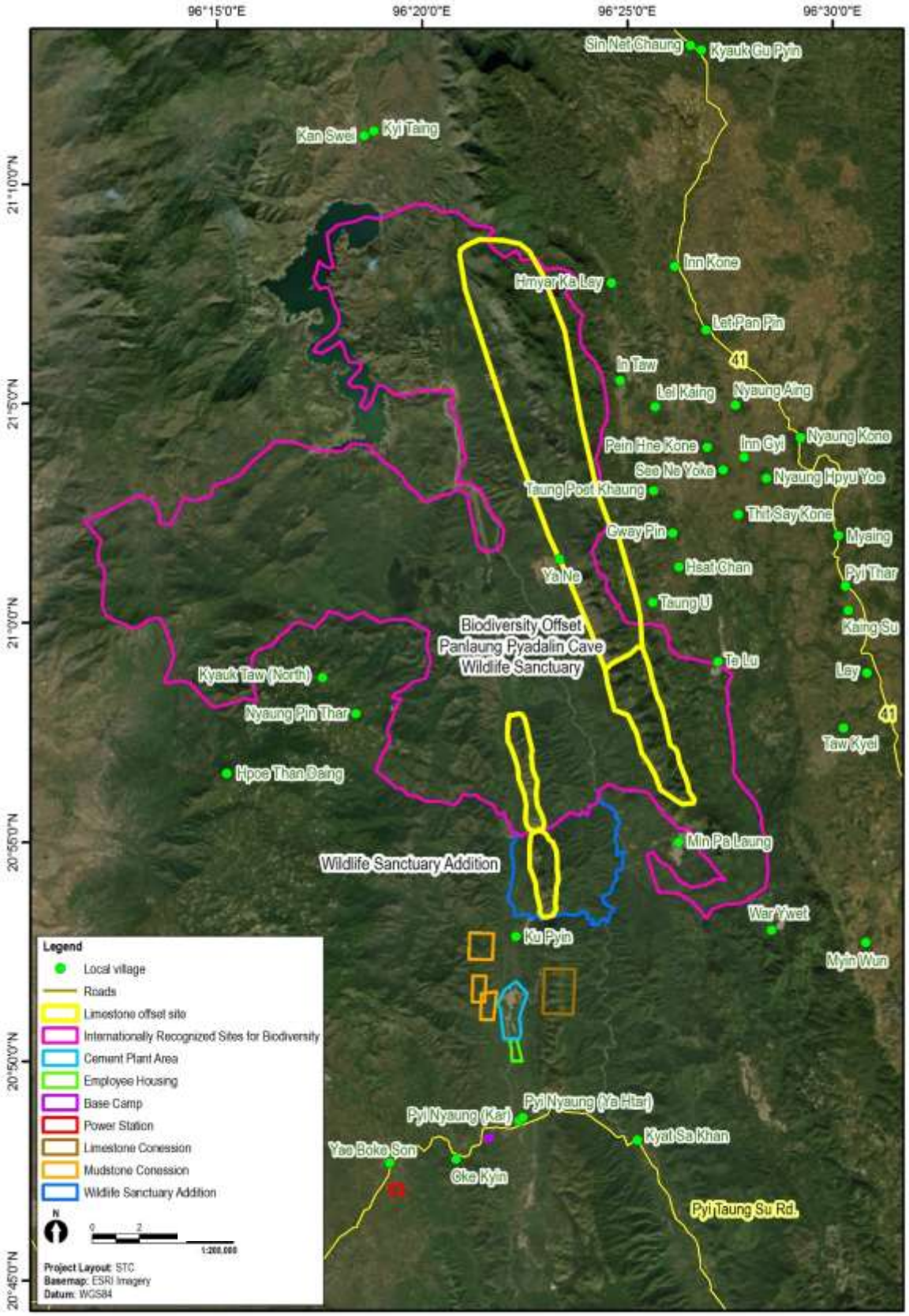
7.5.1 *Monitoring and Evaluation*

The monitoring and evaluation framework for the offset management actions is contained in the BMEP (*Section 8*).

7.5.2 *Budget*

The budget in *Table 7.3* has been estimated for the implementation of the BOMP. All values are in 2017 United States Dollars. All values are in 2017 United States Dollars. Future year allocations will require to be adjusted for inflation.

Figure 7.1 Location of Proposed Offset for Limestone Concession



Note: Villages listed by number are outlined in *Annex G Community Engagement Protocol*

Figure 7.2 Location of Proposed Extension to the Panlaung-Pyadalin Cave Wildlife Sanctuary

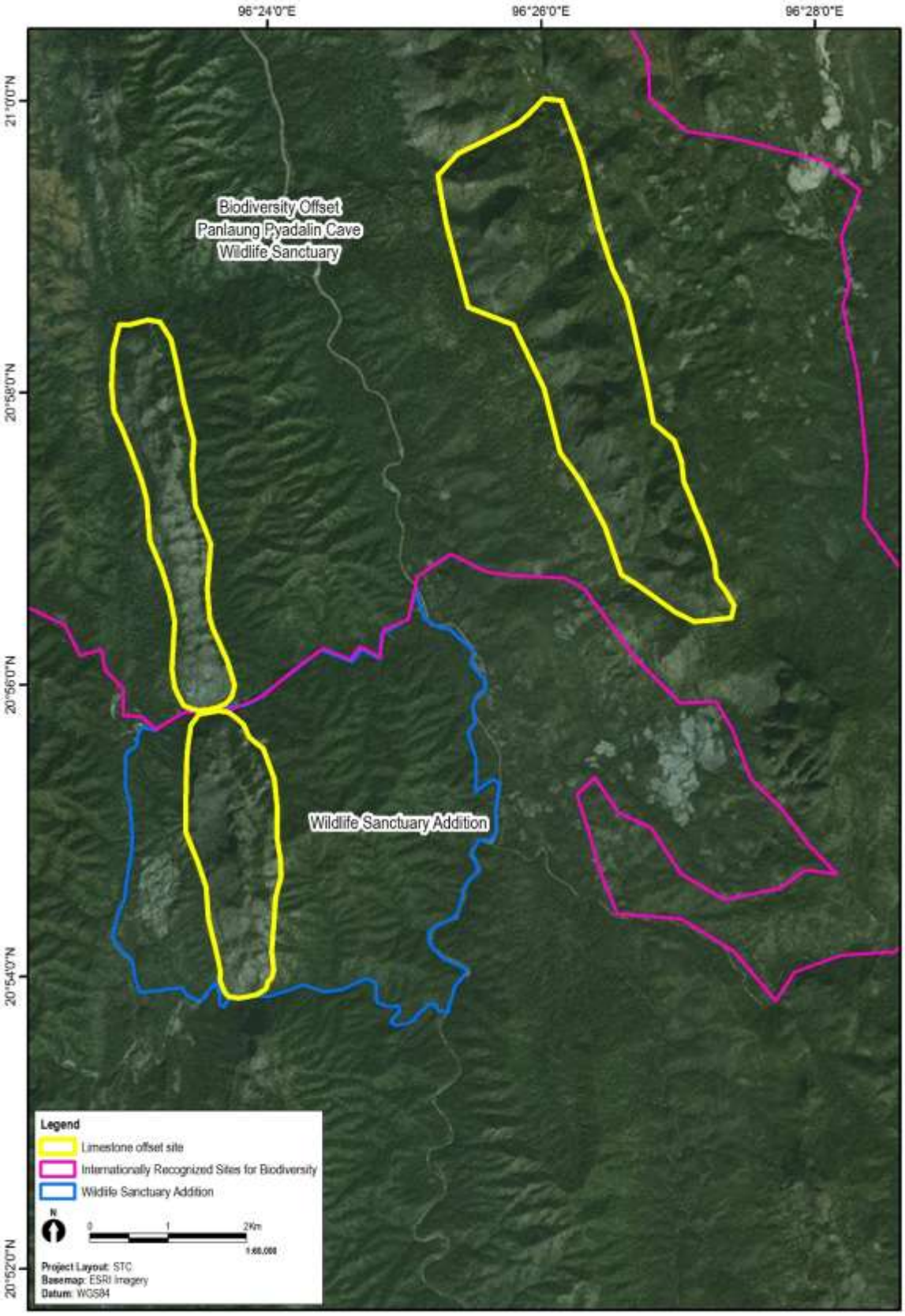
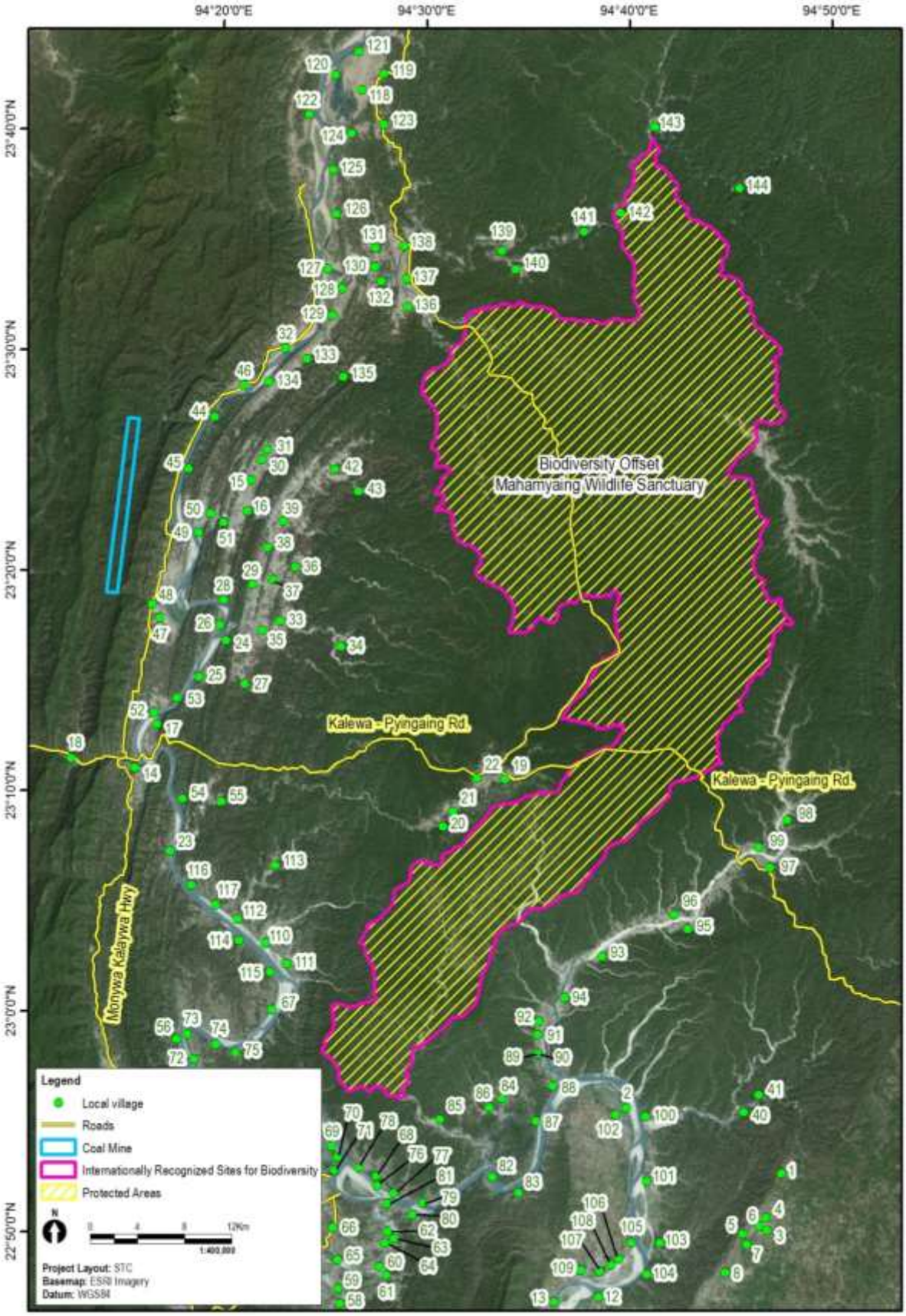


Figure 7.3 Location of Proposed Offset for Coal Mine Concession



Note: Villages listed by number are outlined in *Annex G Community Engagement Protocol*

Table 7.1 Biodiversity Offset Plan Management Actions (Habitat and Species)

<table>
<tr><th>S/N</th><th>Mitigation and / or Management Measures/Procedures</th><th>Responsibility</th><th>Implementation Requirements</th><th>Timeframe</th></tr>
<tr><td>BOMP1.0</td><td>Addition of the Limestone Range to the Panlaung-Pyadalin Cave Wildlife Sanctuary (Limestone Concession Only)
Additions to the Sanctuary are to follow the requirements outlined in the "Procedure of Establishment of Natural Area" (Annex B) as required by the Protection of Wildlife and Conservation of Natural Areas Rules, 2002 to establish the extension. The steps recommended to STC to undertake the process to establish the Sanctuary extension are outlined in Table 7.7.1.
Table 7.7.1 Steps Required to establish Wildlife Sanctuary Extension
<table>
<tr><th>Step</th><th>Action</th><th>Timeframe</th></tr>
<tr><td>1.</td><td>STC to write a letter to the Minister of the Ministry of Natural Resource and Environmental Conservation seeking the addition of 1779ha to the Panlaung-Pyadalin Cave Wildlife Sanctuary, the area of which is shown in Figure 7.1</td><td>By 1 October 2018</td></tr>
<tr><td>2.</td><td>STC to support the Nature and Wildlife Conservation Division (NWCD) of MONREC to establish the "Initial Examination Body" to undertake review and consultation with the local community and undertake actions listed under 8. – 11. of the Procedure (Annex B).</td><td>By 1 May 2019</td></tr>
<tr><td>3.</td><td>STC to support the gazettal of the addition to the Sanctuary with MONREC.</td><td>By 1 September 2019</td></tr>
</table></td><td>EHSS Department</td><td>See "Procedure of Establishment of Natural Area" (Annex B)</td><td>By 1 September 2019</td></tr>
<tr><td>BOMP2.0</td><td>Gazettal of the Mahaimyang Wildlife Sanctuary (Coal Mine Concession Only)
STC are to support MONREC in the gazettal of the Mahaimyang Wildlife Sanctuary. This will include undertaking the steps as outlined in Table 7.7.7.
Table 7.7.7 Steps Required to support Gazettal of the Mahaimyang Wildlife Sanctuary
<table>
<tr><th>Step</th><th>Action</th><th>Timeframe</th></tr>
<tr><td>1.</td><td>STC to write a letter to the Minister of the Ministry of Natural Resource and Environmental Conservation seeking support to gazette the Mahaimyang Wildlife Sanctuary, the area of which is shown in Figure 7.2.</td><td>By 1 October 2018</td></tr>
<tr><td>2.</td><td>STC to support the Nature and Wildlife Conservation Division (NWCD) of MONREC to gazette the Wildlife sanctuary</td><td>By 1 May 2019</td></tr>
</table></td><td>EHSS Department</td><td>Provide support to MONREC to gazette the Wildlife Sanctuary</td><td>By 1 May 2020</td></tr>
<tr><td>BOMP 3.0</td><td>Management and Administrative Framework</td><td></td><td></td><td></td></tr>
<tr><td>BOMP 3.1</td><td>Management Committee
STC is to convene a management committee consisting of:
STC Staff;
MONREC Forestry Department;</td><td>EHSS Department</td><td>Establish a management committee</td><td>By February 2019</td></tr>
</table>

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	• Panlaung-Pyadalin Cave and Mahaimyang Wildlife Sanctuary Management; • Community representatives; • External conservation expert; • International Finance Corporation (observer); and • Contracted conservation NGO(s). The tenure of members of the management committee is to be reviewed every 7.5 years to enable sufficient time for the committee to oversee implementation of one 5 yearly review. The review process can occur during the mid-point of two reviews, enabling efficient use of the committee's time and to manage workload during the member's tenure. The role of the management committee is to oversee the implementation of management actions in this Plan. The committee is to: • Provide strategic advice on the conservation management actions contained in this Plan; • Provide recommendations on the monitoring and evaluation framework; • Review reports submitted by the contracted conservation NGO on progress in implementing this Plan; • Recommend and approve changes in management actions and expenditure; • Prepare the 5 yearly review of the Plan; and • Resolve any disputes with the community and other concerned parties.			
BOMP 3.2	**Meeting Frequency** It is recommended that meetings be initially held on a bi-monthly basis for the first 8 months, followed by 6 monthly meetings thereafter. More frequent meetings may be employed during review and/or tendering processes. Meetings frequencies may vary over the 25 year implementation timeframe.	EHSS Department	Convene meetings as required.	Bi-monthly meetings for 8 months followed by 6 monthly meetings thereafter
BOMP 3.3	**Contracting Service Providers** STC is to convene a tender for the supply of services associated with the implementation of this management plan. The tender is to target suitably qualified National and International NGOs to implement the management plan on 5 yearly terms. One tender is recommended to undertake implementation of the BOMP. The successful tenderer is to be subject to contractual terms based on the delivery on the objectives of this Plan and agreed funding structure. It is intended that the contracts be a maximum of 10 years duration to enable capacity building with the community and Myanmar Government. The duration may be extended, however this would be at additional cost to that budgeted.	EHSS Department	Convene a tender for supply of services in relation to this plan.	By August 2018 with tenderer appointed by April 2018

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
BOMP 3.4	**Funds administration** The following rules will apply to the management of funds associated with this Plan: • Funds to implement this plan will be controlled by STC; • All funds will be expended to the Management Committee, Contracted Conservation NGO and Forestry Department on an annual basis; • Funds expended will be subject to successful implementation of management actions; • STC may retain funds if it is determined that unsatisfactory implementation activities have occurred; • Any additional funds sought by the management committee, Forestry Department, and Contracted Conservation NGO will be at the discretion of STC; • All funding arrangements will be subject to standard accounting and auditing practices; and • All funding arrangements will be subject to legal contracts between relevant parties and STC.	EHSS Department	Annual Budget and administration	Budget allocation on an annual basis
BOMP 3.5	**Report requirements** The following rules apply to reporting on performance associated with the implementation of this plan: • An Annual Report is to be prepared by the Contracted Conservation NGO on performance against the objectives and actions contained within the Plan; and • A five-yearly report on the fifth anniversary of this plan (in place of the Annual Plan) commencing is to be prepared by the Contracted Conservation NGO for the previous 5 years. The report is to report on performance against the objectives and actions contained within the Plan for the previous 5 years and include a review of the success of implementation.	Contracted Conservation NGO Management Committee	Annual report 5 yearly report	Annually 5 yearly
BOMP 3.6	**Five Yearly Review** After the initial five (5) year implementation, a review is to be conducted of the Plan. This review is to determine successes and weaknesses of plan implementation; determine future implementation arrangements (including ongoing tendering arrangements for the Contracted Conservation NGO). The review is to be undertaken by the Management Committee. The review is to be commence 6 months prior to the 5 yearly anniversaries and conclude any recommendations prior to the 5 year anniversary.	Management Committee	5 yearly review	6 months prior to the 5 yearly anniversary
BOMP 4.0	**Staffing** Current staffing is to be supplemented with an addition of a maximum of five (5) Forest Officers per Sanctuary. These officers are to be appropriately qualified and experienced in wildlife conservation in Myanmar. The role of the officers will be to supplement existing resources and implement the actions contained in this Plan. The officers are to be employed by the Wildlife Sanctuaries as temporary staff for up to 5 years with extensions.	Wildlife Sanctuary Management	Employment of up to 5 additional Forest Officers per Sanctuary.	By November 2018
BOMP 5.0	**Community Engagement (Years 1-5 and ongoing dependant on review to Year 25) (15.2.6 of draft Habitat Management Plan)**			

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
BOMP 5.1	**Determining community opportunities and threats** Community stakeholder interviews are to be undertaken with villages within the Sanctuary and within 5km of the Sanctuary boundary. The stakeholder interviews are to occur within 6 months of the commencement of this plan and repeated at 5 year intervals. The interviews are to determine: • Livelihoods and alternative income sources; • Current trends in the use of biodiversity/ecosystem services within the Sanctuary, including any trends in resource availability and the availability of alternative ecosystem services; • Current trends in wildlife hunting/poaching and illegal logging; • Current trends in threats posed by fire, invasive species, soil erosion etc.; • Wildlife observations within the Sanctuary, particularly conservation significant species; and • Interest in participation in community led conservation activities.	Contracted Conservation NGO & Wildlife Sanctuary Management	Preparation of materials for stakeholder engagement interviews; preparation of report and findings.	Within 6 months of plan commencement and at 5 yearly intervals.
BOMP 5.2	**Threat Reduction Campaigns** Based on the results of the community stakeholder interviews, threat reduction campaigns are to be prepared, targeting the threats identified. These threat reduction campaigns may target: • Community Forests; • Alternative livelihoods; • Sustainability of ecosystem service use and alternatives; • Wildlife poaching and hunting; • Illegal logging; • Illegal land-use; • Extractive industries; • Fires; • Soil erosion; • Invasive species; and • Any other threats identified (during community stakeholder interviews). The threat reduction campaigns will aim to educate and empower the community to reduce conservation threats. The threat reduction campaign may consist of: • Government engagement on alternative livelihoods, threats (particularly illegal logging and wildlife trafficking); • Community education meetings focussing on: – Community Forests; – Alternative livelihoods; – Sustainable ecosystem service use and alternatives; – Fire prevention;	Contracted Conservation NGO & Wildlife Sanctuary Management	Preparation of materials required for threat reduction campaigns/ community meetings	Annual campaigns, including a minimum of 6 direct community engagement activities per annum

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	– Sustainable agricultural practices; – Invasive species introduction and transmission; – Soil erosion causes and management; – Wildlife conservation • Education posters and materials; • Field days with local people regarding species of conservation significance, threats and management; • Joint patrols with community members; • Wildlife siting reports/"citizen surveys"; • Community hotline; • Community relationships and dialogue; and • Other recommended methods. The threat reduction campaigns are to occur on an annual basis. A minimum of six (6) direct community engagement activities are to occur annually with local communities.			
BOMP 5.3	**Stakeholder Engagement Survey** A stakeholder engagement survey is to occur on an annual basis to determine attitudinal change in conservation. The survey is to be conducted within 6 months of the start of the offset program to benchmark current attitudes to conservation. Reference should be made to *Annex G Community Engagement Protocol (Conservation and Wildlife).*	Contracted Conservation NGO & Wildlife Sanctuary Management	Preparation of materials and implementation of engagement survey	Minimum of 20 households surveyed as part of engagement survey
BOMP 6.0/6.1	**Patrols and Enforcement (Years 1-5 and ongoing dependant on review to Year 25) (15.2.3 of draft Habitat Management Plan)** Patrols are to be conducted on a monthly basis within the Wildlife Sanctuary. The patrols are to: • Engage with community leaders on conservation and threats; • Detect illegal activities, including illegal logging and poaching of wildlife; and other illegal activities (such as mining/quarrying); • Inspection of any potential sources of fire; • Inspect the condition of roads and tracks; • Inspection to identify invasive species; • Inspection to identify areas of erosion; • Investigation and warning on any illegal activities; and • Identify any new threats. Patrols are to occur on a monthly basis. A minimum of 10% of the Nature Reserve Area is to be patrolled per deployment. Any illegal activities are to be reported to the Management Committee and relevant authorities for action.	Contracted Conservation NGO & Wildlife Sanctuary Management Contracted Conservation NGO & Wildlife	Monthly patrols of at least 10% of wildlife sanctuary per deployment. Procurement and installation of sign-posts	Monthly Sign posts to be established by August 2018 and

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	Biodiversity conservation sign posts, posters, warnings, boundary signs in accord with the updated Law and Rules will be set up beside the path to the Sanctuary and public areas.	Sanctuary Management		maintained on a regular basis.
BOMP 7.0/7.1	**Staff Training (15.4 of draft Habitat Management Plan)** Training is to be conducted of all Wildlife Sanctuary staff, including: • Wildlife management training • Sustainable use of natural resources • Survey technique on flora and fauna • SMART patrol technique • Law enforcement training • Computer and international language (English) training	Contracted Conservation NGO & Wildlife Sanctuary Management	All staff trained	By August 2019 and all new staff within 1 month of arrival.
BOMP 8.0/8.1	**Capital Equipment (Purchased and maintained for 10 years; renewal depending on condition after 10 years)** Capital equipment is to be assessed and provided to Wildlife Sanctuary Management as required. The Capital equipment is to consist of (one (1) set each for each Wildlife Sanctuary): • 1x4x4 Pick-up truck; • 10xMotorbikes; • 40 uniforms (replaced as required); • 4 laptop computers, including software; • 10 tents and associated camping equipment; • 10 high powered torches; • 10 field cameras; • 10 walky talky sets; • 10 binoculars; • 20 camera traps; • Stationary and materials	EHSS Department	Purchase and provision to Conservation NGO & Wildlife Sanctuary Management	Once per 10 years on review of condition of capital equipment.
BOMP 9.0/9.1	**<u>Species Management (Limestone Concession)</u>** **Critical Habitat Species (Requiring Net-Gain)** • Chinese Pangolin *Manis pentadactyla* (CR) • Shan State Langur *Trachypithecus phayrei* spp. *shanicus* (EN) • Karst Snails*: Anauchen sp., Diplommatina sp. 3, Diplommatina sp. 4 and Diplommatina sp. 5 aff. crispata*. • Karst Flora: *Impatiens sp., Amorphophallus sp. and Arisaema sp*. • Karst Reptiles: *Cyrtodactylus shwetaungorm, and C. ywanganensis, and Hemidactylus sp. nov.* **Species of concern (Requiring No-net-loss where feasible)** • Eastern Hoolock Gibbon *Hoolock leuconedys* (VU)			

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	• Bengal Slow Loris *Nycticebus bengalensis* (VU) • Hog Badger *Arctonyx collaris* (VU) **<u>Species management (Coal Mine Concession)</u>** **Critical Habitat Species (Requiring Net-Gain)** • Chinese Pangolin *Manis pentadactyla* (CR) • Western Hoolock Gibbon (*Hoolock Hoolock*) • *Dipterocarpus baudii* (CR) **Species of concern (Requiring No-net-loss where feasible)** • Phayre's Langur *Trachypithecus phayrei phayrei* (EN) • Dhole *Cuon alpinus (*EN) • Gaur *Bos gaurus* (VU) • Bengal Slow Loris *Nycticebus bengalensis* (VU) • Southern Serow *Capriconis sumatraensis* (VU) • Red Goral *Naemorhedus baileyi* (VU) • Asiatic Black Bear *Ursus thibentanus* (VU)			
BOMP 9.1	**Wildlife Management Actions (Both concessions)** The following requirements will be implemented within the Panlaung-Pyadalin Cave Wildlife Sanctuary and Mahaimyang Wildlife Sanctuary regarding the protection of these species: • A minimum of two (2) targeted education programs will be conducted per annum with the local community to provide information on the current conservation risks posed to the species as part of the Threat Reduction Campaigns. Reporting wildlife crime through the community hotline is to be encouraged. • Local community involvement in monitoring surveys (see *Table 7.7*) is to occur to improve knowledge and conservation awareness of the local community. • Wildlife rangers are to be trained on the species conservation, including identification, biology and management. • Targeted market surveys are to occur at markets within 5km of the Wildlife Sanctuaries or settlements along access routes at least 2 times per year. If individual threatened species are detected in the market, investigations are to occur on the source of the individual. Education of the seller is to occur on the conservation status of the species. The market surveys are to focus on: Bengal Slow Loris; Chinese Pangolin; Shan State Langur; Phayre's Langur; Western Hoolock Gibbon; and Eastern Hoolock Gibbon. • Identification of known core habitat within the Wildlife Sanctuary is to occur as part of the monitoring program (see *Table 7.7*). Where breeding habitats are identified, they are to be subject of regular patrols and protection.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Two targeted education programs per annum Two targeted market surveys per annum

<table>
<tr><th>S/N</th><th>Mitigation and / or Management Measures/Procedures</th><th>Responsibility</th><th>Implementation Requirements</th><th>Timeframe</th></tr>
<tr><td></td><td>• Targeted enforcement activities are to occur if information is obtained about illegal poaching or hunting of the species (including through informants, market surveys or regular patrols).
• Where illegally poached/caught individuals are identified, the individuals are to be assessed for their condition/health. Re-release within the wildlife sanctuary is to occur, considering the distribution of individuals to avoid conflict.
• Monitoring of populations are to occur (see Table 7.7)</td><td></td><td></td><td></td></tr>
<tr><td>BOMP 9.2</td><td>Critical Habitat Species (Net Gain):

Western Hoolock Gibbon (Coal mine concession)
The following actions are to occur West of the Thanlywin River within 10km regarding the population of Western Hoolock Gibbon (Hoolock hoolock) (IUCN EN) identified within the vicinity of the Coal Mine concession:
• A population census is to be undertaken of the Western Hoolock Gibbon population to identify the size of the troop.
• Identification of core habitat, including feeding, breeding and resting habitats, including any seasonal movement patterns within the forest.
• Identification of current threats posed to the population.
• A written report is to be prepared on the population, including recommendations for the species conservation and management, identified threats and viability of the population.
• The written report is to be provided to the Nature and Wildlife Conservation Division of MONREC, including recommendations to establish a Wildlife Sanctuary or Nature Reserve to protect the population.
• The steps recommended to STC to undertake the process to establish the Sanctuary extension are outlined in Table 7.7.1.
• Management measures outlined at Row 9.1 Wildlife Management Actions above are to be applied to the Sanctuary, once established.
Table 7.7.1 Steps Required to establish Wildlife Sanctuary for Western Hoolock Gibbon
<table>
<tr><th>Step</th><th>Action</th><th>Timeframe</th></tr>
<tr><td>1.</td><td>STC to write a letter to the Minister of the Ministry of Natural Resource and Environmental Conservation seeking the creation of a Nature Reserve/Wildlife Sanctuary within the core Western Hoolock Gibbon Habitat.</td><td>By 1 January 2019</td></tr>
<tr><td>2.</td><td>STC to support the Nature and Wildlife Conservation Division (NWCD) of MONREC to establish the “Initial Examination Body” to undertake</td><td>By 1 May 2019</td></tr>
</table></td><td>Contracted Conservation NGO & Wildlife Sanctuary Management</td><td>Management actions implemented</td><td>Population census by August 2019

Report prepared by November 2019</td></tr>
</table>

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	review and consultation with the local community and undertake actions listed under 8. – 11. of the Procedure (*Annex B*). 3. STC to support the gazettal of the Sanctuary with MONREC. By 1 September 2019			
BOMP 9.3	**Karst Snails:** ***Anauchen sp., Diplommatina sp. 3, Diplommatina sp. 4 and Diplommatina sp. 5 aff. crispata.*** The following actions are to occur regarding karst snails: • A population census is to be undertaken to determine the distribution of the karst snail fauna within the limestone biodiversity offset area. • A written report is to be prepared on the population, including recommendations for the species conservation and management, identified threats and viability of the population. • Additional specific actions (apart from the actions listed above in both Habitat and Species Management actions) are to be applied as necessary.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019
BOMP 9.4	**Karst Flora:** ***Impatiens sp., Amorphophallus sp. and Arisaema sp.*** The following actions are to occur regarding karst flora: • A population census is to be undertaken of the distribution of karst flora within the limestone biodiversity offset area. • A written report is to be prepared on the population, including recommendations for the species conservation and management, identified threats and viability of the population. • Additional specific actions (apart from the actions listed above in both Habitat and Species Management actions) are to be applied as necessary.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019
BOMP9.5	**Karst Reptiles:** ***Cyrtodactylus shwetaungorm, and C. ywanganensis, and Hemidactylus sp. nov.*** The following actions are to occur regarding karst reptiles: • A population census is to be undertaken the karst reptiles within the limestone biodiversity offset area. • A written report is to be prepared on the population, including recommendations for the species conservation and management, identified threats and viability of the population. • Additional specific actions (apart from the actions listed above in both Habitat and Species Management actions) are to be applied as necessary.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019
BOMP 9.6	**Shan State Langur (Limestone concession)** The following actions are to occur regarding the Shan State Langur:	Contracted Conservation		Population census by August 2019

S/N	Mitigation and / or Management Measures/Procedures	Responsibility	Implementation Requirements	Timeframe
	• A population census is to be undertaken of the Shan State Langur population within the Panlaung-Pyadalin Cave Wildlife Sanctuary to identify the size of the troop. • An assessment is to be undertaken to identify core habitat, including feeding, breeding and resting habitats, including any seasonal migratory patterns. • A written report is to be prepared on the population, including recommendations for the species conservation and management, identified threats and viability of the population. • Additional specific actions (apart from the actions listed above in both Habitat and Species Management actions) are to be applied as necessary.	NGO & Wildlife Sanctuary Management	Management actions implemented	
BOMP 9.7	**Chinese Pangolin (identified within both concessions)** • A census of Chinese Pangolin is to occur within both wildlife concessions (see *Table 7.7*) • Community engagement is to occur regarding the Chinese Pangolin population within both offset sites. Specific engagement is to occur regarding illegal poaching and trafficking of the species. Awareness raising on the conservation of the species is to occur; • Targeted enforcement activities are to occur within the wildlife sanctuaries regarding the poaching of the Chinese Pangolin.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019
BOMP9.8	***Dipterocarpus baudii* (Coal Mine Concession)** • A census of *D. Baudii* is to occur within the Coal Mine Concession and the Mahamyaing Wildlife Sanctuary (see *Table 7.7*). • Propagation of *D. Baudii* is to be trialed using seed stock from individual plants within the Coal Mine Concession. • Propagation is to occur within the site nursery and used in site rehabilitation (See *Management Action 24 in Table 7.1*)	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019
BOMP9.9-BOMP9.14	**Threatened Species (No net loss):** • A census is to occur for all threatened species. • All actions at *Row 9.1* above are to be implemented.	Contracted Conservation NGO & Wildlife Sanctuary Management	Management actions implemented	Population census by August 2019

Table 7.2 Timeline for Implementation of Biodiversity Offset Management Actions

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
Item Ref	**ACTIVITY**	**Responsibility**	**Notes**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
Table 7.6	**Biodiversity Offset Management Actions (Habitat and Species)**																											
BOMP1.0, Step 1	Seek MONREC approval for the addition of 1779 ha to the Panlaung-Pyadalin Cave Wildlife Sanctuary	STC HSE Manager		X																								
BOMP1.0, Step 2	Support NWCD, MONREC to establish the Initial Examination Body and undertake reviews and consultations with the local community	STC HSE Manager			X																							
BOMP1.0, Step 3	Support gazettal of addition to the Sanctuary with MONREC	STC HSE Manager			X																							
BOMP3.1 - 3.2	Management committee meeting	STC HSE Manager	Tenure of each member is 7.5 years maximum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP3.3	Appointment of service provider	STC HSE Manager			X																							
BOMP3.4	Budget Allocation	STC HSE Manager		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP3.5	Annual Report	Contracted Conservation NGO			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP3.5	5-yearly Report	Contracted Conservation NGO						X					X					X					X					X
BOMP3.6	5-yearly review	Management Committee						X					X					X					X					X
BOMP4.0	Support staffing of Forest Officers and review of employment extensions	Wildlife Sanctuary Management			X			X					X					X					X					X
BOMP5.1	Community stakeholder interviews	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management			X			X					X					X					X					X
BOMP5.2	Threat reduction campaigns	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP5.3	Stakeholder engagement survey	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP6.0	Patrols and enforcement within the Wildlife Sanctuary (monthly basis)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
BOMP7.0	Wildlife Sanctuary staff training	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	All new staff are to be trained within 1 month of arrival		X																							
BOMP8.0	Capital Equipment purchase and maintenance	STC HSE Manager	Renewal of equipment depending on condition after 10 years		X								X										X					
BOMP9.1	Targeted education programs with the local community	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	To occur at least 2 times per annum		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.1	Targeted market surveys	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	To occur at least 2 times per annum		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.2	Population census of Western Hoolock Gibbon (*Hoolock hoolock*)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Coal Mine Concession		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.2	Report on status of Western Hoolock Gibbon	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Coal Mine Concession		X																							
BOMP9.2, Step 1	Seek creation of nature reserve/wildlife sanctuary within core Western Hoolock Gibbon habitat	STC HSE Manager	Only applicable to Coal Mine Concession			X																						
BOMP9.2, Step 2	Support NWCD, MONREC to establish the Initial Examination Body and undertake reviews and consultations with the local community	STC HSE Manager	Only applicable to Coal Mine Concession			X																						
BOMP9.2, Step 3	Support gazettal of the Sanctuary with MONREC	STC HSE Manager	Only applicable to Coal Mine Concession			X																						

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
BOMP9.3	Population census of Shan State Langur (*Trachypithecus phayrei spp. shanicus*)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.4	Population census of Chinese Pangolin (*Manis pentadactyla*)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Applicable to both Coal Mine and Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.5	Population census for Karst Snails: *Anauchen sp., Diplommatina sp. 3, Diplommatina sp. 4 and Diplommatina sp. 5 aff. crispata.*	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.6	Population census for Karst Flora: *Impatiens sp., Amorphophallus sp. and Arisaema sp.*	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.7	Population census for Karst Reptiles: *Cyrtodactylus shwetaungorm, and C. ywanganensis, and Hemidactylus sp. nov.*	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.8	Population census of *Dipterocapus baudii*	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Coal Mine Concession		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.9-9.16	Population census for threatened species (no net loss) - Phayre's Langur (*Trachypithecus phayrei phayrei*) - Dhole (*Cuon alphinus*) - Gaur (*Bos gaurus*) - Bengal Slow Loris (*Nyctecibus bengalensis*) - Southern Serow (*Capriconis sumatraensis*) - Red Goral (*Naemorhedus baileyi*) - Asiatic Black Bear (*Ursus thibentanus*)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Coal Mine Concession		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BOMP9.16 - 9.19	Population census for threatened species (no net loss) - Eastern Hoolock Gibbon (*Hoolock leuconedys*)	1. Contracted Conservation NGO 2. Wildlife Sanctuary Management	Only applicable to Apache Cement Plant		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
	- Bengal Slow Loris (*Nycticebus bengalensis*) - Hog Badger (*Artctonyx collaris*)																											

Table 7.3 Biodiversity Offset Management Plan Budget (2017 US Dollar values)

S/N	Item	Year 1	Year 10	Years 5, 15, 20 & 25 (Per Year)	Years 2-4, 6-9, 11-14,16-19,21-24 (Per Year)	Total (25 Years)
BOMP1.0	**Addition of the Limestone Range to the Wildlife Sanctuary**					
BOMP2.0	**Gazettal of Maihamyang Wildlife Sanctuary**					
BOMP 3.0	**Management and Administrative Framework+**					
BOMP 3.1	Management Committee					
BOMP 3.2	Contracting Service Providers++					
BOMP 3.3	Funds administration					
BOMP 3.4	Report requirements					
BOMP 3.5	5 Yearly Review					
BOMP 4.0	**Staffing***					
BOMP 4.1	Staffing (5 additional staff per offset site)					
BOMP 5.0	**Community Engagement****					
BOMP 5.1	Community engagement					
BOMP 5.2	Determining community opportunities and threats					
BOMP 5.3	Threat Reduction Campaigns					
BOMP 5.4	Set up of community hotline					
BOMP 5.5	Community Engagement Survey					
BOMP 6.0	**Patrols and Enforcement**					
BOMP 6.1	Patrols and Enforcement					
BOMP 7.0	**Staff Training**					
BOMP 7.1	Staff Training					
BOMP8.0	**Capital Equipment**					
BOMP 8.1	Capital Equipment~					
BOMP 9.0	**Species Management~~**					
BOMP 9.1	Species Management (Limestone Concession)					

S/N	Item	Year 1	Year 10	Years 5, 15, 20 & 25 (Per Year)	Years 2-4, 6-9, 11-14,16-19,21-24 (Per Year)	Total (25 Years)
BOMP 9.2-BOMP 9.11	Species Management (Coal Mine Concession)					
	Sub Total					
	Total					
	Estimated Total for Coal Mine Concession					
	Estimated Total for Limestone Concession					

Notes:

\+ Labour support for the management and administrative framework is to be provided by STC. This has not been costed in the BOMP budget. Costings are for material costs only.

++ Based on an estimated $XUSD per annum for 10 years as indicated by WCS during consultation.

* Based on an estimated $X per person per year. Labour costs assume that these additional staff resources will support the implementation of the community engagement, patrols and enforcement and monitoring and evaluation components of the BOMP.

** Material costs only. Labour costs are assumed to be covered by salary costs

~ Estimated capital equipment costs as listed in *Table 7.1*. Capital equipment to be replaced at 10 yearly intervals (if required). Cost includes maintenance costs.

~~ Estimated costs of undertaking species actions, including reporting, assessment, monitoring and evaluation costs. This may include costs of external consultants to undertake the required actions.

8 *BIODIVERSITY MONITORING AND EVALUATION PLAN*

8.1 *APPLICATION*

This Biodiversity Monitoring and Evaluation Plan (BMEP) applies to both the BMP and BOMP for the STC limestone concession and coalmine concession. The purpose of the BMEP is to outlined the requirements to measure the success (or failure) of the implementation of the BMP and BOMP and enable adaptive management where failures are identified.

8.2 *MONITORING AND EVALUATION REQUIREMENTS*

The required monitoring and evaluation requirements are outlined in *Table 8.1.* The location of biodiversity monitoring locations will be determined in the field during the implementation of this plan.

Table 8.1 BMP Monitoring and Evaluation Requirements

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BMP1	Appointment of Environment Process Senior Executive (1 for each site)	Within 1 month of acceptance of BAP actions	Required mitigation outlined within this BAP	Coal Mine and Limestone Concession	Not applicable	Environment Process Senior Executives to be appointed within a month of acceptance of BAP actions
BMP2	Records of change management actions undertaken against each incident; defined date for regular update of BMP	Ongoing throughout operations	Required mitigation outlined within this BAP	At relevant locations where BAP actions will be implemented	Minutes of any meetings conducted during operation in relation to BAP implementation and corrective actions	Each Management of Change process to be addressed within 4 weeks of incident; annual
BMP3	Protocol documentation (e.g. Injured wildlife reporting and recording process, communication process)	Starting within 1 month of acceptance of BAP actions and ongoing	Required mitigation outlined within this BAP	Not applicable	Incident records summary	Each injured wildlife encounter to be resolved and closed within 3 days.
BMP4	Protocol documentation (e.g. Injured wildlife reporting and recording process, communication process)	Starting within 1 month of acceptance of BAP actions and ongoing	Required mitigation outlined within this BAP	Not applicable	Incident records summary	All wildlife injuries/mortality attributed to Project actions over Project lifespan are to be recorded.
BMP5	Issuance of Environmental Policy and briefing of all staff on rules	Within 1 month of acceptance of BAP actions	Required actions outlined within this BAP and any additional relevant actions	Not applicable	Not applicable	Zero incidences of poaching, illegal logging and wildlife trade involvement by employees and contractors
BMP6	Training Records	Prior to commencement of works and for all new workers; Refresher training every year	Number of workers trained	Not applicable	Training records maintained	All workers trained at induction and refresher training every year.
BMP7	Incident reporting log and documentation of follow-up actions	On acceptance of BAP actions	Required specifications outlined within this BAP	Within project area	Incident records summary	Zero incidences of poaching, illegal logging and wildlife trade involvement by employees and contractors

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BMP8	Survey reports	1 day prior to clearance	Presence/absence, abundance, ecological observations, sex, maturity	At proposed expansion areas	Survey report	Zero injured or dead wildlife attributed to land clearance.
BMP9	Wildlife shepherding surveys	Daily following erection of fencing/hoardings (if required) Survey in conjunction with shepherding activities Throughout construction and/ or operation (if possible)	Erected fencing/hoardings (if required) 1. Species requiring relocation within the Project area. 2. Habitat features such as hollow trees, dens, nests and roosts, caves 3. Record all habitat features observed using a GPS. Large terrestrial CH trigger species such as the Shan Langur	Work package boundaries Work package area to be cleared Refuge areas	Wildlife shepherding records	Zero injured or dead wildlife attributed to land clearance.
BMP10	Clearance briefing attendance records Inspection of cleared areas	During clearance activities	Areas marked for clearance	Work package area to be cleared	Weekly SHE inspection report	100% of clearance occurs within marked cleared area.
BMP11	Clearance briefing attendance records	Prior to clearance activities	Number of persons briefed and particulars	Not applicable	Quarterly SHE report	100% of contractors, workers and staff involved in land clearance briefed.
BMP12	Biodiversity offset plan and commencement of offset project	Biodiversity Offset Plan to be prepared by end-2017	Details of plan will be dependent on offset requirements and outcome of consultation	Primary location for offset is at Panlang-Pyadalin Cave Wildlife Sanctuary, north of project concession	To be determined in Biodiversity Offset Plan	Offset plan prepared by 2017, prior to project expansion and implementation to commence in mid-2018
BMP13	Minutes of meetings	Yearly	Not applicable	Not applicable	Annual SHE report	Meetings to be held for community members in villages around project area. All minutes of meetings to be documented.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BMP14	Utilisation of wheel wash bay	Monthly during rainy season	Condition of wheel wash (if maintenance is required) and where water is being discharged to	Wheel wash bay	Quarterly SHE report	All vehicles washed prior to entering and leaving
BMP15	Monitoring records, as reviewed by Environment Process Senior Executive	Daily	Signs of poaching activity	All STC access roads within project concession	To report to relevant authorities, including police department if necessary, and lodge an incident internally	Zero incidences of poaching, illegal logging and wildlife trade involvement by employees and contractors
BMP16	Proof of well-maintained access log Training records of security officers	Monthly review of access log	Required specifications outlined within this BAP	At road access points	Non-compliance to be addressed on the spot and if necessary, raised at company meetings and minuted	*Note STC Apache Cement Plant already has a manned security gate.* Zero unregistered vehicles within STC premises.
BMP17	Updated species database of the Project area	Surveying, reporting and mapping to be undertaken (i) before construction; (ii) every 3 years after operations commence; and thereafter	Flora (seedlings, saplings, trees), mammals, birds, reptiles & amphibians, fish Flora: Presence of protected species, pioneer species, invasive species Fauna: Presence, abundance and distribution of species of conservation significance, endemic species	Project area using transects and vegetation plots where baseline surveys have been carried out.	Survey report	Not applicable
BMP18	Review of long term monitoring records	Every 3 years and intensity to change as needed based on findings	Ecological monitoring data for key species, including CH trigger species	Project Area	Annual SHE report	Continued utilisation of Project area by CH trigger species during Project construction and operation.
BMP19	Establishment of database	Database set up to be verified after pre-expansion monitoring work	Required specifications outlined within this BAP	Not applicable	Annual SHE report	Database to be established within 1 year of construction commencement.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BMP20	Placement of posters and literature in the site office and staff assembly areas (e.g. canteen, toilets, accommodation, recreational rooms etc.).	On acceptance of BAP actions	Posters and literature at the STC site offices	PT SEML site office and staff assembly areas	Annual SHE report	Refresh posters and literature in site office a minimum of once a year.
BMP21	Monitoring reports and records	Monthly, intensity to increase based on findings	Signs of wildlife conflict, illegal logging, poaching (e.g. new trails and roads into forest, dead wildlife)	Within project area	Weekly SHE inspection report	100% of all signs of potential wildlife conflict, illegal logging and poaching to be communicated to local forestry officers and relevant authorities within 3 days.
BMP22	Establishment of a communication system with reporting parameters	Upon acceptance of BAP actions	Protocol to be determined and agreed with local authorities	Within project area	Incident Report	Each incident to be submitted to local authority within 3 days.
BMP23	Survey report and inventory development	During construction and operation	Species, abundance, GPS location	Around worksite areas, in particular area where restoration is targeted to occur	Survey report	Map of invasive species aggregations prior to March 2018
BMP24	Site rehabilitation	During construction and operation. Three (3) months after restoration activities: weekly inspections. One (1) year after restoration inspections: 3 monthly inspections.	Soil erosion with rehabilitated areas; planting success rates	Within rehabilitated areas	Quarterly SHE report	All rehabilitated areas successfully rehabilitated with a mix of native indigenous species. Soil erosion controlled within rehabilitated areas.

Table 8.2 BOMP Monitoring and Evaluation Requirements

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BOMP1.0	**Option A: Addition of the Limestone Range to the Wildlife Sanctuary** Provision of final gazettal notice/letter from MONREC that an addition of 1779ha has been made to the Panlaung-Pyadalin Cave Wildlife Sanctuary.	By 1 September 2019	Not applicable	Not applicable	To be included in Annual Report	Addition of 1179ha of land to the Panlaung-Pyadalin Cave Wildlife Sanctuary.
BOMP2.0	**Gazettal of the Mahaimyang Wildlife Sanctuary (Coal Mine Concession Only)** Provision of final gazettal notice/letter from MONREC that the Mahaimyang Wildlife Sanctuary has been gazetted.	By May 2019	Not applicable	Not applicable	To be included in Annual Report	Gazettal of the Mahaimyang Wildlife Sanctuary
BOMP3.0	**Management and Administrative Framework**					
BOMP3.1	Management Committee Set up and appointment of members to the Management Committee. Tenure is for 7.5 years maximum.	By February 2019	Not applicable	Not applicable	To be included in Annual Report	Set up and appointment of members completed.
BOMP3.2	Contracting Service Providers Tender and contracting service provider. Contractual arrangements with service provider.	By March 2019 By April 2019	Not applicable Not applicable	Not applicable Not applicable	To be included in Annual Report Not applicable	Service Provider contracted Contract entered into by Service Provider
BOMP 3.3	Funds administration Setup and administration of funds.	By May 2019	Relevant accounting standards	Not applicable	Not applicable	Fund set up and allocated to service provider
BOMP 3.4	Report requirements Completion of Annual Report.	On anniversary of contract appointment (April 2020)	Completion of relevant KPIs	Not applicable	Preparation of Annual Report	Completion of Annual Report
BOMP 3.5	Completion of 5 Yearly Reports.	On anniversary of 5th year of contract	Not applicable	Not applicable	Preparation of 5 Yearly Report	Completion of 5 yearly report

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
		appointment (April 2024)				
BOMP3.6	5 Yearly Review Completion of 5 yearly reviews.	To commence 6 months prior to 5th year contract anniversary	Not applicable	Not applicable	Not applicable	Completion of 5 yearly review
BOMP 4.0	**Staffing** Employment of five (5) Forest Officers per site (Total of 10)	By June 2020	Suitably qualified and experienced staff employed	5 staff per wildlife sanctuary (Total of 10)	Not applicable	5 suitably qualified and experienced staff employed by June 2019 for each sanctuary
BOMP 5.0	**Community Engagement**					
BOMP 5.1	**Determining community opportunities and threats** Determining community opportunities and threats Completion of community engagement survey	Year 1 and at 5 yearly intervals	Results of survey	Local villages within 5km of Sanctuary	Survey report	Completion of community engagement survey
BOMP 5.2	**Threat Reduction Campaigns** Number of community engagement activities undertaken	Bimonthly	Changes in community behaviour	Local villages within 5km of Sanctuary	Included in Annual Report	Minimum of 6 engagement activities to occur annually
	Changes in community attitudes towards conservation through engagement survey (50 households)	Annually	Results of engagement survey	50 households	Included in Annual Report	Community attitude survey completed for 50 households
	Number of Government engagement activities undertaken	Tri-monthly	Government engagement on conservation	Relevant Government agencies	Included in Annual Report	Minimum of 4 government engagement activities to occur annually

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
	Number of joint patrols undertaken	Tri-monthly	Number of surveys	Local villages within 5km of Sanctuary	Included in Annual Report	Minimum of 4 citizen surveys conducted
	Number of citizen surveys/wildlife reporting conducted	Annually	Number of surveys	Local villages within 5km of Sanctuary	Included in Annual Report	Minimum of 4 citizen surveys conducted
	Set up of community hotline	One time/daily monitoring	Number of phone calls to hotline	Both wildlife sanctuaries	Included in Annual Report	Minimum of 50 calls received annually
BOMP 5.3	**Community Engagement Survey** Conduct community engagement survey	Annually	Questionnaire prepared on conservation attitudes	20 random households per wildlife sanctuary	Included in Annual Report	Minimum 20 households surveyed and survey report prepared.
BOMP 6.0	**Patrols and Enforcement** Number of patrols undertaken	Annually	Number of patrols	Within Wildlife Sanctuary	Included in Annual Report	Minimum of 12 patrols conducted annually
	Number of warnings reported	Annually	Number of warnings	Within Wildlife Sanctuary	Included in Annual Report	All warnings issued
	Number of illegal activities reported	Annually	Number of activities	Within Wildlife Sanctuary	Included in Annual Report	All illegal activities investigated
	Number of successful prosecutions	Annually	Number of prosecutions	Within Wildlife Sanctuary	Included in Annual Report	All prosecutions successful
BOMP 7.0	**Staff Training** Training of staff	By June 2019 and as required on employment of new staff	Attendance of staff at training	At each Wildlife Sanctuary	Included in Annual Report	All staff trained by June 2019.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BOMP 8.0	**Capital Equipment** Purchase and maintenance of capital equipment	Year 1 and review at year 12.5	Purchase of capital equipment	Not applicable	Included in Annual Report	All capital equipment purchased and maintained
BOMP 9.0	**Species Management***					
BOMP 9.1	**General Survey Requirements** The following general survey requirements apply to Critical Habitat and Threatened Species: • A village and market survey is to occur for all species listed below of all villages and markets within 5km of the offset site location, and/or villages along major access routes. • A benchmark report followed by an annual report is to be prepared for all targeted species. • The reporting requirements for each species listed below.	Yearly	Results of village and market survey, including number of individuals and photographs	All villages and markets within 5km of Wildlife Sanctuary	Annual fauna monitoring report	All villages/markets surveyed annually.
BOMP 9.2	**Critical Habitat Species:** Western Hoolock Gibbon (*Hoolock Hoolock*) (Coal Mine Concession area only) Undertake a species census using the following methods: • Triangulating listening surveys are to be conducted at dawn and dusk. When located, population counts are to occur. • Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.4*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.3	Shan State Langur *Trachypithecus phayrei spp. shanicus* (EN) Undertake a species census using the following methods: • Diurnal transect surveys to identify individuals, calls, tracks and traces. When a troop is identified, population counts are to occur. The transects are to comprise of 2 persons along a 2km transect in identified habitats.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
	• Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.					
BOMP 9.4	Population census for Karst Snails: *Anauchen sp., Diplommatina sp. 3, Diplommatina sp. 4 and Diplommatina sp. 5 aff. crispata.* Undertake a species census using the following methods: Microhabitats are to be sampled including: • 'Deathtraps' below slightly overhanging limestone cliffs. • Soil accumulated around the root systems of plants growing on cliff faces. • Accumulations of organic soil in rock crevices. • Leaf litter at the foot of limestone outcrops. • Litter samples from sites where empty shells may accumulate The following samples are to be taken for taxonomy: • Shells over 6 mm long are handpicked. • Soil-samples, small amounts of soil from as many different microhabitats at a sampling site as possible. • All taxonomy shall be undertaken by suitably qualified persons.	Five yearly	Results of surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.5	Population census for Karst Flora: *Impatiens sp., Amorphophallus sp.* and *Arisaema sp.* • Habitat transect surveys are to occur during spring and early summer (June to September) to enable floristics to be visible • A minimum of 5 days searches are to occur of limestone hills	Five Yearly	Results of surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.6	Population census for Karst Reptiles: *Cyrtodactylus shwetaungorm, and C. ywanganensis, and Hemidactylus sp. nov.* Undertake as species census using the following methods: • Surveys are to be conducted in the dry season (November to March)	Yearly	Results of surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
	• Morning (8am to noon) and evening (7.30pm - 10.30pm) habitat searches consisting of 5-7 persons over a period of 5 days • Capture individuals resting using a net or other apparatus • All taxonomy shall be undertaken by suitably qualified persons.					
BOMP 9.7	Chinese Pangolin *Manis pentadactyla* (CR) (Both Concessions) Undertake a species census using the following methods: • Diurnal transect surveys to identify dens, individuals and traces. The transect survey is to cover a minimum of 5km within the offset areas. The transects are to comprise of 2 persons covering an area of 700x60m along the 5km transect. • Report identifying results; pangolin density, population, threats and trends. • Permanent camera trap survey to be utilised with a minimum of 1 trap/100ha.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.8	*Dipterocarpus baudii* (CR) Undertake a species census using the following methods: • Flora transects within identified forest type. The transect is to consist of four (4) 1km random walking transects to identify individuals.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.4*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.9	**Species of concern:** Eastern Hoolock Gibbon *Hoolock leuconedys* (VU) Undertake a species census using the following methods: • Triangulating listening surveys are to be conducted at dawn and dusk. When located, population counts are to occur. • Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BOMP 9.10	Bengal Slow Loris *Nycticebus bengalensis* (VU) Undertake a species census using the following methods: • Nocturnal transect surveys to identify individuals through spotlights. The transects are to comprise of 2 persons along a 2km transect in identified habitats. • Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.11	Hog Badger *Arctonyx collaris* (VU) Undertake a species census using the following methods: • Permanent camera trap survey to be utilised with a minimum of 1 trap/100ha. • Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.3*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.12	Phayre's Langur *Trachypithecus phayrei phayrei* (EN) Undertake a species census using the following methods: • Diurnal transect surveys to identify individuals, calls, tracks and traces. When a troop is identified, population counts are to occur. The transects are to comprise of 2 persons along a 2km transect in identified habitats. • Report identifying results; population, troop size, population mix (juveniles/adults), threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.4*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
BOMP 9.13	Bengal Slow Loris *Nycticebus bengalensis* (VU) Undertake a species census using the following methods: • Nocturnal transect surveys to identify individuals through spotlights. The transects are to comprise of 2 persons walking along a 2km transect in identified habitats. • Report identifying results; estimated population size, threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.4*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.

S/N	Means Of Verification That Commitment Has Been Met	Monitoring / Inspection / Spot Check Parameters				KPIs
		Timing And Frequency Of Monitoring	Parameters	Location	Reporting Requirements	
BOMP 9.14	Dhole *Cuon alpinus* (EN); Gaur *Bos gaurus* (VU); Southern Serow *Capriconis sumatraensis* (VU); Red Goral *Naemorhedus baileyi* (VU) Asiatic Black Bear *Ursus thibentanus* (VU) Undertake a species census using the following methods: • Permanent camera trap survey to be utilised with a minimum of 1 trap/100ha of up to 20 traps. • Report identifying results; population, estimated population size, threats and trends.	Yearly	Results of transect surveys, including GIS data on individuals detected.	See *Figure 7.4*	Annual fauna monitoring report	Annual population estimated. Identification of threats and additional management actions.
Notes: * For 9.0 Species Management, the same monitoring techniques can be used for multiple species. Camera trapping surveys at the coal mine concession can be employed for the monitoring of the Chinese Pangolin, Hog Badger, Dhole, Gaur, Southern Serow, Red Goral and Asiatic Black Bear. Transect surveys can be employed for the monitoring of arboreal species such as the Bengal Slow Loris, Shan State Langur, Eastern and Western Hoolock Gibbon.						

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ERM (2017) **Environmental and Social Impact Assessment: Shwe Taung Cement Cement Plant and Shwe Taung Mining Paluzawa Coal Mine** Prepared by Environmenal Resources Management.

ERM (2017a) **Occupational Health and Safety review and revised Environmental Social Management Plan**

IFC 2012 **Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**. International Finance Corporation, January 1, 2012

MONREC (2017) **Habitat Management Plan, Panlaung-Paladlyin Cave Wildlife Sanctuary**

ANNEX A – Consultation Results Summary

A.1 CONSULTATION RESULTS SUMMARY (JUNE 2017)

Consultation Details	
Date	12 June 2017, Monday, 10:00 am
Location	WCS Office Yangon
Consultation	WCS Myanmar – Robert Tizard
Personnel Present	
ERM	David Nicholson; Cheong Shu Min

ERM provided an introduction about the project sought input from WCS on the (i) proposed funding mechanism, (ii) potential fund governance processes that can be adopted and (iii) WCS' capacity to support the implementation of the offset plan.

Offset Fund Administration and Management

WCS recommended that the contracting and biodiversity offset fund disbursement be carried out in 5-year tranches instead of a one-off disbursement at the onset of the project. The latter represents a longer time horizon which may be unpredictable due to inflation and economic changes. ERM agreed as it may not be feasible for STC to release the funds upfront as it represents a large capital impost on the company's finances in a short time period. The subsequent release of the funds would also need to be contingent on the management of the offset areas.

WCS suggested ERM look at how the Shan State government is managing the Inlay Lake trust fund, a pool of money gathered through tourism revenue from the Inlay Lake Biosphere zone. There is an avenue to work with the state government where the offset will be located to manage and administer the funds. WCS also advised ERM to consult with the Finance Ministry and Planning Ministry to understand if these ministries have any feedback on how the funds will be disbursed.

Considerations around Offset Plan Implementation

Cost

WCS provided some insight into the costs of implementing similar projects. At least $60,000 USD a year would be required for a local representative to run a project; this is likely to be higher if foreigner staff are utilized and of a larger scale. The rough overhead per project fee is 26.8%.

Social Aspects

WCS highlighted the importance of considering the social aspects of implementing biodiversity conservation plans in Myanmar. WCS shared that they dedicate a lot of effort into educating and working with the local people as these groups are most reliant on ecosystem services in the protected area in question. A consultative process is typically

undertaken and constituencies for conservation are built within the community. Themes of community engagement revolve around the resources the community is reliant on, location of these resources, traditional use boundaries, awareness assessments and accessibility to these resources within the general landscape. WCS recommended that mapping be carried out to understand land tenure status of the area. Based on an understanding of the tenure in the area, a community forest plan for each village can be set up where there is a legal system of management rights. This will allow these villagers to manage these plots and have the authority to prevent people from other areas to enter for harvesting.

Panlaung-Pyadalin Cave Wildlife Sanctuary

WCS shared that the Panlaung-Pyadalin Cave Wildlife Sanctuary is chronically underfunded and understaffed. On the potential for the Forest Department rangers to implement the offset plan, WCS commented that they should be able to conduct patrols and undertake enforcement, but building capacity and developing technical skills (e.g. smart spatial monitoring, computer databases, GPS logging) will require more commitment in terms of funds and effort.

WCS advised ERM to clarify with relevant authorities on the actual timeline to amend the boundaries of Panlaung-Pyadalin Cave Sanctuary. From WCS' experience in Myanmar, this requires a lengthy government consultation and potentially a resettlement process. There may be several requirements to seek approvals on various levels from the township, district, and state to cabinet levels. ERM will seek more clarity on this from the Forest Department.

Monitoring

WCS suggested the following parameters for monitoring:

- Regular point monitoring for langurs on limestones outcrops;
- Audio surveys for gibbons involving triangulation and density estimation;
- Permanent camera traps that can also double up as trust building tools by allowing local communities to deploy the traps. Data can also be run through with these communities.

In open deciduous forest such as the vegetation in the proposed Mahamyaing wildlife reserve, line transects is the most straightforward way to conduct monitoring.

The level of expertise required to undertake monitoring could be fairly low. The basic requirements would be that an individual can ensure data is entered correctly.

Capital Expenditure

ERM ran through a list of potential capital expenditure with WCS and sought for their opinion:

- Vehicles – WCS said these are typically difficult to procure. To effectively manage a wildlife reserve, a team will probably require a mixture of four wheel drives and motorbikes.
- Basic office equipment such as telephones will be required
- Generators and car batteries will be required to generate electricity
- Communication equipment such as UHF radios are necessary but procurement of these requires permission from the military
- Ranger uniforms and jungle boots are also typically required
- Firearms may be required on a case by case basis
- Per Diem and food – ERM may wish to consider a per diem and food disbursement structure that is aligned to the physical requirements of the tasks – e.g. field person may receive more as compared to an administrative worker.

WCS agreed to review the biodiversity offset plan that ERM will develop for STC. They advised that ERM should consider translating it to the Myanmar language but cautioned that it was hard to find technical translators.

Consultation Details	
Date	12 June 2017, Monday, 3:00 pm
Location	FFI Office Yangon
Consultation	FFI Myanmar – Frank Momberg
Personnel Present	
ERM	David Nicholson; Cheong Shu Min

Comments on the Proposed Biodiversity Offset Plan

FFI commented that the preliminary proposal for the offset plan was not like-for-like. The proposed plan targets the offset for the coal mine at the Saigaing region to occur at Mahamyaing wildlife reserve. However FFI pointed out that the Hoolock gibbon species at Mahamyaing consists of the Eastern Hoolock gibbon which is different from the Western Hoolock gibbon found at the coal mine. Mahamyaing also faced several problems such as uncontrolled logging, hunting, and lack of staff and funding. In addition, at 60,000 ha, Mahamyaing presents a very large area to manage.

Suggestion for Pauk Sa

FFI shared that the protected area gazettal process could take over 2 years. They suggested ERM look to offset at Pauk Sa (Na Yet Kan), a similar rainforest type on the same ridge as the coal mine but approximately 370 km south. This area also exhibits similar species composition including the Asiatic black bear, Malayan sun bear, Western Hoolock gibbon, gaur, Phayre's langur, Plain-pouched, Great and Rufous-necked Hornbill.

Pauk Sa is currently run on a community-led conservation model where communities maintain and harvest from Community Forests (CF). This CF contains integrated pepper, coffee and chili production areas for alternative income and is laid around a core conservation area. A community forestry institution has been formed in the village that issues CF certificates for each CF. A management plan has also been developed for each CF.

Using Pauk Sa as a benchmark, FFI estimated that the operational cost for managing 1 site a year to be $50,000 USD. The key issue is to be able to influence communities not to hunt. FFI suggested that a grassroots approach may be more effective, citing that it took them 3-4 years to set up a local conservation constituency at Pauk Sa and obtain community consensus to set aside a core conservation area.

FFI shared that a conservation needs assessment has already been undertaken for Pauk Sa; a fauna survey has also been conducted to feed into the proposal to justify the creation of a protected area at Pauk Sa (main reason being the need to set aside a conservation area for the Western Hoolock gibbon). A management plan has not been developed yet. FFI suggested that ERM can develop the offset plan as the management plan for the reserve in conjunction with FFI, listing key tasks as the provision of alternative livelihoods to various communities.

Protected Area Gazettal Process

FFI shared that the typical gazettal process begins with Free and Prior Informed Consent (FPIC) procedures, consultations with local communities and state governments and the formation of settlement committees. Locals will be granted a 90 day period to submit any complaints they have about the proposed PA.

FFI provided 2 offset implementation approaches for consideration: the first would be to engage local communities for patrolling; the second approach would be to involve government staff in patrolling and FFI to lead on the initial capacity building phase. FFI advised that the government may be in favour of decentralized approach towards biodiversity conservation.

Monitoring

FFI said that camera trapping is potentially the easiest mode of monitoring. It can be carried out both in a grid setting or at selected locations where chances of encountered animals are deemed to be the highest. A primate survey can be conducted every 5 years with the adoption of listening posts for gibbon monitoring.

Transect surveys are relevant to flora monitoring but the surveys need not proceed on permanent transects. FFI also suggested conducting surveys to track attitudes and behaviours.

Forest cover should be monitored and can be achieved through the use of drones to obtain higher resolution imagery. Drone based mapping can also be carried out to monitor for illegal logging roads and conversion of grassland to agriculture. In the absence of the drone option, satellite imagery can also be used.

FFI advised that a monitoring budget will need to be set aside under the offset plan.

Capital expenditure

FFI suggested that 2-3 motorbikes will be required.

Funding Model

FFI suggested an FFI-led 5 year establishment and capacity building phase followed by a 20 year implementation phase by the forest department.

Consultation Details	
Date	13 June 2017, Tuesday, 10:00 am
Location	Ministry of Natural Resources and Environmental Conservation (MONREC) Nature and Wildlife Conservation Division, Nay Pyi Taw
Consultation	Win Naing Thaw, Director, Nature and Wildlife Conservation Division
Personnel Present	
STC	U Ze Lum; Kyaw Naing Soe; Zaw Win Htut
ERM	David Nicholson; Cheong Shu Min

Proposed Offset Location for the Cement Plant

The Director was in agreement about the addition of a portion of the limestone range to Panlaung-Pyadalin Cave Wildlife Sanctuary as part of the offset plan.

Proposed Offset Location for the Coal Mine

The Director expressed his preference for the offset for the coal mine to occur at Mahamyaing (Sagaing Region) instead of Pauk Sa (Magway Region). He commented that Pauk Sa was too far from the project area and also administratively in a different state from the coal mine. He shared that the Sagaing Region chief minister has indicated full support for the offset in his region and advised STC to consult with the chief ministry of Sagaing.

The Director said it would take another 6 months before Mahamyaing is gazetted as a PA. He shared that Mahamyaing faced uncontrolled logging, hunting and was understaffed and underfunded.

Biodiversity Offset Plan Structure and Implementation

The Director shared that the biodiversity offset funds will be important in covering gaps in existing MONREC funding and welcomed the partnership between his division and STC. He stated his preference for the biodiversity offset document to contain 2 plans – a management plan and a habitat/ecological restoration plan. ERM highlighted that the offset plan and management plan are unlikely to have the same types of content as the purpose of each plan is different.

He shared that for such offsets, what they are envisioning is the setting up of a project committee for the funds, and a biodiversity trust fund. Shared that there are laws guiding private sector fund use: environmental law states that any polluter pays for pollution and must reinvest in the environment. FD also said that will require a monitoring and inspection team for the Annual Report.

Amendments to Existing Law

The Director said that MONREC is in the process of amending the environmental/conservation law and will be updated end 2017. The offset should consider these laws as well.

Consultation Details	
Date	14 June 2017, Wednesday, 11:30 am
Location	Township Forest Office, Ywangan
Consultation	Kyaw Naing Oo, Forest Department Officer
Personnel Present	
STC	U Ze Lum; Win Htein
ERM	David Nicholson; Cheong Shu Min

Introduction

ERM provided an introduction and background of project and biodiversity offset plan objectives. It was shared that the plan would span a total of 25 years supporting capacity building in the first 5 years. Over the subsequent 20 years, STC will provide an annual fund to the FD to continue managing this site. It was also communicated to the FD officers that there will be monitoring requirements tied to the funds and the IFC will audit the sites to check for progress and based on this disburse committed funds to STC. The FD staff must prepare an annual report must be submitted to STC and the IFC.

The wildlife department officers said that they have no objection to the extension of Panlaung-Pyadalin Cave Sanctuary to include the limestone range to the south and they are supportive of all activities tied to the funds. The officers shared an existing plan to extend Panlaung-Pyadalin sanctuary on northern extent. They also expressed willingness to provide input on the offset plan if required.

Existing Threats to Panlaung-Pyadalin Cave Sanctuary

The officers shared that the key threats faced by the Sanctuary were from overharvesting of materials by the local people. There is also illegal logging around Kyubin village where activities run along the border of the conservation and forest areas. Random inspections and seizures in cooperation with the police department and village leaders have been conducted previously.

The department carries out community engagement and conservation talks, and is proposing community forests for people to harvest from instead. A Japanese organization (Makino Botanical Garden) has assisted the FD before in technology in getting food from bamboo shoots (project ended in 2007).

ERM enquired about the local Forest Department has experienced any conflict with the community. The officers said that they have been verbally threatened after the seizure of illegally harvested wood. Shots have also been fired in the air before but no injuries were sustained. Majority of offenders are locals from vicinity townships. Two cases have been taken to court and offenders jailed under the Wildlife Act before – these cases involved illegal logging using a chainsaw and approaching the logging sites from the lake via boat. No wildlife traffickers have been encountered so far.

Existing Capabilities of Park Management Office

ERM asked the existing resources the FD uses for the wildlife sanctuary. The officers shared that there are currently 40 staff looking after the sanctuary. In terms of equipment, the team has no official motorbikes and instead uses their personal vehicles. There is only 1 tuk tuk vehicle available for use. Patrols are conducted on foot in the forest. The team is already equipped with uniforms, boots and jungle hats.

The FD team conducts patrols 10-15 times a month; a larger team involving the township administrators, police department and FD team conducts its patrols randomly. Currently no monitoring (e.g. population, habitat monitoring) is conducted.

ERM asked if the FD has a GIS system/mapping resource. The officer shared that they use software called Smart patrol where maps can be downloaded from the GPS and processed within the system. The FD has worked with the Korea-based research organization, the National Institute of Biodiversity Research, to conduct surveys on small mammals, amphibians, reptiles and invertebrates. A Memorandum of Understanding (MoU) was signed in 2013 and since then, 3 teams from the NIBR have visited the wildlife sanctuary biannually. The data collected was reported to the head office at Nay Pyi Taw. The FD team possesses no wildlife cameras of their own for monitoring purposes but relies on the data from the NIBR team.

The officers said the PPC management plan is available at the Director's office at Nay Pyi Taw.

Consultation Details	
Date	16 June 2017, Friday, 09:30 am
Location	Township Forest Office, Kalaywa
Consultation	Myo Aung
Personnel Present	
STC	U Ze Lum
ERM	David Nicholson; Cheong Shu Min

Introduction

ERM provided an introduction and background to the project and biodiversity offset plan objectives. It was shared that the plan would span a total of 25 years with an NGO partner supporting capacity building in the first 5 years. Over the subsequent 20 years, STC will provide an annual fund to the FD to continue managing this site. It was also communicated to the FD officers that there will be monitoring requirements tied to the funds and the IFC will audit the sites to check for progress and based on this disburse committed funds to STC. The FD staff must prepare an annual report must be submitted to STC and the IFC.

The FD officer shared their proposal to make Mahamyaing a wildlife sanctuary and said it was due to be approved by the end of the year. He added that there is no management plan for Mahamyaing at the moment.

Existing Conditions at Mahamyaing

Vegetation

The officer shared that there are 3 forest types in Mahamyaing, in a gradient of dry deciduous, mixed deciduous to moist deciduous in a south to north direction. There were no remaining areas of primary forest in the reserve, only mature secondary forest toward the northern extent of the reserve. This area appears to still harbor good quality forest.

Wildlife

Based on the officer's description, the gibbon population in Mahamyaing appears to be distributed throughout the reserve. Elephants were still present albeit seemingly restricted to the northern extent of the reserve where the forest is still in relatively good condition. These areas would be priority areas for conservation. Human-elephant wildlife conflicts have occurred before in Mahamyaing.

Socio-economic Conditions

There are currently an estimated 48 households within the reserve. Illegal logging is undertaken by local people; hunting and poaching occur for subsistence and not for wildlife trafficking purposes. Two hunting methods used – guns and traps. Pangolins are hunted but rarely. The officers identified the major threat to Mahamyaing as illegal logging. It is

understood that officers typically prosecute 2 to 3 cases a month for small fines; patrols are conducted irregularly. Water is fairly scarce at the lower extent of the reserve.

No community engagement has been conducted at Mahamyaing as the people are very scattered and hence hard to engage. Officers are trying to establish community forests and irrigation systems within the reserve in collaboration with Friends of Wildlife. These projects are typically small scale.

Management Details

The FD officer had prepared a list of equipment required to run the Mahamyaing wildlife reserve office. He will be able to generate costing for each set of equipment and the salaries of the park wardens.

A2 Consultation Results Summary (November 2017)

Consultation details	
Date	15 November 2017, Wednesday 10am
Location	STC office, Yangon
Consultation	Ngwe Lwin and Ana Komericki (Flora and Fauna international), WCS – Absent due to illness, IUCN – Absent, WWF – Absent
Personnel Present	
STC	U Zee Lum, Mayzun aungthu, Aung Khaing Nyi
ERM	David Nicholson, Adam Stickler

ERM provided an introduction and background to the project and the Biodiversity Action Plan (BAP) and sought input from NGO representatives on the content, and implementation of the BAP.

FFI asked: Is the entire limestone ridge subject to mining concessions? Are the potential site endemics at risk from non IFC funded projects? ERM responded that IFC PS6 requires the ESIA to assess cumulative impacts; other companies will be required to assess their impacts on fauna and flora values and the Myanmar Government will assess these projects under the EIA Regulation. STC is responsible for managing species that they potentially impact due to their operations.

FFI asked if caves were identified. ERM responded that surveys were conducted and concluded that there were no caves onsite.

FFI asked if there are cave/subsurface watercourses where the rivers cross the roads. ERM responded that the assessment found that there was no water loss from rivers flowing throughout the site. STC provided additional information that this issue was not detected during site assessments.

FFI asked if the monitoring be carried out by educated staff. ERM responded that the NGO service provider will educate staff to undertake monitoring, STC will provide equipment.

FFI asked if there will be a management committee set up. ERM responded that the biodiversity offset management committee will include the NGO service provider, STC, the government, and a technical representative.

FFI asked if there will be an increase in capacity of extraction for the existing site? ERM and STC responded that the rate of extraction will remain constant for 25 years during the concession period. After which the project may move to subsurface mining.

Consultation details	
Date	17 November 2017, Friday 10am
Location	Park Royal Hotel, Nay Pyi Taw
Consultation	Nature and Wildlife Conservation Division of MONREC (NWCD), Ministry of Mines, NDC
Personnel Present	
STC	U Zee Lum, Kyaw Naing Soe, Aung Khaing Nyi
ERM	David Nicholson, Adam Stickler

STC provided an introduction from to the plant project manager Kyaw Naing Soe; in Myanmar language followed by an introduction to the BAP by ERM which included details of STC's commitments to the BAP.

Survey Methodology

The Nature and Wildlife Conservation Division of MONREC (NWCD) asked what the survey methodology by specialists is. ERM responded in further detail the survey techniques and referred NWCD to the ESIA and sub consultant reports.

NWCD asked how are secondary impacts by project being avoided? ERM provided further explanation from the impact summary focusing on secondary effects, including air and noise emissions on wildlife. NWCD was referred to the assessment within the ESIA.

NWCD asked how was the offset area identified. ERM explained that the process took into account a number of considerations such as how well the offset site be managed in the future, how well the offset site matched the biodiversity of the project site and the existing institutional frameworks available for conservation. The habitat area was devised using an internationally recognized metric (Habitat Hectares). The obligation for funding is currently being determined and is based on literature prepared by Flora and Fauna international on protected area management in Myanmar.

NWCD asked if the project could share the species data from the Paunlaung Pyaladin Cave Wildlife Sanctuary and also all reports of flora and fauna from the project site. ERM responded that this information was provided in the ESIA and is also disclosed on the IFC website.

NWCD asked if any social survey been carried out. ERM responded that social surveys had been, including stakeholder engagement and an ecosystem services survey. During the implementation of the BAP the first surveys will also be focused on community engagement.

NWCD asked if there is data on the local dependency on the forest by local people. ERM responded that there is a process to determine livelihood dependence from survey upon implementation. The project will restrict access around the project site but the offset site

will have unrestricted access for the local community. The purpose of the offset is to change attitudes and behaviors to favor wildlife protection whilst sustaining livelihoods.

NWCD recommend more consultation process in the plan for social engagement. This was noted by ERM.

NWCD asked for detail on who will conduct monitoring. ERM responded that monitoring will be conducted by STC, some species will need specialist advice from the NGO service provider and STC employees will be trained to do this in the medium to long term. The methodology is detailed in the BAP.

NCWD recommended that there is no overlap with the actions in the BAP with other conservation project in the vicinity. ERM responded that other conservation projects are known and NCWD are invited to provide other comments if NCWD know of other programs/projects.

NCWD asked if there any plan for the replanting of the lost forest that has been removed from the site within the 25year period. STC responded to this question and are in the process of replanting areas of forest and there are already forest offset areas as required under the Forestry Act.

NWCD asked what the next steps in the process are. ERM responded that the STC will be working on how the procurement process for the NGO service provider will work. ERM will assist with the production of the Terms of Reference (ToR) and it will be reviewed by the IFC. It is expected that the procurement process will occur in 3 to 6 months. ERM requested comments to be provided within 3 weeks on the draft BAP.

Consultation details	
Date	29 November 2017, Wednesday 3pm
Location	MCRB office, Yangon
Consultation	Vicky Bowman (Director MCRB), Aung Kyaw Soe (Extractives Program Director) On Phone: Conrad Savy (IFC)
Personnel Present	
STC	U Zee Lum
ERM	David Nicholson, Adam Stickler

Introduction of MCRB, ERM and STC person attending the meeting occurred.
The following points were made during the presentation:

Offset plan implementation

How will the funding of the protected area work? MCRB is concerned and recommends that the Project must be careful not to inflate government salaries.

ERM commented that this can be funded through an NGO service provider but the details are still being worked out and STC will develop a MoU with the government. ERM/STC will take on your recommendations and will be looking into this but it is noted that there will be a need to comply with the law of the country.

A robust and detailed ecological accounting system is being used to determine the sum of money to be spent on the offset. ERM are still going through this assessment so there currently are not any details. Efforts will be made to ensure the existing financing from the government is not replaced.

Note that the candidate offset areas are much larger than the expected offset. It is not expected that the company is responsible for the entire area so there is a division of responsibility with STC and the Myanmar government. If the protected area was already fully funded then STC or other company would not be able to use it as an offset.

Who are the users of the offset area defined at the Panlaung-Pyadalin Cave Wildlife Sanctuary?

ERM/STC responded that the peoples are Burma and Karen; the villages were formally camps but have recently expanded into villages. The offset is not fixed as yet, the Government will engage with local community and indigenous people to further define the area.

MCRB recommend that there could be tensions about creating the extension of the wildlife sanctuary from experience in other parts of the country and further stresses the importance of consultation in the design of the offset area. ERM/STC may however find that there is less tension in this area as the communities are not long term settled.

Concern over local loss of species
IFC commented that they take a population level view, may lose individuals of the species at the project side but the aim is to protect a species at the habitat level.

Concern over Tiger habitat identified
ERM have discussed about this with FFI – it is a landscape level designation (tiger conservation landscape) which signifies historic range. No data has been found for presence of tiger, community interviews are a tool to determine presence for this species, and this and camera trapping are part of the monitoring plan.

Is there an opportunity to promote tourism to the sanctuary?
This is possible but the access is very difficult to do well. Co-financing any offset by this means is very valuable but tourism can have its own impacts and this will have to be balanced. This will be looked at more through further research and community engagement.

Local community access, land use and livelihoods restoration
Have we looked at community impact at local business?
STC have a community relations committee, local land producers are gradually changing their business around the site away from the use of artisanal lime kilns and illegal logging in the vicinity of the site.

Do you have buy in from neighboring business?
The neighboring companies have been informed and it is up to them to implement the policy. STC have only the control of their concession.

MCRB recommended that if STC work with them to help influence the projects to implement policies.

MCRB recommended that UN REDD should be used to harness company engagement.

Community engagement
Recommendation for the social engagement - do not become disengaged over time.
STC have a public information center and run clinics at the location to give information to the community. The relationship with the local community is active in surrounding villages. A further community engagement plan will be developed and local training will be undertaken. Survey training, controls and enforcement mechanisms come later. Market monitoring surveys will also be undertaken.

Next steps
The Project is still going through the process of finalising the documentation and undertaking consultation. The intent is now to start filling in gaps through consultation. The Project will continue to update the BAP, as part of an ongoing process.

The Project is very keen to have lessons learned sessions with all players when the project is more up and running.

There is a recommendation to talk other parties, other more socially focused groups; there may be further concerns from these groups around the use of coal mining.
MCRB recommends that the IFC takes this on board on the social side. IFC commented that there is a need to get the BAP right with conservation Stakeholders first for the BAP to make it robust before STC/ERM go out into a more public arena.

ANNEX B – Procedure for Establishment of a Natural Area under the Myanmar Forestry Law (Unofficial Translation)

Ministry of Natural Resource and Environment Conservation

Forest Department

The Procedure of Establishment of Natural Area

Natural Area and Forest Land

"Natural Area" means the area determined under the Law for the purpose of Protection and Conservation of wildlife, ecosystem or significant landscape for their sustainment. (The Protection of Wildlife and Conservation of Natural Areas Law, 1994)
"Forest Land" means reserved forest formed under the Forest Law and protected public forest notified under the Law.

Object of Establishment of Nature Reserve

(c) to implement the policies of environment conservation and biodiversity conservation of the State;
(d) to protect ecosystem and its wild plants, wild animals, living and non-living organism, seasonally migratory animals, natural plants and animals found in Myanmar; and
(e) to develop the natural science activities.

Categories of Natural Area of Myanmar

Categories of Natural Area under The Protection of Wildlife and Conservation of Natural Areas Law (1994) and The Protection of Wildlife and Conservation of Natural Areas Rules (2002) are as follows;

(a) Science Reserve Forest
(b) National Park
(c) Marine National Park
(d) Nature Reserve Forest
(e) Wildlife Sanctuary
(f) Geological Park/ Reserve Forest
(g) Other Nature Reserves identified by Ministry

Duties and Functions according to Categories of Natural Areas

The following duties and functions must be carried out according to categories of natural areas;

- **Within Science Reserve Forest**;
    1. Conducting the scientific research within area of land or water where the presence of unique living and non-living organism, geo-physical characteristics and species
    2. Assessing constantly the change of natural process

- **Within Natural Park**;
    1. Protecting and conserving to sustain the living and non-living organism; and conducting the harmless scientific research to the living and non-living organism and conducting the awareness raising activities;
    2. Allowing the public to the recreation zone determined;
    3. Effectively prohibiting the squatting and extraction which can damage the living and non-living organism and nature;
- **Within Marine National Park**;
    1. Protecting and conserving to sustain the marine living and non-living organism;
    2. Conducting the harmless scientific research to the marine living and non-living organism and conducting the awareness raising activities;
    3. Allowing the public to the recreation zone determined;
    4. Effectively prohibiting the squatting and extraction which can damage the marine living and non-living organism and nature;
- **Within Nature Reserve Forest**;
    1. Conserving the unharmed living and non-living organism and natural process for sustainability;
    2. Managing that local community can sustainably use without impacting natural resources;
    3. **Within Wildlife Sanctuary**; Protecting and conserving the wildlife animals including critically protected animals without disturbance, managing for the habitat sustainability, and protecting and conserving the seasonally migratory birds in sanctuary;
    4. **Within Geological Park/ Reserve Forest**; Protecting and conserving the unique nature and well-known heritage of culture; and providing the recreation areas for the public in the area; and
    5. Planning to develop the ecotourism according to the types of the Natural Areas, and spending part of the income for the Natural Area development.

Formation of Natural Area

Establishment of Natural Area – In respect of establishment of the Natural Area, the minister of the Ministry of Natural Resources and Environment Conservation may, with the approval of the Government, identify and establish any categories of Natural Area in any areas by issuing the notification. Zoological garden and botanical garden can be established under sub-section (a), (b) of Section 8 of the Law. In order to determine and establish the Natural Area, the announcement of intention in advance must be made. The followings must be covered -

- Location, boundary, size of area;

- Types of Natural Area and Objective;
- Zoological garden or botanical garden;
- Prohibitions; and
- Formation and functions of Initial Examination Body.

Prohibitions - From the date of announcement of the intention to establish the Natural Area, the following prohibitions must be mentioned in the order of the Union Minister of Ministry of Natural Resource and Environment Conservation.

- Building a new building;
- Catching, killing, wounding, possessing, selling, transporting or transferring of wildlife animals or part of those; destroying, cutting, extracting and collecting of natural plants and forest resource;
- Digging in the land and doing clearance of the land;
- Planting crops;
- Using as a pasture;
- Setting up fire;
- Fishing;
- Hunting; and
- Water and air pollution, damaging the water flow or poisoning the water, possessing or discharging hazardous materials or waste.

Initial Examination Body – the Union Minister of Ministry of Natural Resource and Environment Conservation must form the Body with the township administrator of General Administration Department as Settlement Officer and township forest officer and township land record officer as members and other required representatives. The Body must carry out the following steps;

- **Settlement Form (1) –** disclosure on the Establishment of Natural Area and application of entitlement to the all stakeholders by Settlement Officer/relevant township administrator assigned by Ministry of Natural Resource and Environment Conservation.
- **Settlement Form (2)** –Submitting the recommendation letter to establish the Natural Area and the completeness of settlement activities by Forest Settlement Officer
- **Settlement Form (3) –** coordinating with relevant township, village, ward administration departments to avoid the impact on the entitlement of the people and the applications of individual entitlement within 90 days from the announcing date of Initial Examination Body
- **Settlement Form (4) –** when there is submission (from the community) for matters included in Settlement Form (3), to investigate the required witnesses and relevant documents under the civil law, and prepare and present the list of compensation the government would allow

- **Settlement Form (5) –** when there is submission for the land use, to investigate whether affect the biodiversity or not in the whole submission or a portion of submission; and to submit the notification (draft) with comment - included accurate location, size of area, potential boundary - to Director General of Forest Department.

Issuing of Notification of Determination and Establishment of Natural Area – After reviewing the Report (prepared in accord with law) submitted from Initial Examination Body, Director General must submit (the report) to the Union Minister of Natural Resource and Environment Conservation with (his/her) comment in order to determine and establish the Natural Area under the Section 8 of the Law. After reviewing (the report), the Union Minister must submit (it) to the Union Government with (his/her) comment. With the approval of the Government in exercise of power conferred under the law, the order/notification of the Establishment of Natural Area must be issued. The notification must be disclosed and kept in the Gazette in order to inform the relevant departments, organizations and all stakeholders.

Reformation, Alteration and Cancellation the Category of the Natural Area – In Respect of the entitlement of reforming, altering and cancelling the category of the whole or a portion of the Natural Area, the Union Minister of Ministry of Natural Resource and Environment Conservation with the approval of the Government must carry out. The case file must be established through scrutinizing the following steps in order to present to the Union Government.

In respect of the application for handing over or cancel the whole or a portion of the Natural Area, Region/State Forest Department must be assigned to do field work on the settlement within the Natural Area and land use.
Region/State Forest Department presenting to the Region/State Government must form the Field Visit Survey Body which includes relevant departments.

The report attached with lists of land use and land own, record, map, photo of Field Visit Survey Body must be submitted to Director General of Forest Department via State/Region Forest Department.
In respect of converting the Natural Area into other land use, Director of Forest Department must report to the Union Minister with (his/her) comment.
In respect of converting the Natural Area into other land use, the Union Minister must report to the President Office attached with the meeting's decision of the Union Minister Office Management Committee.

If the President Office approves to convert the Natural Area into other land use, the case file must be submitted to the Union Government and the approval of the Government is required.

The Union Minister with the approval of the Union Government's meeting decision may publish a notification to reform, alter and cancel the category of the whole or a portion of the Natural Area.

Reformation of Natural Area – After issuing the notification of cancelling the whole or a portion of the Natural Area in accord with the procedures above under the law and rules, Director General of Forest Department must submit the case file established with attachments of the required map and boundary of the Natural Area to the Union Minister Office for reforming the Natural Area.
Forest Department

References

The Protection of Wildlife and Conservation of Natural Areas Law, 1994
The Protection of Wildlife and Conservation of Natural Areas Rules, 2002
Wild Animals to be Protected from Extinction in Union of Myanmar, 1994

ANNEX C: No Hunting – No Poaching Posters

NO

HUNTING & POACHING

Illegal hunting and poaching are serious threats to the future of many animals and plants. Many species are important in the normal functioning of the natural ecosystem. Their decrease could lead to habitat degradation. Many local communities rely on natural resources in their daily lives– illegal poaching leads to the unsustainable removal of these resources and threatens livelihoods. Poaching also fuels the illegal wildlife trade which has ties to criminal networks and impacts the security of a region.

Our Commitment

Shwe Taung Group is committed to sustainability and protecting the environment in which we operate. Illegal poaching practices are strongly prohibited on our premises. Offenders will be reported to the Forest Department and local police. Any employee caught engaging in illegal poaching or hunting will be suspended and their employment terminated if necessary.

PROTECTING OUR WILDLIFE

Apache Cement Plant

The forests around you are home to several beautiful and interesting animals. Sadly, they unsustainably hunted or are targets of illegal poachers. Shwe Taung Group seeks your cooperation in protecting these animals. If you see any of the animals below, please notify us at <INSERT MOBILE> with the location, date and number of individuals seen. We will use this information to improve our operations to be more sustainable and wildlife-friendly.

Manis pentadactyla
Chinese Pangolin

The shy **Pangolin** lives in forests and feeds on termites. It is heavily hunted for the illegal wildlife trade, and is critically endangered. There are heavy penalties for hunting and selling this animal.

Macaca assamensis
Assamese Macaque

The **Assamese Macaque** can be found on limestone forests. The primary loss is habitat loss but hunting also occurs. It is legally protected in Myanmar under the 1994 Wildlife Protection Law.

Trachypithecus phayrei spp. *Shanicus*
Shan State Langur

The **Shan State langur** is the eastern subspecies of the endangered Phayre's langur. It is only known from a few protected areas in Myanmar. The survival of the species is threatened by habitat loss and hunting for meat and traditional medicine.

Nycticebus bengalensis
Bengal Slow Loris

The presence of the **Bengal Slow Loris** signals a healthy ecosystem. It is a seed disperser and pollinator, and prefers forests with dense canopies. Unfortunately, it is severely threatened by habitat loss and the wildlife trade.

Ratufa bicolor
Black Giant Squirrel

The **Black Giant Squirrel** is one of the largest squirrels in the world. It is very shy and rarely comes to the ground. Human-driven forest clearance and hunting has led to a decline in the population of this species.

Arctonyx collaris
Hog Badger

The **Hog Badger** is a curious species with a pig-like snout. It is not very wary of people. The decline in numbers of Hog Badger is driven strongly by hunting for the wildlife trade and traditional medicine.

PROTECTING OUR WILDLIFE

Paluzawa Coal Mine

The forests around you are home to several beautiful and interesting animals. Sadly, they unsustainably hunted or are targets of illegal poachers. Shwe Taung Group seeks your cooperation in protecting these animals. If you see any of the animals below, please notify us at <INSERT MOBILE> with the location, date and number of individuals seen. We will use this information to improve our operations to be more sustainable and wildlife-friendly.

Manis pentadactyla
Chinese Pangolin

The shy **Pangolin** lives in forests and feeds on termites. It is heavily hunted for the illegal wildlife trade, and is critically endangered. There are heavy penalties for hunting and selling this animal.

Bos gaurus
Gaur

The **Gaur** is a stunning animal with its massive size and impressive horns. It is highly adaptable and can live in disturbed habitats. It has been heavily targeted for the illegal wildlife trade. It is legally protected in Myanmar.

Trachypithecus phayrei spp. *phayrei*
Phayre's Langur

Phayre's Langur has a preference for good quality forests and consumes mainly leaves, fruits and bark. Hunting and habitat loss are main causes for its decline. It is illegal to hunt this species in Myanmar.

Ursus thibentanus
Asiatic Black Bear

The **Asiatic Black Bear** is an important seed disperser in forests., helping to maintain the healthy life cycle of important plants. The illegal wildlife trade and habitat loss are key threats to the bear.

Hoolock hoolock
Western Hoolock Gibbon

The **Western Hoolock Gibbon** is found west of the Chindwin River in Myanmar. It lives in forests and enjoys a diet of fruits. Habitat loss and hunting are the main threats to these charismatic animals.

Prionailurus viverrinus
Fishing Cat

The **Fishing Cat** is a secretive feline well adapted to catching fish. It is typically found in densely vegetated areas along streams and rivers. Wetland destruction has reduced the habitat for this beautiful animal.

ANNEX D: Anti-Illegal Logging Poster

APACHE
PORTLAND CEMENT
THE STRENGTH TO BUILD

NO

ILLEGAL LOGGING

Illegal logging causes many environmental, economic and social problems. It destroys important forest environments, reducing wildlife populations and increases soil erosion into rivers. This has a negative impact on the livelihoods of many people who depend on a healthy forest environment and clean rivers for water.

Our Commitment

Shwe Taung Group is committed to sustainability and protecting the environment in which we operate. Illegal logging practices are strongly prohibited on our premises. Offenders will be reported to the Forest Department and local police. Any employee caught engaging in illegal logging will be suspended and their employment terminated if necessary.

ANNEX E: Injured Wildlife Management Protocol

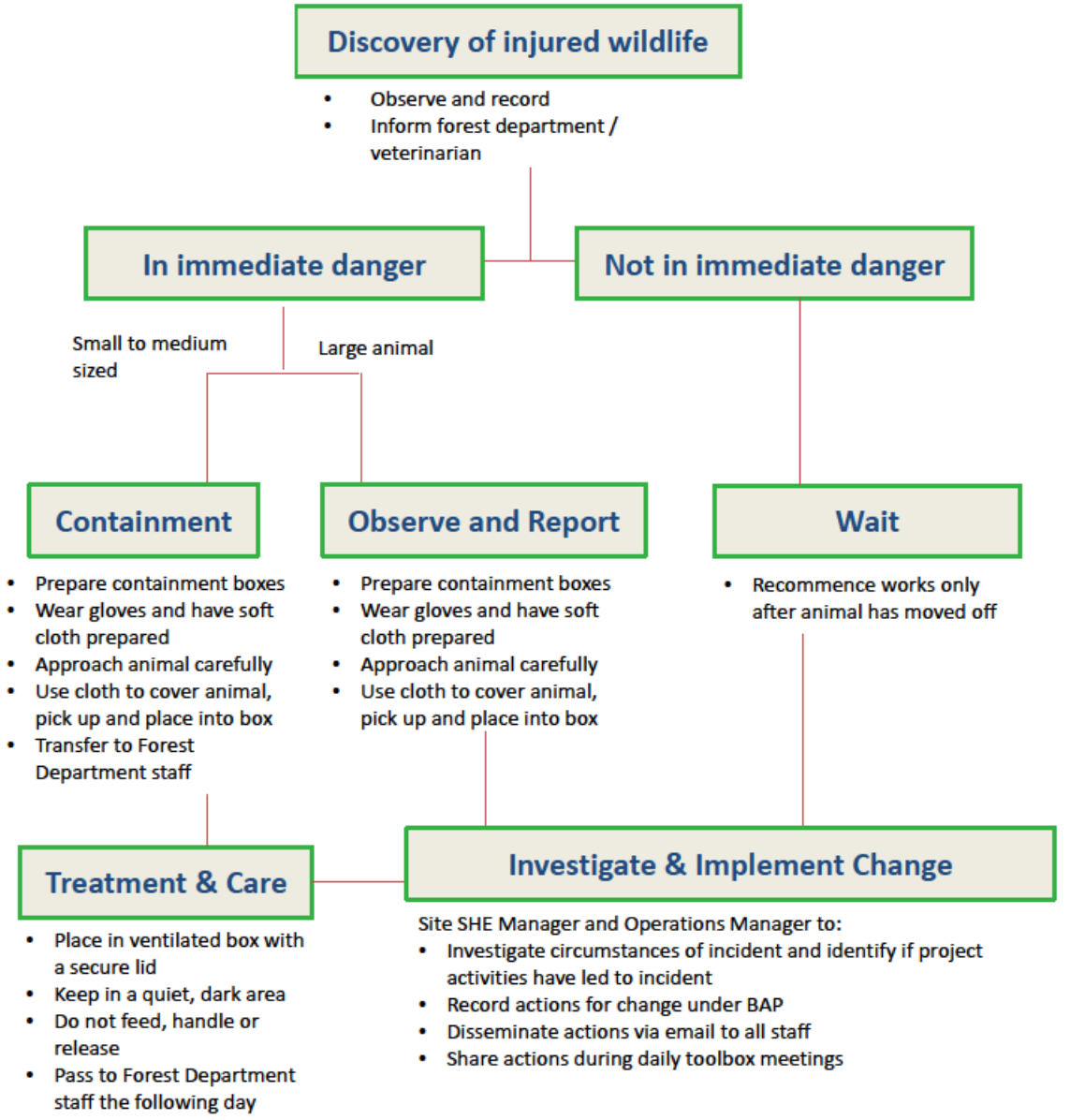
Title	Injured Wildlife Management Protocol
Document Reference	BAP_Plan IWNP V1
BAP Action Item	3 - *Develop protocols for the management of injured wildlife and identifying management of change measures.*
Last Updated	4 December 2018
Objective	A document outlining the appropriate procedures to undertake when injured wildlife is encountered within the project area

Event	Action
Upon discovery of injured animal	• Record the date, time, location, condition of animal and circumstances concerning the incident, including photographic evidence wherever possible. • Stop work in affected area. • Observe from a distance what the animal is doing. • If NOT in immediate danger, wait for animal to move off before carrying on with work. • If animal is in immediate danger or clear distress, assess feasibility of capture depending on its size, location and safety of capture to both animal and staff. • Alert forest department staff on incident and arrange a same-day appointment for transfer of animal to them.
Preparation for containment	• All staff involved in the containment exercise should be equipped with a pair of gloves and towel/gunny sack that is appropriately sized to cover the animal. • A vehicle should be immediately ready to transport the animal back to site without delay.
Management of small to medium sized injured animals, egg. Birds Bats Rodents Pangolins Slow loris Gibbons and langurs	• An adequately sized covered box or cage should be prepared to contain the animal immediately. The bottom of the box/cage should have towels or rags placed at the bottom to protect feet of animals. Use separate boxes for individuals, never place two animals in the same container. • Approach the animal from behind slowly and carefully, pausing when needed to let the animal calm down and habituate to human presence • When picking the animal up, use a towel to gently wrap around its back (and wings, if bird or bat) and cover the head. Keep voices down to avoid further stress to the animal.
Management of large injured animals, egg. Gaur Dhole Asiatic black bear	• Inform the forest department or veterinarian as soon as possible. • If the animal stays in place, cordon off the area and stop all work. Allow the forest department staff/ veterinarian to assess the feasibility of treatment. • If the animal moves off, record which direction it is moving towards and consult the forest department staff on next steps.

Event	Action
Treatment of small to medium sized injured animals	• Pass the animal to the forest department staff. • If the animal must be kept overnight, place it in a ventilated box with a secure lid. Keep it in a quiet, dark area and do not attempt to feed, handle or release it. Transfer the animal to the forest department staff the following day. • Discard all boxes used for transporting injured wildlife to avoid transfer of disease. For cages, clean out thoroughly before re-use. • All staff involved in the capture to wash and sterilize their hands immediately upon return from site. • All clothes worn during the capture should be washed the same day and not re-worn.
Post-incident	• Follow up with forest department/ veterinarian on condition of animal and date of release. • Environment Process Senior Executive to investigate further circumstances of incident • Interview workers on site that day and record their observations • Identify potential activities that could have led to animal injury • If injury attributed to project activities, identify corrective actions to avoid future incidents with Process Senior Executive • Record actions formally under BAP Management-of-Change and Incident Reporting System • Process Senior Executive to disseminate actions via email to all staff and share during daily toolbox meetings

INCIDENT REPORTING FORM			
Submission Details	Name:	Designation:	Date:
Type of Incident	Wildlife Sighting Injury/Roadkill Others	Health & Safety	Illegal Activity
Incident Details	Date:	Time:	Location/GPS:
Description of Incident *Include photographs if available*			
Eyewitnesses			
Condition of Animal and Suspected Cause of Injury *Include photographs if available*			
Actions Taken	Action & Date Taken:		Involved Personnel:
Forest Department Staff Contact Details			
Additional Comments			
Title	Communication Protocol		
Document Reference	BAP_Plan 1.2		
BAP Action Item	3, 4, 22		
Last Updated	4 December 2018		
Objective	A document outlining the appropriate chain of communication for incident reporting during project operations		

INJURED WILDLIFE PROTOCOL



Post-Incident

- Wash hands with soap thoroughly
- Wash all clothes worn on the day of animal handling
- Discard all boxes used for transport or clean cages thoroughly
- Follow up with Forest Department on condition of animal and estimated date of release

INCIDENT REPORTING COMMUNICATION CHAIN CONTACT DETAILS		
Designation	**Name & Address (where relevant)**	**Contact Number**
Senior Manager		
SHE Site Manager		
Process Senior Executive		
Security Supervisor		
Forest Department Warden 1		
Forest Department Warden 2		
Veterinarian		
Police Department Officer 1		
Police Department Officer 2		
Hospital		

Key Steps of Communication

Upon incident occurrence, the SHE Site manager should be notified immediately. The nature of the incident (wildlife sighting/injury, health and safety, illegal activity) and location of the incident should be provided.

Depending on the nature of the incident, the SHE Site manager will escalate the response to the **first responder**:

- Wildlife Incidents: The Process Senior Executive will be informed so that he/she can make decisions to halt work or cordon off the affected area.
- Health and Safety Incidents: The Process Senior Executive will be informed so that he/she can make decisions to halt work or cordon off the affected area.
- For Illegal Activity Incidents: The Security Supervisor will be informed so that he/she can make decisions to secure the site or detain suspects.

Depending on the severity of the incident, the first tier responders together with the SHE Site manager will decide whether there is a need to alert the **second tier of responders**:

- Wildlife Incidents: Forest Department staff and/or a veterinarian should be contacted next.
- Health and Safety Incidents: The hospital will be contacted in the event of a serious injury to make preparations to receive individual.
- For Illegal Activity Incidents: Forest Department staff may be pulled in if illegal poaching or logging activities are suspected. As a final resort, the police department (**third tier responder**) may be notified if suspects are aggressive or activity is a prosecutable offence.

The SHE Site Manager will direct the incident reporting process.

The incident report will be reviewed by the senior manager and approve any corrective actions that do not have a serious impact on project productivity.

The change will be implemented on site.

ANNEX F – Wildlife Shepherding Protocol

Title	Wildlife Shepherding Protocol
Document Reference	BAP_Plan WSP V1
BAP Action Item	9,10,11
Last Updated	4 December 2018
Objective	A document outlining the steps to be undertaken as part of a responsible wildlife shepherding protocol to be applied at the Coal Mine and Mudstone Quarry

Wildlife Shepherding Team Requirements

All personnel involved will be briefed on the details of this plan and their respective roles before field activities begin. Personnel will also be equipped with mobile communication devices on the field to ensure that lines of communication are maintained during field activities and that the appropriate persons (e.g. veterinarians, wildlife handlers) are able to respond to exigencies in a timely manner.

Wildlife Shepherding Protocol

Step	Activity Description
General approach to wildlife shepherding (scheduled during daylight hours only i.e. 8am to 6pm)	
1	Installation of barriers (if required), which will function as a drift fence to guide target terrestrial fauna in the intended direction of movement and as a barrier to prevent wildlife displacement onto adjacent roads.
2	Systematic pattern of walking through the site, starting from the area furthest from and then gradually moving towards the identified refuge area, in order to shepherd wildlife in an intended direction of movement towards adjacent refuge habitats.
3	In conjunction with (2), the site will be carefully surveyed to check for the presence of target fauna species and any active dens.
4	Site inspection by an ecologist to ensure that no target fauna and active dens remain.
5	Closing of gaps in the barriers (if required) as soon as practicable to prevent target terrestrial fauna from returning to the site.
*To note	Steps (2) and (3) to be carried out repeatedly over a course of up to three weeks for a site no larger than twenty hectares.
General approach for target fauna encounters *Highly mobile fauna for which a passive shepherding approach is expected to be effective.*	
6a	Personnel to remain in place to allow fauna to move on their own accord. Generation of mild human noise disturbance (e.g. talking loudly) may be used to encourage fauna movement. However, no attempt should be made to capture or handle these species, unless the animal is visibly injured in which case experienced wildlife handlers will carefully capture the animal for immediate veterinary attention. If any individual fauna does not move on its own after sufficient time (i.e. up to one hour) has passed, the area where the individual is located should be GPS-marked and left overnight to provide additional opportunity for the individual to move on its own accord. Personnel shall return to the GPS-marked location on the following day to inspect the area. This process will be repeated until the individual has moved.

Step	Activity Description
Fauna for which a passive shepherding approach is expected to be unsafe and/or ineffective in guiding the individual fauna to move in an intended direction.	
6b	A capture-and-release approach will be needed to ensure safe relocation of these fauna from the site prior to construction. Experienced wildlife handlers will carefully capture the animal for subsequent assessment and microchipping (where safe and possible) by a veterinarian. Where sensitive fauna (i.e. Chinese Pangolin) and venomous snakes from are concerned, their capture shall only be carried out by designated wildlife handlers who have been trained in the appropriate handling techniques.
Arboreal and aerial species *Able to continue utilizing remnant habitats on the site during construction, and will not be excluded by the installed hoarding.*	
7	An ecologist shall inspect the tree for the presence of fauna, inhabited tree hollows, and nests.
8	In the event that the presence of arboreal mammals and herpetofauna, birds and/or bats are detected on the tree, tree felling or transplanting must be postponed until the animal has left the tree on its own accord.
9	In the event that an inhabited tree hollow is identified, tree felling or transplanting must be postponed until the animal has left the hollow on its own accord and the entrance to the hollow has been sealed to prevent re-entry.
10	Tree felling or transplanting shall not occur during the prime breeding season for local avifauna. In any case, if active nests are detected on the tree, nests shall be left undisturbed until nesting activities have been completed (i.e. the young have left the nest). In addition, inactive nests shall be removed to minimize the possibility of a new nesting attempt. Tree felling or transplanting shall occur only when no active nests are present on the tree.
11	Notwithstanding the aforementioned steps, after tree felling has occurred, an ecologist shall thoroughly search the fallen tree for any injured or trapped fauna that may have gone undetected. In the event that injured or trapped fauna are found, immediate veterinary attention shall be administered.

ANNEX G: Community Engagement Protocol

Title	Community Engagement Guidance
Document Reference	BAP_Plan CEG V1
BAP Action Item	13
Last Updated	4 December 2018
Objective	A document outlining the key topics for discussion with key community members to maintain engagement throughout project operation.

Objectives for Continued Engagement

- Continue raising awareness of the conservation value of the habitats within the Project and surrounding areas;
- Encourage local people not to conduct illegal logging activities and poaching and discuss alternatives;
- Provide a forum for the communities to ask questions, express their concerns and provide comments. Ensure monitoring of grievances and participation of all the groups of the population, including the most vulnerable ones, to the engagements. and
- Update local communities on developments within the Project that might be relevant to them.

Community Survey and Stakeholder Engagement Activities

(a) Local Community Engagement (Focus Groups and Key Stakeholder Interviews)

A detailed socio-economic survey of primary community stakeholders is to be undertaken. This is to understand who the local community are composed of; income; education; health; natural resource use; access patterns; dependencies; demographics; and socio-cultural makeup.

The location of the villages is shown in *Figure G.1* and *Figure G.2*. The names of the villages are shown in *Table G2* below.

Note that not all of these villages will require engagement. Villages should be chosen that are in close proximity or are within the protected areas and/or along major transport routes. Intelligence should be gathered on villages that pose a risk to conservation due to illegal activities.

(b) Outsider Consultation (Key Stakeholder Interviews)

Engagement with outsiders e.g. poachers (where possible); timber traders; law enforcement officers; forestry officials; truckers and other service providers is to occur.

(c) Market Surveys

Visit the local markets where forest products and wild animals are traded. Understand how the any illegal wildlife trade and/or logging value chain works and who the key players to engage or target are. The surveys are to be conducted discretely by Myanmar locals so as to avoid suspicion.

(d) Stakeholder mapping

Map out the information identified from (a) through (c) to identify the key stakeholders, where are they located, how they access/use the protected areas, and how they interact with one another. The level of importance in terms of implementation of the conservation activities related to this BAP requires to be ranked.

(e) Action Plan

Identifying Champions

Identify people from each such community to become "paid volunteers" i.e. people who genuinely want to protect the sanctuaries, who will get paid a reasonable stipend by this budget to act as sanctuary patrols for a number of years. Also identify/assign ambassadors in each community, who will organize events in local language to educate community members and their kids about the need to protect the forests. Use localized communication methods such as community theatre etc. to make it fun and accessible.

Benefits Sharing

Highlight those stakeholders who derive income or similar benefits from the sanctuaries/protected areas; and formulate actions to help the identified local people develop viable alternative income sources. Provide transition strategies where the Project can support the change of livelihood (for e.g. providing chickens and henhouse; facilitating sustainable farming/forestry, etc.)

Managing illegal activities

To manage illegal activities, work with law enforcement to strategically enforce the law, monitor and curb animal/timber/NTFP trade at key market locations, etc. undertake enforcement action against repeat offenders. All legal action must follow due legal process.

Communications Program

As part of local communications, include a broader publicity campaign to let people know about the offset program. Post local language and/or pictorial flyers at market locations, shops, etc. near the offset areas/protected areas. Local radio broadcasts and community workshops can be held.

Past Consultations

A log of stakeholders consulted by ERM during the Supplementary ESIA phase is presented below in *Table G1*. This forms a baseline group of stakeholders to be engaged for future consultations.

Table G1 List of previous consultation undertaken by ERM

Date	Village	Village Tract	Township	Activities Carried Out
17 Jan 2017	Kubyin & Pyi Nyaung	Pyi Nyaung	Tharzi, Mandalay	Meeting with village leaders 2 socio-economic surveys
18 Jan 2017	Kubyin	Pyi Nyaung		25 households surveyed
19 Jan 2017	Pyi Nyaung	Pyi Nyaung		25 households surveyed
20 Jan 2017	Kubyin & Pyi Nyaung	Pyi Nyaung		2 townhall meetings, 6 group discussions
22 Jan 2017	Paluzawa	Ywatha	Kalaywa, Sagaing	Townhall meeting, 11 households surveyed, socio-economic survey, 3 group discussions
23 Jan 2017	Nanmawke	Ma Sein		Townhall meeting, 19 households surveyed, socio-economic survey
24 Jan 2017	Chaungzon	Ma Sein		Townhall meeting, 20 households surveyed, socio-economic survey
25 Jan 2017	Nanmawke & Chaungzon	Ma Sein		6 group discussions

Table G2 List of Villages within 20km of the Biodiversity Offset Sites (Limestone Concession)

No	Name	Lat	Long
1	Kyi Taing	21° 11' 39.336" N	96° 18' 58.248" E
2	Kan Swei	21° 11' 32.208" N	96° 18' 44.748" E
3	In Taing Thar	20° 55' 20.964" N	96° 12' 24.192" E
4	Yae Twin Gyi	20° 55' 22.620" N	96° 11' 31.488" E
5	Myet Ni Kyin	20° 54' 29.268" N	96° 16' 57.288" E
6	Hpoe Than Daing	20° 56' 48.444" N	96° 16' 15.168" E
7	Yin Mar Pin	20° 45' 18.576" N	96° 18' 46.728" E
8	Yae Boke Son	20° 48' 7.560" N	96° 20' 43.800" E
9	Pyi Nyaung (Kar)	20° 49' 14.988" N	96° 23' 49.416" E
10	Pyi Nyaung (Ya Htar)	20° 49' 19.668" N	96° 23' 54.420" E
11	Ku Pyin	20° 53' 27.168" N	96° 23' 30.084" E
12	Oke Kyin	20° 48' 17.460" N	96° 22' 20.316" E
13	Kyat Sa Khan	20° 48' 56.628" N	96° 26' 43.008" E
14	War Ywet	20° 53' 54.672" N	96° 29' 42.792" E
15	Kyauk Taw (North)	20° 59' 7.044" N	96° 18' 27.504" E
16	Nwar Ban Gyi	21° 11' 50.748" N	96° 24' 49.824" E
17	Pway Na Hpar	21° 12' 5.220" N	96° 25' 37.128" E
18	Kyauk Hmyaung	21° 12' 47.952" N	96° 28' 42.852" E
19	Ka Zei	21° 12' 1.764" N	96° 28' 50.772" E
20	Ka Pyin	21° 11' 22.092" N	96° 30' 13.860" E
21	Kyauk Gu Pyin	21° 13' 55.308" N	96° 26' 50.964" E
22	Sin Net Chaung	21° 14' 0.384" N	96° 26' 34.800" E
23	Inn Kone	21° 8' 56.832" N	96° 26' 29.076" E
24	Thein Kone	21° 13' 51.564" N	96° 30' 7.308" E
25	Kyan Taw	21° 8' 24.648" N	96° 30' 55.836" E
26	Yae Chan	21° 6' 39.924" N	96° 30' 57.960" E
27	Tat Kone	21° 5' 53.808" N	96° 30' 35.352" E
28	Oke Twin	21° 10' 43.644" N	96° 30' 52.308" E
29	Kyauk Pon	21° 9' 6.804" N	96° 29' 16.656" E
30	Thit Seint Pin	21° 8' 9.708" N	96° 29' 1.932" E
31	Inn Hla	21° 7' 12.648" N	96° 30' 2.376" E
32	Hta Min Paung	21° 8' 57.264" N	96° 30' 58.032" E
33	Nyaung Aing	21° 5' 51.216" N	96° 28' 8.760" E
34	Let Pan Pin	21° 7' 31.980" N	96° 27' 20.124" E
35	Pein Hne Kone	21° 4' 51.240" N	96° 27' 30.636" E
36	Nyaung Hpyu Yoe	21° 4' 12.972" N	96° 28' 59.952" E

No	Name	Lat	Long
37	See Ne Yoke	21° 4' 21.216" N	96° 27' 55.656" E
38	Inn Gyi	21° 4' 40.260" N	96° 28' 25.680" E
39	Lel Kaing	21° 5' 43.008" N	96° 26' 11.868" E
40	Hmyar Ka Lay	21° 8' 29.040" N	96° 24' 57.780" E
41	In Taw	21° 6' 16.380" N	96° 25' 18.660" E
42	Hsat Chan	21° 2' 4.992" N	96° 26' 59.100" E
43	Taung Poet Khaung	21° 3' 47.664" N	96° 26' 16.188" E
44	Te Lu	20° 59' 58.200" N	96° 28' 3.612" E
45	Taung U	21° 1' 14.664" N	96° 26' 23.856" E
46	Gway Pin	21° 2' 51.180" N	96° 26' 47.040" E
47	Ya Ne	21° 2' 7.224" N	96° 24' 3.564" E
48	Min Pa Laung	20° 55' 47.964" N	96° 27' 20.232" E
49	Nyaung Pin Thar	20° 58' 20.028" N	96° 19' 19.308" E
50	Myaing	21° 2' 59.964" N	96° 30' 49.212" E
51	Inn Khaung	21° 3' 37.188" N	96° 31' 18.084" E
52	Thit Say Kone	21° 3' 21.276" N	96° 28' 21.720" E
53	Nyaung Kone	21° 5' 11.400" N	96° 29' 46.284" E
54	Myauk Lut Kone	21° 1' 35.688" N	96° 31' 52.680" E
55	Lay	20° 59' 54.024" N	96° 31' 41.700" E
56	Kaing Su	21° 1' 17.976" N	96° 31' 9.984" E
57	Pyi Thar	21° 1' 51.348" N	96° 31' 3.864" E
58	Myin Wun	20° 53' 44.268" N	96° 32' 1.032" E
59	Taw Kyei	20° 58' 36.300" N	96° 31' 11.712" E

Table G3 List of Villages within 20km of the Biodiversity Offset Sites (Coal Mine Concession)

No	Name	Lat	Long
1	Paw	22° 55' 4.764" N	94° 51' 32.544" E
2	Ton	22° 57' 33.876" N	94° 43' 42.996" E
3	Pa Lu Za Wa	22° 52' 27.948" N	94° 51' 1.512" E
4	Thit Hpa	22° 53' 0.924" N	94° 50' 56.688" E
5	Auk Yae Twin	22° 52' 13.980" N	94° 49' 49.944" E
6	Gwayt Ngu	22° 52' 37.128" N	94° 50' 38.472" E
7	Aung Thu Kha	22° 51' 45.288" N	94° 50' 5.784" E
8	Taung Pyin Nge	22° 50' 25.008" N	94° 49' 8.256" E
9	Aik	22° 48' 38.844" N	94° 52' 44.976" E
10	Yin	22° 47' 10.752" N	94° 41' 50.424" E
11	Kone Thar	22° 47' 33.900" N	94° 42' 20.484" E
12	Kyauk Hlay Kar	22° 48' 53.244" N	94° 42' 59.364" E
13	Mi Chaung Twin	22° 48' 32.040" N	94° 40' 50.556" E
14	Kyaw Zin	23° 11' 24.180" N	94° 18' 22.752" E
15	Kya Khat Taw	23° 24' 50.184" N	94° 23' 2.112" E
16	Se Gyi	23° 23' 25.116" N	94° 22' 58.548" E
17	Kaing Shwe Taung	23° 13' 27.552" N	94° 19' 16.788" E
18	Thit Chauk	23° 11' 37.752" N	94° 15' 11.556" E
19	Thet Kei Kyin	23° 12' 4.968" N	94° 36' 35.928" E
20	Ka Toe	23° 9' 44.388" N	94° 33' 42.984" E
21	Sin Aing Ma	23° 10' 26.940" N	94° 34' 9.516" E
22	Aung Chan Thar	23° 12' 3.348" N	94° 35' 12.984" E
23	Khaung Tee	23° 7' 44.256" N	94° 20' 23.676" E
24	Sin Gaung	23° 17' 27.888" N	94° 22' 23.556" E
25	Kywe Nan	23° 15' 43.992" N	94° 21' 11.160" E
26	Kywe Ku	23° 18' 9.216" N	94° 22' 1.164" E
27	Thin Gan	23° 15' 33.228" N	94° 23' 26.628" E
28	Ga Zet	23° 19' 18.660" N	94° 22' 6.672" E
29	Naung Hpa Nan	23° 20' 6.468" N	94° 23' 29.724" E
30	He Daung	23° 25' 47.604" N	94° 23' 28.032" E
31	Shan Su	23° 26' 15.648" N	94° 23' 42.576" E
32	Man Hpar Lay	23° 30' 55.800" N	94° 24' 14.652" E
33	Kywe Tat	23° 18' 32.724" N	94° 24' 58.284" E
34	Khan Ni	23° 17' 35.988" N	94° 28' 2.676" E
35	Myo Ma	23° 18' 2.988" N	94° 24' 8.064" E
36	Tha Yet Taw	23° 21' 1.584" N	94° 25' 30.936" E

No	Name	Lat	Long
37	In Daing	23° 20' 22.956" N	94° 24' 27.900" E
38	Maung Khar	23° 21' 49.248" N	94° 24' 5.940" E
39	In Doke	23° 23' 4.596" N	94° 24' 46.080" E
40	Moe Kaung	22° 57' 44.640" N	94° 49' 29.892" E
41	Sin Pe	22° 58' 35.652" N	94° 50' 9.276" E
42	Nan Pin	23° 25' 36.156" N	94° 27' 6.840" E
43	Hin Tin	23° 24' 40.068" N	94° 28' 20.280" E
44	Ywar Thar	23° 27' 34.056" N	94° 21' 0.144" E
45	Ta Bu Chaung	23° 25' 7.428" N	94° 19' 54.732" E
46	Nan Za Lein	23° 29' 6.252" N	94° 22' 19.488" E
47	Myay Thar	23° 18' 15.840" N	94° 19' 2.820" E
48	Yaw Su	23° 18' 52.056" N	94° 18' 37.332" E
49	Ma Sein	23° 22' 15.924" N	94° 20' 38.940" E
50	Ba Let Thar	23° 23' 11.436" N	94° 21' 8.496" E
51	Taung Ywar Ma	23° 22' 49.476" N	94° 21' 50.148" E
52	Ton Nan	23° 13' 58.044" N	94° 19' 6.672" E
53	Man Lon	23° 14' 43.224" N	94° 20' 11.472" E
54	Khon Gyi	23° 10' 9.912" N	94° 20' 48.264" E
55	Thar Si	23° 10' 8.400" N	94° 22' 43.392" E
56	Chaung Wa	22° 59' 13.668" N	94° 21' 23.076" E
57	Pa Thay (North)	22° 47' 13.524" N	94° 30' 3.168" E
58	Inn Daung	22° 47' 45.420" N	94° 30' 20.808" E
59	Sa Thar (Upper)	22° 48' 25.092" N	94° 30' 11.196" E
60	Laung Tei	22° 49' 34.176" N	94° 32' 7.980" E
61	Laung Kyin	22° 49' 11.856" N	94° 32' 31.272" E
62	Pauk Aing	22° 51' 10.872" N	94° 32' 24.936" E
63	Kywe Kya	22° 50' 53.016" N	94° 32' 45.744" E
64	Taung Kone	22° 50' 40.488" N	94° 32' 19.896" E
65	Pwint Hlet	22° 49' 45.912" N	94° 30' 4.104" E
66	Myay See Taung	22° 51' 12.672" N	94° 29' 43.584" E
67	Kyun Taw	23° 0' 52.956" N	94° 25' 57.864" E
68	Kyay Taung U	22° 53' 39.444" N	94° 31' 41.160" E
69	Kan	22° 54' 52.344" N	94° 29' 23.136" E
70	Taung Yar Taw (North)	22° 54' 25.128" N	94° 29' 42.576" E
71	Se Chaung	22° 53' 48.624" N	94° 29' 35.556" E
72	Ba Yon Kar	22° 58' 22.908" N	94° 22' 18.264" E
73	Khon Thar	22° 59' 29.832" N	94° 21' 53.424" E

No	Name	Lat	Long
74	Ku Seik	22° 59' 7.008" N	94° 23' 20.256" E
75	Nga Yaung	22° 58' 48.792" N	94° 24' 20.304" E
76	Ma Taw	22° 53' 14.748" N	94° 31' 45.696" E
77	Let Pan Seik	22° 52' 56.100" N	94° 32' 35.268" E
78	Yon Thar	22° 53' 59.532" N	94° 30' 47.736" E
79	Nga Ohn	22° 52' 36.552" N	94° 34' 2.028" E
80	Na Nwin Chaung	22° 52' 1.956" N	94° 33' 35.100" E
81	Pu Htoe Lone	22° 52' 27.552" N	94° 32' 17.268" E
82	Pin Tin (Notth)	22° 54' 0.252" N	94° 37' 22.872" E
83	Hpet Khat	22° 53' 22.236" N	94° 38' 42.828" E
84	In Pin Hla	22° 57' 35.136" N	94° 37' 33.564" E
85	Ah Nyar Lel	22° 56' 26.628" N	94° 34' 35.688" E
86	Pyin Taw	22° 57' 8.460" N	94° 36' 58.896" E
87	Yar	22° 56' 40.884" N	94° 39' 18.288" E
88	Mauk Ka Taw	22° 58' 19.344" N	94° 40' 0.372" E
89	Za Na Hpyin	22° 59' 45.492" N	94° 39' 9.648" E
90	Thay Ma Thauk	22° 59' 45.492" N	94° 39' 9.648" E
91	Mu Thar	23° 1' 13.296" N	94° 39' 7.128" E
92	Mauk Tet	23° 0' 36.972" N	94° 39' 5.436" E
93	Peik Chin Taw	23° 4' 22.440" N	94° 41' 59.316" E
94	Kyun Taw	23° 2' 22.380" N	94° 40' 17.652" E
95	Sa Myin	23° 5' 53.628" N	94° 46' 7.032" E
96	Ywar Taw	23° 6' 29.700" N	94° 45' 23.652" E
97	Pyin Kaing	23° 8' 56.544" N	94° 49' 56.064" E
98	Te Gyi	23° 11' 10.392" N	94° 50' 37.608" E
99	Shan Chaung	23° 9' 49.752" N	94° 49' 18.084" E
100	Than Pauk	22° 57' 14.976" N	94° 44' 40.704" E
101	Laung Pyayt	22° 54' 18.396" N	94° 44' 56.796" E
102	Kyauk Khei Tet	22° 57' 13.680" N	94° 43' 12.720" E
103	Zin Ka Le	22° 51' 32.688" N	94° 45' 48.420" E
104	Khet Lon	22° 50' 3.984" N	94° 45' 17.136" E
105	Thin Taw	22° 51' 27.828" N	94° 44' 24.504" E
106	Nyaung Pin Thar	22° 50' 41.388" N	94° 43' 50.988" E
107	Bin	22° 50' 2.904" N	94° 42' 58.500" E
108	Oke Hnan Boke	22° 50' 23.820" N	94° 43' 29.172" E
109	Ah Nauk Taw	22° 50' 3.012" N	94° 42' 3.132" E
110	Kyway	23° 3' 53.352" N	94° 25' 24.996" E

No	Name	Lat	Long
111	Ywar Thit Kone	23° 3' 0.288" N	94° 26' 32.820" E
112	Myauk Chun	23° 4' 53.220" N	94° 23' 56.328" E
113	Than Pu Yar	23° 7' 26.688" N	94° 25' 36.984" E
114	Ywar Ba	23° 3' 54.756" N	94° 24' 6.372" E
115	Inn Kone Gyi	23° 2' 34.836" N	94° 25' 44.688" E
116	Kyauk Tan	23° 6' 15.480" N	94° 21' 33.516" E
117	Yaw Su	23° 5' 27.348" N	94° 22' 50.268" E
118	Nar Pin	23° 42' 55.008" N	94° 27' 3.240" E
119	Htin Shu Chaung	23° 43' 43.320" N	94° 28' 4.980" E
120	Kin Tat	23° 43' 28.776" N	94° 25' 42.600" E
121	Shar Pin	23° 44' 37.032" N	94° 26' 45.780" E
122	Tun Pin	23° 41' 37.068" N	94° 24' 33.768" E
123	Aw Zee Khon	23° 41' 24.936" N	94° 28' 15.492" E
124	Nwe Kho	23° 40' 54.120" N	94° 26' 43.476" E
125	Laung Kaung	23° 39' 10.692" N	94° 25' 55.272" E
126	Nyaung Tha Pyay	23° 37' 12.036" N	94° 26' 14.532" E
127	Kyar Inn	23° 34' 40.332" N	94° 26' 2.076" E
128	Zee Khon	23° 33' 50.040" N	94° 26' 47.976" E
129	Inn Ta Paung	23° 32' 34.008" N	94° 26' 27.132" E
130	Hman Pin	23° 34' 54.948" N	94° 28' 20.208" E
131	Taung Twin	23° 35' 47.040" N	94° 28' 19.020" E
132	Kan Htu	23° 34' 17.220" N	94° 28' 43.464" E
133	Yae U Kone	23° 30' 30.384" N	94° 25' 20.028" E
134	Hpar Tin	23° 29' 21.048" N	94° 23' 32.496" E
135	Oke Hpo	23° 29' 49.884" N	94° 27' 11.016" E
136	Taung Kone	23° 33' 12.276" N	94° 30' 7.020" E
137	Khon Thar	23° 34' 28.380" N	94° 29' 57.516" E
138	Taung In	23° 35' 57.696" N	94° 29' 42.036" E
139	Kaung Kway	23° 36' 3.564" N	94° 34' 32.448" E
140	Man New	23° 35' 16.800" N	94° 35' 17.052" E
141	Kyoke Thar	23° 37' 12.684" N	94° 38' 32.640" E
142	Taing Thar	23° 38' 11.148" N	94° 40' 14.700" E
143	Law Thar	23° 42' 12.888" N	94° 41' 39.516" E
144	Inn Taw	23° 39' 42.876" N	94° 46' 3.144" E

Figure G1 Location of Villages (Limestone Concession)

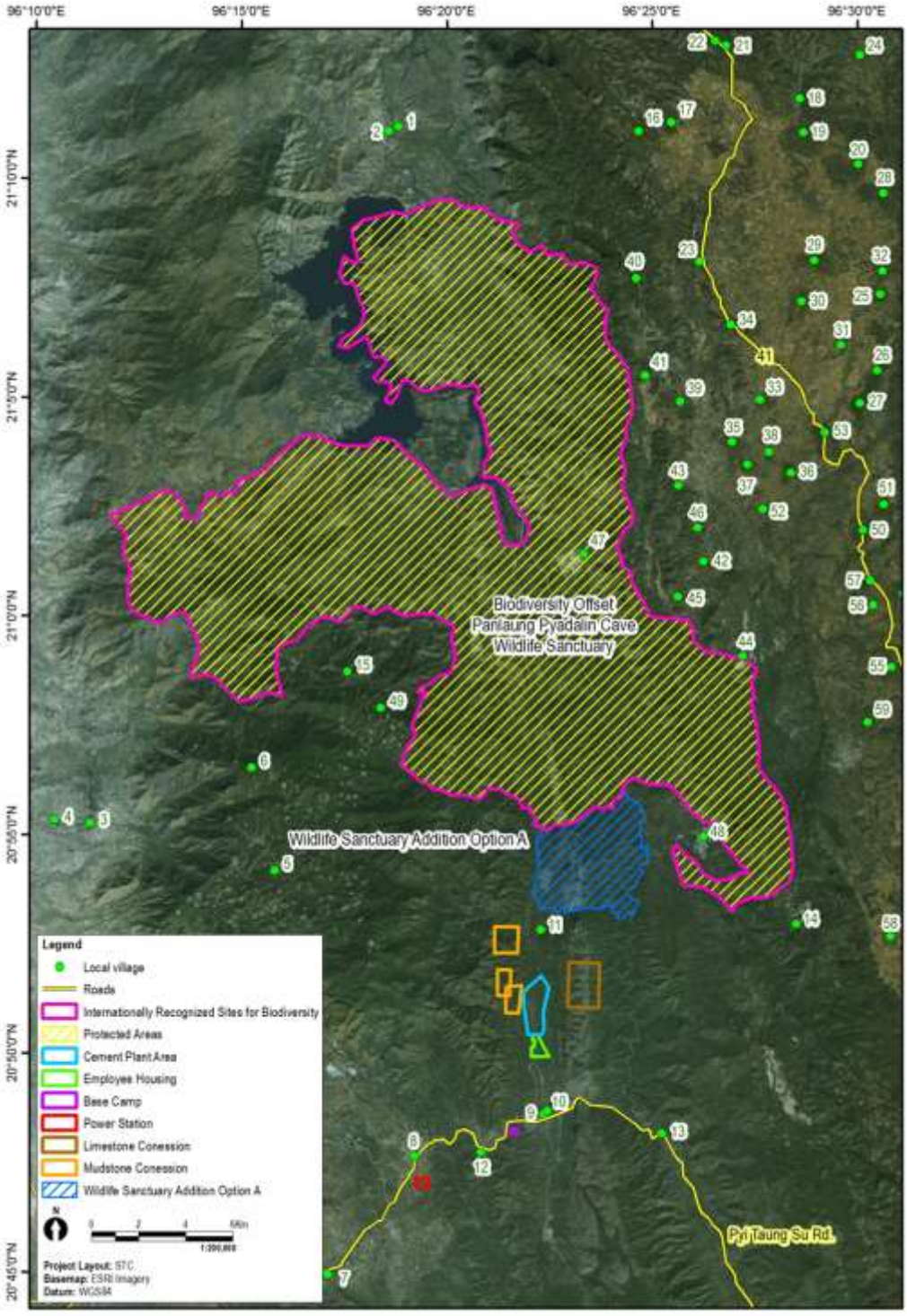
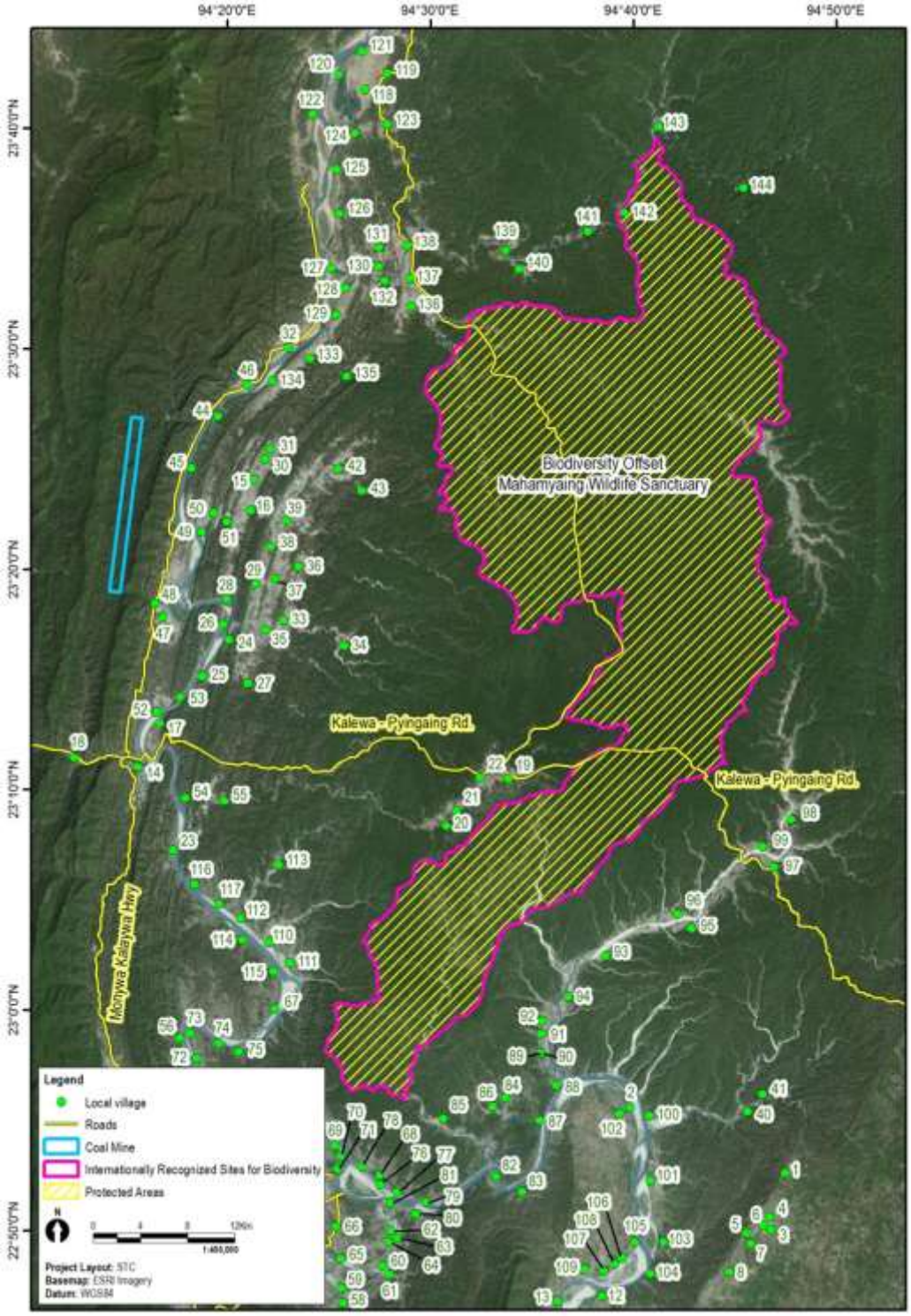


Figure G2 Location of Villages (Coal Mine Concession)



ANNEX H: Wildlife Survey Protocol

Title	Wildlife Survey Protocol
Document Reference	BAP_Plan 1.3
BAP Action Item	9,10,11
Last Updated	4 December 2018
Objective	A document outlining the methodology and locations for wildlife surveys in the project area. Brief descriptions of target species are also provided.

Wildlife Survey Protocol: STC Cement Plant

Objectives: The key habitat of interest identified within the project area is the karst formation within the project's limestone concession (part of the Sai Taung limestone range). Therefore, monitoring activities would be focused on limestone flora and fauna to further characterize the biodiversity of the area, understand potential project impacts on wildlife, and inform future operational/expansion decisions.

Target Species

Species identified to be Critical Habitat (CH) triggers in the Supplementary ESIA report, and suspected to still persist at the project area, will be targeted for future monitoring. These are namely:

- Chinese Pangolin (*Manis pentadactyla*)
- Shan State Langur *Trachypithecus phayrei ssp. shanicus*
- Karst snails
- Karst reptiles
- Karst flora

Fauna Monitoring Protocol

Limestone surveys	<u>Requirements</u> The limestone surveys are not recommended to be undertaken by STC staff given the potential for highly cryptic species to be present within the limestone range, a high level of expertise is required for identification of species. <u>Frequency</u> Conduct these surveys annually for the first 5 years of the loan term. Subsequent surveys may be conducted every 2 years. <u>Procedure – Karst Reptile Surveys</u> Select 5 survey sites throughout the limestone concession, prioritizing habitats rich in karst rocks, boulders and cliff faces. The GPS coordinates of all sites surveyed for that particular round are to be recorded. Given the nature of the landscape and survey, it is unlikely that the same sites can be visited repeated every year. Therefore, the aim of the survey is to continue building on a representative picture of the project area and assess year-on-year changes in species abundance and richness. The diurnal survey will proceed from 8:30 am to 12:00 pm and the nocturnal component from 7:30 pm – 10:30 pm. Conduct a visual search for reptilian species and document species, abundance, location/site and timing of observation. <u>Procedure – Karst Snail Surveys</u> Throughout the project concession, select a total of <u>5 sites</u> where suitable microhabitats and thanatocoenoses are present for the snail survey. The GPS coordinates of all sites surveyed for

Wildlife Survey Protocol: STC Cement Plant	
	that particular round are to be recorded. Given the nature of the landscape and survey, it is unlikely that the same sites can be visited repeated every year. Therefore, the aim of the survey is to continue building on a representative picture of the project area and assess year-on-year changes in species abundance and richness. At each survey site, collect 15 – 20 litres (two buckets) of soil and handpick any shells that are over 6 mm long. Process soil samples through flotation of soil in water and filtering through a cascade of increasingly fine sieves to sort shells according to size. Shells are to be identified down to the lowest possible taxonomic level.
Transect Surveys	<u>Requirements</u> STC staff are to conduct the survey under the guidance of external experts every 1-2 years for the first 5 years to build capacity. Once the STC staff have established reliable skills of detection and identification, surveys can be handed over to STC with external experts joining every 5 years to ensure quality maintenance. Locations for survey: Limestone quarry Mudstone quarry <u>Frequency</u> Conduct these surveys quarterly for the first 5 years of the loan term. Subsequent surveys can be done on an annual basis. <u>Procedure</u> All surveys will be conducted at night starting from 7:30 pm. Conduct visual and auditory detection of mammals, using torchlights for spotlighting. Walk up the limestone quarry via the access road to spot for mammals, including the Chinese Pangolin. Walk up the mudstone quarry via the access road to spot for mammals, including the Chinese Pangolin and Shan State Langur.
Interviews	The Chinese Pangolin and Shan State Langur was detected in the ESIA stage through interviews with local communities. Field monitoring can be supported by indirect observations. As part of STC's continued community engagement, local people should be asked every session on whether they have had any recent sightings of target species. These sightings should be officially minuted in meeting minutes and added to STC's species database.

Wildlife Survey Protocol: Paluzawa Coal Mine	
Objectives: The key habitat of interest identified within the project area is the deciduous forest within and surrounding the project area. The ESIA biodiversity surveys have also uncovered several species of global conservation concern from the site, including the Western Hoolock Gibbon (*Hoolock hoolock*). Therefore, monitoring activities would be focused on camera trapping surveys and targeted gibbon surveys to obtain a better understanding of the population utilizing the project area. The data from these surveys will serve to further characterize the biodiversity of the project area, understand potential project impacts on wildlife, and inform future operational/expansion decisions.	
Target Species	
Species identified to be Critical Habitat (CH) triggers in the Supplementary ESIA report, and suspected to still persist at the project area, will be targeted for future monitoring. These are namely: Chinese Pangolin (*Manis pentadactyla*) Western Hoolock Gibbon (*Hoolock hoolock*)	
Fauna Monitoring Protocol	
Camera Trapping	<u>Requirements</u> STC staff are to conduct the camera trapping survey under the guidance of external experts every 1-2 years for the first 5 years to build capacity. Once the STC staff have established reliable skills of camera deployment and maintenance, surveys can be handed over to STC with external experts joining every 5 years to ensure quality maintenance. Locations for survey: Limestone quarry Mudstone quarry <u>Frequency</u> For the first 5 years of the loan term, conduct 1 camera trapping survey per year, with each survey spanning a total of 60 camera trapping days. For the subsequent years of the loan term, conduct 1 camera trapping survey every 5 years, with each survey spanning a total of 60 camera trapping days per year. <u>Procedure</u> Lay 17 camera traps throughout the project concession at the locations indicated in *Table 1 Camera Trap Locations* and according to the settings in *Table 2 Camera Trap Settings*. Any changes to the camera trap locations should be recorded in the survey report for that particular round of camera trapping. Analyse camera trap findings and derive a species list and relative abundance. Compare species richness and abundance with previously collected data.
Western Hoolock Gibbon Surveys	Each gibbon triangulation survey shall commence at 4:30 am. Three teams are required per survey. Select three points within the concession in a triangle formation. Log the GPS coordinates and elevation of each point. Upon detection of a gibbon call, record compass bearings of the call and the estimated distance. Record if there is more than one individual and if it belongs to a male or female. After the survey, analyse triangulation data to estimate abundance and location of gibbon group. Record this location for follow-up.

Wildlife Survey Protocol: Paluzawa Coal Mine	
	Assess if it is feasible to hike to the location identified from the triangulation survey and investigate. Further reference to be made to: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3605491/

Table H1 Camera Trap Locations

Camera trap location no.	Camera Trap Label	Coordinates	Remarks	ESIA Recorded Species
Phase 1/Phase 2				
C1	ERM UV C27	N23° 26.865' E94° 16.707'	Fruiting tree	Yellow-throated marten, Porcupine, Domestic cattle, Humans
C2	ERM UV C29	N23° 26.430' E94° 16.464'	Mountain ridge	-
C3	ERM SG C25	N23° 26.369' E94° 16.480'	Ridge, near fruiting tree	-
C4	ERM SG C07	N23° 22.875' E94° 16.405'	Ridgeline, bamboo	Red muntjac, Leopard cat, Kalij pheasant
C5	ERM UV 15	N23° 22.794' E94° 16.366'	Bamboo	Porcupine, Red muntjac, Pallas` squirrel
C6	ERM UV C28	N23° 22.702' E94° 16.501'	Bamboo	Red jungle fowl
C7	ERM UO C05	N23° 22.709' E94° 16.533'	Fruiting tree	Porcupine, Red muntjac, Rhesus macaque, Rat, Kalij pheasant
Phase 3				
C8	-	N23° 24.662' E94° 16.668'	Dry bed of a small rocky stream, degraded bamboo forest, close to mining site	Yellow-throated marten, Leopard cat, Squirrel
C9	ERM UV 20	N23° 24.739' E94° 16.659'	bamboo	Red muntjac
Phase 2/Phase 3				
C10	ERM SG C08	N23° 24.776' E94° 16.665'	Fruiting tree, dense bamboo	Red muntjac
C11	ERM SG C23	N23° 24.941' E94° 16.643'	Dense bamboo forest	Wild boar, Northern tree-shrew
C12	ERM UO C01	N23° 24.959' E94° 16.672'	Dense bamboo forest, carnivore tracks	Wild boar, Squirrel
C13	ERM SG C06	N23° 25.057' E94° 16.734'	Ridge, degraded bamboo forest	Large indian civet, Domestic water buffalo, Scaly trush, Red jungle fowl

Camera trap location no.	Camera Trap Label	Coordinates	Remarks	ESIA Recorded Species
C14	ERM SG C22	N23° 24.920' E94° 16.723'	Ridge, dry stream, bamboo	Red muntjac, Greater necklaced laughingthrush
Phase 3/Phase 4				
C15	ERM SG C10	N23° 23.771' E94° 16.675'	Next to small stream, muntjac and carnivore tracks, secondary growth	Red muntjac, Red jungle fowl
C16	ERM UO C04	N23° 23.767' E94° 16.618'	Small stream, close to mining area, degraded forest, tracks of wild boar and muntjac	Fishing cat, Yellow-throated marten, red muntjac, Humans
C17	ERM UV 30	N23° 23.781' E94° 16.545'	Upstream small rocky stream, banana palm, small cat track, muntjac track	Red muntjac,Red-billed blue magpie

Table H2 ***Camera Trap Settings***

Set Mode	Image Size	Image Format	Set Mode Interval	Sensor Level	Night Vision Shutter	Time Stamp	Set Date	Coordinate Input
Camera	8 MP	Widescreen	1 Minute	Normal	Medium	On	Ind. Date	Off

ANNEX I: Invasive Species Management Plan

Title	Invasive Species Management Plan
Document Reference	BAP_Plan ISMP V1
BAP Action Item	9,10,11
Last Updated	4 December 2018
Objective	A plan presenting key actions to prevent the proliferation of invasive species within the project area. A list of invasive flora species currently present within the project area and their key identifying characteristics is also provided.

Procedures for the Eradication of Invasive Species

Use herbicides where appropriate to control invasive species within the Project Area in accordance with the safe use and label directions of the herbicides.

At areas where herbicides are not recommended for use (e.g. Near drinking waterbodies), manual weeding or removal should be considered.

Where required, reforestation experts or ecologists from NGOs can be engaged to provide advice on eradication activities.

Procedures to Prevent the Transmission of Invasive Species

Wheel wash bays to be installed at the guardhouse at the cement plant and Access Road to the Coal Mine to remove dirt and plant material from vehicle wheels prior to entering and leaving the Project Area.

Conduct monitoring of invasive species on an annual basis. Data for the following monitoring parameters should be collected:

- Locations of patches of high density/concentration of invasive species
- Rough extent of patch size for the abovementioned areas
- Number of invasive species recorded from surveys
- Ecological interactions: utilization of invasive species by native fauna
- Geo-referenced photographic evidence

Spatial data should be maintained on the biodiversity database as per *Biodiversity Action Plan Item 19 – Database for storage of biodiversity monitoring data.*

Conduct a comparison of year-on-year invasive species monitoring findings to assess if invasive species are proliferating within the project area.

If species are found to be proliferating, control using herbicides or manual weeding. Investigate to understand paths of transmission, including assessment by external experts, and if it is feasible for the Project to adopt further control measures.

Areas where invasive species have been removed must be rehabilitated to prevent the re-establishment of these species as many of them are weedy species that re-colonize bare ground quickly. Actions that can be undertaken include:

- Removal of soil layer where seed bank or rhizomes is mostly contained, to remove all presence of invasive species propagative parts;
- Replace soil with soil that has been excavated from another part of the project area OR treat soil with herbicide or do manual weeding;
- During the wet season, plant native seedlings (obtained from site nursery) into soil, adopting an intensive and high density planting pattern;
- Fertilize the planted saplings with generic fertilizer;
- Lay mulching (dead plant matter) around the saplings to reduce desiccation and weed growth
- Continue weeding regularly;
- Monitoring regeneration of patch;

Indigenous or naturalized species to be used where ever possible for landscaping, rehabilitation or other on-site needs.

Where required, reforestation experts or ecologists from NGOs can be engaged to provide advice on reforestation activities.

Further information on identification and eradication of invasive native species can be found at:

Global Invasive Species Database: www.iucngisd.org/

Invasive Species Compendium: http://www.cabi.org/isc/

Table I1 Invasive Species Identification Guide (Limestone Quarry)

S/N	Scientific Name	Photograph	Key Features
1	*Ageratum conyzoides*	   Further information: http://www.iucngisd.org/gisd/speciesname/Ageratum+conyzoides	Stems and leaves covered in fine hairs Egg-shaped leaves Purple, blue, pinkish or white small flowers Fruits are small and brown in colour
2	*Bidens pilosa*	  Further information: http://www.iucngisd.org/gisd/speciesname/Bidens+pilosa	Black, slender, rigid seeds with bristle-like barbs Flowers have white petals with tightly clustered orange-yellow florets

S/N	Scientific Name	Photograph	Key Features
3	*Caesalpinia decapetala*	   Further information: http://www.iucngisd.org/gisd/speciesname/Caesalpinia+decapetala	Can be in the form of a shrub or tree Numerous straight to hooked thorns on its stems Pale yellow flowers Fruits are flattened, woody pods
4	*Chromolaena odorata*	   Further information: http://www.iucngisd.org/gisd/speciesname/Chromolaena+odorata	Stems are yellowish green and hairy Leaves are hairy and egg-shaped with a pointed tip at the end Flowers are pale pink Seeds black or dark brown with a tuft of hairs attached
5	*Hiptage benghalensis*	  	Flowers white with a pink or yellow base Fruit is pink with 3 papery, spreading elliptic wings. Brown when mature.

S/N	Scientific Name	Photograph	Key Features
		Further information: http://www.iucngisd.org/gisd/speciesname/Hiptage+benghalensis	
6	*Leucaena leucocephala*	    Further information: http://www.iucngisd.org/gisd/speciesname/Leucaena+leucocephala	Small scrubby tree Bark is greyish Leaves are small and pungent when crushed Flowers are white and filamentous Fruits are hard, flat and thin capsules that ripen from green to brown. Each capsule contains 15-25 shiny brown seeds
7	*Mimosa pudica*	  Further information: http://www.iucngisd.org/gisd/speciesname/Mimosa+pudica	Leaves fold and bend at night and upon being touched Pompom-shaped flowers

S/N	Scientific Name	Photograph	Key Features
8	*Oroxylum indicum*	   Further information: http://www.cabi.org/isc/datasheet/37913	Seed pods are large up to 1.5 m long and 10 cm in width that hang from bare branches Seeds are papery thin Large leaf stalks wither and fall off tree, collecting near base of trunk
9	*Paederia foetida*	  Further information: http://www.iucngisd.org/gisd/species.php?sc=632	Flowers white with violet centre and petals are very hairy

S/N	Scientific Name	Photograph	Key Features
10	*Ricinus communis*	   Further information: http://www.iucngisd.org/gisd/speciesname/Ricinus+communis	Leaves are glossy and palmate Young leaves may mature from red to green Fruit is spiny, greenish capsule Flowers are either red or yellow depending on their sex
11	*Ziziphus jujuba*	  Further information: http://www.iucngisd.org/gisd/speciesname/Ziziphus+mauritiana	Leaves are oval shaped with toothed margins Branches droopy and spiny Flowers white to yellowish-green Fruit is a singular, round to oval shaped fruit; turns green to reddish-brown when ripe

Table I2 Invasive Species Identification Guide (Coal Mine)

S/N	Scientific Name	Photograph	Key Features
1	*Ageratum conyzoides*	 Further information: http://www.cabi.org/isc/datasheet/3572	Erect, branching, annual herb with shallow, fibrous roots. Stems, which may root where the bases touch the ground, are cylindrical, and become strong and woody with age
2	*Amaranthus spinosus*	 Further information: http://www.cabi.org/isc/datasheet/4653	Stem is reddish with spines Fruit opens in a line around the centre

S/N	Scientific Name	Photograph	Key Features
3	*Bidens pilosa*	  Further information: http://www.iucngisd.org/gisd/speciesname/Bidens+pilosa	Black, slender, rigid seeds with bristle-like barbs Flowers have white petals with tightly clustered orange-yellow florets
4	*Caesalpinia decapetala*	   Further information: http://www.cabi.org/isc/datasheet/10733	Can be in the form of a shrub or tree Numerous straight to hooked thorns on its stems Pale yellow flowers Fruits are flattened, woody pods

S/N	Scientific Name	Photograph	Key Features
5	*Chromolaena odorata*	   Further information: http://www.cabi.org/isc/datasheet/23248	Stems are yellowish green and hairy Leaves are hairy and egg-shaped with a pointed tip at the end Flowers are pale pink Seeds black or dark brown with a tuft of hairs attached
6	*Hiptage benghalensis*	   Further information: http://www.cabi.org/isc/datasheet/27228	Flowers white with a pink or yellow base Fruit is pink with 3 papery, spreading elliptic wings. Brown when mature.
7	*Imperata cylindrica*	 	Flowers form a plume like structure which is white and hairy Leaves are long and straight, up to 1.8 m long and 2.5 cm wide Leaves are tough enough to scratch skin

S/N	Scientific Name	Photograph	Key Features
		Further information: http://www.cabi.org/isc/datasheet/28580	
8	*Mikania micrantha*	  Further information: http://www.cabi.org/isc/datasheet/34095	Grows as a climber or creeper Seeds are featherlike Flowers are white and grow in clusters
9	*Mimosa pudica*	  Further information: http://www.cabi.org/isc/datasheet/34202	Leaves fold and bend at night and upon being touched Pompom-shaped flowers

S/N	Scientific Name	Photograph	Key Features
10	*Oroxylum indicum*	   Further information: http://www.cabi.org/isc/datasheet/37913	Seed pods are large up to 1.5 m long and 10 cm in width that hang from bare branches Seeds are papery thin Large leaf stalks wither and fall off tree, collecting near base of trunk
11	*Paederia foetida*	  Further information: http://www.cabi.org/isc/datasheet/38458	Flowers white with violet centre and petals are very hairy

S/N	Scientific Name	Photograph	Key Features
12	*Ziziphus jujuba*	  Further information: http://www.iucngisd.org/gisd/speciesname/Ziziphus+mauritiana	Leaves are oval shaped with toothed margins Branches droopy and spiny Flowers white to yellowish-green Fruit is a singular, round to oval shaped fruit; turns green to reddish-brown when ripe

Table I3 Invasive species within Myanmar

S/N	Scientific Name	Common Name
Bacteria and Viruses		
1	Banana bunchy top virus (BBTV)	-
2	*Yersinia pestis*	-
Coral		
3	*Tubastraea coccinea*	Orange Cup Coral
Plants & Algae		
4	*Acacia auriculiformis* [+]	Acacia
5	*Acacia longifolia*	-
6	*Acacia mangium*	-
7	*Adenanthera pavonina*	-
8	*Ageratum conyzoides*[+]	Goat Weed
9	*Alternanthera philoxeroides*	-
10	*Cardamine flexuosa*	Wavy Bittercress
11	*Chromolaena odorata*	Siam Weed, Bitter Bush
12	*Eichhornia crassipes*	Water Hyacinth
13	*Eichhornia crus-galli* [+]	Barnyard Grass
14	*Hyptis suaveolens* [+]	Bush Tea
15	*Imperata cylindrica*	Blady Grass
16	*Lantana camara* [+]	Lantana
17	*Leucaena leucocephala*	-
18	*Limnocharis flava*	-
19	*Loranthus pulverulentus* [+]	Mistletoe
20	*Mikania micrantha* [+]	Mile-a-Minute
21	*Mimosa diplotricha* [+]	Giant Sensitive Plant
22	*Mimosa pigra* [+]	Giant Sensitive Plant
23	*Paspalum conjugatum* [+]	Buffalo Grass
24	*Pennisetum* spp. [+]	Mission Grass
25	*Prosopis juliflora* [+]	Mesquite
26	*Sorgum halepense* [+]	Johnson Grass
27	*Ziziphus mauritiana*	Chinese Date
28	*Acanthophora spicifera*	-
Insects		
29	*Aedes aegypti*	Yellow Fever Mosquito
30	*Brontispa longissima*	Coconut Leaf Beetle
31	*Matanastria grisea* [+]	Gypsy Moth
32	*Paratrechina longicornis*	Longhorn Crazy Ant
33	*Solenopsis geminata*	Tropical fire Ant
34	*Tapinoma melanocephalum*	Ghost Ant
35	*Trogoderma granarium*	Khapra Beetle
Invertebrates		
36	*Achatina fulica* [+]	Giant African Snail
37	*Pomacea canaliculata* [+]	Golden Apple Snail
38	*Teredo* spp. [+]	Shipworm
39	*Varroa jacobsoii* [+]	Parasitic Bee Mite
Fish		
40	*Clarias gariepinus*	African Sharptooth Catfish
41	*Ctenopharyngodon idella*	Grass Carp

S/N	Scientific Name	Common Name
42	*Cyprinus carpio*	European Carp
43	*Gambusia affinis*	Mosquito Fish
44	*Hypophthalmichthys nobilis*	Bighead Carp
45	*Oreochromis aureus*	Tilapia
46	*Poecilia reticulata*	Guppy
47	*Labeo rohita*	Rohu
Reptile		
48	*Hemidactylus frenatus*	Common House Gecko
Mammal		
49	*Rattus exulans*	Polynesian Rat/Pacific Rat
Notes: + Additionally sourced from Myanmar NBSAP 2015-2020		

ANNEX J: Rehabilitation Plan

Title	Mining Rehabilitation Plan
Document Reference	BAP_Plan 1.3
BAP Action Item	24
Last Updated	4 December 2018
Objective	A plan presenting actions that will support the rehabilitation of the land impacted by mining activity, restoring as far as possible back to a sustainable and usable condition.

Rehabilitation Plan

Rehabilitation Plan
Prior to Mining Activity
Prior to mining activities, the following actions are required to prepare for site rehabilitation following the completion of mining activities: • A site nursery is to be established to grow native seedstock propogated from collected native indigenous seed from the coal mining site. • A flora survey is to occur to identify the existing flora values of the proposed site. Lists of threatened flora and a general list of flora identified during surveys in 2017 are shown below. • A seed collection activity is to occur during late spring in order to gather seed for propogation in the site nursery. • Propogation activities are to occur on collected seed stock in the site nursery. Propogation and nursery care are to continue for the life of the mine. • A full time nursery attendant is to be charged with matinaning flora within the nursery. • No invasive or introduced species are to be cultivated for replanting or landscaping.
Stakeholder Consultation
Prior to site rehabilitation activities, the following consultation will occur: • Undertake one round of consultations with the local community to understand needs and expectations of rehabilitated land use. The planting composition can be adjusted where appropriate (eg. Creation of community forests) and the community can be engaged in the rehabilitation process. • Undertake consutlation with the Forest Department to understand their expectations of rehabilitated land use and if these are aligned to those of the local community. Based on Forest Department feedback, undertake a second round of consultations with the local community, if required. All rehabilitation will be of native indigenous species, in areas that were previously natural habitats. Non-native tree plantations may be established on areas cleared prior to development. A supporting map of such areas will be developed/maintained to inform what type of rehabilitation is required and at which locations.
Landform Reshaping
The following activities will be undertaken during land shaping: • Land reshaping is to occur to return landform to disturbed sites using heavy earth moving equipment. • All land surfaces are to be reshaped with a maximum gradient of 40o, with a preferable gradient of 30o in side slope • All drainage features are to be reshaped occording to natural flow regimes. • Sediment basins are to be retained below reshaped areas during rehabilitation. • Best practice sediment and erosion control measures are to be utilized to reduce overland flow and concentration of waterflow.

Rehabilitation Plan

Erosion and Sediment Control Best Practices

Further references in relation to sediment and erosion control best practices can be found at the following:

- Best practices for erosion and sediment control (IECA): https://www.austieca.com.au/publications/books-1-3
- NSW Office of Environment and Heritage (2012) Erosion and sediment control: http://www.environment.nsw.gov.au/Stormwater/ESCtrlUnsealedRds.htm
- LandCom NSW (2004) Managing Urban Stormwater: Soils and Construction: http://www.environment.nsw.gov.au/resources/water/BlueBookVol1.pdf
- West Virginia Department of Environmental Protection (2006) Erosion & Sediment Control BMP Manual http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Pages/ESC_BMP.aspx

Required Sediment and Erosion Control Measures

Topic	Recommended Measures
Road maintenance	Undertake regular maintenance of roads and road drainage structures. Roads should be inspected regularly, particularly during or after periods of heavy rain to identify issues such as build-up of sediment, deposition of road base sediment in watercourse, riling and scouring of the road surface, flattening out or crossfall. Where these signs are observed, assess severity of erosion and undertake light or heavy road grading to maintain the road profile. In instances where ineffective road drainage was identified to be the issue, design and implement suitable drainage along the affected road
Material stockpiles	All stockpiled materials on site must be covered with a tarpaulin and/or stock piled beneath a sheltered area with provisions to ensure it will not be washed away
Erosion control blankets	For laying of erosion blankets, first ensure that the ground surface is free of grass and objects (rocks and sticks etc). The upslope mat should be placed such that it overlaps the top of the next downslope mat. Secure the mat with staples
Reducing sedimentation into natural watercourses	Accord a level of protection to streams and rivers within the project area, erecting sediment fences where appropriate at vulnerable areas to filter sediments from rainwater flowing into streams and rivers. A series of sedimentation pools may be established in a step wise manner at drainage from the project area that discharges into natural streams and rivers.
Reducing erosion at rehabilitated areas	Drainage systems around rehabilitated areas should be designed to channel bulk of water flow away and through the placement of rock-lined waterways to reduce the velocity of flow. In certain cases the rehabilitated area lies in the path of a natural drainage line within the landscape or at the base of a natural channel/ road where large quantities of water will be flushed towards during heavy rain events.

Topsoiling/ Soil Replacement and Protection

The following activities are required during soil replacement:

- Obtain compost or fertilizer for application to the soil matrix to provide organic material, if available.
- The compost/fertilizer mixture should be screened and treated with herbicide/fungicide to eliminate the viability of invasive species within the mixture to as low as possible
- Based on the Rehabilitation Plan and expertise from the land rehabilitation expert, lay the compost material at the selected location and cover with erosion control blanket as soon as possible
- Soil laying is best done during the dry season where loss of soil due to large downpours can be avoided. However, given planting should be best timed during the wet season when water is plentiful, the plan may accommodate this by laying soil the end and start of the dry and wet seasons respectively and implement erosion control immediately

Vegetation Planting

The following activities are required during vegetation planting:

Rehabilitation Plan
• Engage the community to undertake the planting and maintenance work (weeding, fertilizer) and include remuneration where appropriate • Select plant species native to the project area, preferably sourcing most individuals from the on-site nursery. A variety of fruiting species, nutrient cycling / fixation species should be selected based on the natural vegetation characteristics of the area • During the wet season, plant native seedlings (obtained from site nursery) into soil, adopting an intensive and high density planting pattern • Fertilise the planted saplings with generic fertilizer • Lay mulching (dead plant matter) around the saplings to reduce desiccation and weed growth • Water daily in the absence of heavy rainfall for 6-8 weeks after planting to allow the plant to establish itself • Continue weeding regularly • Where required, reforestation experts or ecologists from NGOs can be engaged to provide advice on reforestation/rehabilitation activities • Fence freshly planted areas to prevent animal intrusion and grazing
Management and Monitoring
The following activities are required for the management and monitoting of rehabilitated areas: • Permanent vegetation monitoring plots: Establishment of at ten 20 m by 20 m monitoring plots throughout the project area and undertake annual surveys of flora species within these plots to track recovery. Number of species and abundance should be recorded and then compared on a year-on-year basis. • As the plots will require walking off-trail to access, this could impede plant regeneration. Therefore, monitoring involving vegetation plots should be undertaken only after 5 years after the start of rehabilitation. • Canopy denseness tracking using satellite imagery: Review of satellite /drone imagery to assess canopy denseness on an annual basis. Identify spots that appear to be regenerating slowly and investigate on the ground. Specific Monitoring Requirements – Paluzawa Coal Mine: • The following activities are required for the management and monitoting of rehabilitated areas for the coal mine concession: • Using transect surveys on accessible trails and along roads, count number of species and abundance of birds and diurnal mammals. • The surveys are to be complemented with annual local community interviews on their perception of the rate of recovery and wildlife that has been sighted utilising the rehabilitated areas. Specific Monitoring Requirements – Apache Cement Plant: • The following activities are required for the management and monitoting of rehabilitated areas at the limestone concession: • For the Apache cement plant, it is unlikely that the original karst condition and substrate composition can be restored. Therefore, monitoring based on karst fauna would not be advised. • Transect surveys on accessible trails and along roads to count for species and abundance of birds and diurnal mammals are recommended. • The surveys are to be complemented with annual local community interviews on their perception of the rate of recovery and wildlife that has been sighted utilising the rehabilitated areas.

Table J1 Flora Species of concern identified in the Coal Mine Concession

S/N	Scientific Name	Common Name	Family	IUCN Class
1	*Acacia intsia* Willd.	Su-pok-gyi	Mimosaceae	LC ver 3.1
2	*Acacia pennata* (L.) Willd.	Su-yit	Mimosaceae	LC ver 3.1
3	*Alstonia scholaris*(L.) R. Br.	Taung-ma-yoe/Say-kha-gyi	Apocynaceae	LR/lc ver 2.3
4	*Bauhinia forficata* Link	Min-ka-daw-kyet-kyay-kite	Caesalpiniaceae	LC ver 3.1
5	*Crotalaria albida* Heyne ex Roth	Not known	Fabaceae	LC ver 3.1
6	*Dalbergia cultrata* Grah.	Yin-daik	Fabaceae	NT ver 3.1
7	*Dalbergia rimosa* Roxb.	Daung-ta-laung	Fabaceae	LC ver 3.1
8	*Dendrocalamus membranaceus* Munro	Hmyin-wa	Poaceae	LC ver 3.1
9	*Desmodium triflorum* (L.)DC.	Than-ma-naing-kyauk-ma-naing	Fabaceae	LC ver 3.1
10	*Dioscorea wallichii* Hook.f.	Ka-det-nwee	Dioscoreaceae	LC ver 3.1
11	*Eclipta alba* (L.) Hassk.	Kyeik-hman	Asteraceae	DD ver 3.1
12	*Equisetum hyemale*	Equisetum	Equisetaceae	LC ver 3.1
13	*Holarrhena pubescens* Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC ver 3.1
14	*Homonoia riparia* Lour.	Ye-mo-ma-kha	Euphorbiaceae	LC ver 3.1
15	*Juglans regia L.*	Thit-khwe/Thit-kya	Juglandaceae	NT ver 3.1
16	*Lathyrus latifolius*	Not known	Fabaceae	LC ver 3.1
17	*Mangifera sylvatica* Roxb.	Taw-tha-yet	Anacardiaceae	LR/lc ver 2.3
18	*Millettia ovalifolia* Kurz	Thin-win	Fabaceae	DD ver 3.1
19	*Mimosa pudica L.*	Hti-ka-yone	Mimosaceae	LC ver 3.1
20	*Polygonum barbatum L.*	Kywe-hna-khaung-gyate	Polygonaceae	LC ver 3.1
21	*Pterocarpus indicus*Willd.	Taw-pa-dauk	Fabaceae	VU A1d ver 2.3
22	*Shorea obtusa* Wall.	Thit-ya	Dipterocarpaceae	LR/lc ver 2.3
23	*Shorea siamensis* (Kurz) Miq.	In-gyin	Dipterocarpaceae	LR/lc ver 2.3
24	*Tadehagi triquetrum* (L.)H. Ohashi	Lauk-thay	Fabaceae	LC ver 3.1
25	*Tetrameles nudiflora* R.Br.	Baing	Datiscaceae	LR/lc ver 2.3
26	*Woodfordia fruticosa* (L.)Kurz	Pan-swe	Lythraceae	LR/lc ver 2.3
27	*Zingiber fragile*	Not known	Zingiberaceae	NT ver 3.1
28	*Ziziphus jujuba* Lam.	Zi	Rhamnaceae	LC ver 3.1

DD=Data Deficient, LC=Least Concern, LR/lc=Lower Risk/least concern, NT=Near Threatened, VU=Vulnearble

Table J2 Flora Species Identified in the Coal Mine Concession

S/N	Scientific Name	Common Name	Family Name	Habitats
1	*Abelmoschus crinitus Wall.*	Taw-wa	Malvaceae	S
2	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	S
3	*Abutilon indicum (L.) Sweet*	Bauk-khway	Malvaceae	S
4	*Acacia intsia Willd.*	Su-pok-gyi	Mimosaceae	CL
5	*Acacia pennata (L.) Willd.*	Su-yit	Mimosaceae	S
6	*Achyranthes aspera L.*	Kyet-mauk-su-pyan	Amaranthaceae	H
7	*Adina cordifolia Hook. f.*	Hnaw	Rubiaceae	T
8	*Aegle marmelos L.*	Ok-shit	Rutaceae	T
9	*Ageratum conyzoides L.*	Khwe-thay-pan	Asteraceae	H
10	*Albizia lebbek (L.)Benth.*	Taung-ko-kko	Mimosaceae	T
11	*Albizia lebbekoides (DC.) Benth.*	Taung-ma-gyi	Mimosaceae	T
12	*Albizia odoratissima (L.f.)Benth.*	Gote-kye	Mimosaceae	T
13	*Alstonia scholaris(L.) R. Br.*	Taung-ma-yoe/Say-kha-gyi	Apocynaceae	T
14	*Amaranthus spinosus L.*	Hnin-nu-new-su-bauk	Amaranthaceae	H
15	*Ampelocissus barbata Planch.*	Not known	Vitaceae	CL
16	*Anogeissus acuminata Wall.*	Yone	Combretaceae	T
17	*Anthocephalus morindaefolius Korth.*	Ma-u-let-lan	Rubiaceae	T
18	*Antidesma velutinumTul.*	Kin-pa-lin	Euphorbiaceae	ST
19	*Ardisia polycephala Roxb.*	Kyet-ma-ok	Myrsinaceae	S
20	*Argemone mexicana L.Sp.*	Kon-kha-ya	Papaveraceae	S
21	*Argyreia nervosa*	Not known	Convolvulaceae	Cl/Cr
22	*Armillaria mellea (VahlFr.) Kummer.*	Not known	Physalacriaceae	M
23	*Artocarpus chaplasha Roxb.*	Taung-pein-ne	Moraceae	T
24	*Artocarpus lakoocha Roxb.*	Myauk-la-khauk	Moraceae	T
25	*Arundinella hispida (Humb.& Bonpl. ex Willd.)Kuntze*	Pyaung-sa-myet	Poaceae	G
26	*Asparagus densiflorus*	Shint-ma-tet	Asparagaceae	CL
27	*Auricularia auricula-judae*	Kywet-na-ywet-hmo	Auriculariaceae	M
28	*Bambusa tulda Roxb.*	Thaik-wa	Poaceae	B
29	*Bauhinia forficata Link*	Min-ka-daw-kyet-kyay-kite	Caesalpiniaceae	Cl
30	*Bauhinia malabarica Roxb.*	Pha-lan/Chin-byit	Caesalpiniaceae	T
31	*Bauhinia sp.*	Swe-daw-nwee	Caesalpiniaceae	Cl/Cr
32	*Beilschmiedia roxburghiana Nees*	Myauk-ok-shit	Lauraceae	T
33	*Bidens pilosa*	Hmwe-sok	Asteraceae	H
34	*Bliospermum axillare Blume*	Hnat-cho	Euphorbiaceae	H
35	*Blume balsamifera DC..*	Phon-ma-thein	Asteraceae	S
36	*Bombax ceiba L.*	Let-pan	Bombacaceae	T
37	*Bombax insigne Wall.*	Taung-let-pan	Bombacaceae	T
38	*Bridelia retusa L.*	Seik-chee	Euphorbiaceae	ST
39	*Buchanania latifolia Roxb.*	Lun-pho	Anacardiaceae	T
40	*Buddleja asiatica*	Pon-ma-gyi	Buddlejaceae	S
41	*Butea monosperma (Lam.)Kuntze*	Pauk-pin	Fabaceae	T
42	*Butea superba Roxb.*	Pauk-nwee	Fabaceae	CL
43	*Caesalpinia decapetala (Roth.)Alston*	Suk-yan-bo /Kyant-sa-su-pin	Caesalpiniaceae	Cl/Cr
44	*Calamus erectus Roxb.*	Taung-kyein	Arecaceae	Cl/Cr
45	*Callicarpa nudiflora*	Kyun-na-lin	Verbenaceae	T

S/N	Scientific Name	Common Name	Family Name	Habitats
46	*Calotropis gigantea*	Ma-yoe	Apocynaceae	S
47	*Canscora diffusa (Vahl) R.Br.*	Kyauk-pan	Gentianaceae	H
48	*Cardiospermum halicacabum L.*	Ka-la-myet-si	Sapindaceae	Cl/Cr
49	*Careya arborea Roxb.*	Ban-bwe	Lecythidaceae	T
50	*Caryota mitis Lour.*	Min-baw	Arecaceae	T
51	*Cassia fistula L.*	Ngu	Caesalpiniaceae	T
52	*Cayratia trifolia*	Not known	Vitaceae	CL
53	*Cedrela febrifuga Blume*	Ye-ta-ma	Meliaceae	T
54	*Celosia argentea*	Kyet-mauk	Amaranthaceae	S
55	*Cephalostachyum pergracile Munro*	Tin-wa	Poaceae	B
56	*Chassalia curviflora*	Phet-ya	Rubiaceae	S
57	*Chromolaena odorata (L.) R.M. King & H Robinson*	Bi-zet	Asteraceae	S
58	*Chukrasia velutina Roem.*	Yin-ma	Meliaceae	T
59	*Clausena excavata Burm.f.*	Seik-nan	Rutaceae	S
60	*Clausena heptaphylla (Roxb.) Wight & Arn.*	Taw-pyin-daw-thein	Rutaceae	S
61	*Clematic fasiculiflora L.*	Khwa-nyo	Ranunculaceae	CL
62	*Cleome viscosa L.*	Hin-ga-la-yaing	Capparaceae	H
63	*Clerodendrum infortunatum Gaertn.*	Phet-kha	Verbenaceae	S
64	*Clerodendrum villosum Blume*	Thin-gyan-pan	Verbenaceae	S
65	*Colona floribunda*	Pet-shat	Tiliaceae	T
66	*Congea tomentosa Roxb.*	Tha-ma-ga-nwee	Verbenaceae	Cl/Cr
67	*Corchorus capsularis L.*	Gon-shaw/Khwe-la-but	Tiliaceae	S
68	*Cordia myxa L.*	Tha-net	Boraginaceae	T
69	*Costus specious Sm.*	Pha-lan-taung-hmwe	Costaceae	H
70	*Crassandra sp.*	Not known	Acanthaceae	H
71	*Cratoxylum cochinchinense*	Pe-ma-kyit	Hypericaceae	ST
72	*Cratoxylum polyanthum Korth*	Pe-ma-kyit	Hypericaceae	ST
73	*Crotalaria albida Heyne ex Roth*	Not known	Fabaceae	S
74	*Croton oblongifolius Roxb.*	Tha-yin-gyi	Euphorbiaceae	ST
75	*Cryptolepis buchanani Rome.& Schult.*	Na-sha-gyi	Asclepiadaceae	Cl/Cr
76	*Curculigo recurvata Dryand.*	Kywet-ma-lut-ohn	Hypoxidaceae	H
77	*Cymbidium aloifolium (L.) Sw.*	Thit-tet-lin-nae	Orchidaceae	E
78	*Dalbergia cultrata Grah.*	Yin-daik	Fabaceae	T
79	*Dalbergia paniculata Roxb.*	Ta-pauk	Fabaceae	T
80	*Dalbergia rimosa Roxb.*	Daung-ta-laung	Fabaceae	ST
81	*Dalbergia stipulacea Roxb.*	Ta-ma-lan-nwee	Fabaceae	Cl/Cr
82	*Dalbergia volubilis Roxb.*	Daung-ta-laung	Fabaceae	ST
83	*Dendrocalamus calostachyus (Kurz)Kurz*	Wa-bo-wa	Poaceae	B
84	*Dendrocalamus membranaceus Munro*	Hmyin-wa	Poaceae	B
85	*Derris sp.*	Leik-yoe	Fabaceae	ST
86	*Desmodium polycarpum (Poir)DC.*	Myay-pe-htwe	Fabaceae	S
87	*Desmodium triflorum (L.)DC.*	Than-ma-naing-kyauk-ma-naing	Fabaceae	H
88	*Dillenia parviflora Griff*	Kyet-zin-byun	Dilleniaceae	T
89	*Dillenia pentagyna Roxb.*	Zin-byun	Dilleniaceae	T
90	*Dioscorea cylindrica Burm.*	Kywe-thon-ywet	Dioscoreaceae	Cl/Cr
91	*Dioscorea pentaphylla L.*	Kywe-ngar-ywet	Dioscoreaceae	Cl/Cr
92	*Dioscorea sativa L.*	Kauk-yin-nwee	Dioscoreaceae	Cl/Cr

S/N	Scientific Name	Common Name	Family Name	Habitats
93	*Dioscorea wallichii Hook.f.*	Ka-det-nwee	Dioscoreaceae	Cl/Cr
94	*Diospyros kika L.f.*	Te/Te-net	Ebenaceae	T
95	*Diospyros ehretioides Wall.*	Auk-chin-sa	Ebenaceae	T
96	*Dipterocarpus sp.*	Ka-nyin-pho	Dipterocarpaceae	T
97	*Drynaria quercifolia*	Oak-leaf Fern	Polyporaceae	F
98	*Duabanga grandiflora*	Myauk-ngo	Lythraceae	T
99	*Eclipta alba (L.) Hassk.*	Kyeik-hman	Asteraceae	H
100	*Equisetum hyemale*	Equisetum	Equisetaceae	H
101	*Equisetum hyemale*	Not known	Equisetaceae	H
102	*Eranthemum roseum*	Not known	Acanthaceae	H
103	*Erythrina stricta Roxb.*	Taung-ka-thit	Fabaceae	T
104	*Euphorbia hypericifolia L.*	Kywe-kaung-hmin-sae	Euphorbiaceae	H
105	*Evolvulus nummularius L.*	Kyauk-kwe	Convolvulaceae	H
106	*Ficus hispida L.*	Kha-aung	Moraceae	T
107	*Ficus lacor Buch.-Ham.*	Nyaung-gyin	Moraceae	T
108	*Ficus obtusifolia Roxb.*	Nyaung-gyat	Moraceae	T
109	*Ficus racemosa L.*	Ye-tha-phan	Moraceae	T
110	*Firmiana colorata (Roxb.)R.Br.*	Wet-shaw	Sterculiaceae	T
111	*Flacourtia cataphracta Roxb.*	Na-ywe	Flacourtiaceae	T
112	*Flemingia congesta Roxb.*	Kye-hmi	Fabaceae	S
113	*Flueggea leucopyrus Willd*	Ye-chin-ya	Euphorbiaceae	S
114	*Gardenia coronaria Buch.-Ham.*	Yin-gat-gyi	Rubiaceae	T
115	*Garuga pinnata Roxb.*	Chin-yok/Gyi-yok	Burseraceae	T
116	*Getonia floribunda Roxb.*	Kywet-nwee	Combretaceae	S
117	*Glochidion sp.*	Hta-ma-sok	Euphorbiaceae	ST
118	*Gmelina arborea Roxb.*	Ya-ma-nae	Verbenaceae	T
119	*Grewia eriocarpa Juss.*	Ta-yaw	Tiliaceae	ST
120	*Grewia laevigata Vahl*	Kyet-tha-yaw	Tiliaceae	T
121	*Heliotropium indicum L.*	Sin-hna-maung	Boraginaceae	H
122	*Heterophragma adenophyllum Seem.*	Phet-than	Bignoniaceae	ST
123	*Hibiscus macrophyllus*	Taung-phet-wun	Malvaceae	T
124	*Holarrhena pubescens Wall. ex G. Don*	Let-htok-gyi	Apocynaceae	T
125	*Homalium tomentosum Benth*	Myauk-chaw	Flacourtiaceae	T
126	*Homonoia riparia Lour.*	Ye-mo-ma-kha	Euphorbiaceae	S
127	*Hoya sp.*	Not known	Asclepiadaceae	CL
128	*Hymenodictyon flaccidum Wall.*	Khu-san	Rubiaceae	ST
129	*Imperata cylindrica (L.)P. Beauv.*	Thet-ke	Poaceae	G
130	*Jasminum laurifolium Roxb.*	Taw-sabe	Oleaceae	Cl/Cr
131	*Juglans regia L.*	Thit-khwe/Thit-kya	Juglandaceae	T
132	*Justicia procumbens*	Not known	Acanthaceae	H
133	*Lagerstroemia macrocarpa Kurz*	Pyin-ma-gyi/Eik-hmwe	Lythraceae	T
134	*Lagerstroemia parviflora Roxb.*	Zaung-ba-lae	Lythraceae	T
135	*Lagerstroemia speciosa (L.)Pers.*	Pyin-ma/Eik-hmwe	Lythraceae	T
136	*Lagerstroemia tomentosa Presl.*	Lae-sa	Lythraceae	T
137	*Lagerstroemia villosa Wall. ex Kurz*	Kyet-ka-law	Lythraceae	T
138	*Lannea coromandelica (Houtt.) Merrr.*	Na-bae	Anacardiaceae	T
139	*Lathyrus latifolius*	Not known	Fabaceae	S
140	*Leea hirta Banks*	Na-ga-mauk-phyu	Leeaceae	S
141	*Leea rubra Blume.*	Na-ga-mauk-ni	Leeaceae	S

S/N	Scientific Name	Common Name	Family Name	Habitats
142	*Lepidagathis semiherbacea (Clarke) Nees*	Not known	Acanthaceae	H
143	*Leptadenia reticulata Wight & Arn.*	Gone-cho	Asclepiadaceae	Cl
144	*Leucas cephalotes Spreng.*	Pin-gu-hteik-peik	Lamiaceae	S
145	*Lindenbergia philippensis Benth.*	Not known	Scrophulariaceae	H
146	*Lophopetalum wallichii Kurz*	Mon-daing	Celastraceae	T
147	*Luffa aegyptiaca Mill.*	Tha-but-kha	Cucurbitaceae	CL
148	*Malaxis sp.*	Not known	Orchidaceae	H
149	*Mangifera sylvatica Roxb.*	Taw-tha-yet	Anacardiaceae	T
150	*Markhamia stipulata (Wall.) Seem.ex K.Schum.*	Ma-hlwa	Bignoniaceae	T
151	*Mazus pumilus (Burm.f.)Steenis*	Not known	Scrophulariaceae	H
152	*Merremia vitifolia (Burm.f.) Hallier. f.*	Kyet-hinga-lae-new	Convolvulaceae	Cl/Cr
153	*Mikania micrantha H.B.K.*	Bi-zet-nwee	Asteraceae	CL
154	*Miliusa roxburghiana Hook.f.& Thomson*	Tha-but-thein	Annonaceae	ST
155	*Miliusa velutina Hook.f.& Thomson*	Tha-but-gyi	Annonaceae	T
156	*Millettia extensa Benth.*	Win-u	Fabaceae	CL
157	*Millettia ovalifolia Kurz*	Thin-win	Fabaceae	T
158	*Millingtonia hortensis L.f.*	Ega-yit	Bignoniaceae	T
159	*Mimosa pudica L.*	Hti-ka-yone	Mimosaceae	H
160	*Miscanthus sinensis*	Not known	Poaceae	G
161	*Mitragyna parvifolia (Roxb.)Korth.*	Htein	Rubiaceae	T
162	*Mitragyna rotundifolia (Roxb.) Kuntze*	Bin-ga	Rubiaceae	T
163	*Moghania strobilifera (L.) Aiton f.*	Not known	Fabaceae	S
164	*Morus laevigata Wall.*	Po-sa-gyi	Moraceae	T
165	*Musa balbisiana*	Sin-chee-taing-nget-pyaw	Musaceae	H
166	*Musa sp.*	Taw-nget-pyaw	Musaceae	H
167	*Nauclea orientalis L.*	Ma-u	Rubiaceae	T
168	*Ocimum gratissimum L.*	Not known	Lamiaceae	H
169	*Oroxylum indicum (L.) Kurz.*	Kyaung-sha	Bignoniaceae	ST
170	*Paederia foetida L.*	Pe-bok-nwee	Rubiaceae	CL
171	*Pajanelia longifolia (Willd.) K. Schum.*	Kyaung-sha-pho	Bignoniaceae	ST
172	*Pandanus foetidusRoxb.*	Tha-baw	Pandanaceae	S
173	*Parthenocissus quinquefolia (L.) Planch.*	Not known	Vitaceae	Cl/Cr
174	*Pentasachme caudatum Wall. Ex Wight*	Not known	Asclepiadaceae	H
175	*Phaseolus velutina Grah.*	Pauk-net	Fabaceae	Cl/Cr
176	*Phyllanthus albizzioides (Kurz)Hook.f.*	Taun-zi-phyu	Euphorbiaceae	T
177	*Phyllanthus columnaris Muell. Arg.*	Kalon-letthe	Euphorbiaceae	ST
178	*Phyllanthus emblica L.*	Zi-phyu	Euphorbiaceae	ST
179	*Physalis minima L.*	Mi-pon/Bauk-thi	Solanaceae	S
180	*Picnoporus cinnabarina*	Not known	Polyporaceae	M
181	*Pilea scripta Langtang*	Kyet-chay-pin	Urticaceae	ST
182	*Polygonum barbatum L.*	Kywe-hna-khaung-gyate	Polygonaceae	H
183	*Prema pyramidata Wall.*	Kyun-na-lin/Kyun-pho	Verbenaceae	T
184	*Protium serratum Engl.*	Tha-di	Burseraceae	T
185	*Pterocarpus indicusWilld.*	Taw-pa-dauk	Fabaceae	T
186	*Pterospermum grandiflorum*	Not known	Sterculiaceae	ST

S/N	Scientific Name	Common Name	Family Name	Habitats
187	*Pterospermum semisagittatum Buch.-Ham.*	Na-gyi	Sterculiaceae	T
188	*Quercus lineata Blume*	Sa-gat	Fagaceae	ST
189	*Salvia sp.*	Not known	Lamiaceae	S
190	*Schima wallichii (DC.)Korth.*	Lauk-ya	Theaceae	T
191	*Schleichera oleosa (Lour.) Oken*	Gyo	Sapindaceae	T
192	*Senna hirsuta (L.) Irwin & Barneby*	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
193	*Senna timoriensis (DC.) Irwin & Barneby*	Taw-ma-ze-li	Caesalpiniaceae	T
194	*Shorea obtusa Wall.*	Thit-ya	Dipterocarpaceae	T
195	*Shorea siamensis (Kurz) Miq.*	In-gyin	Dipterocarpaceae	T
196	*Smilax aspericaulis Wall ex A. D.C.*	Sein-na-baw-thay	Smilaceae	CL
197	*Smilax macrophylla Roxb.*	Sein-na-baw-gyi	Smilaceae	CL
198	*Solanum indicum L.*	Kha-yan-ka-zaw	Solanaceae	S
199	*Sonchus asper*	Not known	Asteraceae	H
200	*Spondias pinnata (L. f.) Kurz.*	Taw-gwe	Anacardiaceae	T
201	*Sterculia foetida L.*	Shaw-wa	Sterculiaceae	T
202	*Sterculia versicolor Wall.*	Shaw-phyu	Sterculiaceae	T
203	*Sterculia villosa Roxb.*	Shaw-ni	Sterculiaceae	T
204	*Stereospermum fimbriatum(Wall. ex G.Don.) A.DC.*	Than-thet	Bignoniaceae	T
205	*Stereospermum suaveolens (Roxb.) DC.*	Kywe-ma-gyo-lein	Bignoniaceae	T
206	*Streblus asper Lour.*	Ok-hne	Moraceae	T
207	*Streptocaulon tomentosum Wight & Arn.*	Myin-sa-gon-ni	Asclepiadaceae	CL
208	*Strychnos nux-blanda A.W.Hill*	Kha-baung	Loganiaceae	ST
209	*Tadehagi triquetrum (L.)H. Ohashi*	Lauk-thay	Fabaceae	S
210	*Tectona grandis L. f.*	Kyun	Verbenaceae	T
211	*Terminalia alata (Heyne) Roth*	Htauk-kyant	Combretaceae	T
212	*Terminalia bellirica (Gaertn) Roxb.*	Thit-seik	Combretaceae	T
213	*Terminalia chebula Retz.*	Phan-kha	Combretaceae	T
214	*Tetrameles nudiflora R.Br.*	Baing	Datiscaceae	T
215	*Tetrastigma planicaule*	Not known	Vitaceae	Cl/Cr
216	*Thladiantha cordifolia (Blume)Cogn.*	Ka-yin-ma-tin-pa	Cucurbitaceae	Cl/Cr
217	*Thunbergia laurifolia Lindl.*	Kyi-hnok-thi	Acanthaceae	CL
218	*Tinospora nudiflora Kurz*	Sin-don-ma-nwee	Menispermaceae	CL
219	*Trema orientalis (L.) Blume*	Kyet-chee-pho	Ulmaceae	ST
220	*Tristaniopsis burmanica (Griff.)P.G. Wilson & J.T. Waterh.*	Taung-tha-bye	Myrtaceae	T
221	*Triumfetta bartramia L.*	Kat-se-nae-thay	Tiliaceae	S
222	*Urea lobata L.*	Kat-se-nae	Malvaceae	S
223	*Vangueria spinosa Roxb.*	Magyi-bauk	Rubiaceae	S
224	*Vitex peduncularis Wall.*	Phet-le-zin/Thit-kyut	Verbenaceae	T
225	*Vitex pubescens Vahl*	Kyet-yoe/Thit-kyut	Verbenaceae	T
226	*Woodfordia fruticosa (L.)Kurz*	Pan-swe	Lythraceae	S
227	*Wrightia arborea (Dennst.) Mabb.*	Let-htok-thay	Apocynaceae	T
228	*Xylia xylocarpa (Roxb.)Taub.*	Pyin-ka-doe	Mimosaceae	T
229	*Zanthoxylum budrunga Wall.*	Ma-yanin-kyet-su	Rutaceae	T
230	*Zanthoxylum rhetsa*	Hmae-khaung	Rutaceae	T
231	*Zingiber fragile*	Not known	Zingiberaceae	H
232	*Zingiber squarrosum Roxb.*	Tauk-ta	Zingiberaceae	H

S/N	Scientific Name	Common Name	Family Name	Habitats
233	*Zingiber zerumbet (L.)Roscoe ex J.E.Sm.*	Lin-nay	Zingiberaceae	H
234	*Ziziphus glabra Roxb.*	Taw-zi-nwee/Paung-bet	Rhamnaceae	Cl/Cr
235	*Ziziphus jujuba Lam.*	Zi	Rhamnaceae	ST

B=Bamboo, CL=Climber, Cl/Cr=Climber/Creeper, E=Epiphyte, F=Fern, G=Grass, H=Herbs, M=Mushroom, S=Shrubs, ST=Small Tree, T=Tree

Table J3 Threatened Flora Species Identified at the Limestone Concession

No.	Scientific Name	Common Name	Family Name	IUCN criteria
1	Bauhinia ornata Kurz	Myauk-hle-kha	Caesalpiniaceae	LC ver 3.1
2	Dalbergia cultrata Grah.	Yin-daik	Fabaceae	NT ver 3.1
3	Dalbergia oliveri Gamble	Ta-ma-lan	Fabaceae	EN A1cd ver 2.3
4	Dalbergia rimosa Roxb.	Daung-ta-laung	Fabaceae	LC ver 3.1
5	Dendrocalamus membranaceus Munro	Hmyin-wa	Poaceae	LCver 3.1
6	Dipterocarpus tuberculatus Roxb.	In	Dipterocarpaceae	LR/lc ver 2.3
7	Holarrhena pubescens Wall. ex G. Don	Let-htok-gyi	Apocynaceae	LC ver 3.1
8	Homonoia riparia	Ye-mo-ma-kha	Euphorbiaceae	LC ver 3.1
9	Ludwigia hyssopifolia	Lay-nyin-thay	Onagraceae	LC ver 3.1
10	Ludwigia octovalvis	Lay-nyin-gyi	Onagraceae	LC ver 3.1
11	Lathyrus latifolius	Not known	Fabaceae	LC ver 3.1
12	Mangifera sylvatica Roxb.	Taung-tha-yet	Anacardiaceae	LR/lc ver 2.3
13	Millettia ovalifolia Kurz	Thin-win	Fabaceae	DD ver 3.1
14	Mimosa pudica L.	Hti-ka-yone	Mimosaceae	LC ver 3.1
15	Pennisetum purpureum Schum.	Yon-sa-myet	Poaceae	LC ver 3.1
16	Potamogeton natans L.	Floating-leaf Pondweed	Potamogetonacea e	LC ver 3.1
17	Pteris vittata	Brake Fern	Pteridaceae	LC ver 3.1
18	Pterocarpus indicusWilld.	Taw-pa-dauk	Fabaceae	VU A1d ver 2.3
19	Shorea obtusa Wall.	Thit-ya	Dipterocarpaceae	LR/lc ver 2.3
20	Shorea siamensis (Kurz) Miq.	In-gyin	Dipterocarpaceae	LR/lc ver 2.3
21	Tadehagi triquetrum (L.)H. Ohashi	Lauk-thay	Fabaceae	LC ver 3.1
22	Tetrameles nudiflora R. Br.	Baing	Datiscaceae	LR/lc ver 2.3
23	Ziziphus jujuba Lam.	Zi	Rhamnaceae	LC ver 3.1

DD=Data Deficient, EN=Endangered, LC=Least Concern, LR/lc=Lower Risk/least concern, NT=Near Threatened, VU=Vulnerable

Table J4 Flora Species identified at the Limestone Concession

S/N	*Scientific Name*	Common Name	Family Name	Habitats
1	*Abelmoschus moschatus*	Taw-yon-pa-de	Malvaceae	S
2	*Acacia catechu Willd.*	Sha	Mimosaceae	T
3	*Acacia pennata (L.) Willd.*	Su-yit	Mimosaceae	Cl/Cr
4	*Achyranthes aspera L.*	Kyet-mauk-su-pyan	Amaranthaceae	H
5	*Acmella calva (DC.) R.K. Jansen*	Pe-le-nyin	Asteraceae	H
6	*Adenostemma viscosum*	Not known	Asteraceae	H
7	*Adina cordifolia Hook. f.*	Hnaw	Rubiaceae	T
8	*Aeginetia pedunculata Wall.*	Kauk-hlaing-di-yaing	Orobanchaceae	H
9	*Aegle marmelos L.*	Ok-shit	Rutaceae	T
10	*Ageratum conyzoides L.*	Khwe-thay-pan	Asteraceae	H
11	*Ajuga lupulina*	Not known	Lamiaceae	H
12	*Alangium chinense (Lour.)Harms.*	Hmaik	Alangiaceae	T
13	*Albizia lebbek (L.)Benth.*	Taung-ko-kko	Mimosaceae	T
14	*Albizia lebbekoides (DC.) Benth.*	Taung-ma-gyi	Mimosaceae	T
15	*Alternanthera sessilis (L.) R.Br.*	Pa-zun-sa-yaing	Amaranthaceae	H
16	*Amaranthus aspera*	Not known	Amaranthaceae	H
17	*Amaranthus gracilis Desf.*	Hin-nu-nwe-yaing	Amaranthaceae	H
18	*Anisomeles indica*	Not known	Lamiaceae	H
19	*Anogeissus acuminata Wall.*	Yon	Combretaceae	T
20	*Anthocephalus morindaefolius Korth.*	Ma-u-let-tan-shae	Rubiaceae	T
21	*Antidesma velutinumTul.*	Kin-pa-lin	Euphorbiaceae	ST
22	*Aporusa dioica (Roxb.) Mull.Arg.*	Thit-khauk	Euphorbiaceae	T
23	*Argyreia nervosa*	Not known	Convolvulaceae	Cl/Cr
24	*Argyreia roxburghii Choisy*	Not known	Convolvulaceae	Cl/Cr
25	*Armillaria mellea (VahlFr.) Kummer.*	Not known	Physalacriaceae	M
26	*Bambusa bambos (L.)Voss*	Kya-khat-wa	Poaceae	B
27	*Bambusa polymorpha Munro*	Kya-thaung-wa	Poaceae	B
28	*Bauhinia malabarica Roxb.*	Pha-lan/Chin-byit	Caesalpiniaceae	T
29	*Bauhinia ornata Kurz*	Myauk-hle-kha	Caesalpiniaceae	Cl/Cr
30	*Bauhinia sp.*	Swe-daw-nwee	Caesalpiniaceae	Cl/Cr
31	*Bidens pilosa*	Hmwe-sok	Asteraceae	H
32	*Blechnum orientale*	Not known	Blechnaceae	F
33	*Bliospermum axillare Blume*	Hnat-cho	Euphorbiaceae	H
34	*Blume balsamifera DC..*	Phon-ma-thein	Asteraceae	S
35	*Blumea balsamifera*	Not known	Asteraceae	H
36	*Boehmeria sp.*	Not known	Urticaceae	S
37	*Bombax anceps Pierre*	Ko-khe	Bombacaceae	T
38	*Bombax ceiba L.*	Let-pan	Bombacaceae	T
39	*Bombax insigne Wall.*	De-du	Bombacaceae	T
40	*Bridelia retusa L.*	Seik-chee	Euphorbiaceae	ST
41	*Buchanania lazan Spreng.*	Lun-pho	Anacardiaceae	T
42	*Buddleja asiatica*	Pon-ma-gyi	Buddlejaceae	S
43	*Butea superba Roxb.*	Pauk-nwee	Fabaceae	Cl/Cr
44	*Caesalpinia decapetala (Roth.)Alston*	Suk-yan-bo /Kyant-sa-su-pin	Caesalpiniaceae	Cl/Cr
45	*Cajanus cajan*	Pe-sin-ngone	Fabaceae	S
46	*Callicarpa arborea Roxb.*	Kyun-na-lin	Verbenaceae	ST
47	*Callicarpa longifolia*	Kun-na-lin-thay	Verbenaceae	ST
48	*Callicarpa nudiflora*	Kyun-na-lin	Verbenaceae	T
49	*Calotropis gigantea*	Ma-yoe	Apocynaceae	S

S/N	*Scientific Name*	Common Name	Family Name	Habitats
50	*Calycopteris floribunda Lam.*	Gyut-nwe	Combretaceae	Cl/Cr
51	*Canscora diffusa (Vahl) R.Br.*	Kyauk-pan	Gentianaceae	H
52	*Careya arborea Roxb.*	Ban-bwe	Lecythidaceae	T
53	*Cassia fistula L.*	Ngu	Caesalpiniaceae	T
54	*Cassia timoriensis DC.*	Not known	Caesalpiniaceae	ST
55	*Cayratia trifolia*	Not known	Vitaceae	CL
56	*Celosia argentea L.*	Taw-kyet-mauk	Amaranthaceae	S
57	*Centratherum punctatum*	Not known	Asteraceae	H
58	*Cephalostachyum pergracile Munro*	Tin-wa	Poaceae	B
59	*Chloris barbata*	Not known	Poaceae	G
60	*Chromolaena odorata (L.) R.M. King & H Robinson*	Bi-zet	Asteraceae	S
61	*Chukrasia velutina Roem.*	Yin-ma	Meliaceae	T
62	*Cissampelos pareira L.*	Not known	Menispermaceae	Cl/Cr
63	*Clematic fasiculiflora L.*	Khwa-nyo	Ranunculaceae	CL
64	*Congea tomentosa Roxb.*	Tha-ma-ga-nwee	Verbenaceae	Cl/Cr
65	*Corchorus aestuans L.*	Byauk-o	Tiliaceae	S
66	*Corchorus capsularis L.*	Gon-shaw/Khwe-la-but	Tiliaceae	S
67	*Crassocephalum crepidioides (Benth.) S. Moor.*	Pan-zauk-htoe	Asteraceae	H
68	*Cratoxylum neriifolium Kurz.*	Be-bya	Hypericaceae	ST
69	*Cratoxylum polyanthumKorth.*	Be-bya	Hypericaceae	ST
70	*Crotalaria mucronata L.*	Taw-paik-san	Fabaceae	S
71	*Crotalaria multiflora L.*	Not known	Fabaceae	H
72	*Croton oblongifolius Roxb.*	Tha-yin-gyi	Euphorbiaceae	ST
73	*Crypteronia pubescens Blume*	A-nan-pho	Crypteroniaceae	T
74	*Cryptolepis buchanani Rome.& Schult*	Na-sha-gyi	Asclepiadaceae	Cl/Cr
75	*Curcuma aurantiaca*	Ma-la	Zingiberaceae	H
76	*Cymbidium aloifolium (L.)Sw.*	Thit-tet-lin-nae	Orchidaceae	E
77	*Dactyloctenium aegyptium*	Lay-gwa-myet	Poaceae	G
78	*Dalbergia cultrata Grah.*	Yin-daik	Fabaceae	T
79	*Dalbergia oliveri Gamble*	Ta-ma-lan	Fabaceae	T
80	*Dalbergia rimosa Roxb.*	Daung-ta-laung	Fabaceae	ST
81	*Dalbergia volubilis Roxb.*	Daung-ta-laung	Fabaceae	ST
82	*Dendrocalamus longispathus (Kurz) Kurz*	Wa-net	Poaceae	B
83	*Dendrocalamus membranaceus Munro*	Hmyin-wa	Poaceae	B
84	*Derris sp.*	Not known	Fabaceae	Cl/Cr
85	*Desmodium heterophyllum (Willd.)DC.*	Not known	Fabaceae	S
86	*Desmodium pulchellum Benth.*	Taung-da-min	Fabaceae	S
87	*Dillenia parviflora Griff*	Kyet-zin-byun	Dilleniaceae	T
88	*Dillenia pentagyna Roxb.*	Zin-byun	Dilleniaceae	T
89	*Dinochloa maclellandii Kurz*	Ba-du-ma-wa/Wa-nwee	Poaceae	B
90	*Dioscorea bulbifera*	Myauk-u	Dioscoreaceae	Cl/Cr
91	*Dioscorea cylindrica Burm.*	Kywe-thon-ywet	Dioscoreaceae	Cl/Cr
92	*Dioscorea pentaphylla L.*	Kywe-ngar-ywet	Dioscoreaceae	Cl/Cr
93	*Dioscorea sativa L.*	Kauk-yin-nwee	Dioscoreaceae	Cl/Cr
94	*Diospyros kika L.f.*	Te	Ebenaceae	T
95	*Dipterocarpus tuberculatus Roxb.*	In	Dipterocarpaceae	T
96	*Duabanga grandiflora*	Myauk-ngo	Lythraceae	T

S/N	*Scientific Name*	Common Name	Family Name	Habitats
97	*Ehretia acuminata R.Br*	Taung-poe-lu-lin	Boraginaceae	T
98	*Elephantopus scaber L.*	Not known	Asteraceae	H
99	*Entada scandens Benth.*	Doe-nwee	Mimosaceae	Cl/Cr
100	*Erythrina stricta Roxb.*	Ka-thit	Fabaceae	T
101	*Euphorbia antiquorum L.*	Tazaung-gyi	Euphorbiaceae	ST
102	*Euphorbia hypericifolia L.*	Kywe-kyaung-hmin-se	Euphorbiaceae	H
103	*Evolvulus nummularius L.*	Kyauk-kwe	Convolvulaceae	Cl/Cr
104	*Ficus hispida L.*	Kha-aung	Moraceae	ST
105	*Ficus lacor Buch.-Ham.*	Nyaung-gyin	Moraceae	T
106	*Ficus microcarpa*	Not known	Moraceae	S
107	*Ficus obtusifolia Roxb.*	Nyaung-gyat	Moraceae	T
108	*Flacourtia cataphracta Roxb.*	Na-ywe	Flacourtiaceae	T
109	*Flemingia congesta Roxb.*	Kye-hmi	Fabaceae	S
110	*Gardenia coronaria Buch.-Ham.*	Yin-gat-gyi	Rubiaceae	T
111	*Getonia floribunda Roxb.*	Kywet-nwee	Combretaceae	Cl/Cr
112	*Glochidion sp.*	Hta-min-sok	Euphorbiaceae	ST
113	*Goniothalamus laoticus*	Not known	Annonaceae	ST
114	*Grewia laevigata Vahl*	Kyet-ta-yaw	Tiliaceae	ST
115	*Harrisonia perforata Merr.*	Su-gyin	Simaroubaceae	S
116	*Hemigraphis brunelloides (Lam.) Bremek.*	Not known	Acanthaceae	S
117	*Hibiscus macrophyllus*	Taung-phet-wun	Malvaceae	T
118	*Hiptage benghalensis (L.) Kurz*	Bein-new	Malpighiaceae	ST
119	*Holarrhena pubescens Wall. ex G. Don*	Let-htok-gyi	Apocynaceae	ST
120	*Homalium tomentosum Benth*	Myauk-chaw	Flacourtiaceae	T
121	*Homonoia riparia*	Ye-mo-ma-kha	Euphorbiaceae	S
122	*Ipomoea quamoclit L.*	Myet-lay-ni	Convolvulaceae	Cl/Cr
123	*Justicia procumbensL.*	Not known	Acanthaceae	S
124	*Justicia sp.(1)*	Not known	Acanthaceae	H
125	*Justicia sp.(2)*	Not known	Acanthaceae	S
126	*Kleinhovia hospita L.*	O-tein/Pashu-phet-wun	Sterculiaceae	T
127	*Lagerstroemia parviflora Roxb.*	Zaung-pa-lae	Lythraceae	T
128	*Lagerstroemia speciosa (L.) Pers.*	Pyin-ma	Lythraceae	T
129	*Lagerstroemia tomentosa Presl.*	Le-sa	Lythraceae	T
130	*Lannea coromandelica (Houtt.) Merrr.*	Na-be	Anacardiaceae	T
131	*Lathyrus latifolius*	Not known	Fabaceae	S
132	*Leea hirta Banks*	Naga-mauk-phyu	Leeaceae	S
133	*Leea rubra Blume.*	Naga-mauk-ni	Leeaceae	S
134	*Lepidagathis semiherbacea (Clarke) Nees*	Not known	Acanthaceae	H
135	*Leptadenia reticulata Wight & Arn.*	Gon-kha	Asclepiadaceae	Cl/Cr
136	*Leucaena leucocephala (Lam.) De.Wit*	Baw-za-gaing	Mimosaceae	ST
137	*Lindenbergia philippensis Benth.*	Not known	Scrophulariaceae	H
138	*Lindenbergia urticaefolia Lehm.*	Not known	Scrophulariaceae	H
139	*Loranthus pulverulentus Wall.*	Kyi-paung	Loranthaceae	E
140	*Ludwigia hyssopifolia*	Lay-nyin-thay	Onagraceae	H
141	*Ludwigia octovalvis*	Lay-nyin-gyi	Onagraceae	H
142	*Luffa aegyptiaca Mill.*	Tha-but-kha	Cucurbitaceae	Cl/Cr
143	*Mangifera sylvatica Roxb.*	Taung-tha-yet	Anacardiaceae	T
144	*Markhamia stipulata (Wall.) Seem.ex K.Schum.*	Ma-hlwa	Bignoniaceae	ST

S/N	*Scientific Name*	Common Name	Family Name	Habitats
145	*Melanorrhoea usitata Wall.*	Sit-se	Anacardiaceae	T
146	*Merremia hederacea Hallier f.*	Nwe-shoke	Convolvulaceae	Cl/Cr
147	*Merremia vitifolia (Burm.f.) Hallier. f.*	Kyet-hinga-lae-new	Convolvulaceae	Cl/Cr
148	*Microcos paniculata L.*	Mya-ya	Meliaceae	ST
149	*Millettia extensa Benth.*	Win-u	Fabaceae	Cl/Cr
150	*Millettia ovalifolia Kurz*	Thin-win	Fabaceae	T
151	*Mimosa pudica L.*	Hti-ka-yone	Mimosaceae	H
152	*Mitragyna rotundifolia (Roxb.) Kuntze*	Bin-ga	Rubiaceae	T
153	*Moghania macrophylla Runtze*	Not known	Fabaceae	S
154	*Morinda tinctoria Roxb.*	Ni-ba-sae	Rubiaceae	S
155	*Mucuna pruriens (L.)DC.*	Khwe-lae-ya	Fabaceae	Cl/Cr
156	*Musa sp.*	Taw-nga-pyaw	Musaceae	H
157	*Nauclea orientalis L.*	Ma-u	Rubiaceae	T
158	*Operculina turpethum (L.) Silva Mansa*	Kyar-hin-nwe	Convolvulaceae	Cl/Cr
159	*Oroxylum indicum (L.) Kurz.*	Kyaung-sha	Bignoniaceae	ST
160	*Oxalis corniculata L.*	Hmo-chin	Oxalidaceae	H
161	*Paederia foetida L.*	Pe-bok-nwee	Rubiaceae	CL
162	*Pennisetum purpureum Schum.*	Yon-sa-myet	Poaceae	G
163	*Phyllanthus albizzioides (Kurz)Hook.f.*	Shit-sha	Euphorbiaceae	T
164	*Phyllanthus emblica L.*	Zi-phyu	Euphorbiaceae	ST
165	*Polygonum chinense L.*	Maha-gar-kyan-sit	Polygonaceae	H
166	*Potamogeton natans L.*	Floating-leaf Pondweed	Potamogetonacea e	Aq
167	*Prema pyramidata Wall.*	Kyun-na-lin/Kyun-pho	Verbenaceae	T
168	*Pteris vittata*	Brake Fern	Pteridaceae	F
169	*Pterocarpus indicusWilld.*	Taw-pa-dauk	Fabaceae	T
170	*Pterospermum semisagittatum Buch.-Ham.*	Na-gye	Sterculiaceae	T
171	*Pueraria lobata var. montana*	Not known	Fabaceae	CL
172	*Salvia regla*	Not known	Lamiaceae	S
173	*Salvia sp.*	Not known	Lamiaceae	S
174	*Salvia splendensKer Gawl.*	Not known	Lamiaceae	H
175	*Samadera indica Gaertn.*	Ka-di	Simaroubaceae	ST
176	*Schleichera oleosa (Lour.) Oken*	Gyo	Sapindaceae	T
177	*Scoparia dulcis L.*	Dana-thu-kha	Scrophulariaceae	H
178	*Senna hirsuta (L.) Irwin & Barneby*	Ka-thaw-hmwe-htu	Caesalpiniaceae	S
179	*Senna timoriensis (DC.)(DC.) H. S. Irwin & Barneby*	Taw-ma-zeli	Caesalpiniaceae	T
180	*Senna tora (L.) Roxb*	Dan-gwe	Caesalpiniaceae	S
181	*Sesbania paludosa Roxb.*	Nyan	Fabaceae	S
182	*Setaria lutescens Hubb.*	Yon-sa	Poaceae	G
183	*Shorea obtusa Wall.*	Thit-ya	Dipterocarpaceae	T
184	*Shorea siamensis (Kurz) Miq.*	In-gyin	Dipterocarpaceae	T
185	*Sida acuta Burm f.*	Ta-byet-si	Malvaceae	S
186	*Smilax aspericaulis Wall ex A. D.C.*	Sein-na-baw-thay	Smilaceae	CL
187	*Smilax macrophylla Roxb.*	Sein-na-baw-gyi	Smilaceae	CL
188	*Spermacoce mauritiana*	Not known	Rubiaceae	H
189	*Spondias pinnata (L. f.) Kurz.*	Taw-gwe	Anacardiaceae	T
190	*Sterculia foetida L.*	Let-khok	Sterculiaceae	T
191	*Sterculia ornata Wall. ex Kurz*	Don-shaw	Sterculiaceae	T
192	*Sterculia versicolor Wall.*	Shaw-phyu	Sterculiaceae	T

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193	*Stereospermum colais (Buch.-Ham. ex Dillwyn) Mabb.*	Than-thay	Bignoniaceae	T
194	*Stereospermum suaveolens (Roxb.) DC.*	Kywe-ma-gyo-lein	Bignoniaceae	T
195	*Strobilanthes auriculata*	Not known	Acanthaceae	S
196	*Strobilanthes rufescens T. Anders.*	Not known	Acanthaceae	H
197	*Strychnos nux-blanda A.W. Hill*	Ka-baung	Loganiaceae	ST
198	*Tadehagi triquetrum (L.)H. Ohashi*	Lauk-thay	Fabaceae	S
199	*Tectona grandis L. f.*	Kyun	Verbenaceae	T
200	*Terminalia alata (Heyne) Roth*	Htauk-kyant	Combretaceae	T
201	*Terminalia pyrifolia Kurz*	Lein-pin	Combretaceae	T
202	*Tetrameles nudiflora R. Br.*	Baing	Datiscaceae	T

Aq=Aquatic, B=Bamboo, CL=Climber, Cl/Cr=Climber/Creeper, E=Epiphyte, F=Fern, G=Grass, H=Herbs, M=Mushroom, S=Shrubs, ST=Small Tree, T=Tree

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ERM's Bangkok Office

179 Bangkok City Tower, 24th Floor
South Sathorn Road
Thungmahamek, Sathorn
Bangkok 10120
Thailand
T: +66 2 679 5200
F: +66 2 679 5209

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