Environmental Impact Assessment (EIA) for Onshore Windfarm Kandok

EIA Report

30 October 2019

Project No.: 0441116

The business of sustainability

ERM

Document details	Onshore Windfarm
Document title	Environmental Impact Assessment (EIA) for Onshore Windfarm Kandok
Document subtitle	EIA Report
Project No.	0441116
Date	30 October 2019
Version	00
Author	Jovy Tam
Client Name	InfraCo Myanmar Wind Power Co. Ltd (“IMWP ”)

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
Final	00	Jovy Tam	Craig Reid	Craig Reid	30.10.2019	nil

Signature page

30 October 2019

Environmental Impact Assessment (EIA) for Onshore Windfarm Kandok

EIA Report

Craig A. Reid
Partner

ERM Hong Kong Ltd.

CONTENTS

List of Tables

List of Figures

1. EXECUTIVE SUMMARY

1.1 Introduction

The Project Proponent for the Kandok Windfarm Project is **InfraCo Myanmar Wind Power Co. Ltd ("IMWP")** which is a wholly owned subsidiary of **InfraCo Asia Development Pte. Ltd** ("IAD") and managed by **Infra Capital Myanmar ReEx Pte. Ltd ("ICM")**. IMWP aims to develop utility-scale wind power projects based on a Public Private Partnership model in Myanmar.

In 2017, IAD signed a Memorandum of Understanding (MOU) in collaboration with the Magway Region Government to assess the feasibility of wind power projects in the Magway Region of Myanmar. Under this MOU, ICM has been undertaking all development activity on behalf of IMWP (and by extension IAD) to demonstrate the technical and commercial viability of wind power in Myanmar. Accordingly, ICM submitted a Project Proponent Report (PPR) to the ECD on 29 March 2018, and it was approved on 12 July 2018. The Scoping Report was submitted on 4 September 2018, and approved after revisions on 30 April 2019.

ICM hereby submits for consideration a request to acquire the ECC under the Project Proponent, IMWP. Accordingly, this EIA is submitted under the Project Proponent IMWP, with the DICA registration number of 120644181.

Further to the signing of the MOU and the feasibility study undertaken, IMWP proposed to develop a wind power project which is located near Kandok, and it includes 25 wind turbines with a capacity of up to 113 MW (hereafter referred to as "the Project" or "the Kandok Windfarm Project").

As per the Myanmar EIA Procedure, this Project requires an Environmental Impact Assessment (EIA) to be conducted and submitted to the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation (MONREC).

This document is the EIA Report for the Kandok Windfarm Project and is submitted to the ECD of the MONREC in order to fulfil Myanmar permitting requirements.

Environmental Resources Management (ERM) – Hong Kong Limited is the environmental and social consultant that conducted this EIA Study. ERM is supported by local environmental and social consultant, Environmental Quality Management (EQM), which is registered under the MONREC Consultant Registration Scheme.

1.2 Policy and Regulatory Framework

The Project will be undertaken in line with a number of national and local standards and laws. Local laws relating to EIA include but not limited to:

- Environmental Conservation Law (2012);
- Environmental Conservation Rules (2014);
- National Environmental Quality (Emission) Guidelines (2015); and
- Environmental Impact Assessment Procedure (2015).

1.3 Project Description and Alternatives

1.3.1 Proposed Project

The Windfarm Site is located in Minhla Township, Magway Region (*Figure 1.1*). The Windfarm Site is part of the Ayeyarwady basin, with an average elevation of roughly 400 m. The Windfarm Site is located in a complex terrain with hilly features.

The following components of the 113 MW Windfarm will be located within the Windfarm Site:

- Meteorological masts (two masts, each approximately 120 m height);

- Wind turbines (25 turbines, with a minimum height of 100 m);
- Foundation and hardstand for the wind turbines;
- Underground cables connecting the turbines;
- Access roads with drainage;
- Transformers;
- Substation; and
- WTG fencing and CCTV (if required).

The areas occupied by the above facilities are shown in *Table 1.1.* These facilities will cover a total area of 92.56 ha, including 2.7 ha of which will be occupied temporarily during the construction phase for the site office and laydown area and 89.86 ha which will be occupied by other facilities during the entire construction and operation phases of the Project.

During construction of the Project, there will also be temporary site office and temporary laydown area which are necessary for the construction activities within the Windfarm Site. These facilities will not be present during operation phase of the Project.

Table 1.1 Land Area Occupied by the Windfarm Facilities (Source: Layout of Facilities provided in the Feasibility Study)

Windfarm Site	Total (ha)
Site office & Laydown area	2.70
Wind turbines	22.50
O&M, Substation	1.04
Access Road to the Windfarm Site (4.7 km section required to be expanded from existing road)	9.40
Internal Access Roads within the Windfarm Site	56.92
Total Area	**92.56**

Layout of the above facilities within the Windfarm Site is provided in *Figure 1.1*.

There are currently a total of five (5) wind turbine models options under consideration for the Project, and their specifications are provided in *Table 1.2*. The layout of turbines will be the same for all wind turbine models. The final wind turbine model will only be confirmed during the detailed design stage of the Project. For the impact assessment, it is assumed that the turbine model Option 1 Siemens Gamesa SG 4.5-145 4.5MW or Option 3 - Vestas V150-4.2 4.2 MW will be used for the Project. It is because their sizes of the turbines (in terms of rotor diameter and hub height) are largest amongst the turbine options which would thus considered to be the worst case scenario for the assessment of relevant impacts related to shadow flicker, bird and bat collision etc.

Table 1.2 Options of Wind Turbine Model

Parameter	Option 1	Option 2	Option 3	Option 4	Option 5
Turbine Type	Siemens Gamesa SG 4.5-145 4.5MW	Gold Wind G140/3.4 3.4MW	Vestas V150-4.2 4.2 MW	General Electric GE 3.8-137 3.8MW	Envision EN141-2.65 2.65MW
Rotor Diameter (m)	145	140	150	137	141
Hub Height (m)	157.5	100	155	131.4	140

Construction activities of the Project are tentatively targeted to commence following receipt of the Environmental Compliance Certificate (ECC) and tentatively can be completed in 21 months, followed by commissioning and operation of the Project. Maintenance activities of the windfarm during the operation phase is anticipated be limited in scale. The windfarm is designed for an operational life of 25 years as stated in the Project's Feasibility Study Report which was conducted to assess the techno-commercial feasibility, although this may be extended if required. It should be noted that the operational lifespan maybe extended to 30 years, if required. There is currently no confirmed plan of decommissioning of the Project, the decision of which would be subject to negotiations with the MOEE.

A brief Project implementation schedule is provided in *Table 1.3.* This schedule was prepared by the logistics consultant engaged to conduct the Transportation Study, and it is subjected to change and pending agreements with the Government.

Table 1.3 Tentative Project Implementation Schedule

Activity	Implementation
Improvement of Offloading Area at Minbu and Access Road to the Windfarm Site	Q1 Year 1 – Q4 Year 1
Improvement of Internal Access Road within the Windfarm Site (including drainage works)	Q1 Year 1 – Q4 Year 1
Construction of Labour Camp, Site Office and Lay Down Area	Q1 Year 1 – Q3 Year 1
Construction of Turbine Foundation and Crane Hardstand	Q1 Year 1 – Q4 Year 1
Transportation of Installation Equipment (for Lifting) from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 1
Transportation of Wind Turbine Components from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 2
Installation of 25 Wind Turbines at the Windfarm Site; Internal Electrical Connections; and Construction of Substation and O&M Building.	Q2 Year 1 – Q3 Year 2
Commissioning and Operation Commencement of Kandok Windfarm	Q3 Year 2 – Q4 Year 2

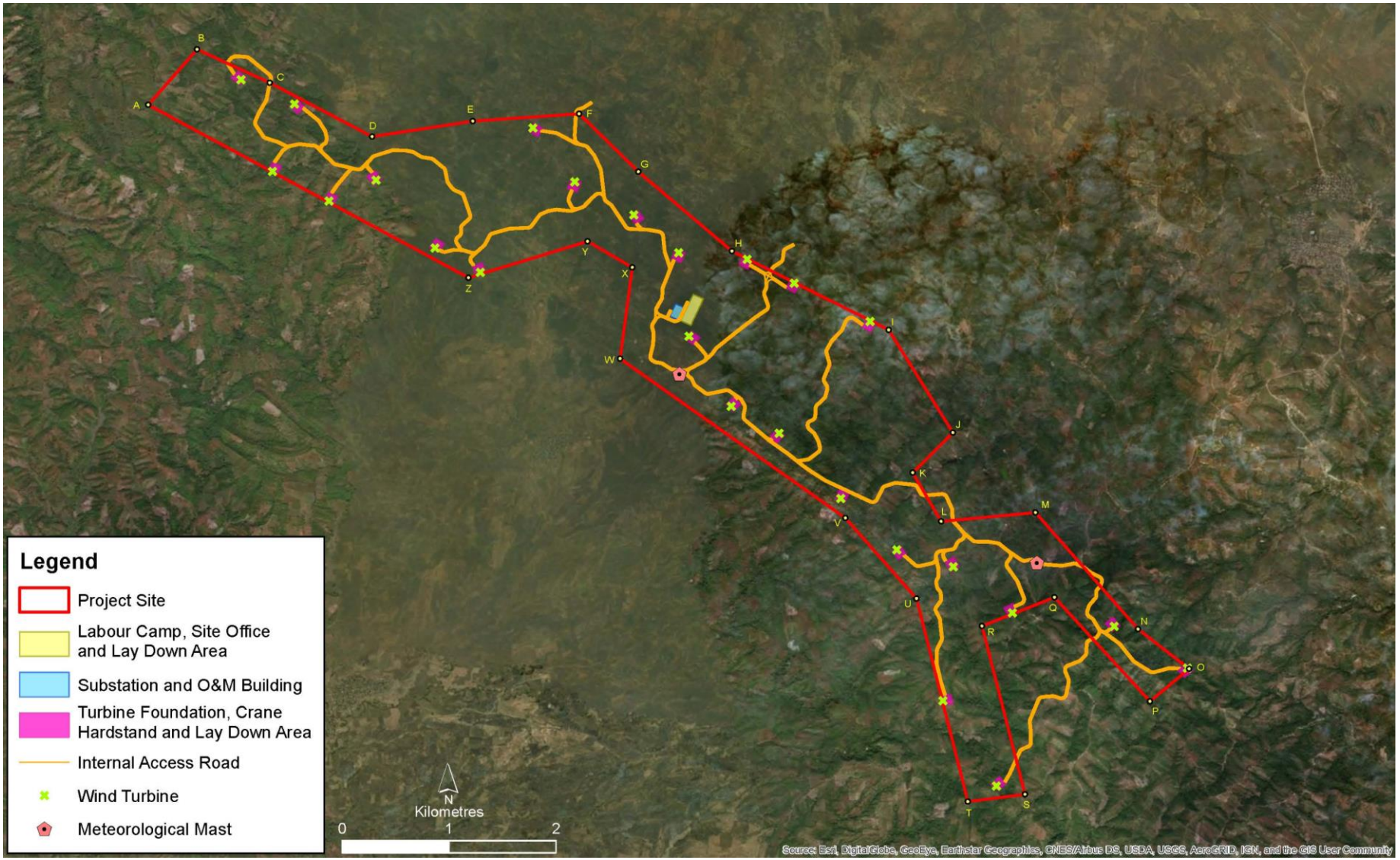


Figure 1.1 Proposed Project Location

1.3.2 Alternatives

Consideration of project alternatives is a fundamental requirement in the planning of any project as a means of avoiding or reducing adverse environmental impacts and maximising or enhancing project benefits. Several options that have been / are considering for the Project include the following:

- Construction of new access roads versus improvement of existing access roads – it is proposed to improve existing access roads from the Minbu offloading area to the Windfarm Site as well as within the Windfarm Site instead of construction of new roads. Generally, improvement of existing roads will involve less Powered Mechanical Equipment (PME) to be used, thus would have gaseous and noise emission reduced when compared to construction of new roads. In addition, improvement of existing roads will mostly be undertaken on land already modified by development which will reduce the extent of direct loss of natural habitats as well as the requirement of land take from households.
- Turbine siting – a number of constraints within the Windfarm Site have been considered when selecting the wind turbine locations in order to avoid impacts to nearby sensitive receivers and infrastructures as well as ensure stability of the turbine. The constraints and setback distance that have been considered are provided in *Table 1.4*. The turbine locations have also avoided reserved forests and monastery areas to avoid direct impacts to them, as well as avoided a slope of greater than 13% for safety consideration.

Table 1.4 Turbine Location Buffer for Layout Finalization

Constraints	Setback Distance	Remarks
Building, village, town	345 m	A setback distances of 1.5 x turbine height is maintained between turbine and nearby building as recommended by the WBG EHS Guidelines for Wind Energy (2015) to reduce risk of blade throw.
Roads	95 m	The minimal setback distance to roads was chosen according to transportation requirement and construction constraints.
Waterways	50 m	Based on foundation requirement of turbine.
Coal Mines / Oil Drilling Activities	65 m	Based on foundation requirement of turbine. The Feasibility Study recommended a setback distance of 65 m from coal mines. The same setback distance from oil drilling activities is maintained as confirmed by IMWP. Further geophysical and geotechnical surveys may be necessary to validate the setback distances for each of the turbine locations

1.4 Description of the Environment

The information provided in this section is based on data collected from primary and secondary sources. Primary environmental and social data were collected in 2018 for the EIA, via a series of field surveys as well as Scoping and EIA consultations. Secondary sources include a desktop review of published information, supplemented with information provided by IMWP and thorough review of available ERM in-house literature. These data sources have been supplemented by data from a variety of stakeholders, including government bodies (e.g. Minhla Forestry Department), Non-Governmental Organisations (NGOs), Civil Society Organisations (CSOs) and local communities.

An Area of Influence (AOI) has been assigned for the environmental and social aspects as appropriate and is summarized in *Table 1.5*. The AOI of the Project encompasses:

- The primary Windfarm Site where windfarm facilities will be installed; and
- Areas potentially affected by the cumulative impacts from other developments as well as induced activities of the Project.

Baseline environmental and social baseline characteristics and conditions in the Project Site and its AOI is presented below.

1.4.1 Environmental Baseline

For air quality, the principal sources of emissions to the atmosphere in the immediate vicinity of the Project Site are likely to be from household fires for domestic purposes (i.e. heating and cooking), dust emissions from vehicle transportation on the unpaved road and coal mining activities in the vicinity. Given that operational of the wind turbines will not have any air emission and the dust impacts from construction is unlikely to affect the nearest village (Set Set Yo Village) which is located 0.9 km (0.5 miles) from the Project Site, no further baseline air quality survey has been undertaken for this EIA.

For ambient noise, the principal sources of noise in the immediate vicinity of the Project Site are likely to be from vehicle transportation and coal mining activities in the vicinity. Given that the nearest village (Set Set Yo Village) is located 0.9 km (0.5 miles) from the Project Site, construction and operational noise are unlikely to be a major issue from the Project which are confirmed in the EIA. As such, no further baseline noise survey has been undertaken.

The water resources used by the nearest community is located at Set Set Yo Village. It should be noted that the nearby mining activities and erosion of the unpaved road could potentially be the existing sources of water quality pollution which are not caused by the Project.

Myanmar is exposed to multiple natural hazards including cyclones, earthquakes, floods, and fires. The country has been periodically hit by natural disasters and the Project Site is located in a moderately sensitive area for natural disasters [(1)].

(1) https://reliefweb.int/map/myanmar/myanmar-natural-hazard-risks-national-hazard-map-issued-22-march-2011

Table 1.5 Area of Influence considered for the Environmental and Social Resource / Receptor

Environmental / Social Aspect	Area of Influence	Remarks
Air Quality during construction phase	500 m from Windfarm Site Boundary	Derived based on potential extent of impacts from construction activities.
Noise during construction phase	300 m from Windfarm Site Boundary	Derived based on potential extent of impacts from construction activities.
Noise during operation phase	2 km from Windfarm Site Boundary	Derived based on WBG EHS Guidelines for Wind Energy (2015).
Water quality during construction and operation phase	2 km from Windfarm Site Boundary	Derived based on potential extent of impacts from construction activities.
Biodiversity for Windfarm Site	2 km from Windfarm Site Boundary	Derived based on potential extent of impacts from construction and operation activities.
Socio-economic conditions	Settlements that are within 2 km of the Windfarm Site as well as those areas where impacts may be experienced more broadly such as employment, economic development, in-migration and public services, often covering a wider spatial area. These included the Set Set Yo, coal mine areas, monastery and pagodas within 2 km from the Project Site as well as Yae Ngan, Yae Nan Ma, Sin Man Kya and oil drilling area outside 2 km of the Project Site.	Derived based on potential extent of impacts from construction and operation activities.

1.4.2 Biodiversity Baseline

Biodiversity surveys conducted between March to November 2018 indicated that the proposed windfarm facilities covers ~36.62 ha of natural habitat and ~55.94 ha of modified habitat with no critical habitat identified (*Table 1.6*).

Table 1.6 Classification of Habitat for the Windfarm Facilities

Windfarm Site	Natural Habitat Area (ha)	Modified Habitat Area (ha)	Total Area occupied by the Windfarm Facility (ha)
Site office & Laydown area	1.92	0.78	2.70
Wind turbines	13.17	9.33	22.50
O&M, Substation	0.80	0.24	1.04
Access Road to the Windfarm Site (4.7 km section required to be expanded from existing road)	0	9.40	9.40
Internal Access Roads within the Windfarm Site	20.73	36.19	56.92
Total Area of Natural / Modified Habitat occupied by the Windfarm Facility in the Windfarm Site (ha)	**36.62**	**55.94**	**92.56**

Note: Natural Habitat and Modified Habitat are defined according to IFC PS6 within the footprint area of the windfarm facilities extracted from the layout provided in the Feasibility Study.

From the bird survey, a total of 16 raptor species were detected flying within 2 km of the windfarm at the turbine's height during survey in March and November 2018. During the March survey, four species were recorded frequently (10 observation or above), including Oriental Honey Buzzard (*Pernis ptilorhynchus*), White-eyed Buzzard (*Butastur teesa*), Black-shouldered Kite (*Elanus caeruleus*) and Crested Serpent Eagle (*Spilornis cheela*). During the November survey, four species were also recorded frequently, including Oriental Honey Buzzard (*Pernis ptilorhynchus*), White-eyed Buzzard (*Butastur teesa*), Shikra (*Accipiter badius*) and Black Baza (*Aviceda leuphotes*). .

Live trapping, acoustic sampling and roost surveys were undertaken for bats which may also collide with the operating turbines. Over the course of the live trapping, 20 bats representing five species arranged in three families were recorded. These bat species included Greater Shortnosed Fruit Bat (*Cynopterus sphinx*), Horsfield's Leaf-nosed Bat (*Hipposideros larvatus*), cf. Grand Leaf-nosed Bat (*Hipposideros cf. grandis*), Javan Pipistrelle (*Pipistrellus javanicus*) and Lesser Asiatic Yellow House Bat (*Scotophilus kuhlii*). A total of 1.31 gigabytes of acoustic activity was recorded during the night survey period which comprised of 868 distinct bat passes. From these data six phonically distinct bat taxa were detected in the acoustic sampling. Reference call data obtained during the survey allowed specific assignment of two phonic types (Lesser Asiatic Yellow House Bat; *Scotophilus kuhlii* and Horsfield's Leaf-nosed Bat; *Hipposideros larvatus*). The remaining taxa cannot be assigned to species with certainty to the current lack of call data for bat species in Myanmar, although all represent aerial insectivores within the Emballonuridae, Molossidae, Vespertilionidae and/or Miniopteridae. Interviews with local residents and direct observations undertaken during the survey

period did not reveal any significant (e.g., >100 individuals) diurnal roosts for bats. No caves were found during the survey period and discussions with residents and field guides also consistently suggested that these do not exist in the vicinity of the Windfarm Site. Because flying fox (*Pteropus spp.*) colonies —which roost in the open on tall trees—are highly conspicuous and therefore invariably well-known where they occur, the Windfarm Site evidently also does not support these. While two colonies of Indian Flying Fox (*P. giganteus*) do occur approximately 150 km to the north on the eastern bank of the Ayeyarwady River, these are also unlikely to visit the Windfarm Site for foraging purposes due to the relative lack of fruiting trees within its interior.

1.4.3 Social Baseline

The Project is located in Minhla Township of Thayet District, in which the regional capital is Magway. A number of villages were identified in the vicinity of the Windfarm Site which are shown in *Table 1.7* and *Figure 1.2*. Primary data on socio-economic condition was gathered during the Scoping and EIA phases of the Project in July and November 2018 from a sample of potentially affected communities in these villages, using collection methods including focus group discussion (FDG), key informant interviews (KII) and settlement profiling.

Table 1.7 Social Area of Influence

Impacted Settlements	Name of Settlement	Location
Directly Affected Settlements (Within 2 km)	Set Set Yo	This village is closest settlement and located within 0.9 km of the Windfarm Site.
	Coal Mine Area	There are a couple of coal mine located within the Windfarm Site.
	Monastery and Pagodas	Set Set Yo Village Monastery is located within the Windfarm Site.
Indirectly Affected Settlements	Yae Ngan	This village is located 3.8 km away from the Windfarm Site.
	Yae Nan Ma	This village is located 3.5 km away from the Windfarm Site.
	Sin Man Kya	This village is located 2.6 km away from the Windfarm Site.
	Oil Drilling Area	A numerous oil drilling area is located approximately 3.4 km away from the Windfarm Site.

The villagers in Set Set Yo, Yae Nan Ma, Yae Ngan and Sin Man Kya are reported to be all Bamar.

According to the data collected in the public consultation meeting, most of households in the vicinity of the Windfarm Site are mainly depending on agriculture for their livelihood. All of the interviewees reported to possess the agricultural land and average land holding size is 5 acres. The primary crops cultivated in this area include paddy, sesame, pulses and pigeon pea.

A land survey was completed by IMWP in 2018 in collaboration with the township administrators, Land Record Department and Forestry Department with the support of local community, including village elders and leaders, to determine the information on land classification, land ownership and land use within the Windfarm Site. Most (~95%) of the land in Kandok is comprised of the land category Taw Yaine (virgin land) while the remaining are religious purpose land or reserved forest land. It was also reported that the virgin land at the Windfarm Site is primarily used by the local community for cultivation but the land users typically do not have user certificates for their land. As such, the “ownership or possession of land” reported above by the local community during the Scoping consultation and EIA consultation of the Project in July and November 2018 are likely to be without proof by land use certificate within the Windfarm Site. As a conservative approach, potential

impacts to both users with and without land use certificates has been included in the impact assessment.

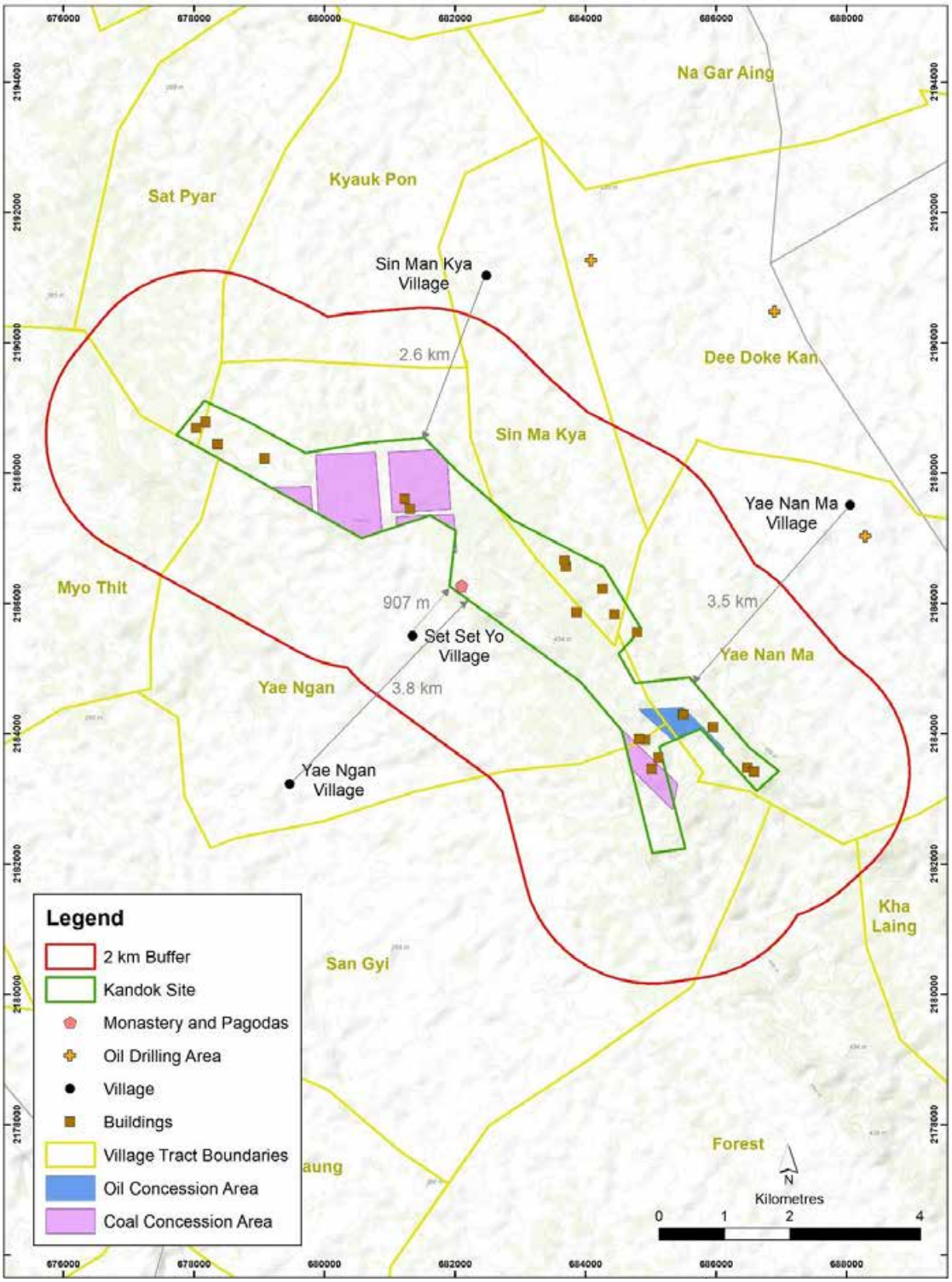
During the consultation undertaken for the EIA as well as IMWP land survey, it is reported that the local community collect minor forest products (such as bamboo, edible flowers and fruits, mushrooms etc.) from the forest area within the Windfarm Site (*Figure 1.2*). Some members of the local community and some coal mine workers also extract timber from the reserve forest for constructing and repairing household structures and agricultural implements. However, this is opportunistic and rare. The dependence of the local community on the forest is expected to be minimal.

There are five coal mines in the Windfarm Site (*Figure 1.2)*. According to the villagers, the coal mines operate on a five year contract. The total area of coal mine is approximately 600 acres. There are workers' camps catering to workers in the coal mine.

There is an oil concession area within the Windfarm Site where there is no drilling operation (*Figure 1.2*). The area is approximately 72 acres. It is also reported that there are local artisanal oil wells which are located 3.4 km away from the Windfarm Site.

Infrastructure is generally limited in the vicinity of the Windfarm Site. For examples, communities in the vicinity of the Windfarm Site do not have access to electricity. All of the settlements near the Windfarm Site have unpaved access roads which can be accessed by car/motorcycle. However, the roads are often damaged during the rainy season and required continued maintenance. Waste management remains an issue in settlements in the vicinity of the Windfarm Site, where it is generally burnt or dumped.

The ERM site visit in 2018 identified a monastery and pagoda in the Windfarm Site (*Figure 1.2)*. No monks reside in the monastery, according to local sources. However, some monks use the monastery during the Buddhist Lent period (July to October). No other cultural heritage sites were recorded during the site visit.



Source: ERM data 2018

Figure 1.2 Map of Social Area of Influence

1.5 Impact Assessment and Proposed Mitigation Measures

The EIA has assessed the potential impacts and proposed mitigation to reduce the level of the impact. The EIA concluded, from previous experience in the industry that potential impacts are typically well understood, with little or no evidence of adverse consequences on the majority of

environmental or social receptors. These potential impacts and the associated mitigation measures are summarised in *Table 1.8*.

1.6 Cumulative Impact Assessment

In addition to the Kandok Windfarm, IMWP has been undertaking wind feasibility studies in Magway Region and has identified other three (3) potential windfarm sites. The Sin Ka Windfarm Site and the Swei Pauk Kan Windfarm Site are located in the Chauk Township, and are approximately more than 100 km away from the Kandok Windfarm Site. The Zin Taung Windfarm Site is located in Mindon Township and is located more than 30 km away from the Kandok Windfarm Site. Cumulative impacts are not expected from these projects with the Kandok Windfarm Project given the large separation distance from the Kandok Windfarm Site.

There will be a proposed 132 kV transmission line of 57.5 km long which connect the Kandok Windfarm to the Mann (Minbu) substation. Cumulative impacts of the windfarm and the transmission line will be assessed in the Initial Environmental Examination (IEE) Report of the transmission line which will be completed subsequent to the current EIA of the Kandok Windfarm.

1.7 Environmental Management Plan

A Project-specific, dedicated Environmental Management Plan (EMP) has been developed to manage impacts associated with the Project and ensure legislative compliance and standards of good practice during the construction and operation of the proposed Kandok Windfarm Project. The EMP includes a schedule and designation of responsibility for the implementation of mitigation measures and a summary of key mitigation measures is presented in *Table 1.8*.

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. The Environmental Monitoring Plan is provided in *Table 1.9*.

In addition to this EMP, there are a number of detailed management plans which are recommended to be developed and implemented in order to reduce the residual impacts from the Project to no greater than moderate significance.

It is recommended that following management plans are to be developed before construction:

- Waste Management Plan;
- Emergency Reponses Plan;
- Spill Response Plan;
- Land Acquisition and Resettlement Framework; and
- Livelihood Restorations Plan.

An Environmental Monitoring Report will be prepared for the ECD on a half-yearly basis during the construction phase to report monitoring findings and environmental and performance of the Project.

Table 1.8 Summary of Impacts and Mitigation Measures

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
Construction Phase				
Air Quality	■ The access road will be paved road. ■ A setback distance of 345 m will be maintained between wind turbine and residential area. ■ Adoption of dust suppression measures such as water suppression at exposed open earthworks at construction site, provision of cover on exposed soil and construction materials including stockpiles, install hoarding (i.e. temporary solid fencing) along the perimeter of the construction worksite boundary etc.	Minor	Negligible	Section 6.3.1
Noise	■ Adoption of good site practices such as well-maintained equipment to be operated on-site, shut down or throttled down between work periods for machines and construction plant items (e.g. trucks) that may be in intermittent use, reduce the number of equipment operating simultaneously as far as practicable, etc. ■ Construction should be avoided within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October.	Minor to Moderate	Minor	Section 6.3.2

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ If construction activity within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October is unavoidable, prior consultation should be conducted with the monks using the pagoda and monastery to discuss the arrangement of construction works to reduce noise impacts to these areas. Noise monitoring should be undertaken at the pagoda and monastery during the Buddhist Lent period and compared against the Myanmar National Environmental Quality (Emissions) Guidelines (NEQ) for ambient noise to check compliance and proposed noise reduction measures if exceedance is recorded.			
Waste Management	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Minor	Minor	Section 6.3.3
Surface Water Quality	■ Earthworks to form the final surfaces should be followed up with surface protection and drainage works to prevent erosion caused by rainstorms. ■ Site drainage facilities should be designed and developed properly, considering runoff from a 25 years rainfall event	Negligible	Negligible	Section 6.3.4

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	and provide for an oily water separator at the tie-in point of the existing drainage system etc. ■ All drainage facilities and sediment control structures should be inspected and maintained on a regular basis. ■ A sewage system should be constructed for the labour camp. Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges before drained to the site drainage system.			
Ground Water Quality	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Negligible	Negligible	Section 6.3.5
Soil Quality	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Negligible	Negligible	Section 6.3.6
Landscape and Visual	■ Construction activities should be restricted to within the Project facility footprint and immediate surroundings only.	Minor	Minor	Section 6.3.7

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ After construction work, any land taken for a temporary basis will be restored to their original form (e.g. for labour camp, site office and lay down area). ■ To the extent possible, existing roads should be used as Access roads to the Windfarm Site, with minor improvement works if required.			
Biodiversity	■ The Project does not encroach upon any Critical Habitat. ■ To the extent possible, existing roads should be used as Access roads to the Windfarm Site, with minor improvement works if required. ■ Implement mitigation and monitoring measures to reduce and monitor impacts from loss of terrestrial habitat, disturbance or displacement of fauna, barrier creation, fragmentation and edge effects, degradation of habitat and direct mortality event.	Moderate	Negligible to Minor	Section 6.3.8
Community Health and Safety	■ The non-local workers should be living in labour camp during construction. ■ Provide training on some of the most common communicable diseases to all workers to raise awareness of the likely diseases, symptoms, preventative measures and transmission routes as well as treatment.	Minor	Minor	Section 6.3.9

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ Ensuring health check-ups of all labourers employed at the Windfarm Site to screen pre-existing communicable diseases. ■ Provide access to workers to healthcare services and medical care in case of sickness. ■ A Traffic Management Plan should be developed in order to provide for of a) adequate staging areas for vehicles; b) adequate facilities and amenities for drivers; and c) a formal training program for drivers employed for the Project. ■ Enforcement of a speed limit of 40 km /h for vehicles along the internal access roads. ■ Erection of crossing signs at known pathways across the internal access roads to alert drivers to the possibility of people and livestock entering the road.			
Occupational Health and Safety	■ Implement controls and mitigation measures according to the World Bank Group Environmental, Health and Safety (WBG EHS) Guidelines for Wind Energy (2015) for working at height, working at remote location and lifting operations. In addition, snake guard should be included as personal protective equipment for the workers (PPE).	Minor	Minor	Section 6.3.10

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
Livelihood and Economy	■ The Project facilities have been sited to avoid residents and coal mine. ■ The temporarily used area will be reinstated after the constructional phase. ■ Develop and implement a Land Acquisition and Resettlement Framework of the Project considering requirement of local Myanmar and international standards (International Finance Corporation Performance Standard (IFC PS) and Asian Development Bank Safeguard Policy Statement (ADB SPS)). ■ Develop and implement a Livelihood Restoration Plan considering requirement of local Myanmar and international standards (IFC PS and ADB SPS).	Minor to Moderate	Minor	Section 6.3.11
Operation Phase				
Noise	■ A setback distance of 345 m should be maintained between wind turbine and residential area. ■ Use of serrated trailing edges as necessary to reduce noise level to achieve compliance of operational impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Noise optimization will be performed using turbines at reduced noise mode to achieve compliance of operational	Moderate	Minor	Section 6.4.1

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Physically relocate sensitive receiver as a last resort if compliance cannot be achieved with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise. A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver. ■ Monitor operational noise impact at selected Noise Sensitive Receivers (NSRs) during the operational phase. ■ If the turbine model confirmed to be used has a higher sound power level than Siemens Gamesa SG 4.5-145 4.5MW, further noise assessment will be undertaken to ensure that the noise level is compliant with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise.			
Shadow Flicker	■ A setback distance of 345 m will be maintained between wind turbine and any nearby building. ■ The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher fencing and planting trees can be explored at locations with potential	Negligible	Negligible	Section 6.4.2

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	impacts of shadow flicker. The use of curtains can also be explored. If these prove effective with the impacts mitigated, the start-stop shadow curtailment strategy as stated below will not be necessary. ■ A start-stop shadow curtailment strategy may be adopted to achieve compliance of shadow flicker impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Physically relocate sensitive receiver as a last resort. A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver. ■ Monitoring of shadow flicker impact through engagement with residents during the operational phase where there are predicted impacts from shadow flicker.			
Waste Management	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Minor	Minor	Section 6.4.3
Surface Water Quality	■ Site drainage facilities should be designed and developed properly considering runoff from a 25 years rainfall event	Negligible	Negligible	Section 6.4.4

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	and provide for an oily water separator at the tie-in point of the existing drainage system etc. ■ All drainage facilities and sediment control structures should be inspected and maintained on a regular basis. ■ A sewage system will be constructed for the operational and maintenance building. Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges before drained to the site drainage system.			
Ground Water Quality	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Negligible	Negligible	Section 6.4.5
Soil Quality	■ A Waste Management Plan (WMP) for the Project should be developed and implemented covering different aspects of waste management including waste generation, storage, recycling, treatment, transport and disposal.	Negligible	Negligible	Section 6.4.6
Landscape and Visual	■ Operational activities should be restricted to within the Project facility footprint and immediate surroundings only. ■ A uniform size and design should be used for the wind turbines as far as practicably possible.	Minor	Minor	Section 6.4.7

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ Cables connecting wind turbines will be buried and not visible. ■ Any land taken for a temporary basis for construction will be restored to their original form (e.g. for labour camp, site office and lay down area) and not used for operation.			
Birds and Bats	Turbine Collision ■ Establish waste control programme to reduce attraction of some raptors species. This should be reflected in the WMP. ■ All tower structures are to be free of holes that can be used for nesting. Roosting habitats (wires and ledges) are to be kept to a minimum. ■ Contrasting colours are to be trialled on wind turbines in order to make turning blades visible to avifauna. ■ Strobe lights may be utilised on all turbines flashing at 3 second intervals to deter nocturnal avifauna, subject to local aviation rules and standards. ■ Ensuring that any all-night lighting on turbine towers and blades consists of LED lights that have ultraviolet wavelengths. Such lights are known to deter certain bat species and are less attractive to insects that bats forage on.	Negligible to Minor	Negligible	Section 6.4.8

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ Habitat management is to be applied to reduce bird and bat habitat within the Windfarm Site. This can include removal of understorey vegetation and minimising standing waterbodies. ■ A carcass monitoring programme is to be conducted on a weekly basis at the base of all turbines. All carcasses are to be identified and a database kept of the number and taxa of the species. A review of the data collected from monitoring carcasses is to be undertaken every 6 months for 2 years to identify particular species susceptible to strike risk by a suitably qualified person with at least seven years of bird and bat identification experience in Myanmar. ■ Additional bird or bat survey should be conducted if significant number of strikes are observed. Windfarm operations may be altered based on the lifecycle characteristics of any species identified that are susceptible to strike. ■ Please refer to mitigation measures for biodiversity impacts above for construction phase.			
Community Health and Safety	■ Please refer to mitigation measures for community health and safety above for construction phase.	Negligible	Negligible	Section 6.3.9

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
Occupational Health and Safety	■ Please refer to mitigation measures for occupational health and safety above for construction phase.	Negligible	Negligible	Section 6.3.10
Livelihood and Economy	■ Please refer to mitigation measures for livelihood and economy above for construction phase.	Minor to Moderate	Minor	Section 6.3.11
Unplanned Events for Construction and Operation Phase				
Accidental Spill of Hazardous Materials	■ Maintenance and refuelling of equipment and vehicles should be carried out in designated areas on hardstand to prevent seepage of any spillages to ground. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing. ■ The hazardous material storage facility should be constructed on bunded hardstand with containment sufficient for 110% of the volume of the single largest tank. Discharges from this bunded area should pass through an oil-water separator. ■ A Spill Response Plan should be developed and implemented.	Negligible	Negligible	Section 6.5.1

Potential Impacts	Summary of Mitigation Measures of EMP	Impact Significance (prior to implementation of Additional Mitigation and Management Measures)	Residual Impact Significance (after implementation of Additional Mitigation and Management Measures)	EIA Section Reference for further details and information
	■ Discharges from the hazardous material storage facility should be monitored monthly for compliance with Myanmar NEQ for site runoff and wastewater discharges (for TSS, oil and grease, pH).			

Table 1.9 Monitoring Programme for Project

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency
Construction Phase		
General	Visual inspection of all active work areas and inspection of records to check general compliance with mitigation measures presented in the EMP.	Weekly
Noise	Check compliance with noise level specified in Myanmar National Environmental Quality for Noise. The parameter will include One Hour LAeq (dBA).	Weekly if works to be undertaken within 300 m of the monastery within the Project Site from July to October.
Surface Water Quality	Treated wastewater from construction activities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: ■ Biological oxygen demand - 30 mg/l ■ Chemical oxygen demand- 125 mg/l ■ Oil and grease - 10 mg/l ■ pH - 6-9 (standard units) ■ Total coliform bacteria - 400 ml ■ Total nitrogen - 10 mg/l ■ Total phosphorus - 2 mg/l ■ Total suspended solids - 50 mg/l	Treated wastewater will be monitored monthly.
Waste	The HSE team will report waste generation and disposal to MONREC on a monthly basis.	Waste will be monitored monthly.
Biodiversity	■ Records are to be kept and regularly (suggested on a monthly basis) reviewed for implementation of the workforce training program for fauna/flora awareness. ■ Records are to be kept and regularly reviewed of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.	Quarterly
Biodiversity	■ Inspections of the Project facilities on a monthly basis during construction in order to identify and eradicate any invasive species.	Monthly

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency
Biodiversity	■ All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.	When occur
Operational Phase		
Surface Water Quality	Treated wastewater from operation facilities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: ■ Biological oxygen demand - 30 mg/l ■ Chemical oxygen demand- 125 mg/l ■ Oil and grease - 10 mg/l ■ pH - 6-9 (standard units) ■ Total coliform bacteria - 400 ml ■ Total nitrogen - 10 mg/l ■ Total phosphorus - 2 mg/l ■ Total suspended solids - 50 mg/l	Treated wastewater will be monitored monthly.
Biodiversity	■ Records are to be kept and regularly reviewed for implementation of the workforce training program for fauna/flora awareness. ■ Records are to be kept and regularly reviewed of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.	Quarterly
Biodiversity	■ Inspections of the Project facilities on an annual basis during construction in order to identify and eradicate any invasive species.	Annual
Biodiversity	■ All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.	When occur
Bats and Birds	■ A carcass monitoring program is to be conducted on a weekly basis at the base of all turbines. All carcasses are to be identified and a database kept of the number and taxa of the species. A review of the data collected from monitoring carcasses is to be undertaken every 6 months for	Weekly for carcass monitoring programme Additional bird or bat surveys when required as reviewed by carcass monitoring programme

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency
	2 years to identify particular species susceptible to strike risk by a suitably qualified person. ■ Additional bird or bat surveys should be conducted if significant number of strikes are observed. Windfarm operations may be altered based on the lifecycle characteristics of any species identified that are susceptible to strike.	
Shadow Flicker	■ Monitoring of shadow flicker impact through engagement with residents during the operational phase where there are predicted impacts from shadow flicker.	Quarterly
Operational Noise from turbines	■ Check compliance with noise level specified in Myanmar National Environmental Quality for Noise. ■ The parameter will include One Hour LAeq (dBA).	Monthly at Set Set Yo Village and the monastery within the Windfarm Site (*Figure 5.3*)

1.8 Public Consultation and Disclosure

During the EIA, stakeholder engagement was conducted with various relevant stakeholders. These meetings helped the Project to gather information to fill in the data gaps and informed the impact assessment in the EIA Report. Consultation involved face-to-face meetings during Scoping and EIA Phases with a range of stakeholders including the Magway Regional Chief Minister and other regional level government (such as regional level ECD, Township Forestry Department, and Regional GAD), Township GAD, village tract leader and local communities. The date, time, location, stakeholder and purpose of each meeting is provided in *Table 1.10* and *Table 1.11.*

Table 1.10 Consultation Activities Undertaken During Scoping

Date, Time and Location	Stakeholder	Purpose of Engagement
Scoping Consultation for this Project (EIA Study)		
10th July, 2018	Magway Regional Chief Minister	■ Present information on the Project ■ Get approval for township / village level meetings ■ Gather concerns and suggestions from stakeholders
11th July, 2018	Minhla GAD Office	■ Arrange village meetings and approvals
13th July, 2018	Minhla GAD Office and Yae Ngan Village	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Get information on Protected Areas and Reserve Forests in Study Area ■ Gather concerns and suggestions from stakeholders; village tract leaders and other interested parties

Date, Time and Location	Stakeholder	Purpose of Engagement
14th July, 2018	Yae Nan Ma and Set Set Yo Village	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Gather concerns and suggestions from stakeholders

Table 1.11 Consultation Activities Undertaken During EIA

Date, Time and Location	Stakeholder	Purpose of Engagement
EIA Consultation for this Project		
6th November, 2018	Yae Ngan Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
6th November, 2018	Set Set Yo Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
8th November, 2018	Yae Nan Ma Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
9th November, 2018	Minhla GAD,	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Get information on Protected Areas and Reserve Forests in Study Area ■ Gather concerns and suggestions from stakeholders; village tract leaders and other interested parties

Key questions during EIA public consultation are included in *Table 1.12*.

.

Table 1.12 Key Questions Raised During Scoping and EIA Public Consultation

Question	Responses	EIA Consideration
Environmental		
It is important to do assessment on noise and air quality of this region as hazardous gas will contaminate the atmosphere.	There would be no air emission from the wind turbine during operation. As a wind power project, the plan is to focus mainly on impacts related to land take and biodiversity especially birds.	Noise impact assessment will be included in the EIA with mitigation measures proposed as necessary.
Land Compensation		
The villagers want to know the opportunities and compensation for the owners of the fallow lands.	The company is currently assessing the land requirement including farmlands in collaboration with the government. IMWP will comply the international standards and local regulatory requirements to acquire land for the Project.	Impact related to land acquisition will be assessed in the EIA with mitigation measures proposed as necessary.
Impacts and incidents		
As the towers are high, the breakdown of towers may happen and harm people and their livestock.	The company will have appropriate insurance to cover damages caused by the tower.	Blade throw impact to be considered in the EIA Report.
Will there be oil leakage into the pond for drinking water and stream? For shifting cultivation farmlands, as everybody do not have the legal document for the land, the compensation will be only for the farmland with documents?	IMWP will comply the international standards and local regulatory requirements to acquire land for the Project. Machinery will be checked regularly to prevent spill.	Impact related to land acquisition and spill will be assessed in the EIA with mitigation measures proposed as necessary.
Will the farmlands and crops be damaged by the wind turbine?	If there are any damages caused by the Project, the person concerned can inform IMWP and IMWP will respond to that properly. IMWP will comply the international standards and local regulatory requirements to acquire land for the Project.	Impact related to land acquisition will be assessed in the EIA with mitigation measures proposed as necessary. Grievance mechanism will be developed for use by local community.
Electricity		
How much will the cost electricity be?	The Project will be connected to national grid. According to existing regulation, the company will not have the right to sell electricity to end-users directly.	None required.

Future engagement activities will consist of the following:

- Further disclosure of Project information and EIA Report, including opportunities to provide feedback;
- Engagement with relevant regional officials/authorities and government organisations on the outcomes of the EIA; and
- Ongoing communications with interested and potentially affected stakeholders during the operation. While impacts on local communities, ongoing project information will be provided to local areas.

A grievance mechanism will be in place, in line with the steps required under the EIA Procedure, as well as international good practice.

If significant issues, concerns or impacts are identified, further stakeholder consultation with relevant, interested or affected stakeholders may be undertaken during operation.

၁ အကျဉ်းချုပ် အစီရင်ခံစာ

၁.၁ နိဒါန်း

ကန်တုတ်လေအားလျှပ်စစ်စီမံကိန်း အတွက် စီမံကိန်းအဆိုပြုသူမှာ InfraCo Myanmar Wind Power Co. Ltd ("IMWP") ဖြစ်ပြီး၊ ၎င်းမှာ Infra Capital Myanmar ReEx Pte. Ltd ("ICM") က စီမံသည့် InfraCo Asia Development Pte. Ltd ("IAD") ၏ ကုမ္ပဏီခွဲဖြစ်ပါသည်။ IMWP သည် မြန်မာနိုင်ငံရှိ ပုဂ္ဂလိကနှင့် အစိုးရ အကျိုး တူပူးပေါင်းဆောင် ရွက်ခြင်း (Public Private Partnership) မော်ဒယ်ပုံစံအပေါ် အခြေခံ၍ လေအားလျှပ်စစ် စီမံကိန်းများကို ပြုလုပ် ဆောင်ရွက်ရန် ရည်ရွယ်ပါသည်။

၂၀၁၇ ခုနှစ်တွင်၊ IAD သည် မြန်မာနိုင်ငံ၊ မကွေးတိုင်းဒေသကြီး ရှိ လေအားလျှပ်စစ်စီမံကိန်းများ၏ ဖြစ်နိုင်ခြေရှိမှု (feasibility) ကို ဆန်းစစ်ရန် မကွေးတိုင်းဒေသကြီးအစိုးရနှင့် ပူးပေါင်း၍ နားလည်မှု စာချွန်လွှာကို လက်မှတ်ရေးထိုးခဲ့ ပါသည်။ အဆိုပါ နားလည်မှုစာချွန်လွှာအရ၊ ICM သည် IMWP (နှင့် IAD အပါအဝင်) ကိုယ်စား နည်းပညာ နှင့် စီးပွားရေးအရတွက်ခြေကိုက်မှု အလားအလာကောင်းများကို မျှော်မှန်းရည်ရွယ်၍ လေအားလျှပ်စစ်ဆိုင်ရာ ဖွံ့ဖြိုးမှုလုပ်ငန်းများကို ဆောင်ရွက်လျက်ရှိပါသည်။ ထို့ကြောင့် ICM သည် ၂၀၁၈ မတ်လ ၂၉ ရက်နေ့တွင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သို့ စီမံကိန်းအဆိုပြုလွှာ (PPR) ကို တင်သွင်းခဲ့ပြီး၊ ၎င်းစီမံကိန်းအဆိုပြုလွှာကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန ECD မှ ၂၀၁၈ ဇူလိုင်လ ၁၂ ရက်နေ့တွင် အတည်ပြုပေးခဲ့ပါသည်။ နယ်ပယ်အတိုင်းအတာ သတ်မှတ် ခြင်း အစီရင်ခံစာကို ၂၀၁၈ စက်တင်ဘာလ ၄ ရက်နေ့တွင် တင်သွင်းခဲ့ပြီး၊ ၂၀၁၉ ဧပြီလ ၃၀ ရက်နေ့တွင် ပြန်လည်ပြင်ဆင်မှုများပြုလုပ်ပြီးနောက် အတည်ပြုပေးခဲ့ ပါသည်။

ICMသည် စီမံကိန်းအဆိုပြုသူ IMWP အတွက် ပတ်ဝန်းကျင်ဆိုင်ရာထိန်းသိမ်းရေးဆိုင်ရာလိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် (ECC) ရရှိရန် ယခုအဆိုပြုလွှာကို တင်သွင်းပါသည်။ ထို့ကြောင့် ဤ ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကို DICA မှတ်ပုံတင် နံပါတ် ၁၂၀၆၄၄၁၈၁ ဖြင့် စီမံကိန်း အဆိုပြုသူ IMWP က တင်သွင်းပါသည်။

နားလည်မှုစာချွန်လွှာ (MOU) လက်မှတ်ထိုးခြင်း နှင့် ဆောင်ရွက်ခဲ့သည့် ဖြစ်နိုင်ခြေရှိမှု (feasibility) တို့အပြင်၊ IMWP သည် ကန်တုတ် အနီးတည်ရှိသော ထုတ်လုပ်မှုပမာဏ ၁၁၃ မဂ္ဂါဝပ်အထိရှိ လေအားလျှပ်စစ်တာဘိုင် ၂၅ ခုပါဝင်သည့် လေအားလျှပ်စစ်စီမံကိန်း (နောင်တွင် "စီမံကိန်း" သို့မဟုတ် "Kandok Windfarm Project" အဖြစ် သုံးနှုန်း သွားမည်) ကို ပြုလုပ်ဆောင်ရွက်ရန် အဆိုပြုပါသည်။

မြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းအရ၊ ဤစီမံကိန်းသည် သယံဇာတ နှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) ၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သို့ တင်သွင်းရန်အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ဆောင်ရွက်ရန် လိုအပ်ပါသည်။

ဤစာတမ်းသည် Kandok Windfarm Project အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာဖြစ်ပြီး မြန်မာနိုင်ငံ၏ ခွင့်ပြုချက်ဆိုင်ရာသတ်မှတ်ချက်များကို ပြည့်မီရန် သယံဇာတ နှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MONREC) ၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သို့ တင်သွင်းရန် ဖြစ်ပါသည်။

Environmental Resources Management (ERM) – Hong Kong Limited သည် ဤပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်း စစ်ခြင်း (EIA) လေ့လာမှုကို ဆောင်ရွက်ခဲ့သည့် ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ အတိုင်ပင်ခံဖြစ်ပါသည်။ MONREC ၏ အတိုင်ပင်ခံမှတ်ပုံတင်စနစ်တွင် မှတ်ပုံတင်ထားသော ပတ်ဝန်းကျင် နှင့် လူမှုအတိုင်ပင်ခံဖြစ်သည့် Environmental Quality Management (EQM) က ERM အား အထောက်အကူပြုပါသည်။

၁.၂ မူဝါဒ နှင့် ကြီးကြပ်ရေး မူဘောင်

စီမံကိန်းကို အမျိုးသားအဆင့် နှင့် ဒေသအဆင့် စံသတ်မှတ်ချက်များ နှင့် ဥပဒေများတို့နှင့်အညီ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) နှင့် စပ်လျဉ်း၍ ပြည်တွင်းစံချိန်စံညွှန်းများနှင့် ဥပဒေများမှာ အောက်ပါတို့ပါဝင်သည် -

- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)၊
- ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ (၂၀၁၄)၊
- အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်များ (၂၀၁၅)၊ နှင့်
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း (၂၀၁၅)။

၁.၃ စီမံကိန်းဖော်ပြချက် နှင့် အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများ

၁.၃.၁ အဆိုပြုစီမံကိန်း

လေအားလျှပ်စစ်စီမံကိန်းတည်နေရာသည် မကွေးတိုင်းဒေသကြီး၊ မင်းလှမြို့နယ်တွင် တည်ရှိသည် (ပုံ ၁.၁)။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှာ ဧရာဝတီမြစ်ဖျမ်း၏ အစိတ်အပိုင်းဖြစ်ပြီး၊ အမြင့် မီတာ ၄၀၀ ခန့်တွင် ရှိပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသည် တောင်ကုန်းများထူထပ်သည့် မြေပြင် အနေအထား၌ တည်ရှိသည်။

၁၃၃ မဂ္ဂါဝပ် လေအားလျှပ်စစ်စီမံကိန်းတွင် အောက်ပါအစိတ်အပိုင်းများသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ အတွင်း တည်ရှိသွားမည် ဖြစ်ပါသည် -

- မိုးလေဝသတိုင်းတာရေးတာဝါတိုင် (တာဝါတိုင်နှစ်တိုင်၊ တစ်တိုင်၏အမြင့်မှာ ၁၂၀ မီတာခန့်ရှိမည်)၊
- လေအားလျှပ်စစ်တာဘိုင်များ (တာဘိုင် ၂၅ ခု၊ အနိမ့်ဆုံးအမြင့်မှာ မီတာ ၁၀၀ ခန့်ရှိမည်)၊
- လေအားလျှပ်စစ်တာဘိုင်များတွက် အခြေခံအုတ်မြစ် ပြုလုပ်မှုများ၊
- တာဘိုင်များနှင့်ချိတ်ဆက်ထားသော မြေအောက်ကေဘယ်ကြိုးများ၊
- ရေနုတ်မြောင်းနှင့် သွားလာမည့်လမ်းများ၊
- ထရန်စဖော်မာများ၊
- ဓာတ်အားခွဲရုံ၊ နှင့်
- လေအားလျှပ်စစ်တာဘိုင်အား ခြံစည်းရိုးခတ်ခြင်း နှင့် CCTV တပ်ဆင်ခြင်း (အကယ်၍လိုအပ်ပါက)။

အထက်ပါနေရာအဆောက်အအုံများမှ နေရာယူသည့် နယ်မြေဧရိယာများကို ဇယား ၁.၁ တွင် ပြထားပါသည်။ ဤအဆောက်အအုံနေရာများသည် စုစုပေါင်း နယ်မြေဧရိယာ ၉၂.၅၆ ဟက်တာ ရှိမည်ဖြစ်ပြီး၊ တည်ဆောက်ရေးအဆင့် ကာလတွင် လုပ်ငန်းခွင်ရုံး နှင့် လေအားလျှပ်စစ်တာဘိုင်ပစ္စည်းများယာယီစုပုံကွင်း ဧရိယာတို့အတွက် ယာယီနေရာယူထားမည့် ၂.၇ ဟက်တာ နှင့် စီမံကိန်း၏ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးအဆင့်များ တောက်လျှောက်ကာလတွင် အခြားအဆောက်အအုံနေရာ များမှ နေရာယူထားမည့် ၈၉.၈၆ ဟက်တာတို့ အပါအဝင်ဖြစ်ပါသည်။

စီမံကိန်းတည်ဆောက်ရေးကာလအဆင့်တွင်၊ စီမံကိန်းလုပ်ငန်းခွင့်တွင်း တည်ဆောက်ရေးလုပ်ငန်းများအတွက် လိုအပ်သော ယာယီလုပ်ငန်းခွင်ရုံး နှင့် လေအားလျှပ်စစ်တာဘိုင်ပစ္စည်းများယာယီစုပုံကွင်းနေရာတို့လည်း ရှိမည် ဖြစ်ပါသည်။ ဤအဆောက်အအုံ နေရာများသည် စီမံကိန်းလည်ပတ်ရေးကာလအဆင့်တွင် ရှိမည် မဟုတ်ပါ။

ဇယား (၁.၁) လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောအဆောက်အအုံများရှိသည့် နယ်မြေဧရိယာ (ကိုးကား - ဖြစ်နိုင်ခြေရှိမှုလေ့လာချက်တွင် ပေးထားသည့် အဆောက်အအုံနေရာများ အသေးစိတ်ပုံစံ)

လေအားလျှပ်စစ်တာဘိုင်ပြုလုပ်သည်နေရာ	စုစုပေါင်း (ဟက်တာ)
လုပ်ငန်းခွင်ရုံး နှင့် လေအားလျှပ်စစ်တာဘိုင်ပစ္စည်းများ ယာယီစုပုံကွင်း	၂.၇၀
လေအားလျှပ်စစ်တာဘိုင်များ	၂၂.၅၀
O&M၊ ဓာတ်အားခွဲရုံ	၁.၀၄
လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသို့ လမ်းရရှိမှု (ရှိပြီးလမ်းမှ တိုးချဲ့ရန်လိုအပ်သည့်လမ်း အပိုင်း ၄.၇ ကီလိုမီတာ)	၉.၄၀
လေအားလျှပ်စစ်စီမံကိန်းအတွင်းလမ်းဖောက်လုပ်မှု	၅၆.၉၂
စုစုပေါင်းနယ်မြေဧရိယာ	**၉၂.၅၆**

လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအတွင်း အထက်ပါ အဆောက်အအုံနေရာများ၏ အသေးစိတ်ပုံစံကို ပုံ ၁.၁ တွင် တင်ပြထားပါ သည်။

စီမံကိန်းအတွက် ထည့်သွင်းစဉ်းစားသည့် စုစုပေါင်း လေအားလျှပ်စစ်တာဘိုင်အမျိုးအစား (၅) မျိုးရှိပြီး၊ အသေးစိတ်ဖော်ပြချက်များကို ဇယား ၁.၂ တွင် ဖော်ပြထားပါသည်။ တာဘိုင်များ၏မြေပြင်တွင် ဆိုက်ထူမည့် တည်နေရာအခင်းအကျင်း (layout) သည် လေအား လျှပ်စစ်တာဘိုင် အမျိုးအစားအားလုံးအတွက် အတူတူဖြစ်ပါသည်။ အပြီးသတ်လေအားလျှပ်စစ်တာဘိုင်အမျိုးအစားရွေးချယ်မှုကို စီမံကိန်း၏ အသေးစိတ်ဒီဇိုင်းအဆင့်ကာလအတွင်း၌သာ အတည်ပြုပေးသွားနိုင်မည် ဖြစ်ပါသည်။ ထိခိုက်မှုဆန်း စစ်ခြင်းနှင့်ပတ်သက်၍ ၎င်းသည် တာဘိုင်အမျိုးအစားပုံစံ ရွေးချယ်စရာ (၁) Siemens Gamesa SG 4.5-145 4.5MW သို့မဟုတ် ရွေးချယ်စရာ (၃) Vestas V150-4.2 4.2 MW ကို စီမံကိန်းအတွက် အသုံးပြုသွားမည် ဖြစ်ပါသည်။ ၎င်းမှာ (ရိုတာအချင်း (rotor diameter) နှင့် ဗဟိုမဏ္ဍိုင်အမြင့် (hub height) တို့အရ) သူတို့၏ တာဘိုင်အရွယ်အစားများသည် တာဘိုင်ရွေးချယ်စရာများ အကြား အကြီးမားဆုံး ဖြစ်သောကြောင့် အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်း (shadow flicker)၊ ငှက် နှင့် လင်းနို့တိုက်မိနိုင်မှု စသည် တို့နှင့် ဆက်စပ်သော သက်ဆိုင်ရာ ထိခိုက်မှုများဆန်းစစ်ခြင်းအတွက် အဆိုးဆုံးဖြစ်နိုင်ခြေနမူနာကို ထည့်သွင်းစဉ်း စားရန် ဖြစ်ပါသည်။

ဇယား (၁.၂) လေအားလျှပ်စစ်တာဘိုင်ပုံစံ ရွေးချယ်စရာများ

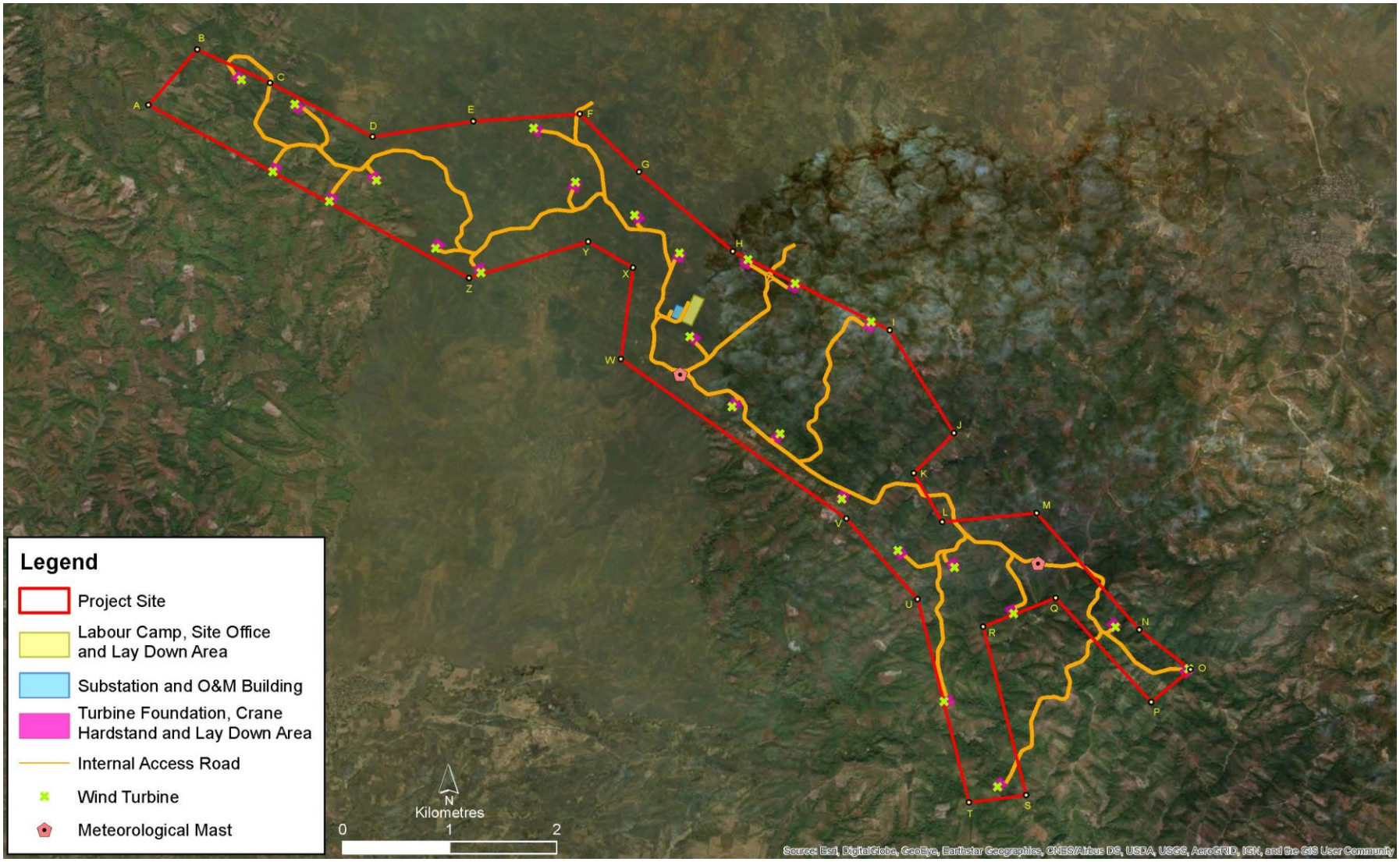
ပါရာမီတာ	ရွေးချယ်စရာ (၁)	ရွေးချယ်စရာ (၂)	ရွေးချယ်စရာ (၃)	ရွေးချယ်စရာ (၄)	ရွေးချယ်စရာ (၅)
တာဘိုင်အမျိုးအစား	Siemens Gamesa SG 4.5-145 4.5MW	Gold Wind G140/3.4 3.4MW	Vestas V150-4.2 4.2 MW	General Electric GE 3.8-137 3.8MW	Envision EN141-2.65 2.65MW
ရိုတာအချင်း (မီတာ)	၁၄၅	၁၄၀	၁၅၀	၁၃၇	၁၄၁

ဗဟိုမဏ္ဍိုင်အမြင့် (မီတာ)	၁၅၇.၅	၁၀၀	၁၅၅	၁၃၁.၄	၁၄၀

စီမံကိန်း၏ တည်ဆောက်ရေးလုပ်ငန်းများကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် (ECC) လက်ခံရရှိပြီးနောက် စတင်ဆောင်ရွက်မည်ဖြစ်ပြီး၊ အကြမ်းအားဖြင့် ၂၁ လအကြာတွင် ပြီးမြောက်မည် ဖြစ်ပါသည်။ ထို့နောက် စီမံကိန်း ဆောင်ရွက်လည်ပတ်ခြင်းကို ဆောင်ရွက်မည် ဖြစ်ပါသည်။ လည်ပတ်ရေးကာလအဆင့်အတွင်း လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ ထိန်းသိမ်းပြုပြင်ရေးလုပ်ငန်းများကို ပမာဏအားဖြင့် ကန့်သတ်ရန် ထားပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာကို နည်းပညာနှင့်စီးပွားဖြစ်ရောင်းဝယ်ရေးဖြစ်နိုင် ခြေရှိမှုကို ဆန်းစစ်ရန် ပြုလုပ်ခဲ့သည့် စီမံကိန်း၏ ဖြစ်နိုင်ခြေရှိမှု လေ့လာလာချက် အစီအရင်ခံစာတွင် ဖော်ပြထား သည့်အတိုင်း လည်ပတ်ရေးသက်တမ်း ၂၅ နှစ်အတွက် ဒီဇိုင်းရေးဆွဲ ထားပါသည်။ ၎င်းမှာ လိုအပ်လျှင် တိုးချဲ့သွား နိုင်ပါသည်။ လိုအပ်လျှင် လည်ပတ်ရေးသက်တမ်းကို နှစ်ပေါင်း ၃၀ အထိ တိုးချဲ့သွားနိုင် ပါသည်။ လက်ရှိအနေအထားတွင် စီမံကိန်းနှင့် ပတ်သက်၍ ပိတ်သိမ်းရေးအစီအစဉ် (decommissioning) အတည်တကျမရှိပါ။ ၎င်းအတွက် ဆုံးဖြတ်ချက်မှာ MOEE နှင့် ညှိနှိုင်းဆွေးနွေးမှုများအပေါ် မူတည်မည် ဖြစ်ပါသည်။စီမံကိန်းအကောင်အထည်ဖော်ဆောင်မှုအချိန်ဇယားအကျဉ်းကို ဇယား ၁.၃ တွင် ဖော်ပြထားပါသည်။ ဤအချိန် ဇယားကို သယ်ယူပို့ဆောင်ရေးလေ့လာချက်ကို ဆောင်ရွက်ရန် ချိတ်ဆက်သည့် ထောက်ပံ့ ပို့ဆောင်ရေးအတိုင်ပင်ခံမှ ပြင်ဆင်ခဲ့ပြီး၊ ၎င်းကို အစိုးရထံမှ ခွင့်ပြုသဘောတူချက်အတွက်စောင့်ဆိုင်းနေပြီး အပြောင်းအလဲဖြစ်နိုင်ပါသည်။

ဇယား (၁.၃) စီမံကိန်းအကောင်အထည်ဖော်ဆောင်ရွက်မှု အချိန်ဇယားအကြမ်း

ဆောင်ရွက်မှု	အကောင်အထည်ဖော်မည့် ကာလ
မင်းဘူးတွင် ကုန်ချနေရာတိုးတက်ကောင်းမွန်အောင်ဆောင်ရွက်မှု နှင့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာသို့ သွားလာသည့်လမ်း	Q1 Year 1 – Q4 Year 1
(ရေနုတ်မြောင်းဆောင်ရွက်မှုများအပါအဝင်) လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာရှိ အတွင်းသွားလာ သည့်လမ်း တိုးတက်ကောင်းမွန်အောင်ဆောင်ရွက်မှု	Q1 Year 1 – Q4 Year 1
အလုပ်သမားစခန်း၊ လုပ်ငန်းခွင်ရှိ ရုံး နှင့် ခင်းကျင်းပြင်ဆင်ထားသောနယ်မြေဧရိယာနှင့် ပတ်၍ တည်ဆောက်မှု	Q1 Year 1 – Q3 Year 1
တာဘိုင်အခြေခံအုတ်မြစ်တည်ဆောက်ခြင်းနှင့် တာဘိုင်ထောင်ရန်လိုအပ်သည့် မြေနေရာပြုပြင်ခြင်း	Q1 Year 1 – Q4 Year 1
ရန်ကုန်မှ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသို့ တပ်ဆင်ရေးကိရိယာ (ချီမရန်အတွက်) သယ်ယူပို့ဆောင်မှု	Q2 Year 1 – Q3 Year 1
ရန်ကုန်မှ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသို့ လေအားလျှပ်စစ်တာဘိုင် အစိတ်အပိုင်းများ သယ်ယူပို့ ဆောင်မှု	Q2 Year 1 – Q3 Year 2
စီမံကိန်းလုပ်ငန်းခွင်တွင် လေအားလျှပ်စစ်တာဘိုင် ၂၅ ခုတပ်ဆင်ခြင်း၊ အတွင်းပိုင်း လျှပ်စစ်ချိတ်ဆက်မှုများ၊ နှင့် ဓာတ်အားခွဲရုံ နှင့် O&M အဆောက်အအုံ တည်ဆောက်ခြင်း၊	Q2 Year 1 – Q3 Year 2
ကန်တုတ် လေအားလျှပ်စစ်စီမံကိန်းတည်ဆောက်ခြင်း နှင့် လည်ပတ်မှုစတင်ခြင်း	Q3 Year 2 – Q4 Year 2



ပုံ (၁.၁) အဆိုပြုစီမံကိန်း တည်နေရာ

၁.၃.၂ အခြားဆောင်ရွက်နိုင်သော နည်းလမ်းများ

စီမံကိန်းဆိုင်ရာနှင့်ပတ်သက်၍ အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများကို ထည့်သွင်းစဉ်းစားခြင်းသည် မည်သည့် စီမံကိန်းကိုမဆို အစီအစဉ်ရေးဆွဲရာတွင် ပဓာနကျသော လိုအပ်ချက်ဖြစ်ပြီး၊ ပတ်ဝန်းကျင်ဆိုးကျိုး သက် ရောက်မှုများ ကို ရှောင်ကြဉ်ရန် သို့မဟုတ် လျှော့ချရန်ဖြစ်ကာ၊ စီမံကိန်းအကျိုးအမြတ်များကို အများဆုံးရရှိရန် သို့မဟုတ် တိုးမြှင့် ရန် ဖြစ်ပါသည်။ စီမံကိန်းအတွက် ထည့်သွင်းစဉ်းစားပြီးဖြစ်သော /စဉ်စားနေသော များစွာသော ရွေးချယ်စရာများတွင် အောက်ပါတို့ ပါဝင်ပါသည် -

- လမ်းသစ်များဖောက်လုပ်တည်ဆောက်ခြင်း နှင့် ရှိနေပြီးသောလမ်းများကို တိုးတက်ကောင်းမွန်အောင် ပြုလုပ် ခြင်း မင်းဘူးအတင်အချနယ်မြေဧရိယာမှ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာနယ်မြေ နှင့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ နယ်မြေအတွင်းတို့၌ လမ်းအသစ်များတည်ဆောက်ခြင်းထက် ရှိနေပြီး သောလမ်းများကို တိုးတက်ကောင်းမွန် အောင်ဆောင်ရွက်ရန် အဆိုပြုပါသည်။ ရှိနေပြီးသောလမ်းများတိုးတက် ကောင်းမွန်အောင် ဆောင်ရွက်ရာတွင် ယေဘုယျအားဖြင့် လျှပ်စစ်ဓာတ်အား စက်ပစ္စည်းဆိုင်ရာကိရိယာ (PME) အသုံးပြုမှု အနည်းငယ်သာ ပါဝင်သဖြင့်၊ လမ်းအသစ်များတည်ဆောက်မှုနှင့် နှိုင်းယှဉ်လျှင် အခိုးအငွေ့ နှင့် ဆူညံသံထုတ်လွှတ်မှုတို့မှာ လျော့နည်းမည် ဖြစ်ပါသည်။ ထို့ပြင်၊ ရှိနေပြီးသောလမ်းများ တိုးတက်ကောင်းမွန် အောင်ပြုလုပ်ခြင်းကို များသောအားဖြင့် ဖွံ့ဖြိုးမှုလုပ်ငန်းမှ ပြုပြင်ထားပြီးဖြစ်သော လမ်းများပေါ်တွင် ဆောင်ရွက်သွား မည် ဖြစ်ပြီး၊ ၎င်းမှာ သဘာဝနေရင်းဒေသများ တိုက်ရိုက်ဆုံးရှုံးမှုပမာဏ နှင့် အိမ်ထောင်စုများမှ မြေရယူရန်လို အပ်မှုကိုလည်း လျော့ကျသွားနိုင်မည် ဖြစ်ပါသည်။
- တာဘိုင်နေရာချခြင်း - အနီးရှိ ထိခိုက်လွယ်နေရာများ နှင့် အခြေခံအဆောက်အအုံများတို့အပေါ် သက်ရောက်မှု များကို ရှောင်ကြဉ်ရန် နှင့် တာဘိုင်၏ တည်ငြိမ်မှုကို သေချာစေရန် လေအားလျှပ်စစ်တာဘိုင်တည်နေရာများကို ရွေးချယ်သောအခါ စီမံကိန်းလုပ်ငန်းခွင်နယ်မြေအတွင်း အတားအဆီးအခက်အခဲများကို ထည့်သွင်းစဉ်းစားခဲ့ ပါသည်။ ထည့်သွင်းစဉ်းစားခဲ့သည့် အတားအဆီးအခက်အခဲများ နှင့် ခွာထားသောအကွာအဝေးတို့ကို ဇယား ၁.၄ တွင် ဖော်ပြထားပါသည်။ လေအားလျှပ်စစ်တာဘိုင်များ နေရာချထားခြင်းတွင် ထိန်းသိမ်းကာကွယ်ထားသော သစ်တော နှင့် ဘုန်းကြီးကျောင်းဧရိယာတို့အပေါ် တိုက်ရိုက်သက်ရောက်မှုမရှိစေရန် ထည့်သွင်းစဉ်းစားထားပြီးဖြစ်ပါသည်။ ထို့အပြင် ဘေးကင်းရေးဆိုင်ရာ ထည့်သွင်းစဉ်းစားမှုများအတွက် လျှောစောက် ၁၃% များသော နေရာများတို့ ကို ရှောင်ကြဉ်ခဲ့ပါသည်။

ဇယား (၁.၄) တာဘိုင်တည်နေရာကြားခံအတွက် အသေးစိတ်အပြီးသတ်ပုံစံ

အကန့်အသတ်များ	ခွာထားသော အကွာအဝေး	မှတ်ချက်များ
အဆောက်အအုံ၊ ကျေးရွာ၊ မြို့	၃၄၅ မီတာ	တာဘိုင်ဒလက်လွှင့်စဉ်မှု အန္တရာယ်ကို လျှော့ချရန် WBG EHS လမ်းညွှန်များ (၂၀၁၅) မှ အကြံပြုထားသည့်အတိုင်း တာဘိုင် နှင့် အနီးရှိ အဆောက်အအုံ တို့အကြား ခွာထားသည့် အကွာအဝေးမှာ ၁.၅xတာဘိုင်အမြင့် အဖြစ် ထားရှိမည်။
လမ်းများ	၉၅ မီတာ	လမ်းများအတွက် အနိမ့်ဆုံး ခွာထားသည့်အကွာအဝေးကို သယ်ယူမှုဆိုင်ရာ သတ်မှတ်ချက်များ နှင့် တည်ဆောက်ရေးဆိုင်ရာ အကန့်အသတ်များအရ ရွေးချယ်သည်။
ရေလမ်းကြောင်းများ	၅၀ မီတာ	တာဘိုင်ပန္နက်ချခြင်းဆိုင်ရာသတ်မှတ်ချက်အပေါ် အခြေခံသည်။
ကျောက်မီးသွေး သတ္တုတွင်းများ / ရေနံတူးဖော်ရေး လုပ်ငန်းများ	၆၅ မီတာ	တာဘိုင်ပန္နက်ချခြင်းဆိုင်ရာသတ်မှတ်ချက်အပေါ် အခြေခံသည်။ ဖြစ်နိုင်ခြေရှိမှုလေ့လာချက်သည် ကျောက်မီးသွေး သတ္တုတွင်းများမှ ၆၄ မီတာ အကွာတွင် ခွါထားရန် အကြံပြုခဲ့ပါသည်။ ရေနံတူးဖော်မှုလုပ်ငန်းများမှ ၎င်းနှင့်တူညီသောအကွာအဝေးကို ထားရန် IMWP မှ အတည်ပြုထားပါသည်။ တာဘိုင်တစ်ခုချင်းအတွက် တည်နေရာများအတွက် အကွာအဝေးတည်နေရာများကို အတည်ပြုရန် နောက်ထပ် ပထဝီရူပသွင်ပြင် နှင့် ပထဝီနည်းပညာ စစ်တမ်းများကို လိုအပ်နိုင်ပါသည်။

၁.၄ ပတ်ဝန်းကျင်အကြောင်းအရာ ဖော်ပြချက်

ဤအခန်းတွင်တင်ပြထားသည့် သတင်းအချက်အလက်များသည် မူလ နှင့် တစ်ဆင့်ခံရင်းမြစ်များမှ ကောက်ယူစုဆောင်းထားသည့် အချက်အလက်များအပေါ် အခြေပြုထားပါသည်။ မူလ ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ အချက်အလက်များကို ကွင်းဆင်းလေ့လာမှုများ၊ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှုများဖြင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် ၂၀၁၈ ခုနှစ်တွင် ကောက်ယူခဲ့ပါသည်။ တစ်ဆင့်ခံ ရင်းမြစ်များတွင် ထုတ်ဝေပြီးသော သတင်းအချက်အလက်များကို ပြန်လည်သုံး သပ်ခြင်း ပါဝင်ပြီး၊ IMWP က ထောက်ပံ့ပေးသည့် သတင်းအချက်အလက်များနှင့် ဖြည့်စွက်ကာ၊ ERM ရုံးတွင်း၌ ရရှိနိုင်သော စာရွက်စာတမ်းများကို သုံးသပ်လျက် ပြုစုခဲ့ပါသည်။ ဤအချက်အလက်ရင်းမြစ်များကို အစိုးရ အဖွဲ့အစည်းများ (ဥပမာ၊ မင်းလှ သစ်တောဦးစီးဌာန)၊ အစိုးရမဟုတ်သောအဖွဲ့အစည်းများ (NGOs)၊ အရပ်ဘက်လူမှု အဖွဲ့အစည်းများ (CSOs) နှင့် ရပ်ရွာလူထုတို့အပါအဝင် အမျိုးမျိုးသော သက်ဆိုင်သူများမှရရှိသည့် အချက်အလက် များဖြင့် ဖြည့်စွက် ထားပါသည်။

ပတ်ဝန်းကျင် နှင့် လူမှုကဏ္ဍများအတွက် ချမှတ်ထားသည့် သက်ရောက်နိုင်စေမည့် နယ်မြေဧရိယာ (AOI) ကို ဇယား (၁.၅) တွင် အကျဉ်းဖော်ပြထားပါသည်။ စီမံကိန်း၏ AOI တွင် အောက်ပါတို့ ပါဝင်သည် -

- လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ အဆောက်အအုံများရှိသည့် မူလ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာကို တပ်ဆင်သွားမည် ဖြစ်ပါသည်။ ထို့ပြင်၊
- အခြားဖွံ့ဖြိုးရေးဆောင်ရွက်မှုများမှ ဆက်စပ်သက်ရောက်မှုများ နှင့် စီမံကိန်း၏ ဖြစ်ပေါ်စေသော လုပ်ငန်းများတို့မှ သက်ရောက်နိုင်ခြေရှိသော နယ်မြေဧရိယာများ တို့ဖြစ်ကြသည်။

စီမံကိန်းလုပ်ငန်းခွင် နှင့် ၎င်း၏ AOI တို့ရှိ အခြေခံ ပတ်ဝန်းကျင် နှင့် လူမှု သွင်ပြင်လက္ခဏာများ နှင့် အခြေအနေများ ကို အောက်တွင် တင်ပြထားပါသည် -

ဇယား (၁.၅) ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ ရင်းမြစ် / နေရာတို့အတွက် ထည့်သွင်းစဉ်းစားသေ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာ

ပတ်ဝန်းကျင် / လူမှု ကဏ္ဍ	သက်ရောက်စေမည့် နယ်မြေဧရိယာ	မှတ်ချက်များ
တည်ဆောက်ရေးအဆင့် ကာလအတွင်း လေထု အရည်အသွေး	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ နယ်နိမိတ်မှ ၅၀၀ မီတာ	တည်ဆောက်ရေးလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများအပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း
တည်ဆောက်ရေးကာလ အတွင်း ဆူညံသံ	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ နယ်နိမိတ်မှ ၃၀၀ မီတာ	တည်ဆောက်ရေးလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများအပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း
လည်ပတ်ရေးကာလအတွင်း ဆူညံသံ	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ နယ်နိမိတ်မှ ၂ ကီလိုမီတာ	လေစွမ်းအင် အတွက် WBG EHS လမ်းညွှန်များ (၂၀၁၅) အပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း
တည်ဆောက်ရေး နှင့် လည်ပတ်ရေး ကာအတွင်း ရေ အရည်အသွေး	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ နယ်နိမိတ်မှ ၂ ကီလိုမီတာ	တည်ဆောက်ရေးလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများအပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း
လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာအတွက် ဇီဝမျိုးစုံ မျိုးကွဲ	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ နယ်နိမိတ်မှ ၂ ကီလိုမီတာ	တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများအပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း

ပတ်ဝန်းကျင် / လူမှု ကဏ္ဍ	သက်ရောက်စေမည့် နယ်မြေဧရိယာ	မှတ်ချက်များ
လူမှု-စီးပွား အခြေအနေများ	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ ၂ ကီလိုမီတာအတွင်းရှိ အခြေချနေ ထိုင်မှုများ နှင့် အလုပ်အကိုင်၊ စီးပွား ဖွံ့ဖြိုးမှု၊ ရွှေ့ပြောင်းဆောင်ရွက်မှု နှင့် ပြည်သူ့ ဝန်ဆောင်မှုများ၊ ပိုကျယ်ပြန့် သည့် နယ်မြေဧရိယာများကဲ့သို့သော တွေ့ကြုံ နိုင်သော သက်ရောက်မှုများကို ရှိနိုင်သည့် နေရာများ။ ၎င်းတို့မှာ စက်စက်ယိုရွာ၊ ကျောက်မီးသွေး သတ္တု တွင်း နေရာများ၊ စီမံကိန်းလုပ်ငန်းခွင်မှ ၂ ကီလိုမီတာအကွာရှိ ဘုန်းကြီးကျောင်း နှင့် ဘုရားပုထိုးများ နှင့် ရေငံရွာ၊ ရေနုံမရွာ၊ ဆင်မာန်ကျရွာကျ နှင့် စီမံကိန်းလုပ်ငန်းခွင် အပြင်ဘက် ရှိ ရေနုံတူးဖော်ရေး နေရာ များ ပါဝင်ကြပါသည်။	တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးလုပ်ငန်းများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများအပေါ် မူတည်၍ ဖြစ်ပေါ်ခြင်း

၁.၄.၁ ပတ်ဝန်းကျင်ဆိုင်ရာ အခြေခံအချက်အလက်

ရေထုအရည်အသွေးနှင့်ပတ်သက်၍၊ စီမံကိန်းလုပ်ငန်းခွင်နှင့်ကပ်လျက်ရှိနေရာတွင် လေထုသို့ ထုတ်လွှတ်သည့် အဓိကရင်းမြစ်များမှာ အိမ်တွင်းအသုံးပြုမှုများ (ဆိုလိုသည်မှာ အပူပေးခြင်း နှင့် ချက်ပြုတ်ခြင်း)၊ အနီးဝန်းကျင်ရှိ မြေသားလမ်းပေါ် ယာဉ်များသယ်ယူပို့ဆောင်မှုမှ ဖုန်မှုန့်ထုတ်လွှတ်မှုများ နှင့် ကျောက်မီးသွေးသတ္တုတွင်းလုပ်ငန်း များမှ ဖြစ်နိုင်ပါသည်။ လေအားလျှပ်စစ်တာဘိုင်များလည်ပတ်မှုမှ မည်သည့် ထုတ်လွှတ်အခိုးအငွေ့ နှင့် တည် ဆောက်ရေးမှ ဖုန်မှုန့်သက်ရောက်မှုများရှိမည် မဟုတ်သဖြင့်၊ စီမံကိန်းလုပ်ငန်းခွင်မှ ၀.၉ ကီလိုမီတာ (၀.၅ မိုင်) အကွာတွင် တည်ရှိသည့် အနီးဆုံးကျေးရွာတို့အပေါ် သက်ရောက်မှု ရှိနိုင်မည် မဟုတ်ပါ။ ထို့ကြောင့် ဤပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းအတွက် နောက်ထပ် လေထုအရည်အသွေးဆိုင်ရာ အခြေခံအချက်အလက်များကို မဆောင် ရွက်ခဲ့ပါ။

အနီးဝန်းကျင်ဆူညံသံနှင့်ပတ်သက်၍၊ စီမံကိန်းလုပ်ငန်းခွင် အနီးဝန်းကျင်ရှိ ဆူညံသံဖြစ်စေသည့် အဓိကရင်းမြစ်များ မှာ ယာဉ်သွားလာမှု နှင့် အနီးဝန်းကျင်ရှိ ကျောက်မီးသွေးသတ္တုတွင်းလုပ်ငန်းများမှ ဖြစ်နိုင်ပါသည်။ အနီးဆုံးကျေးရွာ (စက်စက်ယိုကျေးရွာ) သည် စီမံကိန်းလုပ်ငန်းခွင်နယ်မြေဧရိယာမှ ၀.၉ ကီလိုမီတာ (၀.၅ မိုင်) အကွာအဝေးတွင် တည်ရှိသဖြင့်၊ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေး ဆိုင်ရာ ဆူညံသံများသည် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း တွင် အတည်ပြုထားသော စီမံကိန်းမှ အဓိကကျသော ပြဿနာကိစ္စရပ်ဖြစ်လာနိုင်ခြေမရှိပါ။ ထို့ကြောင့် နောက်ထပ် ဆူညံသံဆိုင်ရာစစ်တမ်းကို မဆောင်ရွက်ခဲ့ပါ။

အနီးဆုံးရပ်ရွာမှ အသုံးပြုသော ရေရင်းမြစ်နေရာတို့သည် စက်စက်ယိုကျေးရွာတွင် ရှိပါသည်။ အနီးရှိ သတ္တုတွင်းလုပ် ငန်းများ နှင့် မြေသားလမ်းမှ မြေတိုက်စားမှုတို့သည် ရှိနေပြီးသောရေရင်းမြစ်နေရာများရှိ ရေအရည်အသွေးအပေါ် ညစ်ညမ်းမှုဖြစ်ပေါ်စေနိုင်ကြောင်း မှတ်သားနိုင်ပြီး၊ ၎င်းမှာ စီမံကိန်းမှဖြစ်ပေါ်ခြင်း မဟုတ်ပါ။ မြန်မာနိုင်ငံသည် ဆိုင်က လုန်းများ၊ မြေငလျင်များ၊ ရေလွှမ်းမိုးမှုများ၊ နှင့် မီးလောင်ကျွမ်းမှုများအပါအဝင် များစွာသော သဘာဝ ဘေးအန္တရာယ်

များဖြင့် ထိတွေ့မှုရှိပါသည်။ နိုင်ငံသည် သဘာဝဘေးအန္တရာယ်များကို အခါအားလျော် ခံရပြီး၊ စီမံကိန်းသည် သဘာဝဘေးအန္တရာယ်များအတွက် အတော်အတန်ထိခိုက်လွယ်သော နယ်မြေဧရိယာ တွင် တည်ရှိပါသည် [1]။

၁.၄.၂ ဇီဝမျိုးစုံမျိုးကွဲ အခြေခံအချက်အလက်

အဆိုပြု လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောအဆောက်အအုံနေရာတို့သည် သဘာဝနေရင်းဒေသ ၃၆.၆၂ ဟက်တာခန့် နှင့် အရေးပါသောနေရင်းဒေသအတွက် မသတ်မှတ်သည့် ပြုပြင်ထားသော နေရင်းဒေသ ၅၅.၉၄ ဟက်တာတို့ ပါဝင်ကြ ကြောင်း၊ ၂၀၁၈ ခုနှစ် မတ်လ မှ စက်တင်ဘာလတို့အကြား ဆောင်ရွက်ခဲ့သည့် ဇီဝမျိုးစုံမျိုးကွဲစစ်တမ်းများက ညွှန်ပြ နေပါသည် (ပုံ ၁.၆)။

ဧယား (၁.၆)

လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအဆောက်အအုံများအတွက်နေရင်းဒေသကို အမျိုးအစားသတ်မှတ်ခြင်း

လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်သော နေရာ	သဘာဝ နေရင်းဒေသ (ဟက်တာ)	ပြုပြင်ထားသော နေရင်းဒေသ (ဟက်တာ)	လေအားလျှပ်စစ်တာဘိုင် ဆောင် ရွက်သော နေရာ အဆောက်အအုံမှ ယူထားသည့် စုစုပေါင်း နယ်မြေဧရိယာ (ဟက်တာ)
လုပ်ငန်းခွင် ရုံး နှင့် လေအားလျှပ်စစ်တာဘိုင်ပစ္စည်းများ ယာယီစုပုံကွင်း	၁.၉၂	၀.၇၈	၂.၇၀
လေအားလျှပ်စစ် တာဘိုင်များ	၁၃.၁၇	၉.၃၃	၂၂.၅၀
O&M၊ ဓာတ်အားခွဲရုံ	၀.၀၈	၀.၂၄	၁.၀၄
လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်သော နေရာသို့ သွားသည့် လမ်း (ရှိပြီးလမ်းမှ တိုးချဲ့ရန် လိုအပ်သည့် ၄.၇ ကီလိုမီတာ အပိုင်း)	၀	၉.၄၀	၉.၄၀
လေအားလျှပ်စစ်တာဘိုင်ဆောင် ရွက်သော နေရာအတွင်းရှိ အတွင်းလမ်း များ	၂၀.၇၃	၃၆.၁၉	၅၆.၉၂
စုစုပေါင်း သဘာဝ နယ်မြေဧရိယာ/လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက် သော နေရာရှိ လေအားလျှပ်စစ်တာဘိုင်အ ဆောက်အအုံများက ယူထား သည့်	**၃၆.၆၂**	**၅၅.၉၄**	**၉၂.၅၆**

https://reliefweb.int/map/myanmar/myanmar-natural-hazard-risks-national-hazard-map-issued-22-march-2011

ပြုပြင်ထားသော နေရင်းဒေသ (ဟက်တာ)			

မှတ်ချက် - ဖြစ်နိုင်ခြေရှိမှုလေ့လာချက်တွင် ပေးထားသည့် အသေးစိတ်ဖော်ပြချက်မှ ယူထားသည့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ အဆောက်အအုံများ၏ ခြေရာနယ်မြေဧရိယာအတွင်းရှိ သဘာဝနေရင်းဒေသ နှင့် ပြုပြင်ထားသော နေရင်းဒေသတို့ကို IFC PS6 အရ အဓိပ္ပါယ်ဖွင့်ဆိုပါသည်။

ငှက်စစ်တမ်းမှ၊ စုစုပေါင်း သားရဲငှက်မျိုးစိတ် ၁၆ မျိုးကို ၂၀၁၈ မတ်လ နှင့် နိုဝင်ဘာလတို့တွင်ပြုလုပ်ခဲ့သည့် စစ်တမ်းကာလအတွင်း တာဘိုင်၏ အမြင့်ရှိ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ ၂ ကီလိုမီတာအတွင်း ပျံသန်းနေကြမှုကို တွေ့ရှိခဲ့ရပါသည်။ မတ်လစစ်တမ်းကာလတွင်၊ အရှေ့တိုင်း သိမ်းငှက်ကြီးမျိုး (Oriental Honey Buzzard) (Pernis ptilorhynchus)၊ သိမ်းငှက်ကြီးမျိုး (White-eyed Buzzard) (Butastur teesa)၊ စွန်ငှက်ကြီးမျိုး (Black-shouldered Kite) (Elanus caeruleus) နှင့် လင်းယုန်ငှက်မျိုး (Crested Serpent Eagle) (Spilornis cheela) တို့အပါဝင် (ကြည့်ရှုလေ့လာမှု ၁၀ ခု နှင့် အထက်) မျိုးစိတ်လေးမျိုး တို့ကို မှတ်တမ်းတင်ခဲ့ကြပါသည်။ နိုဝင်ဘာလ စစ်တမ်းကာလတွင်၊ Shikra (Accipiter badius) ငှက်မျိုး နှင့် Black Baza (Aviceda leuphotes)ငှက်မျိုး တို့အပါအဝင် မျိုးစိတ်လေးမျိုးကို မှတ်တမ်းယူခဲ့ကြပါသည်။

ထောင်ချောက်ဖြင့်အရှင်ဖမ်းခြင်း၊ အသံနမူနာယူခြင်း နှင့် အိပ်တန်းတို့နှင့်ပတ်သက်သည့် စစ်တမ်းများကို လည်ပတ်ရေးဆိုင်ရာ တာဘိုင်များနှင့်လည်း တိုက်မိနိုင်သော လင်းနို့များအတွက် ဆောင်ရွက်ခဲ့ပြီး၊ ထောင်ချောက်ဖြင့်အရှင်ဖမ်းခြင်းဆောင်ရွက်မှုတွင်၊ မျိုးရင်းသုံးမျိုးဖြင့် အစီအစဉ်ချထားသည့် မျိုးစိတ် ၅ မျိုးဖြစ်သော လင်းနို့အကောင် ၂၀ ကို မှတ်တမ်းယူနိုင်ခဲ့ပါသည်။ ၎င်းလင်းနို့မျိုးစိတ်များတွင် လင်းနို့မျိုး (Greater Shortnosed Fruit Bat) (Cynopterus sphinx)၊ လင်းနို့မျိုး (Horsfield's Leaf-nosed Bat) (Hipposideros larvatus)၊ လင်းနို့မျိုး (cf. Grand Leaf-nosed Bat) (Hipposideros cf. grandis)၊ လင်းနို့မျိုး (Javan Pipistrelle) (Pipistrellus javanicus) နှင့် လင်းနို့မျိုး (Lesser Asiatic Yellow House Bat) (Scotophilus kuhlii) တို့ပါဝင်ကြပါသည်။ လင်းနို့ များအဝေးများဖြတ်သွားသည့်အသံ ၈၆၈ ခုကို ပေါင်းစပ်ထားသည့် ညပိုင်းစစ်တမ်းကောက်ယူမှုကာလအတွင်း အသံ ဖြစ်ပေါ်မှုစုစုပေါင်း ၁.၃၁ ဂီဂါဘိုက် ကိုမှတ်တမ်းယူခဲ့ပါသည်။ အသံအရကွဲပြားသည့် လင်းနို့ခြောက်မျိုးနှင့်ပတ်သက် သော အချက်အလက်များမှ အသံနမူနာများဖြင့် တွေ့ရှိခဲ့ပါသည်။ စစ်တမ်းကာလအတွင်း ရရှိခဲ့သော ကိုးကားထား သော အော်မြည်သည့် အသံအချက်အလက်များသည် အသံအမျိုးအစားနှစ်မျိုးဖြစ်သည် လင်းနို့မျိုး(Lesser Asiatic Yellow House Bat) (Scotophilus kuhlii) နှင့် လင်းနို့မျိုး (Horsfield's Leaf-nosed Bat) (Hipposideros larvatus) နှင့်ပတ်သက်၍ အသေးစိတ်အဆိုင်းမန့်ဆောင်ရွက်မှုကို ဖြစ်ပေါ်စေခဲ့ပါသည်။ အားလုံးသည် Emballonuridae၊ Molossidae၊ Vespertilionidae နှင့်/သို့မဟုတ် Miniopteridae အတွင်းရှိ လေပေါ်ပျံဝဲသည့် သတ္တဝါများကို ကိုယ်စားပြုသော်လည်း၊ ကျန်ရှိသောအမျိုးအစားများကို မြန်မာနိုင်ငံရှိ လင်းနို့မျိုးစိတ်များအတွက် လက်ရှိတွင် အော်မြည်သည့်အသံအချက်အလက်များမရရှိသဖြင့် အသေအချာအနေအထားဖြင့် မျိုးစိတ်များကို မသတ်မှတ်နိုင်ပါသည်။ စစ်တမ်းကောက်ယူသည့်ကာလအတွင်း ဆောင်ရွက်ခဲ့သည့် ဒေသခံများနှင့်အင်တာဗျူးများ၊ တိုက်ရိုက်ကိုယ်တိုင် အကဲခတ်လေ့လာမှုများအရ လင်းနို့များအတွက် အရေးပါသော (ဥပမာ၊ ကောင်ရေ ၁၀၀ ထက်များသော) နေ့အခါအိပ်တန်းနေရာများ မပေါ်ထွက်လာပါ။ စစ်တမ်းကာလ နှင့် ဒေသတွင်းနေထိုင်သူများနှင့် ဆွေးနွေးမှုကာအတွင်း ဂူများကို မတွေ့ရှိရပါ။ ထို့ပြင် ကွင်းဆင်းလမ်းညွှန်သူများကလည်း စီမံကိန်းလုပ်ငန်းခွင်နေရာ အနီးဝန်းကျင်၌ ၎င်းတို့မရှိကြောင်း အစဉ်အမြဲ အကြံပြုခဲ့ကြပါသည်။ မြင့်မားသော သစ်ပင်များအပေါ် အိပ်တန်းဝင်တတ်သော လင်းဆွဲမျိုး (Pteropus spp.) အုပ်စုများသည် လွန်စွာပေါ်လွင်တတ်သည်။ ထို့ကြောင့် ၎င်းတို့ရှိနေသော နေရာများကို ပုံမှန်အားဖြင့် ကောင်းစွာသိရှိကြပါသည်။ စီမံကိန်းလုပ်ငန်းခွင်နေရာသည် ၎င်းတို့ရှိကြောင်း အထောက်အထားများ မတွေ့ရှိရပါ။ ဧရာဝတီမြစ်၏ အရှေ့ဘက်ကမ်းရှိ မြောက်ဘက်သို့ ၁၅၀ ကီလိုမီတာခန့် အကွာအထိ လင်းဆွဲမျိုး (Indian Flying Fox) (P. giganteus) အုပ်စု နှစ်စုကို မတွေ့ရှိရသဖြင့်၊ စီမံကိန်းလုပ်ငန်းနေရာအတွင်း အသီးသီးသော အပင်များ ပိုနည်း သောကြောင့် အစားအစာရှာဖွေရန်အတွက် စီမံကိန်းလုပ်ငန်းခွင်နေရာသို့ လာရောက်ရန် ဖြစ်နိုင်ခြေ မရှိပါ။

၁.၄.၃ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်

စီမံကိန်းတည်ရှိရာတိုင်းဒေသကြီး၏ မြို့တော်မှာ မကွေးဖြစ်ပြီး၊ သရက်ခရိုင်၏ မင်းလှမြို့နယ်တွင် တည်ရှိပါသည်။ ဇယား ၁.၇ နှင့် ပုံ ၁.၂ တို့တွင် ပြထားသည့် စီမံကိန်းလုပ်ငန်းခွင်နေရာအနီးဝန်းကျင်၌ ကျေးရွာများကို ဖော်ထုတ်သတ်မှတ်ခဲ့ပါသည်။ လူမှုစီးပွားအခြေအနေနှင့်ပတ်သက်၍ မူလအချက်အလက်များကို အုပ်စုအလိုက်ဆွေးနွေးမှုများ (FGD)၊ အဓိက သတင်းရရှိနိုင်သူများနှင့် အင်တာဗျူးများ (KII) နှင့် နေရာချထားမှုအခြေအနေများပါဝင်သည့် ကောက်ယူမှုနည်းလမ်းများ အသုံးပြုလျက် ၄င်းကျေးရွာတို့၌ ဖြစ်ပေါ်လာနိုင်သည့် ထိခိုက်ခံစားရနိုင်သည့် ရပ်ရွာများ၏ နမူနာတို့ဖြင့်၊ ၂၀၁၈ ခုနှစ် ဇူလိုင်လ နှင့် နိုဝင်ဘာလတို့တွင် စီမံကိန်း၏ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်း နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကာလအဆင့်တို့တွင် ကောက်ယူခဲ့ပါသည်။

ဇယား (၁.၇) လူမှု သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာ

သက်ရောက်သည့် နေရာချထားမှုများ	နေရာချထားမှုအမည်	တည်နေရာ
တိုက်ရိုက်သက်ရောက်သည့် နေရာချထားမှုများ (၂ ကီလိုမီတာအတွင်း)	စက်စက်ယို	ဤကျေးရွာသည်လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ ၀.၉ ကီလိုမီတာ အကာအဝေးတွင် တည်ရှိပြီး၊ အနီးဆုံးနေရာချထားမှုဖြစ်ပါသည်။
	ကျောက်မီးသွေး သတ္တုတွင်းနယ်မြေ ဧရိယာ	လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအတွင်း ကျောက်မီးသွေး သတ္တုတွင်း အနည်းငယ်ရှိပါသည်။
	ဘုန်းကြီးကျောင်း နှင့် ဘုရားများ	စက်စက်ယိုကျေးရွာ၏ ဘုန်းကြီးကျောင်းသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင် ရွက်သောနေရာ အတွင်း၌ တည်ရှိသည်။
သွယ်ဝိုက်သက်ရောက်သည့် နေရာချထားမှုများ	ရေငံ	ဤကျေးရွာသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ၃.၉ ကီလိုမီတာ အကွာတွင် တည်ရှိပါသည်။
	ရေနုံမ	ဤကျေးရွာသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ၃.၆ ကီလိုမီတာ အကွာတွင် တည်ရှိပါသည်။
	ဆင်မာန်ကျ	ဤကျေးရွာသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ၂.၇ ကီလိုမီတာ အကွာတွင် တည်ရှိပါသည်။
	ရေနုံတူးဖော်ရေး နယ်မြေ ဧရိယာ	ရေနုံတူးဖော်သည့်နယ်မြေဧရိယာသည် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက် သောနေရာမှ ၃.၄ ကီလိုမီတာခန့်အကွာတွင် ရှိကြပါသည်။

စက်စက်ယို၊ ရေနုံမ၊ ရေငံ နှင့် ဆင်မာန်ကျတို့ရှိ ကျေးရွာသူ/သားများသည် ဗမာလူမျိုးများဖြစ်ကြောင်း သိရှိရပါသည်။

အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှု အစည်းအဝေးတွင် ကောက်ယူခဲ့သည့် အချက်အလက်များအရ လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်သောနေရာ အနီးနေရာရှိ အိမ်ထောင်စုအများစုမှာ ၄င်းတို့၏ အသက်မွေးဝမ်းကျောင်းအတွက် စိုက်ပျိုးရေး အပေါ် အဓိက မှီခိုကြပါသည်။ အင်တာဗျူးဖြေဆိုသူအားလုံးသည် စိုက်ပျိုးမြေပိုင်ဆိုင်ကြကြောင်း ဖြေကြားခဲ့ကြပြီး၊ ပျမ်းမျှ မြေပိုင်ဆိုင်သည့် အရွယ်အစားမှာ ၅ ဧက ဖြစ်ပါသည်။ ဤနယ်မြေဧရိယာ၌ အဓိကစိုက် ပျိုးသည့် သီးနှံတို့မှာ စပါး၊ နှမ်း၊ ပဲ နှင့် ပဲလွန်းတို့ ဖြစ်ကြပါသည်။

လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအတွင်းရှိ မြေအမျိုးအစား၊ မြေပိုင်ဆိုင်မှု နှင့် မြေအသုံးပြုမှုတို့ကို ဆုံးဖြတ်ရန် IMWP က မြေယာ စစ်တမ်းတစ်ရပ်ကို ၂၀၁၈ တွင် ကျေးရွာ ရပ်မိရပ်ဖ နှင့် ခေါင်းဆောင်တို့အပါအဝင် ဒေသရပ်ရွာ လူထု၏ ကူညီဆောင် ရွက်မှုဖြင့် မြို့နယ်အုပ်ချုပ်ရေးမှူးများ၊ မြေစာရင်းဌာန နှင့် သစ်တောဦးစီးဌာနတို့နှင့်

ပူးပေါင်း ဆောင်ရွက်ခဲ့ပါသည်။ ကန်တုတ်လေအားလျှပ်စစ်စီမံကိန်း၏ မြေအများစု (၉၅%) သည် တောရိုင်းမြေ အမျိုးအစားဝင်ပြီး၊ ကျန်မြေများမှာ ဘာသာရေးနေရာများ သို့မဟုတ် ထိန်းသိမ်းထားသော သစ်တောကြိုးဝိုင်းများ ပါဝင်ကြပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက် သောနေရာရှိ မြေယာတို့ကို အဓိကအားဖြင့် ဒေသခံရပ်ရွာလူထုမှ စိုက်ပျိုးရေးအတွက် အသုံးပြုကြောင်း သိရှိရပါသည်။ သို့ရာတွင် မြေအသုံးပြုသူများသည် ပုံမှန်အားဖြင့် သူတို့၏ မြေယာအတွက် အသုံးပြုသူသက်သေခံ လက်မှတ်များမရှိကြပါ။ ထို့ကြောင့်၊ နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှုများကို ၂၀၁၈ ဇူလိုင် လ နှင့် နိုဝင်ဘာလတို့၌ စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှုကာလများတွင် ဒေသခံရပ်ရွာလူထုက အထက်တွင် တင်ပြခဲ့သော "မြေယာပိုင်ဆိုင်မှု သို့ ပိုင်ဆိုင်ခြင်း" ဆိုသည်မှာ လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်သောနေရာ အတွင်း မြေယာအသုံးပြုမှုသက်သေခံလက်မှတ်အထောက်အထား မရှိဖြစ်နိုင်သည်။ မယုတ်မလွန်ဖြစ်သော ချဉ်းကပ်မှုအဖြစ်၊ မြေယာအသုံးပြုသည့် သက်သေခံလက်မှတ် ရှိသူ နှင့် မရှိသူ နှစ်မျိုး စလုံးအပေါ် ဖြစ်ပေါ်လာနိုင် သော သက်ရောက်မှုများကို ထိခိုက်မှုဆန်းစစ်ရာတွင် ထည့်သွင်းသွားမည် ဖြစ်ပါသည်။

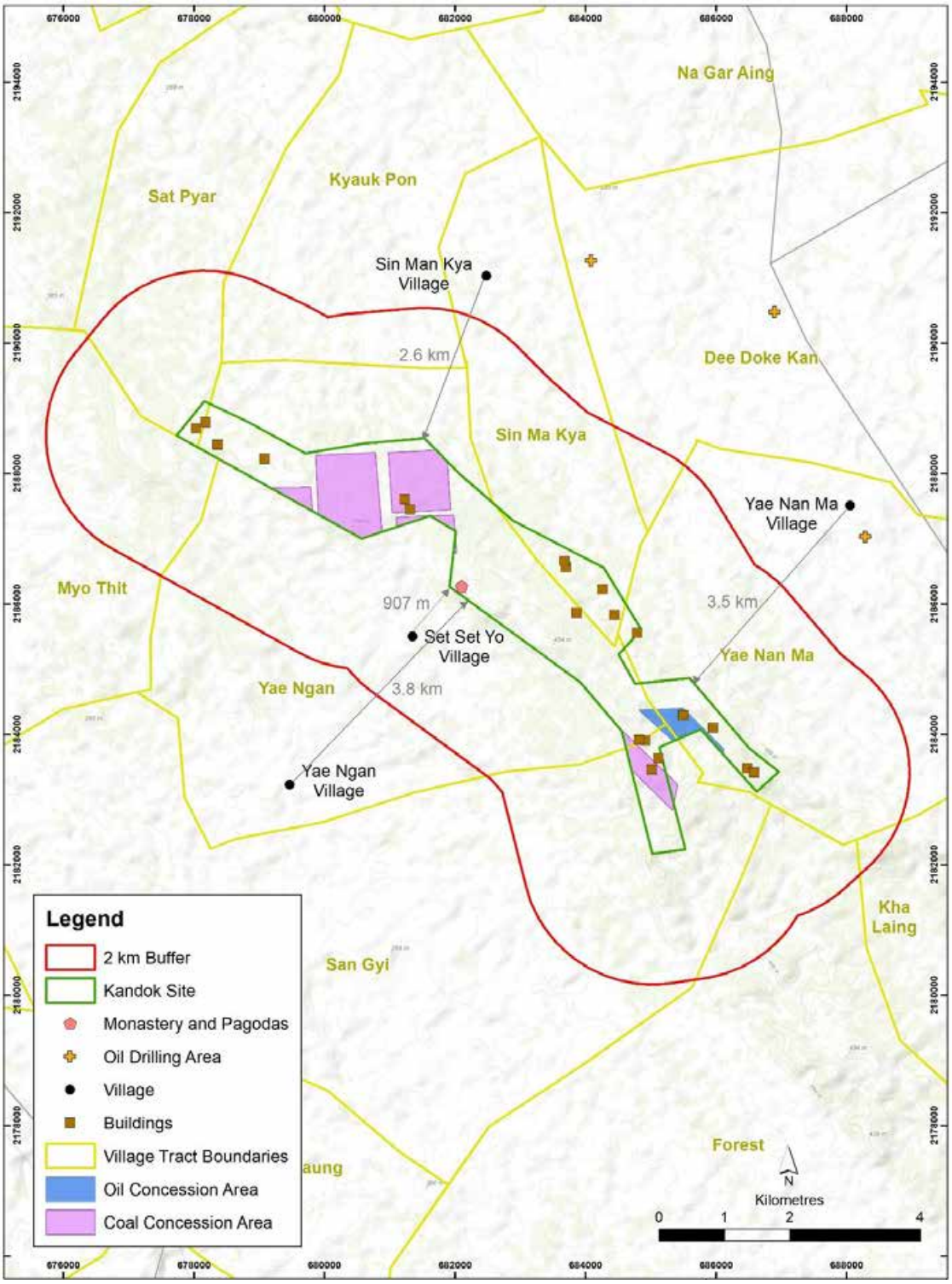
ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) နှင့် ICM မြေယာစစ်တမ်းတို့အတွက် ဆောင်ရွက်ခဲ့သည့် တိုင်ပင်ဆွေးနွေးမှု ကာလအတွင်း လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအတွင်း သစ်တောနယ်မြေဇရိယာမှ ဒေသခံ ရပ်ရွာလူထုသည် အသေးစား သစ်တောထွက်ကုန်များ (ဝါး၊ စားသုံးရန်သင့်လျော်သော အပွင့်များ နှင့် အသီးများ၊ မှို စသည့်တို့ ကဲ့သို့ သော) ကို ရယူ ကြကြောင်း သိရှိရပါသည် (ပုံ ၁.၂)။ ဒေသခံရပ်ရွာ၏ လူအချို့ နှင့် ကျောက်မီးသွေးသတ္တုတွင်း အလုပ်သမားများသည် အိမ်ထောင်စုဖွဲ့စည်းမှုများတည်ဆောက်ရန် နှင့် စိုက်ပျိုးရေးကိရိယာများကို ပြုပြင်ရန် တို့အတွက် ထိန်းသိမ်းကာကွယ် ထားသော သစ်တောမှ သစ်များကိုလည်း ထုတ်ယူကြပါသည်။ သို့ရာတွင် ၎င်းမှာ အခွင့်အရေးရမှ ဆောင်ရွက်ခြင်း ဖြစ်ပြီး၊ ကြုံတောင့်ကြုံခဲ ဖြစ်ပါသည်။ သစ်တောအပေါ် ဒေသခံရပ်ရွာလူထု၏ မှီခိုမှုမှာ အနည်းဆုံးဖြစ် ကြောင်း မျှော် လင့်တွက်ချက်ပါသည်။

လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာတွင် ကျောက်မီးသွေး သတ္တုတွင်းလေးခုရှိပါသည် (ပုံ ၁.၂)။ ကျေးရွာသူ/သား များအဆိုအရ၊ ကျောက်မီးသွေးသတ္တုတွင်းများသည် ငါးနှစ်စာချုပ်ဖြင့် လည်ပတ်ကြခြင်းဖြစ်ပါသည်။ ကျောက်မီးသွေး သတ္တုတွင်း၏ စုစုပေါင်းနယ်မြေဇရိယာမှာ ၆၀၀ ဧကခန့်ရှိပါသည်။ ကျောက်မီးသွေးသတ္တုတွင်းတွင် အလုပ်သမားများနေထိုင်ရန် စခန်းများစီစဉ်ထားရှိပါသည်။

တူးဖော်ရေးလည်ပတ်မှုမရှိသောနေရာဖြစ်သည့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအတွင်း ရေနံပိုင်ဆိုင်ခွင့် နယ်မြေဇရိယာရှိပါသည် (ပုံ ၁.၂)။ နယ်မြေဇရိယာမှာ ၇၂ ဧကခန့် ရှိပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာမှ ၃.၄ ကီလိုမီတာအကွာ၌ ဒေသခံ ရေနံလက်ယက်တွင်းများလည်းရှိကြောင်း သိရှိရပါသည်။

အခြေခံအဆောက်အအုံသည် ယေဘုယျအားဖြင့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ အနီးဝန်းကျင်တွင် အကန့်အသတ် ရှိပါသည်။ ဥပမာ၊ စီမံကိန်းလုပ်ငန်းခွင်နေရာ၏ အနီးဝန်းကျင်ရှိ ရပ်ရွာများတွင် လျှပ်စစ်မီးမရှိပါ။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအနီး နေရာချထားမှုများအားလုံးတွင် မြေသားလမ်းရှိပြီး၊ ကား/ဆိုင်ကယ်တို့ဖြင့် သွားရောက်နိုင်ပါသည်။ သို့ရာ တွင်၊ မိုးရာသီတွင် လမ်းများသည် ပျက်စီးတတ်ပြီး၊ ဆက်လက်ပြုပြင်ထိန်းသိမ်းမှု များလိုအပ်ပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏အနီးဝန်းကျင်ရှိ နေရာချထားမှုများတွင် ပုံမှန်အားဖြင့် မီးရှို့ခြင်း သို့မဟုတ် အမှိုက်ပုံခြင်းတို့ကိုဆောင် ရွက်ကြပြီး၊ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုသည် ကိစ္စရပ်တစ်ခုအနေဖြင့် ရှိနေဆဲ ဖြစ်ပါသည်။

၂၀၁၈ ခုနှစ် ERM ၏ လုပ်ငန်းခွင် ကွင်းဆင်းသွားရောက်လေ့လာမှုတွင် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၌ ဘုန်းကြီးကျောင်း နှင့် ဘုရားတို့ကို ဖော်ထုတ်သတ်မှတ်ခဲ့ပါသည် (ပုံ ၁.၂)။ ဒေသတွင်းရင်းမြစ်များအရ၊ ဘုန်းကြီး ကျောင်းတွင် ဘုန်းကြီးများ သီတင်းသုံးမနေထိုင်ကြပါ။ သို့ရာတွင်၊ အချို့သော ဘုန်းကြီးတို့သည် ဝါတွင်းကာလ (ဇူလိုင်လ မှ အောက်တိုဘာလအထိ) အတွင်း ဘုန်းကြီး ကျောင်းကို အသုံးပြုကြပါသည်။ ကွင်းဆင်းလေ့လာမှု ကာလအတွင်း အခြားယဉ်ကျေးမှုဆိုင်ရာ အမွေအနှစ်နေရာများ ကို မတွေ့ရှိရပါ။



ကုဝိုးကား - ERM data 2018

ပုံ (၁.၂)သက်ရောက်မှုရှိစေမည့် လူမှုနယ်မြေဧရိယာမြေပုံ

၁.၅ ထိခိုက်ဆန်းစစ်ခြင်း နှင့် အဆိုပြု လျှော့ချရေး အစီအမံများ

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) သည် ဖြစ်ပေါ်လာနိုင်သည့် သက်ရောက်မှုများ နှင့် သက်ရောက်မှုအဆင့်ကို လျှော့ချရန် အဆိုပြုလျှော့ချမှုကို ဆန်းစစ်ခြင်းခဲ့ပါသည်။ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) သည် လုပ်ငန်း လုပ်ဆောင်ရွက်မှု၏ ယခင်အတွေ့အကြုံများမှ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများမှာ ပုံမှန်အားဖြင့် ကောင်းစွာ နားလည်သဘောပေါက်ထားပြီးဖြစ်ကြောင်း၊ အဓိက ပတ်ဝန်းကျင် သို့မဟုတ် လူမှုရေးပတ်ဝန်းကျင်တို့အပေါ် ဆိုး ကျိုးဖြစ်စေသည့် အကျိုးဆက်များမှာ အလွန်နည်းကြောင်း သို့မဟုတ် မရှိကြောင်းဖြင့် နိဂုံးချုပ်ထားပါသည်။ ၎င်းဖြစ် ပေါ်လာနိုင်သော သက်ရောက်မှုများ နှင့် ၎င်းနှင့်ဆက်နွယ်သော လျှော့ချရေး အစီအမံများကို ဇယား ၁.၈ တွင် အကျဉ်းတင် ပြ ထားပါသည်။

၁.၆ ဆက်စပ်သက်ရောက်မှု ဆန်းစစ်ခြင်း

ကန်တုတ် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာအပြင်၊ IMWP ကို မကွေးတိုင်းဒေသကြီးရှိ လေအားလျှပ်စစ်အားဆိုင်ရာ ဖြစ်နိုင်ခြေရှိမှု လေ့လာမှုများကို ဆောင်ရွက်ပြီး၊ အခြား ဖြစ်နိုင်ခြေရှိသော လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ (၃) ခု ကို ဖော်ထုတ်သတ်မှတ်ခဲ့ပါသည်။ ဆင်က လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ နှင့် စွယ်ပေါက်ကံ့ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ တို့သည် ချောက်မြို့နယ်အတွင်းရှိပြီး၊ ကန်တုတ် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ၁၀၀ ကီလို မီတာကျော်ခန့် အကွာတွင် တည်ရှိပါသည်။ ဇင်တောင် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသည် မင်းတုန်းမြို့နယ်တွင် တည်ရှိပြီး၊ ကန်တုတ်လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ၃၀ ကီလိုမီတာခန့်အကွာတွင် တည်ရှိသည်။ ကန်တုတ် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာမှ ဝေးကွာမှုကြောင့် ၎င်းစီမံကိန်းများမှ ဆက်စပ်သက်ရောက်မှုရှိနိုင်မည်မဟုတ်ပါ။ ကန်တုတ် လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်သောနေရာမှ မန်း (မင်းဘူး) ဓာတ်အားခွဲရုံအထိ ဆက်ထားသော ၅၇.၅ ကီလိုမီတာ အရှည်ရှိ ၁၃၂ kV သွယ်ယူရေးလိုင်းကို အဆိုပြုမည် ဖြစ်ပါသည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ ဆက်စပ် သက်ရောက်မှုများ နှင့် သွယ်ယူရေးလိုင်းများကို ဆက်သွယ်ရေးလိုင်း၏ ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း (IEE) အစီရင်ခံစာဖြင့် ဆန်းစစ်သွားမည် ဖြစ်ပြီး၊ ၎င်းကို ကန်တုတ် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာ၏ လက်ရှိ ပတ်ဝန်း ကျင်ထိ ခိုက်မှုဆန်းစစ်ခြင်းပြီးနောက် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

၁.၇ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှု အစီအစဉ်

စီမံကိန်းနှင့် ဆက်နွယ်သော သက်ရောက်မှုများကို စီမံခန့်ခွဲရန် နှင့် အဆိုပြု ကန်တုတ်လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သော နေရာ၏ တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးကာလအတွင်း ဥပဒေများလေးစားလိုက်နာမှု နှင့် နိုင်ငံတကာအလေ့ အကျင့်ကောင်းများ၏ စံသတ်မှတ်ချက်များကို လိုက်နာစေရန် စီမံကိန်းအသေးစိတ်နှင့်ပတ်သက်သော ပတ်ဝန်း ကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို ရေးဆွဲပြီးဖြစ်ပါသည်။ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) တွင် အချိန် စာရင်း နှင့် ဇယား ၁.၈ တွင် ဖော်ပြထားသည့် လျှော့ချရေးအစီအမံများအကောင်အထည်ဖော်မှု နှင့် အဓိကလျှော့ချရေးအစီအမံများအကျဉ်းချုပ်တို့အတွက် တာဝန် များချမှတ်ခြင်းတို့ ပါဝင်ပါသည်။

ဥပဒေမူဘောင်လိုအပ်ချက်များကို လေးစားလိုက်နာစေရန် နှင့် လည်ပတ်ရေးဆိုင်ရာ ထိန်းချုပ်မှုများ၏ ထိရောက်မှု နှင့် ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများကို လျှော့ချရန် ရည်ရွယ်သည့် အခြား အစီအမံများကို တွက်ထုတ်ရန် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ်ကို ဇယား ၁.၉ တွင် တင်ပြထားပါသည်။

ဤ EMP အပြင်၊ အတော်အသင့်အရေးပါမှုထက်မပိုသည့် စီမံကိန်းမှ ကြွင်းကျန်သက်ရောက်မှုများကို လျှော့ချရန် ပြင်ဆင်အကောင်အထည်ဖော်သွားမည့် အကြံပြုထားသော အသေးစိတ် စီမံခန့်ခွဲမှုအစီအစဉ်များရှိပါသည်။

တည်ဆောက်ရေးကာလမတိုင်မီ အောက်ပါစီမံခန့်ခွဲမှုအစီအစဉ်များကို အကြံပြုထားပါသည် -

- စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှုအစီအစဉ်၊
- အရေးပေါ် တုံ့ပြန်ရေး အစီအစဉ်၊
- ယိုဖိတ်မှုတုံ့ပြန်ရေး အစီအစဉ်၊
- မြေရယူမှု နှင့် ပြန်လည်နေရာချထားရေး မူဘောင်၊ နှင့်
- အသက်မွေးဝမ်းကျောင်းပြန်လည်ပေးအပ်ခြင်းအစီအစဉ်။

ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု တွေ့ရှိချက်များ နှင့် ပတ်ဝန်းကျင် နှင့် စီမံကိန်း၏ လုပ်ဆောင်မှုတို့ ကို အစီရင်ခံတင်ပြရန် ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအစီရင်ခံစာကို တည်ဆောက်ရေးကာလ အဆင့်တွင် ခြောက်လတစ်ကြိမ် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနအတွက် ပြင်ဆင်တင်သွင်းသွားမည် ဖြစ်ပါသည်။

ဇယား (၁.၈) ထိခိုက်မှုများ နှင့် လျော့ချရေး အစီအမံများအကျဉ်း

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအကားများ
တည်ဆောက်ရေးကာလအဆင့်				
လေထုအရည်အသွေး	■ သွားလာရေးလမ်းသည် တာရှည်ခံအောင်ခင်းထား သည့် လမ်းဖြစ်မည်။ ■ လေအား လျှပ်စစ်တာဘိုင် နှင့် လူနေဇရိယာတို့အကြား ၃၄၅ မီတာ အကွာအဝေး ထားရှိသွားမည် ဖြစ်ပါသည်။ ■ သိုလှောင်ထားသော ကုန်ပစ္စည်းများ အပါအဝင် ဆောက်လုပ်ရေးလုပ်ငန်းအတွက်အသုံးပြုရန်တူးဖော်ထားသည့်မြေကြီးများ နှင့် တည်ဆောက်ရေးပစ္စည်းများပေါ်တွင် ဖုံးအုပ် ပေးထားခြင်း၊ တည်ဆောက်ရေး လုပ်ငန်း နယ်နိမိတ်များ၏ ပတ်လည်အနားတစ်လျှောက် ယာယီ အကာအရံများ (ဥပမာ- ယာယီခိုင်မာသော ခြံစည်းရိုးရှိခြင်း) တပ်ဆင်ခြင်း နှင့် တည်ဆောက်ရေးလုပ်ငန်းခွင်နေရာရှိ မြေပြင်အားရေလောင်းပေးခြင်း ကဲ့သို့သော ဖုန်မှုန့်ထိန်းချုပ်ရေးအစီအမံကို ဆောင်ရွက်ပေးခြင်း။	သာမည	မပြောပလောက်သော	အခန်း (၆.၃.၁)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
ဆူညံသံ	■ လုပ်ငန်းခွင်တွင် အသုံးပြုသည့် ကိရိယာပစ္စည်းတန်ဆာပလာများ၊ တည်ဆောက်ရေးဆိုင်ရာ အစိတ်အပိုင်းများ (ဥပမာ၊ ထရပ်ကား များ) ကောင်းစွာ ပြုပြင် ထိန်သိမ်းခြင်းနှင့် ကိရိယာများဆက်တိုက်အသုံးပြု ပတ်မှုကို တတ်နိုင်သမျှ လျှော့ချခြင်း၊ စက်များကိုအလုပ်ချိန်အပိုင်ခြားအလိုက် စက်ရပ်နားခြင်း ပြုလုပ်ပေးခြင်း။ ■ ဇူလိုင်လ မှ အောက်တိုဘာလဖြစ်သည့် ဝါတွင်းကာလအတွင်း ဘုရား နှင့် ုန်းကြီး ကျောင်းတို့မှ ၃၀၀ မီတာအတွင်း၌ တည် ဆောက်ရေးလုပ်ငန်းကို ရှောင်ကြဉ် သင့်ပါ သည်။ ■ ဇူလိုင်လ နှင့် အောက်တိုဘာလဖြစ်သည့် ဝါတွင်းကာလအတွင်း ဘုရား နှင့် ုန်းကြီး ကျောင်းတို့မှ ၃၀၀ မီတာအတွင်း ဆောက် လုပ်ရေးလုပ်ငန်းကို မလွဲမသွေ ဆောင် ရွက်ရမည်ဆိုလျှင်၊ ၎င်းနယ်မြေဧရိယာများအပေါ် ဆူညံသံသက်ရောက်မှုများ နှင့် ပတ်သက်၍ လျှော့ချရန် တည်ဆောက်ရေးလုပ်ငန်းများ အစီအစဉ်ချမှုကို ဘုရား နှင့် ဘုန်းကြီးကျောင်းတို့ရှိ နေရာလွတ်များအသုံးပြုနိုင်ရန် ဘုန်းကြီးများနှင့် ဆွေးနွေးမှုကို တည်ဆောက်ရေးမတိုင်မီ ဆောင်ရွက်သင့်ပါသည်။ ဆူညံသံနှင့်ပတ်သက်၍ စောင့်ကြပ် ကြည့်ရှု စစ်ဆေးမှုကို အနီးဝန်းကျင် ဆူညံမှုအတွက် မြန်မာနိုင်ငံ၏ အမျိုးသား ပတ်ဝန်းကျင် အရည်အသွေး	သာမညအဆင့် မှ အတန်အသင့်အဆင့်	သာမည	အခန်း (၆.၃.၂)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအ ကားများ
	(ထုတ်လွှတ်မှုများ) လမ်းညွှန်ချက်များ (NEQ) ၏ သတ်မှတ်ချက်များ ကို ကျော်လွန်မှု ရှိ မရှိ စစ်ဆေးရန် ဝါတွင်းကာလအတွင်း ဘုရား နှင့် ဘုန်းကြီး ကျောင်းတို့တွင် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။			
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံး ပြုမှု၊ သန့်စင်မှု၊ သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏ မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။	သာမည	သာမည	အခန်း (၆.၃.၃)
မြေပေါ်ရေ အရည်အသွေး	■ မိုးသက်မုန်တိုင်းများမှ ဖြစ်ပေါ်သည့် မြေတိုက်စားမှုကို ကာကွယ်ရန် မြေတံတိုင်း ဆောင်ရွက်မှုများ၊ မြေမျက်နှာပြင် ကာကွယ်ရေး နှင့် ရေနုတ်လုပ်ငန်းများဖြင့် ဆောင်ရွက်သင့်ပါသည်။ ■ လုပ်ငန်းခွင်ရေးဆိုးစွန့်ပစ်အဆောက်အအုံနေရာများကို ၂၅ နှစ်ကြာ မိုးရွာသွန်းမှုဖြစ်ရပ် မှ စီးကျမှုကို ထည့်သွင်းစဉ်းစားခြင်း၊ ရှိနေပြီး ဖြစ်သော ရေနုတ်မြောင်းစနစ်စသည် တို့၏ ချိတ်ဆက်သည့်နေရာ၌ ဆီပါဝင်သောရေကို ခွဲခြားသည့်ကိရိယာကို ထားရှိပြီး၊ စနစ်တကျ ဒီဇိုင်းဆွဲပြီး ဆောင်ရွက်သင့်ပါသည်။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၃.၄)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	■ ရေနုတ်မြောင်းအဆောက်အအုံနေရာများ နှင့် အနည်ကျမှုဆိုင်ရာ ထိန်းချုပ်ခြင်းဖွဲ့ စည်းတည်ဆောက်ထားမှုများအားလုံးကို ပုံမှန်အနေအထားဖြင့် စစ်ဆေးခြင်း နှင့် ပြုပြင်ထိန်းသိမ်းသွားမည် ဖြစ်ပါသည်။ ■ အလုပ်သမားစခန်းအတွက် မိလ္လာစနစ်ကို တည်ဆောက်သွားမည် ဖြစ်ပါသည်။ မိလ္လာ တို့ကို လုပ်ငန်းခွင်ရှိ ရေနုတ်မြောင်းစနစ်သို့ မဖောက်ထုတ်မီ လုပ်ငန်းခွင်မှ စီးကျခြင်း နှင့် စွန့်ပစ်ပစ္စည်း စွန့်ထုတ်ခြင်းတို့နှင့်ပတ်သက်၍ မြန်မာနိုင်ငံ၏ NEQ နှင့် အညီ သန့်စင်သင့်ပါသည်။			
မြေအောက်ရေ အရည်အသွေး	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံး ပြုမှု၊ သန့်စင်မှု၊ သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏ မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၃.၅)
မြေဆီလွှာအရည်အသွေး	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံး ပြုမှု၊ သန့်စင်မှု၊	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၃.၆)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအ ကားများ
	သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏ မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။			
မြေယာရှုခင်း နှင့် မြင်ကွင်း	■ တည်ဆောက်ရေးလုပ်ငန်းများကို စီမံကိန်းအဆောက်အအုံခြေရာ နှင့် အနီးဝန်း ကျင် များ အတွင်းသာ ကန့်သတ်ထားသင့်ပါသည်။ ■ တည်ဆောက်ရေးဆောင်ရွက်မှုပြီးနောက်၊ ယာယီအသုံးပြုမှုအတွက် ရယူထားသော မြေယာကို သူတို့၏ မူလပုံစံအတိုင်း (ဥပမာ၊ အလုပ်သမားစခန်း၊ လုပ်ငန်းခွင်ရှိ ရုံး၊ နှင့် ခင်းကျင်းပြင်ဆင် ထားသော နယ်မြေဧရိယာ) ဖြစ်အောင် ပြန်လည် ပြုပြင်သွား မည် ဖြစ်ပါသည်။ ■ လိုအပ်လျှင် တတ်နိုင်သမျှ အသေးစားပြုပြင်မွမ်းမံမှုများ လုပ်ထား သည့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသို့ သွားလာသည့် လမ်းအဖြစ် အသုံးပြုသည့် ရှိပြီးလမ်းများကို အသုံးပြုသင့်ပါသည်။	သာမည	သာမည	အခန်း (၆.၃.၇)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
ဇီဝမျိုးစုံမျိုးကွဲ	■ စီမံကိန်းသည် အထူးအရေးပါသော ဇီဝမျိုးစုံမျိုးကွဲ နေရင်းဒေသအပေါ်တွင် ရှိမည် မဟုတ်ပါ။ ■ လိုအပ်လျှင် တတ်နိုင်သမျှ အသေးစားပြုပြင်မွမ်းမံမှုများ လုပ်ထား သည့် လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာသို့ သွားလာသည့် လမ်းအဖြစ် ရှိပြီးလမ်းများကိုအသုံးပြုသင့်သည်။ ■ ကုန်းပေါ် နေ သက်ရှိသတ္တဝါများနေရင်းဒေသဆုံးရှုံးမှု၊ အနှောင့်အယှက်ဖြစ်မှု သို့မဟုတ် ဖယ်ရှားပစ်မှု၊ အတားအဆီးများဖန်တီးမှု၊ အစိတ်စိတ်အမြွှာမြွှာကွဲမှု နှင့် လျော့ပါးသက်ရောက် မှုများ၊ နေရင်းဒေသများ အရည်အသွေးနိမ့်ပါမှု နှင့် တိုက်ရိုက် သေဆုံးမှုဖြစ်ရပ်တို့မှ သက်ရောက်မှုများကို လျှော့ချပြီး စောင့်ကြပ် ကြည့်ရှုစစ်ဆေးရန် လျှော့ချရေး နှင့် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု ဆိုင်ရာ အစီအမံများကို အကောင်အထည်ဖော်ခြင်း။	အတန်အသင့်	မပြောပလောက်သော အဆင့် မှ သာမည်အဆင့်	အခန်း (၆.၃.၈)
ရပ်ရွာလူထု ကျန်းမာရေး နှင့် ဘေးကင်းရေး	■ တည်ဆောက်ရေးကာလအတွင်း ဒေသခံမဟုတ်သူ အလုပ်သမား တို့သည် အလုပ် သမားစခန်းတွင် နေထိုင်သွားကြမည် ဖြစ်ပါသည် ။ ■ ရောဂါများ၊ ရောဂါလက္ခဏာများ၊ ကာကွယ်ရေးအစီအမံများ နှင့် ကူးစက်တတ်သော လမ်းကြောင်းများ နှင့် ကုသမှုနှင့်ပတ်သက် သည့်	သာမည	သာမည	အခန်း (၆.၃.၉)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	အသိအမြင်များ ရရှိစေရန် အလုပ် သမားများအားလုံး အတွက် ဖြစ်တတ်အများဆုံး ကူးစက်ရောဂါအချို့နှင့်ပတ်၍ လေ့ကျင့် သင်ကြားပေးခြင်း။ ■ ကူးစက်လွယ်ရောဂါများ ကြိုတင်ရှိ မရှိကို စိစစ်ရန် စီမံကိန်းလုပ်ငန်း ခွင်နေရာတွင် အလုပ်ခန့်အပ်ထားသည့် အလုပ်သမားများ အားလုံးကို ကျန်းမာရေး စစ်ဆေးမှုများ သေချာစွာ ပြုလုပ်ခြင်း။ ■ အလုပ်သမားများ ဖျားနာလျှင်၊ ကျန်းမာရေးစောင့်ရှောက်မှုများ နှင့် ဆေးဝါးကုသမှု များကို ဆောင်ရွက်ပေးသွားမည် ဖြစ်ပါသည်။ ■ (က) ယာဉ်များအတွက် လုံလောက်သော တစ်ထောက်နားနေ ရာများ၊ (ခ) ယာဉ် မောင်းများအတွက် အဆောက်အအုံနေရာများ နှင့် သာယာအဆင်ပြေမှုများ၊ နှင့် (ဂ) စီမံကိန်းအတွက် အလုပ်ခန့်အပ်သော ယာဉ်မောင်းများအတွက် စနစ်ကျသော လေ့ကျင့်သင်ကြားမှု အစီအစဉ်တို့ဖြင့် ယာဉ်အသွားအလာ စီမံခန့်ခွဲမှုအစီအစဉ်ကို ရေးဆွဲ ဆောင်ရွက်ပေးသင့်ပါသည်။ ■ အတွင်းလမ်းများတွင် ယာဉ်အသွားအလာများအတွက် မြန်နှုန်းကို တစ်နာရီလျှင် ၄၀ ကီလိုမီတာအထိ ကန့်သတ်ဆောင်ရွက်ခြင်း။			

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအ ကားများ
	■ လမ်းမပေါ်သို့ လူများ နှင့် ခြံမွေးတိရစ္ဆာန်များ ဝင်ရောက်လာနိုင် သည့် ဖြစ်နိုင်ခြေကို ယာဉ်မောင်းများအား သတိပေးနိုးဆော်ရန် အတွင်းလမ်းအသွားအလာတစ်လျှောက် လူသိများသည့် လမ်း ကြောင်းများတွင် လမ်းဘေး၌ သတိပေးအမှတ်အသားများကို စိုက်ထူခြင်း။			
လုပ်ငန်းခွင်ကျန်းမာရေး နှင့် ဘေးကင်းရေး	■ အမြင့်နေရာများတွင် အလုပ်ဆောင်ရွက်ခြင်း၊ ဝေးလံသော ဒေသတွင် အလုပ်အလုပ် ခြင်း နှင့် လေးလံမှုပါဝင်သည့် အတင်အချ လုပ်ငန်းများနှင့်ပတ်သက်၍ လေအားလျှပ်စစ် ဓာတ်အားအတွက် ကမ္ဘာ့ဘဏ်အုပ်စု၏ ပတ်ဝန်းကျင်၊ ကျန်းမာရေး နှင့် ဘေး ကင်း ရေး (WBG EHS) လမ်းညွှန်ချက်များ (၂၀၁၅) နှင့်အညီ ထိန်းချုပ် မှုများ နှင့် လျော့ချ ရေး အစီအမံများကို အကောင်အထည် ဖော်ခြင်း။ ထို့ပြင်၊ မြွေကာကွယ်မှုကို အလုပ်သမားများအတွက် တစ်ကိုယ်ရေကာကွယ်ရေးကိရိယာ (PPE) အဖြစ် ထည့်သွင်းသင့် ပါသည်။	သာမည	သာမည	အခန်း (၆.၃.၁၀)
အသက်မွေးဝမ်းကျောင်း နှင့် စီးပွားရေး	■ လူနေထိုင်ရာနေရာများ နှင့် ကျောက်မီးသွေး သတ္တုတွင်းတို့ကို ရှောင်ကြဉ်ရန် စီမံကိန်းအဆောက်အအုံနေရာများကို နေရာချ ထားပြီး ဖြစ်ပါသည်။	သာမညအဆင့် မှ အတန်အသင့်အဆင့်	သာမည	အခန်း (၆.၃.၁၁)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအ ကားများ
	■ ယာယီအသုံးပြုသည့် နယ်မြေဧရိယာကို တည်ဆောက်ရေးကာလ အဆင့်ပြီးနောက် မူလအနေအထားပြန်ရောက်အောင် ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။ ■ မြန်မာနိုင်ငံ နှင့် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ၏ သတ်မှတ် ချက်များ (အပြည်ပြည်ဆိုင်ရာ ဘဏ္ဍာရေး ကော်ပိုရေးရှင်း၏ လုပ်ဆောင်မှု စံသတ်မှတ် ချက်များ (IFC PS) နှင့် အာရှဖွံ့ဖြိုး တိုးတက်ရေးဘဏ်၏ ကာကွယ်စောင့်ရှောက်ရေး မူဝါဒ တင်ပြချက် (ADB SPS)) တို့ကို ထည့်သွင်းစဉ်းစားလျက် စီမံကိန်းနှင့်ပတ် သက်၍ မြေယာရယူမှုမူဘောင်ကို ရေးဆွဲအကောင်အထည် ဖော်သွားခြင်း။ ■ မြန်မာနိုင်ငံ နှင့် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ (IFC PS နှင့် ADB SPS) တို့၏ သတ်မှတ်ချက်များကို ထည့်သွင်းစဉ်းစားလျက် အသက်မွေးဝမ်း ကျောင်းပြန်လည်ရရှိရေးအစီအစဉ်ကို ရေးဆွဲအကောင်အထည်ဖော်ခြင်း။			
လည်ပတ်ရေးကာလအဆင့်				
ဆူညံသံ	■ လေအားလျှပ်စစ်တာဘိုင် နှင့် လူနေထိုင်ရာနယ်မြေဧရိယာ တို့အကြား ခွာထားသည့် အကွာအဝေးကို ၃၄၅ မီတာ ထားရှိ သွားမည် ဖြစ်ပါသည်။	အတန်အသင့်	သာမည	အခန်း (၆.၄.၁)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	■ လေစွမ်းအင် အတွက် WBG EHS လမ်းညွှန်များ (၂၀၁၅) နှင့် အညီ လည်ပတ်ရေးဆိုင်ရာ သက်ရောက်မှုများအောင်မြင်စေရန် လွှသွားပုံရှိ အစွန်းများကို လိုအပ်သလို အသုံးပြုခြင်း။ ■ လေစွမ်းအင်အတွက် WBG EHS လမ်းညွှန်များ (၂၀၁၅) နှင့်အညီ လည်ပတ်ရေးဆိုင်ရာ သက်ရောက်မှုများကို အောင်မြင်စေရန် လျှော့ချထားသော ဆူညံသံအနေအထားဖြင့် တာဘိုင်များကို အသုံးပြုလျက် ဆူညံသံညှိခြင်းကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ■ လည်ပတ်ရေးဆူညံသံအတွက် လေစွမ်းအင်ဆိုင်ရာ မြန်မာနိုင်ငံ NEQ နှင့် WBG EHS လမ်းညွှန်များ (၂၀၁၅) ကို လိုက်နာ မဆောင်ရွက်နိုင်လျှင်၊ ထိခိုက်လွယ် ဧဝပတ်ဝန်းကျင် နှင့် ပတ်သက် ၍ ရုပ်ပိုင်းဆိုင်ရာပြန်လည်နေရာချထားမှု ကို နောက်ဆုံးအဆင့် အဖြစ် ဆောင်ရွက်သင့်ပါသည်။ ပြန်လည် နေရာချထားရေး ဆောင်ရွက်မှုအစီအစဉ်ကို ရေးဆွဲပြီး၊ ထိခိုက်လွယ် ဧဝပတ်ဝန်း ကျင် နှင့်ပတ်သက်၍ ရုပ်ပိုင်းဆိုင်ရာ ပြန်လည်နေရာချ ထားမှုဖြစ်ရပ်ပေါ်လာခဲ့လျှင်၊ ဒေသခံ မြန်မာနိုင်ငံ နှင့် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ (IFC PS နှင့် ADB SPS) တို့၏ သတ်မှတ်ချက် များကို			

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် EIA အခန်း အကိုးအ ကားများ
	ထည့်သွင်းစဉ်းစား၍ အကောင် အထည်ဖော် ဆောင်ရွက်ရ မည် ဖြစ်ပါသည်။ ■ လည်ပတ်ရေးကာလအဆင့်ကာလအတွင်း ရွေးချယ်ထားသော ဆူညံသံထိခိုက်လွယ်မှုနေရာများ (NSRs) တွင် လည်ပတ်ရေး ဆိုင်ရာ ဆူညံသံ သက်ရောက်မှုကို စောင့်ကြည့်ကြည့်ရှုခြင်း။ ■ အသုံးပြုရန် အတည်ပြုထားသည့် တာဘိုင်မော်ဒယ်တွင် Siemens Gamesa SG 4.5-145 4.5MW,ထက် အသံစွမ်းအား ပိုမြင့်လျှင်၊ မြန်မာနိုင်ငံ NEQ နှင့် လေစွမ်းအင်အတွက် WBG EHS လမ်းညွှန်များ (၂၀၁၅) တို့နှင့်ကိုက်ညီစေရန် နောက်ထပ် ဆူညံသံဆန်းစစ်ခြင်းများကို အသေအချာ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။			
အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်း (Shadow Flicker)	■ လေအားလျှပ်စစ်တာဘိုင် နှင့် အနီးဝန်းကျင် အဆောက်အအုံတို့ အကြား ခွာထား သည့် အကွာအဝေးကို ၃၄၅ မီတာ ထားရှိသွား မည် ဖြစ်ပါသည်။ ■ အဆိုပြုထားသည့် တာဘိုင်တည်နေရာများတိုက်ရိုက်လိုင်း ဖြစ်နိုင်ခြေကို အမြင်အားဖြင့် ဆန်းစစ်နိုင်ပြီး၊ မြင့်သော ခြံများအသုံးပြုနိုင်ခြင်း နှင့် သစ်ပင်စိုက်ပျိုးခြင်းတို့ကို အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းဆိုင်ရာ ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများဖြင့် တည်နေရာများတွင်	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၄.၂)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	လေ့လာစီစစ်နိုင် ပါသည်။ ခန်းဆီးလိုက်ကာများအသုံးပြုခြင်းလည်း ဆောင်ရွက်နိုင် ပါသည်။ ၎င်းကို လျှော့ချထားသော သက်ရောက်မှုများဖြင့် ထိရောက်စွာ အတည်ပြုနိုင်လျှင်၊ စတင်ခြင်းရပ်နားခြင်း အရိပ်လျှော့ချခြင်း နည်းဗျူဟာကို အောက်တွင် ဖော်ပြထားသည့် အတိုင်း လိုအပ်မည် မဟုတ်ပါ။ ■ လေအားလျှပ်စစ်ဓာတ်အား အတွက် WBG EHS လမ်းညွှန်ချက် များ (၂၀၁၅) နှင့် အညီ အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းသက်ရောက်မှု များနှင့်ပတ်သက်၍ လေးစား လိုက် နာဆောင်ရွက်ရန် အစနှင့် အဆုံး အရိပ်လျှော့ချမှု မဟာဗျူဟာကို ပြုလုပ် ဆောင်ရွက် သွားမည် ဖြစ်ပါသည်။ ■ ထိခိုက်လွယ် ဇီဝပတ်ဝန်းကျင် နှင့်ပတ်သက်၍ ရုပ်ပိုင်းဆိုင်ရာပြန် လည်နေရာချထားမှု ကို နောက်ဆုံးအဆင့်အဖြစ် ဆောင်ရွက်သင့် ပါသည်။ ပြန်လည်နေရာချထားရေး ဆောင်ရွက်မှု အစီအစဉ်ကို ရေးဆွဲပြီး၊ ထိခိုက်လွယ် ဇီဝပတ်ဝန်းကျင် နှင့်ပတ်သက်၍ ရုပ်ပိုင်းဆိုင်ရာပြန်လည်နေရာချထားမှုဖြစ်ရပ်ပေါ်လာခဲ့လျှင်၊ ဒေသခံ မြန်မာနိုင်ငံ နှင့် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ (IFC PS နှင့် ADB SPS) တို့၏ သတ်မှတ်ချက်များကို ထည့်သွင်းစဉ်းစား၍ အကောင်အထည်ဖော် ဆောင်ရွက်ရမည် ဖြစ်ပါသည်။			

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	■ အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းမှ မျှော်မှန်းထားသောသက်ရောက်မှုများ ရှိနိုင်သည့် လည်ပတ်ရေးကာလအတွင်း ရပ်သူရွာသားများနှင့် ထိတွေ့တိုင်ပင်လျက် အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းကို စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးခြင်း။			
စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှု	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံးပြု မှု၊ သန့်စင်မှု၊ သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏ မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။	သာမည	သာမည	အခန်း (၆.၄.၃)
မြေပေါ်ရေ အရည်အသွေး	■ လုပ်ငန်းခွင်ရေးဆိုးနုတ်အဆောက်အအုံနေရာများကို ၂၅ နှစ်ကြာ မိုးရွာသွန်းမှုဖြစ်ရပ် မှ စီးကျမှုကို ထည့်သွင်းစဉ်းစားလျက်၊ ရှိနေပြီးဖြစ်သော ရေနုတ်မြောင်းစနစ်စသည် တို့၏ ချိတ်ဆက် သည့်နေရာ၌ ဆီပါဝင်သောရေကို ခွဲခြားသည့်ကိရိယာကို ထားရှိပြီး၊ စနစ်တကျ ဒီဇိုင်းဆွဲပြီး ဆောင်ရွက်သင့်ပါသည်။ ■ ရေနုတ်မြောင်းအဆောက်အအုံနေရာများ နှင့် အနည်ကျမှုဆိုင်ရာ ထိန်းချုပ်ခြင်းဖွဲ့ စည်းတည်ဆောက်ထားမှုများအားလုံးကို	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၄.၄)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	ပုံမှန်အနေအထားဖြင့် စစ်ဆေးခြင်း နှင့် ပြုပြင်ထိန်းသိမ်းသွားမည် ဖြစ်ပါသည်။ ■ လည်ပတ်ရေး နှင့် ပြုပြင်ထိန်းသိမ်းရေးအဆောက်အအုံတို့အတွက် မိလ္လာစနစ်ကို တည်ဆောက်သွားမည် ဖြစ်ပါသည်။ မိလ္လာရေဆိုးများ ကို လုပ်ငန်းခွင်ရေနုတ်မြောင်း စနစ်သို့ မဖောက်ထုတ်မီ၊ လုပ်ငန်း ခွင်နေရာမှစီးကျခြင်း နှင့် စွန့်ပစ်ပစ္စည်းစွန့်ထုတ်မှုများ နှင့် ပတ်သက်၍ မြန်မာနိုင်ငံ NEQ နှင့် အညီ သန့်စင် ဆောင်ရွက် သင့်ပါသည်။			
မြေအောက်ရေ အရည်အသွေး	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံးပြု မှု၊ သန့်စင်မှု၊ သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏ မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၄.၅)
မြေဆီလွှာ အရည်အသွေး	■ စီမံကိန်းအတွက် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု အစီအစဉ် (WMP) ကို ရေးဆွဲပြီး၊ စွန့်ပစ် ပစ္စည်းထွက်ရှိမှု၊ သိုလှောင်မှု၊ ပြန်လည်အသုံး ပြုမှု၊ သန့်စင်မှု၊ သယ်ယူပို့ဆောင်မှု နှင့် စွန့်ထုတ်မှုတို့အပါအဝင် စွန့်ပစ်ပစ္စည်းစီမံခန့်ခွဲမှု၏	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၄.၆)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	မူတူကွဲပြားသော ကဏ္ဍများကို ထည့်သွင်း၍ အကောင်အထည်ဖော်ဆောင်ရွက်သင့်ပါသည်။			
မြေယာရှုခင်း နှင့် မြင်ကွင်း	■ လည်ပတ်ရေးလုပ်ငန်းများကို စီမံကိန်းအဆောက်အအုံခြေရာ နှင့် အနီးဝန်းကျင်များ အတွင်းသာ ကန့်သတ်ထားသင့်ပါသည်။ ■ လက်တွေ့ဖြစ်နိုင်သမျှ လေအားလျှပ်စစ်တာဘိုင်များအတွက် ပုံစံတူဒီဇိုင်းတူတို့ကို အသုံးပြုသင့်ပါသည်။ ■ လေအားလျှပ်စစ်တာဘိုင်များကို ချိတ်ဆက်ထားသော ကေဘယ် ကြိုးများကို မြေအောက်တွင် မြှုပ်ထားသွားမည် ဖြစ်ပြီး၊ တွေ့မြင်ရမည် မဟုတ်ပါ။ ■ တည်ဆောက်ရေးနှင့်ပတ်သက်၍ ယာယီကာလအတွက် ရယူထားသော မြေများကို ၎င်းတို့၏ မူလအတိုင်းပုံစံအဖြစ် ပြည်လည်ပြုပြင်သွားမည် (ဥပမာ၊ အလုပ်သမား စခန်း၊ လုပ်ငန်းခွင်ရုံး နှင့် ခင်းကျင်းထားသော နယ်မြေဧရိယာ) ဖြစ်ပြီး၊ လည်ပတ်ရေး အတွက် အသုံးပြုသွားမည် မဟုတ်ပါ။	သာမည	သာမည	အခန်း (၆.၄.၇)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
၄က်များ နှင့် လင်းနို့များ	တာဘိုင်ထိမိတိုက်မိမှု ■ အမဲလိုက်သောငှက်မျိုးစိတ်အချို့၏ ဆွဲဆောင်မှုကို လျော့ချရန် စွန့်ပစ်ပစ္စည်း ထိန်း ချုပ်ရေးအစီအစဉ်ကို တည်ဆောက်ခြင်း။ ၎င်းကို WMP တွင် ထင်ဟပ်သင့်ပါသည်။ ■ တာဝါတိုင်ဖွဲ့စည်းမှုအားလုံးသည် အပေါက်များမပါရှိသည့်အတွက် အသိုက်ပြု လုပ်ခြင်းကို ရှောင်ရှားနိုင်မည် ဖြစ်ပါသည်။ အိပ်တန်းတက်နေရာများ (ဝါယာကြိုးများ နှင့် ငေါထွက် နေသောအဆင့်များ) ကို အနည်းဆုံးဖြစ်အောင် ဆောင်ရွက်မည်။ ■ လှည့်နေသောတာဘိုင်ဒလက်များကို ဒေသရှိ ငှက်မျိုးစိတ်များအတွက် မြင်နိုင်ရန် လေအား လျှပ်စစ်ဓာတ်အားတာဘိုင်များအပေါ်အတွင် သိသိသာသာကွဲပြားသော အရောင်များကို ဆွဲထားမည်။ ■ ဒေသ ပျံသန်းမှုစည်းမျဉ်းများ နှင့် စံသတ်မှတ်ချက်များအပေါ် မူတည်၍ ညငှက်များကို တားဆီးနိုင်ရန် ၃ စက္ကန့်အကြားတစ်ကြိမ် အလင်းထွက်သည့် တာဘိုင် များအားလုံးပေါ်တွင် တဖျတ်ဖျတ် လင်းသည့်မီးများ (Strobe Lights) ကို အသုံးပြုမည် ဖြစ်ပါသည်။	မပြောပလောက်သော အဆင့်မှ သာမညအဆင့်	မပြောပလောက်သော	အခန်း (၆.၄.၈)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျှော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျှော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	■ တာဘိုင် တာဝါတိုင်များ နှင့် တာဘိုင်ဒလက်များပေါ်ရှိ ညလုံးပေါက်မီး အလင်းများ၌ ခရမ်းလွန်ရောင်ခြည်လှိုင်းအလျားများပါရှိသည့် LED မီးအလင်းရောင်တို့ ပါစေခြင်း။ ယင်းကဲ့သို့အလင်းရောင်များသည် လင်းနို့မျိုးစိတ်အချို့ကို တားဆီးနိုင်ပြီး၊ လင်းနို့များ စားသည့် ပိုးမွှားများကို ဆွဲဆောင်မှုလျှော့နည်းစေပါသည်။ ■ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာနယ်မြေ ဧရိယာအတွင်းငှက် နှင့် လင်းနို့နေရင်းဒေသကို လျှော့ချရန် နေရင်းဒေသစီမံခန့်ခွဲမှုကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။ ဤသည်မှာ အပင်အောက်ရှိ အပင်ငယ်များကို ဖယ်ရှားခြင်း နှင့် ရှိနေသော ရေထုများကို လျှော့ချခြင်းတို့ ပါဝင်နိုင်ပါသည်။ ■ တိရိစ္ဆာန်အသေကောင်များ စောင့် ကြပ်ကြည့်ရှုစစ်ဆေးမှု ကို တာဘိုင်များအားလုံး၏ အောက်ခြေ၌ အပတ်စဉ် ဆောင်ရွက်ရန် ဖြစ်ပါသည်။ တိရိစ္ဆာန်အသေကောင်များအားလုံးကို ဖော်ထုတ် သတ်မှတ်ပြီး၊ မျိုးစိတ်များ၏ အရေအတွက် နှင့် အမျိုးခွဲမှုတို့ကို အချက်အလက်ဖြင့်သိမ်း ထားရန် ဖြစ်ပါသည်။ တိရိစ္ဆာန်အသေ ကောင်များ စောင့် ကြပ်ကြည့်ရှုစစ်ဆေးမှုမှ စုဆောင်းထားသော အချက်အလက်များပြန်လည်သုံးသပ်မှု ကို မြန်မာနိုင်ငံရှိ ငှက် နှင့် လင်းနို့			

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	ဖော်ထုတ်သတ်မှတ်သည့်အတွေ့အကြုံ အနည်းဆုံး ၇ နှစ်ရှိသည့် ကျွမ်းကျင်ပညာရှင်တစ်ဦးမှ ဘေးအန္တရာယ်ဆိုက်ရောက်မှု ဖြစ်စေသည့် မျိုးစိတ်များကို ဖော်ထုတ်သတ်မှတ်ရန် (၂) နှစ်တာ ကာလအတွက် (၆) လတိုင်း တွင် ပြုလုပ်ဆောင်ရွက်မည်။ ■ အကယ်၍ အရေးပါသော အန္တရာယ်ဆိုက်ရောက်မှု အရေအတွက် ကို အကဲခတ် လေ့လာတွေ့ရှိရလျှင်၊ နောက် ထပ် ၄က် နှင့် လင်းနို့ စစ်တမ်းကို ဆောင်ရွက် သင့်သည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက် သောနေရာလည်ပတ်မှုများသည် တွေ့ရှိမှုဖြစ် ပေါ်နိုင်သော ဖော်ထုတ်သတ်မှတ် သည့် မျိုးစိတ်များ၏ ဘဝစက်ဝန်းလက္ခဏာများ အပေါ် အခြေခံ၍ ပြောင်းလဲနိုင်ပါသည်။ ■ အထက်ပါ ဇီဝမျိုးစုံမျိုးကွဲအပေါ်သက်ရောက်မှုများအတွက် တည်ဆောက်ရေး ကာလ အဆင့်အတွက် လျှော့ချရေးအစီအမံ များကို ကိုးကားပါ။			
ရပ်ရွာလူထုကျန်းမာရေး နှင့် ဘေးကင်းရေး	■ အထက်ပါ ရပ်ရွာလူထုကျန်းမာရေး နှင့် ဘေးကင်းရေးတို့အတွက် တည်ဆောက်ရေး ကာလအဆင့်အတွက် လျှော့ချရေးအစီအမံ များကို ကိုးကားပါ။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၃.၉)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
လုပ်ငန်းခွင်ကျန်းမာရေး နှင့် ဘေးကင်းရေး	■ အထက်ပါ လုပ်ငန်းခွင်ကျန်းမာရေး နှင့် ဘေးကင်းရေးတို့အတွက် တည်ဆောက်ရေး ကာလအဆင့်အတွက် လျော့ချရေးအစီအမံ များကို ကိုးကားပါ။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၃.၁၀)
အသက်မွေးဝမ်းကျောင်း နှင့် စီးပွားရေး	■ အထက်ပါ အသက်မွေးဝမ်းကျောင်း နှင့် စီးပွားရေးတို့အတွက် တည်ဆောက်ရေး ကာလအဆင့်အတွက် လျော့ချရေးအစီ အမံများကို ကိုးကားပါ။	သာမညအဆင့် မှ အတန်အသင့်အဆင့်	သာမည	အခန်း (၆.၃.၁၁)
တည်ဆောက်ခြင်း နှင့် လည်ပတ်ခြင်းအဆင့်တို့အတွက် စီစဉ်မထားသည့် ဖြစ်ရပ်များ				
အန္တရာယ်ရှိပစ္စည်းများ မတော်တဆ ယိုဖိတ်မှု	■ ကိရိယာပစ္စည်းကို ပြုပြင်ထိန်းသိမ်းခြင်း နှင့် လောင်စာပြန်ဖြည့်ခြင်း နှင့် ယာဉ်များကို ယိုဖိတ်မှုများမှ မြေပြင်သို့စိမ့်ဝင်မှုကို ကာကွယ် တားဆီးရန် ခိုင်သောအခင်းစင်ပေါ်ရှိ သတ်မှတ်ထားသည့် နေရာ၌ ဆောင်ရွက်သင့်ပါသည်။ ခိုင်သောအခင်းစင်မရှိသည့် နေရာတွင် ယာဉ်များ သို့မဟုတ် ကိရိယာပစ္စည်းတို့ကို လောင်စာပြန်ဖြည့်ခြင်း နှင့် ဝန်ဆောင်မှုပေးခြင်းတို့ဆောင်ရွက်သောအခါ၊ အစက်ကျမှု ကိုအောက်ကခံသည့် ဗန်းများကို အသုံးပြုရမည် ဖြစ်ပါသည်။	မပြောပလောက်သော	မပြောပလောက်သော	အခန်း (၆.၅.၁)

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	EMP ၏ လျော့ချရေးအစီအမံများ အကျဉ်း	**သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည်ဖော် မဆောင်ရွက်မီ)	**ကြွင်းကျန် သက်ရောက်မှု၏ အရေးပါမှု** (နောက်ထပ် လျော့ချရေး နှင့် စီမံခန့်ခွဲရေး အစီအမံများ အကောင်အထည် ဖော် ဆောင်ရွက်ပြီးနောက်)	နောက်ထပ်အသေးစိတ် နှင့် အချက်အလက်များအတွက် **EIA အခန်း အကိုးအ ကားများ**
	■ အန္တရာယ်ရှိသောပစ္စည်းသိုလှောင်မှုအဆောက်အအုံနေရာကို အကြီးဆုံးတိုင်ကီ တစ်လုံး ထုထည် ၁၁၀% အတွက် လုံလောက်သောဆန့်ဝင်မှုရှိ တာဆည်ထားသော ခိုင်သည့်အခင်းစင်ပေါ်တွင် တည်ဆောက်သင့်ပါသည်။ ဤတာဆည်ထားသည် နယ်မြေ ဧရိယာမှ စွန့်ထုတ်ရည်များသည် ဆီ-ရေ ခွဲခြားသည့်ကိရိယာ မှတစ်ဆင့် ဖြတ်စီးသင့်ပါသည်။ ■ ယိုဖိတ်မှုတုံ့ပြန်ရေးအစီအစဉ်ကို ရေးဆွဲအကောင်အထည်ဖော် သင့်သည်။ ■ အန္တရာယ်ရှိသော ပစ္စည်းသိုလှောင်မှုအဆောက်အအုံနေရာမှ စွန့်ထုတ်မှုများသည် လုပ်ငန်းခွင်အတွင်း စီးကျမှု နှင့် စွန့်ပစ်ရေ စွန့်ထုတ်မှုများ (TSS၊ ဆီ နှင့် အဆီ၊ pH) အတွက် မြန်မာနိုင်ငံ NEQ နှင့်အညီဖြစ်စေရန်အတွက် လစဉ် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးသင့်ပါသည်။			

ဇယား (၁.၉) စီမံကိန်းအတွက် စောင့်ကြည့်ကြည့်ရှုစစ်ဆေးရေး အစီအစဉ်

စီမံကိန်း လုပ်ငန်း/ ပတ်ဝန်းကျင်ကဏ္ဍ	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအမံများ	ကြိမ်နှုန်း
တည်ဆောက်ရေးကာလအဆင့်		
အထွေထွေ	ဆောင်ရွက်နေသောလုပ်ငန်းနေရာများအားလုံးကို မြင်ကွင်းအနေအထားဖြင့် စစ်ဆေးခြင်း နှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင် တင်ပြထားသည့် လျှော့ချရေး အစီအမံများနှင့် ယေဘုယျ လေးစားလိုက်နာမှုကို စစ်ဆေးရန် မှတ်တမ်းများ နှင့် ပတ်သက်၍ စစ်ဆေးခြင်း။	အပတ်စဉ်
ဆူညံသံ	ဆူညံသံနှင့်ပတ်သက်၍ မြန်မာ အမျိုးသားပတ်ဝန်းကျင် အရည်အသွေးဌ ပြဋ္ဌာန်းထားသော ဆူညံသံအဆင့်နှင့်ပတ်သက်၍ လေးစားလိုက်နာမှုကို စစ်ဆေးခြင်း။ ပါရာမီတာတွင် တစ်နာရီ LAeq (dBA) ကို ထည့်သွင်းသွားမည် ဖြစ်ပါသည်။	ဇူလိုင်လမှ အောက်တိုဘာလအထိ စီမံကိန်းလုပ်ငန်းခွင်အတွင်း ဘုန်းကြီးကျောင်းနှင့် ၃၀၀ မီတာအကွာဌ အလုပ်များကို ဆောင်ရွက်ရလျှင် အပတ်စဉ် ပြုလုပ်ခြင်း။
မြေပေါ်ရေ အရည်အသွေး	လုပ်ငန်းနေရာမှ စီးကျရေ နှင့် စွန့်ပစ်ရေစွန့်ထုတ်မှုများနှင့် ပတ်သက်၍ တည်ဆောက်ရေး လုပ်ငန်းများမှ သန့်စင်ထားသော စွန့်ပစ်ရေတို့ကို အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှုများ) လမ်းညွှန်များကို လေးစားလိုက်နာရေးအတွက် လစဉ် စောင့်ကြပ် ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။ ပါရာမီတာများတွင် အောက်ပါတို့ ပါဝင်သွားမည်ဖြစ်ပါသည် - ■ ဇီဝအောက်ဆီဂျင်ပါဝင်မှု - 30 mg/l ■ ဓာတုအောက်ဆီဂျင်ပါဝင်မှု - 125 mg/l ■ ဆီ နှင့် အဆီ - 10 mg/l ■ pH - 6-9 (စံယူနစ်များ) ■ ကဲတီးရီးယားပါဝင်မှု - 400 ml ■ နိုက်ထရိုဂျင်ပါဝင်မှု - 10 mg/l ■ ဖော့စဖရတ်ပါဝင်မှု - 2 mg/l ■ အစဉ်အခဲပါဝင်မှု - 50 mg/l	သန့်စင်ထားသော စွန့်ပစ်ရေကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။
စွန့်ပစ်ပစ္စည်း	HSE အဖွဲ့သည် စွန့်ပစ်ပစ္စည်းထွက်ရှိမှု နှင့် စွန့်ထုတ်မှုတို့နှင့် ပတ်သက်၍ MONREC သို့ လစဉ် အစီရင်ခံတင်ပြသွားမည် ဖြစ်ပါသည်။	စွန့်ပစ်ပစ္စည်းကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။
ဇီဝမျိုးစုံမျိုးကွဲ	■ ဒေသရင်း သက်ရှိသတ္တဝါများ/အပင်များနှင့်ပတ်သက်၍ သိမြင်မှုအတွက် အလုပ်သမားများကို လေ့ကျင့်သင်ကြားမှု အစီအစဉ်ကို အကောင်အထည်ဖော်ဆောင် ရွက်ရန်	သုံးလတစ်ကြိမ်

စီမံကိန်း လုပ်ငန်း/ ပတ်ဝန်းကျင်ကဏ္ဍ	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအမံများ	ကြိမ်နှုန်း
	အတွက် မှတ်တမ်းများကို သိမ်းထားရန် နှင့် ပုံမှန် ပြန်လည် သုံးသပ်ရန်ဖြစ်သည်။ ■ အခွင့်မရှိဘဲခိုးယူသည့် ဒေသရင်းအပင်များ/ သက်ရှိ သတ္တဝါများအတွက် ဆောင်ရွက်ထားသည့် ကျပန်းစစ်ဆေးမှု များ အားလုံး၏ ရလဒ်များအပါအဝင်၊ စစ်ဆေးရေးဂိတ်များမှတစ်ဆင့် စီမံကိန်းအဆောက်အအုံနေရာများသို့ အမှုထမ်းများအားလုံး၏ ဝင်ထွက်သွားလာမှုဆိုင်ရာ မှတ်တမ်းများကို သိမ်းထားရန် နှင့် ပုံမှန်ပြန်လည်သုံးသပ်ရန် ဖြစ်ပါသည်။	
ဇီဝမျိုးစုံမျိုးကွဲ	■ ပြင်ပမျိုးစိတ်များထိုးဖောက်ဝင်ရာမှုကို ဖော်ထုတ်သတ်မှတ်ရန် နှင့် တိုက်ထုတ်ရန် တည်ဆောက်ရေးကာလ အတွင်း လစဉ်အနေအထားဖြင့် စီမံကိန်းအဆောက်အအုံ နေရာများကို စစ်ဆေးခြင်း။	လစဉ်
ဇီဝမျိုးစုံမျိုးကွဲ	■ စီမံကိန်းလုပ်ငန်းခွင်၌ သေစေလောက်သော တိုက်မိမှုဖြစ်ရပ်များအားလုံး နှင့် ဖြစ်ပျက်ပုံတို့အားလုံးကို မှတ်တမ်းရေးသွင်းမှတ်ယူထားမည် ဖြစ်ပါသည်။	ဖြစ်ပေါ်သည့်အခါ
လည်ပတ်ရေးကာလအဆင့်		
မြေပေါ်ရေ အရည်အသွေး	လုပ်ငန်းနေရာမှ စီးကျရေ နှင့် စွန့်ပစ်ရေစွန့်ထုတ်မှုများနှင့် ပတ်သက်၍ လည်ပတ်ရေးအဆောက်အအုံနေရာများမှ သန့်စင်ထားသော စွန့်ပစ်ရေတို့ကို အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ် လွှတ်မှုများ) လမ်းညွှန်များကို လေးစားလိုက်နာရေးအတွက် လစဉ် စောင့်ကြပ် ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။ ပါရာမီတာများတွင် အောက်ပါတို့ ပါဝင်သွားမည်ဖြစ်ပါသည် - ■ ဇီဝအောက်ဆီဂျင်ပါဝင်မှု - 30 mg/l ■ ဓာတုအောက်ဆီဂျင်ပါဝင်မှု - 125 mg/l ■ ဆီ နှင့် အဆီ - 10 mg/l ■ pH - 6-9 (စံယူနစ်များ) ■ ဂ်တီးရီးယားပါဝင်မှု - 400 ml ■ နိုက်ထရိုဂျင်ပါဝင်မှု - 10 mg/l ■ ဖော့စဖရတ်ပါဝင်မှု - 2 mg/l ■ အစဉ်အခဲပါဝင်မှု - 50 mg/l	သန့်စင်ထားသည့် စွန့်ပစ်ရေကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။
ဇီဝမျိုးစုံမျိုးကွဲ	■ ဒေသရင်း သက်ရှိသတ္တဝါများ/အပင်များနှင့်ပတ်သက်၍ သိမြင်မှုအတွက် အလုပ်သမားများကို လေ့ကျင့်သင်ကြားမှု	သုံးလတစ်ကြိမ်

စီမံကိန်း လုပ်ငန်း/ ပတ်ဝန်းကျင်ကဏ္ဍ	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအမံများ	ကြိမ်နှုန်း
	အစီအစဉ်ကို အကောင်အထည်ဖော်ဆောင်ရွက်ရန် အတွက် မှတ်တမ်းများကို သိမ်းထားရန် နှင့် ပုံမှန် ပြန်လည် သုံးသပ်ရန်ဖြစ်သည်။ ■ အခွင့်မရှိဘဲခိုးယူသည့် ဒေသရင်းအပင်များ/ သက်ရှိ သတ္တဝါများအတွက် ဆောင်ရွက်ထားသည့် ကျပန်းစစ်ဆေးမှု များ အားလုံး၏ ရလဒ်များအပါအဝင်၊ စစ်ဆေးရေး ဂိတ်များမှတစ်ဆင့် စီမံကိန်းအဆောက်အအုံနေရာများသို့ အမှုထမ်းများအားလုံး၏ ဝင်ထွက်သွားလာမှုဆိုင်ရာ မှတ်တမ်းများကို သိမ်းထားရန် နှင့် ပုံမှန်ပြန်လည်သုံးသပ်ရန် ဖြစ်ပါသည်။	
ဇီဝမျိုးစုံမျိုးကွဲ	■ ပြင်ပမျိုးစိတ်များထိုးဖောက်ဝင်ရောက်မှုကို ဖော်ထုတ်သတ်မှတ်ရန် နှင့် တိုက်ထုတ်ရန် လည်ပတ်ရေးကာလ အတွင်း လစဉ်အနေအထားဖြင့် စီမံကိန်းအဆောက်အအုံ နေရာများကို စစ်ဆေးခြင်း။	နှစ်စဉ်
ဇီဝမျိုးစုံမျိုးကွဲ	■ စီမံကိန်းလုပ်ငန်းခွင်၌ သေစေလောက်သော တိုက်မိမှုဖြစ်ရပ် များအားလုံး နှင့် ဖြစ်ပျက်ပုံတို့အားလုံးကို မှတ်တမ်းရေး သွင်းမှတ်ယူထားမည် ဖြစ်ပါသည်။	ဖြစ်ပေါ်သည့်အခါ
လင်းနို့များ နှင့် ငှက်များ	■ တိရိစ္ဆာန်အသေကောင်များ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုကို တာဘိုင်များအားလုံး၏ အောက်ခြေ၌ အပတ်စဉ် ဆောင်ရွက်ရန် ဖြစ်ပါသည်။ တိရိစ္ဆာန်အသေကောင်များအားလုံးကို ဖော်ထုတ်သတ်မှတ်ပြီး၊ မျိုးစိတ်များ၏ အရေအတွက် နှင့် အမျိုးခွဲမှုတို့ကို အချက်အလက်ဖြင့်သိမ်းထားရန် ဖြစ်ပါသည်။ တိရိစ္ဆာန်အသေကောင်များ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုမှ စုဆောင်းထားသော အချက်အလက်များပြန်လည်သုံးသပ်မှုကို သင့်လျော်၍ အရည်အချင်းရှိသောသူတစ်ဦးမှ ဘေးအန္တရာယ်ဆိုက်ရောက်မှုဖြစ်စေသည့် မျိုးစိတ်များကို ဖော်ထုတ်သတ်မှတ်ရန် (၂) နှစ်တာ ကာလအတွက် (၆) လတိုင်းတွင် ပြုလုပ်ဆောင်ရွက်မည်။ ■ အကယ်၍ အရေးပါသော အန္တရာယ်ဆိုက်ရောက်မှု အရေအတွက်ကို အကဲခတ် လေ့လာတွေ့ရှိရလျှင်၊ နောက် ထပ် ငှက် နှင့် လင်းနို့ စစ်တမ်းကို ဆောင်ရွက် သင့်သည်။ လေအားလျှပ်စစ်တာဘိုင်ဆောင်ရွက်သောနေရာလည်ပတ်မှုများသည် တွေ့ရှိမှုဖြစ်ပေါ်နိုင်သော ဖော်ထုတ်သတ်မှတ် သည့် မျိုးစိတ်များ၏ ဘဝစက်ဝန်းလက္ခဏာများ အပေါ် အခြေခံ၍ ပြောင်းလဲနိုင်ပါသည်။	တိရိစ္ဆာန်အသေကောင်များ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ် အတွက် အပတ်စဉ်ဆောင်ရွက်ခြင်း တိရိစ္ဆာန်အသေကောင်များ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှု အစီအစဉ်မှ သုံးသပ်ချက်အရ လိုအပ်သောအခါ၊ နောက်ထပ် ငှက် သို့ လင်းနို့စစ်တမ်းများကို ဆောင်ရွက်ခြင်း

စီမံကိန်း လုပ်ငန်း/ ပတ်ဝန်းကျင်ကဏ္ဍ	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း အစီအမံများ	ကြိမ်နှုန်း
အရိပ်တဖျပ်ဖျပ် လှုပ်ခြင်း (Shadow Flicker)	■ အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းမှ မျှော်မှန်းထားသောသက်ရောက်မှုများ ရှိနိုင်သည့် လည်ပတ်ရေးကာလအတွင်း ရပ်သူရွာသားများနှင့် ထိတွေ့တိုင်ပင်လျက် အရိပ်တဖျပ်ဖျပ်လှုပ်ခြင်းကို စောင့်ကြပ်ကြည့် ရှု စစ်ဆေးခြင်း။	သုံးလတစ်ကြိမ်
တာဘိုင်များမှ လည်ပတ်ရေးဆိုင်ရာ ဆူညံသံ	■ ဆူညံသံအတွက် မြန်မာနိုင်ငံ အမျိုးအသား ပတ်ဝန်းကျင် အရည်အသွေးတွင် ပြဋ္ဌာန်းထားသော ဆူညံသံအဆင့်နှင့် ကိုက်ညီမှုရှိ မရှိ စစ်ဆေးခြင်း။ ■ ပါရာမီတာတွင် တစ်နာရီရှိ LAeq (dBA) ကို ထည့်သွင်းသွားမည် ဖြစ်ပါသည်။	စက်စက်ယိုကျေးရွာ နှင့် လေအားလျှပ်စစ်တာဘိုင် ဆောင်ရွက်ထားသော နေရာ (ပုံ ၅.၃) အတွင်းရှိ ဘုန်းကြီးကျောင်း တို့တွင် လစဉ်စစ်ဆေးခြင်း

၁.၈ အများပြည်သူ နှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် ထုတ်ဖော်တင်ပြခြင်း

ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်းကာလအတွင်း၊ သက်ဆိုင်သူများနှင့်ချိတ်ဆက်တိုင်ပင်ဆွေးနွေးကို စီမံကိန်းနှင့်ပတ်သက်ဆက်နွယ်သူများနှင့် ဆောင်ရွက်ခဲ့ပါသည်။ ဤအစည်းအဝေးများသည် စီမံကိန်းနှင့်ပတ်သက်၍ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာတွင် သက်ရောက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ အချက်အလက်ကွာဟချက်များကိုဖြည့်ရန် သတင်းအချက်အလက်များကို စုဆောင်းရာတွင် အထောက်အကူပြုပါသည်။ တိုင်ပင်ဆွေးနွေးမှုတွင် မကွေးတိုင်းဒေသကြီးအဆင့် ဝန်ကြီးချုပ် နှင့် အခြား တိုင်းဒေသကြီးအဆင့် အစိုးရ (တိုင်းဒေသကြီးအဆင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မြို့နယ် သစ်တော ဦးစီးဌာန၊ နှင့် တိုင်းဒေသကြီး အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန တို့ ကဲ့သို့သော) မြို့နယ်အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန၊ ကျေးရွာအုပ်စု ခေါင်းဆောင် နှင့် ဒေသခံရပ်ရွာလူထုတို့အပါအဝင် သက်ဆိုင်သူ အမျိုးမျိုးတို့နှင့် နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်းဆိုင်ရာ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ ကာလတို့တွင် အစည်းအဝေးများ ပြုလုပ်ခဲ့ပါသည်။ အစည်းအဝေးတစ်ခုချင်း၏ နေ့စွဲ၊ အချိန်၊ နေရာ၊ သက်ဆိုင်သူ နှင့် ရည်ရွယ်ချက်တို့ကို ဇယား (၁.၁၀) နှင့် ဇယား (၁.၁၁) တို့တွင် တင်ပြထားပါသည်။

ဇယား (၁.၁၀) နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းကာလတွင် ဆောင်ရွက်ခဲ့သည့် တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ

နေ့စွဲ၊ အချိန် နှင့် နေရာ	သက်ဆိုင်သူ	ချိတ်ဆက်တိုင်ပင်ဆွေးနွေးမှု၏ ရည်ရွယ်ချက်
ဤစီမံကိန်းအတွက် နယ်ပယ်အတိုင်းအတာသတ်မှတ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးခြင်း (EIA လေ့လာမှု)		
၂၀၁၈ ဇူလိုင်လ ၁၀ ရက်	မကွေး တိုင်းဒေသကြီး ဝန်ကြီးချုပ်	■ စီမံကိန်းသတင်းအချက်အလက် တင်ပြခြင်း ■ မြို့နယ် / ကျေးရွာ အဆင့် အစည်းအဝေးများအတွက် ခွင့်ပြုချက် ရယူခြင်း ■ သက်ဆိုင်သူများထံမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူခြင်း
၂၀၁၈ ဇူလိုင်လ ၁၁ ရက်	မင်းလှ အထွေထွေ အုပ်ချုပ်ရေး ဦးစီးဌာနရုံး	■ ကျေးရွာအစည်းအဝေးများ နှင့် ခွင့်ပြုချက်များကို အစီအစဉ်ချခြင်း
၂၀၁၈ ဇူလိုင်လ ၁၃ ရက်	မင်းလှ အထွေထွေ အုပ်ချုပ်ရေး ဦးစီးဌာန နှင့် ရေငံကျေးရွာ	■ တိုင်းဒေသကြီး အစိုးရ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြား စိတ်ဝင် စားသော အုပ်စုများထံသို့ စီမံကိန်း သတင်းအချက်အ လက်များ ကို တင်ပြခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း ■ လေ့လာမှုနယ်မြေဧရိယာတွင် ထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေ ဧရိယာများ နှင့် သစ်တောများနှင့်ပတ်သက်၍ သတင်း အချက်အလက် များ ရယူခြင်း ■ သက်ဆိုင်သူများ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင် စားသူအုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း
၂၀၁၈ ဇူလိုင်လ ၁၄ ရက်	ရေနံမ နှင့် စက်စက်ယို ကျေးရွာ	■ ဒေသ အစိုးရ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြား စိတ်ဝင် စားသော အုပ်စုများထံသို့ စီမံကိန်း သတင်းအချက်အ လက်များ ကို တင်ပြခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း ■ သက်ဆိုင်သူများထံမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူခြင်း

ဇယား (၁.၁၁) ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းကာလတွင် ဆောင်ရွက်ခဲ့သည့် တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများ

နေ့စွဲ၊ အချိန် နှင့် နေရာ	သက်ဆိုင်သူ	ချိတ်ဆက်တိုင်ပင်ဆွေးနွေးမှု၏ ရည်ရွယ်ချက်
ဤစီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးခြင်း		
၂၀၁၈ နိုဝင်ဘာလ ၆ ရက်	ရေငံကျေးရွာ	■ စီမံကိန်းသတင်းအချက်အလက်များ တင်ပြခြင်း၊ သက်ဆိုင်သူများ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင် စားသူ အုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း
၂၀၁၈ နိုဝင်ဘာလ ၆ ရက်	စက်စက်ယိုကျေးရွာ	■ စီမံကိန်းသတင်းအချက်အလက်များ တင်ပြခြင်း၊ သက်ဆိုင်သူများ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင်စားသူအုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း
၂၀၁၈ နိုဝင်ဘာလ ၈ ရက်	ရေနံမကျေးရွာ	■ စီမံကိန်းသတင်းအချက်အလက်များ တင်ပြခြင်း၊ သက်ဆိုင်သူများ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင်စားသူ အုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း
၂၀၁၈ နိုဝင်ဘာလ ၉ ရက်	မင်းလှ အထွေထွေ အုပ်ချုပ်ရေး ဦးစီးဌာန	■ တိုင်ဒေသကြီး အစိုးရ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင် စားသူ အုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း ■ လူမှုဆိုင်ရာ အခြေခံအချက်အလက်များ ကောက်ယူမှု ဆောင်ရွက်ခြင်း ■ လေ့လာမှုနယ်မြေဧရိယာတွင် ထိန်းသိမ်းကာကွယ်ထားသော နယ်မြေဧရိယာများ နှင့် သစ်တောများနှင့်ပတ်သက်၍ သတင်းအချက်အလက်များ ရယူခြင်း ■ သက်ဆိုင်သူများ၊ ကျေးရွာအုပ်စုခေါင်းဆောင်များ နှင့် အခြားစိတ်ဝင် စားသူ အုပ်စုများမှ စိုးရိမ်မှုများ နှင့် အကြံဉာဏ်များ ကောက်ယူစု ဆောင်းခြင်း

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှုကာလအတွင်း အဓိကမေးခွန်းများကို ဇယား ၁.၁၂ တွင် ထည့်သွင်းထားပါသည်။

ဇယား (၁.၁၂) နယ်ပယ်အတိုင်းအတာ သတ်မှတ်ခြင်း နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ တိုင်ပင်ဆွေးနွေးမှုကာလတွင် မေးမြန်းခဲ့ကြသည့် အဓိကအရေးကြီးသော မေးခွန်းများ

မေးခွန်း	တုံ့ပြန်အဖြေများ	EIA တွင် ထည့်သွင်းစဉ်းစားမှု
ပတ်ဝန်းကျင်နှင့်စပ်လျဉ်း၍		
အန္တရာယ်ရှိသော အငွေ့များသည် လေထုပေါ် ညစ်ညမ်းစေနိုင်သဖြင့် ဤဒေသ၏ ဆူညံသံ နှင့် လေထုအရည် အသွေးအပေါ် ဆန်းစစ်ခြင်းပြုလုပ်ရန် အရေးကြီးပါသည်။	လည်ပတ်ရေးကာလအတွင်း လေအားလျှပ်စစ်တာဘိုင်မှ ထုတ်လွှတ်အခိုးအငွေ့ ရှိမည် မဟုတ်ပါ။ လေအားလျှပ်စစ်စီမံကိန်းဖြစ်သဖြင့်၊ အစီအစဉ်မှာ မြေရယူမှု နှင့် ဧဝမျိုးစုံမျိုးကွဲ အထူးသဖြင့် ငှက်များနှင့် ပတ်သက်သော သက်ရောက်မှုများအပေါ် အဓိက အလေးပေးရန် ဖြစ်ပါသည်။	ဆူညံသံအပေါ် သက်ရောက်မှု ဆန်းစစ်ခြင်းကို အဆိုပြုလျှောချရေး အစီအမံများဖြင့် EIA တွင် လိုအပ်သလို ထည့်သွင်းသွားမည် ဖြစ်သည်။
မြေယာလျော်ကြေးပေးခြင်းနှင့်စပ်လျဉ်း၍		
ပလပ်ထားသောမြေယာများ၏ ပိုင်ရှင်များအတွက် အခွင့်အလမ်းများ နှင့် လျော်ကြေးတို့ကို ကျေးရွာသူ/သားများ သိလိုကြပါသည်။	ကုမ္ပဏီသည် လက်ရှိ၌ လယ်မြေများအပါအဝင် မြေယာဆိုင်ရာ သတ်မှတ်ချက်များကို အစိုးရနှင့် ပူးပေါင်း၍ ဆန်းစစ်လျက်ရှိပါသည်။ IMWP သည် စီမံကိန်းအတွက် မြေများ ရယူရန် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ နှင့် ဒေသ ကြီးကြပ်ရေးဆိုင်ရာ သတ်မှတ်ချက်များကို လိုက်နာဆောင်ရွက်မည် ဖြစ်ပါသည်။	မြေယာရယူမှုနှင့်ပတ်သက်သော သက်ရောက်မှုများကို အဆိုပြု လျှော့ချရေး ဆိုင်ရာ အစီအမံများဖြင့် EIA တွင် လိုအပ်သလို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။
သက်ရောက်မှုများ နှင့် ဖြစ်ရပ်များနှင့် စပ်လျဉ်း၍		
တာဝါတိုင်များသည် မြင့်မားသဖြင့်၊ တာဝါတိုင်များ ကျိုးပဲ့မှု ဖြစ်နိုင်ပြီး၊ လူများ နှင့် သူတို့၏ ခြံမွေးတိရစ္ဆာန်များအပေါ် ထိခိုက်မှုရှိနိုင်သည်။	ကုမ္ပဏီသည် တာဝါတိုင်မှ ဖြစ်ပေါ်မည့် ပျက်စီးမှုများကို ဆောင်ရွက်ပေးနိုင်မည့် သင့်လျော်သော အာမခံရှိသွားမည် ဖြစ်ပါသည်။	တာဘိုင်ဒလက်လွှင့်စဉ်မှုနှင့် ပတ်သက်သည်ကို ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း အစီရင်ခံစာ တွင် ထည့်သွင်းစဉ်းစားမည်ဖြစ်ပါသည်။
သောက်ရေကန် နှင့် စမ်းချောင်းတို့သို့ ယိုစီးမှုများ ရှိနိုင်ပါသလား။ ရွှေပြောင်းတောင်ယာ လယ်မြေများနှင့် ပတ်သက်၍ လူတိုင်းတွင် ဥပဒေဆိုင်ရာ စာရွက်စာတမ်းများမရှိသဖြင့်၊ လျော်ကြေးသည် စာရွက်စာတမ်းများရှိသည် လယ်မြေအတွက်သာ ဆောင်ရွက်ပေးမည်လား။	IMWP သည် စီမံကိန်းအတွက် မြေယာများ ရယူရန် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ နှင့် ဒေသ ကြီးကြပ်ရေးဆိုင်ရာ သတ်မှတ်ချက်များကို လိုက်နာ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ယိုဖိတ်မှုကို တားဆီးကာကွယ်ရန် စက်ပစ္စည်းများကို ပုံမှန်စစ်ဆေးသွားမည် ဖြစ်ပါသည်။	မြေယာရယူမှုနှင့် ယိုဖိတ်မှုတို့နှင့် ပတ် သက်သော သက်ရောက်မှု ကို အဆိုပြု လျှော့ချရေး အစီအမံ များဖြင့် EIA တွင် သင့်လျော်သလို ဆန်းစစ် သွားမည် ဖြစ်ပါသည်။
လေအားလျှပ်စစ်တာဘိုင်များမှ လယ်မြေများ နှင့် သီးနှံများအပေါ် ပျက်စီးစေပါသလား။	စီမံကိန်းကြောင့်ဖြစ်ပေါ်သည့် မည်သည့် ပျက်စီးမှုများ ဖြစ်ဖြစ်ရှိလျှင်၊ သက်ဆိုင်သောသူသည် IMWP ကို	မြေယာရယူမှုနှင့် ပတ်သက်သော သက်ရောက်မှု ကို အဆိုပြု လျှော့ချရေး

မေးခွန်း	တုံ့ပြန်အဖြေများ	EIA တွင် ထည့်သွင်းစဉ်းစားမှု
	သတင်းပေးအကြောင်းကြားနိုင်ပြီး၊ IMWP က ၎င်းကို စနစ်တကျ တုံ့ပြန်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ IMWP သည် စီမံကိန်းအတွက် မြေယာများ ရယူရန် နိုင်ငံတကာ စံသတ်မှတ်ချက်များ နှင့် ဒေသ ကြီးကြပ်ရေးဆိုင်ရာ သတ်မှတ်ချက်များကို လိုက်နာ ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။	အစီအမံများဖြင့် EIA တွင် သင့်လျော်သလို ဆန်းစစ်သွားမည် ဖြစ်ပါသည်။ မကျေနပ်ချက်များ တိုင်ကြားခြင်းဆိုင်ရာ ယန္တရားစနစ်ကို ဒေသခံ ရပ်ရွာလူထုက အသုံးပြုရန် ရေးဆွဲသွားမည် ဖြစ်ပါသည်။
လျှပ်စစ်ဓာတ်အားနှင့်စပ်လျဉ်း၍		
လျှပ်စစ်ဓာတ်အားခမှာ မည်မျှရှိမည်နည်း။	စီမံကိန်းကို အမျိုးသား မဟာဓာတ်အား လိုင်းဖြင့် ချိတ်ဆက်မည် ဖြစ်ပါသည်။ လက်ရှိ ရှိနေသော ကြီးကြပ်မှုအရ၊ ကုမ္ပဏီအနေဖြင့် နောက်ဆုံးလျှပ်စစ်အသုံးပြုသူများ ထံသို့ တိုက်ရိုက် ရောင်းချခွင့် မရှိပါ။	မလိုအပ်ပါ

အနာဂတ်ချိတ်ဆက်တိုင်ပင်ဆွေးနွေးမှုလုပ်ငန်းများတွင် အောက်ပါတို့ ပါဝင်သွားမည် ဖြစ်ပါသည် -

- သဘောထားမှတ်ချက်များပေးနိုင်မည့် အခွင့်အလမ်းများအပါအဝင် စီမံကိန်းဆိုင်ရာ သတင်းအချက်အလက်များ နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း အစီရင်ခံစာနှင့်ပတ်သက်၍ နောက်ထပ် ဖော်ထုတ်တင်ပြခြင်း၊
- ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း၏ ရလဒ်များနှင့်ပတ်သက်၍ သက်ဆိုင်ရာ တိုင်းဒေသကြီးအဆင့် အရာရှိများ/အာဏာပိုင်အဖွဲ့အစည်းများ နှင့် အစိုးရအဖွဲ့အစည်းများနှင့် ချိတ်ဆက်တိုင်ပင် ဆွေးနွေးခြင်း၊ နှင့်
- လည်ပတ်ရေးကာလအတွင်း စိတ်ဝင်စားသူများ နှင့် ဖြစ်ပေါ်လာနိုင်သည့် ထိခိုက်ခံစာရသူများနှင့် ဆက်လက်၍ ဆက်သွယ်ဆောင်ရွက်ခြင်းမှုများ။ ဒေသခံ ရပ်ရွာလူထုအပေါ် သက်ရောက်မှုများနှင့်ပတ်သက်၍၊ ဒေသခံနယ်မြေဧရိယာများသို့ စီမံကိန်းအချက်အလက်များကို ဆက်လက် ဆောင်ရွက်ပေးသွားမည် ဖြစ်ပါသည်။

ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း နှင့် နိုင်ငံတကာ အလေ့အကျင့်ကောင်းတို့ကို လိုက်နာ၍ လိုအပ်သည့်အဆင့်များနှင့်အညီ မကျေနပ်ချက်များတိုင်ကြားခြင်းဆိုင်ရာယန္တရားစနစ်ကို ထားရှိသွားမည် ဖြစ်ပါသည်။

လည်ပတ်ရေးကာလအတွင်း၊ အရေးပါသောကိစ္စရပ်များ၊ စိုးရိမ်မှုများ သို့မဟုတ် သက်ရောက်မှုများကို ဖော်ထုတ်သတ်မှတ်မိလျှင်၊ သက်ဆိုင်ရာ နှင့် စိတ်ဝင်စားသူများ သို့မဟုတ် သက်ဆိုင်သူများနှင့် နောက်ထပ် တိုင်ပင် ဆွေးနွေး မှုကို ပြုလုပ်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

2. INTRODUCTION

InfraCo Myanmar Wind Power Co. Limited ("IMWP") is undertaking a feasibility study to ascertain the viability of a wind power project in Magway Region, Myanmar. The proposed Wind Power Project, which is located near Kandok, includes 25 wind turbines with a capacity of up to 113 MW (hereafter referred to as "the Project" or "the Kandok Windfarm Project").

Pursuant to Section 7 of the Environmental Conservation Law and Articles 52 and 53 of the Environmental Conservation Rules of the Republic of the Union of Myanmar, all Projects undertaken in Myanmar which have the potential to cause significant environmental and social impacts are required to undertake an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) and to obtain an Environmental Compliance Certificate (ECC) in accordance with the EIA Procedure.

This Project submitted a Project Proposal Report (PPR) to the Environmental Conservation Department (ECD) of Ministry of Environmental Conservation and Natural Resources (MONREC) on 29 March 2018. The ECD responded on 12 July 2018 that the Kandok Windfarm Project falls under the EIA Type [(1)]. Environmental Resources Management (ERM)-Hong Kong, Limited (ERM) has been commissioned by IMWP to undertake the EIA Process.

On 8 January 2019, a revised Scoping Report with the Terms of Reference (ToR) of the EIA Study for the Project was submitted to ECD for approval. The ECD approved the Scoping Report and the ToR on 30 April 2019.

This document is the Environmental Impact Assessment (EIA) Report for the Kandok Windfarm Project and is submitted to the ECD of the MONREC in order to fulfil Myanmar permitting requirements.

2.1 Presentation of the Project Proponent

Contact details for the Project Proponent, IMWP, are provided below:

Contact Person: Hillary Strasser, Environment & Compliance Manager

Address: 62B, Kanyeikthar Lane, (10) Quarter, Mayangone Township, Yangon, Myanmar, 11062

Telephone: +95 9 781240240, + 66 96 701 3997

E-mail: hillary@infracapmyanmar.com

Contact Person: Min Min Swe, Project Engineer

Address: 62B, Kanyeikthar Lane, (10) Quarter, Mayangone Township, Yangon, Myanmar, 11062

Telephone: +95 9 765225232

E-mail: minmin.swe@infracapmyanmar.com

2.2 Presentation of Environmental and Social Experts

Environmental Resources Management (ERM) – Hong Kong Limited are the environmental and social consultants that conducted this EIA Study and they are registered under the MONREC Consultant Registration Scheme. ERM are supported by local Myanmar consultants, Environmental Quality Management (EQM), to conduct the public consultation and socio-economic baseline surveys. Information on the experts is presented in *Table 2.1*.

([1]) The transmission line connecting the windfarm to the Mann (Minbu) Substation is subject to a separate Initial Environmental Examination (IEE) as per guidance from ECD received on 12 July 2018.

Table 2.1 Environmental and Social Consultants for the Project

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	MONREC Consultation Registration Scheme
Craig A. Reid	ERM	BSc (Hons) Marine Biology	21	Ecology and Biodiversity. Risk Management and Hazard Identification.	ERM (No. 0016)
Rebecca Summons	ERM	MSc Marine Environmental Protection	8	Ecology and Biodiversity. Risk Management and Hazard Identification.	ERM (No. 0016)
Myat Mon Swe	ERM	MSc Energy and Environmental Management	>10	Socio-economic. Facilitation of Meeting	ERM (No. 0016)
Khin Su Su Naing	ERM	MA International and Community Development	>10	Socio-economic. Facilitation of Meeting	ERM (No. 0016)
Thapye Myo	ERM	BSc Renewable Energy Engineering Diploma in Law	5	Legal Chapter	Applied for under ERM (No. 0016)
Adam Stickler	ERM	MSc Ecology	5	Ecology and Biodiversity	ERM (No. 0016)
Aung Myo Win	ERM	BA English	3	Socio-economic. Facilitation of Meeting	ERM (No. 0016)
Aye Mya Thinzar	ERM	BSc Forestry	3	Ecology and Biodiversity	ERM (No. 0016)
Tom Glenwright	ERM	PhD Marine Ecology	16	Water Pollution Control, Ground water and Hydrology	ERM (No. 0016)
Stuart Mackenzie	ERM	BSc Environmental Geography	10	Waste Management	ERM (No. 0016)
Piers Touzel	ERM	MA Business Administration	15	Socio-Economy, Land use	ERM (No. 0016)
Man Ping To (Mandy To)	ERM	MSc Environmental Management	20	Noise and Vibration	ERM (No. 0016)

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	MONREC Consultation Registration Scheme
Lay Win	Independent	BSc Ecology	>10	Bird Surveys. Ecotourism	Sub-consultant to ERM
Ohnmar Tin May (& team)	EQM	PhD Environmental Toxicology, Technology and Management	14	Public Consultation	EQM (No. 009)

3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section provides the relevant legal and policy context in Myanmar including the following:

- IMWP Environmental and Social Policies;
- Policy and Legal Framework; including:
  - Myanmar EIA legislation, other relevant Myanmar legislation; and
  - International conventions, standards and guidelines relevant to the Project.
- Institutional Framework; and
- Environmental, Social and/or Health standards related to the Project.

3.1 Corporate Environmental and Social Policies

IMWP is a wholly owned subsidiary of IAD and managed by ICM. ICM is a company whose mandate is to develop and finance infrastructure projects on behalf of IAD in Myanmar. IAD is a commercially-managed infrastructure, development, and investment company headquartered in Singapore but operating in over ten countries in Asia in order to help stimulate greater private sector investment into infrastructure projects. IAD is a company of the Private Infrastructure Development Group ("PIDG").

The Private Infrastructure Development Group, established in 2002, is a coalition of multi-lateral donors mobilizing private sector investment to assist developing countries in providing infrastructure vital to boosting their economic growth and combating poverty. The coalition of multi-lateral donors to PIDG include the following organizations: UKAid, the Ministry of Foreign Affairs of the Netherlands (DGIS), the State Secretariat for Economic Affairs (SECO), Australian Aid (DFAT), Sweden Sverige (SIDA), the Netherlands Development Finance Company (FMO), the German state-owned Kreditanstalt für Wiederaufbau (KfW), and the International Finance Corporation (IFC).

InfraCo Asia is funded by the governments of the United Kingdom, the Netherlands, Switzerland, and Australia. InfraCo Asia's programs in Myanmar is funded solely by the United Kingdom – UKAid, and is implemented by ICM.

The organization chart is shown in *Figure 3.1* below.

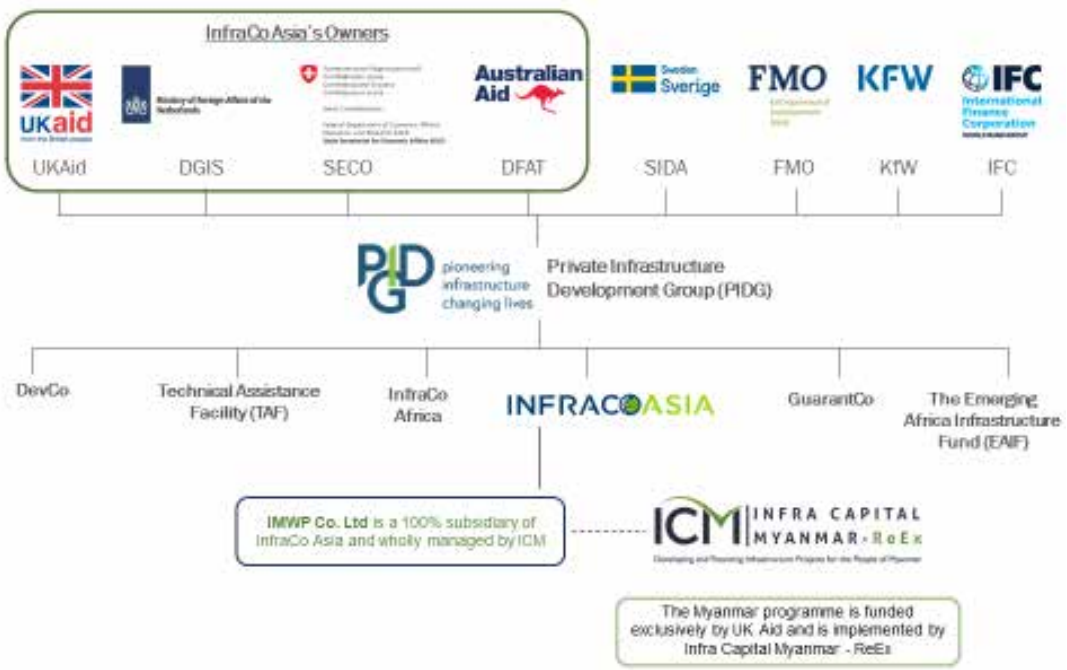


Figure 3.1 Organization Chart

Accordingly, IMWP adheres to International Finance Corporation Performance Standards (IFC PSs) as outlined in PIDG Environmental and Social Policies and Procedures. The IFC PSs are presented in *Section 3.2.4* below.

3.2 Policy and Legal Framework

3.2.1 Myanmar EIA Procedure

The Myanmar EIA Procedure (dated 29 December 2015) sets out the requirements for development, assessment, and subsequent monitoring of an Initial Environmental Examination (IEE), EIA and/or Environmental Management Plan (EMP). The requirements to conduct an IEE / EIA are outlined in the Environment Conservation Law (2012) and Environment Conservation Rules (2014). In Myanmar, matters pertaining to IEE / EIA are generally under the jurisdiction of the ministries and state-owned enterprises. Key ministries, agencies and state-owned enterprises that have jurisdiction over HSE matters in power projects are included in *Table 3.1.*

.

Table 3.1 Key Ministries, Agencies and State-Owned Enterprises Involved in IEE/EIA

Ministry/Agency	Responsibility
Ministry of Natural Resources and Environmental Conservation (MONREC)	The Environmental Conservation Department (ECD) of MONREC has ultimate responsibility in the review and approval, or otherwise, of submissions under the IEE/EIA process.
Ministry of Electricity and Energy (MOEE)	MOEE manages Health, Safety and Environmental (HSE) issues of power generation operators in Myanmar, encouraging operators to establish an HSE Management System and prepare their own IEE/EIA for their project.
Myanmar Investment Commission (MIC)	MIC is a government agency responsible for coordinating with ministries (such as the MOEE) and other state entities to facilitate foreign investment in Myanmar. The MIC is also responsible for granting MIC permits which enable foreign investors to carry out business activities under the Myanmar Investment Law (2016).

An EIA Process is being undertaken for the windfarm component of the Project which is shown in *Figure 3.2*. As required by the Ministry of Natural Resources and Environmental Conservation (MONREC), a separate IEE process is being undertaken for the transmission line component of the Project which is shown in *Figure 3.3.* The IEE Report for the transmission line and the EIA Report for the windfarm of the Project will be submitted to the MONREC, which has ultimate responsibility in the review and approval, or otherwise, of submissions under the IEE/EIA process, in order to obtain an Environmental Compliance Certificate (ECC) in accordance with the EIA Procedure.

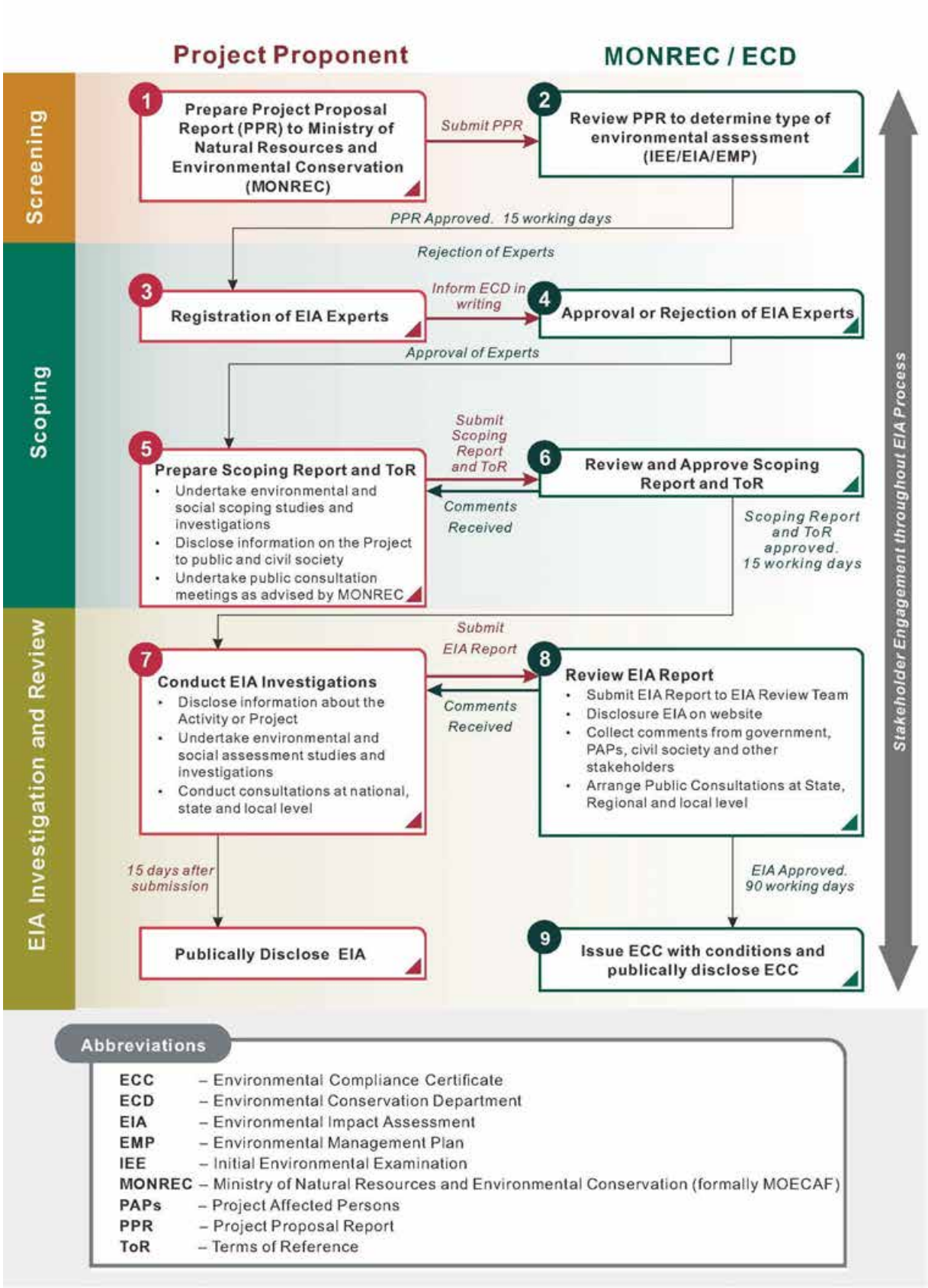


Figure 3.2 EIA Process in Myanmar

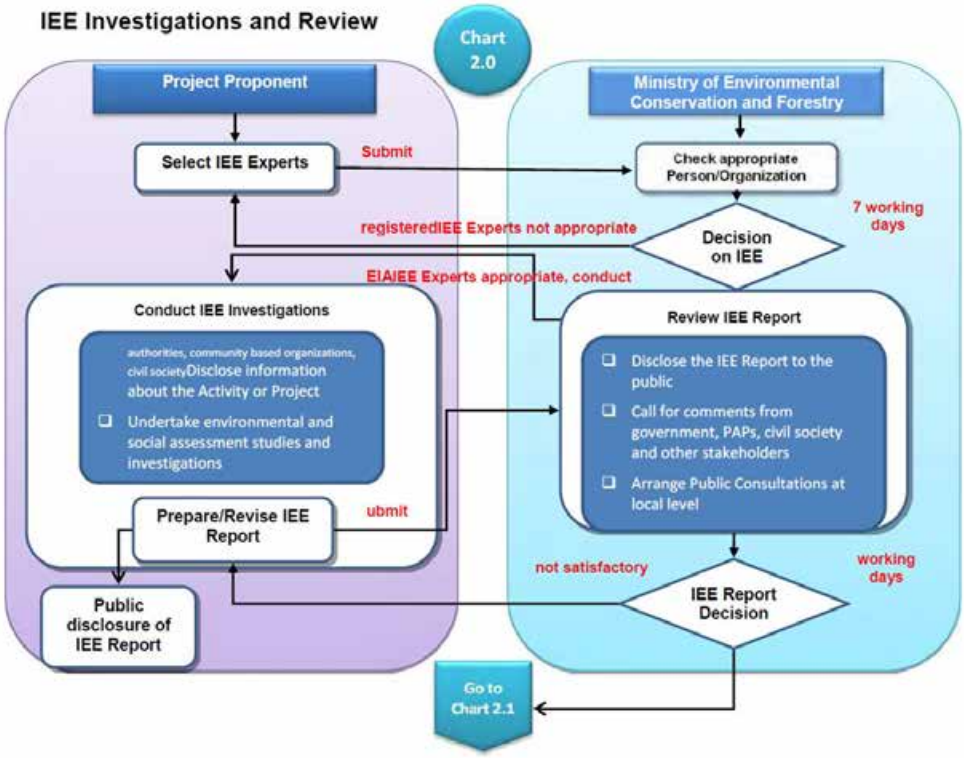


Figure 3.3 IEE Process in Myanmar

3.2.2 Myanmar Legislation Relevant to the Project

Laws relating to environmental and social issues of power project and hence their relevance to the EIA Study are included in *Table 3.2*

.

3.2.3 International Agreements and Conventions

Relevant international conventions to which Myanmar is a signatory include those related to waste management, biodiversity conservation and labour conventions. The key international conventions of relevance to the Project are included in *Table 3.3.*

Table 3.2 Myanmar Legislation Relating to the Project

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
The National Environment Policy, 2019		This new National Environmental Policy provides long-term, strategic guidance for achieving the sustainable future we want. It requires the mainstreaming of environmental protection into planning and decision-making at all levels of government and in all sectors. Its detailed principles respect livelihood needs and development objectives while at the same time recognizing the full value of our ecosystems and the implications of our changing climate. This Policy ensures that environmental protection continues to be a central objective in Myanmar's sustainable development without losing sight of the importance of a pragmatic approach based on an awareness of the constantly evolving world around us. This National Environmental Policy will serve as a guide in mapping out detailed action plans for environmental protection and sustainable development, and set the direction for the on-going implementation and enhancement of relevant laws and policies. The Project Proponent commits to comply and implement the project as per this policy requirement.
The Constitution of the Republic of the Union of Myanmar, 2008	Article 37 (a)(b) , 45, 390	The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. Project Proponent commits to comply as these three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment. There stipulates that: ■ The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces; ■ The Union shall protect and conserve natural environment. ■ Every citizen has the duty to assist the Union in carrying out the following matters: (a) preservation and safeguarding of cultural heritage; (b) environmental conservation;

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		(c) striving for development of human resources; (d) protection and preservation of public property.
Environmental Conservation Law (Pyidaungsu Hluttaw Law No.9/2012)	Clause 7(o), 14,15, 29	Project Proponent commits to comply as there prescribes ■ That the Ministry (MONREC) has the right to manage a proponent to provide compensation for environmental impact and contribute funds and need for prior permission from the Ministry for the business that have been categorized for causing impact on the environmental quality and right to issuing permit with terms and conditions relating to environmental conservation after scrutinizing. ■ To treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards for causing a point source of pollution. ■ That the owner or occupier of any business, material or place which causes a point source of pollution have to install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is impracticable, it has to be arranged to dispose the wastes in accord with environmentally sound methods. For not to violate any prohibition contained in the rules, notifications, orders, directives and procedures under the Environmental Conservation Law.
Environmental Conservation Rules (notification no. 50/2014)	Rule 69(a) (b)	Project Proponent commits: ■ Not to emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. ■ Not to carry out to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.
Environmental Impact Assessment Procedure, (notification no. 616/2015)	Clause 87, 102(a)(b),103, 104, 105, 106, 107, 108, 110, 113, 115, 117	The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorization, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues. Project Proponent commits to bear full legal and financial responsibility:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ For his actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and ■ To support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts until PAPs have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project ***For EMP,*** Project Proponent commits to comply ■ to implement the EMP, all Project commitments, and conditions, and ■ for liability to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project. ■ For his responsibility, and to fully and effectively implement the requirements set forth in ECC, applicable Laws, Rules, EIA Procedure and standards. ■ Project commitments and conditions when providing services to the Project and inform the Ministry with detailed information as to the propose project's potential adverse impacts. ***For monitoring and reporting,*** Project Proponent commits to comply: ■ To notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts. ■ To engage in continuous, proactive and comprehensive self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this EIA Procedure, standards, the ECC, and the EMP during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure). ■ to notify and identify in writing to the Ministry for any breaches of his obligations or other performance failures or violations of the ECC and EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, to undertake within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		Proponent becoming aware of such incident. ■ to submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry. ■ to submit the monitoring report within ten (10) days of completing a monitoring report and the information to be included. ■ To make a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices within ten (10) days of completing ■ To submit a digital copy of a monitoring report within ten (10) days of receiving such request via email or as may otherwise be agreed upon with the requestor for the request of any organization or person. ***For the purposes of monitoring and inspection, the event of emergency,*** Project Proponent commits to ■ grant the ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; ■ grant, from time to time as and when the Ministry may reasonably require, the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed. ■ grant full and immediate access to the Ministry at any time as may be required by the Ministry in the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements. ■ Ensure that the Ministry's rights of access can extend to access by the Ministry to the Project's contractors and subcontractors. *For the Conditions and Revisions to Conditions prescribed in Environmental Compliance Certificate,* The Project Proponent commits to commence the implementation of the Project strictly in accordance with the conditions attached to the ECC and including the EMP, within such time as may be prescribed by the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		Ministry upon receipt of the written approval from the relevant authority.
National Environmental Quality (Emissions) Guidelines (2015)		Project Proponent commits to comply the NEQ guidelines and its setting out for emission standards for air, noise and effluent discharges for oil and gas operations. Project Proponent considers this emissions standards in its environment impact assessment and environmental management plan.
The Forest Law, 2018; Rules, 1995	Clause12	The Forest Law is enacted by Pyihtaungsu Hluttaw in September, 2018. It empowers, to declare for the reserved forest for the maintaining a sustained yield of the forest produce, to manage the forest land. The Project Proponent commits to comply the stipulation (a). For requiring prior approval from the Ministry if desirous to implement the development work or economic project within a forest land and forest covered land. Whoever desirous to undertake as in sub-section (a), has to comply the Environmental Conservation Law and the stipulations from respective Laws.
The Forest Rules, 1995	Clause 27, 30	The Project Proponent commits to comply ■ For any person not to cut, mark, lop, perforate or damage by fire or any other means the teak and any reserved trees grown in the forest land and the land at the disposal of the government except for doing so with permission. ■ For not to fell, cut or dissect the trees which are not reserved trees for commercial purpose in the forest area and land at the disposal of the government, to make firewood or charcoal, without the permission of the State, division or district forest office.
National Land Use Policy 2016		In 2016, the Union of Myanmar implemented a Land Use Policy. The primary aim of the policy was to adopt a necessary, strong and precise policy for sustainable management, administration and use of the land resources of the country. The policy puts in place numerous measures to minimize impacts on informal and formal users from land procurement, for protection of natural resources, minimization of instances of land grab etc. The Project Proponent commits to comply the key provisions:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ to recognize and protect customary land tenure rights and procedures of the ethnic nationalities ■ to Complete an Environmental and Social Impact Assessment (ESIA) before considering a grant for individual land use right or lease of land; ■ to protect natural resources and ecological system that provide shared livelihood and socioeconomic development benefits to the surrounding communities; ■ for requiring to be done through public consultation, negotiation and participatory decision making If physical displacement is to be undertaken, *It should be noted that the provisions of this policy serve as a set of rules that guide the government and are not legally binding as other laws, such as the Land Acquisition Act. However, one of the aims of this policy was to guide the development and enactment of a National Land Law and allow for harmonization and implementation of the existing laws related to the land*.
Land Acquisition, Resettlement and Rehabilitation Law (2019)		The law is relevant for land acquisition with resettlement and rehabilitation. As required by this law, a land acquisition proposal must include a statement of commitment to pay compensation and damages to the people affected by the land acquisition and also a plan for the potential resettlement and rehabilitation of the affected people. However, implementing rules and regulations relevant to this law is not released yet. The Project Proponent commits to comply with the land acquisition, resettlement and rehabilitation requirements of implementing rules and regulations should they be released.
The Land Acquisition Act (India act.1.1894) (Amended in 1954)		The Land Acquisition Act (LAA) of 1894 establishes the basis for the state to acquire land for public use and is yet to be superseded by the more recent legislation. The Project Proponent commits to comply the stipulations in LAA: ■ for specifying a systematic approach for acquisition and compensation of land and other properties for development Projects, ■ for actions related to notifications, surveys, acquisition, and compensation and entitlements, along with disputes resolution, penalties and exemptions.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ for disclosure of information on surveys to affected persons.
The Farmland Law, 2012	Clause 30 (a) (b)	The Project Proponent commits to comply the stipulations for empowering ■ to utilize the farmland for other purposes in the interest of the public in respect of the application:- 1. The Central Farmland Management Body to give permission to utilize the paddy land for other purposes, with the recommendation of the Region or State Farmland Management Body; 2. The respective Region or State Government shall give permission to utilize the farmland for other purposes except paddy land, with the recommendation of the Region or State Farmland Management Body;
The Law of Protection of the Farmer Rights and Enhancement of their Benefits, (Pyidaungsu Hluttaw Law No. 32, 2013)	Clause 20 (f)	The Project Proponent commits to comply the stipulation for the Leading Body, in respect of agriculture and livestock breeding, to carry out the followings: f) carrying out to guarantee in production, import, preparation, package and sales of fertilizer and pesticides that they meet with the standards and are safe for use and to aware farmers the defects of fertilizer and pesticides without guarantee in time.
Vacant, Fallow and Virgin Land Management Act 2012, (Pyidaungsu Hluttaw Law No.10 of 2012)	Clause 16, 19	The Project Proponent commits to comply the stipulation: ■ for Person who is granted the right to use the vacant, fallow and virgin lands has to comply the conditions: (a). Land granted will use for the purpose granted and in relation to economic enterprise; (b). To carry out to be completed within four years from the date of grant according to the purpose granted (can revise by the Central Committee for losing time due to natural disaster and unstable security conditions; (c). Not to mortgaged, giving, sold, leasing or otherwise transferred or divided without the permission of the Cabinet of the Union Government; (d). To fully pay the land revenue; (e). To comply the conditions prescribed by the Central Committee (f). Prohibit to explore other natural resources below and above ground except the purpose granted; (g). To surrender the natural resources found in the authorized land and the Government being desirous of

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		extracting the same on a commercial resumes the area required therefrom. ■ That the Central Committee can resume the area required in the authorized land, if one of the following situation arises:- (a). If ancient culture heritage are found in the authorized land; (b). If infrastructure project or Special project are desired to be constructed on the authorized land, in the interest of the State; (c). Except the permitted minerals , if other natural resources are found in the authorized land which are permitted for production of mining; If natural resources are found in the authorized land which are permitted for the purposes described in Section4, Sub-section (a),(b), and (d);
Myanmar Investment Law, 2016	Clause (50)(d), (51), (65),	Project Proponent commits to comply ■ The stipulation to register the land lease contract at the office of Registry of Deeds in accordance with the Registration Act. ■ The mentioning for appointment, replacement, providing for the employment of staff and workers, ensuring to comply the entitlements and rights in the labor laws and rules, settling dispute regarding HR issues. ■ The stipulation: (a). To respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union; (e). To inform to the Commission if it is found that natural mineral resources or antique objects and treasure trove are not related to the investment permitted; (f). Not to make any significant alteration of topography or elevation of the land on which is entitled to lease or to use, without the approval of the Commission; (g). To abide by applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage; (h). To list and keep proper records of books of account and financial statement and necessary financial matters relating to the investments performed by permit or endorsement

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		in accordance with internationally and locally recognized accounting standards; (i). To close and discontinue the investment only after the payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce; (j). To pay wages and salaries to employees in accordance with applicable laws, rules, procedures, directive and so forth during the period of suspension of investment for a credible reason; (k). To pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease or death due to the work; (l). To supervise foreign experts, supervisors and their families, who employ in their investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar; (m). To respect and comply with the labor laws; (n). To have the right to sue and to be sued in accordance with the laws; (o). To pay effective compensation for loss incurred to the victim, if there are damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a permit or an endorsement; (p). To allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment; To take in advance permit or endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment, and shall submit the situation of environmental and social impact assessment to the Commission along the period of activities of the investments which obtained permit or endorsement of the Commission.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
Myanmar Investment Rules, 2017	Clause 202, 203, 206, 212,	Project Proponent commits: ■ To comply with all terms and conditions in the permit and other applicable laws when the investment is carried out. ■ To fully assist while negotiating with the Authority for settling the grievances of the local community that have been effected due to Investments. ■ To appoint expert foreigner as senior manager, technical and operational expert or advisor according to subsection (a) of the section 51 of the Law. To obtain the permit or tax exemption or relief to insure the relevant insurance out of the following types of the insurance at any insurance business entitled to carry out insurance business within the Union based on the nature of the business: Property and Business Interruption Insurance; Engineering Insurance; Professional Liability Insurance; Bodily Injury Insurance; Marine Insurance; or Workmen Compensation Insurance; Life Insurance; Fire Insurance.
The Import and Export Law, 2012	Clause 7	Project Proponent, as a license holder, commits to comply not to violate the conditions contained in the license.
The Protection of Preservation of Cultural Heritage Region Law, 1998	Clause 13, 15, 22	The State Peace and Development Council Law enacted this law by Law No. 9/ 98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones / region: a) Ancient monumental zone; b) Ancient site zone. The Project Proponent commits: ■ To apply for prior permission and must abide by provisions of existing laws for certain land-based construction works. ■ To comply the stipulation tor the person desirous of carrying out construction works to abide by the provisions of other existing laws and also apply in accordance with the stipulations to the Department to obtain prior permission under this law. ■ To conform to conditions prescribed by the Ministry of Culture for Buildings in cultural heritage region.
Conservation of Water Resources and Rivers Law (2006)	Clause (10), (11)(a), (19),	The Project Proponent commits to comply prohibitions for the following activities:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ "No person shall anchor the vessels where vessels are prohibited from anchoring in the rivers and creeks. ■ No person shall dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk. ■ No one shall dispose of any substance into the river creek that may cause damage to waterway or change of watercourse from the bank or vessel." The empowerment of this Law is provided to the Ministry of Transport for controlling navigation of vessels in the rivers and creeks as well as communicating with local and foreign government and organizations for conservation of water resources, rivers and creeks. Also, to carry out conservation works for water resources, rivers and creeks, in accordance with the relevant international conventions, regional agreements and bilateral agreements for environmental conservation.
The Protection of Biodiversity and Conservation Areas Law, 2018	Clause 39 (d) (e),	Project Proponent commits to comply the stipulation that there may be charge with fine or imprisonment or both if finds guilty of ■ using dynamite or explosive chemicals, electrolyzing, destroying water flow or poisoning water, intentionally pollutes the soil, water, air in the conservation area; Disposing or handling chemical waste and poisoning materials in the conservation area.
The Protection and Preservation of Cultural Heritage Regions Law, 1998	Clause 13, 15, 22	The State Peace and Development Council Law enacted this law by Law No. 9/ 98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones / region: a) Ancient monumental zone; b) Ancient site zone. Project Proponent commits: ■ To apply for prior permission and must abide by provisions of existing laws for certain land-based construction works. ■ To comply the stipulation tor the person desirous of carrying out construction works to abide by the provisions of other existing laws and also apply in accordance with the stipulations to the Department to obtain prior permission under this law.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		To conform to conditions prescribed by the Ministry of Culture for Buildings in cultural heritage region.
The Protection and Preservation of Antique Objects Law (2015)	Clause 12, 13	Project Proponent commits to comply the stipulation: ■ For person who finds any object which has no owner or custodian, needs to inform the relevant Ward or village-tract administrator if he knows or it seems reasonable to assume that the said object is an antique object. For a procedure to inform and the responsibility to inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accordance with the stipulation
The Protection and Preservation of Ancient Monuments Law (2015)	Clause 12, 13, 15, 20	Project Proponent commits to comply the stipulations: ■ For a person who finds an ancient monument over one hundred years old under the water or above ground to promptly inform the relevant Ward or Village-Tract Administrative Office. ■ For procedure to inform and the responsibility to inspect whether it is a real ancient monument or not and keep or cause to protect as may be necessary in accordance with the stipulation. ■ To apply prior permission from the Department before searching for and extracting oil and gas or constructing pipelines For prohibitions not to damage ancient monuments including using machinery which causes vibration and discharging chemical substance.
Myanmar Fire Force Law, 2015	Clause 25	Project Proponent commits: ■ to obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans. ■ To comply the stipulations for the factory, workshop, highway bus, airport, jetty, hotel, motel, guest house, collective-owned building, market, work-site or business exposed to fire hazard of the owner or manager; (a). Not fail to form the reserve fire brigade Not fail to provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department.
Motor Vehicle Law, 2015	Chapter 1, 2(v)	Project Proponent commits to comply the stipulations:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ for reducing environmental pollution caused by motor vehicles ■ for the right of the Department to issue directives, the standards, guidelines for the purposes of importing, manufacturing, assembling, maintaining to be safe in accident and environment conservation. For taking actions to conserve the green environment and the reduction in pollution of air, water, land and noises caused by motor vehicles.
Public Health Law, 1972	Clause 3, 5	Project Proponent commits to cooperate with the authorized person or organization in line with the stipulations ■ To abide by any instruction or stipulation for public health. ■ To accept any inspection, anytime, anywhere if it is needed.
The Protection and Prevention of Communicable Disease Law, 1995	Clause 3(a), 9, 11	Project Proponent commits to comply the stipulations: ■ For the Department of Health to carry out immunizations and health education activities related to communicable diseases ■ For all responsible persons to prepare report for an outbreak of a communicable disease to the nearest Health Officer. For Health Officer to undertake investigations and medical examinations to prevent the control the spread of Principal Epidemic Disease.
Employment and Skill Development Law, 2013	Clause 5, 14, 15, 30	Project Proponent commits to comply the stipulation (a). For the agreement, training and probation period as prescribed in: 1. If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment. 2. If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1). (b). For particulars to be included in the employment agreement: 1. the type of employment; 2. the probation period; 3. wage, salary; 4. location of the employment; 5. the term of the agreement; 6. working hour; 7. day off, holiday and leave; 8. overtime;

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		9. meal arrangement during the work hour; 10. accommodation; 11. medical treatment; 12. ferry arrangement to worksite and travelling; 13. regulations to be followed by the employees; 14. if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training; 15. resigning and termination of service; 16. termination of agreement; 17. the obligations in accord with the stipulation of the agreement; 18. the cancellation of employment agreement mutually made between employer and employee; 19. other matters; 20. specifying the regulation of the agreement, amending and supplementing; 21. Miscellaneous. (c). For the worksite regulations contained in the employment agreement to be in compliance with any existing law and the benefits of the employee not to be less than those of the any existing law. (d). For the employment agreement, the Ministry can issue the notification for paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions. (e). For the employment agreement made under sub-section (a) to be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization. (f). For the worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees to be amended as necessary, in accord with the existing law. (g). For the employer to send a copy of the employment agreement made between the employer and employee, to the relevant employment and labor exchange office within the stipulated period and to get the approval of it. (h). For the employment agreement made before the enforcement of this law has to be confirmed up to the end of the term of the original agreement. ■ To carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		employment for the workers who are proposed to appoint and working at present. ■ To carry out the training for each work or compounding the work individually or group-wise by opening on-job training, training systematically at worksite, sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers; ■ For appointing the youths of 16 years as apprentice, to arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team. ■ For the employer of the industry and service business to put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%; (i) To put in money paid under sub-section (a) not to be deducted from the wage and salary of the employees.
The Settlement of Labor Dispute Law, 2012	Clause 38, 39, 40, 51	The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. Project Proponent commits to comply: ■ Not to fail to negotiate and coordinate in respect of a complaint within the prescribed period without sufficient cause ■ Not to alter the conditions of service of workers involved in disputes prior to investigation by tribunals ■ For no party to strike or lock-out without negotiation, conciliation and arbitration by Arbitration Body. For the employer if commits acts without sufficient cause, to be liable to pay full compensation to workers as determined by Arbitration Body or Tribunal.
The Workmen Compensation Act, 1923 (amended in 1955, 1957, 2005)	Clause 3	The Workmen's compensation act had been promulgated in 1923, amended in 2005, Project Proponent commits to comply the stipulations: ■ For the payment by certain classes of employers to their workmen of compensation for injury by accident. ■ For the liability for compensation of employer's, amount of compensation, compensation to be paid when due and penalty for default, method of calculating

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		wages, review, commutation of half-monthly payments, payment of a lump sum amount, distribution of compensation, compensation not to be assigned, attached or charged, notice and claim, power to require from employers statements regarding fatal accidents, reports of fatal accidents and serious bodily injuries, medical examination, contracting, remedies of employer against stranger, compensation to be first charge on assets transferred by employer, special provisions relating to masters and seamen. ■ For any updating for revising the monetary amount as per the amendment law.
Labor Organization Law (The Pyidaungsu Hluttaw Law No. 7/2011)	Clause 17, 18, 19, 20, 21, 22	This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labor organizations systematically and independently. Project Proponent commits to comply the stipulations as there mentions: ■ That Labor Organizations are free to organise and negotiate workers rights if not meeting labour laws. ■ That Labour Organisations may demand re-appointment of worker if cause of dismissal is related to labour organisation membership or activities or not conform with labour laws.. ■ That Labour Organisations have the right to send representatives to conciliation tribunals. ■ That Labour Organisations have the right to participate and discuss workers rights and interests with government and employers ■ That Labour Organisation have the right to participate in collective bargaining in accordance with labour laws. That Labour Organisation may take collective actions in accordance with the relevant procedures, regulations and law.
Minimum Wages Law, 2013	Clause 12 (a-e), 13 (a-g)	This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness. Project Proponent commits to comply the stipulations:

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ For the employer not to pay wage less than the minimum wage stipulated, do not have the right to deduct any other wage; For the employer to inform rates of minimum wage relating to the business, allow the entry and inspection of the inspection officer, give the sick worker holiday for medical treatment in accord with stipulation and give holiday for the matter of funeral of the family of worker without deducting from the minimum wage.
Payment of Wages Law, 2016	Clause 3, 4, 5, 7 (ii), 8, 9, 10, 14	Project Proponent commits to comply the stipulations: ■ That salaries are to be paid at the end of the month or, depending on the size of the employing enterprise, between 5-10 days before the end of the month. The employer is permitted and required to withhold income tax and social security payments. Other deductions, e.g. for absence, may only be withheld in accordance with the law. ■ For the employer (a) to pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary (b) If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. ■ For finishing the contract, employer need to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire. When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. ■ For the employer to report to the Department with evidence of payment at later date agreed with the employee if the employer has difficulties to pay wages on time because of significant events (eg natural disaster), ■ For the employer to deduct expense which are allowance for accommodation and ferry service arranged by the employer, meal allowance, electricity charges, water service charges and income taxes liable to be paid by workers and cash paid in excess under mistake, which are not included in the expression of wages under this Law and not to deduct from the wages of the worker except the deduction as per clause 7. ■ For any deducting from the salary due to the employees' absence, the total cut

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		salary not to be more than 50 % of his salary. For overtime work, to allow the presiding overtime rate as set by the Law.
Leaves and Holidays Act, 1951	Clause 4.	The Project Proponent commits to comply the stipulations: • For employee to be granted to pay public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year, depending on the date of the variable holidays. ■ For additional rules to apply in accordance with other laws, such as the Social Security Law (2012) for employees contributing to the Social Security Fund. ■ To grant earned leave with average wages or average pay for a period of ten consecutive days by his employer during the subsequent period of twelve months to every employee who has completed a period of twelve months continuous service.
Social Security Law, 2012	Clause 11 (a)(b), 15(a), 16 (a), 18(b), 48(a), 49(a)(b), 51(a)(b), 53(a), 54(a)(b), 75	Project Proponent commits to comply the stipulations: ■ For compulsory registration for social security system and benefits, the following establishments can be applied if they employ minimum number of workers and above determined by the Ministry of Labor in co-ordination with the Social Security Board: i. production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; ii. Government departments, Government organizations and regional administrative organizations doing business; iii. development organizations; iv. financial organizations, v. companies, associations, organizations and their subordinate departments and branch offices doing business; vi. shops, commercial establishments, public entertaining establishments; vii. Government departments and Government organizations doing business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body;

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		viii. construction works carried out for a period of one year and above under employment agreement; ix. works carried out with foreign investment or citizen investment or joint ventured businesses; x. works relating to mining and gemstone contained in any existing law; xi. works relating to petroleum and natural gas contained in any existing law; xii. ports and out-ports contained in any existing law; xiii. works and organizations carried out with freight handling workers; xiv. Ministry of Labor and its subordinate departments and organizations; xv. Establishments determined by the Ministry of Labor from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law. ■ For provisions of compulsory registration under sub-section (a) to continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work: i. carrying out work by employing under stipulated minimum number of workers but more than one worker; ii. changing the employer or changing the type of business. ■ For the Social security fund, to include the funds for health and social care, family assistant, invalidity benefit, superannuation benefit and survivors' benefit, unemployment benefit, other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of labor, other social security fund and social security housing plan fund. ■ For arranging insurance for the workers to enable to enjoy social security benefits by contributing to the social security fund. ■ For the employer to deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund and in such case he can incur the expense. ■ For the employer to effect insurance by registering for employment injury benefit insurance system contained in section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		to provisions of compulsory registration may obtain the employment injury benefits. ■ For the inapplicability to the Workmen's compensation act. ■ For the employer (a) to pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover he shall also bear the expenses for paying as such; (b) to pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit. ■ For the employers and workers (a) to co-ordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment; ■ For the employer (a) to report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such. (b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the relevant township social security office in accord with the stipulations. ■ For keeping records of work and lists.
Yangon City Development Committee Law (Yangon Region Hluttaw Law no.5/2014, amended in 2018)		It has stated that the committee has the right ■ to corporate for the inspection with the concerning authority and ■ to stipulate orders for the carriage, storage of chemical and related substances for not harming to public health and life ■ to manage the waste regarding for the hazardous. There it has been prohibited for disposing chemical and its related substances in areas, which are not being allowed in the City Development area and mentioned offenses and penalties. The Project Proponent commits to comply the stipulations and undertake the necessary proceeding as per this law and notification issued by the committee.
Myanmar National Building Code (2016)	Clause 1.B.1 (code no 1.3.1.1), code no 1.3.1.4	The Project Proponent as a land use development project, including new construction, extension, retrofitting, increase of floor area, and changes in usage of buildings/land, commits: ■ to comply the stipulations for the requirement of "Planning Permit" to be granted by "The Development Planning

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		and Building Authority", as in accordance with Section 1.B.1 of this Code (1.3.1.1) ■ to abide by the Myanmar Environmental Conservation Law of 2012 and to be in conformity with other land bylaws of the regional authorities.
National Energy Policy, 2014	Chapter 3,Clause 4	The national energy policy aims to systematically explore the available energy resources of the county in order to supply the demand of the country and to export as value added products for surplus resources, thus ultimately targeting to sustainably improve the living standard of the country people. There mentions national energy policy, energy sector development plan, energy and electric power sector restructuring program, energy sector framework and strategy and work program. The Project Proponent commits to implement the project to support this policy.
The Electricity Law (The Pyidaungsu Hluttaw Law No. 44, 2014)	Clause 3(e) (f) (h), 8(a), 11, 14, 22(a), 30, 37, 41, 42, 44, 45, 48	This is enacted to encourage the local and foreign investment in the electrical business, to enact fair, transparent and appropriate rules and regulations in order to prescribe the rates of electric power fee which are consistent with current times and to adhere in accord with the international environmental protection treaties which Myanmar has ratified. The Project Proponent commits to comply the stipulations: ■ That with the approval of the Union Government, the Ministry: (a). shall have the right to carry out businesses related to the large scale electric power exploration, construction, generation, transmission, distribution, trading and exchanging which the Union have the right to manage; ■ For carrying out the electrical business, the Ministry, relevant Region or State Government and Leading Bodies of Self-Administered Division or Self-Administered Zones have the right to obtain the required amount of land to use in accord with the existing laws; ■ For the person from local or foreign who desires to invest and operate in any electrical business to apply to obtain the permit to the authorized person to issue permit in accord with the stipulations. ■ For the right of the Ministry allow or refuse an application after scrutinizing, if the permit holder desires to sell electric power to the national grid. ■ For the permit holder to be liable for causing any damage or loss due to the negligence by him to any person or entity. ■ For the right of Ministry to inspect of electrical business and electrical equipment.

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		■ For the right of Ministry to issue required standardizations and techniques of inspection for electrical business. ■ That the Ministry has the right to determine regarding the specification of rates of electric power fee and service charges from the users of electric power the appropriate rates of respective region with the approval of the Union Government. Such rates of electric power fee may be adjusted from time to time. ■ For any person not to operate the electrical business without permit. ■ For permit holder not to operate any other electrical business except the business contained in the permit. For any person not to operate the importing, manufacturing in the country, exporting, distributing and selling of the electrical equipment which are not consistent with the prescribed norm and standard.
Law protecting Ethnic Right, 2015	Clause 5	The Project Proponent commits to comply the stipulations ■ For the Equal right between the Ethnics living in Myanmar. It enacted that if an ethnic loose the right, he can complain to the Regional or State Government to get the equal chance and find the equal right. ■ That project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups. The Project Proponent also commits to comply the Succeeding laws to protect the right of Myanmar national **Monogamy Law (2015):** Concerning all those who are living in Myanmar, Myanmar Citizens who live outside of Myanmar, and foreigners who marry Myanmar citizens while living in Myanmar for preventing misconducting marriages. **Buddhist Women Special Marriage Law (2015):** Concerning the marriage between Buddhist Woman and other religious man. There prescribed the legal procedure, the conditions to be complied by non-Buddhist husband, the customs for dividing property when divorcing. **Religious Conversion Law (2015):** This is enacted for the freedom to convert from one religion to another, or a person without a religion has the freedom to convert to a religion. There prohibited to apply for a religious conversion with an intent to insult, disrespect, destroy, or abuse a religion. ■ Population Control Healthcare Law (2015); This is for alleviate poverty, provide adequate quality healthcare, and

Sources of Related Laws, Rules and Regulations	Relevant Articles	Commitments
		ensure that family planning improves maternal and child health in the country. This Empowers region or state government that concerned with the special zone for healthcare to form region or state population control healthcare group to implementing the task as per the directives of the Ministry and region or state government and the Union Territory Governing body

Table 3.3 International Conventions relevant to the Project

Legislation	Relevance to the Project	Ratification Status (in Myanmar)
Vienna Convention for the Protection of the Ozone Layer 1988 and Montreal Protocol on Substances that Deplete the Ozone Layer 1989	The Project may use or generate ozone depleting substances.	Accession 16th Sep 1998 (Vienna) & Accession 24th Nov 1993 (Montreal)
Convention on Biological Diversity 1992	The Project will be located in terrestrial habitats.	Ratified 25th Nov 1994
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	The Project may generate hazardous wastes (e.g. used oils).	Entered into force 6th April 2015
United Nations Framework Convention on Climate Change 1992 (UNFCCC) and Kyoto Protocol 1997	The Project construction will form part of Myanmar's total emissions output. However, there will be limited emissions during operation.	Entered in force 23rd Feb 1995 (UNFCCC) and 16th Feb 2005 (Kyoto Protocol)
Workmen's Compensation (Accidents) Convention 1925	The Project has risks to occupational health and safety.	Entered in force 16 February 1956
Workmen's Compensation (Occupational Diseases) Convention 1925 and its Revision 1934	The Project has risks to occupational health and safety.	Entered in force 30 Sept 1927; Revision entered in force 17 May 2016

3.2.4 Good International Industry Practice Guidelines

The IMWP will undertake the impact assessment study and Project activities in a manner guided by good international industry practice (GIIP). Applicable guidelines which the IMWP consider in preparing the ESIA include:

- IFC PSs on Environmental and Social Sustainability (2012);
- Asian Development Bank (ADB) Safeguard Policy Statement (SPS) (2009); and
- WBG Environmental, Health and Safety (EHS) guidelines, including:
  - General EHS Guidelines (2007); and
  - EHS Guidelines for Wind Energy (2015).
  - EHS Guidelines for Electric Power Transmission and Distribution (2007).

3.2.4.1 International Financial Corporation (IFC) Performance Standards (PSs)

The IFC of the World Bank Group (WBG) updated its Sustainability Framework in January 2012. This included revising the PS which replaced the previous safeguard policies and will be used to evaluate any project seeking funding through the IFC.

The IFC PS represent the 'policy framework' for the ESIA and sustainable social and environmental management for the project[1], whereas the World Bank Group's EHS Guidelines provide guidance on general and industry best practice as well as recommended numerical limits for emissions to the atmosphere, noise, liquid and solid wastes, hazardous wastes, health and safety, and other aspects of industrial facilities and other types of development projects. The IFC PSs are summarised in *Table 3.4.*

Table 3.4 IFC Performance Standard [2]

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 that is subject to assessment and management).*	■ *Impact identification and assessment.* To identify and assess social and environmental impacts, both adverse and beneficial, in the project's area of influence. ■ *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 2 – Labour and Working Conditions *Recognises that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers.*	■ To promote fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws. ■ To establish, maintain and improve the worker management relationship. ■ To promote compliance with national employment and labour laws. ■ To protect the workforce by addressing child labour and forced labour. ■ To promote safe and healthy working conditions, and to protect and promote the health of workers.
Performance Standard 3 - Resource Efficiency and Pollution Prevention *Recognises that increased industrial activity and urbanisation often generate increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level.*	■ To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. ■ To promote more sustainable use of resources, including energy and water. ■ To reduce project –related greenhouse gas (GHG) emissions.
Performance Standard 4 – Community Health, Safety and Security	■ To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. ■ To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights

[1] IFC Performance Standards on Environmental and Social Sustainability, January 2012, International Finance Corporation, World Bank Group

[2] IFC Performance Standards on Environmental and Social Sustainability, January 2012, International Finance Corporation, World Bank Group

Performance Standards	Objectives
Recognises that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development.	principles and in a manner that avoids or minimises risks to the Affected Communities.
Performance Standard 5 – Land Acquisition and Involuntary Resettlement *Outlines that involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition*	■ To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. ■ To avoid forced eviction. ■ To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected. ■ To improve, or restore, the livelihoods and standards of living of displaced persons. ■ To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.
Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Natural Resources *Recognises 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 integrated conservation needs and development priorities.
Performance Standard 7 – Indigenous Peoples *Recognises that Indigenous Peoples, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population.*	■ To ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples. ■ To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner. ■ To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. ■ To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the life of the project. ■ To ensure the Free, Prior and Informed Consent (FPIC) of the Affected Communities of the IPs when the circumstances described in this Performance Standard are present. ■ To respect and preserve the culture, knowledge and practices of Indigenous Peoples.
Performance Standard 8 – Cultural Heritage	■ PS 8 aims to protect the irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological

Performance Standards	Objectives
Recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities.	Diversity. PS 8 recognises the importance of cultural heritage with an objective to: ■ Protect cultural heritage from the adverse impacts of project activities and support its preservation; and ■ Promote the equitable sharing of benefits from the use of cultural heritage in business activities. ■ The PS requires the project proponent to comply with relevant national law on the protection of cultural heritage, including national law implementing the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage and other relevant international law.

3.2.4.2 Asian Development Bank (ADB) Safeguard Policy Statement (SPS)

In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and brings them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The SPS also provides a platform for participation by affected people and other stakeholders in the project design and implementation.

The SPS applies to all ADB-financed and/or ADB-administered projects and their components, regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS.

The objectives of ADB's safeguards are to:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary Resettlement safeguards; and
- Indigenous Peoples safeguards.

To help borrowers and clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 1 of SPS);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

3.3 Contractual and Other Commitments

The IMWP commit to following all applicable local and international laws listed in this EIA Report.

3.4 Institutional Framework

3.4.1 Myanmar Regulatory Authorities

The Myanmar EIA Procedure (dated 29 December 2015) sets out the requirements for development, assessment, and subsequent monitoring of an Initial Environmental Examination (IEE), EIA and/or Environmental Management Plan (EMP). The requirements to conduct an IEE / EIA are outlined in the Environment Conservation Law (2012) and Environment Conservation Rules (2014). In Myanmar, matters pertaining to IEE / EIA are generally under the jurisdiction of the ministries and state-owned enterprises. Key ministries, agencies and state-owned enterprises that have jurisdiction over HSE matters in power projects are included in *Table 3.5*.

Table 3.5 Key Ministries, Agencies and State-Owned Enterprises Involved in IEE/EIA

Ministry/Agency	Responsibility
Ministry of Natural Resources and Environmental Conservation (MONREC)	The Environmental Conservation Department (ECD) of MONREC has ultimate responsibility in the review and approval, or otherwise, of submissions under the IEE/EIA process.
Ministry of Electricity and Energy (MOEE)	MOEE manages Health, Safety and Environmental (HSE) issues of power generation operators in Myanmar, encouraging operators to establish an HSE Management System and prepare their own IEE/EIA for their project.
Myanmar Investment Commission (MIC)	MIC is a government agency responsible for coordinating with ministries (such as the MOEE) and other state entities to facilitate foreign investment in Myanmar. The MIC is also responsible for granting MIC permits which enable foreign investors to carry out business activities under the Myanmar Investment Law (2016).

3.5 Projects Environmental and Social Standards

The National Environmental Quality (Emissions) Guidelines (NEQ) were enacted in 2015. These Guidelines provide the basis for regulation and control of noise and air emissions and site runoff and wastewater discharges from sector specific projects in order to prevent pollution and protect the environment and public health. These guidelines, which are presented in *Table 3.6* to *Table* 3.8, are noted to be similar to those recommended by the WBG General EHS Guidelines (2007).

Table 3.6 National Environmental Quality (Emissions) Guidelines for Air Quality

Parameter	Unit	Guideline Value (µg/m^3)
Nitrogen Dioxide	1 year	40
	1 hour	200
Ozone	8 hour (daily)	100
Particulate Matter (PM_{10})[a]	1 year	20
	24 hour	50
Particulate Matter ($PM_{2.5}$)[b]	1 year	10
	24 hour	25
Sulphur Dioxide	24 hour	20
	10 minute	500

[a] Particulate matter ≤ 10µm

[b] Particulate matter ≤ 2.5µm

Table 3.7 National Environmental Quality (Emissions) Guidelines on Noise Levels

Receptor	One hour LAeq (dBA)[a]	
	Daytime 07:00 – 22:00 (10:00 - 22:00 for Public holidays)	Night Time 22:00 – 07:00 (22:00 - 10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

[a] Equivalent continuous sound level in decibels (at the nearest sensitive receptor)

Table 3.8 National Environmental Quality (Emissions) Guidelines on Site Runoff and Wastewater Discharges

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125
Oil and grease	mg/l	10
pH	S.U.[a]	6-9
Total coliform bacteria	100 ml	400
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

[a] Standard unit

4. PROJECT DESCRIPTION AND ALTERNATIVES

4.1 Project Background

In 2017, IAD signed a Memorandum of Understanding (MOU) in collaboration with the Magway Region Government to assess the feasibility of wind power projects in the Magway Region of Myanmar. Under this MOU, ICM has been undertaking all development activity on behalf of IMWP (and by extension IAD) to demonstrate the technical and commercial viability of wind power in Myanmar.

Further to the signing of the MOU and the feasibility study undertaken, IMWP proposed to develop a wind power project which is located near Kandok, includes 25 wind turbines with a capacity of up to 113 MW. The number of wind turbines and capacity of the windfarm, amongst other details of the Project as presented in this report, should be confirmed during the detailed design and are thus subjected to change.

A summary of the proposed Project is provided in *Table 4.1*.

Table 4.1 Project Details

Component	Details
Name of the Project	Kandok Windfarm
Project Owner	InfraCo Myanmar Wind Power Co. Limited (IMWP)
Land Area occupied by the Windfarm Facilities	~92.56 ha
Type of Infrastructure	25 wind turbines of up to 113 MW.

4.2 Project Location

The Project Site is located in Minhla Township, Magway Region (*Figure 4.1*). The Project Site is part of the Ayeyarwady basin, with an average elevation of roughly 400 m. The Project Site is located in a complex terrain with hilly features.

There are four villages within a distance of 2 km from the project site boundary. Particularly, Set Set Yo Village is located approximately 1 km (0.6 mile) away from the Project Site.

The following components of the 113 MW Windfarm will be located within the Project Site:

- Meteorological mast (approximately 120 m height);
- Wind turbines (25 turbines, with a minimum height of 100 m);
- Foundation and hardstand for the wind turbines;
- Underground cables connecting the turbines;
- Access roads with drainage;
- Transformers;
- Substation; and
- WTG fencing and CCTV (if required).

These facilities will cover a total area of 92.56 ha within the Project Site.

During construction of the Project, there will also be temporary site office and temporary laydown areas which are necessary for the construction activities within the Project Site. These facilities will not be present during operation phase of the Project.

Layout of the above facilities within the Project Site is provided in *Figure 4.1*.

There are a total of five (5) wind turbine models under consideration for the Project and their specifications are provided in *Table 4.2.* The wind turbine model will only be confirmed during the detailed design stage of the Project. The number and layout of wind turbine will be the same for all turbine models. For the impact assessment, it is assumed that the turbine model Option 1 - Siemens Gamesa SG 4.5-145 4.5MW or Option 3 - Vestas V150-4.2 4.2 MW will be used for the Project. It is because the sizes of the turbines (in terms of rotor diameter and hub height) are largest amongst the turbine options which would thus be considered to be the worst case scenario for the assessment of relevant impacts related to shadow flicker, bird and bat collision etc. IMWP is committed to inform ECD the confirmed turbine model to be used during the detailed design stage of the Project after the issue of the ECC.

Table 4.2 Options of Wind Turbine Model

Parameter	Option 1	Option 2	Option 3	Option 4	Option 5
Turbine Type	Siemens Gamesa SG 4.5-145 4.5MW	Gold Wind G140/3.4 3.4MW	Vestas V150-4.2 4.2 MW	General Electric GE 3.8-137 3.8MW	Envision EN141-2.65 2.65MW
Rotor Diameter (m)	145	140	150	137	141
Hub Height (m)	157.5	100	155	131.4	140

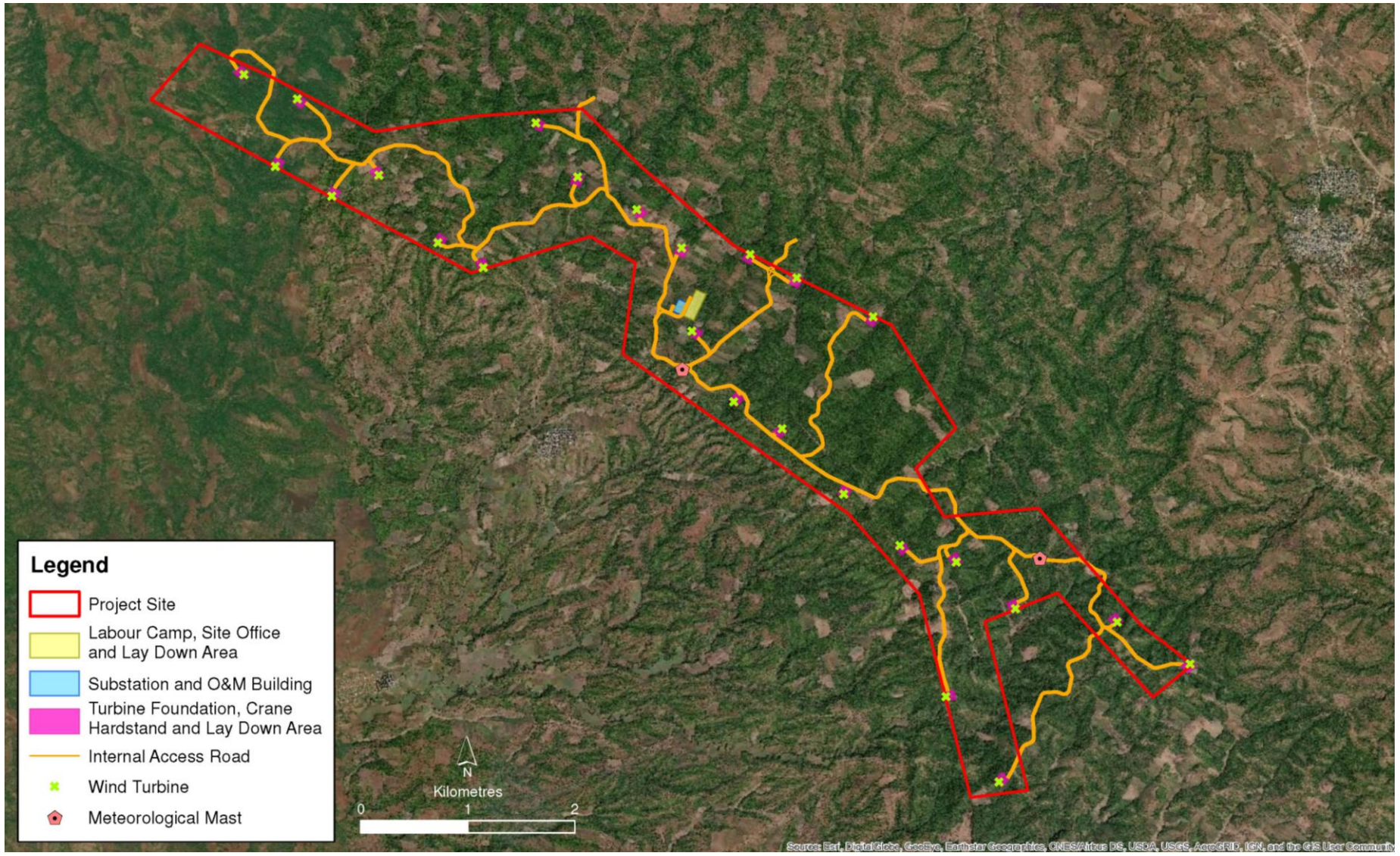


Figure 4.1 Proposed Project Location

4.3 Project Development and Implementation Time Schedules

Construction activities of the Project are tentatively targeted to commence following receipt of the ECC and tentatively can be completed in 21 months, followed by commissioning and operation of the Project. Detailed description of the Project activities during the construction and operation phases are provided in the following *Section 4.4*. This schedule is subject to change and pending agreements with the Government. A brief Project implementation schedule is provided in *Table 4.3.* A more detailed account of the construction and operational activities are provided in *Section 4.4.1* and *Section 4.4.2* respectively.

Table 4.3 Tentative Project Implementation Schedule

Activity	Implementation Period
Improvement of Offloading Area at Minbu and Access Road to the Windfarm Site	Q1 Year 1 – Q4 Year 1
Improvement of Internal Access Road within the Windfarm Site (including drainage works)	Q1 Year 1 – Q4 Year 1
Construction of Labour Camp, Site Office and Lay Down Area	Q1 Year 1 – Q3 Year 1
Construction of Turbine Foundation and Crane Hardstand	Q1 Year 1 – Q4 Year 1
Transportation of Installation Equipment (for Lifting) from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 1
Transportation of Wind Turbine Components from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 2
Installation of 25 Wind Turbines at the Windfarm Site; Internal Electrical Connections; and Construction of Substation and O&M Building.	Q2 Year 1 – Q3 Year 2
Commissioning and Operation Commencement of Kandok Windfarm	Q3 Year 2 – Q4 Year 2

4.4 Description of the Project

4.4.1 Construction Activities

4.4.1.1 Improvement of Offloading Area at Minbu and Access Road to the Project Site

A number of Project components should be transported from the main port in Yangon to the Windfarm Site. These included the wind turbine components (nacelles, blades, tower segments etc.) as well as the specialized lifting equipment for the turbine installation. The main port in Yangon, Myanmar International Terminals Thilawa, is an existing port with no construction activities required for the Project. The Project components should be transported from the main port in Yangon by barges to the offloading area at Minbu.

Construction activities of the Project will commence with improvement of offloading area at Minbu as well as access road to the Windfarm Site. These activities are expected to commence in Q1 of Year 1 and be completed in Q4 of Year 1. The location of the offloading area and storage area in Minbu as well as the land transportation route to the Windfarm Site is shown in *Figure 4.2.* The offloading area

at Minbu is presently in poor condition which should be improved in Q1 of Year 1 to prepare it for offloading the Project components. The offloading area is estimated to be 0.1 ha in size. The improvement works will not include any dredging or filling works to raise the elevation of the jetty and thus potentially significant impacts to water quality and hydrology of the river is not expected. The jetty layout plan is shown in *Drawing A1 to A2* of *Appendix A*. A storage area is located near the Minbu loading area for temporary storage of turbine components and equipment before being taken to the Windfarm Site through the land access route. The storage area is located on bare ground and is estimated to be 23,000 m^2 in size.

From the Minbu offloading area to the Windfarm Site, the turbine components and equipment should be transported through the land route shown in *Figure 4.2*. The land route is an existing road with no new road construction requirement. Instead, there are several locations, including a roundabout, six (6) existing viaducts and 14 critical turning points for which modification / rehabilitation works should be undertaken to allow for the passage of the heavy and large turbine components. These will include:

- Removal of the roundabout near the Minbu offloading as well as flattening and strengthening of the passage created;
- Removal of obstacles of above 0.75 m in height and road signage as well as flattening, levelling and strengthening of the critical turning points; and
- Reinforcement works to support the existing viaducts.

Details of the above modification / rehabilitation works are shown in *Drawing A3 to A17* of *Appendix A*.

There are no potentially significant impacts expected from the modifications of the Minbu offloading area and modifications to the existing roads to the Windfarm Site. This is because these affect small areas confined to the existing jetty location and along existing roads. The above works are also expected to improve the condition of the existing road, which are also used by the public. Therefore, these Project facilities are not discussed further in this EIA Study, except for a 4.7 km section of access road located near the Project Site which will be expanded and thus included in the assessment.

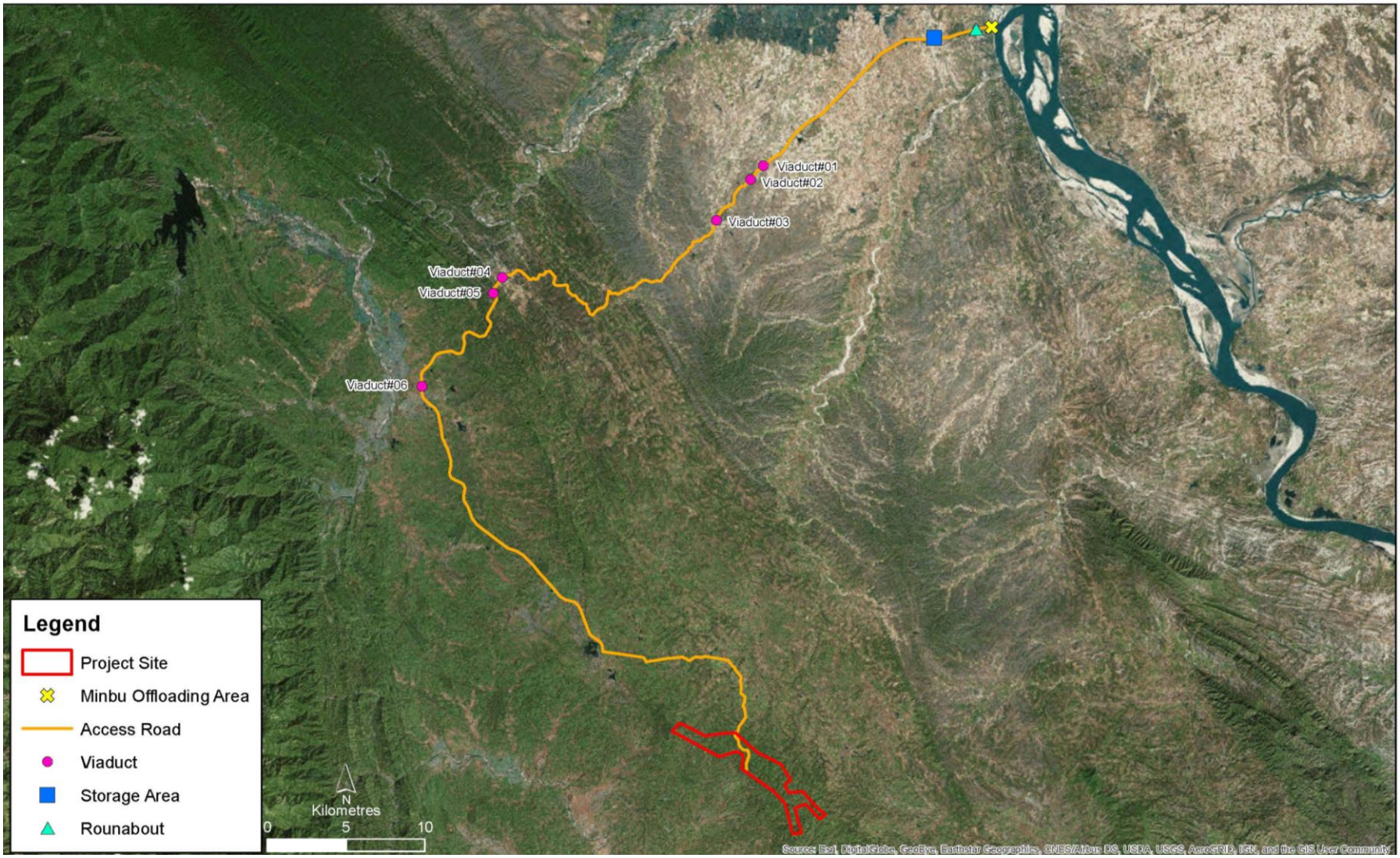


Figure 4.2 Transportation Route of Turbine Components and Lifting Equipment

4.4.1.2 Improvement of Internal Access Roads within the Project Site (including Drainage Works)

It is expected that the internal road improvement works as well as the drainage system construction within the Windfarm Site should be undertaken from Q1 to Q4 of Year 1, although this can be subject to change.

Internal access roads within the Windfarm Site are required to allow access to all wind turbine locations and windfarm facilities during construction and subsequently during operation and maintenance phases of the Project. However, the majority of the roads within and surrounding the Windfarm Site are unpaved. Though these roads are accessible by car/motorcycle, they can be difficult to be used during the wet season from May to August. As such, the existing roads within the Windfarm Site will need to be improved to form the internal access roads to facilitate the construction, operation and maintenance of the Project within the Windfarm Site.

The layout of the internal access roads is shown in *Figure 4.1* with the design shown in *Drawing B1* of *Appendix B.*

The basis of the internal road design is summarized as follows:

- Roads should be designed for the service lifetime of the windfarm;
- The surface course of the main access roads to each wind turbine tower and to windfarm facilities should be composed of compacted and crushed aggregates or selected materials;
- Road structures (thickness of base and sub-base) should be designed based on the results of in-situ CBR test prior to the commencement of construction;
- All road pavement surfaces should have sufficient cross falls/chambers to allow rapid dispersion of surface runoff to the nearby water drainage system under design rainfall conditions. Criteria as defined in the technical specification provided by the wind turbines supplier should also be met; and
- All dimensions of access and services roads, such as minimum width, vertical curve radius, and horizontal curve radius, should be in accordance with the requirements and technical specifications provided by the wind turbine supplier.

As shown in *Drawing B1* of *Appendix B*, the internal access road should be 6 m in width within Right of Way (RoW) of 7 m on each site of the road. The access road should be compacted and paved with impermeable materials such as concrete. Box culvert or bridge may be required for the road crossing the existing waterway. Culverts or trenches should also be provided where the roads are crossing the storm drainage facilities.

Within the RoW of the road should be the drainage which divert surface runoff to nearby water bodies. The drainage system on site will generally consist of overland open channel and trench flow, and if necessary drainage through a catch basin and underground pipe system should be provided in some areas. Site drainage facilities will follow the design basis below:

- Designed to convey the runoff from a 25 years rainfall event;
- Provide oily water separator at the tie-in point of the existing drainage system;
- Convey surface runoff and roof drainage away from the equipment and buildings; and
- Include open flow piping, manholes, area drains, catch basin, and (if required) a retention or detention pond.
- Sewage shall be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges (*Table 3.8*) before drained to the site drainage system. The minimum diameter for sewer line shall be 100 mm (4 inches).

Within the RoW, there will also be a trench which within cables from the turbines will be buried (*Drawing B1* of *Appendix B*).

4.4.1.3 Construction of Labour Camp, Site Office and Lay Down Area

Construction of labour camp, site office and lay down area should be undertaken from Q1 to Q3 of Year 1.

During construction, it is estimated that around 150 workers should be required. Workers needed will include crane assembling teams, riggers, coordinators, operators, drivers, special teams, Project engineers and helpers. These workers should be housed within the labour camp which will are expected to be located in the same area as the construction site office and lay down area, within a land plot of 100 m x 270 m (*Figure 4.1*). Turbine components should be stored at the lay down area while the construction site office should be used by the management and supervisory staffs as well as the engineering team.

Layout of the construction site office and lay down area is showed in *Drawing B2 and B3* of *Appendix B.*

4.4.1.4 Construction of Turbine Foundation and Crane Hardstand

Once the construction of internal access roads have been completed to an extent that allow for access to the turbine location, construction of crane hardstand areas and turbine foundations will commence from Q1 of Year 1 and be completed in Q4 of Year 1, although this schedule can be subjected to change.

The crane hardstand area should be located beside the turbine foundation within a land plot of 90 m x 100 m for each turbine as shown in *Figure 4.1*. The crane hardstand area should be used for main crane assembly and wind turbine erection. There will also be a crane and equipment lay down area at each of the turbine location, located with the same land plot of 90 m x 100 m. Layout of the land plot with the turbine foundation, hardstand and lay down area is shown in *Drawing B4 and B5* of *Appendix B.*

The crane hardstand area should be finished with compacted and crushed aggregates in order to create a continuous area between the edge of the foundation and the working area.

4.4.1.5 Installation of Wind Turbine, Internal Electrical Connections, Substation and O&M Building Construction

Lifting equipment required for the turbine erection should be transported to the Windfarm Site from Q2 to Q3 of Year 1 while the wind turbine components should be transported to the Windfarm Site from Q2 of Year 1 to Q3 of Year 2 when the necessary facilities such as the Minbu offloading, loading area, access roads, lay down, turbine foundation and crane hardstand are ready.

For each turbine, about 17 to 18 days should be required for installation using the lifting crane at the hardstand area, although this is subject to change. As outlined by IMWP's Transportation Study, the installation of 25 turbines will require an estimated 435 days to complete and should be undertaken from Q2 of Year 1 to Q3 of Year 2. This schedule can be subjected to change.

Underground cables will connect the wind turbines to the substations which would be constructed within the Windfarm Site. It is expected that the underground cables will follow the internal road alignment and finally be connected to the substation (*Drawing B6* of *Appendix B*). Location of the substation is shown in *Figure 4.1*. The operational and maintenance (O&M) building should be located within the same land plot of 80 m x 130 m in size together with the substation *Drawing B7* of *Appendix B*). The O&M building should be built to support operation of the windfarm.

It is expected that construction of the windfarm should be completed in Q3 of Year 2, although this schedule can be subjected to change.

4.4.1.6 Power, Fuel and Water Supply

Power requirement during the construction phase should be met through the use of diesel generator sets. Three 200 kVA generator sets are expected to be required for the Project for batching plant work, other labour works and the labour camp.

During construction, water will be needed for construction activities, domestic purposes and drinking water for labourers. It is anticipated that 165 L of water should be required for each m^3 of concrete (1). It is estimated that ~100 m^3 of concrete should be required per turbine foundation. As such, the water requirement for each turbine foundation would ~be 16,500 L of water. Water will also be required for domestic purpose and it is estimated that around 110,000 L should be required per week. The water demand is expected to be met through delivery by tankers from regional water resources such as at the river of the Minbu offloading area.

For drinking water, it is estimated that around 1,300 L should be required per day (2) and should be supplied by bottled water purchased from Minhla Town.

Fuel required during construction phase should be procured from the nearby Minhla Town.

4.4.1.7 Waste Generation

Solid wastes that are expected to be generated from the Project and their disposal routes are provided in *Table 4.4*.

Table 4.4 Type, Estimated Volume and Disposal Route of Solid Wastes

Waste Type	Source	Estimated quantity	Method of disposal
Non-hazardous Waste			
Domestic solid waste	Labour Camp	15-16 kg per day	Reuse and recycle if possible. Otherwise these will be transported to the nearest waste disposal site approved by the local authority.
Construction debris (excavated earth)	Construction of turbine foundations, access road etc.	0.5-1.0 tonnes per day	Excess construction materials will be backfilled where possible. Otherwise these will be transported to the nearest waste disposal site approved by the local authority.
Packaging waste containing wood, cardboard and other recyclables (e.g. solar panel packaging)	Packaging material for wind turbine generators	10 kg per wind turbine generator	Reuse and recycle if possible. Otherwise these will be transported to the nearest waste disposal site approved by the local authority.
Sludge from sewage system	Labour Camp	12-15 kg per month	Transported to the nearest waste disposal site approved by the local authority.

Waste Type	Source	Estimated quantity	Method of disposal
All non-recyclables waste	Construction activities	5-10 kg per day	Transported to the nearest waste disposal site approved by the local authority.
Hazardous Waste			
Used oil / waste oil	Construction machinery	5-10 litres per month	Disposed of at appropriate hazardous waste management facilities (e.g. Golden Dowa Eco-system Myanmar Co. Ltd, which is located at Thilawa of Yangon Region).
Oil contaminated rags	Cleaning activities	1-2 kg per month	Disposed of at appropriate hazardous waste management facilities approved (e.g. Golden Dowa Eco-system Myanmar Co. Ltd, which is located at Thilawa of Yangon Region).

Wastewater generated during the construction phase will include domestic sewage from labour camp. A sewage system will be constructed for the labour camp which should consist of soak pits for the collection of wastewater from the labour camp kitchen and washing area. Sewage from the toilets should be discharged into septic tanks. Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility.

4.4.2 Operation Activities

It is expected that the commissioning and operation of the Kandok windfarm will commence in the Q3 of Year 2. Maintenance activities of the windfarm should be limited in scale. The windfarm is designed for an operational life of 25 years. However, there is currently no confirmed plan of decommissioning of the Project.

4.4.2.1 Meteorological Mast

Two meteorological (met) masts have been erected on site for the operational lifetime of the Project (*Figure 4.1*). The met masts are 120 m high. On-site maintenance inspections will be carried out on the met masts at regular intervals to ensure the wind data is being recorded and stored correctly. Regular maintenance checks will also be carried out at regular intervals to ensure the masts continue to be structurally safe.

4.4.2.2 Turbine Operation and Maintenance

Most day-to-day facility operations will likely be done remotely through the use of computer networks and by a small team.

Once constructed, it is expected that the Project Site will have regular gearbox maintenance and blade inspection. Maintenance activities normally consists of the following:

- Visual inspections;
- Hydraulic system adjustments;
- Gearbox oil sampling, testing and extractions;
- Filter changes (as necessary); and

- Annual shut-down maintenance, which will mostly include cleaning, greasing, changing mechanical parts, etc.

4.4.2.3 Workforce

During operation it is expected that there will be a limited number of full time staffs working onsite for security, operation and civils/caretaker purposes. They will be working from the O&M building (*Figure 4.1*).

4.4.2.4 Traffic

Traffic during operation will be limited to maintenance vehicles and movement of employees around the Project Site. Maintenance vehicles will use the access road for initial service and routine maintenance.

4.4.2.5 Waste Generation

Waste is mainly generated from packaging, food, consumables and maintenance work. Typically, waste generated from maintenance works includes, but not limited to, topping up of hydraulic and transformer oil, greasing of bearings, painting of equipment; and replacing oil/dry filters, capacitors, and electrical panels. Replaced mechanical parts can either be sent for recycling or refurbishment. The disposal route of the wastes generated during operation and maintenance will be the same as the construction phase which are presented in *Table 4.4*.

Wastewater will be generated from the O&M building where the limited number of operational staffs will be working from. A sewage system should be available for the O&M building which should consist of soak pits for the collection of wastewater from the kitchen and washing area. Sewage from the toilets should be discharged into septic tanks. Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility.

4.5 Comparison and Selection of Project Alternatives

Consideration of project alternatives is a fundamental requirement in the planning of any project as a means of avoiding or reducing adverse environmental impacts and maximising or enhancing project benefits. Several options that have been / are considering for the Project include the following:

- Construction of new access roads versus improvement of existing access roads – it is proposed to improve existing access roads from the Minbu offloading area to the Windfarm Site as well as within the Windfarm Site instead of construction of new roads. Generally, improvement of existing roads will involve less Powered Mechanical Equipment (PME) to be used, thus would have gaseous and noise emission reduced when compared to construction of new roads. In addition, improvement of existing roads will mostly be undertaken on land already modified by development which will reduce the extent of direct loss of natural habitats as well as the requirement of land take from households.
- Turbine siting – a number of constraints within the Windfarm Site have been considered when selecting the wind turbine locations in order to avoid impacts to nearby sensitive receivers and infrastructures as well as ensure stability of the turbine. The constraints and setback distance that have been considered are provided in *Table 4.5*. The turbine locations have also avoided reserved forest and monastery area to avoid direct impacts to them as well as slope of greater than 13% for safety consideration.

Table 4.5 Turbine Location Buffer for Layout Finalization

Constraints	Setback Distance	Remarks
Building, village, town	345 m	A setback distances of 1.5 x turbine height is maintained between turbine and nearby building as recommended by the WBG EHS Guidelines for Wind Energy (2015) to reduce risk of blade throw.
Roads	95 m	The minimal setback distance to roads was chosen according to transportation requirement and construction constraints.
Waterways	50 m	Based on foundation requirement of turbine.
Coal Mines	65 m	Based on foundation requirement of turbine.

5. DESCRIPTION OF THE ENVIRONMENT

This section is structured to provide information on the environmental and social baseline characteristics and conditions in the Project Site and its Area of Influence (AOI). The discussion is limited to the factors and environmental and social components that could have an impact on the Project, or which may be impacted by the Project.

5.1 Setting the Study Limits

The AOI of the Project encompasses:

- The primary Project Site where windfarm facilities will be installed; and
- Areas potentially affected by the cumulative impacts from other developments as well as induced activities of the Project.

It should be noted that the AOI for a particular resource/ receptor may vary depending on the nature of the change caused by the Project activities and the type of effect being considered, but in each case it is defined to include all the area within which it is likely that potentially significant impacts could result. For example, a 300 m AOI would be considered as sufficient for construction noise given the localised nature of noise impacts while the AOI for water quality impacts due to unplanned spills would cover the downstream area where elevated pollutant level is expected, which is often more than 300 m. As such, the AOI for each specific resource / receptor / impact will vary and these are defined in the sections below.

5.2 Methodology and Approach

The information provided in this section is based on data collected from primary and secondary sources. Primary environmental and social data were collected in 2018 for the EIA, via a series of field surveys as well as Scoping and EIA consultations. Secondary sources include a desktop review of published information, supplemented with information provided by IMWP and through review of available ERM in-house literature. These data sources have been supplemented by data from a variety of stakeholders, including government bodies (e.g. Minhla Forestry Department), Non-Governmental Organisations (NGOs), Civil Society Organisations (CSOs) and local communities.

The objective of this section is to ensure there is a robust environmental and social baseline for the Study Area against which the potential Project impacts can be assessed.

5.3 Public Administration and Planning

The Project is located in the Minhla Township of Magway Region. Eight public socio-economic development plans in the same region of the Project have been identified, including one road and bridge project, two power supply projects and five water supply projects [(1)]. These projects are not located in the same township of the Project Site.

5.4 Protected and Environmentally Sensitive Areas

The Study Area lies within the Irrawaddy Plains Endemic Bird Area (EBA) [(2)] which is a large (160,000 km^2) area that covers two restricted-range bird species endemic to the dry forest and scrub habitat; the Hooded Treepie *Crypsirina cucullata,* classified as on the International Union for Nature

(1) Japan International Cooperation Agency (2017) Preparatory Survey for Regional Development for Poverty Reduction Phase II Final Report (accessed from: http://open_jicareport.jica.go.jp/pdf/12270443_01.pdf on 14 December 2017)

(2) An EBA is an area that encompasses the overlapping breeding ranges of two or more restricted-range bird species.

Conservation (IUCN) Red List [1] as Near Threatened (NT) and White-throated Babbler, *Chatarrhaea gularis,* classified on the IUCN Red List as Least Concern (LC) (BirdLife International, 2018).

Data provided from the Minhla Forestry Department in July 2018 indicates that the proposed Study Area will encroach onto a small area of the Shan Dat Reserved Forest.

Key Biodiversity Areas (KBAs) have been identified in Myanmar and are regarded as areas holding significant populations of species of high conservation concern but are not legally recognised nor designated as protected areas in Myanmar (World Database of KBAs, 2018). KBAs close to the proposed Study Area is shown in *Table 5.1.*

One of the closest KBA to the Project Site is the *Ayeyarwady River: Sinbyugyun to Minbu Section KBA* which is also an Important Bird Area (IBA). This area is triggered by the presence of winter migratory and congregatory birds: Bar-headed Goose *Anser indicus* and the Ruddy Shelduck *Tadorna ferruginea* which are classified as Least Concern (LC) under the IUCN Red List.

The closest legally protected area is the Shwesettaw Protected Area, which is managed by the Forestry Department and is a designated Wildlife Sanctuary. This area lies in the same location as the Shwesettaw KBA which is 31 km from the windfarm facilities. This area is triggered by the presence of the Eld's Deer *Rucervus eldii,* Endangered (En) and the Burmese Starred Tortoise *Geochelone platynota,* Critically Endangered (Cr) (Protected Planet, 2018).

An overview of sensitive environmental receptors close to the Study Area is provided in Table 5.1 and *Figure 5.1.*

(1) The IUCN Red List of Threatened Species assess the risk of extinction to species, categories are; Extinct (EX), Extinct in the wild (EW), Critically endangered (CR), Endangered (EN), Vulnerable (VU), Near threatened (NT), Least concern (LC), Data deficient (DD), and Not evaluated (NE).

Table 5.1 Protected or Sensitive Areas in the Study Area

Site	Key Species (IUCN status in brackets)	Nearest Distance from Windfarm Site
Ayeyarwady River: Sinbyugyun to Minbu Section IBA and KBA	Bar-headed Goose *Anser indicus* (LC) and the Ruddy Shelduck *Tadorna ferruginea* (LC)	33 km NE
Man Chaung KBA	Southeast Asian Softshell Turtle *Amyda cartilaginea* (VN) and the Burmese Peacock Softshell *Nilssonia formosa* (EN)	31 km NW
Shwesettaw KBA and Protected area	Eld's Deer *Rucervus eldii* (EN) Burmese Starred Tortoise *Geochelone platynota* (CR)	31 km NW
Irrawaddy Plains Endemic Bird Area	Hooded Treepie (*Crypsirina cucullata*) NT White-throated Babbler (*Chatarrhaea gularis*) LC	0 km
Shan Dat Reserved Forest	According to information provided by Minhla Forestry Department, this forest is not considered as protected forest which are of higher conservation value.	0 km
Army Controlled Reserved Forest	According to information provided by Minhla Forestry Department, this forest is not considered as protected forest which are of higher conservation value.	20 km N
North Sabwet East Reserved Forest	According to information provided by Minhla Forestry Department, this forest is not considered as protected forest which are of higher conservation value.	20 km N
Pagangan Reserved Forest	Based on information collected by Minhla Department of Forestry there are numerous species recorded as protected.	20 km N

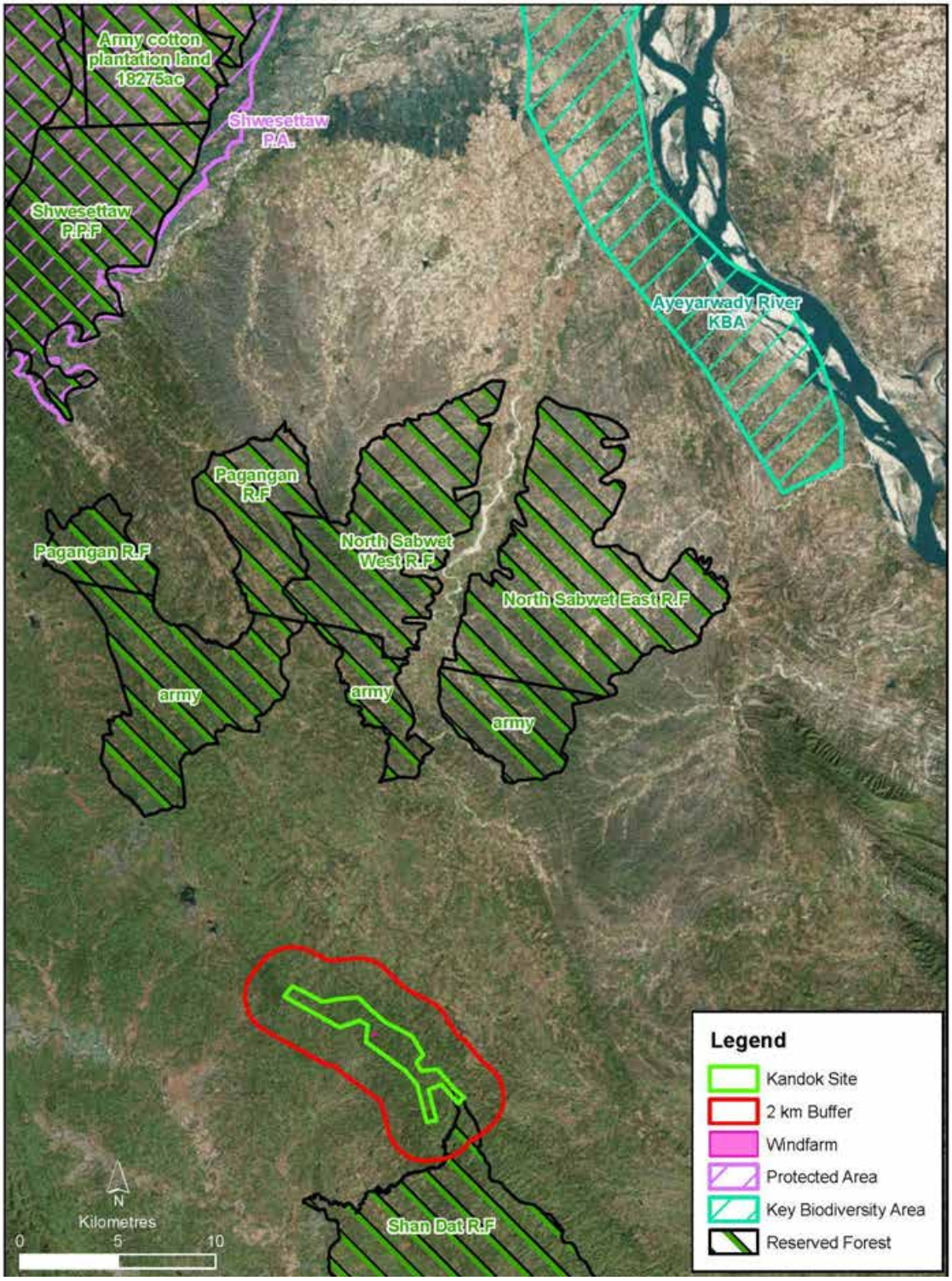


Figure 5.1 Sensitive Areas in the Study Area

5.5 Physical Components

5.5.1 Air Quality

Secondary data are not available on ambient air quality in the Study Area. The principal sources of emissions to the atmosphere in the immediate vicinity of the Study Area are likely to be from household fires for domestic purposes (i.e. heating and cooking), dust emissions from vehicle transportation on the unpaved road and coal mining activities in the vicinity.

Air quality sensitive receivers (ASRs) within 500 m of the Project Site boundary may be affected by emissions of dust and particulate matter from construction activities of the Project (please refer to *Section 6.3.1*). These includes buildings, coal mine camp and monastery with no main village settlement (*Figure 5.2*). There would not be any air emissions from the wind turbines and thus ASRs are not identified for the operation phase.

Given that operation of the wind turbines will not have any air emission and the dust impacts from construction is unlikely to affect the nearest village (Set Set Yo Village) which is located 0.9 km (0.5 miles) from the Project Site (*Figure 5.2*), no further baseline air quality survey has been undertaken for this EIA.

5.5.2 Noise

Secondary data are not available on ambient noise in the Study Area. The principal sources of noise in the immediate vicinity of the Study Area are likely to be from vehicle transportation and coal mining activities in the vicinity.

Noise sensitive receivers (NSRs) within 2 km of the Project Site boundary may be affected by operational noise impacts of the Project (please refer to *Section 6.4.1*). These includes buildings, coal mine camp, monastery and the Set Set Yo Village (*Figure 5.3*). For construction phase noise impacts, NSRs within 300 m from the Project activities may be affected and are thus include in the NSRs identified in *Figure 5.3* (please refer to *Section 6.3.2*).

Given that the nearest village (Set Set Yo Village) is located 0.9 km (0.5 miles) from the Project Site (please refer to *Section 5.7.1*), construction noise is unlikely to be a major issue from the Project. In addition, operational noise assessment has been undertaken in accordance with the Myanmar NEQ for noise and WBG EHS Guidelines for Wind Energy (2015). The assessment has shown that the operational noise level is in compliant with the noise criteria as stated in the Myanmar NEQ for noise and WBG guidelines (please refer to *Section 6.4.1*). As such, no further baseline noise survey has been undertaken for this EIA.

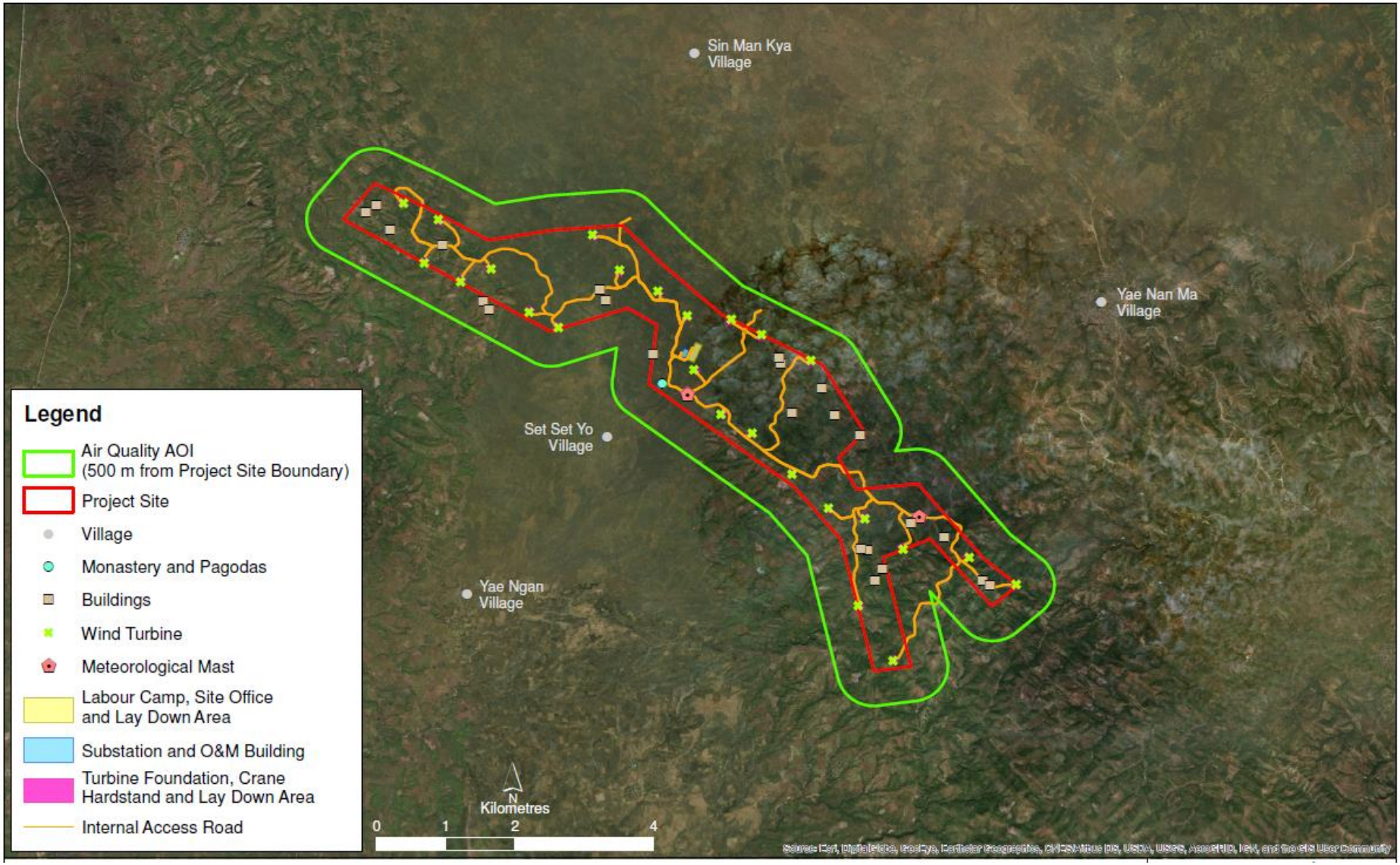


Figure 5.2 Air Quality Sensitive Receiver

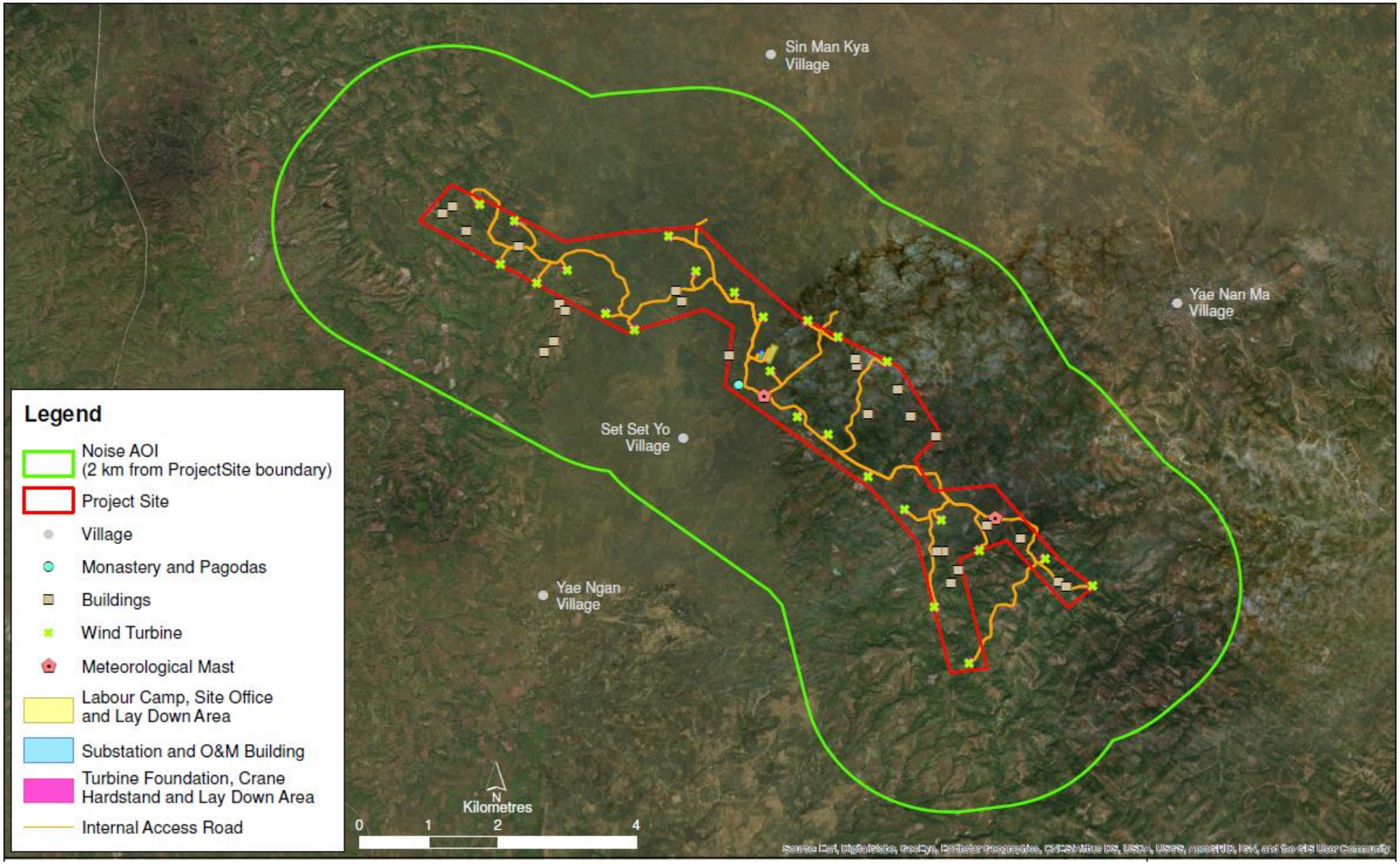


Figure 5.3 Noise Sensitive Receiver

5.5.3 Water Quality

The water resources used by the nearest community is located at Set Set Yo Village which is 0.9 km (0.5 miles) from the Project Site (please refer to *Section 5.7.1*). In addition, siting of the wind turbine has considered location of nearby watercourse within a setback distance of at least 50 m. Given the above and the sewage from the Project will be controlled as specified in *Section 4.4.1.7* and *Section 4.4.2.5*, impacts to water quality is unlikely to be a key issue from the Project and thus no baseline water quality survey has been undertaken.

It should be noted that the nearby mining activities and erosion of the unpaved road could potentially be the existing sources of water quality pollution which are not caused by the Project.

5.5.4 Geology and Soils

The geological landscape in the Study Area is characterised by the Indo-Burman Ranges which branch southwards from the eastern Himalayas and the Irrawaddy Valley Basin, also known as the Inner Myanmar Tertiary Basin. The soil type is generally classed as Luvisol or Cambisol type soil, which are a characteristic soil of forested regions [(1)].

5.5.5 Climate and Meteorology

The weather and climate of Myanmar is primarily influenced by the Northeast and the Southwest monsoons and the short transitional periods between them. The southwest monsoon (June to September) is characterised by extensive cloud cover, light rain almost daily, interspersed with rain squalls or thunderstorms. The northeast monsoon (December to April) brings less cloud, scant rainfall, mild temperatures and lower humidity during winter (Climate-data.org, 2018).

The Central Dry Zone of Myanmar is usually defined to include the majority of three regions (Magway (in which the Project is located), Mandalay, and Sagaing) occupying the centre of Myanmar. Rain is concentrated largely in the period May-October, with an intermediate dry period often occurring during June or July. The lengthy period without precipitation, relatively high average temperatures, and generally light shallow soils, result in semi-arid conditions restricting agricultural potential in the absence of irrigation (LIFT, 2014).

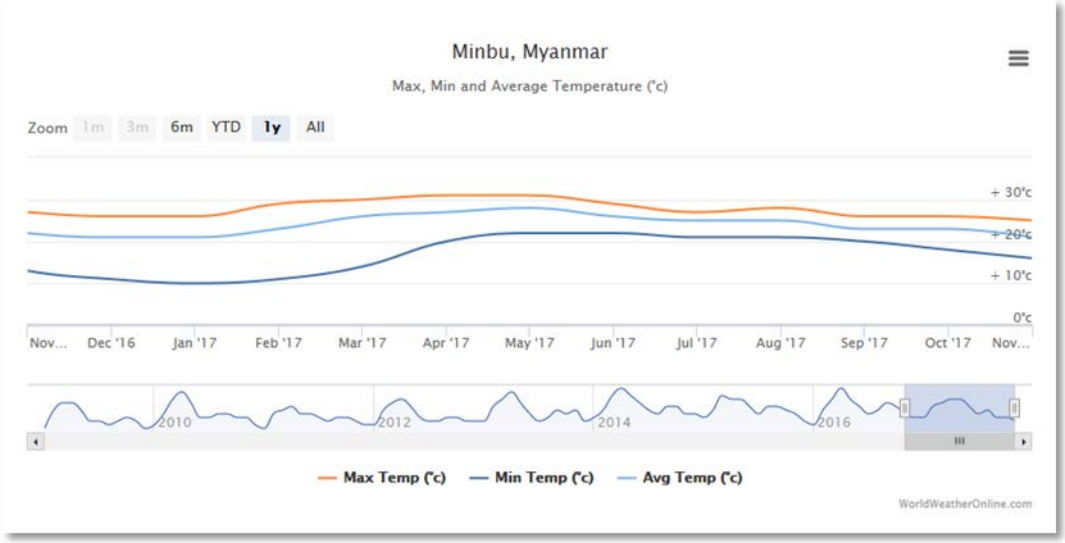
Minbu is located around 46 km from the Project Site and has a tropical climate. The temperature averages 27.6 °C and around 839 mm of precipitation falls annually (Climate-data.org, 2018). The driest month is January, with 1 mm of rain and the wettest is September, averaging 147 mm. Wind speed is seasonally highest in February to April, averaging at 9.2 mph in March 2017 (World Weather Online, 2018). Information on annual average rainfall, temperature, and wind speed is present in *Table 5.2*, *Figure 5.4* and *Figure 5.5.*

Table 5.2 Average Rainfall and Temperature at Minbu (between 1982 and 2012)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	21.9	24.3	28.7	32.2	31.7	29.4	28.9	28.6	28.6	28.3	25.8	22.1
Min. Temperature (°C)	14.6	16.1	20.6	25.1	26	25.2	25.1	24.8	24.5	24.1	20.9	16.1
Max. Temperature (°C)	29.2	32.5	36.8	39.4	37.5	33.7	32.8	32.5	32.8	32.5	30.7	28.1
Avg. Temperature (°F)	71.4	75.7	83.7	90.0	89.1	84.9	84.0	83.5	83.5	82.9	78.4	71.8
Min. Temperature (°F)	58.3	61.0	69.1	77.2	78.8	77.4	77.2	76.6	76.1	75.4	69.6	61.0
Max. Temperature (°F)	84.6	90.5	98.2	102.9	99.5	92.7	91.0	90.5	91.0	90.5	87.3	82.6
Precipitation / Rainfall (mm)	1	1	5	19	130	137	108	129	147	116	44	12

Source: Climate-Data.Org (2018)

(1) Stokes R.B (1988) A Review of the Geology of Myanmar.



Source: World Weather Online (2018)

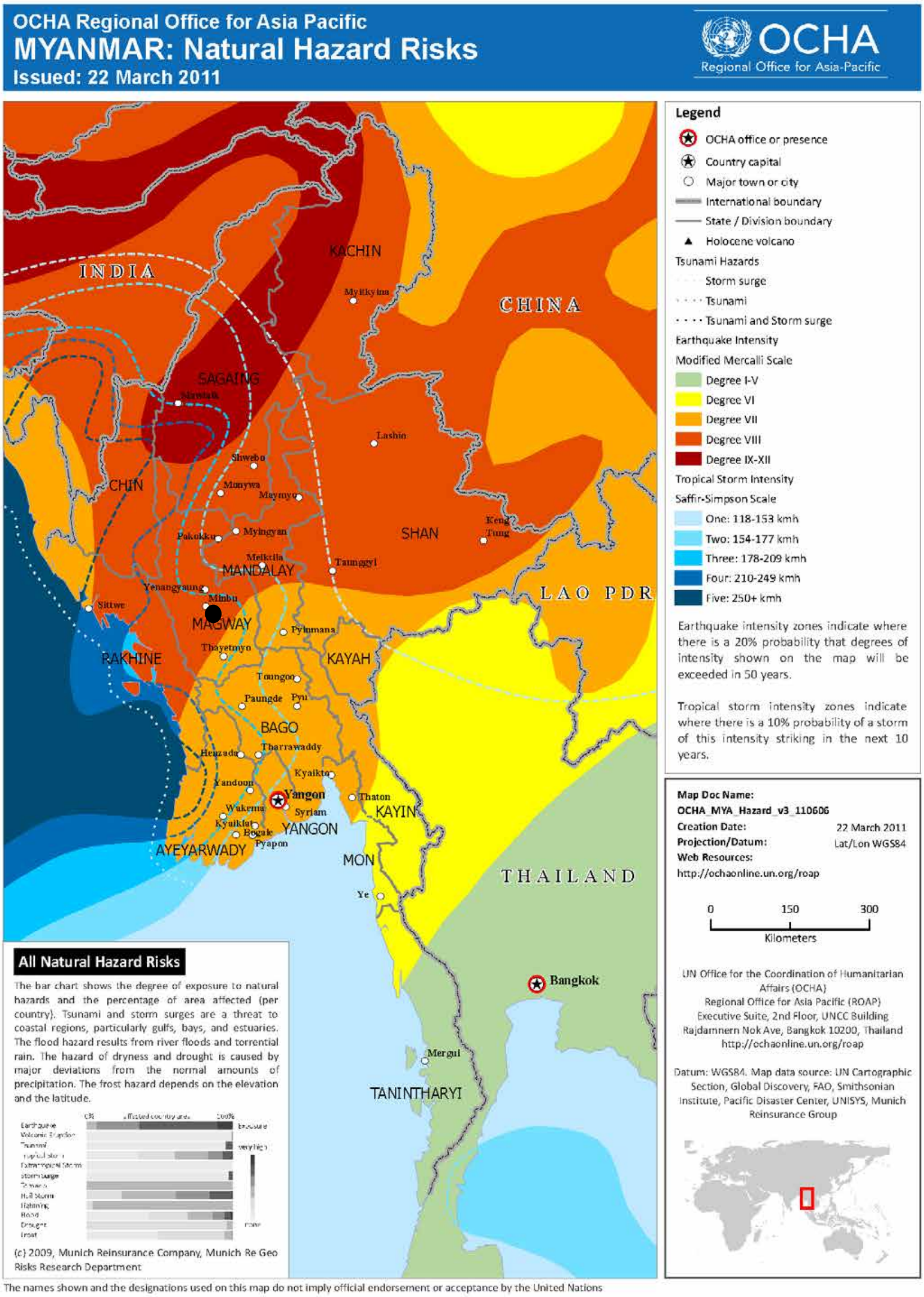
Figure 5.4 Temperature Data for Minbu (2017)

Source: World Weather Online (2018)

Figure 5.5 Wind Speed at Minbu (2017)

5.5.6 Natural Hazards

Myanmar is exposed to multiple natural hazards including cyclones, earthquakes, floods, and fires. The country has been periodically hit by natural disasters and the risk throughout Myanmar is shown in ***Figure 5.6***. This shows that the Project is located in a moderately sensitive area for natural disasters.



Project location shown as black dot

Figure 5.6 Natural Hazard Risks in Myanmar (Source: OCHA, 2011)

5.5.6.1 Earthquakes

A review of available literature has shown that Myanmar is seismologically unstable and vulnerable to earthquakes due to its location in the active Alpide seismotectonic belt and the young Alpine-Himalayan-Sumatran orogenic belt (Theilen and Pararas-Carayannis, 2009). Historic records show that at least 15 major earthquakes with magnitudes M≥7.0 Richter Scale have occurred in Myanmar in the last hundred years. These earthquakes occurred within Myanmar in the last century, at Bago (5 May 1930), at Yangon (27 March, 16 May and 21 May 1931), at Sagaing (16 July 1956) and at Bagan (8 July 1976) (Union of Myanmar, 2009). More recently, a M6.8 RS occurred with an epicentre west of Chauk, adjacent to Rakhine State (24 August 2016).

5.5.6.2 Storms and Cyclones

Gale force winds (17.2 ms-1 or over) are mainly associated with local rain squalls and with severe tropical storms or cyclones most associated with the summer monsoon. The threat of cyclones with winds above 32.7 m s-1 is greatest during the transition periods between the monsoons when solar heating is at its greatest (OCHA, 2011).

5.5.6.3 Flooding

During the rainy season of 2015 (July, August and September) 18 out of the 25 townships were affected by flooding which required emergency response. There were six affected villages in the Minhla Township and these were classed as being partially affected with minor damages and partial loss of assets. By December 2015, all affected villages in the Minhla Township had recovered to their original state (WASH, 2015).

In June 2018, heavy rainfall led to severe flooding in Magway Region. According to the Ministry of Social Welfare, Relief and Resettlement, this caused five fatalities and damaged houses, roads, bridges and farmlands in Minbu, Myothit, Salin and Pwintphyu Districts (The Irrawady, 2018; MITV, 2018).

5.6 Biological Components

5.6.1 Desktop Assessment

The desktop assessment includes a review of:

- Environmental studies, scientific literature or any other type of pre-existing biodiversity assessments available for the Project Study Area and within the Area of Influence;
- National or regional plans (e.g., Strategic Environmental Assessments, National Biodiversity Strategies and Action Plans);
- Existing conservation programs or initiatives in the Project Site and its surroundings;
- Existing data (e.g. IUCN Red List of Threatened Species, Global Invasive Species Database, IUCN Species Action Plans and nationally protected species lists), to identify if there are native and/or migratory species associated within the Study Area and AOI;
- Existing data to identify any potential invasive species in the Project Site and the surrounding landscape; and
- Location of any habitats of conservation significance, including World Heritage Areas; Protected Areas; Key Biodiversity Areas (Important Bird and Biodiversity Areas and Alliance for Zero Extinction sites), Endemic Bird Areas; Tiger Conservation Landscapes.

5.6.1.1 Ecoregion Description

The WWF EcoRegions [1] that coincide with the Project Site are shown in *Table 5.3*.

Table 5.3 WWF EcoRegions coinciding with Project Site

EcoRegion	Size (ha)	Status
Irrawaddy moist deciduous forests	13,830,536	Vulnerable

Irrawaddy Moist Deciduous Forests

This ecoregion is located within the Irrawaddy River Basin, the catchments of Bago Yoma, and the foothills of Rakhine Yoma [2]. The soils belong to the Irrawaddian series, which consists of the fluvial sands with terrestrial and aquatic vertebrate fossils. Silicified wood fossils are found among ferruginous, calcareous, and siliceous concretions, with quartz pebbles. The Irrawaddian rocks are distinct from other Tertiary rock groups. Their occurrence reaches up to the Kachin State in the north and in Chindwin districts in Sagaing division. The southern distribution is down to Rangoon.

Moist deciduous forests dominate this ecoregion but are found not only in the Irrawaddy River Basin but also throughout the country along the Chindwin, Sittang, and Salween rivers. Topographically the forests are found on well-drained hilly or undulating land up to 1,000 m. The region is best characterized by more than 1,500 mm rainfall interrupted by dry spells. According to Champion's classification, it is moist upper mixed deciduous forest.

The forests are closed high forest. They cover large areas in Pegu Yoma. The westward extension is across Irrawaddy River onto Rakhine Yoma foothills, and the northern extension is up to the Kachin State. Trees reach a height of more than 30 m. The dominant species are teak (*Tectona grandis*) and Pyinkado or ironwood (*Xylia kerri*). Species composition is varied and intimately mixed with bamboo groves. In the matrix of deciduous species, some evergreen dominants appear in places.

Common tree species are teak (*Tectona grandis*), ironwood (*Xylia kerri*), *Terminalia tomentosa*, *T. belerica, T. pyrifolia, Homalium tomentosum, Salmalia insigni, Ginelina arborea, Lannea grandis, Odina wodia, Pterocarpus macrocarpus* (Burma Padauk), *Millettia pendula, Berrya ammonilla, Mitravgyna rotundifdlia* and *Vitex spp.*

Bambusa polymorpha and *Cephalostachyum pergracile* are the most common bamboos in lower Myanmar. In the north *Dendrocalamus hamiltonii, D. membranaceus* (Wapyu), and *Cephalostachyum pergracile* are common bamboos.

The undergrowth often consists of *Leea* spp., *Barleria strigosa*, and other *Acanthaceae*. *Eupatorium odoratum*, a noxious weed, colonized the areas when timber extraction left gaps.

5.6.1.2 Internationally Recognised Areas

World Heritage Areas

World Heritage Areas are sites that are selected by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as having cultural, historic, scientific or other form of significance [4]. These areas are legally protected by international treaties and demarcated by UNESCO as protected zones. This allows for practical conservation of areas which would otherwise be subjected to threats

(1) Ecoregions are large units of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions. Ecoregions are used to classify the entire globe based on original ecological characteristics, and do not imply conservation priority or current conditions. Some ecoregions are however considered priorities for conservation due to past or current threats.

(2) https://www.worldwildlife.org/ecoregions/im0117

such as uncontrolled and unrestricted access, and associated activities such as poaching and illegal logging.

World Heritage Areas was not identified within 50 km from the Project Site. Therefore, world heritage sites are not considered relevant for this assessment.

Ramsar Sites

The Convention of Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for the conservation and use of wetlands and their resources [(1)]. The Ramsar Convention for Myanmar was effective from 17 March 2005, and currently has five sites designated as Wetlands of International Importance which cover an approximate surface area of 156,541 ha [(2)].

The Ramsar sites in Myanmar are Gulf or Mottama (Ramsar site no. 2299), Indawgyi Wildlife Sanctuary (Ramsar site no. 2256), Lnlay Lake Ramsar Site (Ramsar site no. 2356), Meinmahla Kyun Wildlife Sanctuary (Ramsar site no. 2280) and Moeyungyi Wetland Wildlife Sanctuary (Ramsar site no. 1431). As none of these seven sites are within 50 km of the Project Site, Ramsar sites are not considered relevant for this assessment.

Key Biodiversity Areas

Please refer to *Section 5.4.*

Endemic Bird Areas

Please refer to *Section 5.4.*

An overview of sensitive environmental receptors close to the Project Site are provided in *Table 5.4* and *Figure 5.1*.

5.6.1.3 Nationally Protected Areas

Data provided from the Minhla Forestry Department in July 2018 indicates that the proposed Study Area will encroach onto a small area of the Shan Dat Reserved Forest. An Army Controlled Reserved Forest, North Sabwet West Reserved Forest and Pagangan Reserved Forest are located more than 10 km north to the Project Site (*Table 5.1* and *Figure 5.1*). According to information provided by Minhla Forestry Department, these forests are not considered as protected forest which are of higher conservation value.

5.6.1.4 Tiger Conservation Landscapes

Tigers are large carnivores that occur at low densities and require large home ranges to harbour viable populations [(3)]. Much of the global conservation policy on endangered species is focused on land allocation schemes for supporting tiger populations, in addition to promoting and maintaining connectivity among fragmented landscapes and populations [(21)]. Tiger Conservation Landscapes (TCLs) are defined as identified connected areas of suitable tiger habitat that can support at least five adult tigers and where tiger presence has been confirmed in the past decade [(4)].

[1] The Ramsar Convention on Wetlands (2014) About the Ramsar Convention. Retrieved from https://www.ramsar.org/about-the-ramsar-convention

[2] The Ramsar Convention on Wetlands (2011) The Annotated Ramsar List of Wetlands of International Importance. Retrieved from https://rsis.ramsar.org/ris-search/?f[0]=regionCountry_en_ss%3AMalaysia

[3] Linkie, M., Wibisono, H.T., Martyr, D.J. & Sunarto, S. (2008) *Panthera tigris* ssp. *sumatrae*. The IUCN Red List of Threatened Species 2008: e.T15966A5334836. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T15966A5334836.en

[4] Dinerstein, E., C. Loucks, A. Heydlauff, E. Wikramanayake, G. Bryja, J. Forrest, J. Ginsberg, S. Klenzendorf, P. Leimgruber, T. O'Brien, E. Sanderson, J. Seidensticker and M. Songer (2006) Setting Priorities for the Conservation and Recovery of Wild

Three TCL classes exist within Myanmar, namely Class I. Class I indicates a landscape that have habitat to support at least 100 tigers and there is evidence of breeding, minimal to moderate levels of threat and conservation measures in place 21.

The Project Site does not overlap with any identified TCL class. The nearest identified TCL, Northern Forest Complex - Namdapha - Royal Manas, is located above 50km west of the Project Site.

5.6.2 Results of Field Surveys

5.6.2.1 Study Area

The Study Area is located in an area of mixed natural habitat and cultivated land. The type of vegetation in the area is predominantly dry deciduous forest, monoculture plantation and crop cultivation. Cultivated land is considered as modified habitat. Environmental baseline surveys for flora and fauna have been conducted in 2018 to verify the existing conditions of the Study Area.

To characterise the baseline in relation to habitats, flora and terrestrial fauna (excluding birds and bats), the Project Site plus a buffer of 2 km has been adopted as the Study Area (*Figure 5.7*). To identify sensitive biodiversity receptors in the wider area, designated and recognised conservation sites have been identified out to 50 km from the Project Site using desk based study information.

5.6.2.2 Methodology and Approach

Baseline data gathering included a desk based study and field surveys. A desk based assessment of the baseline biodiversity of the Study Area was undertaken using publicly available data and satellite imagery. Surveys of the habitats, flora and fauna within the Study Area was undertaken between March and November 2018.

Baseline data collection for habitats and flora were collected by undertaking walkover surveys at representative points across the Project Site. Due to the relatively degraded nature of the habitats recorded on site, specific surveys for individual receptor groups (amphibians, reptiles, mammals etc.) were not considered necessary following the initial baseline surveys. Surveys included habitat mapping and targeted sampling at four representative sample plots within different identified habitats in the Study Area. The location of the surveys points are shown in *Figure 5.7*.

A bat survey was undertaken during the wet season (July 2018). Sampling methods comprised live-trapping using mist nets and harp traps, acoustic surveys using static and mobile detectors, and interviews undertaken by two surveyors. Meteorological data were also incorporated into the assessment. Survey locations are shown in *Figure 5.7.* In total, 242 hrs of passive acoustic sampling (22 nights) were achieved with the static detector in two locations within the Project Site. Active sampling effort (5–15 July) achieved was a total of 3,196.5 m^2 mist-net-hours, 158.4 m^2 harp-trap-hours and 91.5 hrs of acoustic sampling (8.3 nights) at eight (8) discrete locations within this area detailed in *Figure 5.7*.

To record the use of the site by birds in flight, baseline vantage point (VP) surveys of the Project Site were undertaken during the March and November migration seasons. In total 36 hours of VP survey were undertaken from each of six VP locations, covering the full area of the Project Site during each season. The surveys were undertaken from areas of raised ground along the ridge line running through the Project Site which provided coverage across the whole Project site, with a watch area of approximately 180° viewed from each VP (*Figure 5.8*). The survey locations and areas are presented in *Figure 5.7*.

During the VP surveys, flight activities by target species were recorded. Target species comprised:

Tigers: 2005–2015. A User's Guide. WWF, WCS, Smithsonian, and NFWF-STF, Washington, D.C. – New York. Retrieved from: https://c402277.ssl.cf1.rackcdn.com/publications/639/files/original/TCL_UserGuide2006.pdf?1378820490

- all raptors;
- all waterfowl;
- all waders; and
- all soaring birds (storks, pelicans, cranes etc.).

Survey standards and guidance followed recommended bird survey methods to inform impact assessment of onshore windfarms (Jenkins et al (2015); SNH (2014)).

Furthermore, interview surveys were conducted with local residences during the baseline survey. The interview survey was conducted with intention to collect secondary species data to compile a more robust fauna species list. The interview survey had a particular focus on mammal and herpetofauna species, given the relatively lower encountering rate of these fauna groups. A booklet with mammal and herpetofauna species photos were shown to the local residence during the interview survey.

5.6.2.3 Habitats and Flora

The following three habitat types were recorded during the baseline survey:

- Mixed dry deciduous forest and shrubs;
- Agricultural land; and
- Open area/ abandoned farmland.

All plant species recorded were IUCN LC unless stated otherwise.

Mixed Bamboo and Moist Deciduous Forest

Mixed Bamboo and Moist Deciduous Forest was the dominant habitat type across the Project Site and the Study Area (*Figure 5.9*). The dominant bamboo species recorded was *Dendrocalamus strictus* (Male bamboo, Hmyin-wa), Tree species onsite included *Randia dumetorum* (Say-than-paya), *Tectona grandis* (Teak, Kyun), *Acacia catechu* (Sha), *Bauhinia racemosa* (Bidi leaf tree, Pha-lan), *Taliparitі macrophyllum* (Large-Leaved Hau, Ni-ba-sae), *Terminalia crenulata* (Htauk-kyant), *Phyllanthus emblica* (Indian gooseberry, Zi-phyu) *Dalbergia cultrata* (Indian Blackwood, Yin-daik), *Lagerstroemia parviflora* (Zaung-pa-lae), *Tectona hamiltoniana* (Dahat teak, Da-hat), *Heterophragma sulfureum* (Thit-lin-da), *Dalbergia paniculata* (Hton-pauk), *Lannea coromandelica* (Indian ash tree, Na-be), *Albizia proce*r (White Siris, Sit), *Balanites aegyptiaca* (desert date, Thit-pa-lwe) and *Dalbergia kurzii* (Thit-pok) with shrubs including *Morinda angustifolia* (Morinda, Ni-ba-sae). All species recorded were common and widespread throughout the Magway region with the exception of *Dalbergia cultrata* (Yin-daik) which is listed as Near Threatened on the IUCN Red List.

Thickets of bamboo and forest patches ranged from isolated clumps around cultivated land to larger stands of vegetation. Bamboo and forest vegetation is densest in the southeast of the Project Site, close to the Shan Dat Reserved Forest, to the northwest which opens into a mosaic of shifting cultivation farmland and shrubland.

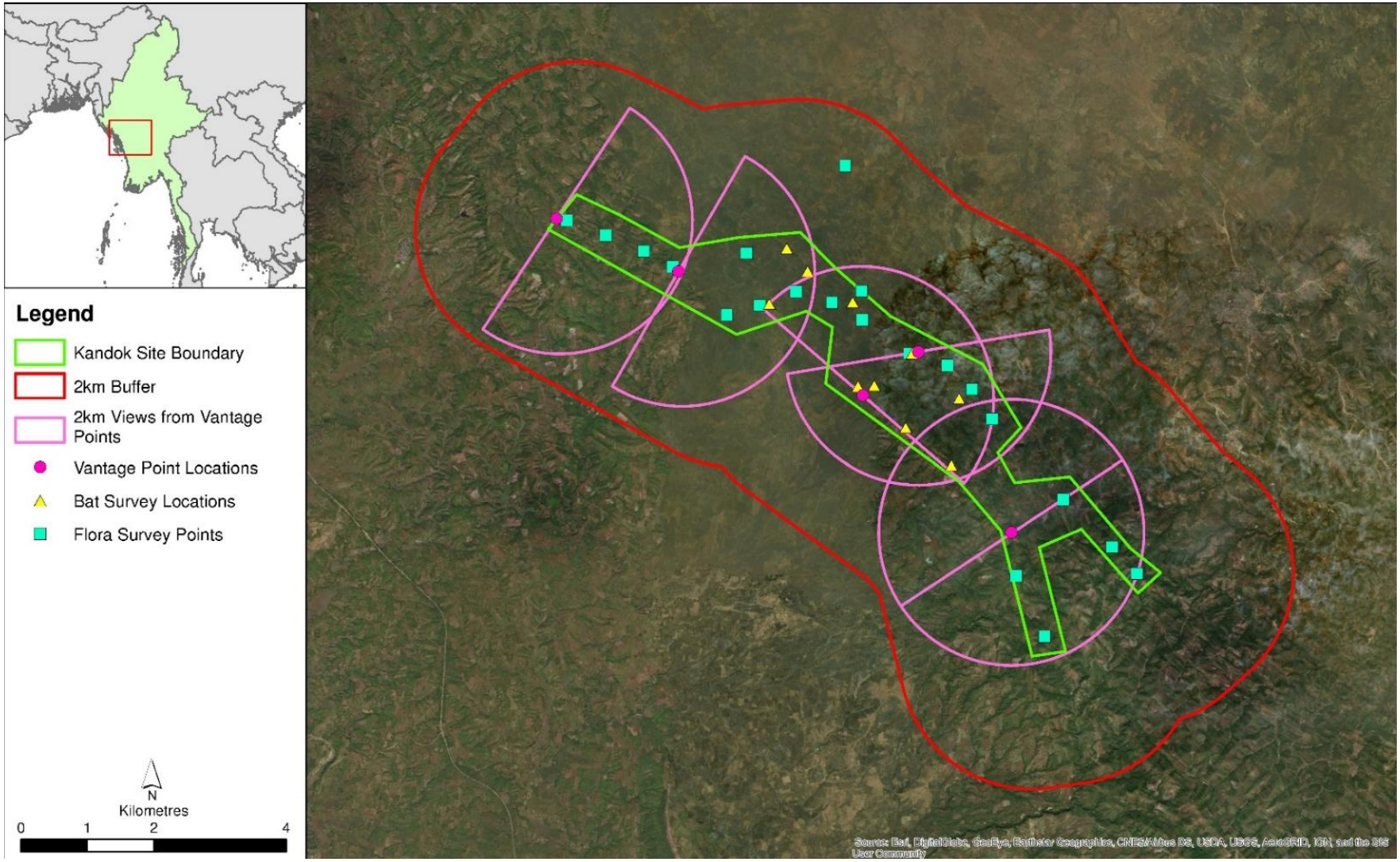


Figure 5.7 Biodiversity Survey Area and Survey Locations

View of Project Site from VP 1

View of Project Site from VP 2

View of Project Site from VP 3

View of Project Site from VP 4

View of Project area Site VP 5

View of Project area Site VP 6

Figure 5.8 View Points of Project Site

Source: ERM (2018)

Figure 5.9 Mixed Bamboo and Moist Deciduous Forest

Crop Cultivation

Parts of the Study Area were used for subsistence and cash crop farming which is managed by periodic burning of fallow vegetation, resulting in a mosaic of crop fields and fallow land (see *Figure 5.10*). The most frequently encountered crops on the Project Site include paddy, sesame, pulses and pigeon pea. Fallow land was dominated by bamboo, native regrowth of shrub and invasive weeds described in *Table 5.4*. Small areas of teak cultivation are apparent in the area.

Source: ERM (2018)

Figure 5.10 Arable and Fallow Land

Waterbodies

The Project Site is generally freely draining with small seasonal streams flowing of the ridgeline. There are two small waterbodies identified (the largest is approximately 0.2 ha in size) near the Project Site. One is a dammed watercourse in the northwest which serves a nearby settlement, and the other two are in the southeast of the site and appear to be natural. A slightly larger (approximately 0.5 ha in size) waterbody lies 100 m to the southeast of the Project Site and larger waterbodies are associated with nearby villages which are used by local communities to provide drinking water for livestock and for domestic use (e.g. washing clothes) (see *Figure 5.11*).

Source: ERM (2018)

Figure 5.11 Waterbody with Surrounding Vegetation

Threatened and Protected Flora

The majority of plant species recorded during baseline surveys are common and widespread and typical of the relatively modified habitats present within the Study Area. The majority of species recorded have not been evaluated by IUCN, but all those that have, are listed as LC apart from *Dalbergia cultrata* which is listed as Near Threatened (NT) on the IUCN Red List and is locally common.

The majority of plant species have also not been evaluated on the IUCN or Myanmar Red List system for identifying threatened species. One IUCN Data Deficient (DD) species *Carica papaya* (Papaya) was recorded onsite. None of the species which have yet to be evaluated by IUCN or under the Myanmar Red List were identified as being of conservation concern during baseline surveys by the local expert leading the flora study.

5.6.2.4 Invasive Species

Ten invasive species have been recorded on site and are shown in *Table 5.4*. *Chromolaena odorata, Ageratum conyzoides, Amaranthus spinosus* and *Mikania micrantha* are all relatively widespread, but are considered to be invasive weeds which outcompete native species and crops and in some cases are noxious as with *Jatropha gossypifolia* and *Tridax procumbens*. Other invasive species listed are (or possibly are) native to Myanmar but are seen as invasive in other countries. Notwithstanding whether these invasive plant are native, they may still populate disturbed land quickly and may outcompete crops.

Table 5.4 Invasive Species Recorded in Project Site

Scientific Name	Myanmar Name	Family	Origin
Ageratum conyzoides	Khwe-thay-pan	Asteraceae	Tropical Americas
Alternanthera sessilis	Pa-zun-sa-yaing	Amaranthaceae	Tropical Asia (Native)
Amaranthus spinosus	Hin-nu-nwe-su-pauk	Amaranthaceae	Tropical Americas
Chromolaena odorata	Bi-zet	Asteraceae	Americas
Eleusine indica	Sin-ngo-myet	Poaceae	Tropics (Native)
Jatropha gossypifolia	Kyet-su-ka-na-kho	Euphorbiaceae	Tropical Americas
Mikania micrantha	Bi-zet-nwee	Asteraceae	Americas
Paderia foetida	Pe-bok-nwee	Rubiaceae	Tropical Asia (Native)
Tridax procumbens	Hmwe-sok-nay-kya	Asteraceae	Tropical Americas
Ziziphus jujuba	Zi	Rhamnaceae	Asia (Native)

5.6.2.5 Mammals

During baseline surveys, an interview survey was conducted with local residents to understand the mammal community. Description of Red Muntjac *Muntiacus muntjak* was described by locals. Brief description of wild cat, wild dogs and Jackal were mentioned, however, these were not identified to species level. With reference to IBAT species database, the wild cat mentioned is anticipated to be Leopard Cat *Prionailurus bengalensis* and jackal is anticipated to be Golden Jackal *Canis aureus,* both species are listed as Least Concern under IUCN Red List (2019).

During the baseline survey, it was observed the habitats within Project Site are modified or frequently receiving disturbance from human activities, including land clearance, burning and cattle grazing.

Therefore, mammal species of conservation significance are not anticipated to occur at the Project Site.

5.6.2.6 Herpetofauna

During baseline surveys, an interview survey was conducted to understand the herpetofauna community. No species of herpetofauna was reported by the interviewed groups.

With reference to IBAT species database, all of the amphibian species and most of the reptile species in the Project Site area are considered as Least Concern by IUCN Red List (2019). The reptile species with conservation status include King Cobra *Ophiophagus Hannah* (IUCN: Vulnerable), Burmese Python *bivittatus* (IUCN: Vulnerable) and Burmese Starred Tortoise *Geochelone platynota* (IUCN: Critically Endangered). The *G. platynota* however is considered locally extinct. Populations of the species have been reintroduced to Lawkanandar, Minzontaung and Shwe Settaw Wildlife Sanctuaries which contain the only populations of this species.

These species are known to use a range of habitat including woodland, shrub land and grassland. However, given the habitats within the Project Site are frequently disturbed by human activities and cattle grazing, the habitats within the Project Site is not anticipated to support herpetofauna species of conservation significance.

5.6.2.7 Bats

Desk Review

Desk review indicates that 37 bat species arranged in eight families have been previously documented in the central Magway / Mandalay region of Myanmar. This can be regarded as a reasonably comprehensive list of species that could occur at the Project Site, albeit incomplete due to low survey coverage. All of the 37 species are listed by IUCN (2019) as Least Concern, although it should be noted that the IUCN Red List categories for SE Asian bat species are currently being updated.

One species documented in the Project Study Area, Indian Flying Fox (*Pteropus giganteus*), is listed on Appendix II of CITES. The nearest colonies of this species to the Kandok Project Site include a colony of ca. 3,500 individuals located at Nyaung Hla, Bagan (144 km to the north) and a colony of ca. 3,500 individuals located at Nyang U, Bagan (164 km to the north) (N. Furey, unpublished data). Both colonies are located on the eastern bank of the Ayeyarwady River.

Live trapping

Over the course of the live trapping, 20 bats representing five species arranged in three families were recorded: Pteropodidae (1 species), Hipposideridae (2) and Vespertilionidae (2) (*Table 5.5*). This is a low capture rate considering sampling effort and likely reflects in part: a) poor weather conditions during the survey period, and b) the relative ineffectiveness of ground-based live-traps in the open habitats that characterised many of the sampling locations.

Acoustic Sampling

A total of 1.31 gigabytes of acoustic activity was recorded from during the 30.3 night survey period which comprised of 868 distinct bat passes. From these data six phonically distinct bat taxa were detected in the acoustic sampling. Reference call data obtained during the survey allowed specific assignment of two phonic types (Lesser Asiatic Yellow House Bat; *Scotophilus kuhlii* and Horsfield's Leaf-nosed Bat; *Hipposideros larvatus*).

The remaining taxa cannot be assigned to species with certainty to the current lack of call data for bat species in Myanmar, although all represent aerial insectivores within the Emballonuridae, Molossidae (phonic type: 24-cFM), Vespertilionidae and/or Miniopteridae (phonic types: 36-cFM, 44-bFM & 50-bFM) shown in *Table 5.5* and exemplar calls in *Figure 5.12*.

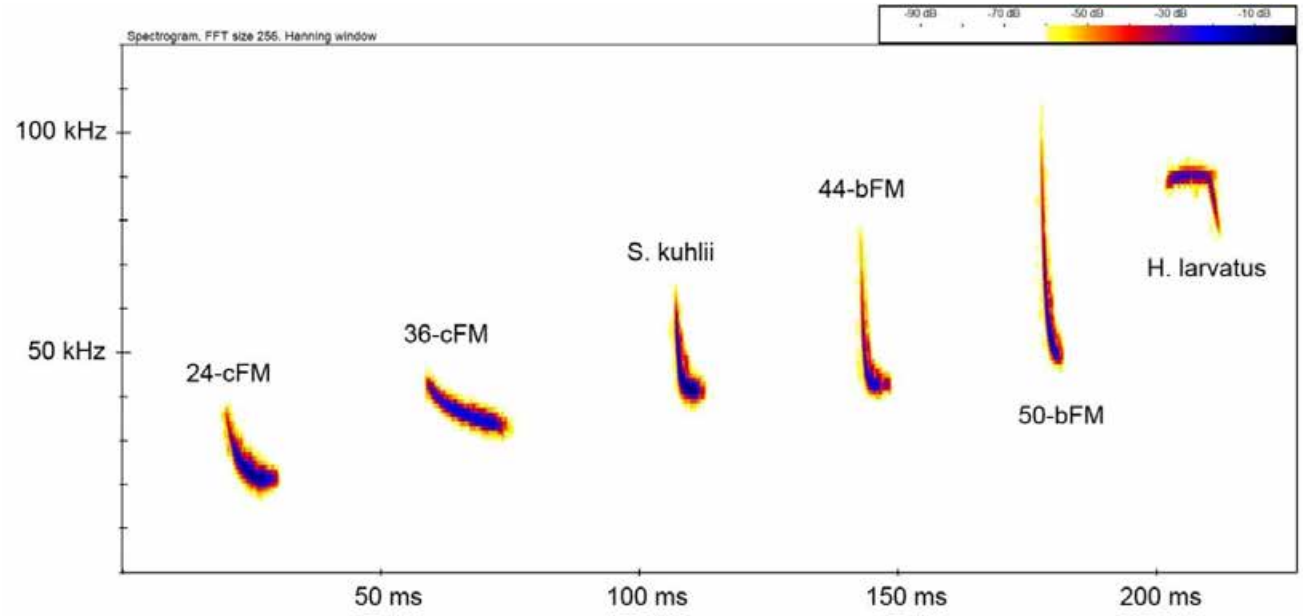


Figure 5.12 Echolocation Calls of Selected Bats at Kandok

Variation over the course of the total 333.5 detector hours (30.3 detector nights) achieved during the survey period, the majority of insectivorous bat activity essentially occurred in the first hour following dusk (nightly mean for 1900–2000 hrs = 23.1%; local sunset times during survey 18:53–18:49) and before dawn (mean for 0500–0600 hrs = 22.6%, local sunrise times during survey = 05:35–05:44) See *Figure 5.13*, although this varied markedly (SD± 24.1 & 21.5 respectively).

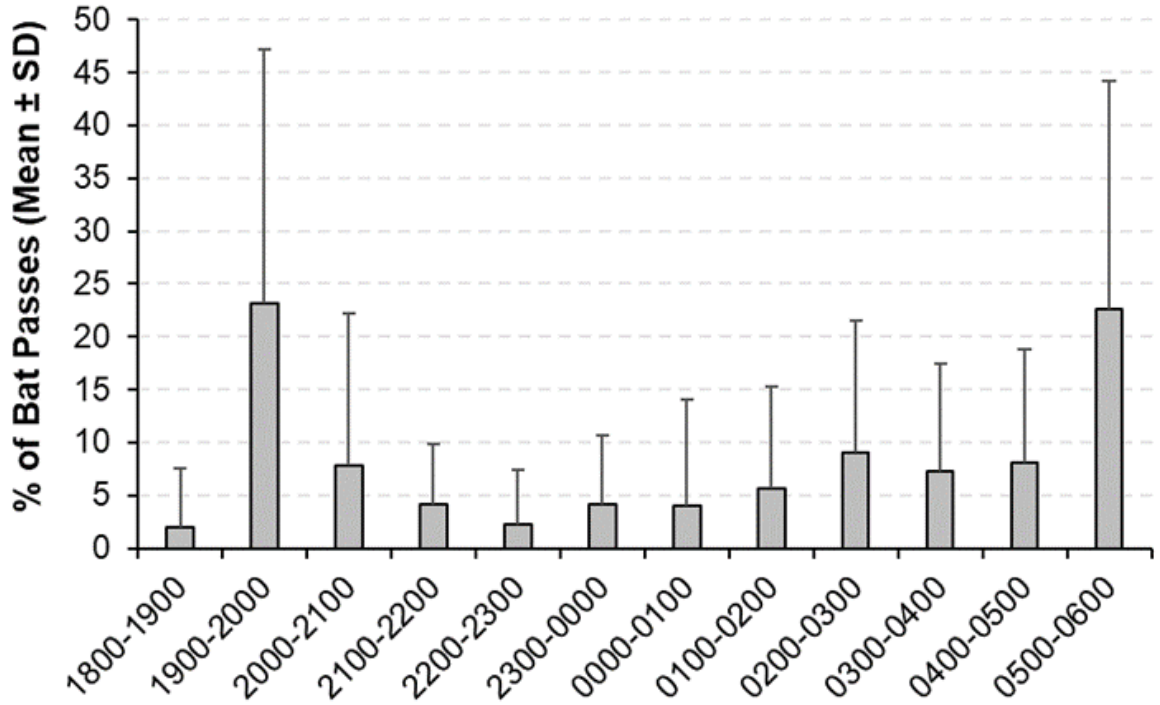


Figure 5.13 Hourly variation in bat activity at Kandok

Roost Surveys

Interviews with local residents and direct observations undertaken during the survey period did not reveal any significant (e.g., >100 individuals) diurnal roosts for bats. No caves were found during the survey period and discussions with residents and field guides also consistently suggested that these do not exist in the vicinity of the Project Site.

Because flying fox (*Pteropus spp.*) colonies —which roost in the open on tall trees—are highly conspicuous and therefore invariably well-known where they occur, the Project Site evidently also does not support these. While two colonies of Indian Flying Fox (*P. giganteus*) do occur approximately 150 km to the north on the eastern bank of the Ayeyarwady River, these are also unlikely to visit the Project Site for foraging purposes due to the relative lack of fruiting trees within its interior.

Table 5.5 Bat Species recorded on the Project Site

Species	Common name	IUCN Red List Category	Migratory/ Congregatory	Habitat Type	Behavioural Ecology*	Flight height range Within turbine air space (Y/N)	Potential Risk
Cynopterus sphinx	Greater Shortnosed Fruit bat	LC	no	Foliage	IV	Y	Medium
Hipposideros larvatus	Horsfield's Leaf-nosed bat	LC	Congregatory	Caves, Artificial	II	Y	High
Hipposideros cf. grandis	Grand Leaf-nosed bat	LC	Congregatory	Caves, Artificial	II	Y	High
Pipistrellus javanicus	Javan Pipistrelle	LC	Potential Migrant, Congregatory	Artificial	III	Y	High
Scotophilus kuhlii	Lesser Asiatic Yellow House bat	LC	Potential Migrant, Congregatory	Foliage	III	Y	High
Phonic Types							
22-cFM	Unknown	Unknown	Unknown	Unknown	III	Unknown	Unknown
36-cFM	Unknown	Unknown	Unknown	Unknown	III	Unknown	Unknown
44-bFM	Unknown	Unknown	Unknown	Unknown	III	Unknown	Unknown
50-bFM II-III	Unknown	Unknown	Unknown	Unknown	II, III	Unknown	Unknown

**Roman numerals after each species name indicates their foraging strategy according to Furey & Racey (2016):*
I: Insectivorous species that forage in the highly cluttered airspace within the forest interior (or forest interior specialists);
II: Insectivorous species that forage in partially cluttered spaces such as clearings, streams or other tunnels within the forest or just above the canopy (edge and gap foragers);
III: Insectivorous bats that forage in unobstructed airspaces found in large clearings or high above the forest canopy (open-space foragers);
IV: Fruit and nectar-eating bats that fly into the partially cluttered air-spaces between tree canopies, roost in small numbers and forage locally;
V: Fruit and nectar-eating bats that fly in unobstructed airspaces, roost in large colonies and forage over large areas.

5.6.2.8 Birds

A number of the species recorded are migratory, with migrants principally occurring in the Magway Region during February to March and again in October to November. As such, two seasons of bird survey was undertaken for the Project in March and November 2018, respectively.

March 2018 Survey

A total of 92 species including 11 target bird species were recorded during baseline surveys (including VP surveys and point count surveys) undertaken in March 2018. All target species recorded during the VP surveys are IUCN Least Concern and Completely Protected [(1)] (CP) Myanmar Protected Species [(2)].

Maps of flight lines for target species recorded within the Project Site during VP surveys are presented in *Figure 5.14 - Figure 5.18*.

Raptors

During the dry season, 11 raptor species were recorded within the Project Site. Oriental Honey-buzzard (*Pernis ptilorhynchus*) was the most common raptor recorded with 41 flights recorded (see *Figure 5.14*). Frequent foraging flights were recorded across the Project Site including flights at collision risk height. The White-eyed Buzzard (*Butastur teesa)* was the second most frequently recorded species with 39 observations (*Figure 5.15*). Other species recorded include the Black-shouldered Kite (*Elanus caeruleus*) (36 observations (*Figure 5.16*) and Crested Serpent Eagle (*Spilornis cheela*) (24 observations; *Figure 5.17*) which were also regularly recorded foraging over the site, with Black-shouldered Kite often perching, or hovering, to look for prey. Less frequently recorded raptors included Common Kestrel (*Falco tinnunculus*) (eight observations), Changeable Hawk-eagle (*Nisaetus limnaeetus*) (seven observations), Shikra (*Accipiter badius*) (six observations), unidentified Buzzard species (two observations), Booted Eagle (Aquila pennata) (two observations), Peregrine Falcon (*Falco peregrinus*) (two observations) and single records of Japanese Sparrow-hawk (*Accipiter gularis*) and Chinese Sparrow Hawk (*Accipiter soloensis*). All of the raptor species recorded during the VP surveys spent time flying at rotor height (*Figure 5.18*).

Waterbirds and Waders

No waterbirds or waders were recorded during VP surveys in March. During point count observations, low numbers of waterbirds were recorded. One Pond Heron (*Ardeola sp*.) was recorded to the west of the Project Site as well as two records of White-throated Kingfisher (*Halcyon smyrnensis*). A single record was made of White-throated Kingfisher (*H. smyrnensis*) in the far east of the Project Site. No species of waterbird or wader was recorded as flying at rotor height.

1 All Accipitridae and Falconidae are Completely Protected under Myanmar Protection of Wildlife, Wild Plants and Conservation of Natural Areas Act 15(A)

2 FOREST DEPARTMENT NOTIFICATION NO. 583/94 (26 October 1994)

Passerines and Other Species

Passerines were not included in the list of target species recorded during the VP surveys. During point count surveys, 81 passerine species were recorded. The majority were common and widespread species distributed across the site such as: Common Iora (*Aegithina tiphia*), Common Tailorbird (*Orthotomus sutorius*), Greater Coucal (*Centropus sinensis*), Grey-breasted Prinia (*Ceryle rudis*), Indian Roller (*Coracias benghalensis*), Large Cuckooshrike (*Coracina macei*), Purple Sunbird (*Cinnyris asiaticus*), Red Junglefowl (*Gallus gallus*), Red-vented Bulbul (*Pycnonotus cafer*), Rose-ringed Parakeet (*Psittacula krameri*) and Rufescent Prinia (*Prinia rufescens*).

Six Species are endemic to Myanmar. These include the Burmese Collared-dove (*Streptopelia xanthocycla*), Jerdon's Minivet (*Pericrocotus albifrons*), Hooded Treepie (*Crypsirina cucullata*), Burmese Bushlark (*Mirafra microptera*), Ayeyawady Bulbul (*Pycnonotus b. blanfordi*) and White-throated Babbler *Chatarrhaea* (*Turdoides gularis*). Six Species are listed as near threatened on the IUCN Red List: Alexandrine Parakeet (*Psittinus eupatria*), Grey-headed Parakeet (*Psittacula finschii*), Blossom-headed Parakeet (*Psittacula roseate*), Red-breasted Parakeet (*Psittacula alexandri*), Jerdon's Minivet (*Pericrocotus albifrons*) and the Hooded Treepie (*Crypsirina cucullata*). Seventeen species are protected under Myanmar Law; seven are Completely Protected (CP) and 10 are Protected (NP).

All IUCN listed, Myanmar protected, endemic and migratory species found in the Study Area are summarised below in *Table 5.6.*

Table 5.6 IUCN Listed, Myanmar Protected, Endemic and Migratory Species recorded during Species Point Counts during March 2019

Common Name	Species Name	IUCN Listing	Myanmar 1994 Listing	Endemic	Migrant
Alexandrine Parakeet	*Psittinus eupatria*	NT	NP		
Ashy Drongo	*Dicrurus leucophaeus*				latitudinal
Asian House Martin	*Delichon dasypus*				latitudinal
Ayeyawady Bulbul	*Pycnonotus b. blanfordi*			Endemic	
Barn Swallow	*Hirundo rustica*				latitudinal
Black Drongo	*Dicrurus macrocercus*				latitudinal
Black-hooded Oriole	*Oriolus xanthornus*		NP		
Black-naped Oriole	*Oriolus chinensis*		NP		latitudinal
Blossom-headed Parakeet	*Psittacula roseata*	NT	NP		

Common Name	Species Name	IUCN Listing	Myanmar 1994 Listing	Endemic	Migrant
Blue-throated Flycatcher	*Cyornis rubeculoides*				latitudinal
Booted Eagle	*Hieraaetus pennatus*				latitudinal
Brown Shrike	*Lanius cristatus*				latitudinal
Burmese Bushlark	*Mirafra microptera*			Endemic	
Burmese Collared-dove	*Streptopelia xanthocycla*			Endemic	
Burmese Shrike	*Lanius collurioides*				latitudinal
Chinese Sparrow Hawk	*Accipiter soloensis*				latitudinal
Common Hoopoe	*Upupa epops*		CP		latitudinal
Common Kestrel	*Falco tinnunculus*				latitudinal
Common Kingfisher	*Alcedo atthis*		CP		
Eurasian Wryneck	*Jynx torquilla*				latitudinal
Greater Flameback	*Chrysocolaptes lucidus*		CP		
Greater Yellownape	*Chrysophlegma flavinucha*		CP		
Grey-headed Parakeet	*Psittacula finschii*	NT	NP		
Hair-crested Drongo	*Dicrurus hottentottus*				latitudinal
Hooded Treepie	*Crypsirina cucullata*	NT	CP	Endemic	
Japanese Sparrow-hawk	*Accipiter gularis*				latitudinal
Jerdon's Minivet	*Pericrocotus albifrons*	NT		Endemic	
Olive-backed Pipit	*Anthus hodgsoni*				latitudinal
Oriental Honey-buzzard	*Pernis ptilorhynchus*				latitudinal
Oriental White-eye	*Zosterops palpebrosus*		NP		
Peregrine Falcon	*Falco peregrinus*				latitudinal
Pond Heron Sp.	*Ardeola speciosa*				latitudinal
Purple Sunbird	*Cinnyris asiaticus*		NP		
Red-breasted Parakeet	*Psittacula alexandri*	NT	NP		

Common Name	Species Name	IUCN Listing	Myanmar 1994 Listing	Endemic	Migrant
Red-rumped Swallow	*Cecropis daurica*				latitudinal
Rose-ringed Parakeet	*Psittacula krameri*		NP		
Rufous Treepie	*Dendrocitta vagabunda*		NP		
Rufous Woodpecker	*Micropternus brachyurus*		CP		
White Wagtail	*Motacilla alba*				latitudinal
White-bellied Woodpecker	*Dryocopus javensis*		CP		
White-throated Babbler	*Turdoides gularis*			Endemic	
White-throated Fantail	*Rhipidura albicollis*				latitudinal

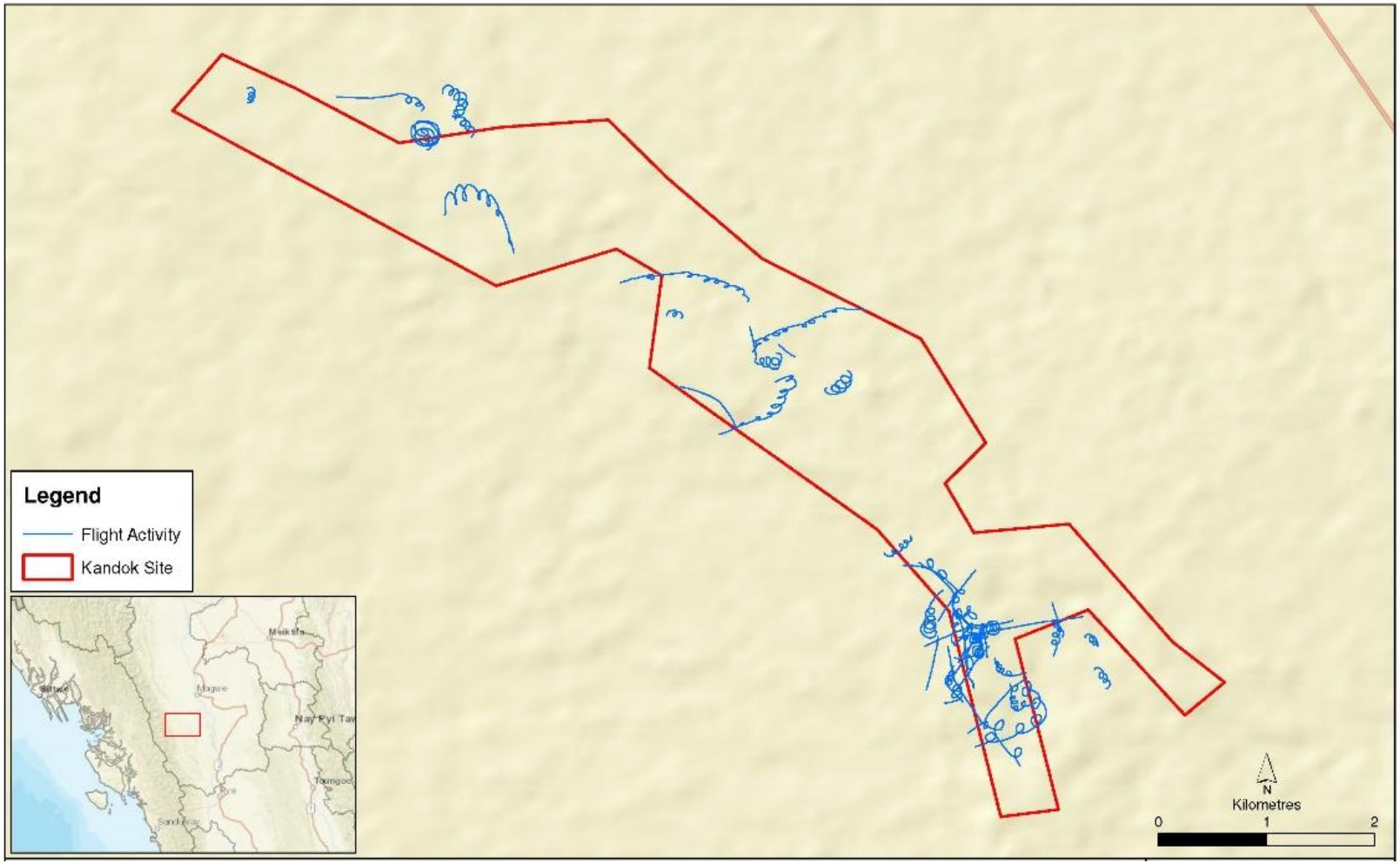


Figure 5.14 Oriental Honey-buzzard Flightlines during Survey in March 2018

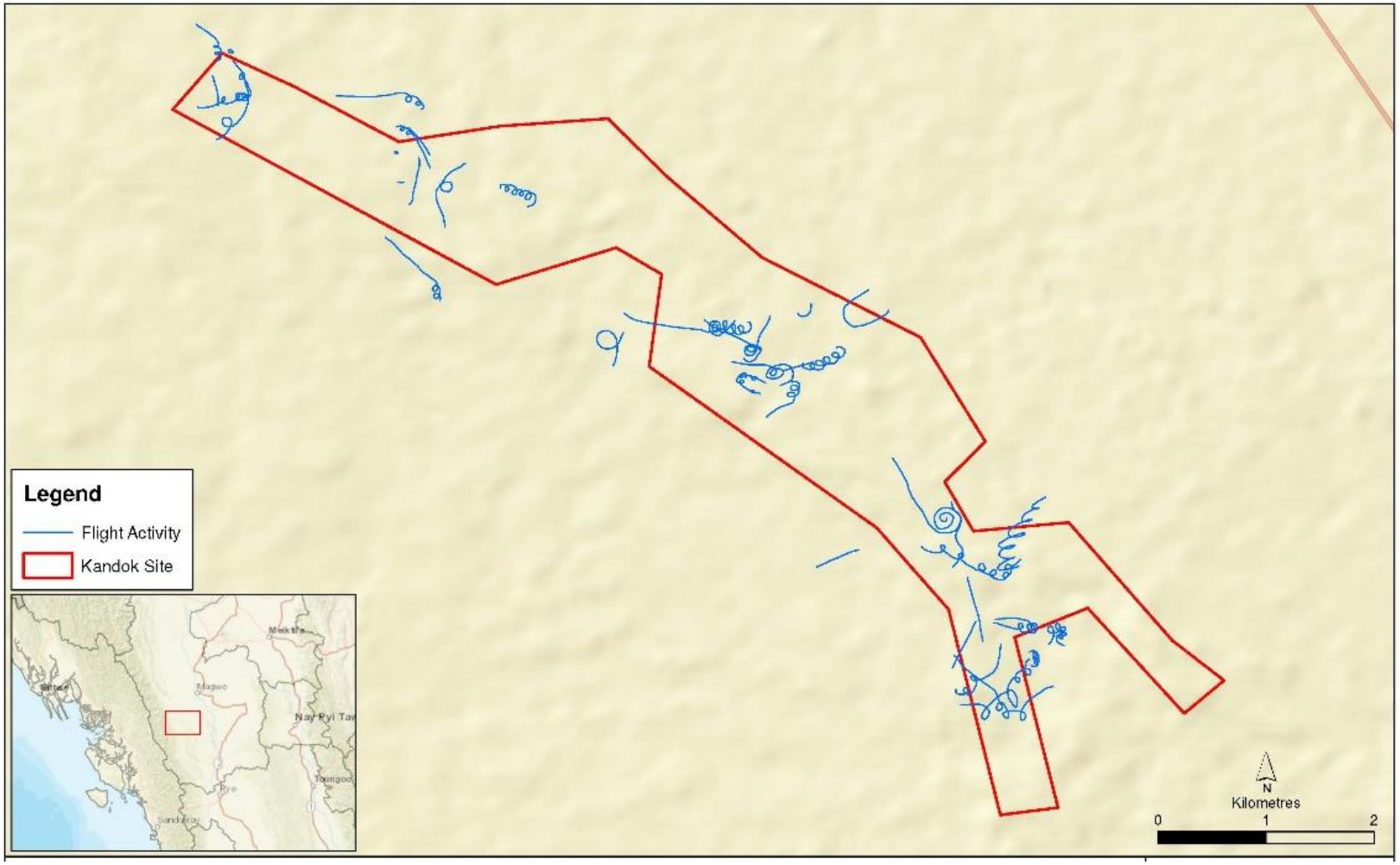


Figure 5.15 White-eyed Buzzard Flightlines during Survey in March 2018

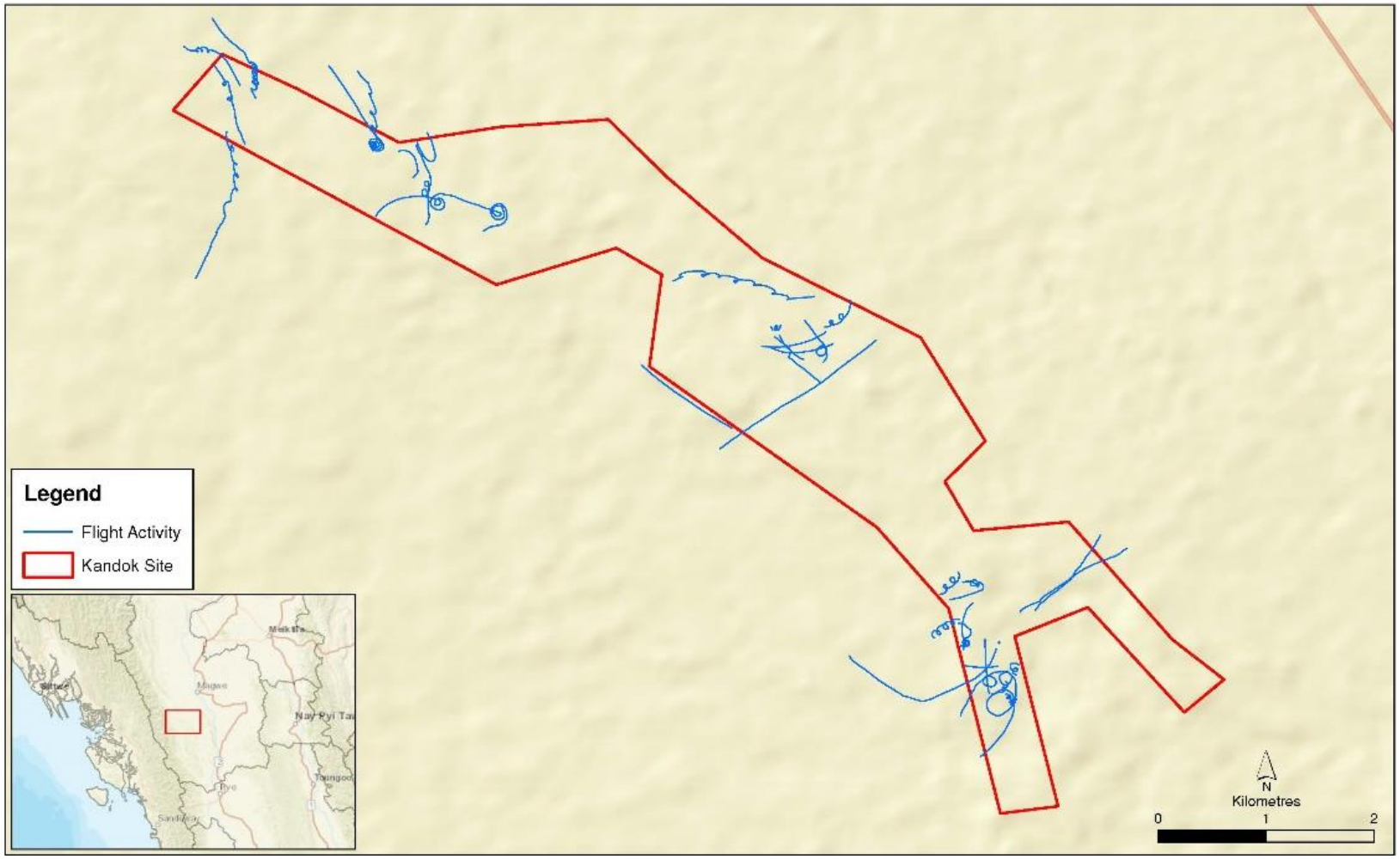


Figure 5.16 Black-shouldered Kite Flightlines during Survey in March 2018

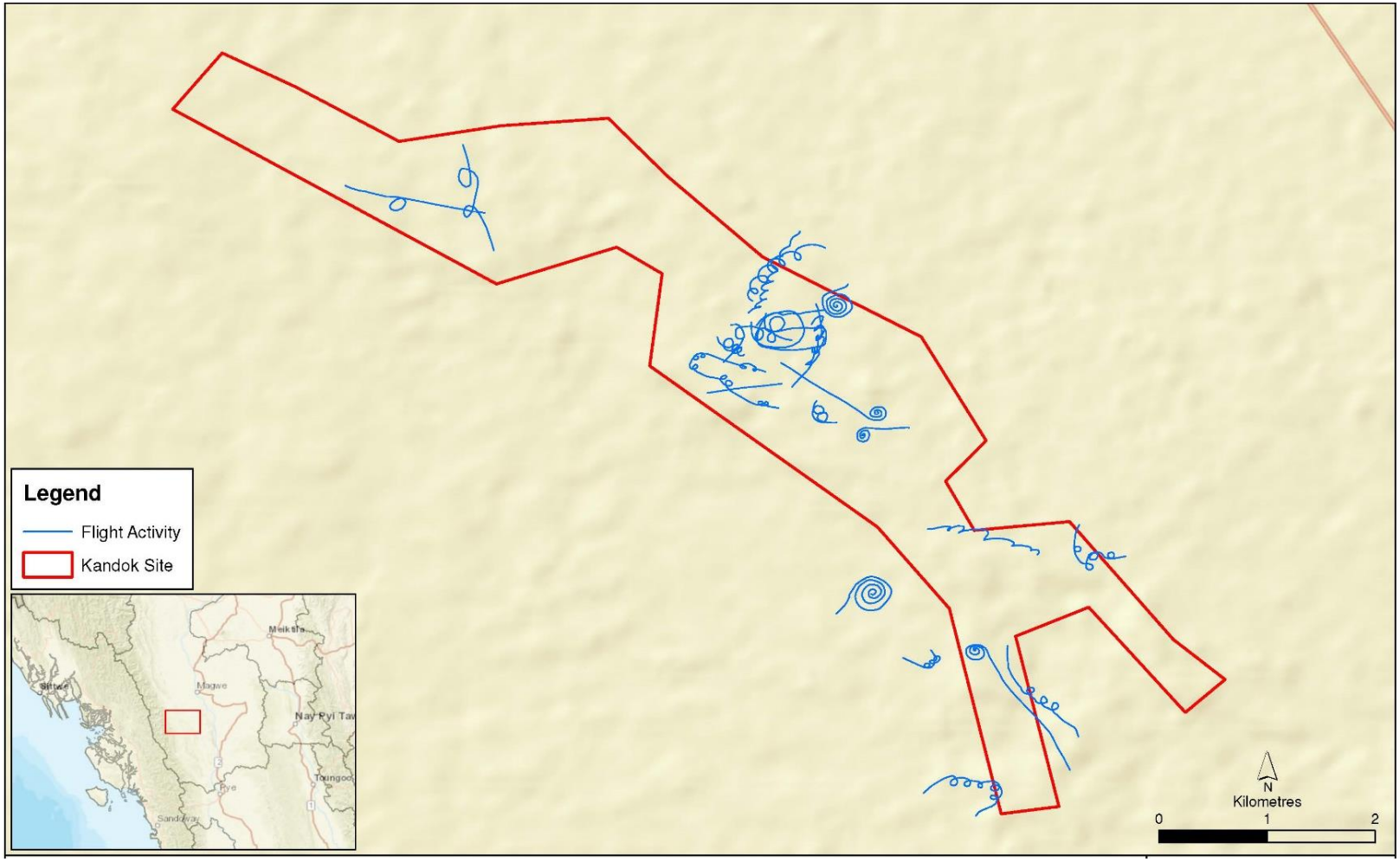


Figure 5.17 Crested Serpent Eagle Flightlines during Survey in March 2018

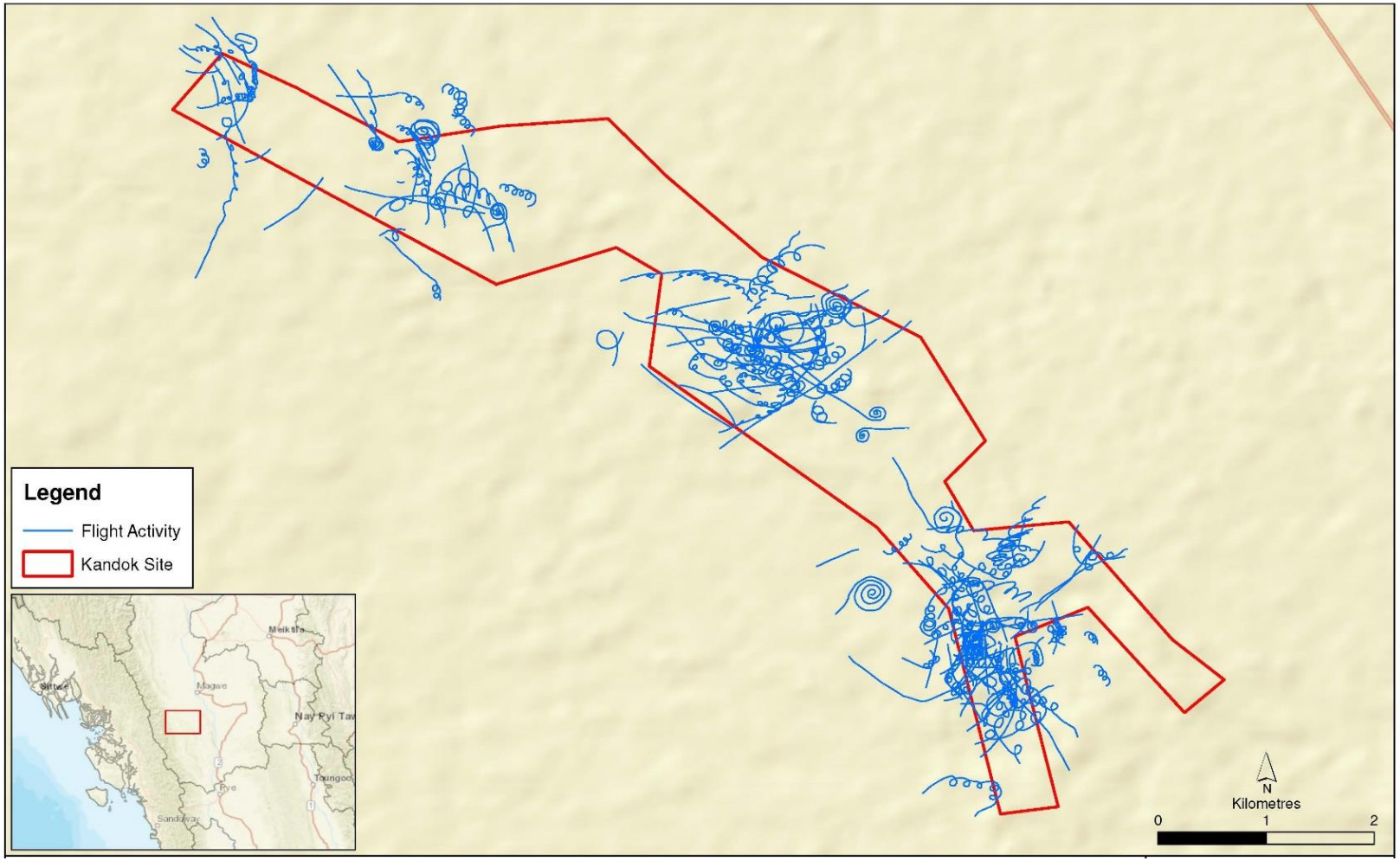


Figure 5.18 All Raptor Flightlines during Survey in March 2018

November 2018 Survey

A total of 96 species including 15 target bird species were recorded during baseline surveys undertaken in November 2018. All target species recorded are IUCN Red List (2019) Least Concern and 15 Completely Protected [(1)] (CP) Myanmar Protected Species [(2)].

A number of the species recorded are migratory, with migrants principally occurring in the Magway region during February to March and again in October to November.

Maps of flight lines for target species recorded within the Project Site during VP surveys are presented *in Figure 5.19 - Figure 5.23*.

Raptors

During the survey in November 2018, 15 raptor species were recorded within the Project Site, in which three species were unidentified. Oriental Honey-buzzard (*Pernis ptilorhynchus*) was the most common raptor recorded with 36 flights recorded (*see Figure 5.19*). Frequent foraging flights were recorded across the Project Site including flights at collision risk height. The White-eyed Buzzard (*Butastur teesa)* was the second most frequently recorded species with 15 observations (*Figure 5.20*). The third most frequently recorded species was Shikra (*Accipiter badius*) (11 observations (*Figure 5.21*). Other species were recorded under 10 times, including Amur Falcon (*Falco amurensis*) (six observation), Black Baza (*Aviceda leuphotes*) (five obserbations), Black Kite (*Milvus migrans*) (two observations), Black-shouldered Kite (*Elanus caeruleus*) (four observations), Changeable Hawk-eagle (*Nisaetus limnaeetus*) (two observations), Common Kestrel (*Falco tinnunculus*) (six observations), Crested Serpent-eagle (*Spilornis cheela*) (nine observations), Eurasian Sparrowhawk (*Accipiter nisus*) (one observations) and Himalayan Buzzard (*Buteo refectus*) (three observations). Although Black Baza was only recorded in five times, it was noticed that it was often flying in groups of over ten individuals. The flightpaths of Black Baza are shown in *Figure 5.22.*

All of the raptor species recorded during the VP surveys are shown in *Figure 5.23.*

Waterbirds and Waders

No waterbirds or waders were recorded during VP surveys in October. During point count observations, low numbers of waterbirds were recorded. Two species, Grey Heron (*Ardea cinerea*) and Woolly-necked Stork (*Ciconia episcopus*) were recorded in the Project Site. No species of waterbird or wader was recorded as flying at rotor height.

Passerines and Other Species

Passerines were not included in the list of target species recorded during the VP surveys. During point count surveys, 81 passerine species were recorded. The majority were common and widespread species distributed across the site similar to those recorded during survey in March 2018.

Six Species are endemic to Myanmar. These include the Ayeyawady Bulbul (*Pycnonotus blanfordi*), Burmese Collared-dove (*Streptopelia xanthocycla*), Hooded Treepie (*Crypsirina cucullata*) Jerdon's Minivet (*Pericrocotus albifrons*), Burmese Bushlark (*Mirafra microptera*), and White-throated *Chatarrhaea* (*Turdoides gularis*).

Five species are listed as Near Threatened on the IUCN Red List (2019): Alexandrine Parakeet (*Psittinus eupatria*), Blossom-headed Parakeet (*Psittacula roseata*), Grey-headed Parakeet (*Psittacula finschii*), Hooded Treepie (*Crypsirina cucullata*) and Jerdon's Minivet (*Pericrocotus albifrons*). One species, Woolly-necked Stork (*Ciconia episcopus*) is listed as Vulnerable on the IUCN Red List (2019). A total of 37 species are protected under Myanmar Law; 19 species are Completely Protected (CP) and 18 species are Protected (NP).

All IUCN listed, Myanmar protected, endemic and migratory species found in the Project Site are summarised below in *Table 5.7.*

Table 5.7 IUCN Listed, Myanmar Protected, Endemic and Migratory Species recorded during November 2018

Common Name	Species Name	IUCN 2019 Listing	Myanmar 1994 Listing	Endemic	Migrant
Alexandrine Parakeet	*Psittinus eupatria*	NT	NP		
Amur Falcon	*Falco amurensis*		CP		Latitudinal
Ashy Drongo	*Dicrurus leucophaeus*				Latitudinal
Asian Barred Owlet	*Glaucidium cuculoides*		CP		
Ayeyawady Bulbul	*Pycnonotus blanfordi*			Endemic	
Barn Swallow	*Hirundo rustica*				Latitudinal
Black Baza	*Aviceda leuphotes*		CP		Latitudinal
Black Drongo	*Dicrurus macrocercus*				Latitudinal
Black Kite	*Milvus migrans*		CP		Latitudinal
Black-hooded Oriole	*Oriolus xanthornus*		NP		
Black-naped Oriole	*Oriolus chinensis*		NP		Latitudinal
Black-shouldered Kite	*Elanus caeruleus*		CP		
Black-winged Cuckooshrike	*Coracina melaschistos*				Latitudinal
Blossom-headed Parakeet	*Psittacula roseata*	NT	NP		
Blue-tailed Bee-eater	*Mecops philippinus*				Latitudinal
Burmese Bushlark	*Mirafra microptera*		NP	Endemic	

Common Name	Species Name	IUCN 2019 Listing	Myanmar 1994 Listing	Endemic	Migrant
Burmese Collared Dove	*Streptopelia xanthocycla*			Endemic	
Burmese Shrike	*Lanius collurioides*				Latitudinal
Changeable Hawk-eagle	*Nisaetus limnaeetus*		CP		
Common Flameback	*Dinopium javanese*		CP		
Common Hill Myna	*Gracula religiosa*		NP		
Common Hoopoe	*Upupa epops*		CP		Latitudinal
Common Kestrel	*Falco tinnunculus*		CP		Latitudinal
Crested Serpent Eagle	*Spilornis cheela*		CP		
Oriental Dollarbird	*Eurystomus orientalis*				Latitudinal
Eurasian Sparrowhawk	*Accipiter nisus*		CP		Latitudinal
Eurasian Wryneck	*Iynx torquilla*				Latitudinal
Greater Flameback	*Chrysocolaptes lucidus*		CP		
Greater Necklaced Laughingthrush	*Garrulax pectoralis*		NP		
Green-billed Malkoha	*Rhopodytes tristis*		NP		
Grey Bushchat	*Saxicola ferreus*				Latitudinal
Grey Heron	*Ardea cinerea*		NP		Latitudinal
Grey-headed Parakeet	*Psittacula finschii*	NT	NP		
Hair-crested Drongo	*Dicrurus hottentottus*				Latitudinal
Himalayan Buzzard	*Buteo burmanicus*		CP		
Hooded Treepie	*Crypsirina cucullata*	NT	CP	Endemic	
Indian Roller	*Coracias benghalensis*				
Jerdon's Minivet	*Pericrocotus albifrons*	NT	NP	Endemic	
Jungle Myna	*Acridotheres fuscus*		NP		
Olive-backed Pipit	*Anthus hodgsoni*				Latitudinal
Oriental Honey-buzzard	*Pernis ptilorhynchus*		CP		Latitudinal
Purple Sunbird	*Cinnyris asiaticus*		NP		

Common Name	Species Name	IUCN 2019 Listing	Myanmar 1994 Listing	Endemic	Migrant
Red-rumped Swallow	*Cecropis daurica*				Latitudinal
Rose-ringed Parakeet	*Psittacula krameri*		NP		
Rufous Treepie	*Dendrocitta vagabunda*		NP		
Scarlet Minivet	*Pericrocotus speciosus*		NP		
Scarlet-backed Flowerpecker	*Dicaeum cruentatum*		NP		
Shikra	*Accipiter badius*		CP		
Small Minivet	*Pericrocotus cinnamomeus*		NP		
White Wagtail	*Motacilla alba*				Latitudinal
White-eyed Buzzard	*Butastur teesa*		CP		
White-throated Babbler	*Turdoides gularis*		CP	Endemic	
Woolly-necked Stork	*Ciconia episcopus*	VU	CP		

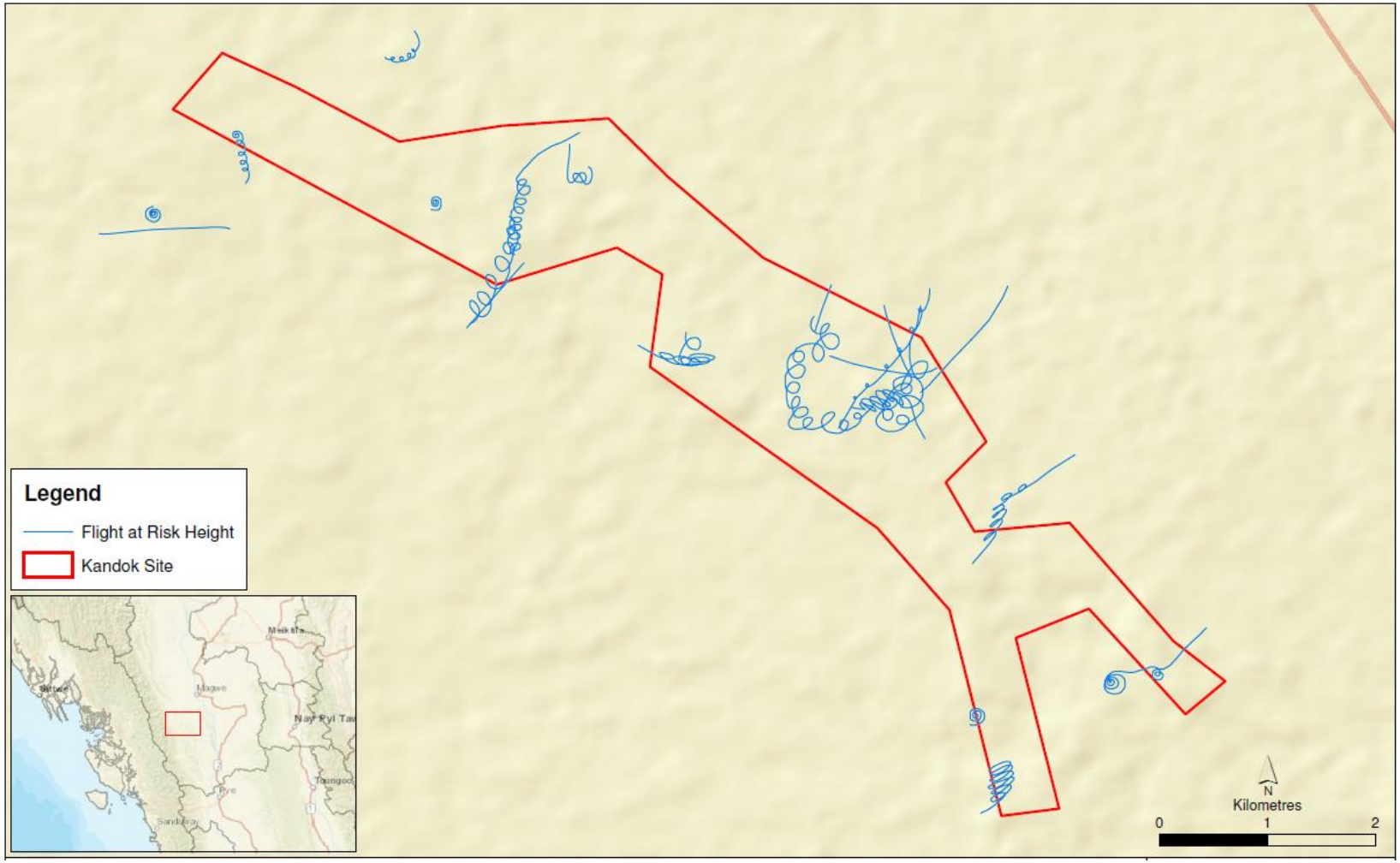


Figure 5.19 Oriental Honey buzzard Flightlines during Survey in November 2018

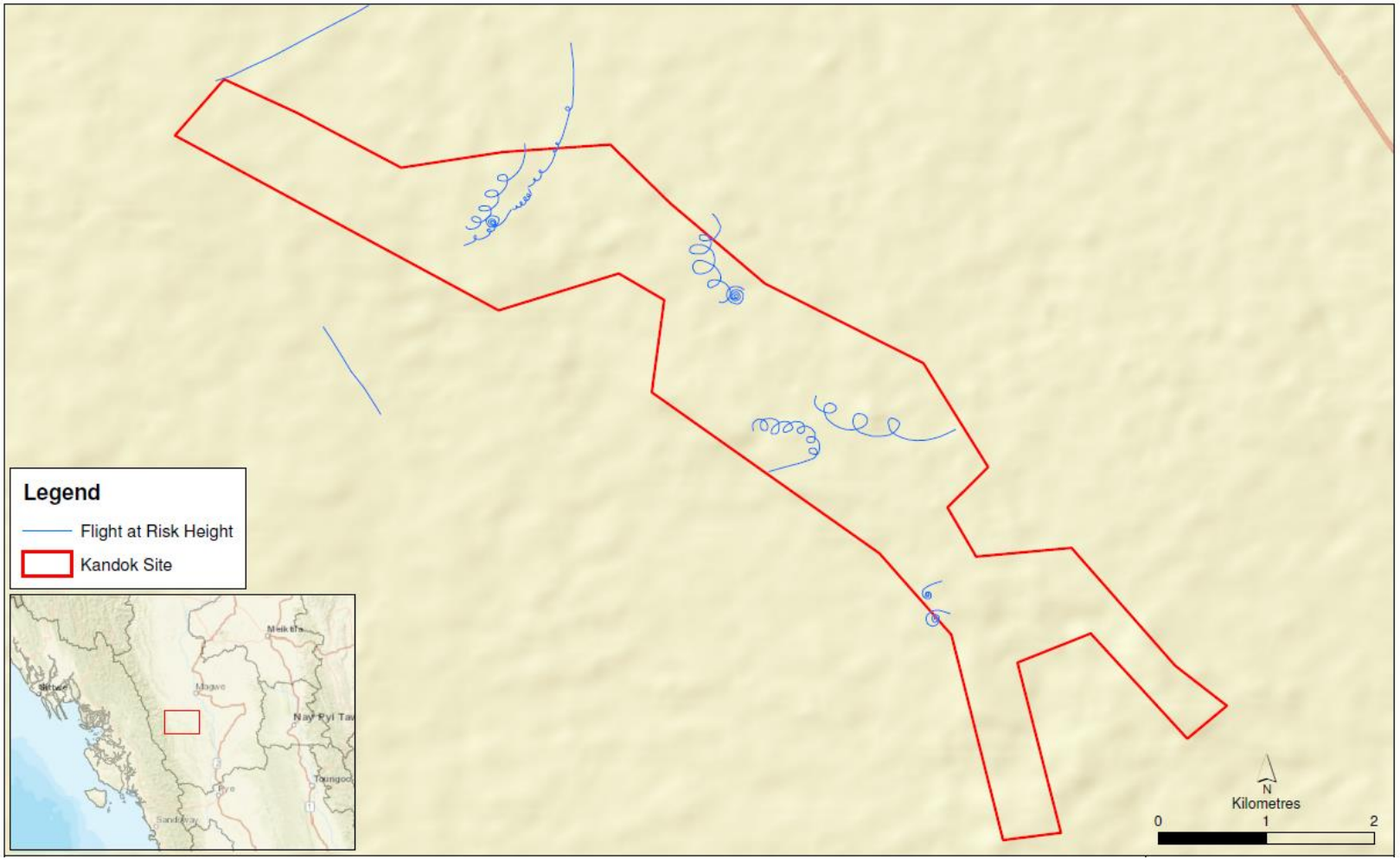


Figure 5.20 White-eyed Buzzard Flightlines during Survey in November 2018

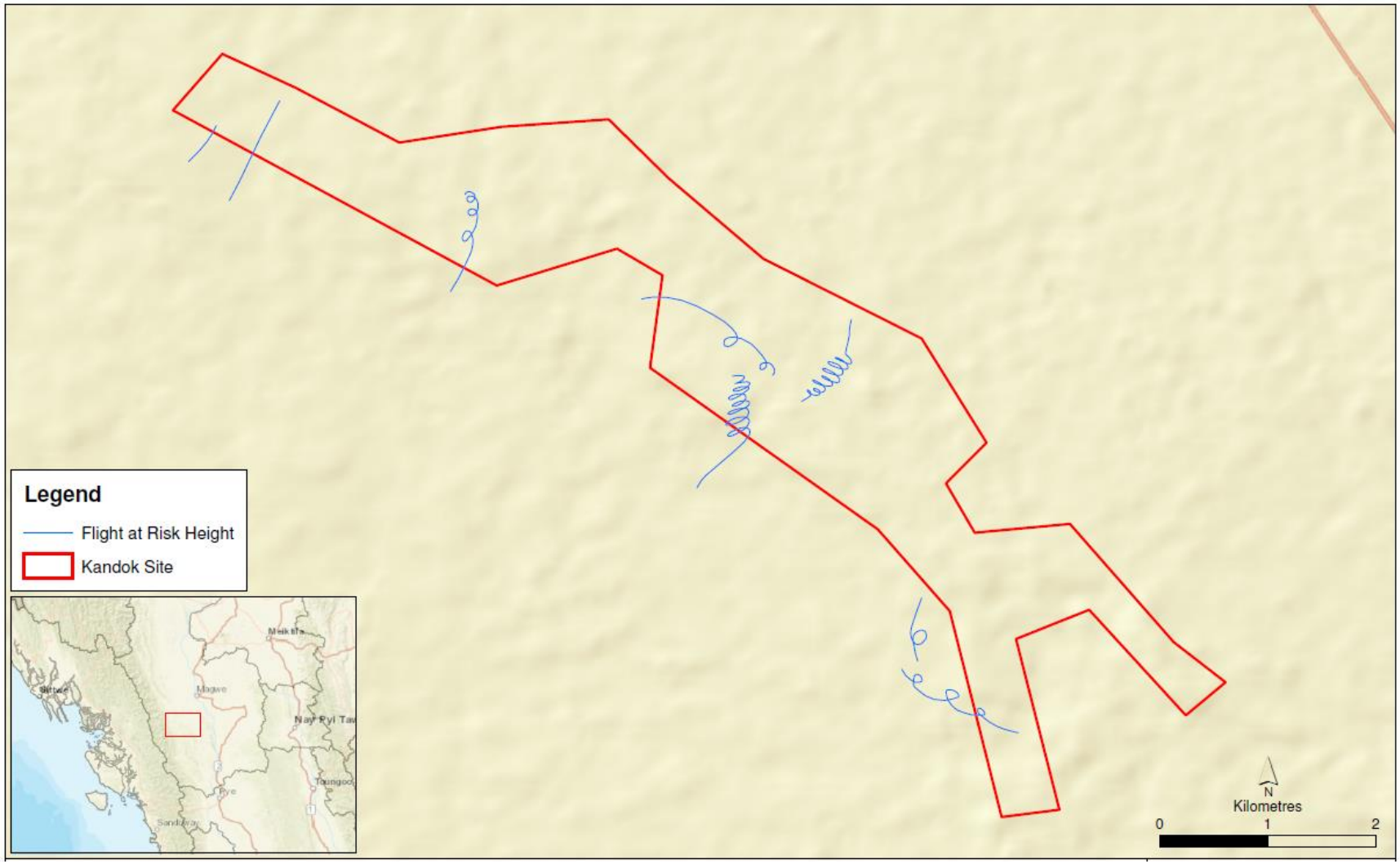


Figure 5.21 Shikra Flightlines during Survey in November 2018

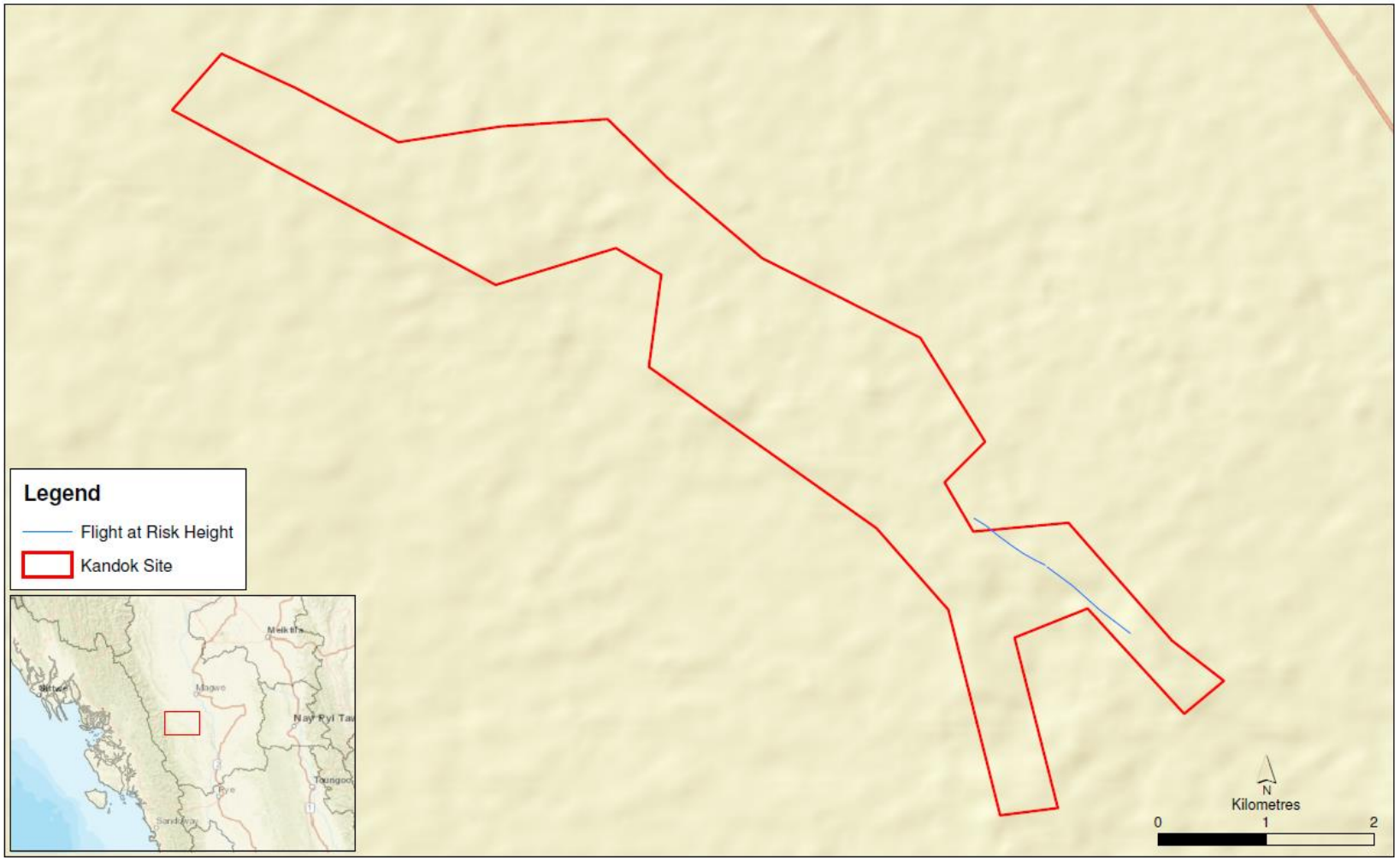


Figure 5.22 Black Baza Flightlines during Survey in November 2018

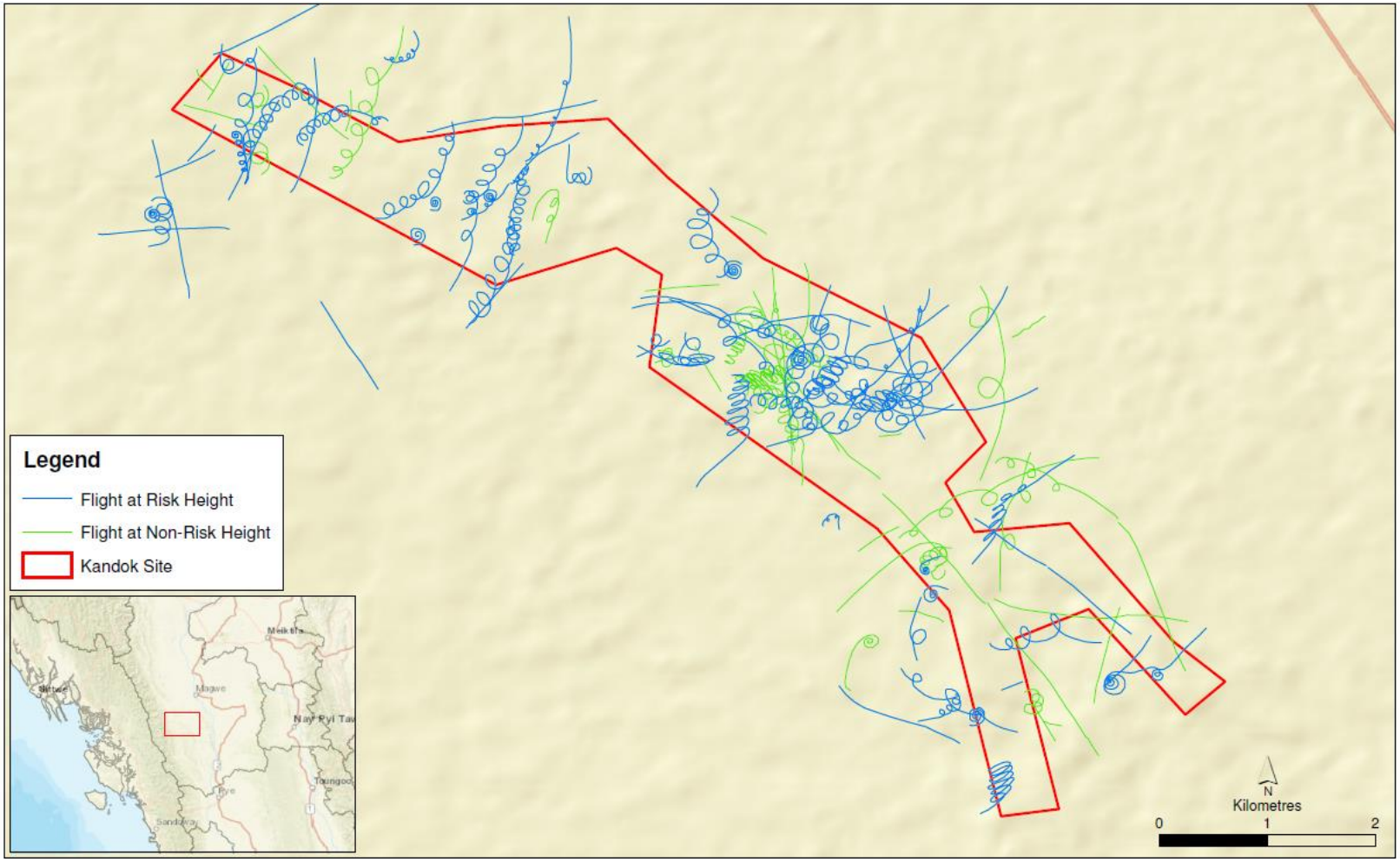


Figure 5.23 All Raptor Flightlines during Survey in November 2018

5.6.3 Modified and Natural Habitats

ERM has used the International Finance Corporation Performance Standard 6 Guidance Note [1] (IFC PS6) to define the background assessment requirements, as ERM's experience is that this approach is acceptable in defining the biodiversity screening assessment needs of this Project.

The purpose of the screening assessment is to identify potential critical and natural habitats potentially impacted by the Project, and biodiversity values that may occur within the Project Study Area. A 50 km buffer has been used to identify biodiversity habitats and values in this assessment. A 2 km Project Area of Influence has been preliminary defined in relation to defining habitat values in the immediate Project vicinity.

The assessment utilised the infrared bands of available high-resolution LandSat imagery to determine land uses and vegetation distribution. Indices such as the Normalised Differential Vegetation Index (NDVI) and the Bare Ground Index (BGI) were used for this purpose. This data was combined with other sources of information, including vegetation maps, geological maps and land use data. The output includes a detailed land class analysis identifying areas of agriculture (plantation), forest type, roads, villages and other land use features for terrestrial habitats. From this assessment, further image classification was undertaken in conjunction with the results of field assessments to delineate the areas of natural habitat and modified habitat within the Project Site and EAA.

In relation to IFC PS6[2] , modified habitat is defined as "*areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition*".

Natural habitat is defined as *"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".*

5.6.3.1 Ecologically Appropriate Area (EAA)

As part of the process of carrying out a Critical Habitat assessment, it is essential that the spatial boundaries relevant to the assessment are clearly determined and defined (IFC, 2018). IFC PS6 recommends defining an Ecologically Appropriate Area (EAA), to determine the presence of critical habitat for each species or ecosystem with regular occurrence in the project's area of influence. The EAA should taking into account the distribution of species of ecosystems and ecological patterns, processes, features and functions that are necessary for maintaining them. The EAA delineates the area of habitat to be considered for the assessment within which the biological communities and/or management issues have more in common with each other than they do with those in adjacent areas.

[1] IFC (2019) Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, February 2019

[2] IFC 2012. Performance Standards on Environmental and Social Sustainability, published January 2012. Available in English at: http://www.ifc.org/wps/wcm/connect/115482804a0255db96fbffd1a5d13d27/PS_English_2012_Full-Document.pdf?MOD=AJPERES.

The EAA may or may not have an actual management boundary (e.g. legally protected areas, World Heritage sites, KBAs, IBAs, community reserves) but could also be defined by some other sensible ecologically defined boundary (IFC, 2019).

5.6.3.2 Result

Based on the above IFC PS6 recommendation, an EAA is defined in *Figure 5.24* to show the natural and modified habitat within the Project Site and the EAA. *Table 5.8* below shows the area of natural and modified habitat within the Project Site and EAA. The Project is not anticipated to directly impact the entire Project Site. Impacts will primarily be at the actual footprint of the proposed windfarm facilities, including access roads, wind turbines and relevant supporting infrastructures. Details of the impact are later discussed in *Section 6*.

Table 5.8 Area of Natural and Modified Habitat within Project Site and Ecological Appropriate Area

Habitat	Area in Project Site (ha)	Area in Ecological Appropriate Area (ha)
Natural	642.4	3,890.0
Modified	527.5	17,001.0
Total	**1,169.9**	**20,891.0**

The Project Site is considered to be a mix of natural and modified habitat. The natural habitats found within the Project Site are mainly patches of bamboo and broadleaf forest. Whereas, modified habitat area consist of area of cleared land with grass and shrub regrowth, agricultural land and cattle grazing areas. Signs of recent fire was also observed at serval locations within the Project Site as a result of shifting slash and burn cultivation practice by the locals. The area within the EAA comprise of a much higher proportion of modified habitat where it is predominantly agricultural land with several village settlement.

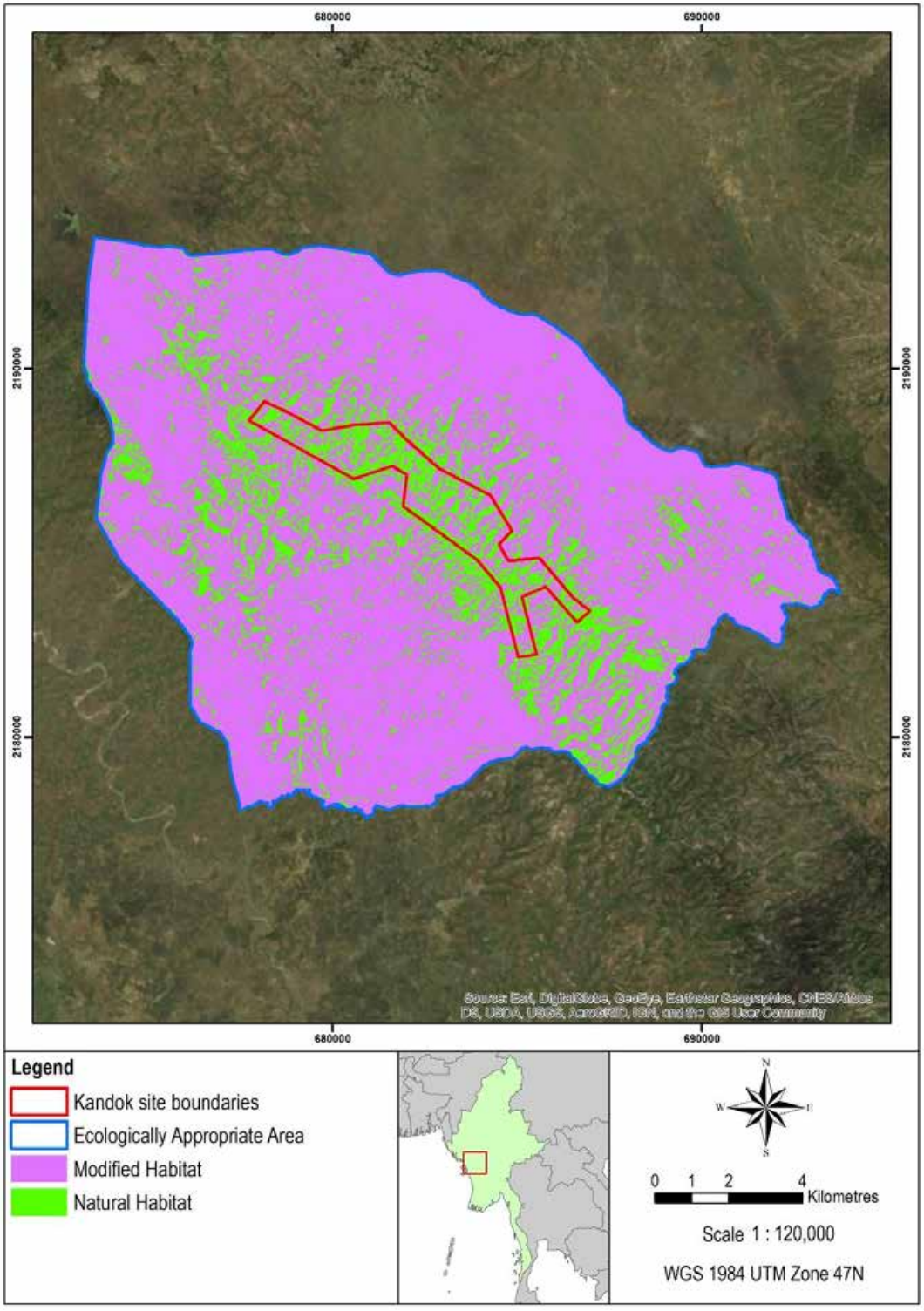


Figure 5.24 Critical Habitat Determination for Ecologically Appropriate Area (EAA)

5.6.4 Threatened Species

Threatened species are identified as those classified on the IUCN Red List of Threatened Species as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). CR, EN and VU species are considered to be at a heightened risk of extinction and are awarded an elevated level of consideration under IFC PS6. Species identified as endemic, restricted range, migratory and/or congregatory according to the relevant IUCN species profiles are also listed in order to assess against the IFC PS6 Critical Habitat thresholds. Where species have not yet been evaluated by IUCN, the protection status has been considered. Threatened species also included those protected nationally. For Myanmar, protected species are those listed under Forest Department Notification No. 583/94 [(1)].
The Integrated Biodiversity Assessment Tool (IBAT) [(2)] was used to determine the potential Critical Habitat species (Critically Endangered/ Endangered/ Vulnerable) that may occur within the Project Site and Study Area. The Project Site lies within grid cells 77015 [(3)].
Threatened species identified specific to the Project Site and Study Area as shown in *Table 5.9*. This includes threatened species identified in past baseline studies and desktop review.

[1] Forest Department, Ministry of Forestry. 1994. Forest Department Notification No. 583/94.

[2] IBAT for Research and Conservation Planning (2018) Map Viewer. Retrieved from https://www.ibat-alliance.org/ibat-conservation/

[3] IBAT for Research and Conservation Planning (2018). Species list for grid cell 77015. Retrieved from https://conservation.ibat-alliance.org/gridfactsheet/77015

Table 5.9 Threatened Species Identified or Likely to Occur within the Project Site

Scientific name	Common name	IUCN Status	Myanmar National Status	Migratory/ Congregatory	Endemic/ Restricted Range	Source	Record Type
Bird							
Alcedo atthis	Common Kingfisher	LC	NP	Latitudinal		Survey	DO
Anser indicus	Bar-headed Goose	LC	CP	Latitudinal		KBA	PR
Aquila nipalensis	Steppe Eagle	EN	CP	Latitudinal		IBAT	PR
Aythya baeri	Baer's Pochard	CR	CP			IBAT	PR
Chatarrhaea gularis	White-throated Babbler	LC	-			EBA	PR
Chrysocolaptes lucidus	Greater Flameback	LC	CP			Survey	DO
Chrysophlegma flavinucha	Greater Yellownape	LC	CP			Survey	DO
Cinnyris asiaticus	Purple Sunbird	LC	NP			Survey	DO
Crypsirina cucullata	Hooded Treepie	NT	CP			Survey	DO
Dendrocitta vagabunda	Rufous Treepie	LC	NP			Survey	DO
Dicaeum cruentatum	Scarlet-backed Flowerpecker	LC	CP			Survey	DO
Dryocopus javensis	White-bellied Woodpecker	LC	CP			Survey	DO
Emberiza aureola	Yellow-breasted Bunting	CR	-	Latitudinal		IBAT	PR
Gracula robusta	Nias Hill Myna	CR	-			IBAT	PR
Gracula venerata	Tenggara Hill Myna	EN	-			IBAT	PR
Gyps bengalensis	White-rumped Vulture	CR	CP			IBAT	PR
Gyps tenuirostris	Slender-billed Vulture	CR	CP			IBAT	PR
Halcyon smyrnensis	White-throated Kingfisher	LC	NP			Survey	DO
Haliaeetus leucoryphus	Pallas's Fish-eagle	EN	CP			IBAT	PR
Heliopais personatus	Masked Finfoot	EN	-	Latitudinal		IBAT	PR
Leptoptilos dubius	Greater Adjutant	EN	-			IBAT	PR
Micropternus brachyurus	Rufous Woodpecker	LC	CP			Survey	DO
Oriolus chinensis	Black-naped Oriole	LC	NP	Latitudinal		Survey	DO
Oriolus xanthornus	Black-hooded Oriole	LC	NP			Survey	DO
Pavo muticus	Green Peafowl	EN	CP			IBAT	PR
Pericrocotus albifrons	Jerdon's Minivet	NT	NP			Survey	DO

Psittacula alexandri	Red-breasted Parakeet	NT	NP			Survey	DO
Psittacula finschii	Grey-headed Parakeet	NT	NP			Survey	DO
Psittacula krameri	Rose-ringed Parakeet	LC	NP			Survey	DO
Psittacula roseata	Blossom-headed Parakeet	NT	NP			Survey	DO
Psittinus eupatria	Alexandrine Parakeet	NT	NP			Survey	DO
Psittinus eupatria	Alexandrine Parakeet	NT	NP			Survey	DO
Sarcogyps calvus	Red-headed Vulture	CR	CP			IBAT	PR
Tadorna ferruginea	Ruddy Shelduck	LC	CP	Latitudinal		KBA	PR
Upupa epops	Common Hoopoe	LC	CP	Latitudinal		Survey	DO
Zosterops palpebrosus	Oriental White-eye	LC	NP			Survey	DO
Mammal							
Axis porcinus	Hog Deer	EN				IBAT	PR
Cuon alpinus	Dhole	EN				IBAT	PR
Elephas maximus	Asian Elephant	EN	CP			IBAT	PR
Hoolock hoolock	Western Hoolock Gibbon	EN	CP			IBAT	PR
Manis javanica	Sunda Pangolin	CR	CP			IBAT	PR
Manis pentadactyla	Chinese Pangolin	CR	CP			IBAT	PR
Panthera tigris	Tiger	EN	CP			IBAT	PR
Rucervus eldii	Eld's Deer	EN				IBAT	PR
Trachypithecus phayrei	Phayre's Leaf-monkey	EN				IBAT	PR
Viverra megaspila	Large-spotted Civet	EN				IBAT	PR
Reptile							
Geochelone platynota	Burmese Starred Tortoise	CR	CP		Endemic	KBA	PR

5.6.5 Critical Habitat

Critical Habitat Triggers

Critical habitat is defined in IFC PS6 as 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”.

Critical Habitat may not be limited to pristine or highly biodiverse areas but rather may include both modified habitat and natural habitats across the broader landscape that supports the biodiversity values that trigger the Critical Habitat criterion. Critical Habitats can therefore be a subset of both modified habitat and natural habitat.

Assessment for Critical Habitat is undertaken as a screening process against the criteria defined within IFC PS 6 Guidance Note. This involved GIS analysis and desk based data collection including a review of previous biodiversity studies.

Critical Habitat criteria are defined in PS6 Guidance Note 6 (GN6), Paragraphs GN69 to 97.

Table 5.10 provides detail of the qualifying requirements for Critical Habitat criteria 1 to 3 (i.e. thresholds), while details of the likely qualifying interests for Criterion 4 and 5 will be defined based on research and expert opinion.

Table 5.10 Criteria Habitat Criteria (IFC PS6 Guidance Note 2019)

Criteria	Thresholds
Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	(a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (0.5% of the global population AND 5 reproductive units 15 of a CR or EN species); (b) Areas that support globally-important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a). (c) As appropriate, areas containing nationally/regionally-important concentrations of an IUCN Red-listed EN or CR species.
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	(a) Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;	(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle. (b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.
Criterion 4: Highly threatened and/or unique ecosystems; and/or	(a) Areas representing ≥ 5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN. (b) Other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.
Criterion 5: Areas associated with key evolutionary processes	No set criteria

Notes: *Endemic Species* = an endemic species is one that has ⩾ 95 percent of its global range inside the country or region of analysis[1]; *Restricted-range Species* = Species with world distributions of less than 50,000km[1]; *Migratory species* = Any species or lower taxon of wild animals, in which a significant proportion of the members of the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries[2]; *Congregatory Species* = Species that gather in globally significant numbers at a particular site and at a particular time in their life cycle for feeding, breeding or resting (during migration)[3].

The five criteria are 'triggers' in that if an area of habitat meets any one of the criteria, it will be considered Critical Habitat irrespective of failing to meet any other criterion [(4)]. Therefore, Critical Habitat can be determined through a single criterion or where a habitat holds biodiversity meeting all five criteria. This approach is generally more cautious but is used more widely in conservation [(5)]. Critical Habitat criteria therefore have two distinctive characteristics. First, components of biodiversity are essentially assigned to only two levels of conservation significance, those that trigger Critical Habitat and those that do not (Tier considerations being secondary to this primary Critical Habitat

[1] International Finance Corporation. (2019). Biodiversity Conservation and Sustainable Management of Living Natural Resources. *Guidance Note 6*. 6 (GN52), 16.
[2] Convention on the Conservation of Migratory Species of Wild Animals (1979) Convention on the Conservation of Migratory Species of Wild Animals. Convention on Migratory Species Secretariat, Bonn, Germany.
[3] Langhammer PF, Bakarr MI, Bennun LA, et al (2007) Identification and gap analysis of Key Biodiversity Areas: targets for comprehensive protected area systems. IUCN, Gland, Switzerland
[4] The Biodiversity Consultancy (TBC) (2013) Getting through PS6: Critical Habitat and its requirements. Case Studies from Guinea and Mongolia. Whitmore, T.C. (1984) Tropical Rain Forests of the Far East. Oxford University Press. Second Edition.
[5] McDonald-Madden, E. Gordon, A. Wintle, B. Walker, S. Grantham, H. Carvalho, S. Bottrill, M. Joseph, L. Ponce, R. Stewart, R. & Possingham, H. P. (2009). "True" Conservation Progress. Science 323: 43-44.

determination). Second, each criterion is applied separately and not in combination, meaning that the scores are not cumulative.

For Critical Habitat Criteria 1 and 2, a review of all IUCN CR and EN, Myanmar completely protected species (indicating the highest level of conservation concern in Myanmar) and endemic and restricted range species occurring in Myanmar was undertaken to determine which, based on published distributions, occur in the EAA. Species which have published broad scale distributions that overlap with the EAA but for which suitable habitat is not present (e.g. Asian Elephant) were discounted. For Criterion 3, literature was reviewed to identify the presence of any designated site or habitat which supported internationally important concentrations of migratory or congregatory species (as defined by IFC GN6).

For Criterion 4 and 5, literature was reviewed to identify whether the habitats present within the EAA were considered to be a highly threatened or unique ecosystem or a likely hotspot of evolutionary processes. The results of the Critical Habitat Determination are presented in *Table 5.11*.

Table 5.11 Critical Habitat Assessment Screening

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Birds						
Alcedo atthis	Common Kingfisher	LC	NP	1a	The species has a wide extent of occurrence spanning 79,900,000 km2 and many countries throughout Europe, the Middle-East, and Asia. The global population is estimated to number < c.600, 000 individuals. This species prefers still or gently flowing water with plenty of small fish, and with reeds, rushes or shrubs on the banks for perches. Streams, small rivers, canals and ditches are favoured to open waterbodies, but it also uses lakes, ponds and flooded gravel pits. In winter it becomes more coastal, also using estuaries, harbours and rocky seashores.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Anser indicus	Bar-headed Goose	LC	CP	1a	The species has a wide extent of occurrence in Central Asia and were introduced in Canada and Spain. The population is declining due to over-hunting, unsustainable levels of egg collecting and habitat destruction.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Aquila nipalensis	Steppe Eagle	EN	CP	1a	The species has a wide extent of occurrence spanning 12,500,000 km2 and many countries throughout Europe and	**There was no record of the species in baseline studies.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					Asia. The population is declining owing to habitat loss and impacts from power lines and wind energy developments. It inhabits areas of steppe and semi-desert, and is recorded breeding up to 2,300 m in mountainous regions.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range and the EAA does not provide preferred habitat for the species. **The Project Site is not considered to trigger Critical Habitat for this species**.
Aythya baeri	Baer's Pochard	CR	CP	1a	The species breeds from the Amur and Ussuri basins in Russia southwards to the central and lower Yangtze floodplain in central-eastern China. Few have been recorded wintering in countries outside China, such as Bangladesh, Myanmar, Thailand and Hong Kong.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species**.
Chatarrhaea gularis	White-throated Babbler	LC	-	2a	This species is native to Myanmar and has a restricted range of occurrence. The extent of occurrence is <20,000 km^2 with a declining or fluctuating range size. The population of the species is considered common but the numbers have not been quantified. The population is suspected to be stable and there are no evidence for any current decline and substantial threats.	There was no record of the species in baseline studies. The EAA is not anticipated to regularly hold ≥10% of the global population size and ≥10 reproductive units of a species (Criterion 2a), given the habitat within the EAA is considered to be modified habitat with frequent human disturbance. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Chrysocolaptes lucidus	Greater Flameback	LC	CP	1a	The global population size has not been quantified. The species can be found in a number of southeast Asian counties such as Bangladesh, Bhutan, Cambodia, China, India, Malaysia and Myanmar. This species has a very wide estimated extent of occurrence of 12,300,000km2. The species favours habitats, such as forests, artificial/terrestrial lands, and shrublands.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Chrysophlegma flavinucha	Greater Yellownape	LC	CP	1a	The breeding population of this species resides exclusively in Asian countries: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, and Vietnam. The global population size has not been quantified, but the species is reported to be common to fairly common throughout its range. The species can be found in forests and artificial/terrestrial lands.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Cinnyris asiaticus	Purple Sunbird	LC	NP	1a	This species has a breeding zone covering much of Asia and parts of the Middle-East. These countries include Afghanistan, Bhutan, Cambodia, China, India, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam. The global population size has not been quantified, but the species is described as common	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					throughout most of its range, although rare and local in Bhutan. Suitable habitats for this species are forests, wetlands, shrublands, and artificial/terrestrial lands.	
Crypsirina cucullata	Hooded Treepie	NT	CP	2	This species is endemic to the dry zone of central Myanmar on the plains of the Irrawaddy and Sittang Rivers, including areas in the dry dipterocarp forest, dry thorn scrub, secondary growth and the edge of agricultural land in the lowlands to 1,000 m. Hooded Treepie has a wide extent of occurrence of 180,000 km2. This species is considered common in suitable habitats and the population might be experiencing slow to moderate decline due to habitat loss from agricultural development.	Although Hooded Treepie is endemic to Myanmar, it has a wide extent of occurrence of 180,000 km2, which is above the threshold (<50,000 km2) as described in Criterion 2. **The Project Site is not considered to trigger Critical Habitat for this species.**
Dendrocitta vagabunda	Rufous Treepie	LC	NP	1a	The species breeds exclusively in Bhutan, and resides in Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Pakistan, Thailand, and Vietnam. The global population size has not been quantified, but the species is reported to be generally common to very common, though rare in Vietnam. Ideal habitat for this species includes forest and artificial/terrestrial land.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Dicaeum cruentatum	Scarlet-backed Flowerpecker	LC	CP	1a	The global population of this species is rapidly declining. This species is migratory and once had an extensive breeding zone ranging from Finland, Belarus, Ukraine through Kazakhstan, China, and Mongolia to Russia, Japan and Korea, however it is now considered to be potentially extinct in Finland, Belarus, Ukarine and parts of Russia. This species stops over in Yangtze Valley of China then winters in small regions in the South-East Asia such as Myanmar. The species breeds in wet meadows with tall vegetation and scrubs, normally during the second half of June to the beginning of July, and winters in rice fields and grasslands in large flocks.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Dryocopus javensis	White-bellied Woodpecker	LC	CP	1a	*Dryocopus javensis* occurs throughout Indomalaya, with populations in India, Myanmar, China, Thailand, Indonesia, Malaysia, Brunei and the Philippines. The global population size has not been quantified, but the species is reported to be local and uncommon throughout its range, while the population in Korea has been estimated at < 100 breeding pairs. The preferred habitat for this species is forest.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Emberiza aureola	Yellow-breasted Bunting	CR	-	1a	The species is now thought to have potentially completely disappeared from Finland, Belarus, Ukraine and large parts of Russia. In the autumn, birds stop-over in large numbers to moult in the Yangtze Valley, China, before continuing on to their winter quarters. It winters in a relatively small region in South and South-East Asia, which includes eastern Nepal, north - eastern India, Bangladesh, Myanmar, southern China, Cambodia, Laos, Vietnam, and Thailand. The European population is now estimated to number just 120-600 mature individuals. Preferred habitats for *Emberiza aureola* are wetlands, grasslands, shrublands, and artificial/terrestrial lands.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Gracula robusta	Nias Hill Myna	CR	-	1a	This species has two potential populations and only occurs in Banyak and Nias Islands off the coast of Sumatra, Indonesia. Only two recent records of the wild population were found on one island, and the population size is placed in the band of 1-49 mature individuals. It is found in moist evergreen forest and was known to mimic noises including human speech. Unsustainable trapping for domestic cage bird trade in Indonesia is considered to be	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given Myanmar is not within its geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					the main reason for the decline of this species. The remaining population in the wild has a high risk of extinction.	
Gracula venerata	Tenggara Hill Myna	EN	-	1a	The species occurs in moist or semi-evergreen forest in lowlands, hills and mountains. The species experiences high levels of trapping for the cage bird trade and habitat loss. Its range occurs in the Lesser Sundas, being found from Lombok and Sumbawa east to Pantar and Alor, Indonesia.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given Myanmar is not within its geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Gyps bengalensis	White-rumped Vulture	CR	CP	1a	The species occurs in Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia, and southern Vietnam and is considered extinct in southern China and Malaysia. The species was formerly known as possibly the most abundant large bird of prey globally but the population has declined rapidly through 1990s with an estimated population of 3,750-14,999 individuals now. It could be found mostly in plains and feeds on carrion. The extremely rapid decline of the species population was mainly due to feeding on animal carcasses which have been treated with veterinary drug	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), this species is considered to be possibly extinct in Myanmar. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					diclofenac, hunting and reduced food availability.	
Gyps tenuirostris	Slender-billed Vulture	CR	CP	1a	The species occurs in regions north of India to southern West Bengal, east through the plains of Assam, southern Nepal, and north and central Bangladesh. Previously, it is commonly found in South-East Asia, but is now considered extinct in Thailand and Malaysia with recent records from Cambodia, southern Laos and Myanmar. The population is estimated to be 1,000-2,400 mature individuals or 1,500-3750 individuals. It usually inhabits dry open country and forested areas away from human habitation and feeds on carrion. The extremely rapid decline of the species population was mainly due to feeding on animal carcasses which have been treated with veterinary drug diclofenac, hunting and reduced food availability.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), this species is considered extinct in Myanmar. **The Project Site is not considered to trigger Critical Habitat for this species.**
Halcyon smyrnensis	White-throated Kingfisher	LC	NP	1a	The resident population of the species occurs widely across Southeast Asia and the Middle East, including Afghanistan, Azerbaijan, Bangladesh, Bhutan, Cambodia, China, Egypt, Hong Kong, India, Indonesia, Iran, Iraq, Israel, Jordan,	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range.

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					Kuwait, Laos, Malaysia, Myanmar, Nepal, Pakistan, Palestine, Singapore, Sri Lanka, Syria, Thailand, Turkey, and Vietnam. There are no information on the global population size. This species is predominantly found in marine-intertidal area, forest, terrestrial, aquatic & marine system, and wetlands.	**The Project Site is not considered to trigger Critical Habitat for this species**.
Haliaeetus leucoryphus	Pallas's Fish-eagle	EN	CP	1a	The species breeds only in northern India, Bangladesh and Myanmar, with very small numbers in Bhutan, dispersing north of the Himalayas to Kazakhstan, Russia and Mongolia in its non-breeding season (May to September). The global population is placed in the band 1,000–2,499 mature individuals, and considered to comprise a single migratory population, rather than multiple isolated subpopulations. The preferred habitat is closely associated with wetlands, principally large lakes and rivers, from the lowlands to 5,000 m.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Heliopais personatus	Masked Finfoot	EN	-	1a	Heliopais personatus is patchily distributed from north-east India and Bangladesh, through Myanmar, Thailand, Cambodia, Laos and Vietnam to Peninsular Malaysia, Sumatra and Java, Indonesia. Populations are apparently in steep decline throughout	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					its range such that its population is now thought to number in the low thousands at most, and possibly fewer than 1,000 mature individuals. The population may now number as low as 1,000 individuals, and so is placed in the band 1,000-2,499 individuals. This equates to 667-1,666 mature individuals, rounded here to 600-1,700 mature individuals. The species is found in wetlands and forests.	units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Leptoptilos dubius	Greater Adjutant Stork	EN	-	1a	This species was previously widespread and common across much of South and continental South-East Asia but declined dramatically during the first half of the 20th century. It is known to breed in Assam and Bihar, India, and at the Tonle Sap lake, Cambodia. Huge numbers once bred in Myanmar, but there have been just two recent reports from Meinmahla Kyun in 1998 and Kachin State in 2006. The total population is estimated to number 800-1,200 mature individuals, roughly equivalent to 1,200-1,800 individuals in total. The Greater adjutant can be found in forests, wetlands, artificial/terrestrial lands, and grasslands.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Micropternus brachyurus	Rufous Woodpecker	LC	CP	1a	The brown woodpecker species native to Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Singapore, Sri Lanka, Thailand, Vietnam. The global population size has not been quantified, but the species is reported to be locally common to uncommon, while the population in China has been estimated at 100-10,000 breeding pairs. They can be found in forests, shrublands, artificial/terrestrial, and wetlands.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Oriolus chinensis	Black-naped Oriole	LC	NP	1a	This species occurs extensively across southern and south-eastern Asia, mostly covering a great area in China, Thailand, Malaysia, Philippines and Indonesia. The national population size is estimated to be 10,000 - 100,000 breeding pairs. The population is in decline mainly due to habitat loss and unsustainable levels of hunting.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Oriolus xanthornus	Black-hooded Oriole	LC	NP	1a	The species occurs in Bangladesh, Bhutan, Cambodia, China, India, Laos, Myanmar, Nepal, Sri Lanka, Thailand, and Vietnam. A non-breeding population can also be found in Indonesia and Malaysia. The global population size has not been quantified,	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range.

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					but the species is described as common. The species is suspected to be stable in the absence of evidence for any declines or substantial threats. Suitable habitats for this species include forest and artificial/terrestrial lands.	**The Project Site is not considered to trigger Critical Habitat for this species.**
Pavo muticus	Green Peafowl	EN	CP	1a	The species occurs in Cambodia, China, Laos, Myanmar, Thailand, and Vietnam, and was considered to be potentially extinct in Bangladesh, India and Malaysia. The population is estimated to be 10,000-19,999 mature individuals or 15,000-29,999 individuals. It is found in a wide variety of habitats, including a mixture of forest types, grasslands and savannas, from sea levels to an altitude of at least 2,100m. The population is rapidly declining and severely fragmented due to intense habitat conversion and extremely high hunting levels. Negative population trends and habitat fragmentation are projected to continue.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Pericrocotus albifrons	Jerdon's Minivet	NT	NP	1a	The species had formerly considered as common in Myanmar but is now considered as uncommon to rare. The population is found in plains habitats and is currently experiencing slow to moderate	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide area of extent of occurrence (163,000km2).

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					decline as a result from habitat loss. The global population size has not been quantified due to the lack of data.	**The Project Site is not considered to trigger Critical Habitat for this species.**
Psittacula alexandri	Red-breasted Parakeet	NT	NP	1a	*Psittacula alexandri* occurs in south and south-east Asia. It is thought to remain abundant in much of Myanmar. The global population size has not been quantified, but the species is reported to be generally common. The population is suspected to be in moderately rapid decline overall, owing to unsustainable levels of exploitation and on-going habitat destruction. This suspicion is supported by widespread anecdotal evidence that indicates declines in many parts of its range. They can be found in forests and artificial/terrestrial lands.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Psittacula finschii	Grey-headed Parakeet	NT	NP	1a	*Psittacula finschii* is distributed from eastern India, Bhutan and Bangladesh, through Myanmar, northern and Central Thailand and Cambodia, Laos, Vietnam and south-western China. The largest population is likely to be in Myanmar, and in parts of the west of the country it has been noted to be the most common Psittacula. Overall, the population is suspected to be suffering an ongoing	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					decline. The global population size has not been quantified, but the species is reported to be uncommon in China, with variable status elsewhere. The ideal habitats for this species are forests, artificial/terrestrial lands, and shrublands.	
Psittacula krameri	Rose-ringed Parakeet	LC	NP	1a	This species is widely distributed across the world. The global population size has not been quantified, but the species is reported to be common to abundant throughout its natural range, while the population in Japan has been estimated at c.100-10,000 introduced breeding pairs. The population is suspected to be increasing as ongoing habitat degradation is creating new areas of suitable habitat including savannahs, grassland, artificial/terrestrial lands, wetlands, forests, and shrublands.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Psittacula roseata	Blossom-headed Parakeet	NT	NP	1a	*Psittacula roseata* occurs in South and South-East Asia, ranging from eastern India and Bangladesh, through Myanmar, Thailand, Laos, Cambodia, Vietnam and southern China. It has been described as generally common, but has declined in some parts of its range. It is rare in southern China and scarce in Vietnam. It	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					was apparently abundant in Myanmar in c.1990, but has now declined in numbers, and it has become uncommon or rare in Thailand. The global population size has not been quantified, but the overall abundance appears to be much reduced across its range in recent decades. The species' population is suspected to be in moderately rapid decline owing to on-going habitat destruction and unsustainable levels of exploitation. They are found in forests, shrubland, and artificial/terrestrial lands.	
Psittinus eupatria	Alexandrine Parakeet	NT	NP	1a	*Psittacula eupatria* is widespread in South and South-East Asia including southern and central Myanmar. The global population size has not been quantified, but the species is reported to be of variable abundance across its range. The species' population is suspected to be in moderately rapid decline overall, owing to on-going habitat destruction and unsustainable levels of exploitation. This species inhabits a variety of moist and dry forests and woodlands, as well as cultivated areas, mangroves and plantations, mainly below 900 m, but reaching c.1,600 m locally.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Sarcogyps calvus	Red-headed Vulture	CR	CP	1a	*Sarcogyps calvus* occurs in South-East Asia including Myanmar (rare resident; recent records come mainly from Mount Victoria, with up to 11 in Shan state in 2003 - the first recent documented records in the east of the country). Given its rarity in South-East Asia it is unlikely that more than a few hundred individuals remain there, while the total population seems unlikely to exceed 10,000 mature individuals given the patchiness of its distribution across India and the apparently catastrophic very recent declines. It frequents open country usually away from human habitation, well-wooded hills and dry deciduous forest with rivers, usually below 2,500 m.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), this species is considered to be possibly extinct in Myanmar. **The Project Site is not considered to trigger Critical Habitat for this species.**
Tadorna ferruginea	Ruddy Shelduck	LC	CP	1a	This species has an extent occurrence which covers a majority of central Asia and parts of north Africa and is considered to be regionally extinct in Turkmenistan. The global population is estimated to be 170,000-220,000 individuals. The species is largely migratory and is found in shores of inland freshwater, saline and brackish lakes and rivers in open country, particularly those in open steppe, upland	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range and absent of preferred habitat. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					plateau and mountainous regions. The overall population trend is uncertain.	
Upupa epops	Common Hoopoe	LC	CP	1a	This species is abundantly distributed around the globe. The overall population is estimated at 5,000,000-10,000,000 individuals. The species is declining throughout its range as a result of habitat destruction and over-hunting. This species occupies open country such as pastures, parkland, orchards, sand-heathland, olive groves and vineyards as well as steppe and broken ground in Asia and dry wooded savannahs in Africa. It requires the presence of features offering perches, shade, nest-sites and accessible food.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Zosterops palpebrosus	Oriental White-eye	LC	NP	1a	*Zosterops palpebrosus* can be found in shrublands and forests in countries, such as Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam. The global population size has not been quantified, but the species is described as common. The population is suspected to be in decline owing to ongoing habitat destruction and fragmentation. The species favours habitats like shrublands and forests	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its large geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Mammal						
Axis porcinus	Hog Deer	EN		1a	This species is native to Bangladesh, Bhutan, Cambodia, India, Nepal and Pakistan, and is considered to be possibly extinct in Myanmar, China, Laos and Vietnam. It is usually found in habitat consisting of wet or moist tall grassland near medium to large-sized rivers. The subpopulation in Myanmar has declined by 40-60% in the last three generations and is considered to have some influence on the global assessment of the population trend. The population is decreasing due to hunting, habitat loss and degradation.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), this species is considered to be possibly extinct in Myanmar. **The Project Site is not considered to trigger Critical Habitat for this species.**
Cuon alpinus	Dhole	EN		1a	The species used to occur throughout South and East Asia, reaching southern parts of Russia and the mountains ranging from eastern Kazakhstan to northern Pakistan. It is a habitat generalist and is found in a wide variety of vegetation types. There is no quantitative information of the species and is estimated to be decreasing due to the reduction in prey, habitat loss/transformation, persecution, diseases and increased completion with other species.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Elephas maximus	Asian Elephant	EN	CP	1a	Asian elephants still occur in isolated populations in 13 states, with a very approximate total range area of 486,800 km². The species occurs in a number of countries in southeast Asia including Myanmar. The Asian elephant has a wide, but highly fragmented, distribution in Myanmar. The five main areas of elephant abundance are: the Northern Hill Ranges, the Western Hill Ranges, Pegu Yoma (central Myanmar), Tenasserim Yoma (in the south, bordering Thailand), and Shan State or eastern Yoma. A recent estimate for the global population size of the Asian elephant was 41,410–52,345 animals. The overall population trend of the Asian elephant has been downwards. This remains the case in most parts of its range, but especially in most of the countries of South-east Asia. Asian elephants are generalists and they occur in grassland, tropical evergreen forest, semi-evergreen forest, moist deciduous forest, dry deciduous forested and dry thorn forest, in addition to cultivated and secondary forests and scrublands.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
Hoolock hoolock	Western Hoolock Gibbon	EN	CP	1a	This species is native to Bangladesh, India (Assam) and Myanmar. The population is estimated to be about 200-280 individuals in Bangladesh, 2,600 individuals in northeastern India and no population estimates for Myanmar. However, it is considered possible that the largest and most viable populations of Western Hoolock Gibbon can be found in Myanmar. The species is found in a wide variety of forest habitats and the population has approximately declined by at least 50% over the past 40 years mainly due to hunting and habitat loss.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Manis javanica	Sunda Pangolin	CR	CP	1a	The species is widely distributed geographically, occurring across mainland and island Southeast East Asia, including Myanmar. This species is distributed in central and southern Myanmar, but has apparently been eradicated widely from lowland areas due to human agricultural expansion and hunting. There is virtually no information available on population levels of any species of Asian pangolin and no comprehensive population estimates. This species is rarely observed, principally because of its increasing rarity, but also because it is secretive, elusive and	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					primarily nocturnal. This species is found in primary and secondary forest, including lowland dipterocarp forest, and cultivated areas including gardens and oil palm and rubber plantations, including near human settlements.	
Manis pentadactyla	Chinese Pangolin	CR	CP	1a	This species occurs in the Himalayan foothills of Nepal, southern Bhutan and north and northeastern India, possibly northeastern Bangladesh, northern and western Myanmar, to northern and Annamite regions of Laos and northern Viet Nam, northwest Thailand, and through southern China (south of the Chiangjiang - the Yangtze River) to Hainan, Taiwan (P.R. China) and Hong Kong SAR. The species is plausibly widespread in northern Myanmar, although there are few records and its exact distribution is not well known. There is virtually no information available on population levels of any species of Asian pangolin either at the global or national level anywhere across the species' range. This species is found in a wide range of habitats, including primary and secondary tropical forests, limestone forests, bamboo forests, broad-leaf and	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					coniferous forests, grasslands and agricultural fields.	
Panthera tigris	Tiger	EN	CP	1a	Breeding populations of Tigers are currently found in eight range states: Bangladesh, Bhutan, India, Indonesia, Malaysia, Nepal, Russia, and Thailand. There is evidence of breeding in China and Myanmar between 2009 and 2014, though these populations are likely dependent on immigration from neighbouring countries. The global Tiger estimate published in the 2010 Red List assessment of 2,154 tigers was an updated version of the estimate of Tiger numbers in source sites. This was not a complete estimate of global Tiger numbers, but justified because Tiger status outside the source sites is generally poor and poorly known. Tigers are found mainly in the forests of tropical Asia, although they historically occurred more widely in drier and colder climes. One subspecies, the Amur Tiger *P. t. altaica*, persists in the Russian Far East. Photos of Tigers up to 4,500 m have been obtained in Bhutan.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Rucervus eldii	Eld's Deer	EN		1a	Based on both habitat extent and size of remaining patches, Myanmar and Cambodia are the pre-eminent countries	There was no record of the species in baseline studies.

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					for Eld's Deer. However, the actual status of remaining populations is more related to hunting levels. A nationwide survey of Myanmar in 1997 found evidence of Eld's Deer within 23 of 24 townships surveyed, out of the 28 that were reported to contain Eld's Deer in 1992. However, surveys in 2007 found Eld's Deer in only 14 townships and had therefore seriously declined. More recent, anecdotal, assessment of habitat quality indicates considerable loss of lowland deciduous forest throughout central Myanmar in the last 10 years. At Shwesettaw Wildlife Sanctuary, favourable habitat has been taken over by agriculture however more recent information suggests that the site may now hold the most significant Eld's Deer population in the country with at least 200 individuals noted in 2004.	The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**
Trachypithecus phayrei	Phayre's Leaf-monkey	EN		1a	This species is native to countries including Bangladesh, China, India, Laos, Myanmar, Thailand and Vietnam. There is little information available concerning the species' status in Myanmar. The species prefers primary and secondary evergreen and semi-evergreen forest, mixed moist	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range.

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					deciduous forest, but is also found in bamboo-dominated areas, light woodlands, and near tea plantations. The global population estimate is not available. However, it is suggested that the global population is seriously declining, due to a number of threats such as loss of habitat from deforestation and development, as well as hunting and trapping.	**The Project Site is not considered to trigger Critical Habitat for this species.**
Viverra megaspila	Large-spotted Civet	EN		1a	Large-spotted Civet has been found in southern China, Cambodia, Laos, Peninsular Malaysia, Myanmar, Thailand, and Vietnam. Throughout the twentieth century it has had an enormous decline in global population, mainly as a result of converting suitable habitat to agricultural land. In Myanmar there are only a few records, from only a few sites. Based on the extent of habitat on suitable terrain, many areas of habitat potentially suitable for Large-spotted Civet, including some large tracts, have not been surveyed by methodology appropriate to find the species. Generalised trade-driven hunting for ground-dwelling mammals is generally less pervasive than in Vietnam and Laos. In combination, these factors suggest that Myanmar might retain populations	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

Scientific Name	Common Name	IUCN Listing	Myanmar Status	Relevant CH Criterion	Species information*	CH rationale
					comparable to or exceeding those in Cambodia. Several examinations of records over varying geographic scales have concluded that Large-spotted Civet is basically a lowland species.	
Reptile						
Geochelone platynota	Burmese Starred Tortoise	CR	CP	1a	*Geochelone platynota* is found in exclusively in Myanmar. There is no available information on its population and the current population trend. The main threat arise from hunting and trapping. The species favours to forests and forest edges in the dry zone of central Myanmar.	There was no record of the species in baseline studies. The EAA is not considered to support globally important concentrations of this species, i.e. 0.5% of the global population and 5 reproductive units (Criterion 1a), given its wide geographical range. Furthermore, according to IUCN Red List (2019), given its wide geographical range. **The Project Site is not considered to trigger Critical Habitat for this species.**

*Species information sourced from IUCN Red List of Threatened Species profiles unless otherwise referenced.
IUCN status: LC = Least Concerned, NT = Near Threatened, EN = Endangered, CR = Critically Endangered
Myanmar status: NP = Normally Protected, CP = Completed Protected

5.7 Social Baseline

This section describes the socio-economic context of the AOI. The information presented is based secondary data sources as well as primary data gathered during the Scoping and EIA phase of the Project in July and November 2018. The primary data were collated in a sample of Project affected communities; collection methods are summarised in *Table 5.12*.

Table 5.12 Primary Data Collection Methods

. Activity	Description	Picture
Focus Group discussion (FDG)	FGDs were held with men, women and landowners to gather information on specific groups as well as obtain feedback regarding their perceptions of the project.	
Key informant interviews (KII)	KIIs were held with village leader, village tract leader and those with knowledge of specific topic areas and on project perceptions, including teachers, Minhla Township GAD and other township relevant departments.	
Settlement profiling	Settlement profiles were undertaken in a sample of communities in order to gather information on demographics, access to public infrastructure, livelihoods, cultural heritage and other key sensitivities.	

Photo Source: ERM field trip (2018)

5.7.1 Social Area of Influence

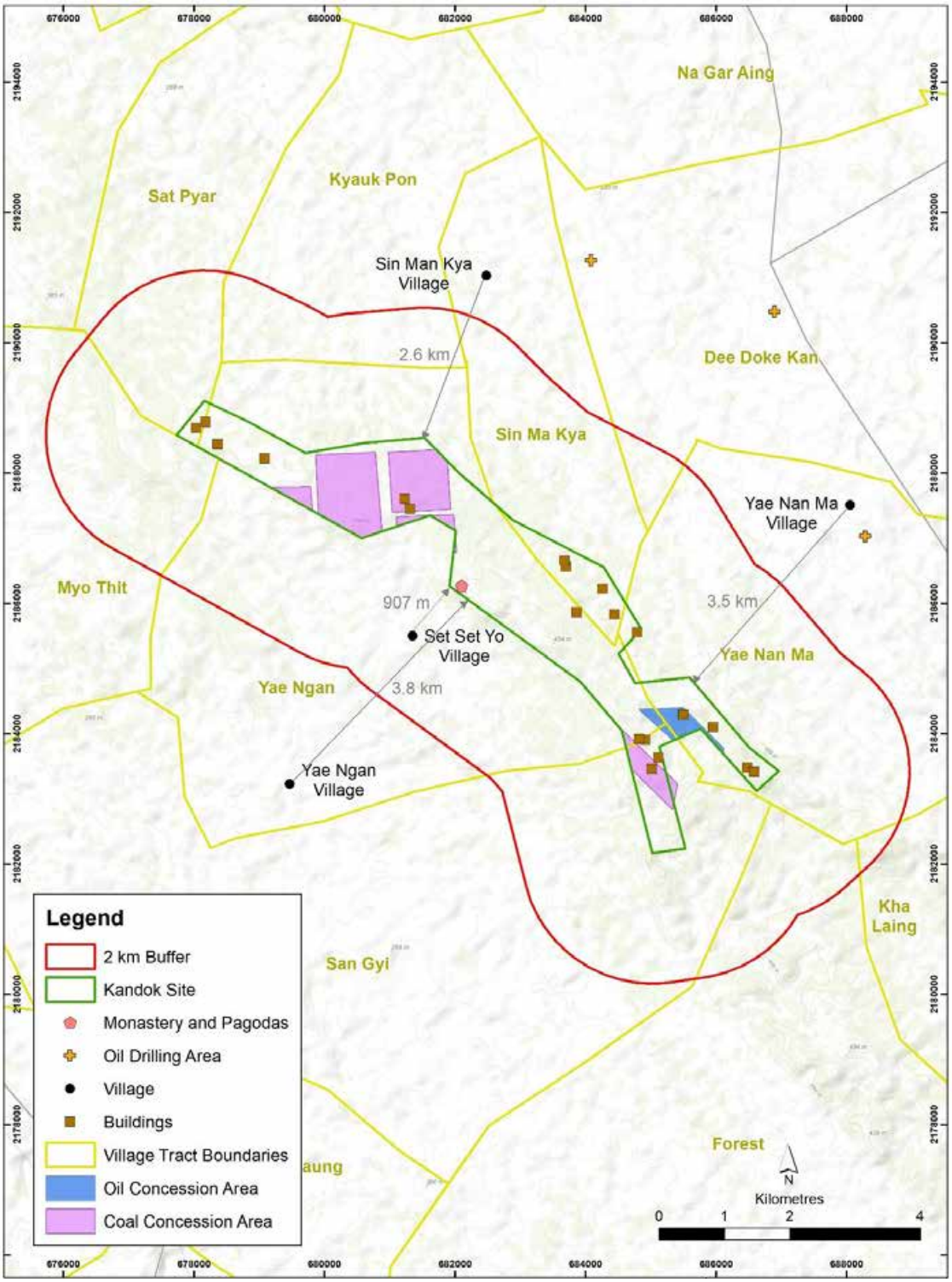
The social AOI is defined by households and settlements that may be directly and indirectly impacted by the Project during construction, operation and decommissioning.

The direct AOI includes settlements that are within 2 km of the Project Site. The indirect AOI includes areas where impacts may be experienced more broadly such as employment, economic development, in-migration and public services, often covering a wider spatial area.

Table 5.13 details the settlements that have been considered in the AOI. The table also shows where a representative sample of baseline information was gathered. *Figure 5.25* shows the settlements in the AOI and local infrastructure. It should be noted that although there is an oil concession area within the Project Site, there was no drilling activity recorded within the Project Site during the ERM site visit in 2018.

Table 5.13 Social Area of Influence

Impacted Settlements	Name of Settlement	Location	Baseline Information gathered (Yes = Y, No = N)
Directly Affected Settlements (Within 2 km)	Set Set Yo	This village is closest settlement and located within 0.9 km of the Project Site.	Y
	Coal Mine Area	There are a couple of coal mine located within the Project Site.	Y
	Monastery and Pagodas	Set Set Yo Village Monastery is located within the Project Site.	Y
Indirectly Affected Settlements	Yae Ngan	This village is located 3.8 km away from the Project Site.	Y
	Yae Nan Ma	This village is located 3.5 km away from the Project Site.	Y
	Sin Man Kya	This village is located 2.6 km away from the Project Site.	Y
	Oil Drilling Area	An oil drilling area is located approximately 3.4 km away from the Project Site.	Y



Source: ERM data 2018

Figure 5.25 Map of Social Area of Influence

5.8 Geography and Social Political Context

The Project is located in Magway Region, the second largest region in Myanmar comprising 44,820 km^2. It is however the most populated, accounting for 8 % of the total population of Myanmar [(1)]. The region is further divided into five districts. The Project is located in Minhla Township of Thayet District, in which the regional capital is Magway, located approximately 43 km from Magway Town and 36 km from Minhla Town.

Myanmar is ranked 148th out of 189 countries in the United Nations Development Programme (UNDP) Human Development Index (HDI) [(2)], placing it in the middle human development group. Between 1990 and 2017, Myanmar's HDI value increased from 0.358 to 0.578 and Myanmar's life expectancy at birth increased by 8.0 years, mean years of schooling increased by 2.5 years and expected years of schooling increased by 3.9 years [(3)]. Additionally, between 1990 and 2017 Myanmar's GNI per capita increased by about 632.0 %. These increases reflect Myanmar's growing economy resulting from various sectors, including oil and gas and mining.

Myanmar is a former British colony which gained independence in 1948. The country operates a multi-party democracy whereby the President is the Head of State and the Head of the Government. The National League for Democracy (NLD) was most recently elected as President in November 2015.

5.8.1 Administrative Structure

5.8.1.1 Regional

Under the 2008 Constitution, the Union of the Republic of Myanmar is organised into seven States and seven Regions, six Self-Administered Zones and Self-Administered Divisions and one union territory containing the capital Nay Pyi Taw and surrounding townships. Below the state and region government there are 76 Districts, 330 townships, 84 sub-townships, 413 towns, 3,133 wards, 13,620 village tracts and 63,938 villages [(4)].

The Magway Region is administered by Regional government headed Chief Minister and ninth Ministers. There are;

- Regional Chief Minister
- Minister of Region Security and Border Affairs
- Minister of Social Affairs
- Minister of Resource, environmental, Electricity and Energy
- Minister of Region Planning
- Minister of Transport and Communications
- Minister of Agriculture and Irrigation
- Minister of Labor, Immigration and Population
- Minister of Chin Ethnic Affairs

[1] Department of Population, The 2014 Myanmar Population and Housing Census. Available at http://www.dop.gov.mm/en/state-region/magway

[2] The HDI measures the key dimensions of human development a long and healthy life, being knowledgeable and have a decent standard of living, including life-expectancy, access to education and income.

[3] UNDP (2018) Myanmar briefing note for countries on 2018 Human Development Indices and Indicators. Available at http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/MMR.pdf

[4] GAD homepage http://www.gad.gov.mm/en/content/total-list-districts-townships-sub-townships-towns-wards-village-tracts-and-villages-regions#overlay-context=my/content/

- Region Advocate General

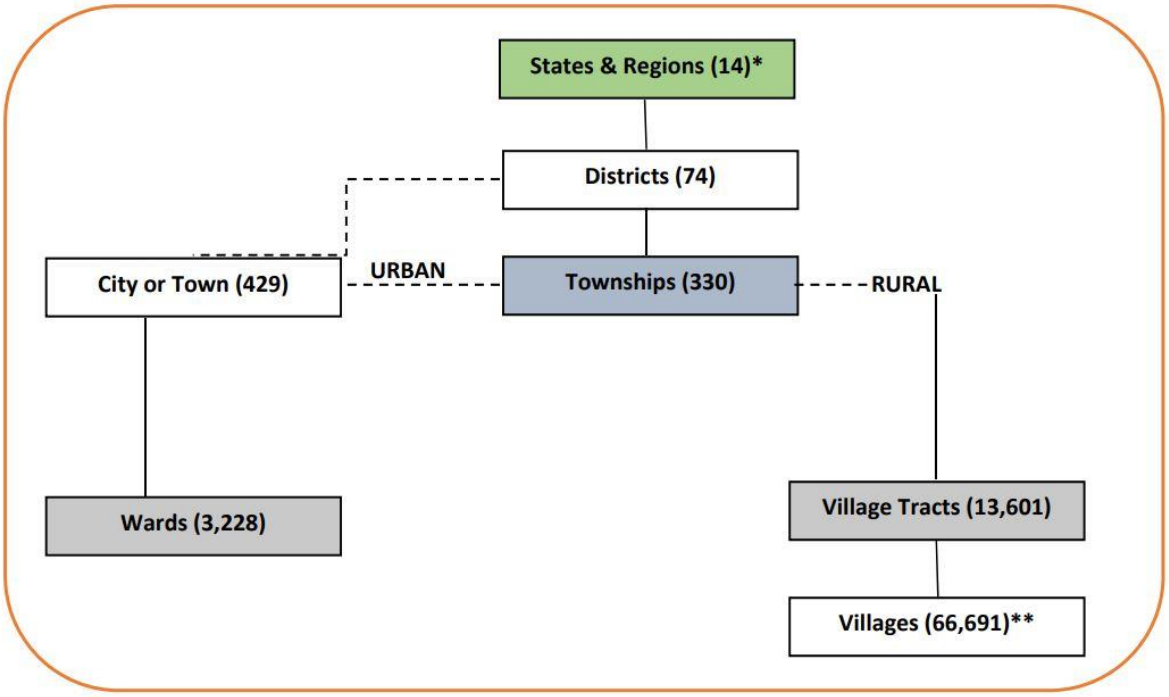
5.8.1.2 District and Township

The Secretary of Region from General Administrative Department (GAD) under the Ministry of Home Affairs is the head of administrative service at Regional level in addition to the Chief Minister. Districts and Township are administrated by GAD official under District and Township General Administrative Department. However, several other line ministries also have their officers stationed at the township level[1].

5.8.1.3 Village Tract and Village Level

The village tract administration reports directly to the township level administration and in most areas is administrated by a Village Tract Administrator, a clerk or secretary and a number of 100 household leaders [(2)].

The administrative leadership structure is presented in *Figure 5.26*.



Source: General Administrative Department, Ministry of Home Affairs, March 2016

Figure 5.26 Administrative Leadership Structure

5.9 Demographics

5.9.1 Population

At the time of the 2014 census, the total population of Myanmar was 51,486,253, with a population of 24,824,586 males and 26,661,667 females [(3)]. The population of Magway Region was 3,917,055 comprising 1,813,974 male (46 %) and 2,103,081 female (54 %) while total population of Minhla Township was 122,903 with 59,131 male (48%) and 63,772 female (52%).

[1] UNDP Mapping the State of local Governance in Myanmar

[2] UNDP Mapping the State of local Governance in Myanmar

[3] Myanmar, Department of Population, The 2014 Myanmar Population and Housing Census, March 2016

Table 5.14 provides detail of the population size based on information provided by village tract leader and Township General Administrative Department [(1)]. The closest village to the Project Site is Set Set Yo with a population of approximately 525 people.

Table 5.14 Reported Population in the Study Area

Settlement	Households	Population	Male	Female
Minhla Township	29,469	122903	59,131	63,772
Set Set Yo Village	135	525	-	-
Yae Ngan village	369	1537	740	797
Sin Ma Kya village	186	3352	1799	1553
Yae Nan Ma village	1236	4824	2393	2431

Source: The 2014 Myanmar Population and Housing Census, Minhla Township and ERM field data, 2018

5.9.2 Age Profile

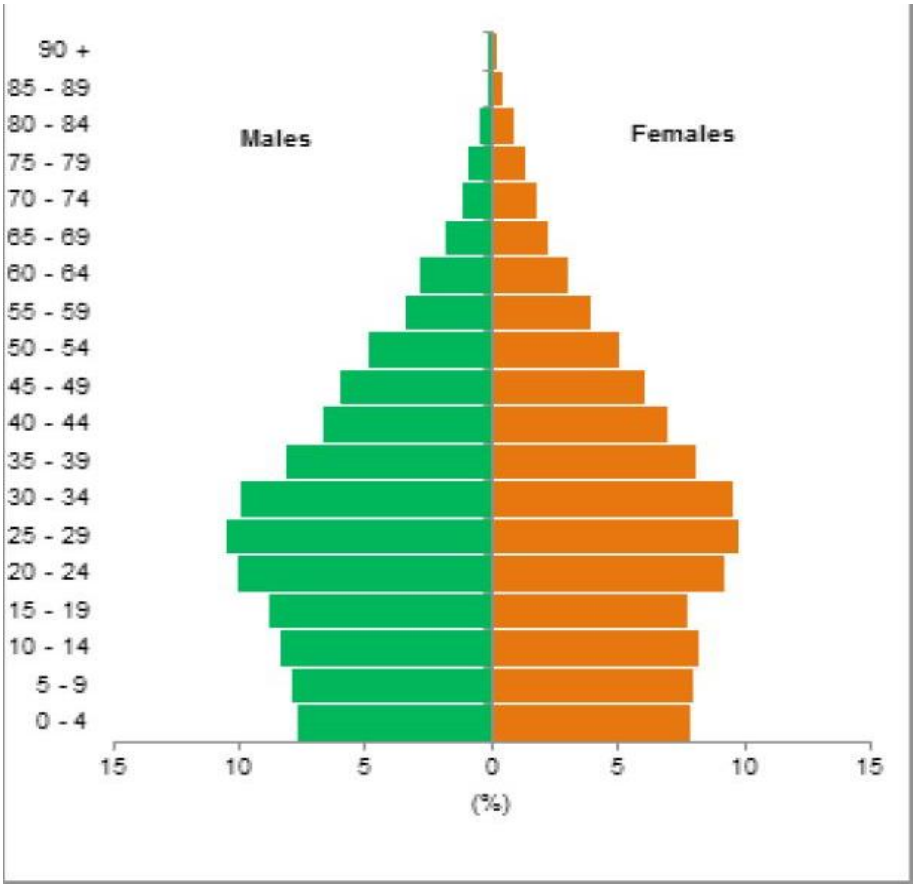
Myanmar has a young population. According to the 2014 census the proportion aged less than 15 years represented 28.6 %, 15-64 (working age group) represented 65.6 % and those over 65 represented 5.8 % [(2)]. The population markedly declined from age group 30 – 34 onwards. Starting from age group 40-44, there are less males than females in all age groups [(3)].

Aged profile data in the village level is not available.

[1] Minhla Township GAD Data, 2017

[2] The Union Report: Occupation and Industry, The 2014 Myanmar Population and Housing Census

[3] Minhla Township Report, The 2014 Myanmar Population and Housing Census, October 2017



Source: Minhla Township Report, The 2014 Myanmar Population and Housing Census

Figure 5.27 Age Population Structure of Minhla Township

5.9.3 Religion, Ethnicity and Language

At the time of the 2014 census, 87.9 % of the population of Myanmar were Buddhist, 6.2 % Christian, 4.3 % Muslim and 0.5 % Hindu. Within Minhla Township, 97.4 % people are Buddhist and 0.1 % are Christian, 0.02% are Hindu and 0.2% are Muslim. According to the ERM's field visit in November 2018, it was reported that the (ethnic) population of Minhla primarily comprises Bamar (85%) and Chin (7.4%). *Table 5.15* and *Table 5.16* show the ethnicity, religion and language distribution in Minhla Township and the villages in the vicinity of the Project Site. The villagers in Set Set Yo, Yae Nan Ma, Yae Ngan and Sin Man Kya in the Study Area are reported to be all Bamar.

Table 5.15 Ethnicity in Minhla Township

Ethnicity	Population	Minhla Township Population	Percentage (%)
Kayin	1	122,903	<0.001%
Chin	9,102		7.4%
Bamar	113,409		85%
Rakhine	5		0.004
Shan	2		0.001%

Source: Minhla Township GAD, 2017

Table 5.16 Religion and Language in the Study Area

Settlement	Religion	Ethnicity	Language
Minhla Township	Buddhist (97%)	Bamar	Bamar
Set Set Yo	Buddhist (100%)	Bamar	Bamar
Yae Nan Ma	Buddhist (100%)	Bamar	Bamar
Yae Ngan	Buddhist (100%)	Bamar	Bamar
Sin Man Kya	Buddhist (100%)	Bamar	Bamar

Source: ERM field data, 2018

5.10 Infrastructure and Services

5.10.1 Education and Schools

5.10.1.1 National Level

The Ministry of Education (MOE) is the largest education provider in Myanmar. The country has been prioritising to reform education since 2015 and adopted K-12 structure extending schooling by two years. The current basic education system of Myanmar comprises of five years of primary education (KG to Grade 4), four years of lower secondary and two years of upper secondary education [(1)]. There are currently 47,363 basic education schools in Myanmar reaching approximately 9.26 million students. In addition, a significant percentage of students access basic education through monastic, private, community and other types of schools. The number of schools, teachers and students in the basic education system in the 2015-16 Academic Year are listed in *Table 5.17*.

The majority of children begin the schooling when they reach five years of age. The school begins the formal classes in June of every year. The 2014 census revealed that one in five children between the ages of 10 and 17 – about 1.7 million young people – were working instead of attending school. According to UNESCO data, there were 284,278 young children not enrolled in school in 2014, compared with 649,341 in 2010. Thus, it is clear the nation's net enrolment rates have been improving since the country embarked on its political reforms. At the primary level, the net enrolment rate was 94.5% in 2014, compared with 87.8% in 2010, while at the secondary level the rate was 48.3% in 2014, up from 45.1% four years before[2].

Table 5.17 Number of Schools, Teachers and Students in Basic Education

School	No. of Basic Education Schools (2015-16)	No. of Basic Education Teachers (2015-16)	No. of Basic Education Students (2015-16)
Upper Secondary	3,513	34,393	873,832
Lower Secondary	6,224	129,945	2,795,607
Primary	35,650	158,176	5,184,041
Monastic	1,538	11,044	297,039
Private	438	7,397	107,451
Total	47,363	340,955	9,257,970

Source: Ministry of Education, 2015-16

[1] National Education Strategic Plan 2016 – 21 Summary, 2016

[2] Major changes to Myanmar's education sector under way. Available at https://oxfordbusinessgroup.com/overview/back-basics-major-changes-education-sector-are-under-way

5.10.1.2 Local Level

Minhla Township has 160 schools comprising five basic education high schools, five basic education high school branches [1], eight basic education middle schools, 53 basic education middle school branches, 33 basic education post-primary schools [2] and 53 primary schools, two monastic education schools and one nursery. The literacy rate of aged 15 and over in Minhla Township is 92.9%. School attendance in Minhla Township drops after age 11 for both males and females [3]. There were 4,725 enrolled students and 167 teachers in five High School of Minhla Township. A teacher – student ratio is one teacher for every 28 pupils.

According to the ERM's site visit in November 2018, there was Basic Education Middle School Branch in Set Set Yo Village. There are 66 students and 9 teachers in the school. After a student finishes the Middle School, some attend High School in Minhla Town and High School Branch in Yae Nan Ma. It is reported that some children in the village drop out from middle school because their families could not afford to send them to High School. The Middle School in Set Set Yo village is showed in *Figure 5.28*.

Source: ERM field trip (2018)

Figure 5.28 Middle School Branch in Set Set Yo

Yae Nan Ma Village has a high school where 584 student are currently studying. There are 27 teachers. A student – teacher ratio is one teacher for every 22 pupils. It is observed that the lack of school facilities is the major challenge in the school. The high school of Yae Nan Ma is showed in *Figure 5.29*.

[1] Branch School is a school which is attached to the nearest basic education school in the community and supported by the government for students who reside far away from the basic education school

[2] Post-primary schools are primary schools, which are permitted to officially open middle school classes, except Grade 9, so that students who have completed primary education can pursue lower secondary school education conveniently in their community

[3] Minhla Township Report, The 2014 Myanmar Population and Housing Census, 2017

Source: ERM field trip (2018)

Figure 5.29 High School Branch in Yae Nan Ma

5.10.2 Livelihood and Economy

Tourism

The historic Minhla fort (*Figure 5.30*) is a tourist destination located on the western bank of the Ayeyarwady River in Minhla. This is located over 38 km from the Project Site. Over 3,200 foreign tourists visit the ancient fort per year (Department of Ancient Research, Minhla, 2015). Other tourist activities include river cruises along the Ayeyarwady River from Mandalay to Minhla.

Source: ERM field trip (2018)

Figure 5.30 Minhla Fort

Industry

Oil drilling is a large industry in Minhla Township and local artisanal wells have been operating in the area for more than 100 years. Oil fields in Minhla Township include Htankhine, Da Htut Pin, and Yae Nan Ma. Day labourers earn approximately 3,000 kyats per day and the oil is sold at 8,000 kyats per barrel. Local women are hired for cooking and transportation of the oil (ERM Site Visit, 2018). Photos of the oil drilling activities observed during ERM site visit in 2018 are provided in *Figure 5.31*. It should be noted that although there is an oil concession area within the Project Site as shown in *Figure 5.25*, there was no drilling activity recorded within the Project Site during the ERM site visit in 2018.

There are also numerous coal mine operation known as “rat-hole” mining in Minhla Township. The coal is reported to be sold to buyers from Yangon. Many workers are employed and paid based on how much coal is dug out [1]. It is reported that there are a number of coal mine accidents with collapses and casualties in Minhla Township.

There are five coal mines in the Project Site. According to the villagers, the coal mines operate on a five year contract. There is a workers’ camp (with 5-6 structures), located within the Project Site (ERM Site Visit, 2018). The total area of coal mine is approximately 600 acres. The workers’ camp caters to workers in the coal mine. Photos of coal mining activities observed during ERM site visit in 2018 are provided in *Figure 5.32*.

It is also reported that the local artisanal oil wells are located 3.4 km away from the Project Site. However, there is potential oil field area within the Project Site where there is no drilling operation yet. The area is approximately 72 acres.

[1] https://www.mmtimes.com/in-depth/16083-workers-put-lives-at-risk-inside-rat-hole-coal-mines-2.html

Source: ERM field trip (2018)

Figure 5.31 Oil Drilling in Minhla Township

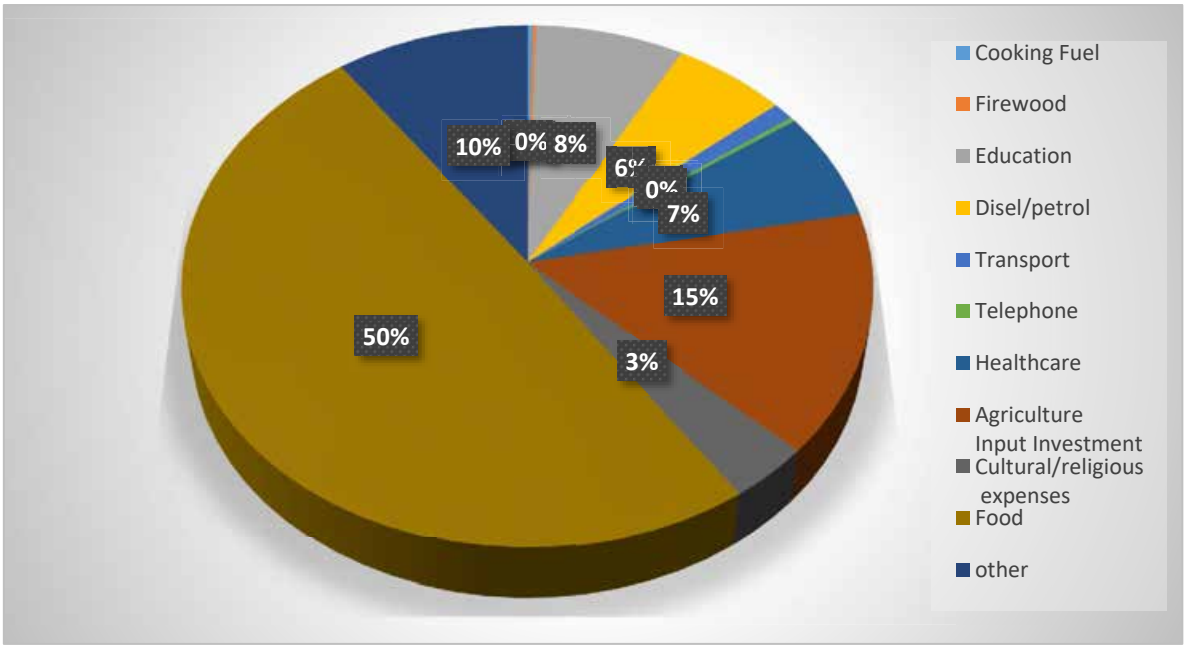
Source: ERM field trip (2018)

Figure 5.32 Coal Mine in the Project Site

Agriculture

The population in Minhla Township, in which the Project Site is located, relies heavily on agriculture for their livelihoods, growing mainly rice and chickpea, sesame, cotton and pigeon pea. In 2017, the cultivated area of agricultural crops in Minhla Township include 15,087 acres of rice, 1,221 acres of groundnut (monsoon season), 52,288 acres of sesame (monsoon season), 11,049 acres of green gram (monsoon season), 28,972 acres of pigeon pea, 29,938 acres of cotton plant and 348 acres of millet. Land usage in this township is 14,295 acres of paddy land, 71,732 acres of dry land, 26 acres of garden land and 632 acres of hill plots (Taung Yar) (Minhla Township GAD website, 2017).

According to the data collected in the public consultation meeting, most of households in the Study Area are mainly depending on agriculture for their livelihood. The villager's main expenditure is for food (50%), followed by agriculture investment (15%), education (8%), health care (7%), cultural/religious expense (3%) and diesel/petrol (6%). A detail of expenditure is shown in *Figure 5.33*.



Source: ERM field trip (2018)

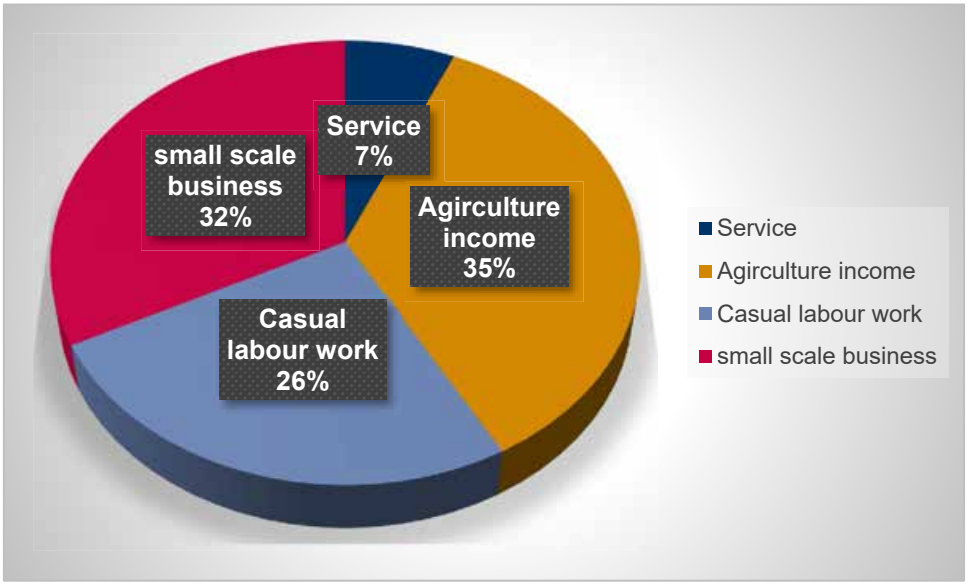
Figure 5.33 Monthly Households Expenditures in the Study Area

All of the interviewees in the Study Area reported to possess agricultural land and it was made know that the average land holding size is about 5 acres. The primary crops cultivated in these areas include paddy, sesame, pulses and pigeon pea. The major source of income is from agriculture (35%), small scale business (32%) and casual labour (26%). It is reported that there are some people, who do not own the land they are cultivating, work as casual labour. These people usually migrate to urban areas to find employment. The source of income is shown in *Figure 5.34*.

A land survey was completed by IMWP in 2018 in collaboration with the township administrators, Land Record Department and Forestry Department with the support of local community, including village elders and leaders, to determine the information on land classification, land ownership and land use for the area under feasibility/survey within the Project Site. Most (~95%) of the land in Kandok is comprised of the land category Taw Yaine (virgin land) while the remaining are religious purpose land or reserved forest land. It was reported that the virgin land at the Project Site is primarily used by the local community for cultivation and the land users typically do not have user certificates for their land. As such, the "ownership or possession of land" reported above by the local community during the Scoping consultation and EIA consultation of the Project in July and November

2018 are likely to be without proof by land use certificate within the Project Site. As a conservative approach, potential impacts to both users with and without land use certificates has been included in the impact assessment.

In Yae Nan Ma village, it was reported that another source of income is from oil drilling. The villagers drill the well in their house compound and sometimes purchase a land from other land owner. The oil driller uses the winch, generator and set up a tripod of bamboo poles with 40 or 50 feet high to drill a well. It is also reported that the oil production is declining in the area. The oil drilling is shown in *Figure 5.35.*



Source: ERM field trip (2018)

Figure 5.34 Source of Income in the AOI

Source: ERM field trip (2018)

Figure 5.35 Oil Drilling Rig in House Compound

Collection of Minor Forest Product

During the consultation undertaken for the EIA as well as IMWP land survey, it was reported that the local community collect minor forest products (such as bamboo, edible flowers and fruits, mushrooms etc.) from the forest area within the Project Site. Some members of the local community and some coal mine workers also extract timber from the reserve forest for constructing and repairing household structures and agricultural implements. However, this is opportunistic and rare. The dependence of the local community on the forest is expected to be minimal.

5.10.3 Water Resource

In Minhla Township, 57.9% of households use improved sources of drinking water from purifier, tube well, borehole and protected well/spring. Some 29.3% of households use water from protected well/spring and 25.5% use water from river/stream/canal. In rural areas, 42.4% of the households use water from unimproved sources for drinking water (Minhla Township Census Report 2017).

According to the HH survey, the settlement in the Study Area access water from lake, hand dug wells and tube wells for household consumption and drinking water. However, it is reported that the underground water in Yae Ngan is salty. Water scarcity is the major challenge in dry season in Yae Ngan Village. There is a pond in Set Set Yo village. The water from the pond is dry out in the middle of summer of every year. The water source in the Study Area is shown in *Figure 5.36* and *Figure 5.37*.

Source: ERM field trip (2018)

Figure 5.36 Water Pond in Set Set Yo Village

Source: ERM field trip (2018)

Figure 5.37 Water Storage Tank in the AOI

5.10.4 Waste Disposal

Waste management remains an issue in settlements in the Study Area, where it is generally burnt or dumped.

5.10.5 Energy Sources

In Minhla Township, the main source of energy for lighting is from electricity (21.8%), candle (28.2%), private generator (25%) and solar (9.5%) and other source included battery and kerosene. The majority of households (78.3%) in Minhla Township use firewood, followed by charcoal (7.9%) for cooking. Only 13.4% of households use electricity for cooking (Minhla Township Census Report 2017).

Communities in the vicinity of the Project Site do not have access to electricity. The main source of lighting in the Study Area is from solar panel and private generator. The community main cooking fuel is firewood and charcoal that are collected from nearby forest areas.

5.10.6 Roads and Transportation

All of the settlements near the Project Site have unpaved access roads which can be accessed by car/motorcycle. However, the roads are often damaged during the rainy season and required continued maintenance.

It is reported that Yae Ngan and Set Set Yo villages are inaccessible during rainy season. Yae Nan Ma village is quite accessible as the village is located next to Kandok highway road.

5.10.7 Communication

In terms of telecommunication system, the villages near the Project Site have cell phone signal. MPT and Telenor mobile networks are available.

5.11 Public Health

Minhla Township has four hospitals and six village health center (Minhla Township GAD, 2017). The communities near the Project Site receive their care services in Minhla Township Hospital and Yae Nan Ma Staton Hospital. The distance to Yae Nan Ma Station Hospital is: Set Set Yo (7 km); Yae Ngan (9 km); and Sin Man Kya (6 km). The distance to Minhla Township Hospital is: Set Set Yo (39 km); Yae Ngan (41 km); and Sin Man Kya (34 km). A hospital is shown in *Figure 5.38* and *Figure 5.39*.

The common disease in Minhla Township are Tuberculosis and diarrhoea (Minhla GAD data 2017).

Source: ERM field trip (2018)

Figure 5.38 Station Hospital in Yae Nan Ma

Source: ERM field trip (2018)

Figure 5.39 Minhla Township Hospital

5.12 Cultural Components

The ERM site visit in 2018 identified a monastery and pagoda (*Figure 5.40* and *Figure 5.41*) in the Project Site. No monks reside in the monastery. However some monks use the monastery during the Buddhist Lent period (July to October). No other cultural heritage sites were recorded during the site visit.

It is reported that there are pagodas and monastery in every villages in the Study Area.

Source: ERM field trip (2018)

Figure 5.40 Village Pagodas in the Windfarm Area

Source: ERM field trip (2018)

Figure 5.41 Village Monastery in the Windfarm Area

6. IMPACT ASSESSMENT

This section presents the environmental and social impact assessment methodology, impact assessment, and recommended mitigation measures, to reduce or avoid potential impacts from the Project, where appropriate. It covers the construction, operation and decommissioning of the Project.

6.1 Impact Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process. The principal impact assessment steps are summarised in *Figure 6.1* and comprise:

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

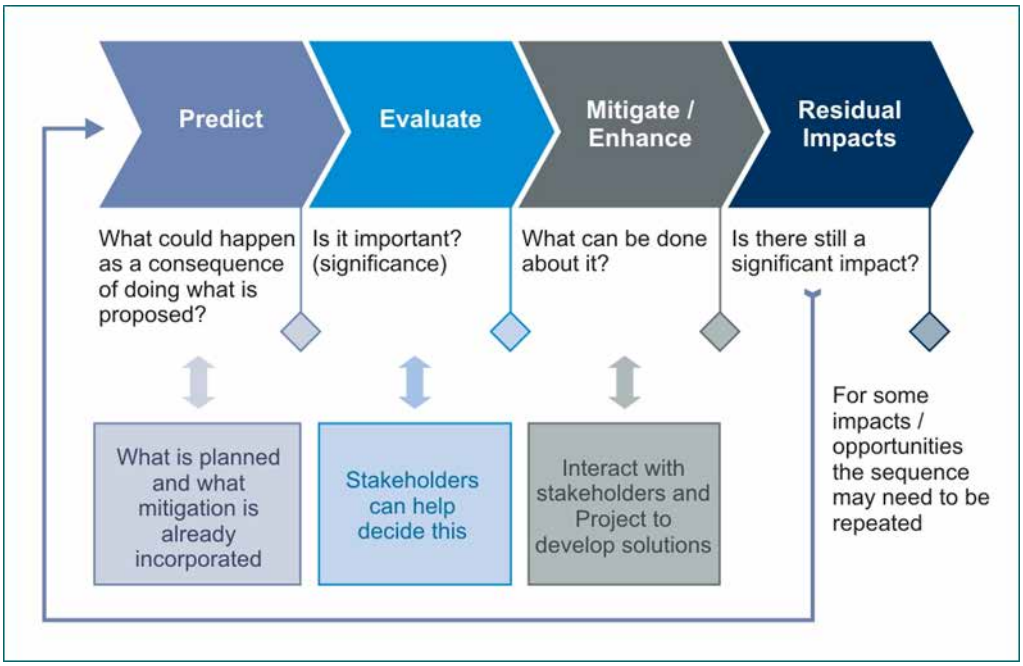


Figure 6.1 Impact Assessment Process

6.1.1 Prediction of Impacts

Prediction of impacts is an objective exercise to determine what could potentially happen to the environment as a consequence of the Project activities. This is a repeat of the process undertaken in scoping, whereby the potential interactions between the Project and the baseline environment are identified. In the impact assessment stage, these potential interactions are updated based on additional Project and baseline information. From these potential interactions, the potential impacts to the various resources/receptors are identified, and are elaborated to the extent possible. The diverse range of potential impacts considered in the impact assessment process typically results in a wide

range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

6.1.2 Evaluation of Impacts

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in *Table 6.1*.

Table 6.1 Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	The relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project footprint, projected for several kilometres, etc.).	Local Regional International
Duration	The time period over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	*[no fixed designations; intended to be a numerical value]*
Frequency	A measure of the constancy or periodicity of the impact.	*[no fixed designations; intended to be a numerical value]*

The definitions for the type designations are shown in *Table 6.2*. Definitions for the other designations are resource/receptor-specific, and are discussed in the resource/receptor-specific chapters.

Table 6.2 Impact Type Definitions

Designations (Type)	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., sound emitted from the construction leading to behavioural changes in terrestrial fauna).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., reduction in water quality from waste discharges leading to toxic effects in aquatic fauna).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is likelihood. The likelihood of an unplanned event occurring is designated using a qualitative scale, as described in *Table 6.3*

.

Table 6.3 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

6.1.3 Impact Magnitude, Receptor/Resource Sensitivity and Impact Significance

Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor-by-resource/receptor basis, as further discussed in each of the resource/receptor-specific chapters. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large

In the case of a positive impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the IA to indicate that the Project is expected to result in a positive impact, without characterising the exact degree of positive change likely to occur.

In addition to characterising the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity / vulnerability / importance of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity / vulnerability / importance of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterising sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in *Table 6.4*.

Table 6.4 Impact Significance

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix.

Box **6-1** provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the impact assessment process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Box 6-1 Context of Impact Significances

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which

the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.1.4 Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this impact assessment, ERM has adopted the following mitigation hierarchy:

- Avoid at Source; Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, labour camp or storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- Compensate in Kind; Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

6.1.5 Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact

assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

6.1.6 Management and Monitoring

The final stage in the impact assessment process is definition of the management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An Environmental and Social Management Plan, which is a summary of all actions which IMWP has committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the EIA report. The Environmental and Social Management Plan includes mitigation measures, compensatory measures and offsets and management and monitoring activities.

6.2 Identification of Impacts

For the Project, potential impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental and social resources or receptors.

The results from the scoping process for the Project are presented in the Scoping Matrix in *Table 6.5*. The scoping matrix displays Project activities against resources/receptors, and supports a methodological identification of the potential interactions each Project activity may have on the range of resources/receptors within the Area of Influence for the Project.

Table 6.5 Potential Interactions and Significance of Impacts to Receptors / Receivers

	Project Activity / Sensitive Receptors	Physical							Biological			Social				
		Air Quality	Noise & Vibration	Surface Water Quality	Groundwater Quality	Soil Quality	Landscape & Visual Amenity	Shadow Flicker	Terrestrial flora	Terrestrial fauna	Bats & Birds	Infrastructure & Services	Livelihoods and Economy	Community Health and Safety	Occupational Health & Safety	Cultural Heritage
Construction Phase																
1	Site geotechnical and groundworks															
2	Establishment of labour camp, site office and lay down area															
3	Improvement of internal access roads within Project Site															
4	Water sourcing, transportation and use															
5	Waste Disposal and Wastewater discharges															
6	Construction of turbine foundation and crane hardstand															
7	Delivery of equipment, turbines and construction materials															
8	Turbine erection															
9	Cable trenching and laying															
10	Construction of substation															
11	Presence of workforce															
Operational Phase																
1	Operation/presence of wind turbines															
2	Electromagnetic interference															
3	Vehicle movements															
4	Equipment maintenance															
5	Waste disposal and wastewater discharge															
6	Presence of workforce (security & maintenance)															
Unplanned Events																
1	Equipment Failure / blade throw															
2	Spills and Leaks															

Key

	An interaction is not reasonably expected
	An interaction is reasonably possible but the resulting impact is unlikely to lead to significant effects
	An interaction is reasonably possible and the resulting impact is likely to lead to an effect that is significant

6.2.1 Scoped Out Impacts

Potential interactions that were deemed not to result in a potentially significant impact (grey in the matrix) have been scoped out with justification and will not be considered in more detail in the EIA phase. The rationale for scoping out the following impacts associated with the development is provided in *Table 6.6*.

Table 6.6 Aspects not carried over into the Impact Assessment

Impact	Rationale for scoping out of assessment
Air Quality – operation	There will not be any operational emission from the wind turbine. The impact on local air quality will be limited to emissions from vehicle movements during operation and maintenance activities. Impact will be local and its frequency will be limited. Thus, impact is scoped out because it is not expected to be significant.
Cultural Heritage – Construction and Operation	The ERM site visit in 2018 identified a monastery and pagoda (*Figure 5.40* and *Figure 5.41)* in the Project Site. No monks reside in the monastery. It is reported that some monks use the monastery during the Buddhist Lent period (July to October). The siting of the Project facilities has avoided the monastery and pagoda with a setback distance of at least 345 m maintained from the wind turbine as recommended by the WBG EHS Guidelines for Wind Energy (2015). It is reported that there are pagodas and monastery in every villages in the Study Area. Given that the nearest village (Set Set Yo Village) is located 0.9 km (0.5 miles) from the Project Site (please refer to *Section 5.7.1*), it is not expected that these pagodas and monastery will be affected by the construction and operation of the windfarm. No other cultural heritage sites were recorded during the site visit. Based on the above, impacts on cultural heritage resources is scoped out. It should, however, be noted that the monastery and pagoda within the Project Site will be considered as a sensitive receiver for assessment of impacts such as those related to air quality, noise and shadow flicker.
Community Health and Safety – Operation	There would be limited operational activities during the operation of the Project. Management plans and procedures developed for construction activities concerning community health and safety will also be adopted for the operation of the Project since the type of impacts (e.g. related to vehicle movements, influx of labour etc.) will be similar but of smaller scale. As such, impacts to community health and safety are not expected to be potentially significant. A setback distances of 1.5 x turbine height is maintained between turbine and nearby building as recommended by the WBG EHS Guidelines for Wind Energy (2015). Potentially significant impact from blade throw is thus not expected. Environmental impacts on air quality, noise, water quality, soil quality, shadow flicker and waste generation from the operational of the Projects which may affect community health and safety are scoped in for the assessment.

Impact	Rationale for scoping out of assessment
Occupational Health and Safety – Operation	There would be limited operational activities during the operation of the Project. Management plans and procedures developed for construction activities concerning occupational health and safety (e.g. Traffic Management Plan, working at height procedures etc.) will also be adopted for the operation of the Project since the type of activities will be similar but of smaller scale. As such, impacts to occupation health and safety are not expected to be potentially significant.
Infrastructure and Services – Construction and Operation	As presented in *Section 4.4.1.6,* water required for the construction of the Project will be met via supply by bottled water for drinking water and via delivery by tankers from regional water resources such as at the river of the Minbu offloading area for construction activities. Operational requirements of water will be very limited. In terms of infrastructure of transportation, the Project will improve the access road which will also be used by the public. On waste infrastructure, the Project will develop a Waste Management Plan which will require disposal of waste at facility approved by the authority. According to WBG EHS Guidelines for Wind Energy (2015), wind turbines could potentially cause electromagnetic interference with telecommunication systems (e.g., microwave, television, and radio). Given there are limited number of potential residents within the Project Site, such interference, if any, is not expected to be potentially significant. Based on the above, impacts on infrastructure and services used by the community are not expected to be potentially significant.

6.2.2 Scoped-In Impacts

There are interactions between the resources/receptors and Project activities that have been identified as likely to lead to significant impacts which have been investigated during the EIA. These included:

Construction Phase

- Environmental impacts on air quality, noise, surface water quality, ground water quality, soil quality, waste management issues and landscape and visual amenity;
- Biodiversity impacts on terrestrial fauna and flora; and
- Social impacts on livelihoods and economy, community health and safety and occupational health and safety.

Operational Phase

- Environmental impacts on noise, surface water quality, ground water quality, soil quality, waste management issues and landscape and visual amenity as well as shadow flicker;
- Biodiversity impacts on terrestrial fauna and flora, as well as collision impacts to birds and bats; and
- Social impacts on livelihoods and economy.

Unplanned Events

- Environmental impacts on surface water quality, ground water quality, soil quality due to accidental spills and leaks.
- Social impacts on community health and safety and occupational health and safety due to accidental spills and leaks.

The assessment of the above impacts are provided in *Section 6.3* for construction phase and *Section 6.4* for operation phase. Impacts of unplanned events are assessed in *Section 6.5.*

6.3 Construction Impact Assessment and Mitigation Measures

6.3.1 Air Quality

6.3.1.1 Source of Impact

The main construction phase will occur over a period of 21 months and the activities identified as having a potential impact on air quality during this time include:

- Establishment of labour camp, site office and lay down area;
- Improvement of internal access roads within Project Site;
- Construction of turbine foundation and crane hardstand;
- Cable trenching and laying; and
- Construction of substation.

The above activities involve excavation, backfilling, use of construction vehicles on unmade roads and stockpiles of material that has the potential to generate dust and particulate matter (Total Suspended Particulate (TSP), PM_{10} and $PM_{2.5}$) to air. Dust and particulate matter have the potential to cause impacts on sensitive receivers in the vicinity of construction activities if not managed accordingly.

Emissions from vehicles used during the construction phase may contain carbon monoxide (CO), oxides of nitrogen (NO_x), sulphur dioxide (SO_2), PM and volatile organic compounds (VOCs). WBG General EHS Guidelines (2007) specifies that additional ways to reduce impacts do not need to be

considered for fleets consisting of less than 120 Heavy Goods Vehicles (HGVs) and less than 540 Light Goods Vehicles (LGVs) per day [1]. During the remainder of the construction phase the exact number of vehicles required on a daily basis is not known, however it is anticipated to be less that the abovementioned criteria. The combustion emissions from construction phase traffic have therefore been scoped out of the assessment and are not considered further.

6.3.1.2 Existing Controls / Mitigation

Considering the activities during the construction phase of the Project, the following dust suppression measures and good site practices are recommended and taken into account when assessing the significance of potential impacts:

- The access road will be paved road.
- A setback distance of 345 m will be maintained between wind turbine and residential area.
- Water suppression should be applied at exposed open earthworks at construction site.
- Provision of cover on exposed soil and construction materials including stockpiles.
- The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape.
- Drop heights of material should be minimized.
- Vehicles transporting dusty materials should be covered at all times.
- Install hoarding (i.e. temporary solid fencing) along the perimeter of the construction worksite boundary such as the labour camp, site office and lay down area, as far as practicable.

The following points should be noted with regard to the use of water and chemical suppressants to attenuate dust:

- During the wet season, or at any time during the year when there is excessive rainfall, management techniques, especially those which include using additional water to suppress dust, should be reviewed and their use amended accordingly, as fugitive dust and particulate emissions will naturally be attenuated during periods of heavy or prolonged rainfall; and
- During periods of extended drought, watering of construction areas may not be feasible. In this instance, the use of alternative surface treatments such as chemical dust suppressants should be considered.

6.3.1.3 Significance of Impact

The distance at which impacts due to emissions of dust and particulate matter would occur depend on the duration and type of construction activity, the size distribution of particles generated, the sensitivity of the receptors and the meteorological conditions.

The Institute of Air Quality Management (IAQM) [2] provide guidance for defining the significance arising from construction sites based on the magnitude of the change and the sensitivity of the receptors identified. The risk of dust emissions is defined using a number of variables including, but not limited to the activities being undertaken, the duration of activities, the size of the site and the meteorological conditions. The guidance further provides screening criteria of 350 m and 50 m from the construction site and access road, respectively, beyond which impacts are not considered likely. The premise of the guidance is that with the implementation of effective site specific mitigation measures, the environmental effect will not be significant in most cases. While this is likely to be applicable during the wet season, it is considered that airborne dust may travel further in Myanmar during the dry season owing to climatic conditions.

([1]) World Bank Ground General Environmental, Health and Safety Guidelines: Air Emissions and Ambient Air Quality (2007).

(2) Institute of Air Quality Management (2014) Guidance on the Assessment of Dust from Demolition and Construction

In terms of dust emissions from open surfaces (i.e. exposed construction areas, disturbed land, stockpiles), the USEPA (1) present evidence which suggests that at wind speeds of less than 5.3 m/s and where rainfall exceeds 0.25 mm over a 24 hour period, dust is unlikely to be lifted and emissions will therefore be negligible. It should be noted, however, that fugitive dust emitted from an unpaved surfaces or from material handling processes may be dispersed via substantially lower wind speeds once emitted and travel considerable distances, so additional consideration to this process should be given.

The evidence presented suggests that emissions and subsequent impacts to air quality associated with the construction activities will depend greatly upon the nature of the activities occurring at any one time or location and local meteorological conditions at the time of release. Given that during construction, emission source locations and volumes of materials being moved are constantly changing, impacts have not been separately quantified for separate construction sites or activities, instead, the impact from construction dust is expected to have a medium magnitude if unmitigated and uncontrolled at receptors within a conservative distance of 500 m of construction activities, which may affect the coal mine camp and several residential houses within the Project Site but not the main village settlement located ~0.9 km (0.5 miles) from the Project Site (*Figure 5.2*). The ASRs may already be affected by existing emissions from household fires for domestic purposes (i.e. heating and cooking), dust emissions from vehicle transportation on the unpaved road and coal mining activities in the vicinity. Provided that the mitigation measures presented in *Section 6.3.1.2* above will be implemented properly, impact from construction dust of the Project is expected to be of small magnitude and will not be a significant source of additional emission to the existing emission sources. When considering impacts to human health due to inhalation of airborne pollutants, all sensitive human receptors are defined as medium sensitivity. This represents general populations and areas of habitation.

Based on the above, the impact significance associated with dust and particulate matters generated during construction are considered to be **Minor**.

(1) United States Environmental Protection Agency (1995) AP-42 Section 13.2 Fugitive dust sources, www.epa.gov

Table 6.7 Assessment of Air Quality Impact Related to Construction Dust and Particulate Matter

Impact	Adverse impact to air quality due to dust and particulate matter generated from construction related activities such as excavation, backfilling, use of construction vehicles on unmade roads and stockpiles of material.				
Impact Nature	**Negative**	Positive	Neutral		
	Elevated ambient concentrations of dust, PM_{10} and $PM_{2.5}$ from construction related activities will have a **negative** impact on air quality.				
Impact Type	**Direct**	Indirect	Induced		
	Elevated ambient concentrations of dust, PM_{10} and $PM_{2.5}$ from construction related activities will have a **direct** impact on air quality.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential impacts to air quality will occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Construction activities at the site have the potential to result in significant emissions of dust up to 500 m from the construction site boundary and can therefore be described as **local.**				
Impact Scale	The scale of the impact is likely to be up to 500 m from the construction site boundary.				
Frequency	Impacts will arise continuously from construction related activities.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	When considering impacts to human health due to inhalation of airborne pollutants, all sensitive human receptors are defined as 'medium' sensitivity. This represents general populations and areas of habitation.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor.**				

6.3.1.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary. However, following industry practices, a number of site management measures could be implemented throughout the remaining construction period to manage and reduce episodes which can lead to potential impacts and include:

- Record all dust and air quality complaints and follow up by identifying the causes and taking appropriate measures to reduce emissions in a timely manner.
- Record any exceptional incidents that lead to fugitive dust emissions either on or off the Project site and make a record of the action taken to resolve the issue and reduce the possibility of it occurring again in the future.
- Undertake frequent inspections at nearby receivers and make a record of inspection findings. Inspections should include regular dust soiling checks of surfaces such as vehicles and window sills within 100 m of the construction site boundary.

6.3.1.5 Significance of Residual Impact

With the implementation of existing control and mitigation measures, it is expected that the impact significance would be minor. Following industry practices, additional measures are also recommended which could further reduce the residual impact to **Negligible**.

6.3.2 Construction Noise

6.3.2.1 Source of Impact

Operation of the powered mechanical equipment (PME) will be the major sources of noise impact to the noise sensitive receivers (NSRs) over the 25-month construction phase of the Project. PMEs will be deployed for the following key construction activities:

- Establishment of labour camp, site office and lay down area;
- Improvement of access roads;
- Construction of turbine foundation and crane hardstand;
- Turbine Erection;
- Cable trenching and laying; and
- Construction of substation.

In addition, vehicular traffic related to the Project a potential source of noise during construction. Truck movements along the access roads will create a temporary noise disturbance at receptors located along the access roads. The noise impact will be temporary and only limited to the transit of the trucks. Noise from vehicular traffic is considered as not potentially significant and thus not discussed further.

6.3.2.2 Existing Controls / Mitigation

The following noise control measures and good site practices are recommended and taken into account when assessing the significance of potential impacts:

- Well-maintained equipment to be operated on-site.
- Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components.
- Shut down or throttled down between work periods for machines and construction plant items (e.g. trucks) that may be in intermittent use.
- Reduce the number of equipment operating simultaneously as far as practicable.
- Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable.
- Locate noisy plant as far away from receptors as practicable.
- Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities.

6.3.2.3 Significance of Impact

In general, a 300 m AOI would be considered as sufficient for construction noise given the localised nature of noise impacts. As such, the magnitude of construction noise impacts from construction of turbine foundation, crane hardstand and erection of turbines is anticipated to be negligible given the turbine location is designed to be at least 345 m from residential area (*Figure 5.3*). The locations of the substation, labour camp, site office and laydown area are also more than 300 m from the nearest NSRs and the noise impact magnitude is thus also considered negligible from the construction of these facilities.

For access road improvement as well as cable trenching and laying area which follow the same alignment, the construction activities would be within 300 m of residential area such as the coal mine camps and several residential houses within the Project Site but not the main village settlement located ~0.9 km (0.5 miles) from the Project Site (*Figure 5.3*). The village pagoda and monastery,

which is reported to be used by some monks during the Buddhist Lent period (July to October), is also within 300 m from the access road and cable trenching and laying area. These NSRs are subjected to existing noise generated from vehicle transportation and coal mining activities. Provided that mitigation measures recommended in *Section 6.3.2.2* above will be implemented properly, impact from construction noise of the Project is expected to be of small magnitude and would not be a significant source of noise in addition to the existing noise sources. In terms of receptor sensitivity, it is generally considered medium since the NSRs are also subjected and adopted to existing noise sources from coal mining and transportation on the unpaved road. For the pagoda and monastery, the sensitivity is considered high when it is used by the monks during the Buddhist Lent period (July to October).

Based on the above, the impact significance associated with noise generated during construction are considered to be **Minor** except for the pagoda and monastery for which the impact is considered to be **Moderate** during the Buddhist Lent period (July to October).

Table 6.8 Assessment of Construction Noise Impact Related to the use of PMEs

Impact	Noise impact from the use of PMEs for construction works during construction phase.				
Impact Nature	**Negative**	Positive	Neutral		
	Noise impact from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Noise impact from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential noise impacts will occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Construction activities at the site have the potential to result in significant noise impact of up to 300 m from the construction site boundary and can therefore be described as **local.**				
Impact Scale	The scale of the impact is likely to be up to 300 m from the construction site boundary.				
Frequency	Impacts will arise continuously from construction related activities.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	**High**		
	Generally considered **medium** since the NSRs are subjected and adopted to existing noise sources from coal mining and transportation on the unpaved road. For the pagoda and monastery, the sensitivity is considered **high** when it is used by the monks during the Buddhist Lent period (July to October).				
Impact Significance	Negligible	**Minor**	**Moderate**	Major	
	The impact significance is expected to be **Minor** except for the pagoda and monastery for which the impact is considered to be **Moderate** during the Buddhist Lent period (July to October).				

6.3.2.4 Additional Mitigation and Management

The following mitigation measures should be applied to mitigate the construction noise impacts at the pagoda and monastery within the Project Site:

- Construction should be avoided within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October.
- If construction activity within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October is unavoidable, prior consultation should be conducted with the monks using the pagoda and monastery to discuss the arrangement of construction works to reduce noise

impacts to these areas. Noise monitoring should be undertaken at the pagoda and monastery during the Buddhist Lent period and compared against the Myanmar NEQ for ambient noise to check compliance and proposed noise reduction measures if exceedance is recorded. Details on noise monitoring are provided in *Table 8.4*.

6.3.2.5 Significance of Residual Impact

With the implementation of the additional mitigation measures, the residual noise impact due to construction is expected to be of **Minor** significance.

6.3.3 Waste Management

6.3.3.1 Source of Impact

Activities during the construction phase of the Project will generate a variety of wastes which can be categorized based on their nature and the options for disposal, such as inert waste (inert wastes, scrap metals/metal off-cuts, wood, cardboard, paper and some plastics), refusal (food residues, paper, used bottles and cans, packaging and broken furniture) and hazardous waste (e.g. waste oil and oily rags, waste acid, waste batteries, used lubricating and hydraulic oils, fluorescent light bulbs, and contaminated containers such as empty paint tins). Estimation of the waste stream from the construction activities of the Project is provided in *Table 4.4* with brief description provided below.

Inert Wastes

Inert wastes such as packaging waste containing wood, cardboard and other recyclables as well as soil from excavation may be generated from construction activities. It is unlikely that the disposal of inert wastes will pose any long-term negative impacts to environments.

General Refuse

General refuse generated by construction activities has the potential to lead to variety of foul impacts without proper housekeeping practices. These impacts involve mal-odor, littering, water quality impacts, visual nuisance, pests and scavenging animals along with diseases to the Project Site as well as local communities. The disposal of these types of waste at the site other than accredited landfills or subcontractor can lead to similar impacts at disposal locations.

Hazardous Waste

A small quantity of hazardous waste are likely to be generated by the Project. Hazardous wastes can pose serious environmental and health and safety hazards without proper management plans during handling, storage, transportation and disposal.

Inappropriate disposal of wastes could lead to contamination of air, soil and water resources. Water quality impacts can be associated with poor storage of materials, poor handling and direct impacts of waste on water quality by littering on a nearby watercourse. Soil and ecological impacts are related with inappropriate dumping in sensitive areas and inadequate storage/coverage during transport resulting in windblown litter. In addition, secondary impacts on local community health are expected including usage of the water obtained from impacted water courses. There are also potential nuisance impacts related to the dust creation and impacts from the transport of wastes to disposal sites.

6.3.3.2 Existing Controls / Mitigation

The following existing control and mitigation control measures will be adopted for the construction of the Project:

- A Waste Management Plan (WMP) for the Project should be developed and implemented. The WMP should include the following:

- Good housekeeping practices for waste storage and handling referencing good international industry practice (GIIP);
- A waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected from the construction and to identify appropriate disposal routes;
- Construction materials should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
- Construction wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible;
- Waste suitable for reuse should be stored on site and reintroduced to the construction process as and when required;
- The WMP should identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase;
- A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP;
- Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers);
- Waste should be collected regularly by reputable waste collectors;
- Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible;
- Disposal of construction waste in or off the construction site should be prohibited;
- Chain of custody documents should be used for construction waste and hazardous waste to monitor disposal; and
- Waste segregation should be practiced at the labour camp with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

6.3.3.3 Significance of Impact

The impact magnitude is considered small with proper implementation of mitigation measures. The resource/receptor sensitivity is considered medium considering the potentially hazardous nature of the wastes. The impact significance is considered **Minor**.

Table 6.9 Assessment of Waste Management Issue during Construction

Impact	Waste management Issues from the construction works including insert wastes, general refuse and hazardous wastes.				
Impact Nature	**Negative**	Positive	Neutral		
	Impact from improper waste management from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impact from improper waste management from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Impact from improper waste management may occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized and short-term impact duration.				
Frequency	Impact from improper waste management from the construction activities may arise continuously from construction related activities.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity of receptor is considered as **medium**.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.3.3.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.3.3.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual waste management impact due to construction is expected to be of **Minor** significance.

6.3.4 Surface Water Quality

6.3.4.1 Source of Impact

Domestic-type wastewater and sewage will arise from the construction workforce. Black and grey water will arise from the construction workforce and from drainage from cooking and laundry facilities serving site workers. It is estimated up to 50-60 workers will be working on-site during the construction phase of the Project. With an assumed sewage generation rate of 0.19 m^3 per worker per day [(1)], up to about 12 m^3 of sanitary wastewater will be generated per day, mostly from the labour camp and site office. Mis-management of sewage and wastewaters would have the potential to result in contamination of surface waters, which may result in localized land/ecological contamination, impacts to health, odour nuisance and attraction of vermin.

Surface run-off from the Project, particularly following heavy rains, could have potential impacts on water quality of surface waters. Surface run-off from the Project Site could contain high levels of suspended solids (SS). It may also contain contaminants if washed out from areas used for maintenance, material and equipment laydown, parking, fuel storage and fuelling.

(1) EPD Hong Kong 2005. Technical Paper Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning. Available at: http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/water/guide_ref/files/gesf.pdf

6.3.4.2 Existing Controls / Mitigation

The following existing control and mitigation control measures will be adopted for the construction of the Project:

- Earthworks to form the final surfaces should be followed up with surface protection and drainage works to prevent erosion caused by rainstorms.
- Site drainage facilities should be developed following the design basis below:
  - Designed to convey the runoff from a 25 years rainfall event.
  - Provide oily water separator at the tie-in point of the existing drainage system.
  - Convey surface runoff and roof drainage away from the equipment and buildings.
- All drainage facilities and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit will be removed regularly.
- A sewage system will be constructed for the labour camp which should consist of soak pits for the collection of wastewater from the labour camp kitchen and washing area.
- Sewage from the toilets should be discharged into septic tanks.
- A storage pond should be considered to collect the wastewater from sewage system or septic tank. The retention time of storage pond should be designed to cover the closed system management (no waste discharge to the public).
- Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility.
- Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges (*Table 3.8*) before drained to the site drainage system. The minimum diameter for sewer line should be 100 mm (4 inches).

6.3.4.3 Significance of Impact

The water resources used by the nearest community is located at Set Set Yo Village which is 0.9 km (0.5 miles) from the Project Site (please refer to *Section 5.7.1*). In addition, siting of the wind turbine has considered location of nearby watercourse within a setback distance of at least 50 m. With the proper implementation of the existing control and mitigation measures, it is expected that the impact magnitude would be negligible. Sensitivity of the Water Sensitive Receiver (WSR) is considered as high given that nearby water sources is extracted for irrigation etc. The significance of impacts associated with wastewater and run-off during construction is considered **Negligible**.

Table 6.10 Assessment of Surface Water Quality Impacts during Construction

Impact	Surface water quality impact from site run-off and sewage generated from construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Surface water quality impact from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Surface water quality impact from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential water quality impacts will occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of surface water quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized discharge / spill and short-term impact duration.				
Frequency	Impacts from wastewater and runoff will arise continuously from construction related activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures.				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of WSR is considered as **high** given that nearby water sources is extracted for irrigation etc.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.3.4.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.3.4.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual surface water quality impact due to construction is expected to be of **Negligible** significance.

6.3.5 Ground Water Quality

6.3.5.1 Source of Impact

Impacts on ground water quality may be caused by the following activities:

- Improper waste management practice as discussed in *Section 6.3.3*. Ground water quality impacts can be associated with poor storage of materials, poor handling and direct impacts of waste on water quality by littering on a nearby ground water sources (i.e. wells).
- Wastewater discharged and run-off as discussed in *Section 6.3.4*, which may enter local ground water sources (i.e. wells).

6.3.5.2 Existing Controls / Mitigation

The existing controls and mitigation measures are provided in *Section 6.3.4.2* for waste management and in *Section 6.3.4.2* for wastewater and run-off. These controls and mitigation measures will also be provided to control the ground water quality impacts from the Project.

6.3.5.3 Significance of Impact

The water resources used by the nearest community is located at Set Set Yo Village which is 0.9 km (0.5 miles) from the Project Site (please refer to *Section 5.7.1*). Provided that the existing controls and mitigation measures provided in *Section 6.3.4.2* for waste management and in *Section 6.3.4.2* for wastewater and run-off are implemented properly, the ground water quality impacts from the Project are expected to be of negligible magnitude. Receptor sensitivity is considered high as the community is using the ground water for drinking purpose. The significance of impacts to ground water quality is considered **Negligible**.

Table 6.11 Assessment of Ground Water Quality Impacts during Construction

Impact	Ground water quality impact due to waste management issues as well as wastewater discharged and site run-off from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Ground water quality impact from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Ground water quality impact from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential water quality impacts will occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of ground water quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized and short-term impact duration.				
Frequency	Impacts from wastewater and runoff as well as waste management will arise continuously from construction related activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of receptor is considered as **high** given that nearby water sources is extracted for drinking etc.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.3.5.4 Additional Mitigation and Management

No additional mitigation and management measures are considered necessary given the impact is of minor significance.

6.3.5.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual ground water quality impact due to construction is expected to be of **Negligible** significance.

6.3.6 Soil Quality

6.3.6.1 Source of Impact

Impacts on soil quality may be caused by the following activities:

- Improper waste management practice as assessed in *Section 6.3.3*. Soil quality impacts are related with inappropriate dumping and inadequate storage/coverage during transport resulting in windblown litter.

- Wastewater discharged and run-off as assessed in *Section 6.3.4*, which would have the potential to result in localized soil contamination within and in the vicinity of the Project Site.

6.3.6.2 Existing Controls / Mitigation

The existing controls and mitigation measures are provided in *Section 6.3.4.2* for waste management and in *Section 6.3.4.2* for wastewater and run-off. These controls and mitigation measures will also be provided to control the soil quality impacts from the Project.

6.3.6.3 Significance of Impact

Provided that the existing controls and mitigation measures provided in *Section 6.3.4.2* for waste management and in *Section 6.3.4.2* for wastewater and run-off are implemented properly, the soil quality impacts from the Project are expected to be of negligible magnitude. Receptor sensitivity is considered high as the community is using land within the Project Site for agriculture. The significance of impacts to ground water quality is considered **Negligible**.

Table 6.12 Assessment of Soil Quality Impacts during Construction

Impact	Soil quality impact due to waste management issues as well as wastewater discharged and site run-off from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Soil quality impact from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Soil quality impact from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential soil quality impacts will occur throughout the construction phase only and can therefore be described as **short-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of soil quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized and short-term impact duration.				
Frequency	Impacts from wastewater and runoff as well as waste management will arise continuously from construction related activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures.				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of receptor is considered as **high** given that the community is using land within the Project Site for agricultural purpose.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.3.6.4 Additional Mitigation and Management

No additional mitigation and management measures are considered necessary given the impact is of minor significance.

6.3.6.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual soil quality impact due to construction is expected to be of **Negligible** significance.

6.3.7 Landscape and Visual Impacts

6.3.7.1 Source of Impact

Construction of the windfarm will involve the following activities which may potentially lead to impacts to the landscape and visual amenity:

- Establishment of labour camp, site office and lay down area;
- Improvement of access roads;
- Construction of turbine foundation and crane hardstand;
- Erection of turbine;
- Cable trenching and laying; and
- Construction of substation.

6.3.7.2 Existing Controls / Mitigation

The following existing controls and mitigation measures will be implemented to mitigate the landscape and visual impacts of the Project:

- Construction activities should be restricted to within the Project facility footprint and immediate surroundings only.
- After construction work, any land taken for a temporary basis will be restored to their original form (e.g. for labour camp, site office and lay down area).
- Access road to the Project Site will be existing road with minor improvement works required.

6.3.7.3 Significance of Impact

Change in landscape character will occur on land occupied by the wind turbines and the associated facilities (e.g. substation, labour camp, site office, lay down area, crane hardstand, met masts etc.) as well as the internal access roads. Land that will temporarily be used for construction phase is anticipated to be 2.70 ha in area for the labour camp, site office and lay down area. The temporarily used area will be reinstated after the constructional phase. A total land area of 89.86 ha will be occupied during the life time of the Project of 25 years where the operational facilities (wind turbines, substation, operation and maintenance buildings and internal access roads etc.) will be located. The impact magnitude is considered small given the localised and small area occupied compared to area of the Project Site.

The land areas occupied by the Project are mainly used by the community for agricultural purpose and a small area of the internal access road will be encroached into the reserved forest to the southeast of the Project Site. The sensitivity to change in landscape character is considered medium since these areas are noted to be modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions.

The significance of impacts due to change in landscape character is thus considered to be **Minor.**

Majority of the construction activities, except for erection of turbine, will only be mainly visible to the visual sensitive receivers (VSRs) within the Project Site. Due to the height of turbine and the installation equipment, turbine erection may be visible to main village settlement surrounding the Project Site, the closest of which is 0.9 km (0.5 miles) away from the Project Site boundary. Given the above and that Project Site is observed to be modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions, the magnitude of visual impacts due to the Project construction activities is considered as small.

The VSRs is considered to be of medium sensitivity given they are already adopted to existing modifications and disturbance caused by human activities within the Project Site.

The significance of visual impacts is thus considered to be **Minor.**

Table 6.13 Assessment of Landscape and Visual Impacts during Construction

Impact	Landscape and visual impact from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Landscape and visual impact from the construction activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Landscape and visual impact from the construction activities is **direct**.				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential landscape and visual impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
	Extent of landscape and visual impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the small area occupied by the facilities (less than 85 ha) and majority of the construction activities will only be mainly visible to the visual sensitive receivers within the Project Site.				
Frequency	Impacts will arise continuously from construction and operation phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity to change in landscape character is considered **medium** since the Project Site is modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions. VSRs is considered to be of **medium** sensitivity given they are already adopted to existing modifications and disturbance caused by human activities within the Project Site.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.3.7.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.3.7.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual landscape and visual impacts due to construction is expected to be of **Minor** significance.

6.3.8 Biodiversity

6.3.8.1 Source of Impact

The impact assessment on biodiversity is undertaken in accordance with IFC PS 6.

Table 6.14 broadly defines the types of threats to biodiversity values that have potential to occur as a result of a Project. These threats to biodiversity are derived from IFC PS6 and relate to the activities that are likely to occur during construction and post construction phases.

Table 6.14 Types of Threats to Biodiversity *Values*

Term	Description
Loss of terrestrial habitat	Permanent loss of habitat or species due to permanent or temporary site activities. Temporary and permanent impacts to terrestrial habitat from constructing turbines and relevant infrastructures.
Disturbance or displacement of individuals from light; noise and/or vibration impacts	Disturbance to, or displacement/exclusion of a species from foraging habitat due to construction activities, and operational and maintenance activities. Impacts from light, noise and vibration sources on surrounding habitats causing disturbance and displacement and changes in behaviour.
Disturbance to fauna, barrier creation, fragmentation and edge effects	Creation of barriers to the movements of wildlife, such as mammals, reptiles and amphibians and invertebrates and plants with limited powers of dispersal. Fragmentation of habitat, permanent /temporary severance of wildlife corridors between isolated habitats of importance for biodiversity. Edge effect is occurred when a habitat is exposed to a different adjacent habitat type or structure. These impacts can include increased risk of parasitism or disease, increased risk of predation, adverse microclimate conditions (including drying out and subsequent fire risk), and competition from invasive species.
Degradation of habitat from dust; water pollution; or invasive species	Disturbance or damage to adjacent habitat and species caused by changes in microclimate, vulnerability to predation and invasion and overall changes in conditions that can lead to a change in the community and its values for flora and fauna. This can include increased exposure to noise, light and dust. Introduction or spreading of alien species during the construction works.
Mortality – turbine strike to avifauna, vehicle strike, hunting and poaching	Impact due to potential flight of avifauna through the Rotor Swept Zone (RSZ) of the wind turbines. Mortality of individual fauna species as a result of vehicle or machinery strike or falling debris during clearing activities. Mortality to individual fauna species as a result of worker influx and hunting/poaching of extant fauna

Table 6.15 scopes the impacts likely during the construction, operation and decommissioning phases of the Project. The impact assessment for these impact types are further assessed below. Impacts that will occur for the construction phase or continuing from construction to operation phase are discussed in this section. Impacts that will occur for the operation phase only or required to be reassessed for operation phase are discussed in *Section* 6.4.8. There is no planned decommissioning of the Project and as such the impact assessment will not cover the decommissioning phase.

Table 6.15 Scoping of Potential Impacts during Construction and Operation

Type of Impact	Construction Phase	Operational Phase	Decommissioning Phase
Loss of Habitat	Yes	No	No
Disturbance or displacement of fauna	Yes	Continuing from construction phase	Reassessed for decommissioning phase
Barrier creation, fragmentation and edge effects	Yes	Continuing from construction phase	Continuing from operational phase
Degradation of habitat	Yes	Continuing from construction phase	Reassessed for decommissioning phase
Mortality – turbine strike, vehicle strike, hunting and poaching	Yes	Reassessed for operational phase	Continuing from operational phase

Notes:

Yes: considered to be likely impacts during the phase.

No: considered that there will be no impacts or negligible impacts during the phase

Continuing from construction and/or operation phase: the impact is likely to continue from the operation phase and the mitigations outlined are appropriate to manage impacts during construction, operational and/or decommissioning phases.

Reassessed for operational and/or decommissioning phase: the impact is likely to be different during the phase and hence is reassessed based on the likely impacts. Additional mitigations may be outlined to apply to this phase.

6.3.8.2 Existing Controls / Mitigation

The following existing controls and mitigation measures are applied for the Project:

Loss of Terrestrial Habitat

- The Project does not encroach upon any Critical Habitat.

Barrier Creation, Fragmentation and Edge Effects

- The proposed access roads should be made following existing paths where possible to minimise the impact.

6.3.8.3 Significance of Impact

Loss of Terrestrial Habitat

The removal of habitat within the Project Site will reduce the availability of breeding, foraging and roosting habitat for resident species, subsequently, reducing the ecological value of the area.

In order to establish the windfarm, habitat clearing is required. The geospatial assessment undertaken to define Natural Habitat and Modified Habitat has classified 54.9% (642.4 ha) of the Project Site as Natural Habitat and 45.1% (527.5 ha) is Modified Habitat.

Among the 1,170 ha Project Site, 2.7 ha of habitat will lost during construction phase. The area of temporary habitat loss include an area for site office and lay down area. The temporary access area will be reinstated after the constructional phase. A total of 89.86 ha habitat will be lost permanently, which accounts for approximately 7.7% of the Project Site. The area of permeant loss include the facilities in operational phase, including wind turbines, substation, O&M buildings, substation and internal access roads.

No critical habitat was identified within the Project Site or the EAA. The areas of Natural Habitat and Modified Habitat impacted during operation of the Project Site are shown in *Table 6.16.*

.

Table 6.16 Clearing of Habitat within the Project Site

Windfarm Site	Natural Habitat Area (ha)	Modified Habitat Area (ha)	Total (ha)
Temporary Loss			
Site office & Laydown area	1.92	0.78	**2.70**
Permanent Loss			
Wind turbines	13.17	9.33	22.50
O&M, Substation	0.80	0.24	1.04
Internal Access Roads within the Windfarm Site	20.73	36.19	56.92
Access Road to the Windfarm Site (4.7 km section required to be expanded from existing road)	0	9.40	9.40
Total (Permanent loss)	**34.70**	**55.16**	**89.86**
Total Area subjected to Clearing (include Temporary and Permanent Loss)	**36.62**	**55.94**	**92.56**

The Project Site and EAA are located within the Irrawaddy Plains Endemic Bird Area, but not within any nationally or Internationally Protected Areas. Observation from ecological baseline survey has shown a high level of disturbance in the Natural and Modified Habitat within the Project Site, including land clearance, burning and cattle grazing. Impacts to critical habitat is not anticipated from this Project.

The development of the windfarm will not result in the removal of any aquatic habitat, thus, relevant impacts are not considered. Habitat removal (vegetation clearing) within the Project Site is considered to be a direct impact to terrestrial biodiversity values. The total area of permanent Natural Habitat lost due to the construction of the windfarm is estimated to be 34.70 ha.

The sensitivity of the Project Site habitat is considered be minor due to the level of human disturbance observed during ecological baseline survey, and the absence of conservation significant species.

The magnitude of effect is likely to be medium as 92.56 ha will be subject to clearing. Nevertheless, vegetation clearing (habitat loss) will not result in the loss of viability or functioning of the remaining habitat given 56% of the habitat lost will be Modified Habitat.

The overall impact is therefore likely to be considered of **Minor** significance.

Table 6.17 Assessment of Impacts from Loss of Terrestrial Habitats during Construction and Operation

Impact	Impacts from loss of terrestrial habitats from the construction works and operation.			
Impact Nature	**Negative**	Positive	Neutral	
	Impacts from loss of terrestrial habitats are **negative**.			
Impact Type	**Direct**	**Indirect**	Induced	
	Impacts from loss of terrestrial habitats are **direct** and **indirect.**			
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent
	Potential impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.			
Impact Extent	**Local**	Regional	International	
	92.56 ha will be subject to clearing.			
Impact Scale	92.56 ha will be subject to clearing,			
Frequency	Impacts will arise continuously from construction and operation phase.			
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is expected to be **medium** with existing control / mitigation measures**.**			
Receptor Sensitivity	**Low**	Medium	High	
	Sensitivity of receptor is considered to be low.			
Impact Significance	Negligible	**Minor**	Moderate	Major
	The impact significance is expected to be **Minor**.			

Disturbance or Displacement of Individuals

Resident fauna species within the Project Site are expected to be subject to disturbances, which could result in temporary or permanent displacement. Expected disturbances include:

- Light emissions;
- Noise emissions; and
- Vibration.

Project machinery, vehicles and equipment indirectly cause light, noise and vibration emissions.

Light, noise and vibration disturbances have the potential to influence breeding, roosting and/ or foraging behaviour of resident fauna. It is likely these disturbances will be greatest during the construction phase. In extreme cases, noise, light and vibration impacts can disturb species at a population scale.

Noise will be the primary disturbance, which will be closely associated with vegetation clearing, excavation, movement of materials, lifting and other typical construction activities. These activities will introduce noise sources, which are not currently limited in the Project Site and EAA. More specifically, noise can impact communication potential, which in turn can affect breeding potential, predator detection and social interactions [(1)] .

Lighting associated with the Project has the potential to inhibit fauna movement patterns, particularly, nocturnal species. Similarly, introducing light sources has the potential to deter foraging and dispersal activities of nocturnal species.

It is expected that vibration impacts associated with planned movement of any heavy vehicles/machinery will occur. Species that rely on vibration for prey/ predator detection can also be negatively affected. Impacting these key behavioural attributes can often result in impacts to the distribution of an individual.

([1]) van der Ree, R., Smith, D.J. and Grilo, C., 2015. Handbook of road ecology. John Wiley & Sons.

The duration of construction activities is expected to be short-term within 21 months. Similarly, it should be noted that the light, noise and vibration disturbances will not be continuous for the construction phase, or focused on any one specific location for the total time. Light, noise and vibration disturbance are unlikely to occur at all locations simultaneously.

Resident mammals, birds, herpetofauna invertebrate and fish species within the Project Site and EAA are likely to be disturbed at some level by the light, noise and vibration impacts. Light, noise and vibration impacts are unlikely to have a serious impact upon resident flora species. The conservation significant bird species are highly mobile and will likely actively avoid noise, light and vibration impacts, although, they could be displaced.

The magnitude of effect due to disturbance and displacement of fauna is likely to be small as the effect will not cause a substantial change in the population of the species present, or other species dependent on them.

Non-conservation significant species are expected to have a low sensitivity to light, noise and vibration impacts. Non-conservation significant species generally contain more resilient populations, therefore, the impacts are considered less severe. Conservation significant species are expected to have a medium sensitivity to light, noise and vibration impacts. Conservation significant species generally contain vulnerable populations, therefore, the impacts are considered potentially detrimental.

The overall significance of this impact is therefore **Negligible** for non-conservation significant species and **Minor** for conservation significant species.

Table 6.18 Assessment of Impacts on Disturbance and Displacement of Fauna during Construction and Operation

Impact	Impacts of disturbance and displacement of fauna from the construction works and operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts of disturbance and displacement of fauna are **negative**.				
Impact Type	**Direct**	**Indirect**	Induced		
	Impacts from loss of terrestrial habitats are **direct** and **indirect.**				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
Impact Scale	Impact extent will be restricted to the Project Site.				
Frequency	Impacts will arise from construction and operation phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	**Medium**	High		
	Sensitivity of non-conservation significant species is considered to be low. Sensitivity of conservation significant species is considered to be medium.				
Impact Significance	**Negligible**	**Minor**	Moderate	Major	
	The impact significance is expected to be **Negligible** for non-conservation significant species and **Minor** for conservation significant species.				

Barrier Creation, Fragmentation and Edge Effects

The proposed location for the windfarm is anticipated to contribute to habitat fragmentation and expose surrounding habitat to the impacts of edge effects. Barriers to fauna and flora dispersal

include natural factors (e.g. rivers) and anthropogenic factors (e.g. roads). Barriers to dispersal limit the foraging, breeding and roosting potential of fauna, which can ultimately result in population scale impacts [1]. Habitat fragmentation involves the division of continuous habitat, effectively creating barriers between habitat fragments, which can negatively impact fauna and flora populations [2]. Edge effects involves two dissimilar areas or habitat types being located immediately adjacent to one another. This phenomenon commonly occurs during construction developments, where a remnant vegetation patch will become adjacent to bare ground or infrastructure. Negative impacts include microclimate changes, increased predator and poacher access and increased erosion.

At present, the habitat within Project Site is somewhat fragmented by small access roads and patches of cleared land by shifting cultivation and coal mining. The windfarm will widen some existing paths. This will deter resident species from utilising these areas as there will be an increased risk of predation and interactions with humans. Essentially, the access roads and other infrastructures, such as wind turbine and site office will act as barriers for wildlife. Increased poaching and hunting access to these areas may be a potential issue. Microclimate and erosional changes are also likely to occur.

The magnitude of impact is likely to be medium as the network of access roads has a large coverage in the Project Site. This could cause some level of change in the population of the species present, or other species dependent on them.

Non-conservation significant species are expected to have a low sensitivity to barrier, fragmentation and edge effects impacts. Non-conservation significant species generally contain more resilient populations, therefore, the impacts are considered less severe. Conservation significant species are expected to have a medium sensitivity to barrier, fragmentation and edge effects impacts. Conservation significant species generally contain susceptible populations, therefore, the impacts are considered potentially detrimental.

The overall significance of this impact is therefore **Minor** for non-conservation significant species and **Moderate** for conservation significant species.

(1) Krisp, J.M., 2004. Three-dimensional visualisation of ecological barriers. Applied geography, 24(1), pp.23-34.

(2) Didham, R.K., 2001. Ecological consequences of habitat fragmentation. e LS.

Table 6.19 Assessment of Impacts on Barrier Creation, Fragmentation and Edge Effect during Construction and Operation

Impact	Impacts from barrier creation, fragmentation and edge effect during construction works and operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts from barrier creation, fragmentation and edge are **negative**.				
Impact Type	**Direct**	**Indirect**	Induced		
	Impacts from barrier creation, fragmentation and edge are **direct** and **indirect.**				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
Impact Scale	Impact extent will be restricted to the Project Site.				
Frequency	Impacts will arise from construction and operation phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is expected to be **medium** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	**Medium**	High		
	Sensitivity of non-conservation significant species is considered to be low. Sensitivity of conservation significant species is considered to be medium.				
Impact Significance	Negligible	**Minor**	**Moderate**	Major	
	The impact significance is expected to be **Minor** for non-conservation significant species and **Moderate** for conservation significant species.				

Degradation of Habitat

A range of Project activities have the potential to lead to habitat degradation. These activities include excavation, land clearing, movement of vehicles as well as light and noise from operating machineries.

During construction, land preparation activities have the potential to generate dust, which may settle on vegetation adjacent to the Project Site. Excessive dust deposition on flora may act to suppress growth through limiting photosynthesis and the dusted foliage may also become unpalatable to foraging fauna. The construction activities will be temporary and dust generation is likely to be localised to active work areas. Rainfall will generally remove dust from foliage.

Project activities can result in invasive species being introduced or spread throughout the Project Site and to the surrounding environment. Typical activities include increased movement of people, vehicles, machinery, vegetation and soil. An increase in the prevalence of invasive species has the potential to reduce habitat integrity. Invasive flora species can rapidly germinate in disturbed areas whereby affecting the ability of native vegetation communities to re-establish. Invasive fauna may adversely impact native fauna and flora as a result of increased competition for resources, predation or habitat degradation. The proposed access road has a heightened likelihood of spreading and introducing invasive flora species. The proposed access road forms a network connecting facilities within the Project Site and requires maintenance (track clearing), which increases vehicle activity. Linear infrastructure are regularly inhabited with invasive species as they are subject to increased human activity and often provide suitable habitat for colonising species. It is common for invasive flora species to have strong initial competitive attributes, which allows them to outcompete native species.

The sensitivity of the Project Site to the habitat degradation sources is considered low given the habitat within Project Site is known to be frequently disturbed.

The magnitude of effect is likely to be medium as the land clearance for access roads and other facilities have the potential to harbour invasive flora species, which can significantly reduce the ecological value of the surrounding habitats.

The overall significance of this impact is **Minor**.

Table 6.20 Assessment of Impacts from Degradation of Habitats during Construction and Operation

Impact	Impacts from degradation of habitats during construction works and operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts from degradation of habitats are **negative**.				
Impact Type	**Direct**	**Indirect**	Induced		
	Impacts from degradation of habitats are **direct** and **indirect.**				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
	Impact extent will be restricted to the Project Site.				
Impact Scale	Potential impacts to fauna within and in the vicinity of the Project Site.				
Frequency	Impacts will arise from construction and operation phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is expected to be **medium** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	Medium	High		
	Sensitivity of receptor is considered to be **low**.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

Direct Mortality Events

Mortality events may arise from vehicle, machinery strikes or from falling debris during clearing activities. The Project may also increase the influx of hunters and poachers.

The increase of vehicles in the area associated with the Project will intensify the risk of vehicle strikes. Furthermore, vegetation clearing has the potential to cause fauna mortality events.

Hunting and poaching by local people and/ or the workforce may impact the species of conservation concern.

Mortality events due to bird and bat collision to turbines are assessed for the operation phase in *Section 6.4.8* and not included in this section.

The sensitivity of resident species is considered to be low for non-conservation significant species and medium for conservation significant species.

The magnitude of effect for non-conservation and conservation significant species is likely to be small as the effect will not cause a substantial change in the species population or other dependent species.

The overall significance of this impact is **Negligible** for non-conservation significant species and **Minor** for conservation significant species.

Table 6.21 Assessment of Impacts from Direct Mortality Events during Construction and Operation

Impact	Impacts from direct mortality events during construction works and operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts from direct mortality events are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impacts from direct mortality events are **direct.**				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
	Impact extent will be restricted to the Project Site.				
Impact Scale	Potential impacts to fauna within and in the vicinity of the Project Site.				
Frequency	Impacts will arise from construction and operation phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	**Medium**	High		
	Sensitivity of non-conservation significant species is considered to be low. Sensitivity of conservation significant species is considered to be medium.				
Impact Significance	**Negligible**	**Minor**	Moderate	Major	
	The impact significance is expected to be **Negligible** for non-conservation significant species and **Minor** for conservation significant species.				

6.3.8.4 Additional Mitigation and Management

It is recommended that the following mitigation measures be applied:

Loss of Terrestrial Habitat

- Development of clearing protocol, keeping record of clearing status and any observation.
- Conduct pre-construction surveys to search for active nesting bird and threatened flora species prior to clearance of thickets. If active nests are recorded, clearance of the thicket should be delayed until nesting has completed. Any threatened flora species identified during the surveys should be translocated to suitable nearby habitat outside the clearing footprint.
- All natural habitat cleared for the preparation of the windfarm is to be compensated onsite through replanting of native habitat flora within the Project Site. The area to be replanting are to include native indigenous flora and be of an area of at least 36.62 ha. The replanting program is to be outlined within a replanting and landscaping management plan.
- Vegetation clearing limit should be marked clearly. Vegetation clearance should be limited to minimum need for safe implementation of the works.
- Employ appropriate sediment and erosion control measures.
- Where possible, salvaging cleared material and transferring it to nearby suitable habitat.
- Clearing vegetation outside of designated areas will be prohibited, with penalties levied, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation.
- The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to unauthorised clearing of vegetation, as well as the

punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations.

- Weekly inspections to be conducted to ensure:
  - clearing protocol is active;
  - clearing is restricted to approved areas; and
  - sediment and erosion control measures are active.
- Records are to be kept and regularly reviewed (3 monthly) for implementation of the workforce training program for fauna/flora awareness; and
- Records are to be kept and regularly reviewed (3 monthly) of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.

Disturbance and Displacement of Fauna

- Implement noise and vibration mitigation measures;
- Where possible, lighting should not be active during the night; and
- Where lighting is required, it should not be directed towards areas likely to contain native fauna (e.g. mixed bamboo and moist deciduous forest).

Barrier Creation, Fragmentation and Edge Effect

- Where possible, connect nearby fragmented secondary forest patches through the development and implementation of a replanting plan;
  - Only use suitable native flora species in revegetation efforts; and
  - Fence areas between patches to promote natural restoration and prevent further damage from anthropogenic impacts (e.g. walking tracks).
- Hunting and poaching will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws.
- Engage with local community to raise awareness of conservation species to reduce poaching and hunting within Project Site that are now more accessible.

Degradation of Habitat

- Internal roads to be constructed as soon as possible. Drivers should be instructed to stay on access roads, so that adjacent vegetation will be left undisturbed as far as possible.
- Adopt good construction practice measures to reduce the risk of secondary impacts to habitats and non-avian fauna species including to control dust, noise, drainage, spills and leaks.
- Water spraying should be used to control level of dust where appropriate.
- Invasive species within Natural Habitats should be eradicated where possible. Appropriate use of herbicides may be used to control invasive species within the Project Site in accordance with the safe use and label directions of the herbicides.
- Monitoring is to include inspections of the Project facilities on a monthly basis during construction in order to identify and eradicate any invasive species. During operational phase, monitoring should be conducted on an annual basis. New infestations identified are to be controlled.

Direct Mortality Event

- All vehicles are to maintain a speed of a maximum of 40 km/ hr within work sites to reduce the risk of fauna strikes.
- All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.

6.3.8.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual impacts are expected to be of **Negligible** significance for loss of habitat, disturbance and displacement of fauna, degradation of habitat and direct mortality events.

With the implementation of the mitigation measures, the residual impacts are expected to be of **Negligible** to **Minor** significance for impacts from barrier creation, fragmentation and edge effect.

6.3.9 Community Health and Safety

6.3.9.1 Source of Impact

During the site visit in 2018, it is observed that both local residents and livestock are regularly crossing the existing access road within the Project Site. There is thus a risk that local residents may be injured as a result of unintended contact with construction vehicles.

The Project is likely to employ approximately 150 workers during the construction phase. Some of these workers, especially the skilled labour, may be from other areas of Myanmar or other countries. These non-local workers may introduce communicable diseases that are not currently common in the local community. The lack of health care facilities may also contribute to the increased transmission of diseases as people may be unable to access health care in a timely manner leading to worsening health outcomes. Any increase in demand on existing health services will also affect the ability of local community to seek and receive treatment.

In addition, the majority of the local people are Myanmar and their life styles and customs can be different from the others who would come from the other regions. As such, the presence of a non-local workforce who may be not Myanmar may result in the presence of behavioral traits, habits and lifestyle in the community, which may at times be alien to the local community. These behavioral traits may cause discomfort/ inconvenience to the community resulting in disagreement and at times conflicts.

Environmental impacts which may affected community health and safety are assessed in *Section 6.3.1* to *6.3.6*.

6.3.9.2 Existing Controls / Mitigation

The following existing controls and mitigation measures will be implemented:

- The non-local workers will be living in the labour camp during construction.
- Provide training on some of the most common communicable diseases to all workers to raise awareness of the likely diseases, symptoms, preventative measures and transmission routes as well as treatment.
- Ensuring health check-ups of all labourers employed at the Project Site to screen pre-existing communicable diseases.
- Provide access to workers to healthcare services and medical care in case of sickness.
- A Traffic Management Plan should be developed inclusive of a) adequate staging areas for vehicles; b) facilities and amenities for drivers; and c) a formal training program for drivers employed for the Project.

- Enforcement of a speed limit of 40 km /h for vehicles along the internal access roads.
- Erection of crossing signs at known pathways across the internal access roads to alert drivers to the possibility of people and livestock entering the road.

6.3.9.3 Significance of Impact

Since the Project Site and its vicinity has been opened for coal mine and oil production, the local community is familiar with non-local people. Therefore, no significant issue between locals and non-locals are expected and the impact magnitude is expected to be minor for potential disagreement / conflicts between locals and non-locals.

With the implementation of existing controls and mitigation measures, the impact magnitude is expected to be minor for construction traffic as well as potential health issues caused by the presence of non-local workers.

The local community is considered of medium sensitivity since they are adapted to existing non-local workers working for the coal mine and oil field. It is also noted that the trucks from coal mines operated to some extent around the Project Site and the community is thus expected to adapt to traffic of heavy vehicles.

The significance of impacts to community health and safety is thus considered to be **Minor.**

Table 6.22 Assessment of Community Health and Safety Impacts during Construction

Impact	Community health and safety impacts from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Community health and safety impacts from the construction activities are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Community health and safety impacts from the construction activities are **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential community health and safety impacts will occur throughout the construction phase in short-term for temporary construction facilities.				
Impact Extent	**Local**	Regional	International		
	Extent of community health and safety impacts is expected to be limited to the local community and thus considered as **local.**				
Impact Scale	Impact scale is considered small given the localized and short-term impact duration.				
Frequency	Impacts will arise continuously from construction phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity of local community is considered **medium** with existing non-local workers and traffic conditions.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.3.9.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.3.9.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual community health and safety impacts due to construction is expected to be of **Minor** significance.

6.3.10 Occupational Health and Safety

6.3.10.1 Source of Impact

The Project will employ 50 to 60 workers for construction activities. Workers are at risk of occupational health and safety incidents. The WBG EHS Guidelines for Wind Energy (2015) indicated the following key occupational health and safety risks related to windfarm project:

- Working at height;
- Working in remote locations; and
- Lifting operations

6.3.10.2 Existing Controls / Mitigation

The following existing controls and mitigation measures will be implemented according to the WBG EHS Guidelines for Wind Energy (2015):

Working at Height

- Eliminate or reduce the requirement to work at height.
- If working at height cannot be eliminated, use work equipment or other methods to prevent a fall from occurring.
- Ensure all structures are designed and built to the appropriate standards and have the appropriate means of working-at-height systems fitted.
- Suitable exclusion zones should be established and maintained underneath any working at height activities, where possible, to protect workers from falling objects.
- Ensure all employees working at height are trained and competent in the use of all working at height and rescue systems in place.
- Provide workers with a suitable work-positioning device; also ensure the connectors on positioning systems are compatible with the tower components to which they are attached.
- Ensure that hoisting equipment is properly rated and maintained and that hoist operators are properly trained.
- When working at height, all tools and equipment should be fitted with a lanyard, where possible, and capture netting should be used if practicable.
- Signs and other obstructions should be removed from poles or structures prior to undertaking work.
- An approved tool bag should be used for raising or lowering tools or materials to workers on elevated structures.
- Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk of lightning strikes.
- An Emergency Response Plan (ERP) should be in place detailing the methods to be used to rescue operatives should they become stranded or incapacitated while at height.

Working at Remote Location

- Suitable communication equipment available for the work crew.
- The training and competence of personnel working remotely and the readiness of all necessary safety equipment in the location.
- Supervision by competent personnel empowered to make decisions based on events and conditions at the work location.
- Means for managers to track the exact location of the working crew.
- Local emergency plan in place.
- Provision of suitably qualified first-aid-trained personnel in the work crew.
- Snake guard should be included as personal protective equipment for the workers (PPE).

Lifting Operations

- Ensure all relevant information is known about the load, e.g., the size, weight, method of slinging, and attachment points.
- Ensure all lifting equipment (including load attachment points) is suitable, capable of supporting the load, in good condition, and in receipt of any statutory inspections required.
- Ensure all supervisors, equipment operators, and slingers are trained and competent in the lifting equipment and intended lifting techniques.
- Where possible, exclusion zones are to be established and maintained in order to prevent any unauthorized access to lifting areas.
- When lifting large loads, ensure weather conditions are favourable for the task.
- Safe operating parameters of heavy lifting equipment should not be exceeded at any time.
- A planning meeting between all parties involved in the lift should be carried out and should include: the details of the lift, the roles of each party involved in the lift, and the methods used to communicate instructions among the parties.

6.3.10.3 Significance of Impact

With the implementation of existing controls and mitigation measures according to the WBG EHS Guidelines for Wind Energy (2015), the impact magnitude is expected to be minor. The sensitivity of the receptor is considered to be medium as the workforce engaged for key activities related to working at height and lifting operations are expected to be trained to perform the job.

The significance of impacts to occupational health and safety is thus considered to be **Minor.**

Table 6.23 Assessment of Occupational Health and Safety Impacts during Construction

Impact	Occupational health and safety impacts from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Occupational health and safety impacts from the construction activities are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Occupational health and safety impacts from the construction activities are **direct**.				
Impact Duration	Temporary	**Short-term**	Long-term	Permanent	
	Potential occupational health and safety impacts will occur throughout the construction phase in short-term for temporary construction facilities.				
Impact Extent	**Local**	Regional	International		
	Extent of occupational health and safety impacts is expected to be limited to the workforce engaged and thus considered as **local.**				
Impact Scale	Impact scale is considered small given the localized and short-term impact duration.				
Frequency	Impacts will arise continuously from construction phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity of local community is considered **medium** with skilled workers trained for key activities related to working at height and lifting operations.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.3.10.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.3.10.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual occupational health and safety impacts due to construction is expected to be of **Minor** significance.

6.3.11 Livelihood and Economy

6.3.11.1 Source of Impact

According to findings from the land survey undertaken by IMWP and the consultation undertaken by ERM in 2018, the Project Site and its AOI (i.e. area within 2 km from the Project Site boundary) is located within the agricultural land of nearby villages including Set Set Yo, Sin Ma Kya, Sat Pyar, Kyauk Pon, Tha Pyay Myaung, Katin, Yae Nan Ma (South) and Yae Nan Ma (North). Currently, a total of 204 villagers have been identified as using agricultural land in the Project Site. In addition, forest within the Project Site is also used by the local community for extraction of minor forest product, though the dependence of the community on the forest is expected to be minimal.

For the construction of the Project, it is estimated that land will be required temporarily for 25 months for the labour camp, site office and lay down area. Land area will be occupied during the life time of the Project of 25 years where the operational facilities (wind turbines, substation, operation and maintenance buildings and internal access roads etc.) will be located. The Project facilities have been sited to avoid residents and coal mine and thus there will be no physical displacement due to the Project. The Project will, however, require land which are currently used by the local community for farming and extraction of minor forest products. The construction of the Project will thus potentially

affect livelihood of the local community via economic displacement and impacts on access to resources, which is reported to be mainly rely on farming for their livelihood.

The following impact assessment covers both the construction and operation phase given that all land required for operational phase will have been acquired before or during the construction phase.

6.3.11.2 Existing Controls / Mitigation

The following existing controls and mitigation measures will be implemented to mitigate the impacts on livelihood and economy of local community from the Project:

- The Project facilities have been sited to avoid residents and coal mine and thus there will be no physical displacement due to the Project.
- The temporarily used area will be reinstated after the constructional phase.
- IMWP will adopt the following principles in the Land Acquisition and Resettlement Framework (LARF) of the Project considering requirement of local Myanmar and international standards (IFC PS and ADB SPS):
  - The avoidance and minimization principle of impacts related to land will be applied to the entire Project including the temporary land requirement
  - The land procurement process should be undertaken in an informed and participatory manner based on the principles of Informed Consultation and Participation;
  - There should be no forced eviction for the Project. The Project should put in place a non-tolerance of forced eviction and land grab policy;
  - Ensure that the affected population's access to legal or other appropriate remedies is not restricted by the Project;
  - Ensure that the stakeholders have access to a grievance mechanism for the communication of any grievances and concerns regarding the land acquisition;
  - The absence of formal title and/or certificate of land is not a bar to entitlements;
  - Minimize impact on land, natural resources and critical cultural heritage under traditional ownership and/or customary use;
  - Minimize the use of productive agricultural land with a preference to impact lower productive land;
  - Ensure that the payment of compensation and disbursal of entitlements for impacted assets, including temporary impacts, are completed prior to the physical possession of the land and assets; and
  - The entitlements shall be identified based on the principles of replacement cost with the aim to improve the standard of living.
- IMWP will develop and implement a Livelihood Restoration Plan (LRP) considering requirement of local Myanmar and international standards (IFC PS and ADB SPS). The LRP will include:
  - Details of PAFs (via Census Survey and Asset Inventory), summary of present livelihood profile, livelihood impacts and community feedback;
  - Principles for livelihood restoration;
  - Identification of entitlements, in addition to compensation paid, for enhancing Project benefits and livelihood restoration, including;
    - Top up of government compensation based on results of the market valuation
    - Skill enhancement;

- Livelihood support measures;
- Specific measures for vulnerable groups etc.; and
- Linkage to employment and procurement opportunities.

- Detailed entitlement matrix specifying the entitlements for each PAF through household entitlement plans;
- Implementation plan for entitlements identified;
- Integration with other management plans formulated;
- Roles and responsibilities for implementation;
- Identification of external partners;
- Implementation schedule;
- Budget for implementation;
- Reporting and documentation requirements; and
- Monitoring and review requirements.

6.3.11.3 Significance of Impact

Land that will temporarily be used for construction phase is anticipated to be 2.70 ha in area for the labour camp, site office and lay down area which are reported to be used by the local community for farming. A total land area of 89.86 ha will be occupied during the life time of the Project of 25 years where the operational facilities (wind turbines, substation, operation and maintenance buildings and internal access roads etc.) will be located Except for a small 700 m section of the internal access roads which is located within the reserved forest, the other facilities are located on agricultural land.

With proper implementation of the existing controls and mitigation measures, potential impacts to the local community using the forest for minor forest product extraction is expected to be of small magnitude since similar resources is available in the immediate vicinity and the internal access road is expected to enhance access of the local community to these resources. In addition, only a short section of the internal access road is located within the reserved forest area. The sensitivity of the local community using the forest for minor forest product extraction is considered medium since they do not mainly depend on that for livelihood.

The significance of impacts to livelihood and economy of the local community using the forest for minor forest product extraction due to land take by the Project is thus considered to be **Minor.**

With proper implementation of the existing controls and mitigation measures, potential impacts to the local community using land for farming is expected to be of small magnitude. The sensitivity of the local community using the land for farming is considered high since they are largely dependent on agriculture for the livelihood.

The significance of impacts to livelihood and economy of the local community using the land for farming due to land take by the Project is thus considered to be **Moderate.**

Table 6.24 Assessment of Impacts to Livelihood and Economy during Construction

Impact	Livelihood and economic impacts from the construction works.				
Impact Nature	**Negative**	Positive	Neutral		
	Livelihood and economic impacts from the construction activities are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Livelihood and economic impacts from the construction activities are **direct**.				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential livelihood and economic impacts will occur throughout the construction phase in short-term for temporary construction facilities and throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
	Extent of livelihood and economic impacts are expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the small area occupied by the facilities (92.56 ha).				
Frequency	Impacts will arise continuously from construction and operation phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	**High**		
	Sensitivity of the local community using the forest for minor forest product extraction is considered medium since they do not mainly depend on that for livelihood. Sensitivity of the local community using the land for farming is considered high since they are largely dependent on agriculture for the livelihood.				
Impact Significance	Negligible	**Minor**	**Moderate**	Major	Critical
	The impact significance is expected to be **Minor** for local community using the forest for minor forest product extraction and **Moderate** for local community using the land for farming. .				

6.3.11.4 Additional Mitigation and Management

The following additional mitigation measures should be applied to mitigate the livelihood and economic impacts to local community:

- IMWP should liaise closely with the government to ensure that the overall timelines and principles of land procurement are upheld according to both Myanmar local and international standards (IFC PS and ADB SPS).

6.3.11.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual due to construction is expected to be of **Negligible** significance.

6.4 Operational Impact Assessment and Mitigation Measures

6.4.1 Operational Noise

6.4.1.1 Source of Impact

Substation operations may generate noise emissions at NSRs (*Figure 5.3*). Given that the nearest NSR is located more than 300 m from the substation, operational noise from the substation is not expected to be potentially significant and thus not discussed further.

Vehicular traffic related to the Project a potential source of noise during operation. Truck movements along the access roads will create a temporary noise disturbance at receptors located along the access roads. The noise impact will be temporary and only limited to the transit of the trucks. Noise from vehicular traffic is considered as not potentially significant and thus not discussed further.

According to WBG EHS Guidelines for Wind Energy (2015), wind turbines produce noise through a number of different mechanisms which can be generally grouped into mechanical and aerodynamic sources. The major mechanical components include those from the gearbox, generator and yaw motors. Other mechanical systems, such as fans and hydraulic motors, are noted to contribute to the overall acoustic emissions. In addition, the interaction of air and the turbine blades produces aerodynamic noise through a variety of processes as air passes over and past the blades. Operational noise from the wind turbines are further assessed below.

6.4.1.2 Existing Controls / Mitigation

The existing controls and mitigation measures related to operational noise from wind turbines include:

- A setback distance of 345 m will be maintained between wind turbine and residential area.
- Use of serrated trailing edges as necessary to reduce noise level to achieve compliance of operational impacts with the WBG EHS Guidelines for Wind Energy (2015).
- Noise optimization will be performed using turbines at reduced noise mode to achieve compliance of operational impacts with the WBG EHS Guidelines for Wind Energy (2015).
- Physically relocate sensitive receiver as a last resort if compliance cannot be achieved with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise.
- A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver.

6.4.1.3 Significance of Impact

Operational noise levels from the wind turbines are predicted using the software WindPRO, version 3.2. The noise impact from the windfarm is calculated using the international norm ISO 9613-2. This method enables the calculation of noise impact from a wind turbine on its environment. The indicated noise emission of the wind turbine given by the manufacturer is considered as reference emission at hub height. The model uses algorithms per octave band to simulate the dissipation of the sound from one or more sources. The model takes into account the following phenomena:

- Geometrical dissipation (the larger the distance to the noise source, the more the noise is spread over a bigger surface);
- Atmospherical absorption (in function of air humidity, temperature etc.);
- Ground absorption (in function of the ground use between the sound source and the receiver); and
- Topography.

The calculations are performed for meteorological conditions that are favourable for the propagation of sound. When calculating the sound level at a specific location, it is assumed that the wind is coming from the direction with the largest noise impact (from the wind turbines towards the houses) and that there is no vegetation or obstacles. By combining several calculated sound levels the iso-noise contours are defined. In general, the ISO 9613-2 model gives a slightly conservative prediction of the noise impact.

The following assumptions are made while calculating the operational noise levels of the wind turbines:

- The turbine model Option 1 - Siemens Gamesa SG 4.5-145 4.5MW is assumed to be used;
- Setup of geometrical model: the wind turbines are considered point sources at hub height;
- The topography is based on elevation lines: no diffraction on elevation lines;
- No simulation of buildings (no wall reflection);
- Transfer damping factors: air absorption coefficients at 10°C and 70% relative humidity;
- No meteo correction (Cmeteo=0): under ISO conditions: calculation done for downwind condition;
- Ground attenuation using the Alternative method from ISO 9613-2 (mean of height perpendicular to line of sight);
- No vegetation damping;
- Method of calculation for source sound: frequential sound power level (1/3rd octave bands or 1/1st octave bands if sound power spectrum is not known in 1/3rd octave bands) at a fixed wind speed 10m/s at 10m height;
- Method of calculation sound propagation: frequential noise calculation in 1/3rd octave bands from 50 Hz (or 1/1st octave bands if sound power spectrum is not known in 1/3rd octave bands and no control on tonality);
- Immission height: 4 m above ground level.

The maximum operational noise level was predicted to be 52 (dB) (A) LA_{90} at NSRS which is higher than the level specified with the WBG EHS Guidelines for Wind Energy (2015) (35 (dB) (A) L_{A90}) and 54 dB(A) L_{Aeq} which complied with the Myanmar NEQ level and WBG General EHS Guidelines (2007) of 55 dB(A) $L_{Aeq,1\ hour}$ for daytime noise at residential / institutional / educational type NSR but exceeded the standards of 45 dB(A) $L_{Aeq,1\ hour}$ for night-time.

Given the predicted exceedance of the night-time noise level at residential / institutional / educational type NSR, a noise optimization is performed in order to identify the best noise mode configuration compliant with the night-time limit of 45 dB(A). The turbine model (Siemens Gamesa SG 4.5-145 4.5MW) has eight (8) noise modes: Mode 0 is the normal mode, Mode 8 is the mode with the lowest noise emission. The optimized configuration is presented in the following *Table 6.25* which would result in the predicted operational noise level to be compliant with the Myanmar NEQ level and WBG General EHS Guidelines (2007) for daytime and night-time noise at residential / institutional / educational type NSR. With the adoption of the optimized configuration, the operational noise impact is considered to be of negligible magnitude.

Table 6.25 Noise Complaint Configuration

Turbine	Noise Mode Daytime 07:00 – 22:00	Noise Mode Night-time 22:00 – 07:00
1	Mode 0	Mode 0
2	Mode 0	Mode 0
3	Mode 0	Mode 0
4	Mode 0	Mode 1
5	Mode 0	Mode 0
6	Mode 0	Mode 3
7	Mode 0	Mode 3
8	Mode 0	Mode 0
9	Mode 0	Mode 1
10	Mode 0	Mode 0
11	Mode 0	Mode 4
12	Mode 0	Mode 3
13	Mode 0	Mode 3
14	Mode 0	Mode 0
15	Mode 0	Mode 4
16	Mode 0	Mode 1
17	Mode 0	Mode 1
18	Mode 0	Mode 6
19	Mode 0	Mode 0
20	Mode 0	Mode 3
21	Mode 0	Mode 3
22	Mode 0	Mode 5
23	Mode 0	Mode 4
24	Mode 0	Mode 0
25	Mode 0	Mode 5

In terms of receptor sensitivity, it is generally considered medium since the NSRs are also subjected and adopted to existing noise sources from coal mining and transportation on the unpaved road. For

the pagoda and monastery, the sensitivity is considered high when it is used by the monks during the Buddhist Lent period (July to October).

Based on the above, the impact significance associated with noise generated during operation of wind turbine are considered to be **Negligible**.

Table 6.26 Assessment of Operational Noise Impact of Wind Turbines

Impact	Noise impact from the wind turbine operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Noise impact from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Noise impact from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential noise impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Impacts are expected within 2 km of the turbines and can therefore be described as **local.**				
Impact Scale	The scale of the impact is likely to be up to 2 km from the turbines.				
Frequency	Impacts will arise continuously from operational activities.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	**High**		
	Generally considered **medium** since the NSRs are subjected and adopted to existing noise sources from coal mining and transportation on the unpaved road. For the pagoda and monastery, the sensitivity is considered **high** when it is used by the monks during the Buddhist Lent period (July to October).				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.4.1.4 Additional Mitigation and Management0

As the significance of impacts is considered negligible with exiting control and mitigation measures, additional mitigation measures are not considered necessary. It is recommended to monitor operational noise impact at selected NSRs during the operational phase (*Table 8.4*). In addition, if the turbine model confirmed to be used has a higher sound power level than Siemens Gamesa SG 4.5-145 4.5MW, further noise assessment will be undertaken to ensure that the noise level is compliant with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise.

6.4.1.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual impact due to operational noise of wind turbine is expected to be of **Negligible** significance.

6.4.2 Shadow Flicker

6.4.2.1 Source of Impact

Shadow flicker refers to the pattern of alternating light intensity observed when the rotating blades of a wind turbine cast a shadow on a receptor under certain wind and light conditions (Figure 6.2). Shadow flicker occurs under a limited range of conditions when the sun passes behind the hub of a wind turbine and casts an intermittent shadow over neighbouring properties. Shadow flicker may

become an issue when sensitive receptors (e.g. residential area, schools, pagodas) are located nearby and have a specific orientation to the wind turbine.

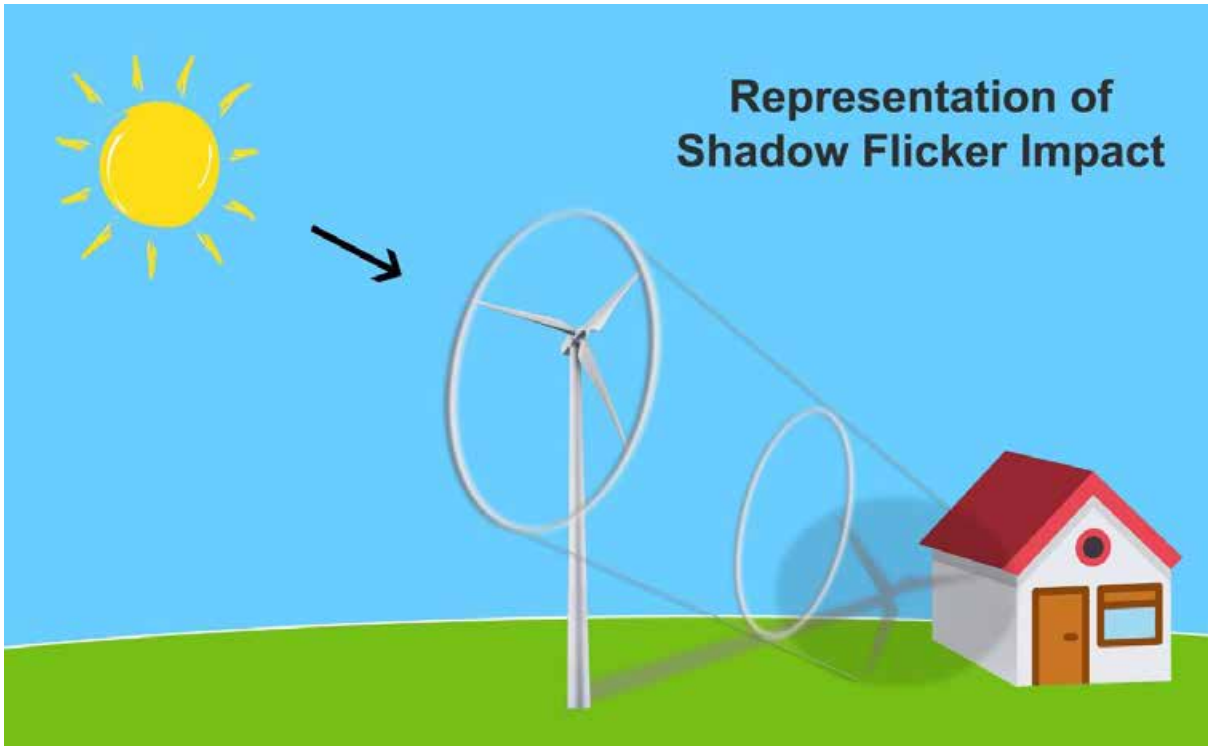


Figure 6.2 Illustration of Shadow Flicker Impact

6.4.2.2 Existing Controls / Mitigation

The existing controls and mitigation measures include:

- A setback distance of 345 m will be maintained between wind turbine and any nearby building.
- The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher fencing and planting trees can be explored at locations with potential impacts of shadow flicker. The use of curtains can also be explored. If these prove effective with the impacts mitigated, the start-stop shadow curtailment strategy as stated below will not be necessary.
- A start-stop shadow curtailment strategy will be adopted to achieve compliance of shadow flicker impacts with the WBG EHS Guidelines for Wind Energy (2015).
- Physically relocate sensitive receiver as a last resort if compliance cannot be achieved with WBG EHS Guidelines for Wind Energy (2015) for shadow flicker. A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver.

6.4.2.3 Significance of Impact

There is no Myanmar standard regulating the frequency or duration of shadow flicker. WBG EHS Guidelines for Wind Energy (2015) have suggested that the predicted duration at sensitive receptors should not exceed 30 hours per year and 30 minutes per day on the worst affected day, based on an astronomical worst-case scenario which is defined as follows:

- There is continual sunshine and permanently cloudless skies from sunrise to sunset;
- There is sufficient wind for continually rotating turbine blades;
- The rotor is perpendicular to the incident direction of the sunlight;
- Sun angles less than 3 degrees above the horizon level are disregarded (due to likelihood of vegetation and buildings);
- The blade of the wind turbine should cover at least 20% of the area of the sun;
- Distances between the rotor plane and the tower axis are negligible; and
- Light refraction in the atmosphere is not considered.

The shadow flicker caused by the wind turbines of the Project was calculated using the software WindPRO 3.2 (1). The calculation takes in consideration the following parameters:

- Position of the wind turbine;
- Hub height and the rotor diameter of the wind turbine;
- Position of the shadow receptor;
- Size of the window of a house (standard values: width of 5m, height of 2m and 1m above ground level) and its tilt (angle of the window plane to the horizontal);
- As no information is available regarding the orientation of the windows, the calculation was done considering a virtual omnidirectional window;
- Geographic position together with time zone and daylight saving time information;
- A simulation model (information about the earth's orbit and rotation relative to the sun);
- Considered shadow receptors include mainly houses and monastery.

Results of the shadow flicker assessment without the start-stop shadow curtailment strategy show exceedance of the standards specified in the WBG EHS Guidelines for Wind Energy (2015) (i.e. 30 hours per year and 30 minutes per day on the worst affected day) at several sensitive receptors (*Figure 6.3*). A start-stop shadow curtailment strategy is thus recommended and shown in *Table 6.27*. With the adoption of the start-stop shadow curtailment strategy as shown in *Table 6.28,* the shadow flicker impact at the sensitive receptor would become compliant with the standards specified in the WBG EHS Guidelines for Wind Energy (2015).

Given that the shadow flicker duration is in compliance with the standards specified in the WBG EHS Guidelines for Wind Energy (2015), the impact magnitude is considered as negligible.

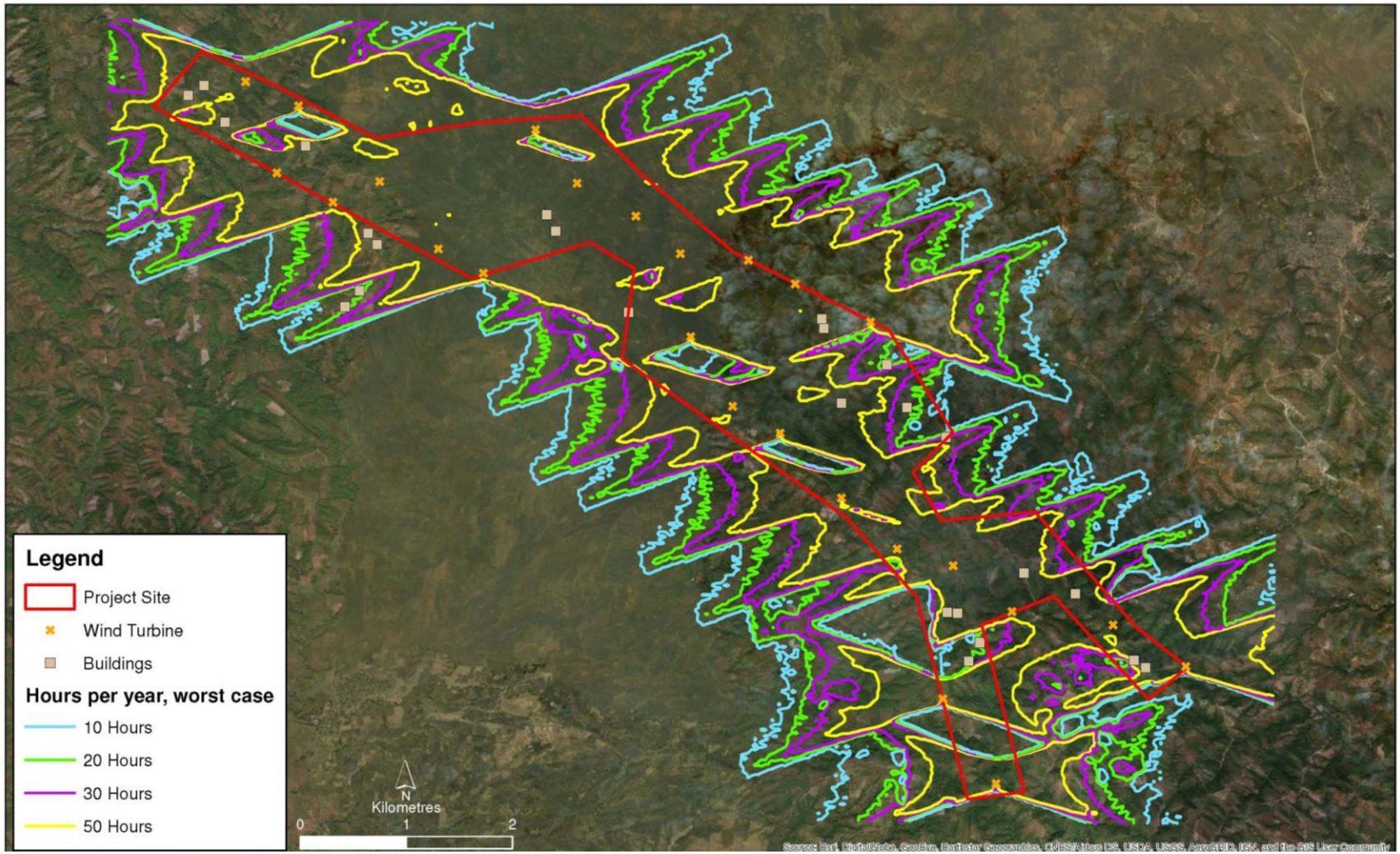


Figure 6.3 Results of Shadow Flicker Model

Table 6.27 Shadow Curtailment Strategy for the 25 Wind Turbines

Turbine No.	Stop duration [h/year]
1	19.39
2	100.59
3	11.06
4	137.2
5	77.04
6	147.45
7	77.52
8	127.1
9	243.01
10	0
11	83.52
12	108.35
13	136.55
14	1.25
15	16.33
16	152
17	215.05
18	6.02
19	0.35
20	0.58
21	201.19
22	10.17
23	213.06
24	158.41
25	123.17

Table 6.28 Shadow Flicker Model Results with Start-Stop Strategy

Receptor	Shadow Hours: Hours / Year	Max Shadow Minutes / Day
A	0:00	0
B	14:27	15
C	12:07	20
D	13:46	26
E	0:00	0
F	4:40	14
G	6:38	18
H	29:42	29
I	18:55	23
J	28:04	25
K	2:51	07
L	21:16	27
M	5:15	15
N	14:31	29
O	16:11	30
P	19:24	25
Q	20:23	30
R	22:12	30
S	13:40	21
T	7:50	19
U	16:01	15
V	9:16	11
W	1:59	13
X	5:47	18
Y	0:00	0
Z	17:28	28
AA	0:00	0
AB	7:46	15
AC	0:00	0
AD	17:03	29

In terms of receptor sensitivity, it is generally considered medium since the receptors are subjected to existing disturbance from human activities in the area such as coal mining and transportation on the unpaved road. For the pagoda and monastery, the sensitivity is considered high when it is used by the monks during the Buddhist Lent period (July to October).

Based on the above, the impact significance associated with shadow flicker of wind turbine are considered to be **Negligible**.

Table 6.29 Assessment of Shadow Flicker Impact of Wind Turbines

Impact	Shadow flicker impact from the wind turbine operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Shadow flicker impact from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Shadow flicker impact from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential shadow flicker impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Impacts are expected in the vicinity of the wind turbines and can therefore be described as **local.**				
Impact Scale	Scale of impact is small as predicted by the shadow flicker model with curtailment strategy				
Frequency	Impacts will arise continuously from operational activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	**High**		
	Generally considered **medium** since the sensitive receptors are subjected and adopted to existing disturbances from coal mining and transportation on the unpaved road etc. For the pagoda and monastery, the sensitivity is considered **high** when it is used by the monks during the Buddhist Lent period (July to October).				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.4.2.4 Additional Mitigation and Management

As the significance of impacts is considered negligible with exiting control and mitigation measures, additional mitigation measures are not considered necessary. It is recommended to monitor shadow flicker impact through engagement with residents during the operational phase where there are predicted impacts from shadow flicker (*Table 8.4*).

6.4.2.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual impact due to shadow flicker of wind turbine is expected to be of **Negligible** significance.

6.4.3 Waste Management

6.4.3.1 Source of Impact

Waste is mainly generated from packaging, food, consumables and maintenance work during operation of the Project. Typically, waste generated from maintenance works includes, but not limited to, topping up of hydraulic and transformer oil, greasing of bearings, painting of equipment; and replacing oil/dry filters, capacitors, and electrical panels. Replaced mechanical parts can either be

sent for recycling or refurbishment. The disposal route of the wastes generated during operation and maintenance will be the same as the construction phase which are presented in *Table 4.4*.

Please refer to *Section 6.3.4.1* for relevant discussion of impacts related to inert wastes, general refuse and hazardous wastes which are similar between construction and operation phase, except that the rate of waste generation is expected to be lower for operation phase due to limited scale of operation activities.

6.4.3.2 Existing Controls / Mitigation

The following existing control and mitigation control measures will be adopted for the operation of the Project:

- A Waste Management Plan (WMP) for the Project should be developed and implemented. The WMP should include the following:
  - Good housekeeping practices for waste storage and handling referencing good international industry practice (GIIP);
  - A waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected from the operation and to identify appropriate disposal routes;
  - Materials for operation and maintenance should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
  - Wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible;
  - The WMP should identify disposal routes (including transport options and disposal sites) for all wastes generated during the operation phase;
  - A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP;
  - Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers);
  - Waste should be collected regularly by reputable waste collectors;
  - Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible;
  - Disposal of waste in or off the Project facilities should be prohibited;
  - Chain of custody documents should be used for all wastes to monitor disposal; and
  - Waste segregation should be practiced at the O&M building with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

6.4.3.3 Significance of Impact

Operational activities of the windfarm is expected to be limited in scale. The impact magnitude is considered small with proper implementation of mitigation measures. The resource/receptor sensitivity is considered medium considering the potentially hazardous nature of the wastes. The impact significance is considered **Minor**.

Table 6.30 Assessment of Waste Management Issue during Operation

Impact	Waste management Issues from the operational works including insert wastes, general refuse and hazardous wastes.				
Impact Nature	**Negative**	Positive	Neutral		
	Impact from improper waste management from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impact from improper waste management from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Impact from improper waste management may occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized nature and limited scale of operational activities.				
Frequency	Impact from improper waste management may arise continuously from operational activities.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity of receptor is considered as **medium**.				
Impact Significance	Negligible	**Minor**	Moderate	Major	Critical
	The impact significance is expected to be **Minor**.				

6.4.3.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.4.3.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual waste management impact due to operation is expected to be of **Minor** significance.

6.4.4 Surface Water Quality

6.4.4.1 Source of Impact

Potential impacts to surface water quality during operational phase is expected to be of similar nature to the construction phase which are related to wastewater generated from workforce and site run-off. Please refer to *Section 6.3.4.1* for relevant discussion of source of water quality impacts related to wastewater and site run-off.

During operation it is expected that there will be a limited number of full time staffs working onsite for security, operation and civils/caretaker purposes. They will be working from the O&M building. Wastewater will be generated from the O&M building where the limited number of operational staffs will be working from.

6.4.4.2 Existing Controls / Mitigation

The following existing control and mitigation control measures will be adopted for the operation of the Project:

- Site drainage facilities should be developed following the design basis below:
  - Designed to convey the runoff from a 25 years rainfall event.

- Provide oily water separator at the tie-in point of the existing drainage system.
- Convey surface runoff and roof drainage away from the equipment and buildings.

- All drainage facilities and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit will be removed regularly.
- A sewage system will be constructed for the O&M building which should consist of soak pits for the collection of wastewater from the labour camp kitchen and washing area.
- Sewage from the toilets should be discharged into septic tanks.
- A storage pond should be considered to collect the wastewater from sewage system or septic tank. The retention time of storage pond should be designed to cover the closed system management (no waste discharge to the public).
- Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility.
- Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges (*Table* 3.8) before drained to the site drainage system. The minimum diameter for sewer line should be 100 mm (4 inches).

6.4.4.3 Significance of Impact

Operational activities of the windfarm is expected to be limited in scale. With the proper implementation of the existing control and mitigation measures, it is expected that the impact magnitude would be negligible. Sensitivity of the Water Sensitive Receiver (WSR) is considered as high given that nearby water sources is extracted for irrigation etc. The significance of impacts associated with wastewater and run-off during operation is considered **Negligible**.

Table 6.31 Assessment of Surface Water Quality Impacts during Operation

Impact	Surface water quality impact from site run-off and sewage generated from the operational works.				
Impact Nature	**Negative**	Positive	Neutral		
	Surface water quality impact from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Surface water quality impact from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential water quality impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of surface water quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized discharge / spill and limited scale of operational activities.				
Frequency	Impacts from wastewater and runoff will arise continuously from operational activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of WSR is considered as **high** given that nearby water sources is extracted for irrigation etc.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.4.4.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.4.4.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual surface water quality impact due to operation is expected to be of **Negligible** significance.

6.4.5 Ground Water Quality

6.4.5.1 Source of Impact

Impacts on ground water quality may be caused by the following activities:

- Improper waste management practice as discussed in *Section 6.4.3*. Ground water quality impacts can be associated with poor storage of materials, poor handling and direct impacts of waste on water quality by littering on a nearby ground water sources (i.e. wells).
- Wastewater discharged and run-off as discussed in *Section 6.4.4*, which may enter local ground water sources (i.e. wells).

6.4.5.2 Existing Controls / Mitigation

The existing controls and mitigation measures are provided in *Section 6.4.3.2* for waste management and in *Section 6.4.4.2* for wastewater and run-off. These controls and mitigation measures will also be provided to control the ground water quality impacts from the Project.

6.4.5.3 Significance of Impact

Operational activities of the windfarm is expected to be limited in scale. Provided that the existing controls and mitigation measures provided in *Section 6.4.3.2* for waste management and in *Section 6.4.4.2* for wastewater and run-off are implemented properly, the ground water quality impacts from the Project are expected to be of negligible magnitude. Receptor sensitivity is considered high as the community is using the ground water for drinking purpose. The significance of impacts to ground water quality is considered **Negligible**.

Table 6.32 Assessment of Ground Water Quality Impacts during Operation

Impact	Ground water quality impact due to waste management issues as well as wastewater discharged and site run-off from the operational works.				
Impact Nature	**Negative**	Positive	Neutral		
	Ground water quality impact from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Ground water quality impact from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential water quality impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of ground water quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized nature and limited scale of operational activities.				
Frequency	Impacts from wastewater and runoff as well as waste management will arise continuously from operational activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of receptor is considered as **high** given that nearby water sources is extracted for drinking etc.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.4.5.4 Additional Mitigation and Management

No additional mitigation and management measures are considered necessary given the impact is of minor significance.

6.4.5.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual ground water quality impact due to operation is expected to be of **Negligible** significance.

6.4.6 Soil Quality

6.4.6.1 Source of Impact

Impacts on soil quality may be caused by the following activities:

- Improper waste management practice as assessed in *Section 6.4.3*. Soil quality impacts are related with inappropriate dumping and inadequate storage/coverage during transport resulting in windblown litter.
- Wastewater discharged and run-off as assessed in *Section 6.4.4*, which would have the potential to result in localized soil contamination within and in the vicinity of the Project Site.

6.4.6.2 Existing Controls / Mitigation

The existing controls and mitigation measures are provided in *Section 6.4.3.2* for waste management and in *Section 6.4.4.2* for wastewater and run-off. These controls and mitigation measures will also be provided to control the soil quality impacts from the Project.

6.4.6.3 Significance of Impact

Operational activities of the windfarm is expected to be limited in scale. Provided that the existing controls and mitigation measures provided in *Section 6.4.3.2* for waste management and in *Section 6.4.4.2* for wastewater and run-off are implemented properly, the soil quality impacts from the Project are expected to be of negligible magnitude. Receptor sensitivity is considered high as the community is using land within the Project Site for agriculture. The significance of impacts to ground water quality is considered **Negligible**.

Table 6.33 Assessment of Soil Quality Impacts during Operation

Impact	Soil quality impact due to waste management issues as well as wastewater discharged and site run-off from the operational works.				
Impact Nature	**Negative**	Positive	Neutral		
	Soil quality impact from the operational activities is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Soil quality impact from the operational activities is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential soil quality impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of soil quality impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized nature and limited scale of operational activities.				
Frequency	Impacts from wastewater and runoff as well as waste management will arise continuously from operational activities.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of receptor is considered as **high** given that the community is using land within the Project Site for agricultural purpose.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

6.4.6.4 Additional Mitigation and Management

No additional mitigation and management measures are considered necessary given the impact is of minor significance.

6.4.6.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual soil quality impact due to operation is expected to be of **Negligible** significance.

6.4.7 Landscape and Visual Impacts

6.4.7.1 Source of Impact

Operation of the windfarm will be introducing the following new elements into the existing landscape and visual environment:

- O&M building;
- Internal access roads;
- Wind turbine; and

- Construction of substation.

These new elements may potentially lead to impacts to the landscape and visual amenity.

6.4.7.2 Existing Controls / Mitigation

The following existing controls and mitigation measures will be implemented to mitigate the landscape and visual impacts of the Project:

- Operational activities should be restricted to within the Project facility footprint and immediate surroundings only.
- A uniform size and design should be used for the wind turbines.
- Cables connecting wind turbines will be bury and not visible.
- Any land taken for a temporary basis for construction will be restored to their original form (e.g. for labour camp, site office and lay down area) and not used for operation.

6.4.7.3 Significance of Impact

Change in landscape character will occur on land occupied by the wind turbines and the associated facilities as well as the internal access roads. A total land area of 89.86 ha will be occupied during the life time of the Project of 25 years where the operational facilities (wind turbines, substation, operation and maintenance buildings and internal access roads etc.) will be located. The impact magnitude is considered small given the localised and small area occupied compared to area of the Project Site.

The land areas occupied by the Project are mainly used by the community for agricultural purpose and a small area of the internal access road will be encroached into the reserved forest to the southeast of the Project Site. The sensitivity to change in landscape character is considered medium since these areas are noted to be modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions.

The significance of impacts due to change in landscape character is thus considered to be **Minor.**

The wind turbine is high and will be the key visible Project element to the surrounding VSRs, including those within the Project Site and the main village settlement surrounding the Project Site, the closest of which is 0.9 km (0.5 miles) away from the Project Site boundary. Given that only 25 wind turbines will be installed and the Project Site is observed to be modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions, the magnitude of visual impacts due to the Project element is considered as small. An illustration of the wind turbines at the Project site is shown in *Figure 6.4.*

The VSRs is considered to be of medium sensitivity given they are already adopted to existing modifications and disturbance caused by human activities within the Project Site.

The significance of visual impacts is thus considered to be **Minor.**

Figure 6.4 Illustration of Wind Turbines at the Project Site (not to scale)

Table 6.34 Assessment of Landscape and Visual Impacts during Operation

Impact	Landscape and visual impact due to presence of turbines and Project facilities.				
Impact Nature	**Negative**	Positive	Neutral		
	Landscape and visual impact from the presence of Project elements is **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Landscape and visual impact from the presence of Project elements is **direct**.				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential landscape and visual impacts will occur throughout the operation phase in long–term (25 years) for operational facilities.				
Impact Extent	**Local**	Regional	International		
	Extent of landscape and visual impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the small area occupied by the facilities (89.86 ha) and only 25 wind turbines will be installed for the Project.				
Frequency	Impacts will arise continuously from the operation phase.				
Impact Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact magnitude is expected to be **small** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity to change in landscape character is considered **medium** since the Project Site is modified and disturbed by human activities such as agriculture, coal mining as well as firewood extractions. VSRs is considered to be of **medium** sensitivity given they are already adopted to existing modifications and disturbance caused by human activities within the Project Site.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.4.7.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.4.7.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual landscape and visual impacts due to operation is expected to be of **Minor** significance.

6.4.8 Biodiversity Impacts to Birds and Bats

6.4.8.1 Source of Impact

Impacts related to loss of habitat, disturbance and displacement of fauna, degradation of habitat, direct mortality events as well as barrier creation, fragmentation and edge effect will occur for the construction phase or continuing from construction to operation phase. These impacts are assessed in *Section 6.3.8*.

This section assessed impacts to turbine strike to birds and bats which occur during the operation phase only.

Once a windfarm is constructed, it may impact on bird and bat populations by causing additional mortality through colliding with the turbines or associated structures including overhead lines. Several factors influence the risk of collision, including:

- Location of these structures (i.e. are they sited on regular local flight paths or migration routes);
- Extent to which birds are flying at heights at which the turbines are operating;
- Extent to which the birds exhibit avoidance behaviour (i.e. alter their flight path to avoid the structures);
- Extent to which some bird species fly at night, a time when the structures are much less visible;
- Extent to which the birds' flight patterns change naturally during poorer weather conditions, or in the case of raptors when stooping or pursuing prey, hence making them more susceptible to collisions;
- Use of lighting on the turbines which may attract birds to them at night; and
- Extent of habituation.

Bats can also suffer from barotrauma, which is due to sudden changes in air pressure when flying close to turning blades causing collapse of the lungs of bats.

6.4.8.2 Existing Controls / Mitigation

There are no existing controls and mitigation measures.

6.4.8.3 Significance of Impact

Birds

Birds are most susceptible when they fly at Rotor Swept Zone (RSZ) height, either at level flight or through diving behaviour. This mostly impacts raptors when they dive to capture prey, flocking birds that utilize open fields for foraging, migrating birds flying in transit, or single individuals foraging or in transit between habitats.

The ecological baseline survey indicate that a total of 16 raptor species were detected flying within 2 km of the windfarm at the turbine's height. Among those species, four species were recorded frequently (10 observation or above), including Oriental Honey Buzzard, White-eyed Buzzard, Black-

shouldered Kite and Crested Serpent Eagle. The collision risk of these species were calculated for the flights recorded, as shown *Table 6.35* below.

Table 6.35 Predicted Annual Collision Mortalities for Frequently Occurring Raptors within the Project site (assumed 80% Operational Time of the Windfarm)

Species	No. of Rotor Transits / Year	Collision Probability	Predicted Mortalities / Year				
			No Avoidance	90% Avoidance	95% Avoidance	98% Avoidance	99% Avoidance
March 2018 Survey							
Oriental Honey-buzzard	88.90	16.5	11.73	1.17	0.59	**0.23**	0.12
White-eyed Buzzard	62.68	15.1	7.57	0.76	0.38	**0.15**	0.08
Black-shouldered Kite	82.52	20.4	13.47	1.35	0.67	**0.27**	0.13
Crested Serpent Eagle	121.50	23.2	22.55	2.26	1.13	**0.45**	0.23
November 2018 Survey							
Oriental Honey-buzzard	106.89	16.5	14.11	1.41	0.71	**0.28**	0.14
White-eyed Buzzard	71.63	15.1	8.65	0.87	0.43	**0.17**	0.09
Shikra	143.65	20.1	23.10	2.30	1.15	**0.46**	0.23
Black Baza	68.84	19.9	10.96	1.10	0.55	**0.22**	0.11

Oriental Honey-buzzard

A total of 41 flights of Oriental Honey-buzzard were recorded at the Windfarm Site during the March survey. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.23 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 5.75 birds killed. During the November survey, 36 flights were recorded. However the number of Oriental Honey-buzzard at risk height was higher, the predicted collision rate with 98% avoidance is 0.28 birds per year, and 7 birds over the indicative 25 year operational lifespan of the windfarm.

The latest global population estimate for Oriental Honey Buzzard is 100,000-1,000,000 mature individuals, with a stable population trend. At this level of collision, the magnitude of the impact is considered to be negligible.

White-eyed Buzzard

A total of 39 flights of White-eyed Buzzard were recorded at the Windfarm Site during the March survey. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.15 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 3.75 birds killed. During the November survey, 15 flights were recorded. However the number of White-eyed

Buzzard at risk height was higher, the predicted collision rate with 98% avoidance is 0.17 birds per year, and 4.25 birds over the indicative 25 year operational lifespan of the windfarm.

Although the latest global population estimate for White-eyed Buzzard is not available, it is assessed to have a stable population trend (IUCN Red List, 2019). Being classified as a Least Concerned species, it is assumed to have a large population size and not reached the thresholds for Vulnerable under the population size criterion (<10,000). At this level of collision, the magnitude of the impact is considered to be negligible.

Black-shouldered Kite

A total of 36 flights of Black-shouldered Kite were recorded at the Windfarm Site during the March survey. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.27 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 6.75 birds killed. During the November survey, Black-shouldered Kite was recorded less frequently, two flights with four individual birds were recorded.

The latest global population estimate for Black-shouldered Kite is over 100,000 individuals, with an increasing population trend. At this level of collision, the magnitude of the impact is considered to be negligible.

Crested Serpent Eagle

A total of 24 flights of Crested Serpent Eagle were recorded at the Windfarm Site during the March survey. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.45 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 11.25 birds killed. During the November survey, Crested Serpent Eagle was recorded less frequently, six flights with nine individual birds were recorded.

The global population estimate for Crested Serpent Eagle is not available but it is assessed to have a stable population trend. However, being classified as a Least Concerned species, it is assumed to have a large population size and not reached the thresholds for Vulnerable under the population size criterion (<10,000). At the level of collision at 0.45 bird per year, the magnitude of the impact is considered to be negligible.

Shikra

A total of 11 flights of Shikra were recorded at the Windfarm Site during the November survey. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.46 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 11.5 birds killed.

The latest global population estimate for Shikra is over 500,000 individuals, with a stable population trend. At this level of collision, the magnitude of the impact is considered to be negligible.

Black Baza

A total of five flights of Black Baza were recorded at the Windfarm Site during the November survey. Although only five flights were recorded during the survey, it was observed in three flights that Black Baza was flying in a small flock of 10 – 15 individuals. Assuming at 98% avoidance, the predicted collision rate at risk flight height is 0.22 birds per year. Over an indicative 25 year operational lifespan of a windfarm this would equate to 5.5 birds killed.

The global population estimate for Black Baza is not available but it is assessed to have a decreasing population trend. However, being classified as a Least Concerned species, it is assumed to have a large population size and not reached the thresholds for Vulnerable under the population size criterion (<10,000). At the level of collision at 0.22 bird per year, the magnitude of the impact is considered to be negligible.

The raptor species are considered of low sensitivity given they are considered as least concern by IUCN Red List (2019). Based on the above, the significance of impacts to bird due to collision with turbines is thus considered to be **Negligible.**

Table 6.36 Assessment of Impacts from Turbine Strike on Birds during Operation

Impact	Impacts from turbine strike on birds during operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts from turbine strike on birds are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impacts from turbine strike on birds are **direct.**				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential impacts will occur throughout the operation phase in long–term (25 years).				
Impact Extent	**Local**	Regional	International		
	Birds are most susceptible when they fly at Rotor Swept Zone (RSZ) height at the turbines.				
Impact Scale	Predicted collision rate is low. Small considering the global population of the bird species recorded.				
Frequency	Impacts will arise continuously during operation phase.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	Medium	High		
	Sensitivity of receptor is considered to be low.				
Impact Significance	**Negligible**	Minor	Moderate	Major	
	The impact significance is expected to be **Negligible**.				

Bats

The wing morphology of bats determines their mobility and directly influences their foraging preferences, home range areas and dispersal abilities, including capacity for migration (Norberg & Rayner 1987) (1). Because the classification of McKenzie et al. (1995) (2) reflects the differential risks of collision at windfarms and propensities for migration of bat species, all species registered were categorized using Furey & Racey (2016) (3) and associated publications as follows:

- Strategy I: Insectivorous species that forage in the highly cluttered airspace within the forest interior (or forest interior specialists);
- Strategy II: Insectivorous species that forage in partially cluttered spaces such as clearings, streams or other tunnels within the forest or just above the canopy (edge and gap foragers);
- Strategy III: Insectivorous bats that forage in unobstructed airspaces found in large clearings or high above the forest canopy (open-space foragers);
- Strategy IV: Fruit and nectar-eating bats that fly into the partially cluttered air-spaces between tree canopies, roost in small numbers and forage locally;
- Strategy V: Fruit and nectar-eating bats that fly in unobstructed airspaces, roost in large colonies and forage over large areas.

Because absolute data on flight height ranges do not exist for most bat species in Southeast Asia, this necessitated a precautionary approach to application of this category. To this end, all bat species not confined to the complex airspaces of the forest interior (e.g., Strategy 2–5 spp.) were assumed to be capable of flying within the ranges of wind turbine blades.

(1) Norberg, U.M., Rayner, J.M.V. (1987) Ecological morphology and flight in bats (Mammalia: Chiroptera): Wing adaptations, flight performance, foraging strategy and echolocation. Philosophical Transactions of the Royal Society London B 316: 355–427.

(2) McKenzie, N.L. et al. (1995) Correspondence between flight morphology and foraging ecology in some palaeotropical bats. Australian Journal of Zoology 43: 241–457.

(3) Furey, N.M., Racey, P.A. (2016) Can wing morphology inform conservation priorities for Southeast Asian cave bats? Biotropica 48: 545–556.

In decreasing order, the risk of collision at windfarms and propensity for migration associated with the five categories is typically: strategy III > strategy V > strategy IV > strategy II > strategy I. This is supported by empirical data from studies of bat mortality at windfarms in Vietnam and the categories translate into the following risk classifications: High = strategy III and V species, Medium = strategy IV and II species, Low = strategy I species. Due to the lack of fruit orchards within the Kandok Project Site however, strategy II taxa are likely to experience a higher degree of risk compared to strategy IV and V species. Thus until further empirical data are available, bat foraging strategies at Kandok may be provisionally modified into the following risk categories: High = strategy III and II species, Medium = strategy IV and V species, Low = strategy I species.

Among the five bat species recorded during the ecological survey, apart from *Cynopterus sphinx* being considered as of medium potential risk, the remaining four species, *Hipposideros larvatus*, *Hipposideros cf. grandis*, *Pipistrellus javanicus* and *Scotophilus kuhlii* are considered to have a high potential risk.

The sensitivity of the recorded bat species to collision events is considered to be low given the absence of conservation significant species (i.e. all recorded species considered as Least Concerned on IUCN Red List (2019)). The potential risk of collision of these species are considered as medium to high. The bat species recorded are being classified as Least Concerned species which have large population size and not reached the thresholds for Vulnerable under the population size criterion (<10,000) of IUCN (2019). The magnitude of impact to these species is thus likely to be medium since only a small proportion of the global population will be affected.

The overall significance of this impact is considered as **Minor** for the bat species.

Table 6.37 Assessment of Impacts from Turbine Strike on Bats during Operation

Impact	Impacts from turbine strike on bats during operation.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts from turbine strike on bats are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impacts from turbine strike on bats are **direct.**				
Impact Duration	Temporary	Short-term	**Long-term**	Permanent	
	Potential impacts will occur throughout the operation phase in long–term (25 years).				
Impact Extent	**Local**	Regional	International		
	Bats are most susceptible when they fly at Rotor Swept Zone (RSZ) height at the turbines.				
Impact Scale	Small considering the global population of the bat species recorded.				
Frequency	Impacts will arise continuously during operation phase.				
Impact Magnitude	Positive	Negligible	Small	**Medium**	Large
	The impact magnitude is expected to be **medium** with existing control / mitigation measures**.**				
Receptor Sensitivity	**Low**	Medium	High		
	Sensitivity of receptor is considered to be low.				
Impact Significance	Negligible	**Minor**	Moderate	Major	
	The impact significance is expected to be **Minor**.				

6.4.8.4 Additional Mitigation and Management

It is recommended that the following mitigation measures be applied as good practices:

- Establish waste control programme to reduce attraction of some raptors species. This should be reflected in the WMP.
- All tower structures are to be free of holes that can be used for nesting. Roosting habitats (wires and ledges) are to be kept to a minimum.

- Contrasting colours are to be trialled on wind turbines in order to make turning blades visible to avifauna.
- Strobe lights are to be utilised on all turbines flashing at 3 second intervals to deter nocturnal avifauna.
- Ensuring that any all-night lighting on turbine towers and blades consists of LED lights that have ultraviolet wavelengths. Such lights are known to deter certain bat species and are less attractive to insects that bats forage on.
- Habitat management is to be applied to reduce bird and bat habitat within the Project Site. This can include removal of understorey vegetation and minimising standing waterbodies.
- A carcass monitoring programme is to be conducted on a weekly basis at the base of all turbines. All carcasses are to be identified and a database kept of the number and taxa of the species. A review of the data collected from monitoring carcasses is to be undertaken every 6 months for 2 years to identify particular species susceptible to strike risk by a suitably qualified person with at least seven years of bird and bat identification experience in Myanmar.
- Additional bird or bat survey should be conducted if significant number of strikes are observed. Windfarm operations may be altered based on the lifecycle characteristics of any species identified that are susceptible to strike.

6.4.8.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual impacts to birds and birds due to collision with turbines is expected to be of **Negligible** significance.

6.4.9 Livelihood and Economy

6.4.9.1 Source of Impact

Land area will be occupied during the life time of the Project of 25 years where the operational facilities (wind turbines, substation, operation and maintenance buildings and internal access roads etc.) will be located. The potential impacts to livelihood and economy of local community due to land take requirement of these facilities have been included in the assessment of construction phase. Please refer to *Section 6.3.11.1* for relevant discussion.

6.4.9.2 Existing Controls / Mitigation

Please refer to *Section 6.3.1.2* for existing controls and mitigation measures that will be adopted for the operation of the Project.

6.4.9.3 Significance of Impact

The potential impacts to livelihood and economy of local community due to land take requirement of operational facilities have been included in the assessment of construction phase. Please refer to *Section 6.3.11.3* for relevant detailed discussion.

The significance of impacts to livelihood and economy of the local community using the forest for minor forest product extraction due to land take by the Project is considered to be **Minor.**

The significance of impacts to livelihood and economy of the local community using the land for farming due to land take by the Project is thus considered to be **Moderate.**

6.4.9.4 Additional Mitigation and Management

Please refer to *Section 6.3.11.4* for additional mitigation measures that will be adopted for the operation of the Project.

6.4.9.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual due to operation is expected to be of **Negligible** significance.

6.5 Unplanned Events

6.5.1 Accidental Spills and Leaks

6.5.1.1 Source of Impact

Various hazardous materials will be used for the Project activities such as fuels and lubricating oils used for operation and maintenance of machinery during the construction and operation phases. There is the potential for accidental release in the course of material storage and handling during construction and operation of the Project. The spill locations may include areas used for maintenance, material and equipment laydown, parking, fuel storage and fuelling around the Project Site. Spills at these locations also have the potential to impact surface water quality, ground water quality, soil quality and community health and safety.

6.5.1.2 Existing Controls / Mitigation

The following existing control and mitigation control measures will be adopted for the construction and operation of the Project:

- Maintenance and refuelling of equipment and vehicles should be carried out in designated areas on hardstand to prevent seepage of any spillages to ground. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing.
- The hazardous material storage facility should be constructed on bunded hardstand with containment sufficient for 110% of the volume of the single largest tank. Discharges from this bunded area should pass through an oil-water separator.
- A Spill Response Plan should be developed and implemented.
- Discharges from the hazardous material storage facility should be monitored monthly for compliance with Myanmar NEQ for site runoff and wastewater discharges (for TSS, oil and grease, pH).

6.5.1.3 Significance of Impact

Incidental spills of fuels are infrequent but do occur. Spills most frequently occur due to malfunction of handling systems and poor handling practices during fuel transfers. Large releases of hazardous materials from equipment and storage are rare because those are designed and built specifically to prevent release. Overall it is unlikely that a spill would occur and this has thus been factored into the assessment of impact significance.

Project activities with the potential to lead to accidental spills will generally be limited within the Project Site. The risk of a direct release to the surface water is thus very unlikely. It is, however, possible that run-off from the Project Site could transport spilled materials on the ground to the surface water depending on spill location and drainage patterns. The concentration of spilled materials released to surface water is expected to be very low given the existing mitigation measures such as spill containment provided by bunded area at places where spills are more likely to occur (e.g. storage and handling areas of hazardous materials). The impact magnitude is therefore considered to be negligible.

Sensitivity of the sensitive receiver (for surface water, groundwater, soil and community) is considered as high given that nearby water sources is extracted for irrigation and drinking and soil is used for agriculture etc.

The significance of impact associated with accidental spills and leaks is considered **Negligible**.

Table 6.38 Assessment of Accidental Spills and Leaks Impacts during Construction and Operation

Impact	Accidental spills and leaks from the construction and operational works.				
Impact Nature	**Negative**	Positive	Neutral		
	Impacts on surface water quality, ground water quality, soil quality and community health and safety from the accidental spills and leaks are **negative**.				
Impact Type	**Direct**	Indirect	Induced		
	Impacts on surface water quality, ground water quality, soil quality and community health and safety are **direct**.				
Impact Duration	Temporary	**Short-term**	**Long-term**	Permanent	
	Potential impacts will occur throughout the construction phase only and can therefore be described as **short-term** in nature. Potential water quality impacts will occur throughout the operational phase of 25 years and can therefore be described as **long-term** in nature.				
Impact Extent	**Local**	Regional	International		
	Extent of impact is expected to be limited to the vicinity of the Project Site and can therefore be considered as **local.**				
Impact Scale	Impact scale is considered small given the localized spill and the containment measures.				
Frequency	Impacts may arise continuously from construction and operation related activities.				
Likelihood	**Unlikely**	Possible	Likely		
	Spill is unlikely to occur.				
Impact Magnitude	Positive	**Negligible**	Small	Medium	Large
	The impact magnitude is expected to be **negligible** with existing control / mitigation measures**.**				
Receptor Sensitivity	Low	Medium	**High**		
	Sensitivity of is considered as **high**				
Impact Significance	**Negligible**	Minor	Moderate	Major	Critical
	The impact significance is expected to be **Negligible**.				

6.5.1.4 Additional Mitigation and Management

As the significance of impacts is considered minor with exiting control and mitigation measures, additional measures are not considered necessary.

6.5.1.5 Significance of Residual Impact

With the implementation of the mitigation measures, the residual impacts due to accidental spills and leaks are expected to be of **Negligible** significance.

7. CUMULATIVE IMPACT ASSESSMENT

7.1 Methodology and Approach

Cumulative impacts encompass impacts that result from the incremental impact, on areas or resources used or directly impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. The IFC (2012) defines cumulative impacts as those generally recognised as important on the basis of scientific concerns and or concerns from affected communities.

Cumulative impacts in this section refer to the additional impacts that may be generated by other developments or activities in the vicinity of the Project Site, that when added to the impacts of the construction and operation of the proposed Project combine to cause a greater impact. Such impacts may arise due to spatial overlap (e.g. overlap in spatial extent of air quality changes) or temporal overlap (e.g. noise impacts caused by construction activities at the same time from different sources).

7.2 Potential Impacts and Mitigation Measures

In addition to the Kandok Windfarm, IMWP has been undertaking wind feasibility studies in Magway Region and has identified other three (3) potential windfarm sites. The Sin Ka Windfarm Site and the Swei Pauk Kan Windfarm Site are located in the Chauk Township, and are approximately more than 100 km away from the Kandok Windfarm Site. The Zin Taung Windfarm Site is located in Mindon Township and is located more than 30 km away from the Kandok Windfarm Site. Cumulative impacts are not expected from these projects with the Kandok Windfarm Project given the large separation distance from the Kandok Windfarm Site.

The Kandok windfarm will be connected to the Mann (Minbu) Substation by a 132 kV transmission line. The transmission line is considered as a concurrent project with the Kandok windfarm and is subjected to a separate Initial Environmental Examination (IEE) as per guidance from ECD received on 12 July 2018. The IEE is still ongoing and the cumulative impacts arise from the windfarm and the associated transmission line project will be assessed in the IEE Report and thus not included here.

8. ENVIRONMENTAL MANAGEMENT PLAN

This document provides the Environmental Management Plan (EMP) for the planning and operation of the Project. This EMP provides the procedures and processes which will be applied to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which IMWP has committed. In addition, this EMP is used to ensure compliance with statutory requirements and corporate sustainability policies.

8.1 Project Description by Project Phase

In 2017, InfraCo Asia Development Pte. Ltd. (InfraCo Asia) signed a Memorandum of Understanding (MOU) in collaboration with the Magwe Government to assess the feasibility of wind power projects in the Magway Region of Myanmar. IMWP, on behalf of InfraCo Asia as the project principal, is leading the effort to demonstrate the technical and commercial viability of wind power in Myanmar. IMWP aims to develop medium-scale wind power projects based on a Public Private Partnership model.

Further to the signing of the MOU and the feasibility study undertaken, IMWP proposed to develop a wind power which is located near Kandok, includes 25 wind turbines with a capacity of up to 113 MW.

A summary of the proposed Project is provided in *Table 8.1*.

Table 8.1 Project Details

Component	Details
Name of the Project	Kandok Windfarm
Project Owner	InfraCo Myanmar Wind Power Co. Limited (IMWP)
Land Area occupied by the Windfarm Facilities	~92.56 ha
Type of infrastructure	25 wind turbines of up to 113 MW.

Construction activities of the Project are tentatively targeted to commence following receipt of the ECC and tentatively can be completed in 21 months, followed by commissioning and operation of the Project. Detailed description of the Project activities during the construction and operation phases are provided in *Section 4.4*. A brief Project implementation schedule is provided in *Table 8.2.* A more detailed account of the construction and operational activities are provided in *Section 4.4.1* and *Section 4.4.2*, respectively.

Table 8.2 Tentative Project Implementation Schedule

Activity	Implementation Period
Improvement of Offloading Area at Minbu and Access Road to the Windfarm Site	Q1 Year 1 – Q4 Year 1
Improvement of Internal Access Road within the Windfarm Site (including drainage works)	Q1 Year 1 – Q4 Year 1
Construction of Labour Camp, Site Office and Lay Down Area	Q1 Year 1 – Q3 Year 1
Construction of Turbine Foundation and Crane Hardstand	Q1 Year 1 – Q4 Year 1
Transportation of Installation Equipment (for Lifting) from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 1
Transportation of Wind Turbine Components from Yangon to the Windfarm Site	Q2 Year 1 – Q3 Year 2
Installation of 25 Wind Turbines at the Windfarm Site; Internal Electrical Connections; and Construction of Substation and O&M Building. .	Q2 Year 1 – Q3 Year 2
Commissioning and Operation Commencement of Kandok Windfarm	Q3 Year 2 – Q4 Year 2

8.2 Project and Commitments

The Project is being conducted in line with IFC social and environmental performance standards, Myanmar regulatory requirements and international conventions, standards and guidelines. The policy and legislative framework is discussed in more detail in *Section 3*.

8.3 Summary of Impacts and Mitigation Measures

The EIA has assessed the potential impacts and proposed mitigation to reduce the level of the impact. The EIA concluded, from previous experience in the industry that potential impacts are typically well understood, with little or no evidence of adverse consequences on the majority of environmental or social receptors. These potential impacts and the associated mitigation measures are summarised in *Table 8.3*. The schedule and responsibility for implementation of these mitigation measures are also identified as necessary.

ICM is working in Myanmar to develop the Project, on behalf of IMWP, a 100% wholly owned subsidiary of IAD. IAD is a commercially managed infrastructure development and investment company that funds pre-financial-close, early stage infrastructure development activities by taking an equity stake in sustainable infrastructure projects. IAD's projects span across South and South East Asia's frontier and emerging markets.

The ownership and operation of the Project whilst held by IMWP at the point of writing, may at any one point of time be transferred or assigned to another party. Notwithstanding this transfer or assignment, the Project Owner or Assignee shall undertake to develop, own and operate the Project based on the same principles, recommendations, and undertakings states within this document, as guided by the Myanmar EIA Procedures, the IFC PSs, the ADB SPS as well as the WBG EHS Guidelines as stated in *Section 3*.

Table 8.3 Summary of Impacts and Mitigation Measures (Commitment Table)

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
Construction Phase					
C1.1	6.3.1	Air Quality	■ The access road will be paved road. ■ A setback distance of 345 m will be maintained between wind turbine and residential area. ■ Water suppression should be applied at exposed open earthworks at construction site. ■ Provision of cover on exposed soil and construction materials including stockpiles. ■ The design of stockpiles should be optimised to retain a low profile with no sharp changes in shape. ■ Drop heights of material should be minimized. ■ Vehicles transporting dusty materials should be covered at all times. ■ Install hoarding (i.e. temporary solid fencing) along the perimeter of the construction worksite boundary such as the labour camp, site office and lay down area, as far as practicable. The following points should be noted with regard to the use of water and chemical suppressants to attenuate dust: ■ During the wet season, or at any time during the year when there is excessive rainfall, management techniques, especially those which include using additional water to suppress dust, should be reviewed and their use amended accordingly, as fugitive dust and particulate emissions will naturally be attenuated during periods of heavy or prolonged rainfall; and ■ During periods of extended drought, watering of construction areas may not be feasible. In this instance, the use of alternative surface treatments such as chemical dust suppressants should be considered. ■ Record all dust and air quality complaints and follow up by identifying the causes and taking appropriate measures to reduce emissions in a timely manner. ■ Record any exceptional incidents that lead to fugitive dust emissions either on or off the Project site and make a record of the action taken to resolve the issue and reduce the possibility of it occurring again in the future. ■ Undertake frequent inspections at nearby receivers and make a record of inspection findings. Inspections should include regular dust soiling checks of surfaces such as vehicles and window sills within 100 m of the construction site boundary.	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.2	6.3.2	Noise	■ Well-maintained equipment to be operated on-site. ■ Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components. ■ Shut down or throttled down between work periods for machines and construction plant items (e.g. trucks) that may be in intermittent use. ■ Reduce the number of equipment operating simultaneously as far as practicable. ■ Orientate equipment known to emit noise strongly in one direction so that the noise is directed away from receptors as far as practicable.	EPC Contractor HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			■ Locate noisy plant as far away from receptors as practicable. ■ Use material stockpiles and other structures, where practicable, to screen noise sensitive receptors from on-site construction activities. ■ Construction should be avoided within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October. ■ If construction activity within 300 m of the pagoda and monastery during the Buddhist Lent period from July to October is unavoidable, prior consultation should be conducted with the monks using the pagoda and monastery to discuss the arrangement of construction works to reduce noise impacts to these areas. Noise monitoring should be undertaken at the pagoda and monastery during the Buddhist Lent period and compared against the Myanmar NEQ for ambient noise to check compliance and proposed noise reduction measures if exceedance is recorded.		
C1.3	6.3.3	Waste Management	■ A Waste Management Plan (WMP) for the Project should be developed and implemented. The WMP should include the following: - Good housekeeping practices for waste storage and handling referencing good international industry practice (GIIP); - A waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected from the construction and to identify appropriate disposal routes; - Construction materials should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures; - Construction wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible; - Waste suitable for reuse should be stored on site and reintroduced to the construction process as and when required; - The WMP should identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase; - A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP; - Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers); - Waste should be collected regularly by reputable waste collectors; - Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible; - Disposal of construction waste in or off the construction site should be prohibited; - Chain of custody documents should be used for construction waste and hazardous waste to monitor disposal; and - Waste segregation should be practiced at the labour camp with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.	EPC Contractor HSE Manager	Environmental Monitoring Report Waste Management Plan

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
C1.4	6.3.4	Surface Water Quality	■ Earthworks to form the final surfaces should be followed up with surface protection and drainage works to prevent erosion caused by rainstorms. ■ Site drainage facilities should be developed following the design basis below: - Designed to convey the runoff from a 25 years rainfall event. - Provide oily water separator at the tie-in point of the existing drainage system. - Convey surface runoff and roof drainage away from the equipment and buildings. ■ All drainage facilities and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit will be removed regularly. ■ A sewage system will be constructed for the labour camp which should consist of soak pits for the collection of wastewater from the labour camp kitchen and washing area. ■ Sewage from the toilets should be discharged into septic tanks. ■ A storage pond should be considered to collect the wastewater from sewage system or septic tank. The retention time of storage pond should be designed to cover the closed system management (no waste discharge to the public). ■ Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility. ■ Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges (*Table* 3.8) before drained to the site drainage system. The minimum diameter for sewer line should be 100 mm (4 inches).	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.5	6.3.5	Ground Water Quality	Please refer to C1.3 and C1.4 above.	EPC Contractor HSE Manager	Please refer to C1.3 and C1.4 above.
C1.6	6.3.6	Soil Quality	Please refer to C1.3 and C1.4 above.	EPC Contractor HSE Manager	Please refer to C1.3 and C1.4 above.
C1.7	6.3.7	Landscape and Visual	■ Construction activities should be restricted to within the Project facility footprint and immediate surroundings only. ■ After construction work, any land taken for a temporary basis will be restored to their original form (e.g. for labour camp, site office and lay down area). ■ Access road to the Project Site will be existing road with minor improvement works required.	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.8a	6.3.8	Biodiversity	**Loss of Terrestrial Habitat** ■ The Project does not encroach upon any Critical Habitat. ■ Development of clearing protocol, keeping record of clearing status and any observation. ■ Conduct pre-construction surveys to search for active nesting bird and threatened flora species prior to clearance of thickets. If active nests are recorded, clearance of the thicket should be delayed until nesting has completed. Any threatened flora species identified during the surveys should be translocated to suitable nearby habitat outside the clearing footprint. ■ All natural habitat cleared for the preparation of the windfarm is to be compensated onsite through replanting of native habitat flora within the Project Site. The area to be replanting	EPC Contractor HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			are to include native indigenous flora and be of an area of at least 36.62 ha. The replanting program is to be outlined within a replanting and landscaping management plan. ■ Vegetation clearing limit should be marked clearly. Vegetation clearance should be limited to minimum need for safe implementation of the works. ■ Employ appropriate sediment and erosion control measures. ■ Where possible, salvaging cleared material and transferring it to nearby suitable habitat. ■ Clearing vegetation outside of designated areas will be prohibited, with penalties levied, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation. ■ The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to unauthorised clearing of vegetation, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations. ■ Weekly inspections to be conducted to ensure: - clearing protocol is active; - clearing is restricted to approved areas; and - sediment and erosion control measures are active. ■ Records are to be kept and regularly reviewed (3 monthly) for implementation of the workforce training program for fauna/flora awareness; and ■ Records are to be kept and regularly reviewed (3 monthly) of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.		
C1.8b	6.3.8	Biodiversity	**Disturbance and Displacement of Fauna** ■ Implement noise and vibration mitigation measures; ■ Where possible, lighting should not be active during the night; and ■ Where lighting is required, it should not be directed towards areas likely to contain native fauna (e.g. mixed bamboo and moist deciduous forest).	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.8c	6.3.8	Biodiversity	**Barrier Creation, Fragmentation and Edge Effects** ■ The proposed access roads should be made following existing paths where possible to minimise the impact. ■ Where possible, connect nearby fragmented secondary forest patches through the development and implementation of a replanting plan; - Only use suitable native flora species in revegetation efforts; and - Fence areas between patches to promote natural restoration and prevent further damage from anthropogenic impacts (e.g. walking tracks). ■ Hunting and poaching will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws. ■ Engage with local community to raise awareness of conservation species to reduce poaching and hunting within Project Site that are now more accessible.	EPC Contractor HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
C1.8d	6.3.8	Biodiversity	**Degradation of Habitat** ■ Internal roads to be constructed as soon as possible. Drivers should be instructed to stay on access roads, so that adjacent vegetation will be left undisturbed as far as possible. ■ Adopt good construction practice measures to reduce the risk of secondary impacts to habitats and non-avian fauna species including to control dust, noise, drainage, spills and leaks. ■ Water spraying should be used to control level of dust where appropriate. ■ Invasive species within Natural Habitats should be eradicated where possible. Appropriate use of herbicides may be used to control invasive species within the Project Site in accordance with the safe use and label directions of the herbicides. ■ Monitoring is to include inspections of the Project facilities on a monthly basis during construction in order to identify and eradicate any invasive species. During operational phase, monitoring should be conducted on an annual basis. New infestations identified are to be controlled.	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.8e	6.3.8	Biodiversity	**Direct Mortality Event** ■ All vehicles are to maintain a speed of a maximum of 40 km/ hr within work sites to reduce the risk of fauna strikes. ■ All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.9	6.3.9	Community Health and Safety	■ The non-local workers will be living in labour camp during construction. ■ Provide training on some of the most common communicable diseases to all workers to raise awareness of the likely diseases, symptoms, preventative measures and transmission routes as well as treatment. ■ Ensuring health check-ups of all labourers employed at the Project Site to screen pre-existing communicable diseases. ■ Provide access to workers to healthcare services and medical care in case of sickness. ■ A Traffic Management Plan should be developed inclusive of a) adequate staging areas for vehicles; b) facilities and amenities for drivers; and c) a formal training program for drivers employed for the Project. ■ Enforcement of a speed limit of 40 km /h for vehicles along the internal access roads. ■ Erection of crossing signs at known pathways across the internal access roads to alert drivers to the possibility of people and livestock entering the road.	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.10a	6.3.10	Occupational Health and Safety	**Working at Height** ■ Eliminate or reduce the requirement to work at height. ■ If working at height cannot be eliminated, use work equipment or other methods to prevent a fall from occurring. ■ Ensure all structures are designed and built to the appropriate standards and have the appropriate means of working-at-height systems fitted. ■ Suitable exclusion zones should be established and maintained underneath any working at height activities, where possible, to protect workers from falling objects.	EPC Contractor HSE Manager	Environmental Monitoring Report Emergency Response Plan

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			■ Ensure all employees working at height are trained and competent in the use of all working at height and rescue systems in place. ■ Provide workers with a suitable work-positioning device; also ensure the connectors on positioning systems are compatible with the tower components to which they are attached. ■ Ensure that hoisting equipment is properly rated and maintained and that hoist operators are properly trained. ■ When working at height, all tools and equipment should be fitted with a lanyard, where possible, and capture netting should be used if practicable. ■ Signs and other obstructions should be removed from poles or structures prior to undertaking work. ■ An approved tool bag should be used for raising or lowering tools or materials to workers on elevated structures. ■ Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk of lightning strikes. ■ An Emergency Response Plan (ERP) should be in place detailing the methods to be used to rescue operatives should they become stranded or incapacitated while at height. ■ When lifting large loads, ensure weather conditions are favourable for the task. ■ Safe operating parameters of heavy lifting equipment should not be exceeded at any time. ■ A planning meeting between all parties involved in the lift should be carried out and should include: the details of the lift, the roles of each party involved in the lift, and the methods used to communicate instructions among the parties.		
C1.10b	6.3.10	Occupational Health and Safety	**Working at Remote Location** ■ Suitable communication equipment available for the work crew. ■ The training and competence of personnel working remotely and the readiness of all necessary safety equipment in the location. ■ Supervision by competent personnel empowered to make decisions based on events and conditions at the work location. ■ Means for managers to track the exact location of the working crew. ■ Local emergency plan in place. ■ Provision of suitably qualified first-aid-trained personnel in the work crew. ■ Snake guard should be included as personal protective equipment for the workers (PPE)	EPC Contractor HSE Manager	Environmental Monitoring Report
C1.10c	6.3.10	Occupational Health and Safety	**Lifting Operations** ■ Ensure all relevant information is known about the load, e.g., the size, weight, method of slinging, and attachment points. ■ Ensure all lifting equipment (including load attachment points) is suitable, capable of supporting the load, in good condition, and in receipt of any statutory inspections required. ■ Ensure all supervisors, equipment operators, and slingers are trained and competent in the lifting equipment and intended lifting techniques.	EPC Contractor HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			■ Where possible, exclusion zones are to be established and maintained in order to prevent any unauthorized access to lifting areas.		
C1.11	6.3.11	Livelihood and Economy	■ The Project facilities have been sited to avoid residents and coal mine and thus there will be no physical displacement due to the Project. ■ The temporarily used area will be reinstated after the constructional phase. ■ IMWP will adopt the following principles in the Land Acquisition and Resettlement Framework (LARF) of the Project considering requirement of local Myanmar and international standards (IFC PS and ADB SPS): - The avoidance and minimization principle of impacts related to land will be applied to the entire Project including the temporary land requirement - The land procurement process should be undertaken in an informed and participatory manner based on the principles of Informed Consultation and Participation; - There should be no forced eviction for the Project. The Project should put in place a non-tolerance of forced eviction and land grab policy; - Ensure that the affected population's access to legal or other appropriate remedies is not restricted by the Project; - Ensure that the stakeholders have access to a grievance mechanism for the communication of any grievances and concerns regarding the land acquisition; - The absence of formal title and/or certificate of land is not a bar to entitlements; - Minimize impact on land, natural resources and critical cultural heritage under traditional ownership and/or customary use; - Minimize the use of productive agricultural land with a preference to impact lower productive land; - Ensure that the payment of compensation and disbursal of entitlements for impacted assets, including temporary impacts, are completed prior to the physical possession of the land and assets; and - The entitlements shall be identified based on the principles of replacement cost with the aim to improve the standard of living. ■ IMWP will develop and implement a Livelihood Restoration Plan considering requirement of local Myanmar and international standards (IFC PS and ADB SPS). The LRP will include: - Details of PAFs (via Census Survey and Asset Inventory), summary of present livelihood profile, livelihood impacts and community feedback; - Principles for livelihood restoration; - Identification of entitlements, in addition to compensation paid, for enhancing Project benefits and livelihood restoration, including; ▪ Top up of government compensation based on results of the market valuation ▪ Skill enhancement; ▪ Livelihood support measures; ▪ Specific measures for vulnerable groups etc.; and ▪ Linkage to employment and procurement opportunities.	EPC Contractor HSE Manager	Environmental Monitoring Report Land Acquisition Framework Livelihood Restoration Plan

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			- Detailed entitlement matrix specifying the entitlements for each PAF through household entitlement plans; - Implementation plan for entitlements identified; - Integration with other management plans formulated; - Roles and responsibilities for implementation; - Identification of external partners; - Implementation schedule; - Budget for implementation; - Reporting and documentation requirements; and - Monitoring and review requirements.		
Operation Phase					
O1.1	6.4.1	Noise	■ A setback distance of 345 m will be maintained between wind turbine and residential area. ■ Use of serrated trailing edges as necessary to reduce noise level to achieve compliance of operational impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Noise optimization will be performed using turbines at reduced noise mode to achieve compliance of operational impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Physically relocate sensitive receiver as a last resort if compliance cannot be achieved with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise. ■ A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver. ■ Monitor operational noise impact at selected NSRs during the operational phase ■ If the turbine model confirmed to be used has a higher sound power level than Siemens Gamesa SG 4.5-145 4.5MW, further noise assessment will be undertaken to ensure that the noise level is compliant with Myanmar NEQ and WBG EHS Guidelines for Wind Energy (2015) for operational noise.	Project Owner or Assignee HSE Manager	Feasibility Study Report Environmental Monitoring Report
O1.2	6.4.2	Shadow Flicker	■ A setback distance of 345 m will be maintained between wind turbine and any nearby building. ■ The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher fencing and planting trees can be explored at locations with potential impacts of shadow flicker. The use of curtains can also be explored. If these prove effective with the impacts mitigated, the start-stop shadow curtailment strategy as stated below will not be necessary. ■ A start-stop shadow curtailment strategy as shown in Table 6.27 will be adopted to achieve compliance of shadow flicker impacts with the WBG EHS Guidelines for Wind Energy (2015). ■ Physically relocate sensitive receiver as a last resort if compliance cannot be achieved with WBG EHS Guidelines for Wind Energy (2015) for shadow flicker.	Project Owner or Assignee HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			■ A resettlement action plan to be developed and implemented considering requirement of local Myanmar and international standards (IFC PS and ADB SPS) in case of physically relocation of sensitive receiver. ■ Monitoring of shadow flicker impact through engagement with residents during the operational phase where there are predicted impacts from shadow flicker.		
O1.3	6.4.3	Waste Management	■ A Waste Management Plan (WMP) for the Project should be developed and implemented. The WMP should include the following: - Good housekeeping practices for waste storage and handling referencing good international industry practice (GIIP); - A waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected from the operation and to identify appropriate disposal routes; - Materials for operation and maintenance should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures; - Wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible; - The WMP should identify disposal routes (including transport options and disposal sites) for all wastes generated during the operation phase; - A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP; - Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers); - Waste should be collected regularly by reputable waste collectors; - Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible; - Disposal of waste in or off the Project facilities should be prohibited; - Chain of custody documents should be used for all wastes to monitor disposal; and - Waste segregation should be practiced at the O&M building with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.	Project Owner or Assignee HSE Manager	Environmental Monitoring Report Waste Management Plan
O1.4	6.4.4	Surface Water Quality	■ Site drainage facilities should be developed following the design basis below: - Designed to convey the runoff from a 25 years rainfall event. - Provide oily water separator at the tie-in point of the existing drainage system. - Convey surface runoff and roof drainage away from the equipment and buildings. ■ All drainage facilities and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit will be removed regularly.	Project Owner or Assignee HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			■ A sewage system will be constructed for the O&M building which should consist of soak pits for the collection of wastewater from the labour camp kitchen and washing area. ■ Sewage from the toilets should be discharged into septic tanks. ■ A storage pond should be considered to collect the wastewater from sewage system or septic tank. The retention time of storage pond should be designed to cover the closed system management (no waste discharge to the public). ■ Sludge from the sewage system should be cleared regularly and be carried away from the site by trucks to appropriate disposal facility. ■ Sewage should be treated to meet the Myanmar NEQ on Site Runoff and Waste Discharges (*Table* 3.8) before drained to the site drainage system. The minimum diameter for sewer line should be 100 mm (4 inches).		
O1.5	6.4.5	Ground Water Quality	Please refer to O1.3 and O1.4 above.	Project Owner or Assignee HSE Manager	Please refer to O1.3 and O1.4 above.
O1.6	6.4.6	Soil Quality	Please refer to O1.3 and O1.4 above.	Project Owner or Assignee HSE Manager	Please refer to O1.3 and O1.4 above.
O1.7	6.4.7	Landscape and Visual	■ Operational activities should be restricted to within the Project facility footprint and immediate surroundings only. ■ A uniform size and design should be used for the wind turbines. ■ Cables connecting wind turbines will be bury and not visible. ■ Any land taken for a temporary basis for construction will be restored to their original form (e.g. for labour camp, site office and lay down area) and not used for operation.	Project Owner or Assignee HSE Manager	Environmental Monitoring Report
O.18	6.4.8	Birds and Bats	Please refer to C1.8a-d above for other biodiversity impacts. For bird and bats: ■ Establish waste control programme to reduce attraction of some raptors species. This should be reflected in the WMP. ■ All tower structures are to be free of holes that can be used for nesting. Roosting habitats (wires and ledges) are to be kept to a minimum. ■ Contrasting colours are to be trialled on wind turbines in order to make turning blades visible to avifauna. ■ Strobe lights are to be utilised on all turbines flashing at 3 second intervals to deter nocturnal avifauna. ■ Ensuring that any all-night lighting on turbine towers and blades consists of LED lights that have ultraviolet wavelengths. Such lights are known to deter certain bat species and are less attractive to insects that bats forage on. ■ Habitat management is to be applied to reduce bird and bat habitat within the Project Site. This can include removal of understorey vegetation and minimising standing waterbodies. ■ A carcass monitoring programme is to be conducted on a weekly basis at the base of all turbines. All carcasses are to be identified and a database kept of the number and taxa of the species. A review of the data collected from monitoring carcasses is to be undertaken every 6 months for 2 years to identify particular species susceptible to strike risk by a	Project Owner or Assignee HSE Manager	Environmental Monitoring Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			suitably qualified person with at least seven years of bird and bat identification experience in Myanmar. ■ Additional bird or bat survey should be conducted if significant number of strikes are observed. Windfarm operations may be altered based on the lifecycle characteristics of any species identified that are susceptible to strike.		
O1.9		Community Health and Safety	Please refer to C1.9 above.	Project Owner or Assignee HSE Manager	Please refer to C1.9 above.
O1.10		Occupational Health and Safety	Please refer to C1.10a-c above.	Project Owner or Assignee HSE Manager	Please refer to C1.10a-c above.
O1.11	6.4.9	Livelihood and Economy	Please refer to C1.11 above.	Project Owner or Assignee HSE Manager	Please refer to C1.11 above.
Unplanned Events					
U1.1	6.5.1	Accidental Spills and Leaks	■ Maintenance and refuelling of equipment and vehicles should be carried out in designated areas on hardstand to prevent seepage of any spillages to ground. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing. ■ The hazardous material storage facility should be constructed on bunded hardstand with containment sufficient for 110% of the volume of the single largest tank. Discharges from this bunded area should pass through an oil-water separator. ■ A Spill Response Plan should be developed and implemented. ■ Discharges from the hazardous material storage facility should be monitored monthly for compliance with Myanmar NEQ for site runoff and wastewater discharges (for TSS, oil and grease, pH).	EPC Contractor (Construction Phase Project Owner or Assignee HSE Manager (Operation Phase)	Spill Response Plan

8.4 Overall Budget for Implementing the EMP

The overall annual budget for implementing the EMP is yet to be finalized.

8.5 Management and Monitoring Sub-Plans

A number of management plans are recommended to be developed and implemented in order to reduce the residual impacts from the Project to no greater than moderate significance. These management plans are presented below.

8.5.1 Waste Management Plan

8.5.1.1 Objectives

A Waste Management Plan (WMP) should been developed that covers construction and operation of the Project.

The objectives of the Waste Management Plan (WMP) are to:

- Ensure waste is managed in a controlled and environmentally sound manner;
- Comply with all statutory and contractual requirements concerning the management of waste;
- Ensure resources are recovered where possible and safe to do so, for re-use and recycling; and
- Ensure appropriate recording and tracking occurs for all wastes generated.

8.5.1.2 Legal Requirements

Under the WMP, good housekeeping practices for waste storage and handling will be referencing good international industry practice (GIIP).

8.5.1.3 Implementation Schedule

The WMP will be implemented during the construction and operation phase of the Project.

8.5.1.4 Management Actions

The following will be implemented for wastes generated from the construction and operation phases of the Project:

- Good housekeeping practices for waste storage and handling referencing good international industry practice (GIIP);
- A waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected to identify appropriate disposal routes;
- Materials should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
- Wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible;
- Waste suitable for reuse should be stored on site and reintroduced to the construction process as and when required;
- The WMP should identify disposal routes (including transport options and disposal sites) for all wastes generated;
- A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and

operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP;

- Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers);
- Waste should be collected regularly by reputable waste collectors;
- Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible;
- Disposal of waste in or off the construction site / Project facilities should be prohibited;
- Chain of custody documents should be used for all wastes to monitor disposal; and
- Waste segregation should be practiced at the labour camp and O&M Building with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

8.5.1.5 Monitoring Plans

Chain of custody documents should be used for all wastes to monitor disposal. IMWP should record the waste type, volume and disposal method which should be reported in the Environmental Monitoring Report to be submitted to MONREC quarterly during construction of the Project.

8.5.1.6 Projected Budgets and Responsibilities

The cost for the WMP is included in the overall budget for the EMP.

A summary of the monitoring for the Project is provided in *Table 8.4*.

8.5.2 Emergency Response Plan

8.5.2.1 Objectives

IMWP will respond to emergency situations from the Project activities in Myanmar. The Emergency Response Plan (ERP), which also cover fire risk management, includes:

- Hierarchy of protection;
- Preparedness and planning for emergencies;
- Employee responsibilities;
- Emergency response procedures;
- Medical emergencies including medevac procedures;
- Natural disasters (e.g. flood, cyclone, earthquakes) related emergencies;
- Fire and electrical related emergencies; and
- Any other emergency response plan required by the Republic of the Union of Myanmar authorities.

8.5.2.2 Legal Requirements

The ERP will be referencing good international industry practice (GIIP).

8.5.2.3 Implementation Schedule

The ERP will be implemented during the construction and operation phase of the Project.

8.5.2.4 Management Actions

IMWP will develop plans and procedures to identify the potential for and response to environmental accidents and health and safety emergency situations and for preventing and mitigating any potentially adverse environmental and social impacts that may arise. The plans include but are not limited to: notification procedures; an emergency response organization with personnel properly trained on their roles and responsibilities; having adequate and appropriate emergency response equipment readily available to respond to minor incidents; and having the capability to quickly request additional assistance.

8.5.2.5 Monitoring Plans

Should an emergency situation occur, they will be reported to MOEE.

8.5.2.6 Projected Budgets and Responsibilities

The cost for the ERP is included in the overall budget for the EMP.

8.5.3 Spill Response Plan

8.5.3.1 Objectives

The objectives of the Spill Response Plan (SRP) are to describes the spill preventative measures and spill response procedures.

8.5.3.2 Legal Requirements

The SRP will be referencing good international industry practice (GIIP).

8.5.3.3 Implementation Schedule

The SRP will be implemented during the construction and operation phase of the Project.

8.5.3.4 Management Actions

IMWP will develop plans and procedures to identify the potential for and response to spill and for preventing and mitigating any potentially adverse environmental and social impacts that may arise. The plans include but are not limited to: spill control hierarchy, control measures to prevent spills such as proper engineering design, handling, storage and transportation guidelines on hazardous materials, spill response training, spill response organization and procedures as well as spill response PPE and drill requirements.

8.5.3.5 Monitoring Plans

Should emergency situation occur, they will be reported to MOEE.

8.5.3.6 Projected Budgets and Responsibilities

The cost for the SRP is included in the overall budget for the EMP.

8.5.4 Land Acquisition and Resettlement Framework

8.5.4.1 Objectives

A Land Acquisition and Resettlement Framework (LAF or LARF) will be developed to provide:

- an understanding of the process to be followed for the assessment of impacts related to land acquisition;
- documentation of the acquisition process;

- principles to be followed for land acquisition;
- entitlements for the various impacts identified; and
- process to be followed for the development and implementation of the Livelihood Restoration Plan (LRP) for the Project.

8.5.4.2 Legal Requirements

The LAF will follow requirement of local Myanmar and international standards (IFC PS and ADB SPS).

8.5.4.3 Implementation Schedule

The LAF will be implemented during the construction and operation phase of the Project.

8.5.4.4 Management Actions

The following will be included as key principles in the LAF:

- The avoidance and minimization principle of impacts related to land will be applied to the entire Project including the temporary land requirement
- The land procurement process should be undertaken in an informed and participatory manner based on the principles of Informed Consultation and Participation;
- There should be no forced eviction for the Project. The Project should put in place a non-tolerance of forced eviction and land grab policy;
- Ensure that the affected population's access to legal or other appropriate remedies is not restricted by the Project;
- Ensure that the stakeholders have access to a grievance mechanism for the communication of any grievances and concerns regarding the land acquisition;
- The absence of formal title and/or certificate of land is not a bar to entitlements;
- Minimize impact on land, natural resources and critical cultural heritage under traditional ownership and/or customary use;
- Minimize the use of productive agricultural land with a preference to impact lower productive land;
- Ensure that the payment of compensation and disbursal of entitlements for impacted assets, including temporary impacts, are completed prior to the physical possession of the land and assets; and
- The entitlements shall be identified based on the principles of replacement cost with the aim to improve the standard of living.

8.5.4.5 Monitoring Plans

Monitoring plan will be specified in the LRP.

8.5.4.6 Projected Budgets and Responsibilities

The cost for the LAF is included in the overall budget for the EMP.

8.5.5 Livelihood Restoration Plan

8.5.5.1 Objectives

The Livelihood Restoration Plan (LRP) should put in place the entitlements for the population affected by land acquisition of the Project and the proposed implementation process. These entitlements shall

be aimed towards mitigating the adverse social and economic impacts resultant from the land acquisition, providing a top up amount compensating the losses and to the extent possible, improving the affected population's livelihoods and standards of living.

8.5.5.2 Legal Requirements

The LRP will follow requirement of local Myanmar and international standards (IFC PS and ADB SPS).

8.5.5.3 Implementation Schedule

The LRP will be implemented during the construction and operation phase of the Project.

8.5.5.4 Management Actions

The LRP will include:

- Details of PAFs (via Census Survey and Asset Inventory), summary of present livelihood profile, livelihood impacts and community feedback;
- Principles for livelihood restoration;
- Identification of entitlements, in addition to compensation paid, for enhancing Project benefits and livelihood restoration, including;
  - Top up of government compensation based on results of the market valuation
  - Skill enhancement;
  - Livelihood support measures;
  - Specific measures for vulnerable groups etc.; and
  - Linkage to employment and procurement opportunities.
- Detailed entitlement matrix specifying the entitlements for each PAF through household entitlement plans;
- Implementation plan for entitlements identified;
- Integration with other management plans formulated;
- Roles and responsibilities for implementation;
- Identification of external partners;
- Implementation schedule;
- Budget for implementation;
- Reporting and documentation requirements; and
- Monitoring and review requirements.

8.5.5.5 Monitoring Plans

The LRP will include monitoring and review requirements. This may include regular monitoring of the process of LRP implementation through quarterly monitoring during the implementation phase and annual monitoring for a period of two years post the implementation completion.

8.5.5.6 Projected Budgets and Responsibilities

The cost for the LRP is included in the overall budget for the EMP.

8.5.6 Environmental Monitoring Plan

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. The Environmental Monitoring Plan is provided in *Table 8.4*.

Environmental Monitoring Report will be submitted to the ECD on a half-yearly basis during the construction phase to report monitoring findings and environmental and performance of the Project.

Table 8.4 Monitoring Programme for Project

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
Construction Phase			
General	Visual inspection of all active work areas and inspection of records to check general compliance with mitigation measures presented in the EMP.	Weekly	EPC Contractor HSE Manager
Noise	Check compliance with noise level specified in Myanmar National Environmental Quality for Noise. The parameter will include One Hour LAeq (dBA).	Weekly if works to be undertaken within 300 m of the monastery within the Project Site from July to October.	EPC Contractor HSE Manager
Surface Water Quality	Treated wastewater from construction activities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: ■ Biological oxygen demand - 30 mg/l ■ Chemical oxygen demand- 125 mg/l ■ Oil and grease - 10 mg/l ■ pH - 6-9 (standard units) ■ Total coliform bacteria - 400 ml ■ Total nitrogen - 10 mg/l ■ Total phosphorus - 2 mg/l ■ Total suspended solids - 50 mg/l	Treated wastewater will be monitored monthly.	EPC Contractor HSE Manager
Waste	The HSE team will report waste generation and disposal to MONREC on a monthly basis.	Waste will be monitored monthly.	EPC Contractor HSE Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
Biodiversity	■ Records are to be kept and regularly reviewed for implementation of the workforce training program for fauna/flora awareness. ■ Records are to be kept and regularly reviewed of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.	Quarterly	EPC Contractor HSE Manager
Biodiversity	■ Inspections of the Project facilities on a monthly basis during construction in order to identify and eradicate any invasive species.	Monthly	EPC Contractor HSE Manager
Biodiversity	■ All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.	When occur	EPC Contractor HSE Manager
Operational Phase			
Surface Water Quality	Treated wastewater from operation facilities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: ■ Biological oxygen demand - 30 mg/l ■ Chemical oxygen demand- 125 mg/l ■ Oil and grease - 10 mg/l ■ pH - 6-9 (standard units) ■ Total coliform bacteria - 400 ml ■ Total nitrogen - 10 mg/l	Treated wastewater will be monitored monthly.	Project Owner or Assignee HSE Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
	■ Total phosphorus - 2 mg/l ■ Total suspended solids - 50 mg/l		
Biodiversity	■ Records are to be kept and regularly reviewed for implementation of the workforce training program for fauna/flora awareness. ■ Records are to be kept and regularly reviewed of all personnel entering and exiting the Project facilities through checkpoints, including results of all random inspections undertaken for poached flora/fauna.	Quarterly	Project Owner or Assignee HSE Manager
Biodiversity	■ Inspections of the Project facilities on an annual basis during construction in order to identify and eradicate any invasive species.	Annual	Project Owner or Assignee HSE Manager
Biodiversity	■ All collision mortality events and incidents of hunting or poaching at the Project Site to be logged and recorded.	When occur	Project Owner or Assignee HSE Manager
Bats and Birds	■ A carcass monitoring program is to be conducted on a weekly basis at the base of all turbines. All carcasses are to be identified and a database kept of the number and taxa of the species. A review of the data collected from monitoring carcasses is to be undertaken every 6 months for 2 years to identify particular species susceptible to strike risk by a suitably qualified person. ■ Additional bird or bat surveys should be conducted if significant number of strikes are observed. Windfarm operations may be altered based on the lifecycle characteristics of any species identified that are susceptible to strike.	Weekly for carcass monitoring programme Additional bird or bat surveys when required as reviewed by carcass monitoring programme	Project Owner or Assignee HSE Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
Shadow Flicker	■ Monitoring of shadow flicker impact through engagement with residents during the operational phase where there are predicted impacts from shadow flicker.	Quarterly	Project Owner or Assignee HSE Manager
Operational Noise from turbines	■ Check compliance with noise level specified in Myanmar National Environmental Quality for Noise. ■ The parameter will include One Hour LAeq (dBA).	Monthly at Set Set Yo Village and the monastery within the Project Site (*Figure 5.3*)	Project Owner or Assignee HSE Manager

9. PUBLIC CONSULTATION AND DISCLOSURE

9.1 Methodology and Approach

9.1.1 Purpose of the Consultation

The specific objectives for stakeholder engagement were to:

- Inform relevant stakeholders about the project and its planned Project activities;
- Identify stakeholders and communities potentially affected by Project activities;
- Gather baseline information on the social and biological environment; and
- Engage with potentially affected groups to understand potential Project impacts, perceptions and concerns and discuss appropriate mitigation measures.

9.1.2 Identification of Relevant Stakeholders and Potential Issues

The process of identifying potentially affected stakeholders started with scoping which is conducted to identify relevant issues and select the townships and villages potentially impacted. The scoping exercise involved both desk-based and preliminary consultation with a number of stakeholders including government authorities.

ERM's previous experience of stakeholder engagement in the Region was utilised to inform the stakeholder selection. This information is based on discussions with General Administrative Department (GAD) representatives as well as previous project experience.

Figure 9.1 shows the locations of the townships and villages visited for the public consultation meetings.

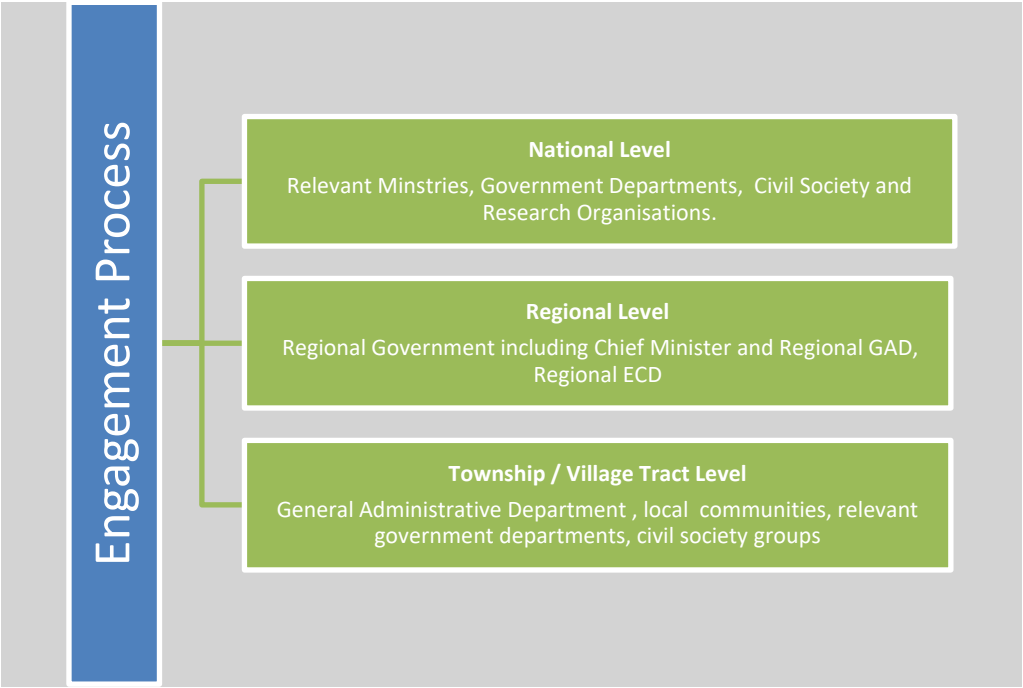
Stakeholder engagement is an ongoing process and as such new stakeholders may emerge as the Project progresses. This will be captured and inform ongoing stakeholder engagement activity that will be undertaken for the Project.

Figure 9.1 Township and Village consulted in the Study Area

9.1.3 Overall Approach and Scope of Engagement for the Impact Assessment

Stakeholder engagement was conducted across administrative levels, subject to permissions of responsible authorities. *Figure 9.1* provides an overview of the levels engaged including: National Government, Regional and township and village tract levels.

Engagement, as specified in the Myanmar EIA Procedure, was undertaken in two phases in July and November 2018. A consultation team consisting of ERM and IMWP representatives conducted meetings and consultations at the administrative levels. To ensure village level representation, a request was made to the Township GAD offices for village tract leaders from the potentially impacted villages to be present.



Source: ERM (2018)

Figure 9.2 Engagement at Three levels with Key Stakeholders

National Level

Stakeholder engagement at the national level was focused on government agencies with regulatory and policy making responsibility. The purpose of early engagement was to introduce the Project and IMWP, to seek clarity on the EIA process and expectations on stakeholder engagement and disclosure. The opportunity was also used to obtain required permissions for engagement with agencies at regional and township level and get access to data and information for the EIA Study.

In subsequent stages, engagement covered identification of relevant stakeholders at the state, township and village tract level. At the national level, consultation included MOEE and MONREC.

Regional Level

Stakeholder engagement at the Regional Level focused on obtaining required permission for engagement activities at the township level and get access to information on local communities in the Area of Influence. At the Regional level the Project met with the Chief Minister of Magway Region and delegates.

Township / Village Tract Level

Meetings were conducted with Minhla Township. The necessity for this meeting and the participation was also discussed during the Chief Minister's meeting in Magway undertaken during Scoping phase. The purpose of engagement was to make the township levels aware of the Project, seek an understanding of specific issues and stakeholder concerns, discuss potential impacts and mitigation measures and obtain village and township level social and environmental data.

The purpose of engagement was to make the community aware of the Project, seek an understanding of specific issues and stakeholder concerns in the individual townships, discuss potential impacts and mitigation measures and obtain district and township level social and environmental data.

The key stakeholders engaged with included;

- GAD (District and Township);
- Relevant Township Government Departments
- Member of Parliament
- Village Tract Leaders and local community;
- Civil Society Organizations

9.1.4 Format and Content of Consultation Meetings

Key Principles

The consultation process was guided by the following key principles:

- Inclusive: The consultations were organised to ensure representation of potentially affected and interested stakeholders. Separate focus group discussions (FGDs) were undertaken with farmers and women.
- Sharing of information: At the township and village level consultations, special emphasis was given to build community level understanding of the Project and all the information was provided in Myanmar language.
- Participatory: Stakeholders were encouraged to actively participate in the consultations and were always given the opportunity to ask questions.

The approach to consultation, informed by these principles, is described below.

Consultation Approach

The stakeholder consultation meetings were structured as followed:

- Introductions and information disclosure: Introduce ICM (and IMWP), Kandok Windfarm Project, the EIA, the proposed stakeholder engagement process, the potential environmental and social impacts and mitigation to help the stakeholders understand the Project and IMWP's intentions for engagement.
- Question and answer session for all stakeholders in the town hall meeting to raise concerns, comments or ask questions to which ICM (and IMWP) can directly respond.
- Data collection: Collection of more in-depth information through questionnaire with key stakeholder groups in the town hall meetings and village tracts.

In order to inform stakeholders about the Project and share information on the activities, a two page flyer was produced which contained Project information and details on how to feedback into the Project. All information was communicated through use of visual media (including posters and power point presentations) and was provided in local Myanmar language.

To gather more environmental and social baseline data and to identify potentially affected communities, FGDs were undertaken with village leaders, and were guided by questionnaires covering information relating to:

- Generic village profile: Collected information on demographic patterns, communities, occupations, and communication and grievance systems.
- Environment: Collected information on protected areas.
- All information collected was summarised and confirmed with stakeholders at the end of the discussion. Stakeholders were also given time to share their concerns and views and any further clarifications they required at the end of the meetings.
- Any queries raised by the stakeholders were responded to, and also noted to feed into the impact assessment process for the EIA.

9.2 Summary of Consultation Activities Undertaken for the EIA Process

9.2.1 Scoping Phase

During scoping, consultation meetings were held with various relevant stakeholders at the regional level in Magway and township level in Minhla. The purpose of the Scoping consultations was to present information on the Project, gather information on potentially affected people, and gather information on the potential data gaps and how these can be closed for the EIA Report. Scoping consultation involved face-to-face meetings with a range of stakeholders including Magway Regional Chief Minister and other regional level government (such as regional level ECD, Township Forestry Department, and Regional GAD, Township GAD, village tract leader and local communities. The date, time, location, stakeholder and purpose of each meeting are provided in *Table 9.1*

.

Table 9.1 Consultation Activities Undertaken During Scoping

Date, Time and Location	Stakeholder	Purpose of Engagement
Scoping Consultation for this Project (EIA Study)		
10th July, 2018	Magway Regional Chief Minister	■ Present information on the Project ■ Get approval for township / village level meetings ■ Gather concerns and suggestions from stakeholders
11th July, 2018	Minhla GAD Office	■ Arrange village meetings and approvals
13th July, 2018	Minhla GAD Office and Yae Ngan Village	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Get information on Protected Areas and Reserve Forests in Study Area ■ Gather concerns and suggestions from stakeholders; village tract leaders and other interested parties
14th July, 2018	Yae Nan Ma and Set Set Yo Village	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Gather concerns and suggestions from stakeholders

The minutes of the meetings and photos from Scoping consultation are provided in ***Appendix C***; some photos of the meeting are also provided in *Figure 9.3* and *Figure 9.4*.

Source: ERM field trip (2018)

Figure 9.3 Meeting with Magway Regional Chief Minister

Source: ERM field trip (2018)

Figure 9.4 Meeting with Minhla Township GAD, other relevant government departments, CSOs and other interested party

9.2.2 EIA Phase

During the EIA Phase, public consultation meetings were conducted in Minhla Township. The meeting location were selected based on previous visits for the scoping visit. The meetings were conducted in Minhla Township GAD and Set Set Yo, Yae Nan Ma and Yae Ngan villages. The meeting was attended by 32 people in Minhla GAD, 82 people in Set Set Yo village, 89 people in Yae Nan Ma village and 78 people in Yae Ngan village consisting of; local community, GAD, Department of Forestry, MPs, Media and CSOs.

The date, time, location, stakeholder and purpose of each meeting is provided in *Table 9.2*. The public consultation photos are shown in *Figure 9.5* and *Figure 9.6*.

During the consultation, the household (HH) survey was held in Minhla, Set Set Yo, Yae Nan Ma and Yae Ngan villages.

The household (HH) survey was guided by a questionnaire covering:

- Demographic profile, land holding; number of land owners and landless; types of school facilities; credit access; market access; health facility access; access to water source; cooking fuel type uses; fuelwood collection; type of diseases; electricity access; number of households with income; infrastructure; number of people by type of livelihood; number of people by type of livestock; number of members and meetings of support groups; and, type of support from and contribution to support group.

Table 9.2 Consultation Activities Undertaken During EIA

Date, Time and Location	Stakeholder	Purpose of Engagement
EIA Consultation for this Project		
6th November, 2018	Yae Ngan Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
6th November, 2018	Set Set Yo Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
8th November, 2018	Yae Nan Ma Village	■ Present Project information, gather concerns and suggestions from stakeholders village tract leaders and other interested parties ■ Undertake socio-baseline data collection
9th November, 2018	Minhla GAD,	■ Present Project information to local government, village tract leaders and other interested parties ■ Undertake socio-baseline data collection ■ Get information on Protected Areas and Reserve Forests in Study Area ■ Gather concerns and suggestions from stakeholders; village tract leaders and other interested parties

The minutes of the meetings and photos from the EIA consultation are provided in ***Appendix C***; some photos of the meeting are also provided in *Figure 9.5* and *Figure 9.6*.

Source: ERM field trip (2018)

Figure 9.5 Meeting with local community in Yae Nan Ma village

Source: ERM field trip (2018)

Figure 9.6 Meeting in Minhla GAD

9.3 Results of Consultation

The following section summaries the key issues raised in public consultation meeting and *Table 9.3* presents the responses concerned with these issues.

Table 9.3 Key Questions Raised During Scoping and EIA Public Consultation

Question	Responses	EIA Consideration
Environmental		
It is important to do assessment on noise and air quality of this region as hazardous gas will contaminate the atmosphere.	There would be no air emission from the wind turbine during operation. As a wind power project, the plan is to focus mainly on impacts related to land take and biodiversity especially birds.	Noise impact assessment will be included in the EIA with mitigation measures proposed as necessary.
Land Compensation		
The villagers want to know the opportunities and compensation for the owners of the fallow lands.	The company is currently assessing the land requirement including farmlands in collaboration with the government. IMWP will comply the international standards and local regulatory requirements to acquire land for the Project.	Impact related to land acquisition will be assessed in the EIA with mitigation measures proposed as necessary.
Impacts and incidents		

Question	Responses	EIA Consideration
As the towers are high, the breakdown of towers may happen and harm people and their livestock.	The company will have appropriate insurance to cover damages caused by the tower.	Blade throw impact to be considered in the EIA Report.
Will there be oil leakage into the pond for drinking water and stream? For shifting cultivation farmlands, as everybody do not have the legal document for the land, the compensation will be only for the farmland with documents?	IMWP will comply the international standards and local regulatory requirements to acquire land for the Project. Machinery will be checked regularly to prevent spill.	Impact related to land acquisition and spill will be assessed in the EIA with mitigation measures proposed as necessary.
Will the farmlands and crops be damaged by the wind turbine?	If there are any damages caused by the Project, the person concerned can inform IMWP and IMWP will respond to that properly. IMWP will comply the international standards and local regulatory requirements to acquire land for the Project.	Impact related to land acquisition will be assessed in the EIA with mitigation measures proposed as necessary. Grievance mechanism will be developed for use by local community.
Electricity		
How much will be electricity fee? The farmers cannot afford if that's too high.	It is technically hard to distribute electricity from the Project directly to the village and the Project will need to be connected to national grid. According to existing regulation, the company did not have the right to sell electricity to end-users directly.	None required.

9.4 Ongoing Consultations

Future engagement activities will consist of the following and are shown in detail in *Table 9.4:*

- Further disclosure of Project information and EIA Report, including opportunities to provide feedback;
- Engagement with relevant regional officials/authorities and government organisations on the outcomes of the EIA; and
- Ongoing communications with interested and potentially affected stakeholders during the operation. While impacts on local communities, ongoing project information will be provided to local areas.

A grievance mechanism will be in place, in line with the steps required under the EIA Procedure, as well as international good practice.

If significant issues, concerns or impacts are identified, further stakeholder consultation with relevant, interested or affected stakeholders may be undertaken during operation.

Table 9.4 Stakeholder Communication and Notification

Timing	Purpose	Stakeholder / Group	Method of communication / notification
■ Following lodgement of EIA for assessment	■ Disclose EIA Report	■ Relevant regional officials / authorities ■ Relevant Government organisations ■ Villagers ■ Other relevant stakeholders ■ General public	■ Hardcopy EIA executive summary (Myanmar) made available in Minhla, Magway and Yangon ■ Publish Project information on signboards at the site; ■ Regional and national advertising – via newspapers. ■ EIA (English) and executive summary (Myanmar and English) available on IMWP website
■ During the Project activities	■ Address any community concerns that	■ Implement the Grievance Mechanism	■ Grievance mechanism disclosed to local community and government

9.5 Disclosure

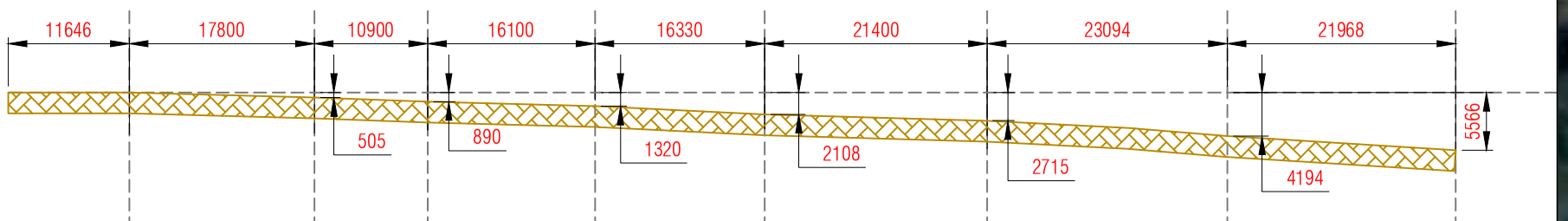
As per the requirements of the EIA Procedure, IMWP has disclosed information on the Project on their website, www.infracapmyanmar.com. There will also be adverts in one English and one Myanmar newspaper and hard copies of the report will be made available in Yangon, Minhla and Magway.

9.6 Community Grievance Mechanism

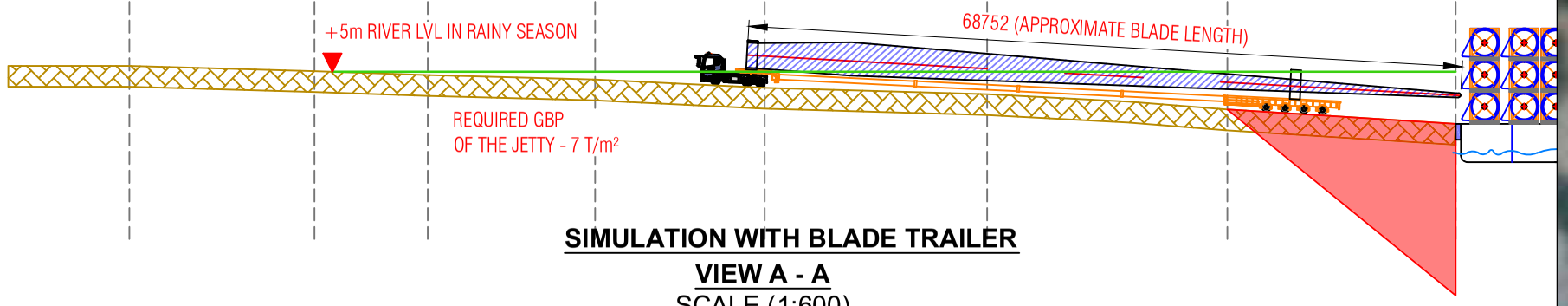
A grievance mechanism will be created by IMWP so that stakeholders can raise questions or concerns with the Project and have the concerns addressed in a prompt and respectful manner. Should a grievance or complaint be made, the complaint/grievance will be received by a Community Liaison Officer or similar. The grievance will be recorded and investigated and responded to. Should the complainant not accept the response, a review will be carried out. Once resolved, the grievance will be closed out and recorded in the Grievance Register.

APPENDIX A DRAWINGS OF ACCESS ROUTE TO PROJECT SITE

NOTE : RIVER LEVEL WILL BE RAISED +5m DURING RAINY SEASON WHICH IS FROM JUNE TO OCTOBER.



EXISTING JETTY ELEVATION



SIMULATION WITH BLADE TRAILER

VIEW A - A

SCALE (1:600)

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	21-05-18	ISSUED FOR APPR.

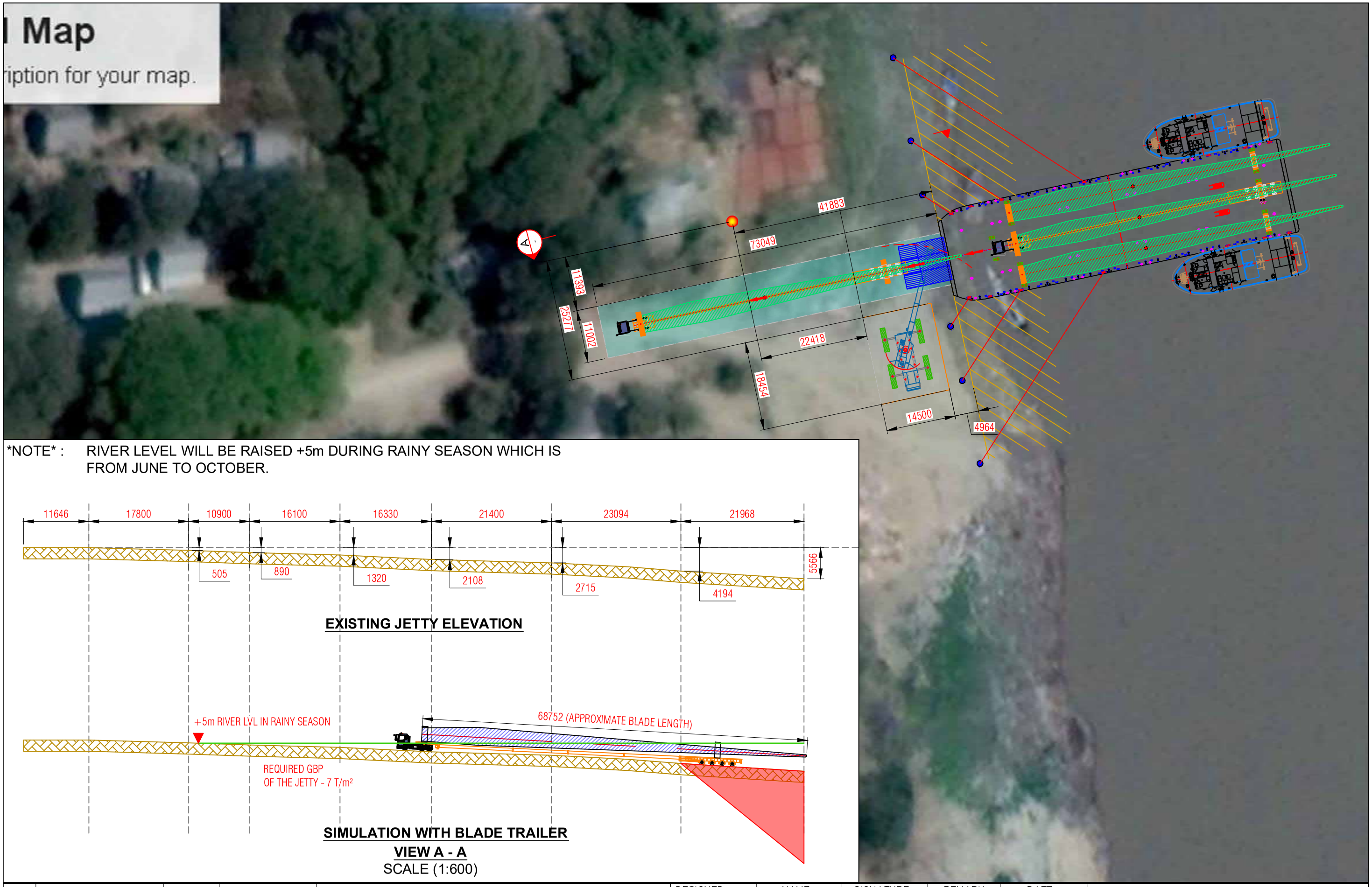
PROJECT LOGISTICS
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			21-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A1 - JETTY LAYOUT PLAN - MINBU JETTY

PROJECT: TBC

SCALE 1:700 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



NOTE : RIVER LEVEL WILL BE RAISED +5m DURING RAINY SEASON WHICH IS FROM JUNE TO OCTOBER.

EXISTING JETTY ELEVATION

SIMULATION WITH BLADE TRAILER

VIEW A - A

SCALE (1:600)

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	28-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

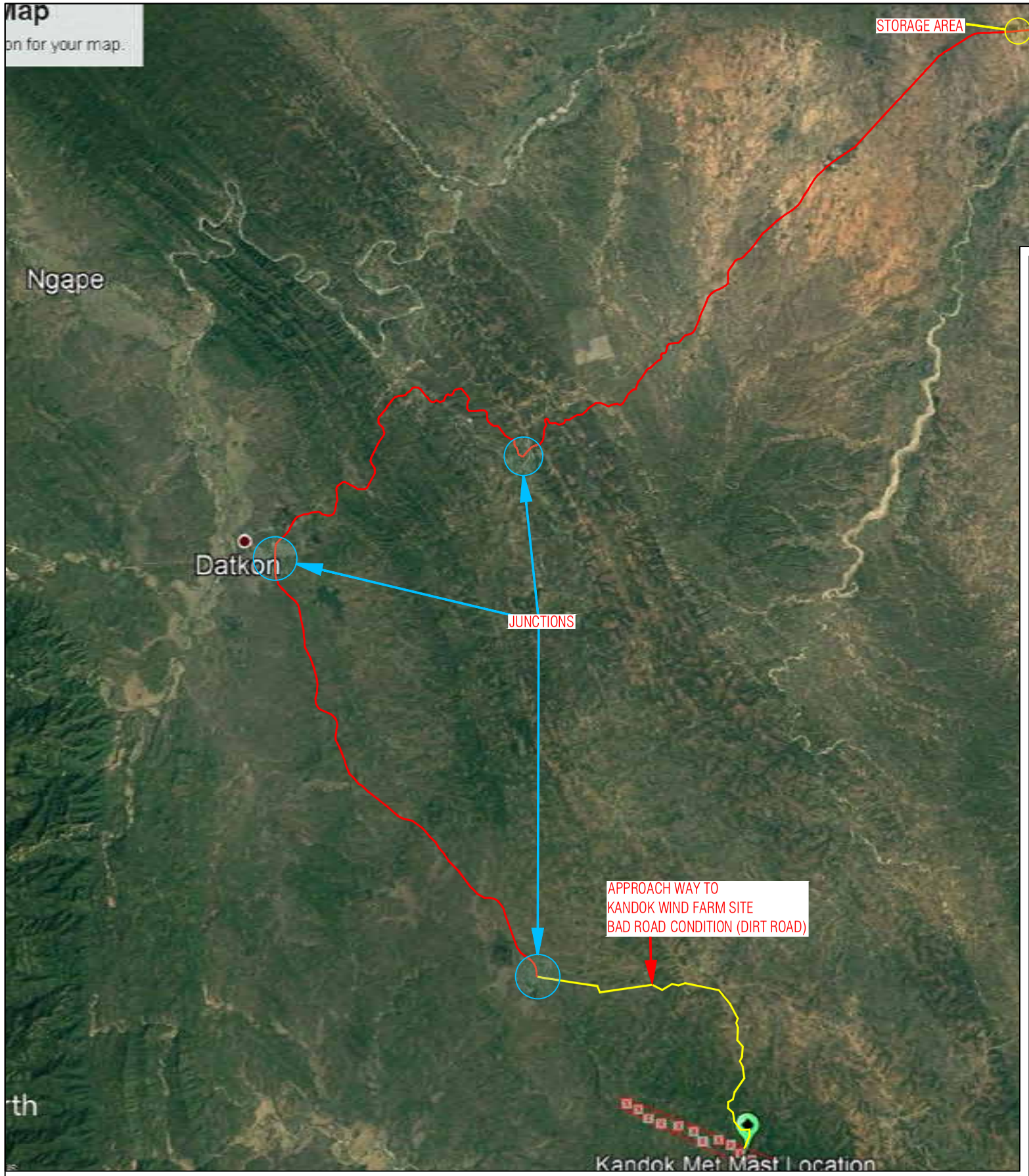
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			28-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A2 - JETTY LAYOUT PLAN - MINBU JETTY OPTION-02

PROJECT: TBC

SCALE 1:700 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



LAND SURVEYED ROUTE MAP FROM MINBU JETTY TO KANDOK SITE (TOTAL 88.00km)

NOTE : DETAILED LAND SURVEY DATA IS MENTIONED IN THE SURVEY REPORT.

PROPOSED STORAGE AREA (3.50km FROM MINBU JETTY)
SCALE (1:2000)

LAT.
LONG.

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	22-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			22-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

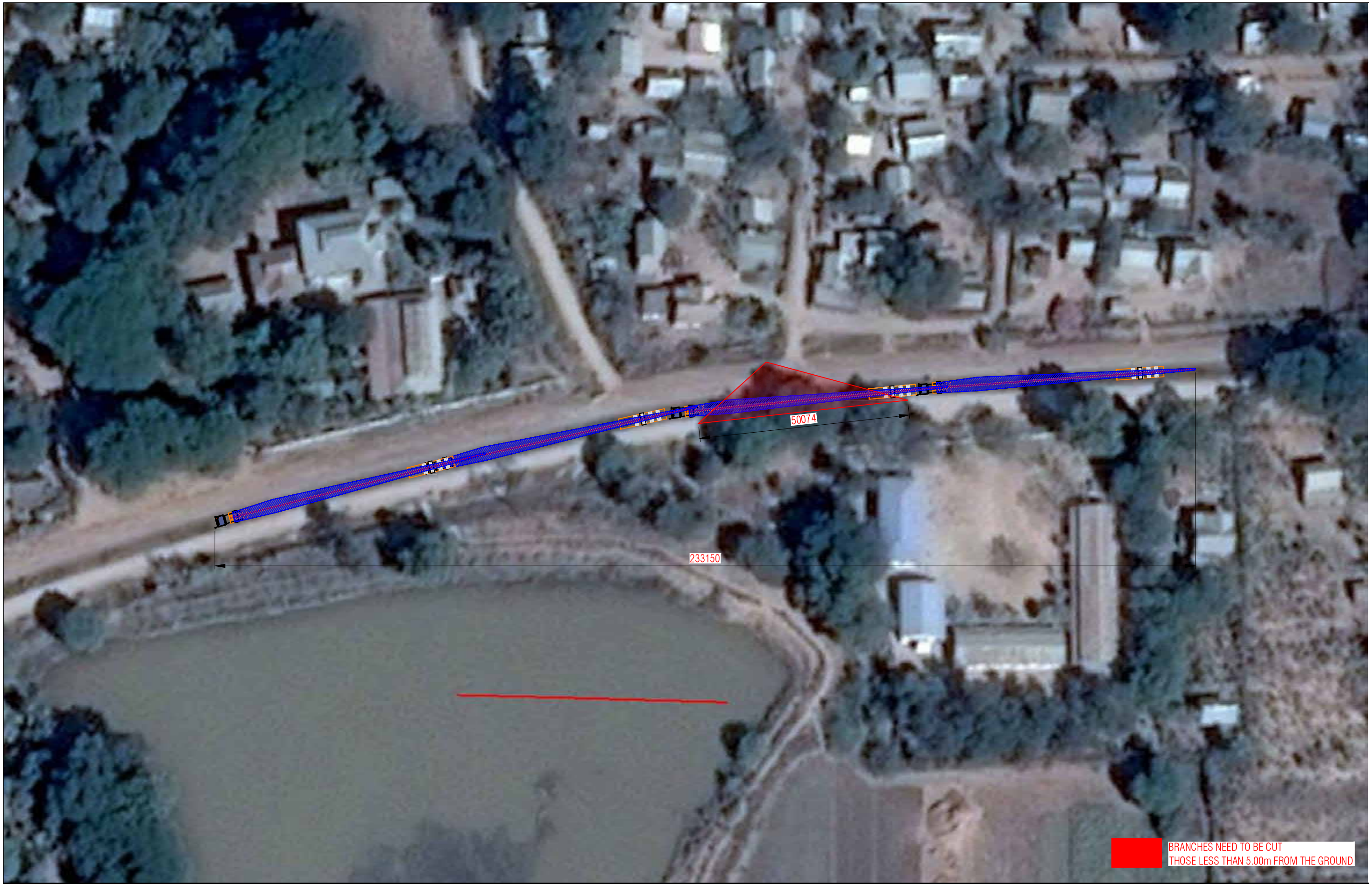
TITLE : . 3 - LAND ROUTE MAP FROM MINBU JETTY TO KANDOK SITE

PROJECT: TBC

SCALE 1:NTS | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

					DESIGNED	NAME	SIGNATURE	REMARK	DATE	TITLE : A4 - TURNING STUDY DWG – KANDOK – TP-02
					CUSTOMER	INFRA CAPITAL MYANMAR				
					APPROVED	Mr. Kevin				
					CREATE	Mr. Si Thu			17-05-2018	PROJECT: TBC
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.		PROJECT No.				PAPER SIZE A3	SCALE 1:450 / DRAWING No. DWG-CEA-XXXX-XXX / REV. 00
REV.	Doc.No.	DATE	DESCRIPTION		CONTRACT No.				SHEET 1/1	

PROJECT LOGISTICS
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A5 - TURNING STUDY DWG - KANDOK - TP-01

PROJECT: TBC

SCALE 1:800 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A6 -TURNING STUDY DWG - KANDOK - TP-03

PROJECT: TBC

SCALE 1:500 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.
REV.	Doc.No.	DATE	DESCRIPTION

PROJECT LOGISTICS

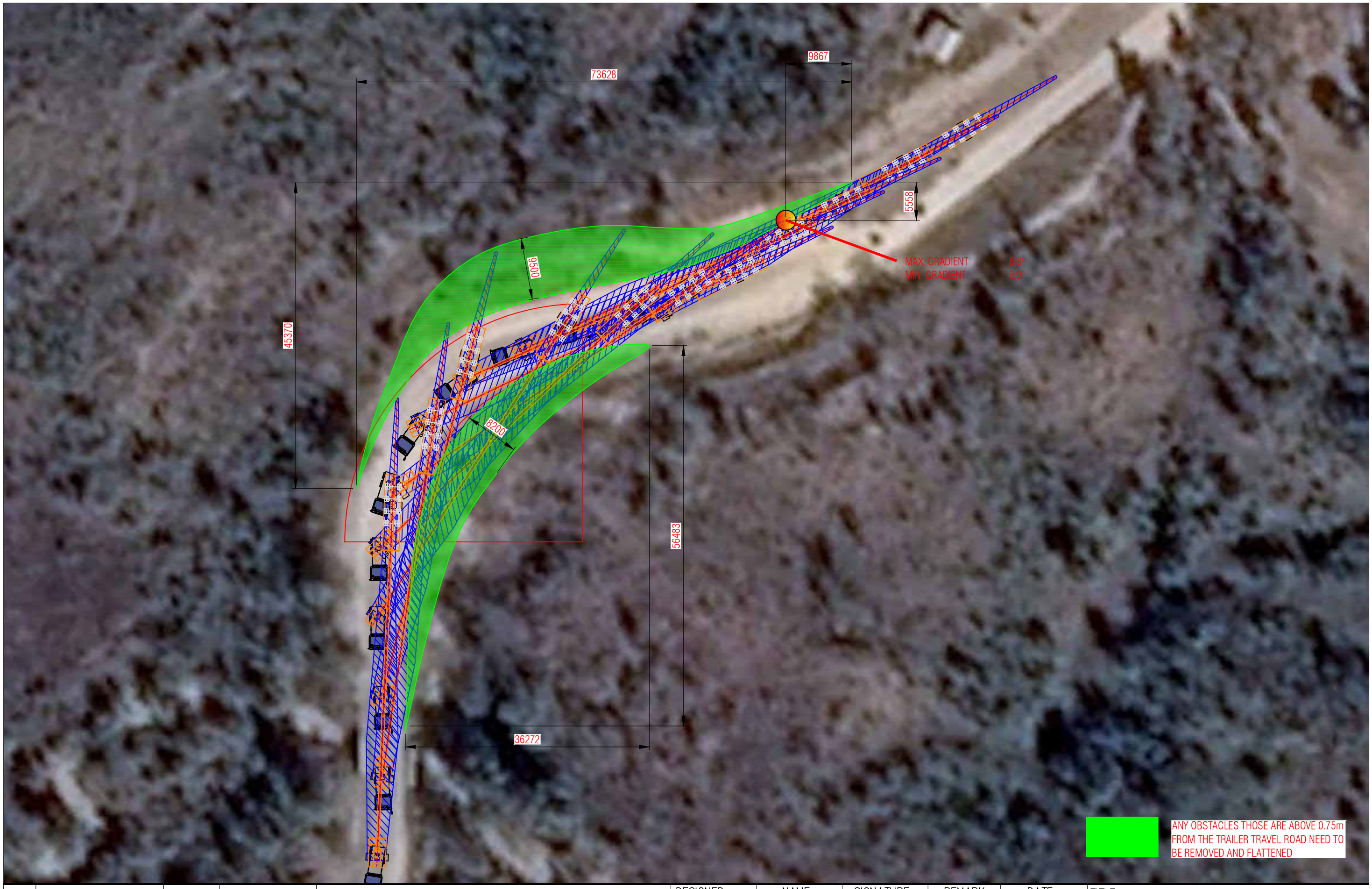
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

DESIGNED	NAME	SIGNATURE	REMARK	DATE
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A7 - TURNING STUDY DWG - KANDOK - TP-04

PROJECT: TBC

SCALE 1:1200 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A8 - TURNING STUDY DWG - KANDOK - TP-05

PROJECT: TBC

SCALE 1:500 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

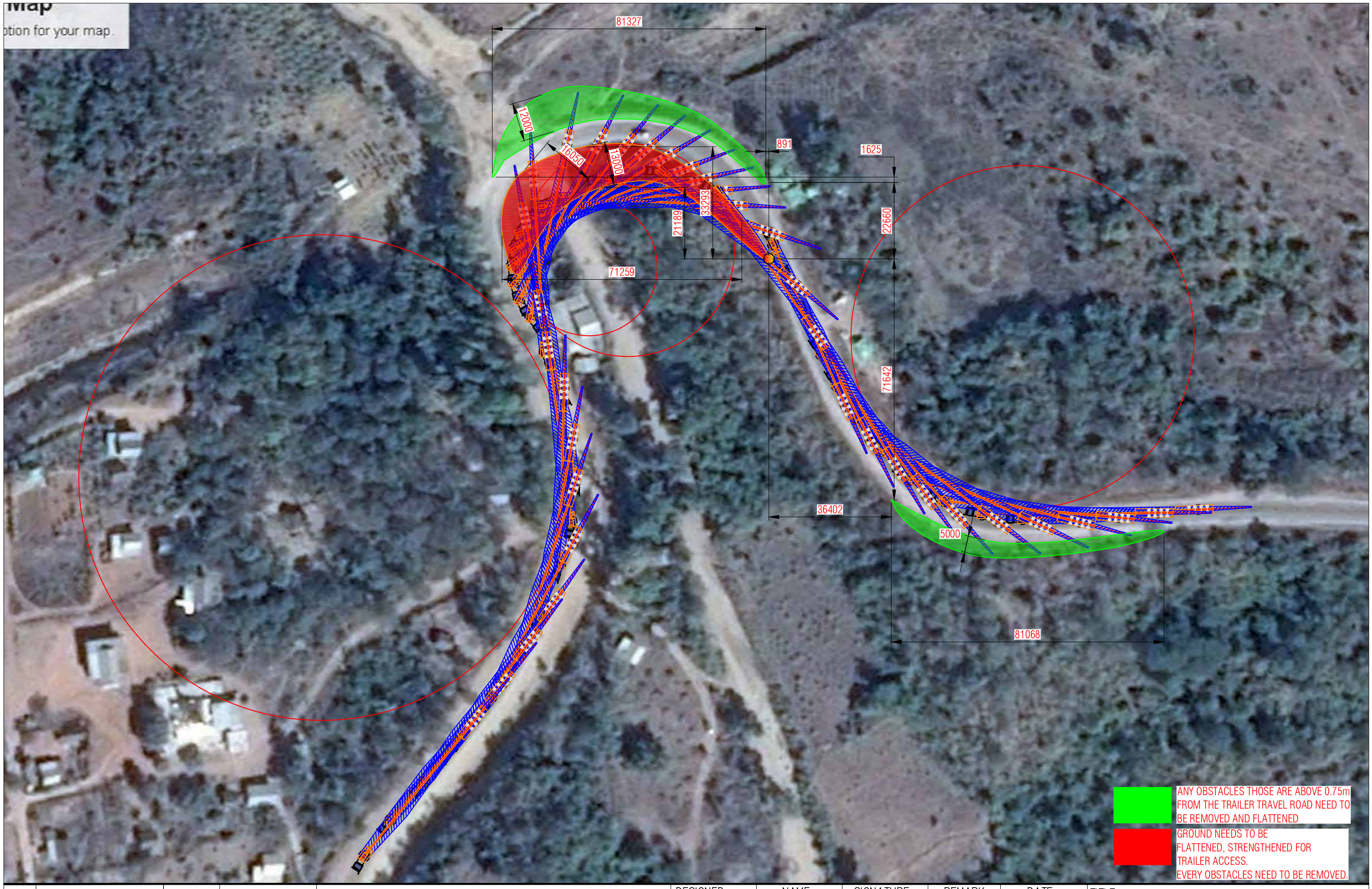
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A9 - TURNING STUDY DWG - KANDOK - TP-06

PROJECT: TBC

SCALE 1:600 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A10 - TURNING STUDY DWG - KANDOK - TP-07

PROJECT: TBC

SCALE 1:1000 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

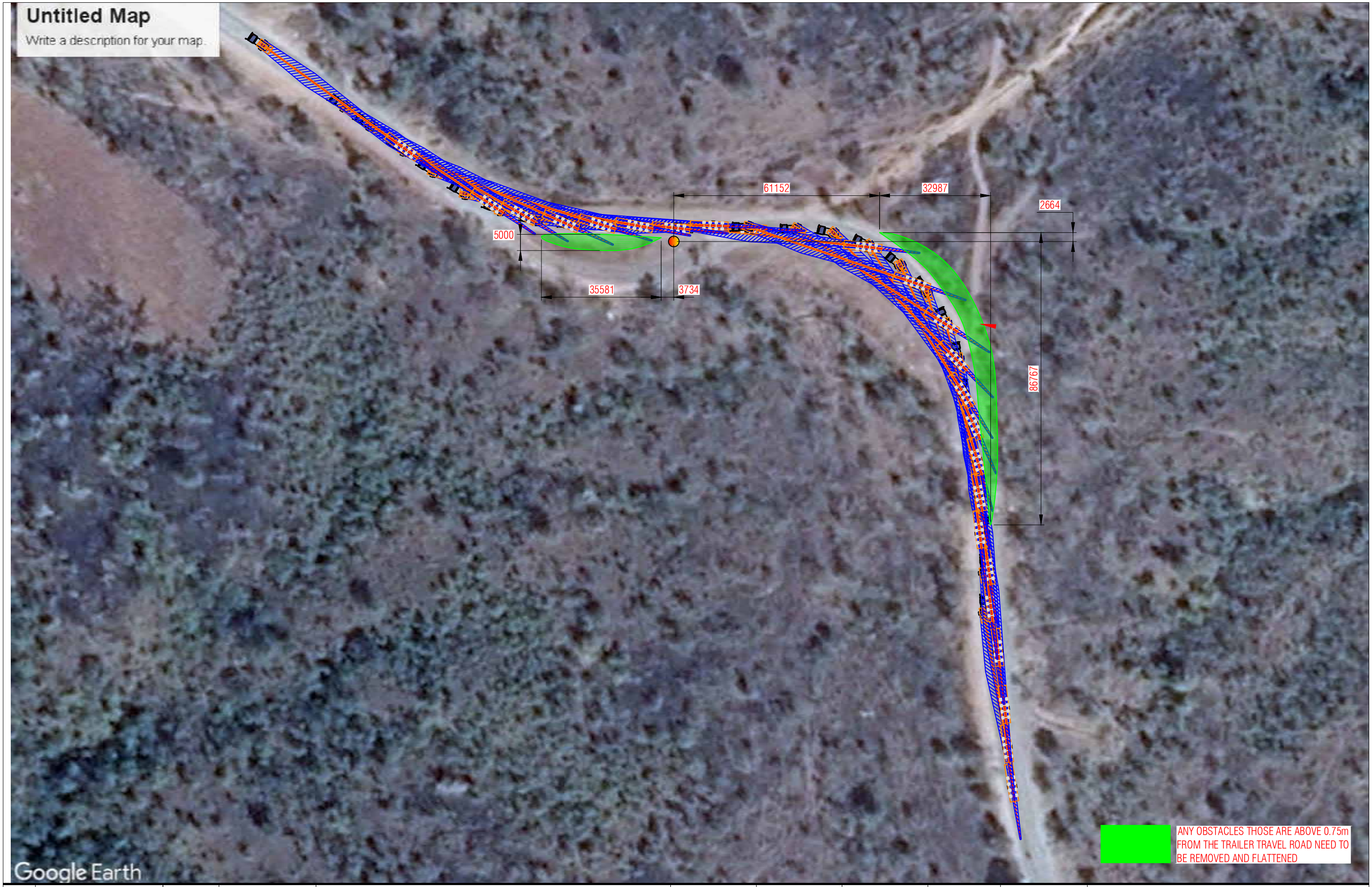
TITLE : A11 - TURNING STUDY DWG - KANDOK - TP-08

PROJECT: TBC

SCALE 1:500 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

Untitled Map

Write a description for your map.



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A12 -TURNING STUDY DWG - KANDOK - TP-09

PROJECT: TBC

SCALE 1:1000 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

e a description for your map.

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A13 - TURNING STUDY DWG - KANDOK - TP-10

PROJECT: TBC

SCALE 1:800 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	17-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

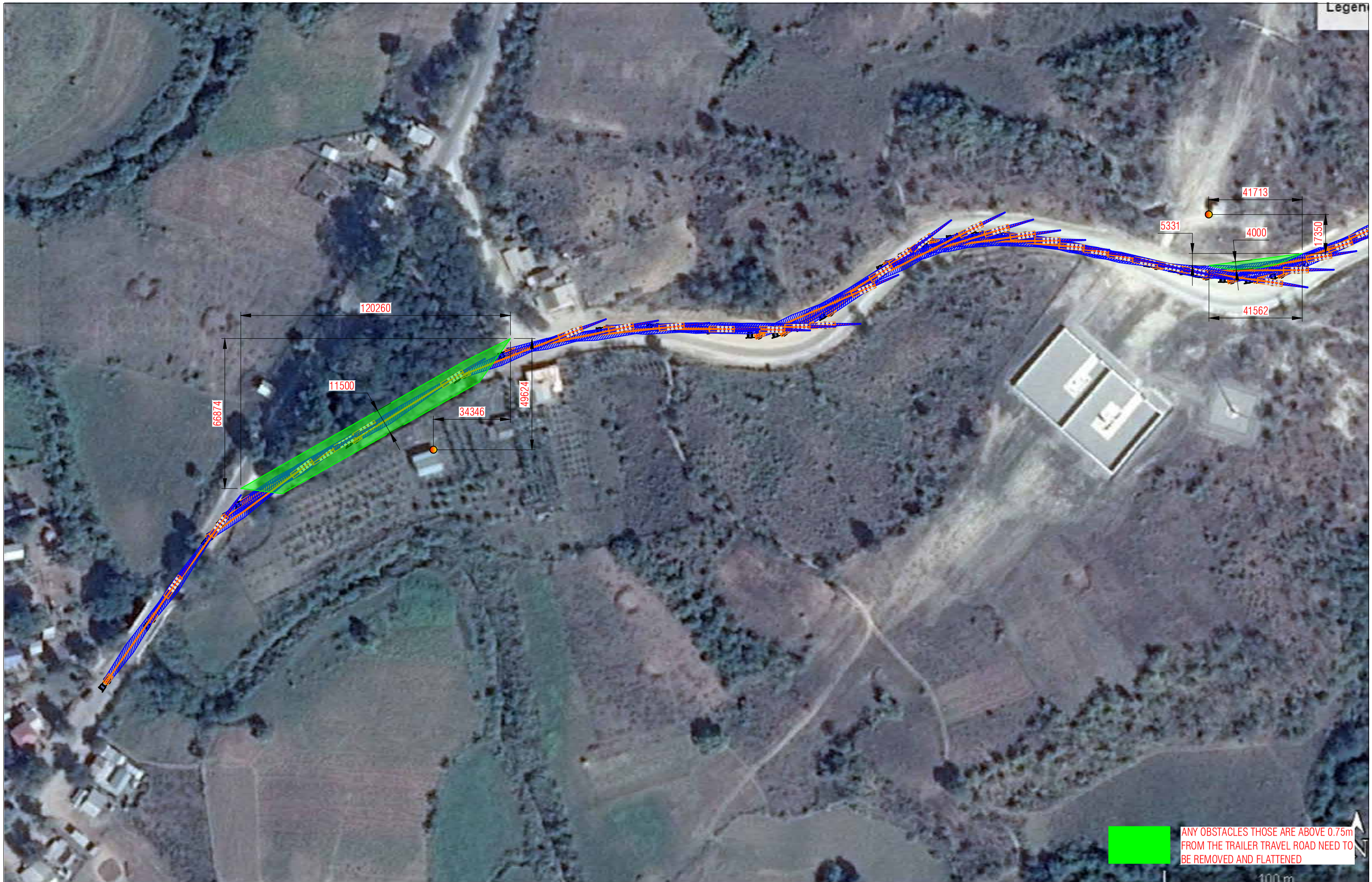
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			17-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A14 - TURNING STUDY DWG - KANDOK - TP-11

PROJECT: TBC

SCALE 1:800 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	18-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

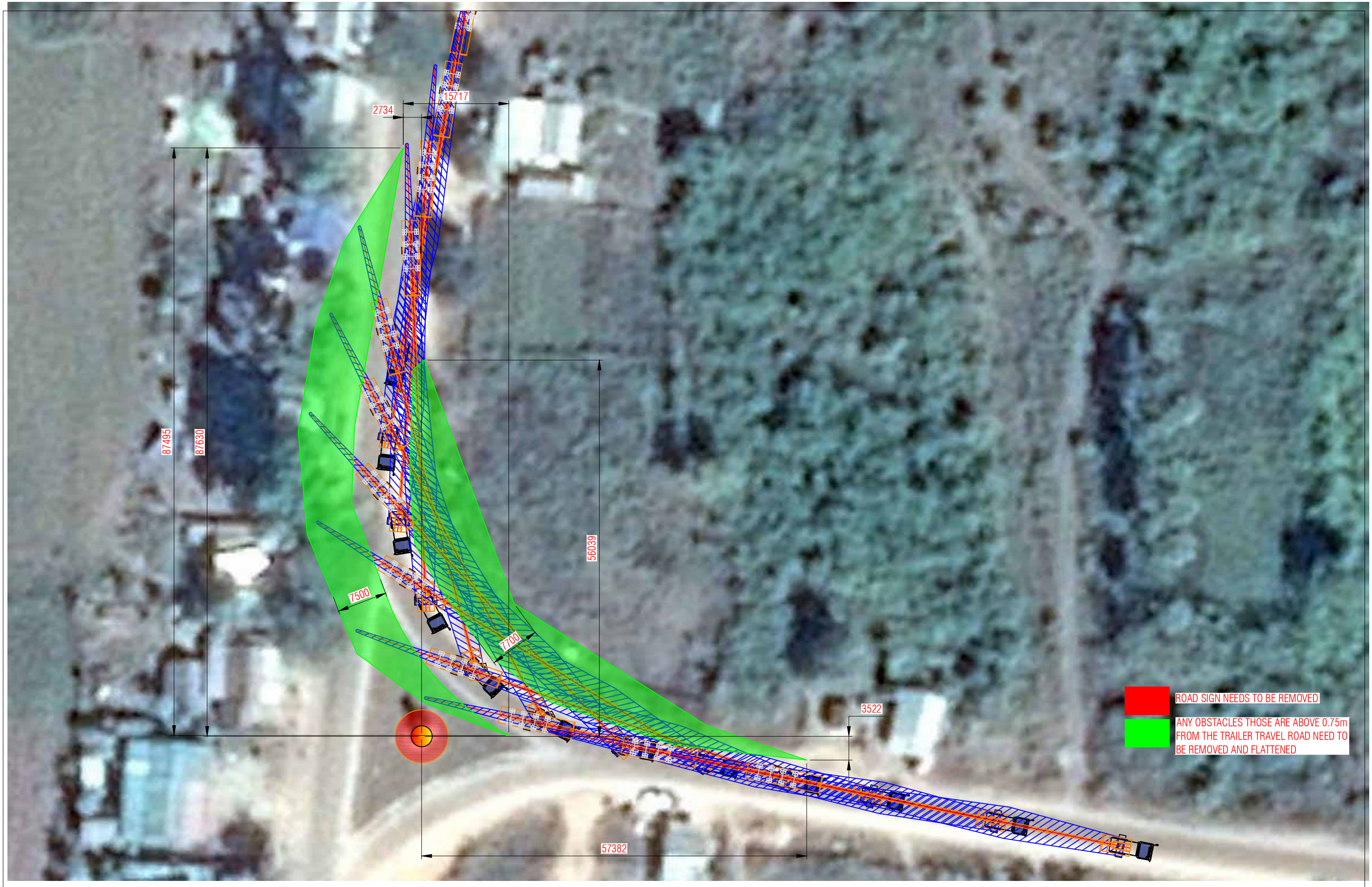
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			18-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A15 - TURNING STUDY DWG - KANDOK - TP-12

PROJECT: TBC

SCALE 1:1500 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	18-05-18	ISSUED FOR APPR.

CEA PROJECT LOGISTICS

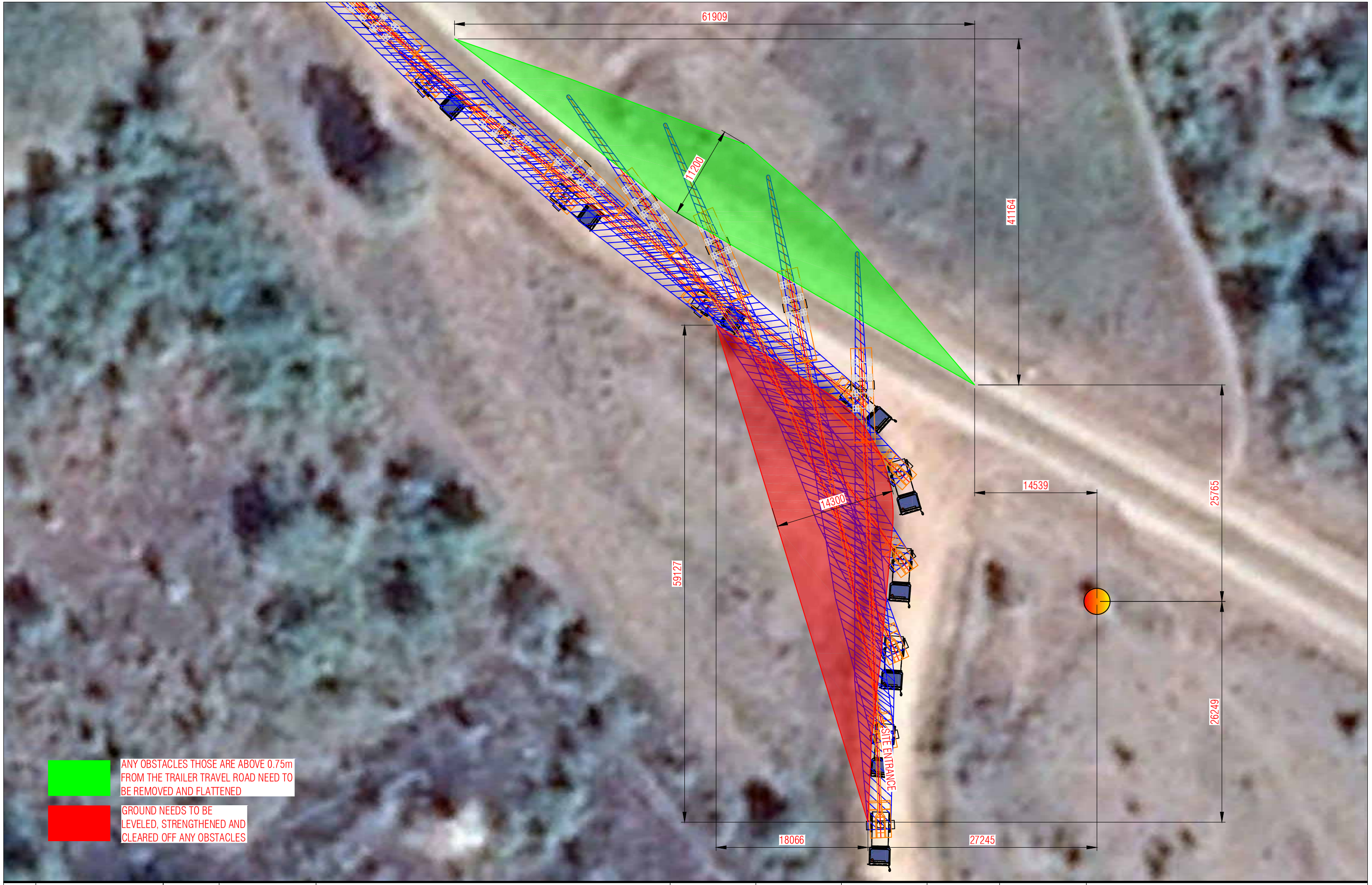
Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			18-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A16 - TURNING STUDY DWG - KANDOK - TP-13

PROJECT: TBC

SCALE 1:500 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00



REV.	Doc.No.	DATE	DESCRIPTION
00	DWG-CEA-XXX-XXX	18-05-18	ISSUED FOR APPR.

PROJECT LOGISTICS

Project Logistics
Block B, Ground Floor
Room No. G-18, Pearl Condo
Corner Of Kabaraye Pagoda Road
&Sarayrsan Road, Yangon, Myanmar
Tel. +959 421 031 286
Fax. +951 657 959

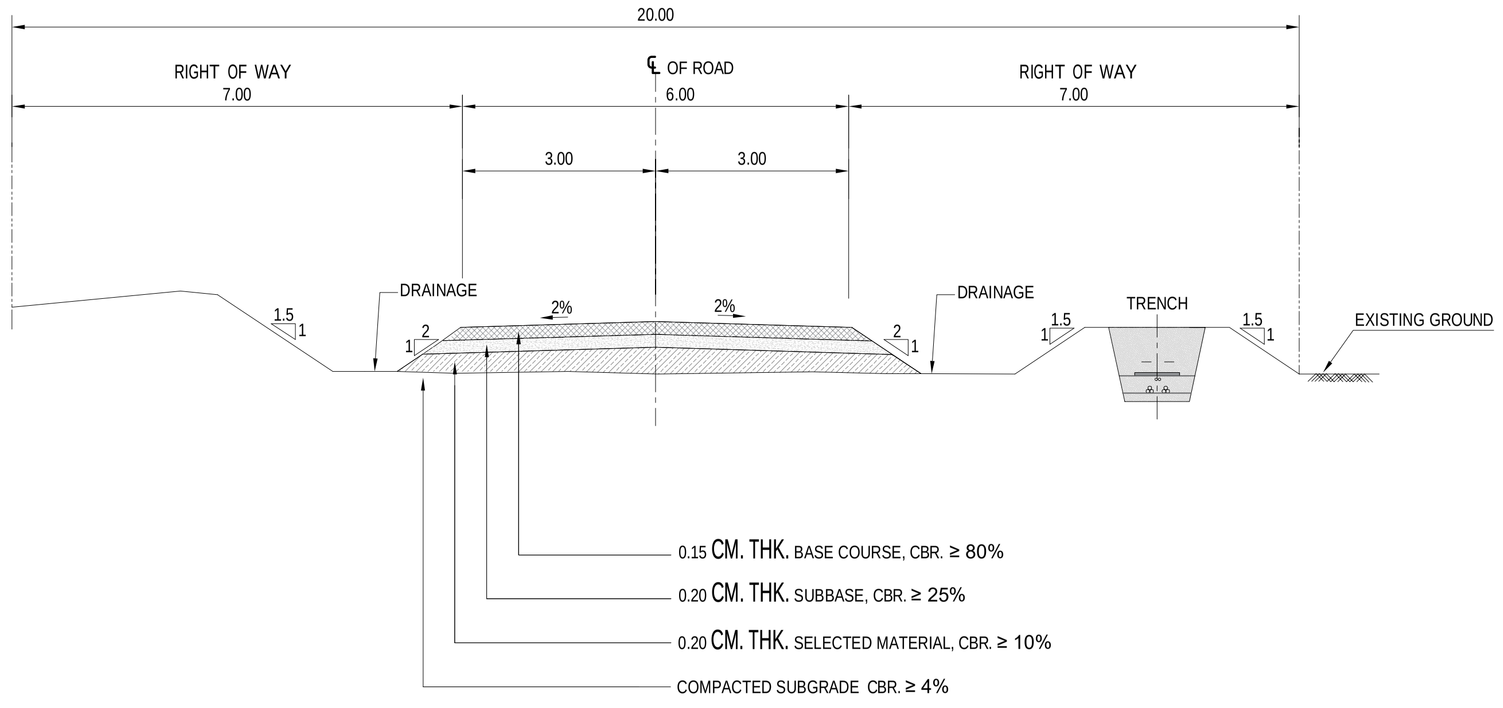
	NAME	SIGNATURE	REMARK	DATE
DESIGNED				
CUSTOMER	INFRA CAPITAL MYANMAR			
APPROVED	Mr. Kevin			
CREATE	Mr. Si Thu			18-05-2018
PROJECT No.				PAPER SIZE A3
CONTRACT No.				SHEET 1/1

TITLE : A17 - TURNING STUDY DWG - KANDOK - TP-14

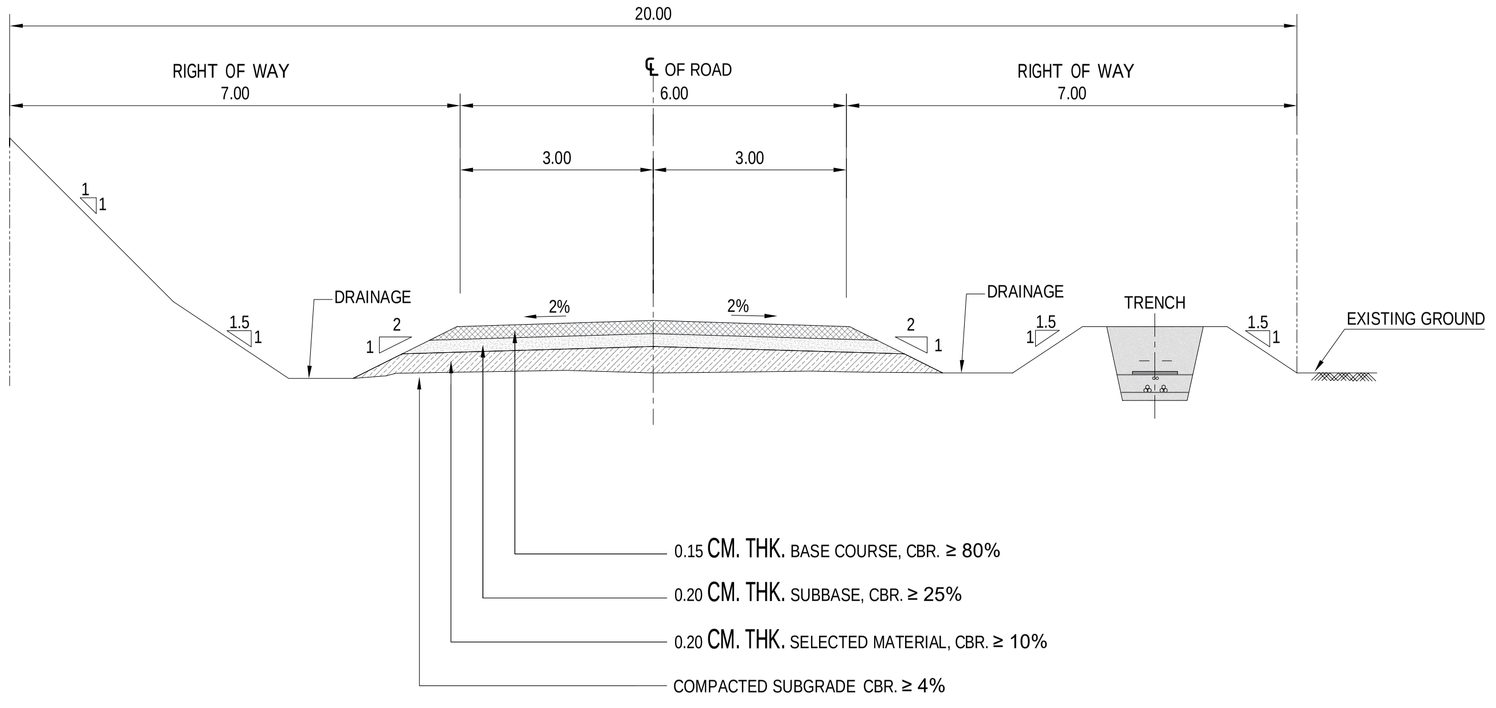
PROJECT: TBC

SCALE 1:400 | DRAWING No. DWG-CEA-XXXX-XXX | REV. 00

APPENDIX B KANDOK WINDFARM DRAWINGS



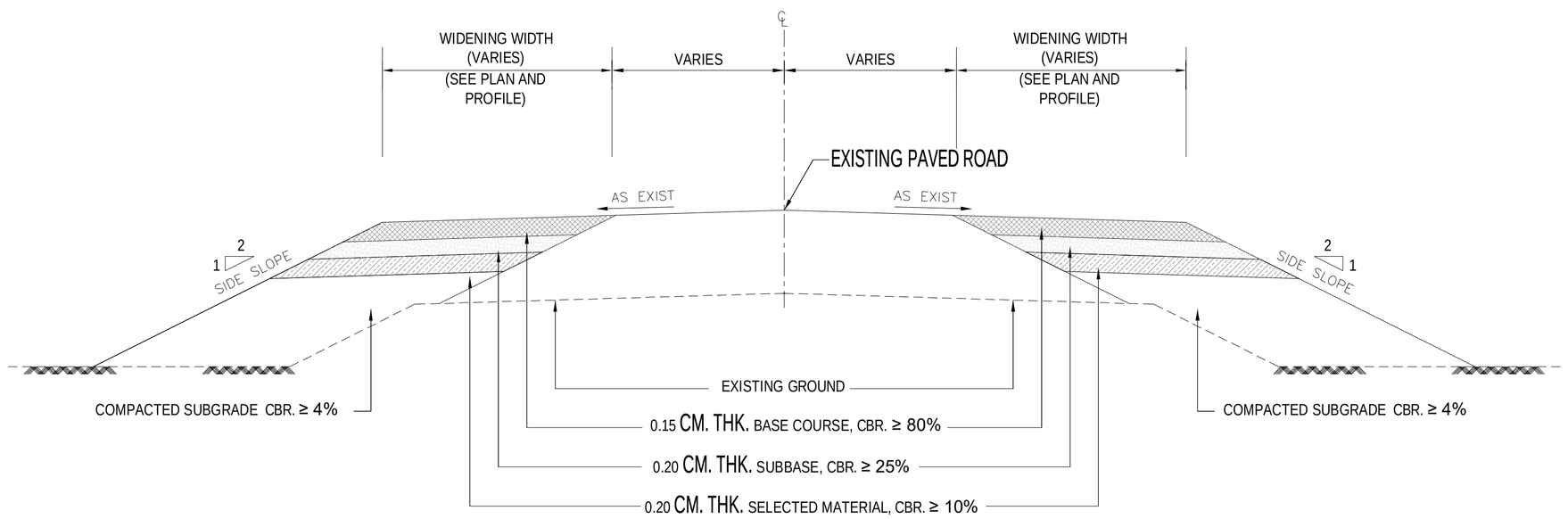
TYPICAL CROSS SECTION
1:150



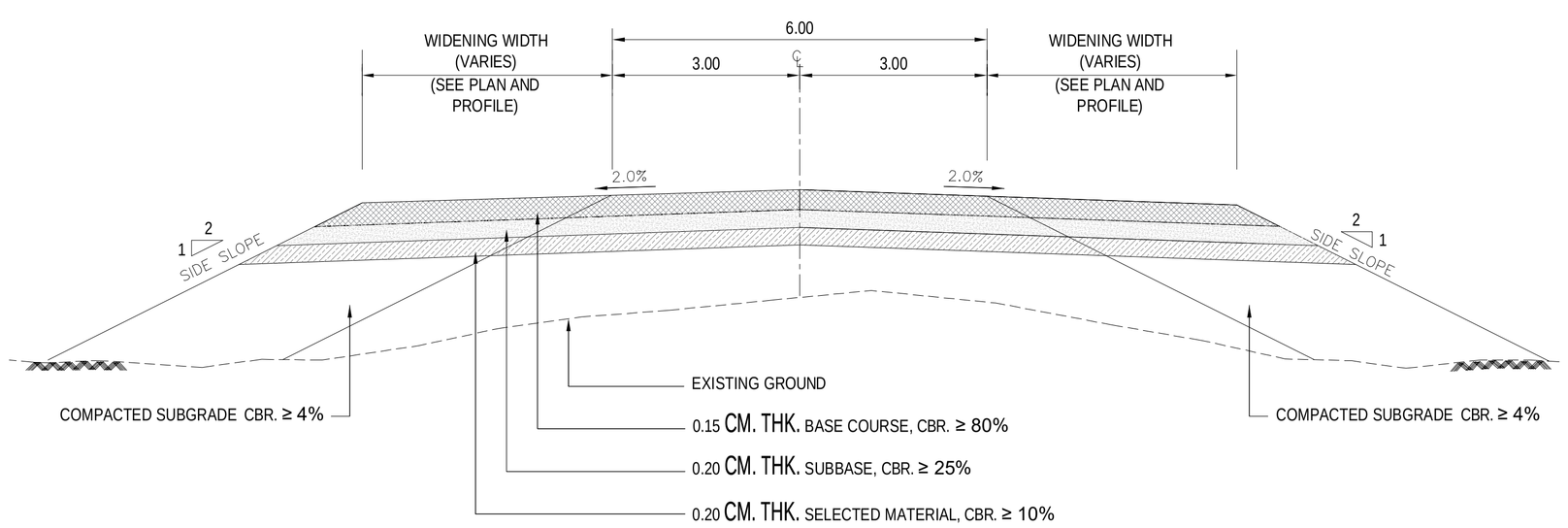
TYPICAL CROSS SECTION
1:150

NOTES :

1. ALL DIMENSIONS ARE IN METER, EXCEPT OTHERWISE SHOWN .
2. SOIL COMPACTION FOR SUBGRADE, SUBBASE, AND BASE COURSE SHALL BE ACHIEVED AT LEAST 95% OF THE MAXIMUM DENSITY.



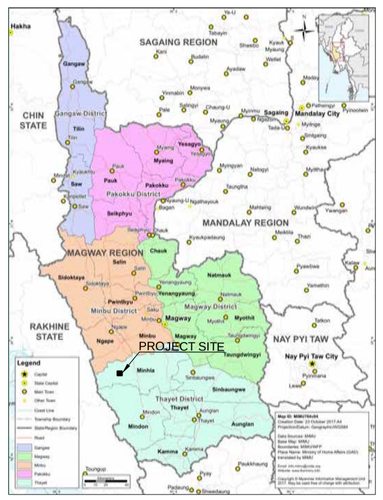
TYPICAL CROSS SECTION FOR WIDENING AT CURVE
1:150



TYPICAL CROSS SECTION FOR WIDENING AT CURVE
1:150

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y M D	Modifications	Status	Drawn	Checked	Approved	Validated
B	2019/02/21	ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES
A	2019/02/12	ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

KANDOK WIND POWER

Subject

B1 - TYPICAL SECTION FOR ROAD AND DRAINAGE

TRACTEBEL ENGIE

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

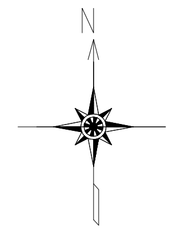
External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

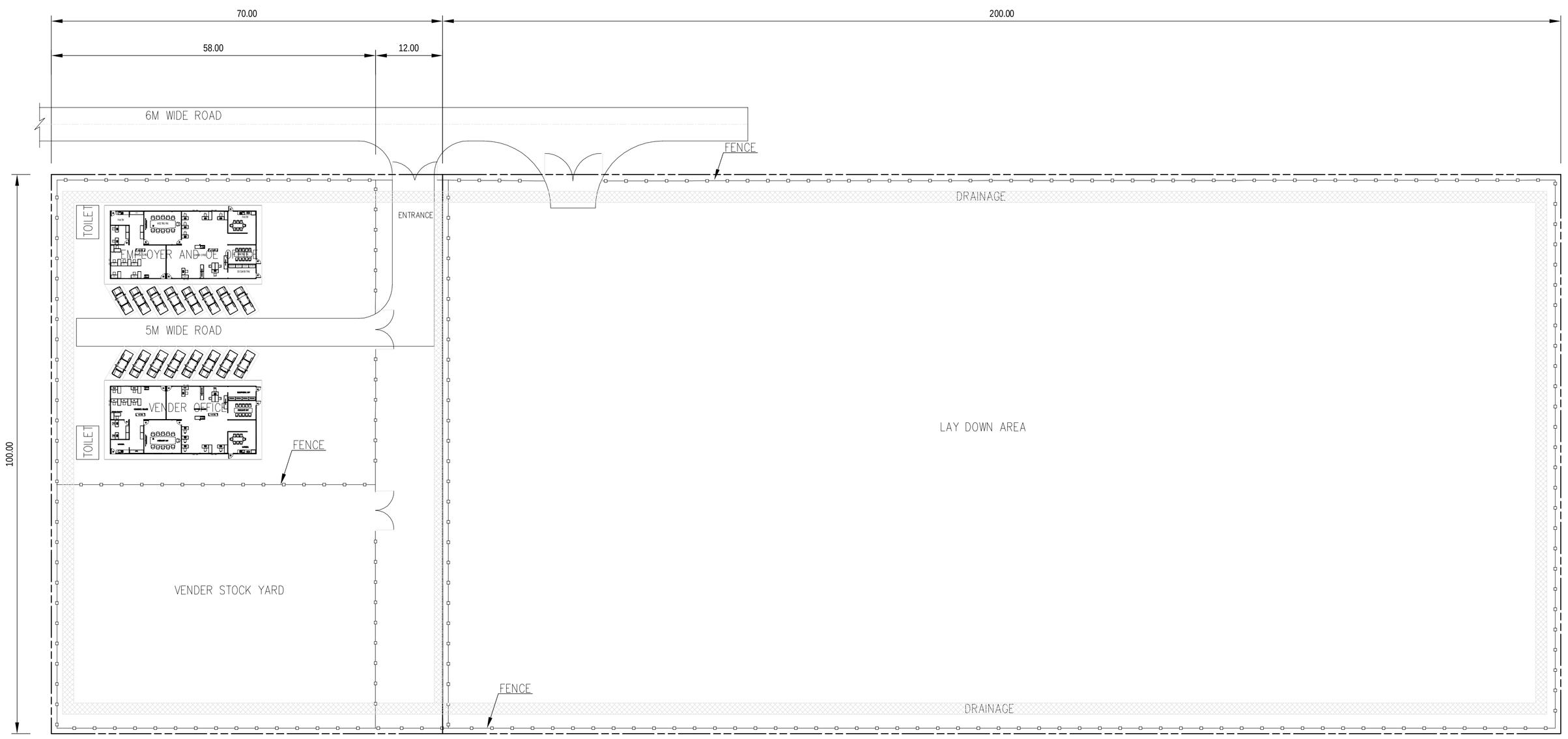
Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CD-501	N/T	-	A1

Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CD-501	1/1	B

DESIGN NORTH

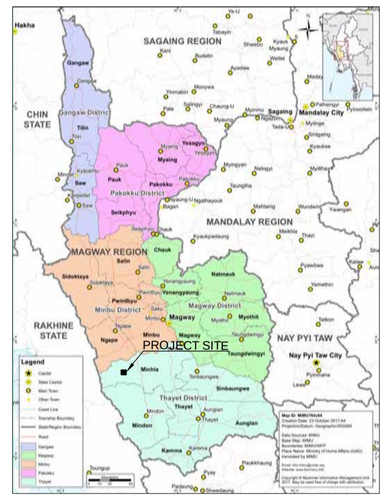




PLAN VIEW

NOTES :

1. ALL DIMENSIONS ARE IN METER, EXCEPT OTHERWISE SHOWN .



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019/02/12			ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Customer

ICM INFRA CAPITAL MYANMAR - ReEx

Project

KANDOK WIND POWER

Subject

B2 - SITE OFFICE AND LAYDOWN AREA

TRACTEBEL ENGIE

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Klasang Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

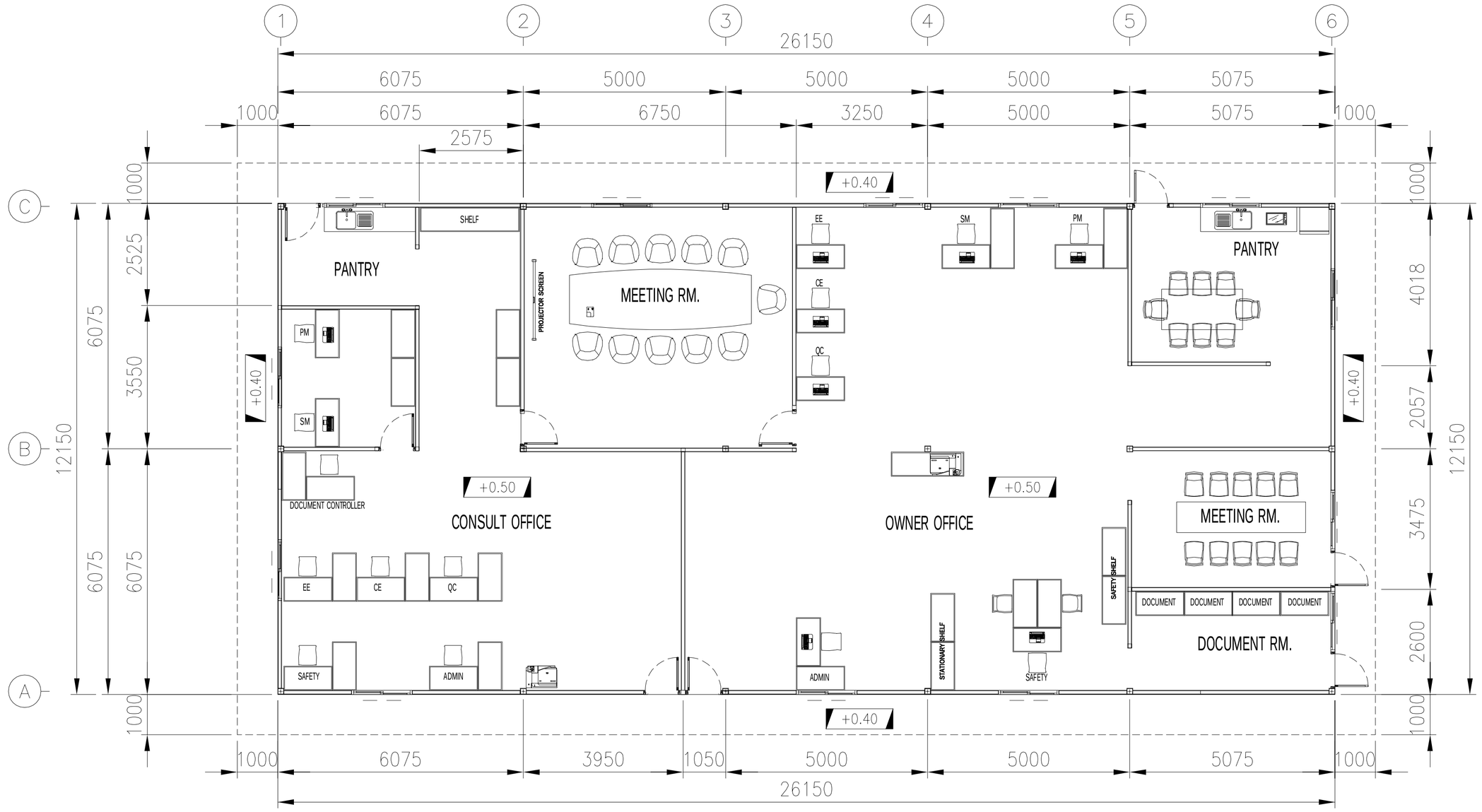
External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CD-201	N/T	-	A1

Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CD-201		

0 1 2 3 4 5 6 7 8 9 10



GROUND FLOOR

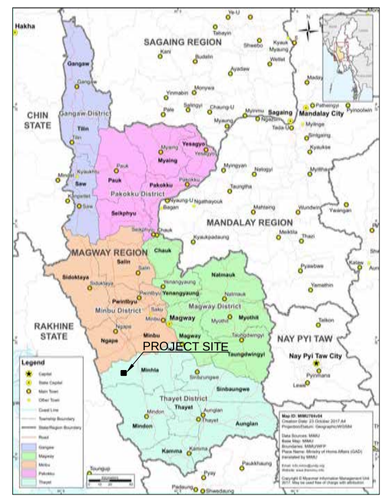
SCALE 1:75

DESIGN NORTH

N

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER, EXCEPT OTHERWISE SHOWN .



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019/02/12			ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Customer

ICM INFRA CAPITAL MYANMAR - ReEx

Project

KANDOK WIND POWER

Subject

B3 - SITE OFFICE BUILDING EQUIPMENT LAYOUT

TRACTEBEL ENGIE

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

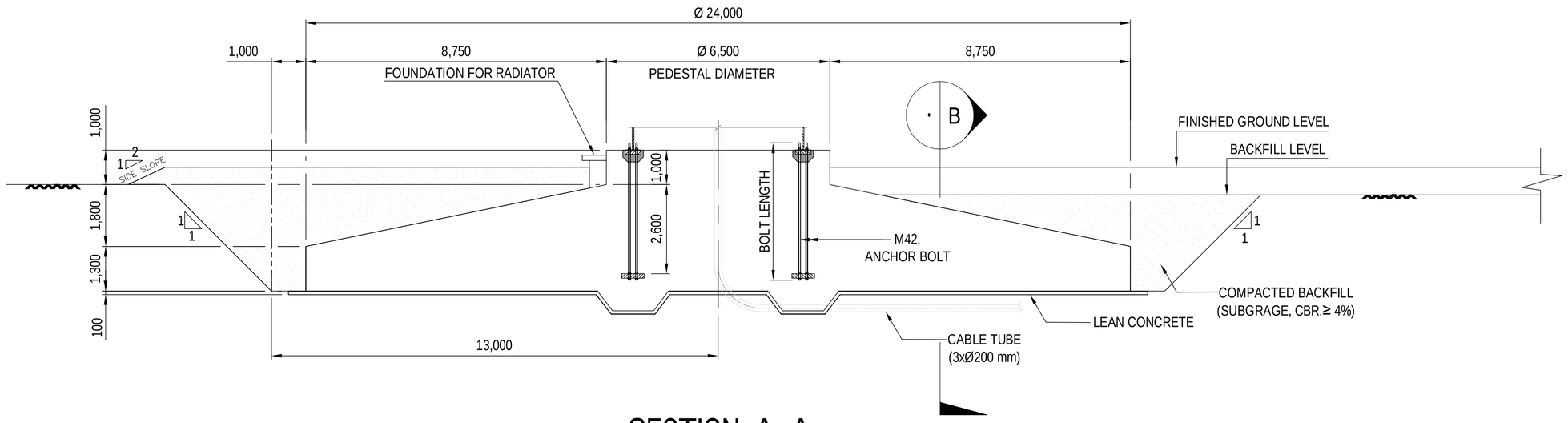
External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CD-500	N/T	-	A1

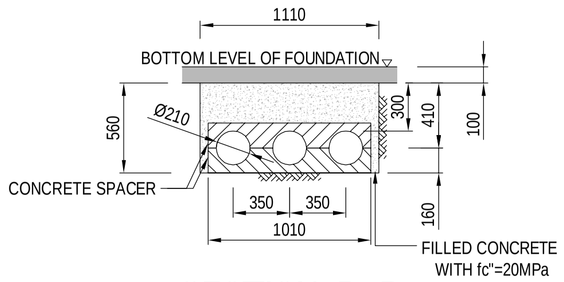
Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CD-500	1/1	

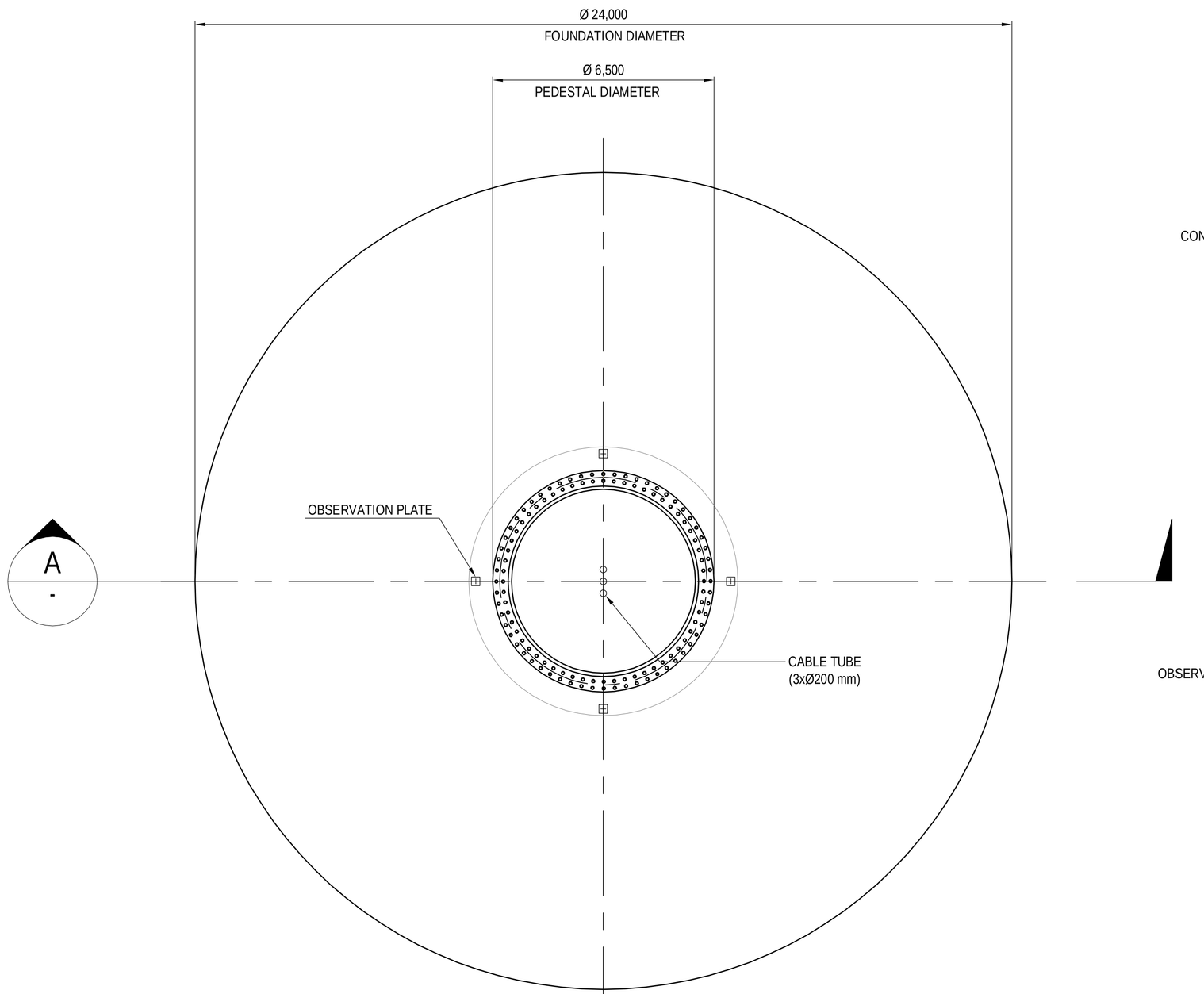
0 1 2 3 4 5 6 7 8 9 10



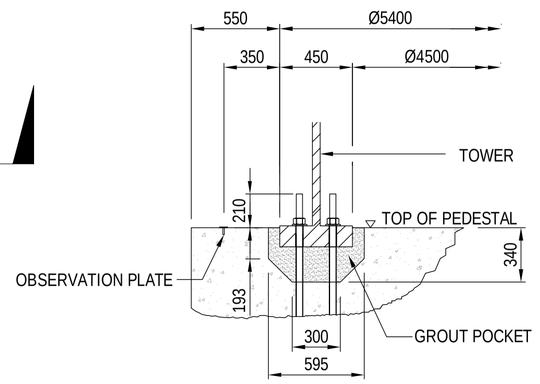
SECTION A-A
SCALE 1:100



SECTION B-B
SCALE 1:20
(CABLE TRENCH)



PLAN VIEW
SCALE 1:100



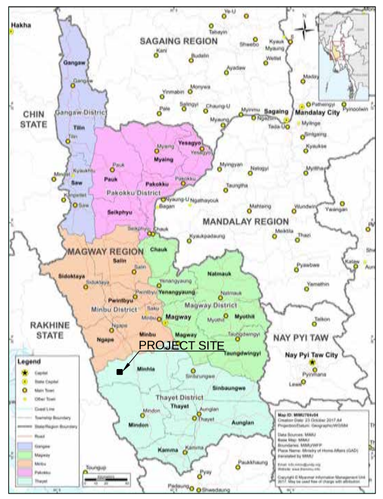
ENLARGED DETAIL
SCALE 1:20

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER, EXCEPT OTHERWISE SHOWN .

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019/02/12			ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

KANDOK WIND POWER

Subject

B4-
WTG FOUNDATION
PLAN AND SECTION

TRACTEBEL ENGIE

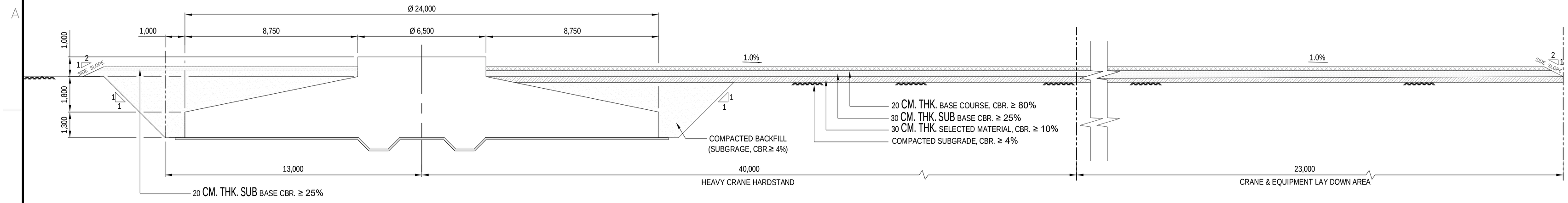
TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

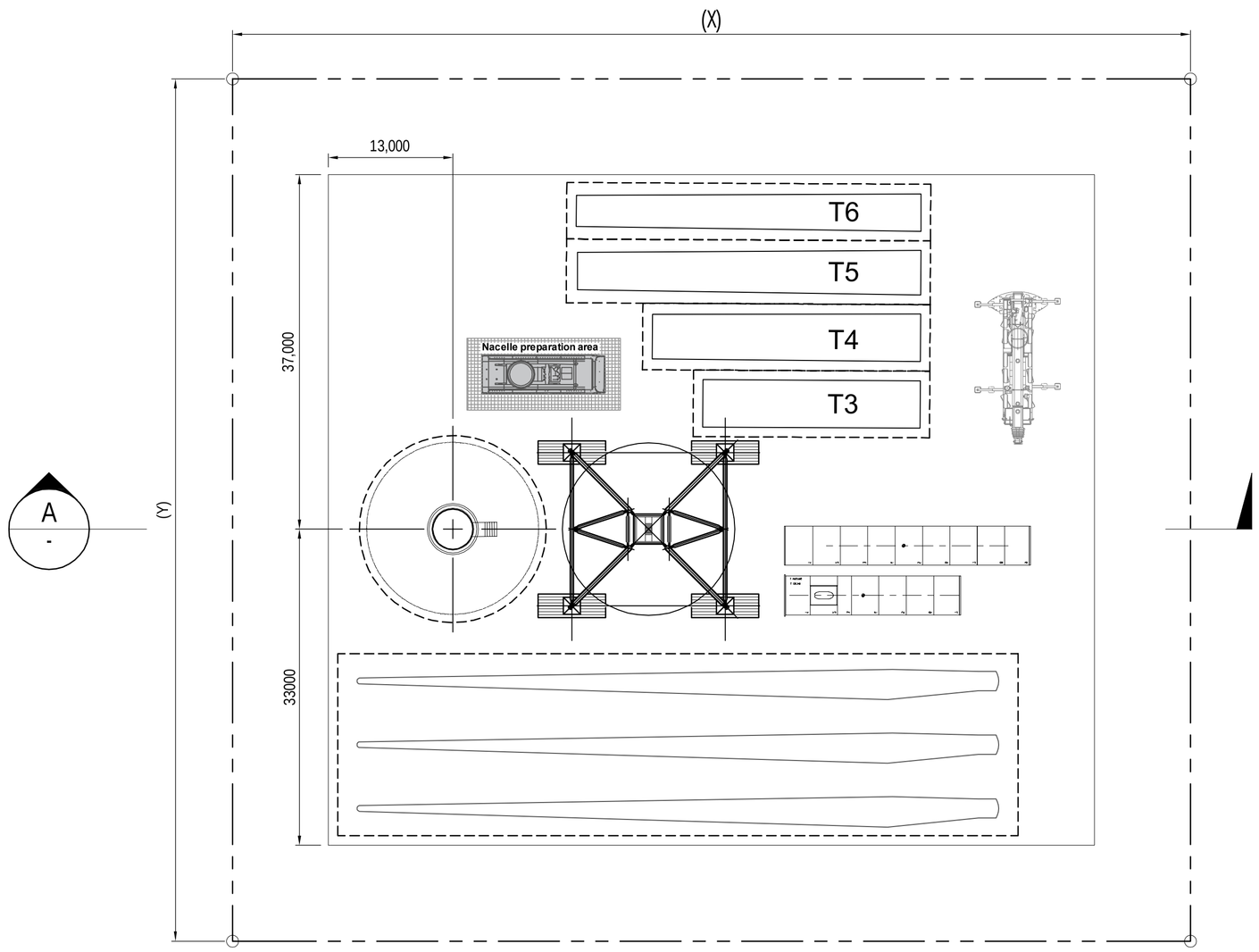
Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CVST-101	N/T	-	A1

Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CVST-101	1/1	A



SECTION A-A
SCALE 1:100



PLAN VIEW
SCALE NTS

	ITEM	(X)m.	(Y)m.	BLADE (m)
1	VESTUS	80	70	67
2	GE	76	70	66
3	ENVISION	83.50	70	70.50
4	GOLD WIND	83.50	70	70.20
5	SIEMENS GAMESA	85.50	70	72.50
6	LAND SECURED	100	90	

NOTES :

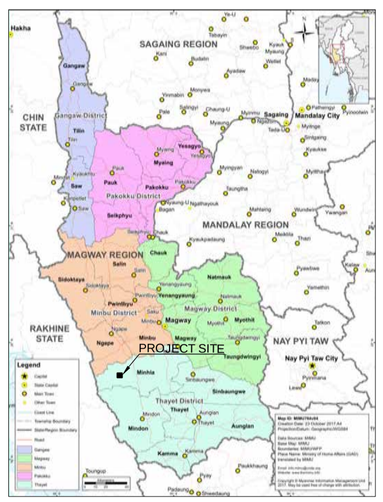
1. ALL DIMENSIONS ARE IN MILLIMETER, EXCEPT OTHERWISE SHOWN .

2.5 0 5 10m
SCALE 1:250

0 1 2 3 4 5 6 7 8 9 10

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y M D	Modifications	Status	Drawn	Checked	Approved	Validated
B	2019/02/27	ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES
A	2019/02/12	ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

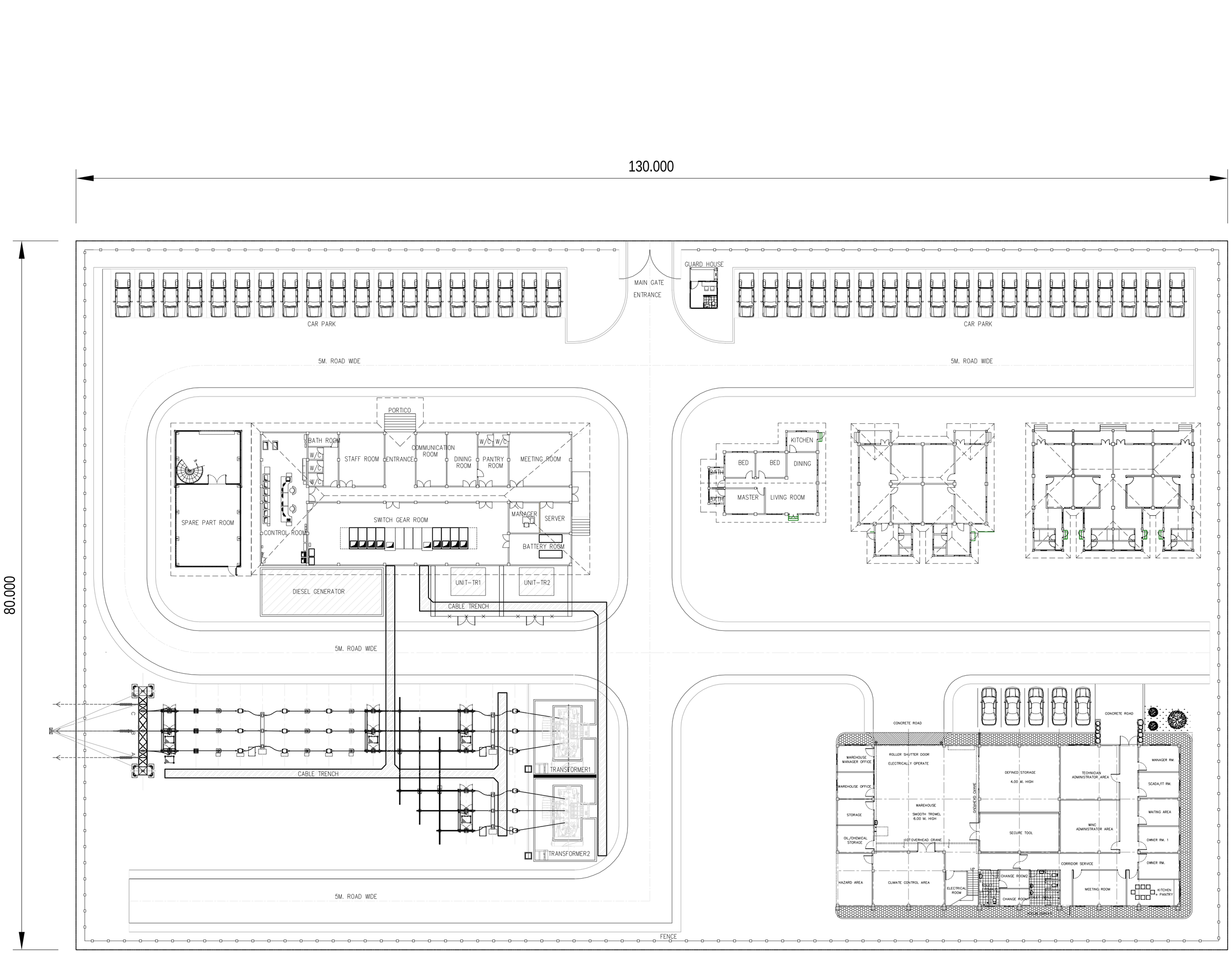
KANDOK WIND POWER

Subject

B5 - HARDSTAND AND CAN PAD PLAN

External Reference: RENEWABLE ENERGY
Confidentiality Level: CONCEPTUAL DESIGN
Replaces DWG Nr: ICM-CV-HT001
Scale: N/T
Nb Sheet: -
Size: A1
Imputation: H 000000 000
Technical Subdivision: RENEWABLE
Issuer: TE
Project Code: H.000000
Type: CD
Running Number: ICM-CV-HT001
Sheet: 1/1
Rev.: B

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND



PLAN VIEW

DESIGN NORTH

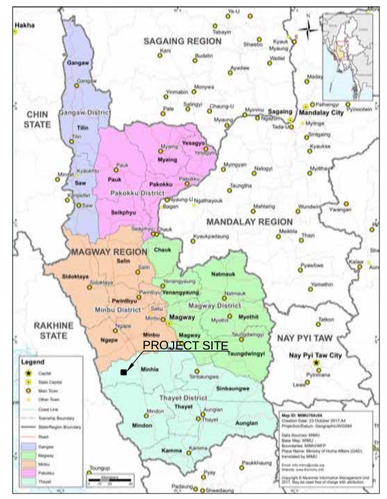
N

NOTES :

1. ALL DIMENSIONS ARE IN METER, EXCEPT OTHERWISE SHOWN .

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019	02	12	ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

KANDOK WIND POWER

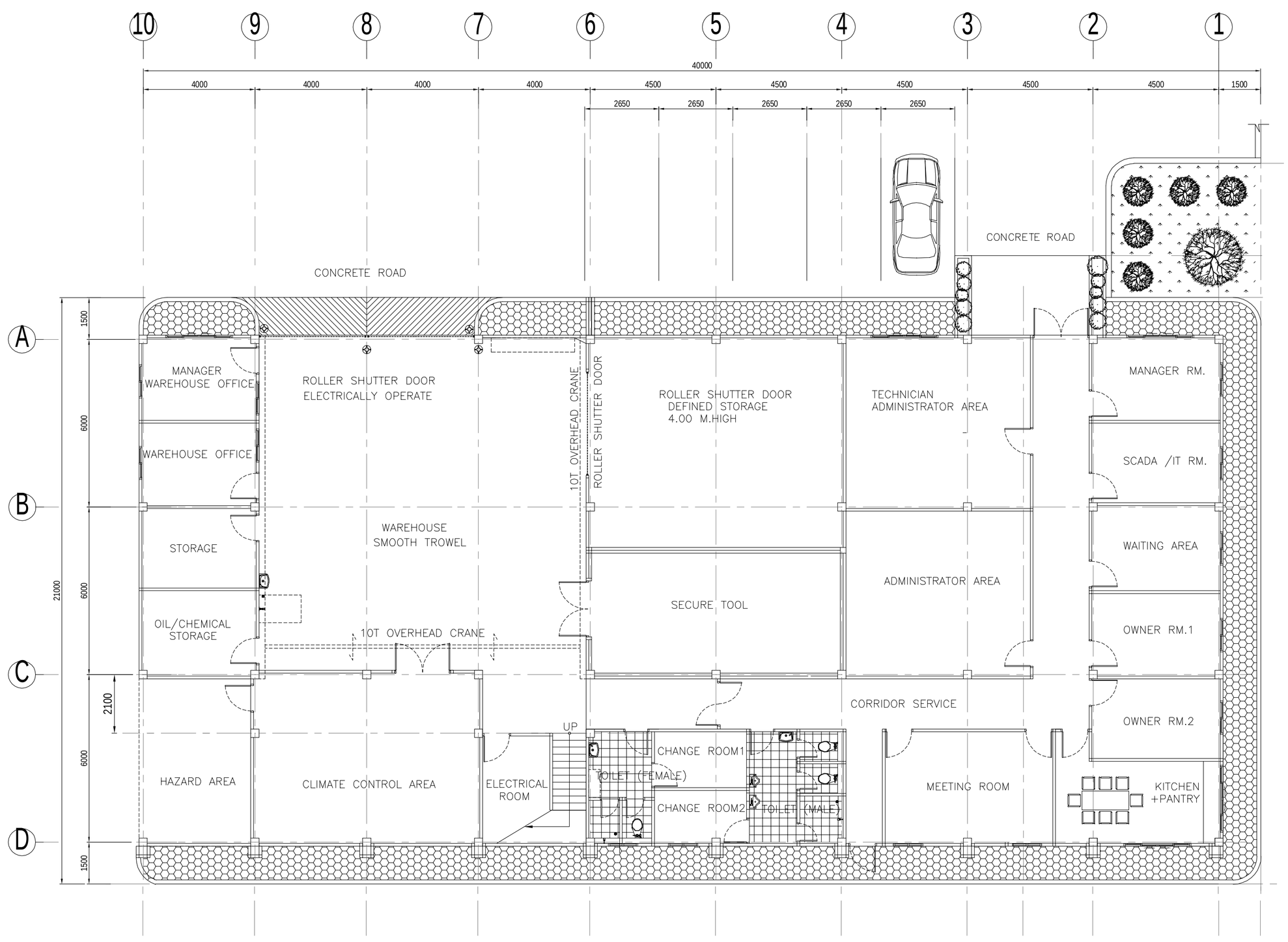
Subject

B6 - SUBSTATION LAYOUT

TRACTEBEL ENGIE

External Reference: RENEWABLE ENERGY
Confidentiality Level: CONCEPTUAL DESIGN
Replaces DWG Nr: ICM-CD-200
Scale: N/T
Nb Sheet: -
Size: A1
Imputation: H | 000000 | 000
Technical Subdivision: RENEWABLE
Issuer: TE
Project Code: H.000000
Type: CD
Running Number: ICM-CD-200
Sheet:
Rev.:

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND



GROUND FLOOR

SCALE 1:100

DESIGN NORTH

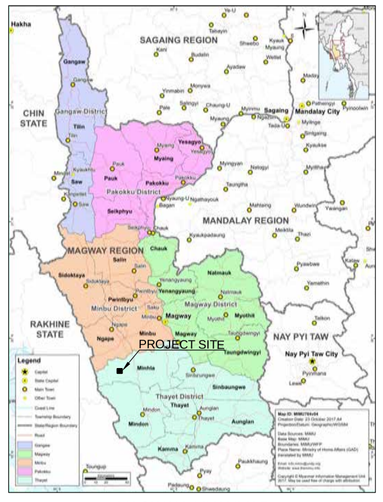
N

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER, EXCEPT OTHERWISE SHOWN .

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019/02/12			ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

KANDOK WIND POWER

Subject

B7 - O&M BUILDING EQUIPMENT LAYOUT

TRACTEBEL ENGIE

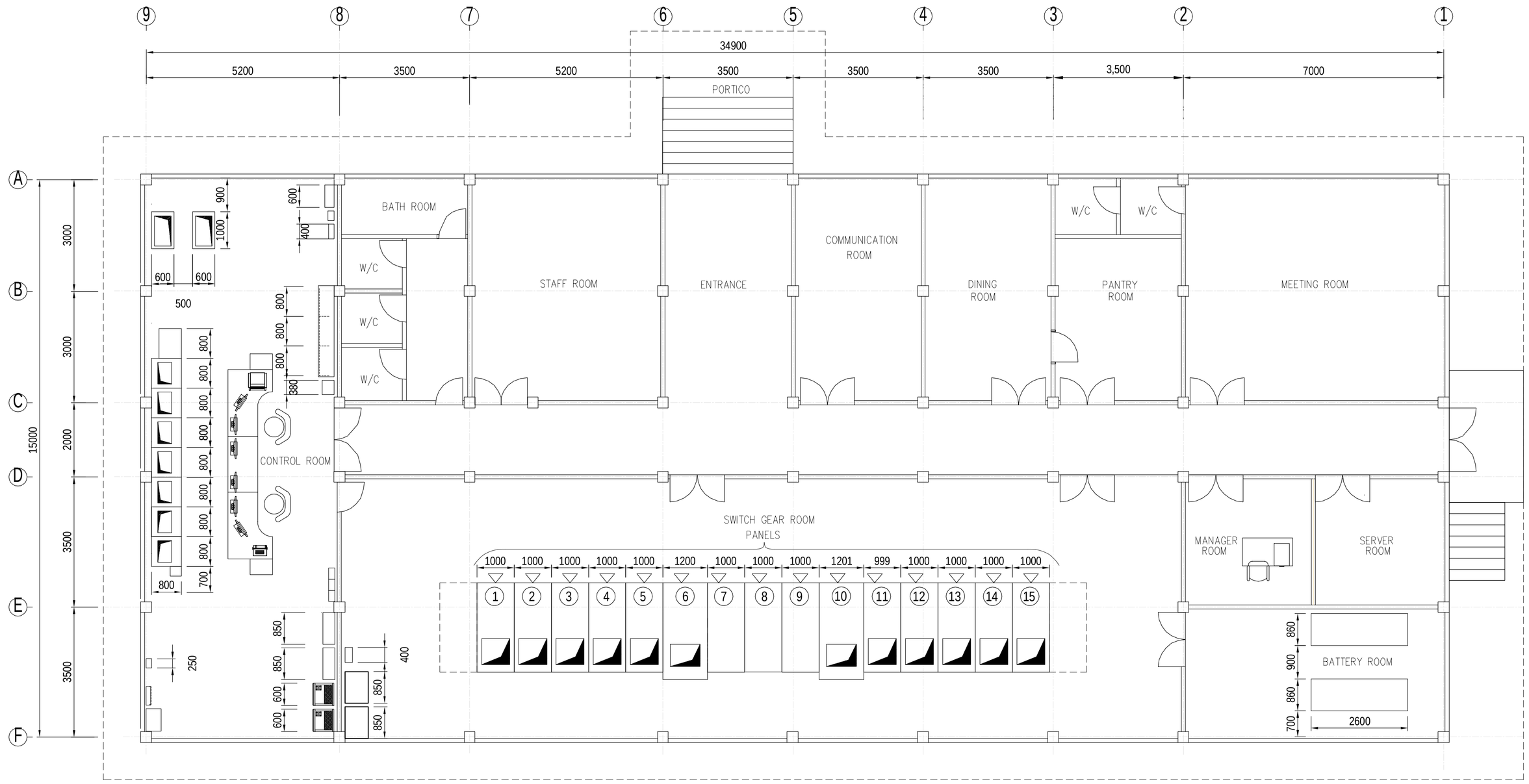
TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CD-400	N/T	-	A1

Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CD-400	1/1	A



FIRST FLOOR

SCALE 1:75

DESIGN NORTH

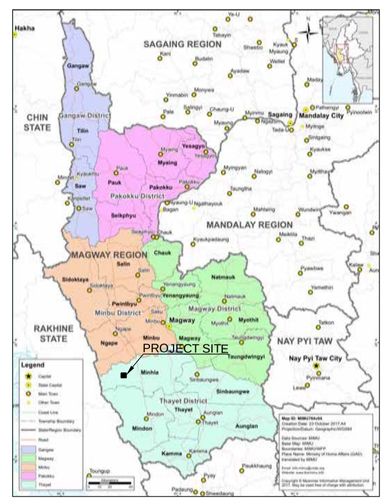
N

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETER, EXCEPT OTHERWISE SHOWN .

Customer

ICM INFRA CAPITAL MYANMAR - ReEx



MAGWAY, MYANMAR
KEY PLAN

Rev.	Y	M	D	Modifications	Status	Drawn	Checked	Approved	Validated
A	2019/02/12			ISSUED FOR INFORMATION		KITIPAT	SANUPONG	RATHAKORN	SARES

Project

KANDOK WIND POWER

Subject

B8 - CONTROL BUILDING EQUIPMENT LAYOUT

TRACTEBEL ENGIE

TRACTEBEL ENGINEERING LTD.
HEADOFFICE
Unit 1903-05, 19th Fl., Two Pacific Place
142 Sukhumvit Road, Kwaeng Klongtoey Khet Klongtoey
Bangkok 10110 - THAILAND

External Reference	Confidentiality Level
RENEWABLE ENERGY	CONCEPTUAL DESIGN

Replaces DWG Nr	Scale	Nb Sheet	Size
ICM-CD-301	N/T	-	A1

Imputation		Technical Subdivision	Issuer
H 000000	000	RENEWABLE	TE

Project Code	Type	Running Number	Sheet	Rev.
H.000000	CD	ICM-CD-301	1/1	A

0 1 2 3 4 5 6 7 8 9 10

APPENDIX C MEETING MINUTES

Meeting of Minutes: Stakeholder Consultation of Wind Power Project (Kandok & Zin Taung)

Detail			
Project	Kandok & Zin Taung: Wind Power Project		
Venue	Chief Minister Meeting Hall	**Region/State**	Magway Region
District	Magway	**Township**	Magway
Objective	Stakeholder Consultation Meeting		
Date	10/07/2018		
Time	10:00 AM – 11:00 AM		

- U Tin Min Lat (Lead Project Developer, Infra Capital Myanmar - ReEx) introduced Infra Capital Myanmar – ReEx and explained the brief information of Wind Power Project in Kandok and Zin Taung sites.
- Daw Khin Su Su Naing (Senior Consultant, Environmental Resources Management [ERM]) gave an overview of the IEE & EIA process as per the Myanmar EIA Procedure.

Comment from Chief Minister, Dr. Aung Moe Nyo

- We have invited all Magway Region Cabinets for this meeting except Minister of Education, Minister of Health and Minister of Social Welfare, Relief and Resettlement as they are in Nay Pyi Taw for the government meeting.
- U Win Ko Ko, Assistant Director from Magway Region Environmental Conservation Department, is here today. At first, I think your teams are visiting his department. As he is here now, you talk to him for your needs and explain him some necessary information.
- I am sorry to hear the recent accident that Tower construction worker killed and one is injured and admitted to hospital.
- I am much appreciated that the company, Infra Capital Myanmar- ReEx, had provided aids to those family in Irrawaddy Region who was killed and admitted to the hospital in the accident. Thank for that.

Comment from Chief Minister, Dr. Aung Moe Nyo

- Out of three option for transmission line, will one line be chosen?

Response from U Tin Min Lat, ICMRE Myanmar

- Yes, we will chose one option. We are waiting on the result of ESIA study and will also need to consult with Ministry of Electricity and Energy. The most likely transmission line is option 1 of Mann Substation.

Comment from Chief Minister, Dr. Aung Moe Nyo

- In term of the production amount of MW and feeding the electricity to National Grid, your company must be permitted by the Union Minister from Union Government. Is it going well?

Response from U Tin Min Lat, ICMRE Myanmar

- We are currently preparing to submit the feasibility study report. When we met the Union Government a while ago, we discussed 230 kV feeding to National Grid. We also need to consult with Union Government. We actually want to consult with Union Government after we receive an approval from Regional Government.

Comment from Chief Minister, Dr. Aung Moe Nyo

- According to your feasibility study, is the production of electricity possible?

Response from U Tin Min Lat, ICMRE Myanmar

- Yes, technically the wind speed is very good. The wind speed around existing met mast and current construction area are good as well. While the accident happened, the wind speed is 14.89 meters per second (54 km per hour) which was considered under the level one category of Cyclone. Therefore, the accident was happened.

Comment from Chief Minister, Dr. Aung Moe Nyo

- At this site in western part of Irrawaddy River, the wind speed is good. How is the wind speed in the site near Gway Cho and Gyo Pin in Chauk Township? No information yet?

Response from U Tin Min Lat, ICMRE Myanmar

- Yes, no information yet. The construction of met mast tower is completed. Our technicians are going to install the sensor in this week. Thus, we will receive the data info in the latest at the end of this month.

Comment from Chief Minister, Dr. Aung Moe Nyo

- For us, there is nothing to go against the project. 100 Acre of land can be granted at the Regional level, but 1,000 acre of land must be granted by Union Government under rule & regulation and Department of Forestry approval in Myanmar.

Response from U Tin Min Lat, ICMRE Myanmar

- 2,899 Acres and 1,447 Acres means we generally included this whole area. When the wind turbines are constructed, the minimum final project area of land will be reduced to one quarter of the maximum project area.

Comment from Chief Minister, Dr. Aung Moe Nyo

- Ok, good. We will cooperate with you as much as we can. I think there is no such a project in Myanmar.

Response from U Tin Min Lat, ICMRE Myanmar

- We will also work hard to produce the electricity in 2020. Yes, there is no wind power project in Myanmar. In the past, some company conducted the feasibility study in some state & division of Myanmar. No company didn't reach the step we are here today.

Comment from Chief Minister, Dr. Aung Moe Nyo, Magway Regional Government

- Will the executive summary of feasibility study be submitted to the government?

Response from U Tin Min Lat, ICMRE Myanmar

- Yes, we will submit the feasibility study report to Union Government.

Comment from Chief Minister, Dr. Aung Moe Nyo

- Not only bat survey, Siberia birds and migratory birds come to Myanmar. When the wind turbines exist, aren't they coming again? The study should be conducted. I want to know about it.
- Noise pollution is part of environment pollution. If the wind turbine rotate, how noisy?

Response from Daw Khin Su Su Naing, ERM Myanmar

- A noise is one of emission from the project. Also, there will be the present of biological species including the migratory birds along the transmission route. They are the main part in Environment Impact Assessment (EIA) before the project start. Noise is very closely related to the public health, and we need to access the noise level before the project. After the project start, we also need to access the noise level from wind turbine. We need to mitigate the noise level and prepare a mitigation plan. Besides, we need to access all sensitive receptor near the Project Site and how all receptor will be impacted.

Comment from Chief Minister, Dr. Aung Moe Nyo

- Magway Regional Government will also need to submit our consent about this project to Union Government. Please provide us the necessary information.

Response from U Tin Min Lat, ICMRE Myanmar

- Sure, we will provide. But currently the information isn't available yet. After the feasibility study is completed, we will provide.

Comment from Chief Minister, Dr. Aung Moe Nyo

- Obviously, we should do this project for electricity. The local people think that nature is beautiful without wind turbines.

Comment from U Win Ko Ko, Magway ECD

- ERM presentation is good. I am sure ERM Myanmar is very experienced in conducting IEE/EIA. Could you let me know is PPR submitted? When?
- Due to lack of human resource in ECD headquarter, ECD is also in uneasy condition. It is good PPR is submitted. I hope ERM Myanmar will prepare the complete EIA report for this wind power project. Also, please deliver a copy of EIA report to Magway ECD as well as Magway Regional Government.
- When ERM conduct a public consultation, please do them properly and explain the local people. It is very important.

Response from Daw Khin Su Su Naing, ERM Myanmar

- Yes, we have submitted. Normally, we should receive PPR within 15 working days. It has been two months now.
- Yes, after the scoping report is completed, we will surely distribute the executive summary of report with Myanmar translation to Magway ECD and Magway Regional Government.
- So ERM Myanmar have been conducted EIA/IEE over one hundred report, especially in oil & gas sector.
- We will meet Mindon GAD and Minhla GAD tomorrow. We will make sure to include all people including COSs etc. We will also explain in more clear way.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	Dr. Aung Moe Nyo	Chief Minister	Magway Regional Government
2.	Colonel Min Oo	Minister of Border Affairs	Magway Regional Government
3.	U Myint Zaw	Minister of natural resources and environment, Electricity and Energy	Magway Regional Government
4.	U Zaw Min	Minister of Finance and Planning	Magway Regional Government
5.	U Tin Nwe Oo	Minister of Transport, Communications and construction	Magway Regional Government
6.	U Win Maw Htay	Minister of Agriculture, Livestock and Irrigation	Magway Regional Government
7.	U Myint Swe	Minister of Labor, Immigration and Population	Magway Regional Government
8.	U San Linn	Attorney-General	Magway Regional Government
9.	U Hla Than	Auditor General	Magway Regional Government
10.	U Wai Zin Tun	Secretary	Magway Regional Government
11.	U Htin Aung	Director, City Development Committee	Magway Regional Government
12.	U Win Ko Ko	Assistant Director, Environmental Conservation Department	Magway Regional Government
13.	U Kyaw Zin	Deputy Director of Regional government	Magway Regional Government
14.	U Aung Soe Oo	Assistant Director of regional Government	Magway Regional Government
15.	U Win Myat Kyaw	Staff Officer	Magway Regional Government
16.	Ko Htwe	PSO of Minister of Finance and Planning	Magway Regional Government
17.	Ma Zin Nwe Win	Deputy Staff Officer	Magway Regional Government
18.	Ma Nyein Ei Khaing	Junior Clerk	Magway Regional Government

Photo

Presentation from Daw Khin Su Su Naing, ERM Myanmar

Presentation of Project information from ICMRE

Magway ECD

ERM Myanmar presentation

Meeting of Minutes: Stakeholder Consultation for Wind Power Project (Kandok)

Detail			
Project	Kandok Wind Power project		
Venue	Minhla Government Administration Department	**Region/State**	Magway
District	Thayet	**Township**	Minhla
Objective	Stakeholder Consultation Meeting		
Date	13/7/2018		
Time	9:00 AM – 12:00 PM		

- U Tin Min Lat, Lead Project Developer, Infra Capital Myanmar (ICM), introduced ICM –and explained the brief information of Wind Power Project in Zin Taung sites.
- Daw Khin Su Su Naing, Senior Consultant at Environmental Resources Management (ERM), gave an overview of the EIA process as per the Myanmar EIA Procedure.

Comment from U Maung Ko, No (2) Regional Parliament Representative, Minhla Township

- The project location is in my constituency area. How many villages in Minhla Township will have access to electricity if the project is successful?
- How much money will the local community have to invest in the project and what is the charge for electricity per unit?

Response from U Tin Min Latt, ICM

- The wind power produces the electricity based on the wind speed. The electricity from wind power will connect with national grid and can't be directly distributed to the local areas. The sub-station will be built in the project area, and it is possible that the sub-station could distribute the electricity to the local area. The charges of electricity will depend on the government tariffs.
- The estimated cost is 2.3 to 2.5 million dollars to produce 1 megawatt of electricity from a wind power station. The cost of this project is 250 million. The local community does not need to pay for the project. The project will provide many benefits near the project areas (Set Set Yo, Yae Nan Ma, etc) such as improving transportation (the access road), job opportunities and electricity access.

Comment from U Maung Ko, Regional Parliament Representative, Minhla

- When will the wind power station be in operation?

Response from U Tin Min Latt, ICM

- The wind power station is expected to operate in 2020.

Comment from Dr. Paing Khant, Assistant surgeon of Minhla Hospital

- Is there a standard operating procedure for accidental injuries in workplace? What happens if there is a natural disaster such as a cyclone?

Response from U Tin Min Latt, ICM

- For accidental events during construction, we plan to carry out the risk assessment and work with ISOS. ISOS in Yangon and Bangkok will provide recommendations for our emergency action plan. Our company has a safety procedure to improve occupational health and safety in the workplace.
- In the operation phase, the system does not operate during rain. The turbine will start with a wind speed of 3-4 ms-1. The wind speed of over 50 meters per second will automatically stop the system to protect it against high wind.

Comment from Daw Than Than Aye, Regional Parliament Representative, Minhla

- We warmly welcome the wind power project. Can the project provide the electricity to the villages?

Response from U Tin Min Latt, ICM

- The government is responsible for providing electricity to the village according to the National Electrical Program. The amount of time to provide the electricity is based on the villages proximity to the sub-station.

Comment from U Win Lwin Htay, Deputy Township Administrator

- The project is located in the mountains of Set Set Yo. We examined this area with forest department, agriculture land management and statics department. Is it the underground transmission line and is it connected with Minbu? What is the Mechanism for obtaining landownership if the transmission is underground?

Response from U Tin Min Latt, ICM

- We checked the land use with the general administration department (GAD). The transmission line is connected with Minbu by the existing 230 transmission line. The area for transmission line is included in land ownership survey. The compensation for land use will be considered for the local community in cooperation with the regional government.

Suggestion from U Tin Tun Aung, Agriculture and Land Record Department

- Agriculture land is included in the Project Area. The company should discuss with the local farmers to compensate for the transmission area.

Comment from Dr Aung Myint, Minhla

- Wind power has a higher cost than other project (gas power project etc.). These projects are mostly located in coastal regions and the turbines are very large. Personally I accept this project but the project area is located in Shan Dat reserved forest. The wind speed in these areas is good as we know results from research. The construction of buildings, control system and high power transmission is carried out with forest department, agriculture department and survey department.
- I noticed the transmission line is put underground. The distance of 100 yards near the transmission line defines the danger area according to the National Electrical Program. The company should give awareness training to local people near the transmission line area.

- The company should discuss with the regional government (forest department, agriculture department and survey department) before construction the transmission line
- The company should have an agreement with local people to get the electricity.
- The cutting of trees should be as low as possible.
- Oil exploration has existed in the project area so the project should have a good firefighting plan.

Response from U Tin Min Latt, ICM

- We do the land ownership survey with regional government to avoid the villages and agricultural areas. We will discuss with regional government and local people to compensate the land use. We will give awareness training for the dangerous of transmission line area.

Comment from U Aung Ko, Regional Parliament Representative, Minhla

- How many job opportunities will be produced by the project?

Response from U Tin Min Latt, ICM

- If the project is put into operation, there will be job opportunities. In the construction phase there will be more jobs than in the operation phase as there is no need to retain large amount of staff for the maintenance systems.

Comment from Dr. Paing Khant

- Will vocational training be given to local people?

Response from U Tin Min Latt, ICM

- We will consider giving vocational training.

Comment from Daw Than Than Aye, Regional Parliament Representative, Minhla

- Will 27 wind turbine be situated in Minhla Township for the project? We have many young graduates from local Technological Universities with skills such as Electrical Power Engineering and Electronic and Communication. The training should also carried out for these young engineers.

Response from U Tin Min Latt, ICM

- The project will have 27 wind turbine will be installed in Minhla Township We can give jobs to people with no experience and they attend internal intensive training in workplace (on job training).

Comment from U Tun Oo, Forest Department

- The project is located in Shan Dat reserved forest. We surveyed the area and found the existing condition is good (number of trees, wildlife and other valuable species) and presented this to the ministry. Company should submit report to Head of Forest department, MONREC for this reason.

Response from U Tin Min Latt, ICM

- We comply with procedures and laws related with the forest department, survey department, agricultural department and general administration department.

Comment from Dr. Aung Myint

- Many forest plantations are found in Shan Dat reserved forest so we can measure the minimum requirement for land use. Should the company request permission?

Response from U Tin Min Latt, ICM

- The company will request to get permission from the forest department and land survey department.

Suggestion from U Min Zaw Hun, Department of Rural Development (DRD)

- Myanmar National Electrification Project (NEP) is implemented by Department of Rural Development to provide electricity to villages which are far from the national grid. A mini grid and solar system are used. The local people pay for this service for a few years and then they own the system later. The village would maintain this system.

Suggestion from U Soe Htay, Planning Department

- The community Driven Development Project (CDD) is currently being implemented under the current government. The project aims for the social economic development of the community from the grassroots level. When we implement the such a project, we face a lot of difficulties such as land compensation and crop compensation etc. Therefore, I would like you to negotiate with all related government departments and local communities. If not, the issues will be difficult to solve later. I would like to suggest that the negotiation and cooperation will be key when the project implements.

Comment from Dr. Aung Myint, local community member

- The company has explained the project to us before the construction phase. After this, they will have less contact with community people. Your project explained to the community about the impacts to the community. After your project gets final approval from Union Government and is ready to start, I would like you to discuss with all Township Government Departments about the project detail again. If not, it will be quite hard to deal with when problems arise. Then, people may go against the project.

Response from Daw Khin Su Su Naing, ERM

- We note your recommendations and suggestions for this project.

Attendance List

No	Name	Position	Department/ Organization/ Address
1.	U Win Ko	Township Secretary	Minhla
2.	Dr Paing Khant	Assistant surgeon	Minhla hospital
3.	U Kyaw Lin Soe	Staff officer	Fire Service Department
4.	U Soe Htay	Deputy Director	Ministry of Planning
5.	Daw Than Than		Member of Parliament
6.	Dr. Aung Myint	Doctor	Minhla
7.	U Min Zaw Hun	Staff officer	Department of Rural development
8.	U Maung Ko		Parliament Representative from Minhla
9.	U Hlaing Myint Than		Parliament Representative from Minhla
10.	U Win Ko	Writer	Government Administrative Department
11.	Daw Khin May Aye		Government Administrative Department
12.	Daw Nyo		Government Administrative Department
13.	Daw Thidar Moe		Government Administrative Department
14.	Daw Nu Nu Yin		Government Administrative Department
15.	Daw Tin Tin Hla		Government Administrative Department
16.	Daw Zin Zin Wai		Government Administrative Department
17.	U Than Soe	Overseer	Government Administrative Department
18.	U Than Htak Win	Overseer	Government Administrative Department
19.	U Kyaw Win Sein	Overseer	Government Administrative Department
20.	Daw Zar Zar Nyein		
21.	Daw Yi		
22.	Daw Su Su Mar		Myanmar Economic Bank
23.	U Thet Wai Soe	Engineer-2	Ministry of Electric Power
24.	U Aung Min Oo	Staff Officer	Ministry of Social Welfare, Relief and Resettlement
25.	Dr. Win Than	Staff Officer	Department of livestock
26.	U Myint Soe	Staff Officer	Department of Agriculture
27.	Daw Su Mar Phyo	Deputy Director	Department of Tradition
28.	U Maung Myo	Overseer	
29.	Daw Nilar Tun		Ministry of Religious Affairs
30.	U Kyi Htay		
31.	Daw Mya Mya Wai	Staff Officer	Department of statistics
32.	U Win Hlaing	Staff Officer	Ministry of Health and Sports
33.	U Aung Naing Htoo Myint		
34.	U Kyaw Kyaw Soe		
35.	U Nay Ko Aung	Lawyer	
36.	U Tin Tun Aung		
37.	U Aung Zaw		Department of Education
38.	U Tun Oo	Ranger	Department of Forestry
39.	U San Tun		
40.	U Thein Sein		
41.	U Myo Naing		
42.	U Tun Tin		
43.	Daw Yi Mon Phway	Staff Officer	
44.	U Thet Naing Win		

No	Name	Position	Department/ Organization/ Address
45.	U Myo Thant		
46.	U Zaw Win Oo		
47.	Daw Thin Thin Soe		

Photos








Meeting of Minutes: Stakeholder Consultation of Wind Power Project (Kandok)

Detail			
Project	Kandok Wind Power Project		
Venue	Yae Ngan Village Head's House	**Region/State**	Magwe
District	Thayet	**Township**	Min Hla
Objective	Stakeholder Consultation Meeting		
Date	13rd July 2018		
Time	3:00 PM to 5:00 PM		

- U Tin Min Lat, Lead Project Developer, Infra Capital Myanmar-ReEx (ICM), introduced ICM and explained the brief information of Wind Power Project in Zin Taung sites.
- Daw Khin Su Su Naing, Senior Consultant, Environmental Resources Management (ERM), gave an overview of the EIA process as per the Myanmar EIA Procedure.

Comment from U Sein Win, Village Head

- What is the timeline of the project?
- When will the project start?
- We don't know much about the wind turbines installed on the hill near the village.

Response from U Tin Min Latt, ICM

- In regards of the timeline, it depends on the government approvals. We are now negotiating with the Regional Government to start our project in 2020. The electricity generated from the wind-power project will be sold to the government. We can start this project if government guarantees to buy the electricity.
- Wind turbines produce electricity from the wind. We assume that this region is the suitable place to implement wind-power project according to our records of wind speed.

Comment from U Sein Win

- Do these turbines need a large area of land to install them?

Response from U Tin Min Latt, ICM

- There will be a spacing of over 2000 feet between two turbines. The land needed for one turbine is the same as this house however, the blades of the turbine are large, it may take 3 acres per turbine in order to cover area under the blades. The area on the ground will not be wide. The lower edge of the fan is over 120 feet from the ground and the height of the turbine is over 300 feet.

Comment from Villager

- If the turbines are installed, land will be required. Some of us have a form-7 and some don't. If the proposed turbines are in their farm land, how do you plan for compensation?

Response from U Tin Min Latt, ICM

- We are planning to do an agricultural land information survey by coordinating with the township administrator. We had planned to do survey last month. But we couldn't because of heavy rain and flooding in road. We know that some villagers will not have a form-7 or form-10 for their own land. As this project will be implemented in cooperation with the government, we will proceed with the guidance of the Regional Government. We will not force any resettlement from land on our project.

Comment from Villager

- Will the electricity generated from this project be distributed to the surrounding seven villages if the project is successful?

Response from U Tin Min Latt, ICM

- I couldn't say that the electricity will be definitely accessed. That is because we cannot distribute the electricity from this project directly to the villages. Wind turbines only generate electricity when wind is available. The amount of generated electricity differs based on the wind's speed. If the transmission lines are available, sub-stations have to be installed near the project area. The chances of electricity access depends on the government. But there may be more opportunities for gaining access to electricity in these villages from these substations if the project goes ahead.

Response from Daw Khin Su Su Naing, ERM

- In terms of the project, these consultation meetings will be conducted again and we intend to consult continuously during the project period. The contact number and address are also provided in the handouts so you can send the questions/complaints concerning with the project at any time.

Attendance List

No	Name	Position	Department/ Organization/ Address
48.	U Thar Yin		Yae Ngan Village
49.	U Tin Oo		Yae Ngan Village
50.	U Tin Mya		Yae Ngan Village
51.	U Hla Aung		Yae Ngan Village
52.	U Maung Ngwe		Yae Ngan Village
53.	U Thein Naing		Yae Ngan Village
54.	U Hla Aung		Yae Ngan Village
55.	U Zar Myo		Yae Ngan Village
56.	U Linn Zaw Aung		Yae Ngan Village
57.	U Chit Sai		Yae Ngan Village
58.	U Aung Chit		Yae Ngan Village
59.	U Aung Kyi		Yae Ngan Village
60.	U Bo Pu		Yae Ngan Village
61.	Daw Mya Yi		Yae Ngan Village
62.	Daw Khin Mar Win		Yae Ngan Village
63.	Daw Khin Myint		Yae Ngan Village
64.	Daw Htay Kyi		Yae Ngan Village
65.	Daw Kyar Tin		Yae Ngan Village
66.	Daw Wine Kyi		Yae Ngan Village
67.	Daw Sut Phyu		Yae Ngan Village
68.	Daw Khin Nyunt		Yae Ngan Village
69.	Daw San Nu		Yae Ngan Village
70.	Daw Ohn Yi		Yae Ngan Village
71.	Daw Nwe		Yae Ngan Village
72.	Daw San Aye		Yae Ngan Village
73.	Daw Cho		Yae Ngan Village
74.	Daw Than Htay		Yae Ngan Village
75.	U Sein Win	Village Head	Yae Ngan Village
76.	Daw Khin Htay		Yae Ngan Village
77.	Daw Hla Nyein		Yae Ngan Village
78.	U Daung		Yae Ngan Village
79.	Daw Makyar		Yae Ngan Village
80.	Daw Mi Khu		Yae Ngan Village
81.	Daw Hla Kyi		Yae Ngan Village
82.	Daw Thein Yi		Yae Ngan Village
83.	Daw Phyu Ma		Yae Ngan Village
84.	U Phoe Tee		Yae Ngan Village
85.	Daw Tun Kyi		Yae Ngan Village
86.	Daw Khin Sein		Yae Ngan Village
87.	Daw Mar Htay		Yae Ngan Village
88.	U Nyein Chan Aung		Yae Ngan Village
89.	Daw Ma Tin		Yae Ngan Village
90.	Daw Kyi Mar		Yae Ngan Village
91.	Daw Nyo Tin		Yae Ngan Village

No	Name	Position	Department/ Organization/ Address
92.	Daw Kyi Khin		Yae Ngan Village
93.	Daw Thandar Win		Yae Ngan Village
94.	Daw Mone Sein		Yae Ngan Village
95.	Daw Hla Aye		Yae Ngan Village
96.	Daw Aye Mi		Yae Ngan Village
97.	U Bo Htay		Yae Ngan Village
98.	U Tin Aye		Yae Ngan Village
99.	U Khin Maung Yi		Yae Ngan Village

Photos

Meeting of Minutes: Stakeholder Consultation of Wind Power Project (Kandok)

Detail			
Project	Kandok Wind Power Project		
Venue	Monastery Hall, Yae Nan Ma Village	**Region/State**	Magwe
District	Thayet	**Township**	Minhla
Objective	Stakeholder Consultation Meeting		
Date	14th July 2018		
Time	09:30 AM to 12:00 PM		

- U Tin Min Lat, Lead Project Developer, Infra Capital Myanmar-ReEx (ICM), introduced ICM and explained the brief information of Wind Power Project in Zin Taung sites.
- Daw Khin Su Su Naing, Senior Consultant, Environmental Resources Management (ERM), gave an overview of the EIA process as per the Myanmar EIA Procedure.

Comment from U Khin Mg San, Village Head of Yae Nan Ma

- Will the nearby villages access to electricity from this project?

Response from U Tin Min Latt, ICMRE Myanmar

- We would really would like to distribute electricity to the nearby villages. But our wind power project only generates electricity when winds are available. The amount of generated electricity differs based on the wind's speed. It is not easy to distribute electricity by only wind power project. A sub-station have to be installed 20 miles from this village. Since the sub-station will be connected with government transmission lines, there will be opportunities to access the electricity for the villages.

Comment from U Sein Tun, Yae Nan Ma village

- All of the farmland are owned by farmers but the Department of Agricultural Land Management and Statistics didn't issue a form-10 to them. Therefore, it is suggested to negotiate with the local community for compensation process when the turbine will be installed.

Response from U Tin Min Latt, ICMRE Myanmar

- We follow this process as per your suggestion. We are planning to do land surveys in all the project areas by coordinating with the township administrator. We know that some villagers will not have a form-7 or form-10 for their land. We will try to collect agricultural land information (i.e. who really owns or operates the land). We will then proceed with the compensation process based on this information and with guidance from the government.

Comment from U Khin Mg Soe, Yae Nan Ma Village

- In the implementation stage, which roads will the project use? What are the environmental impacts of this project?

Response from U Tin Min Latt, ICMRE Myanmar

- We are still assessing the best access road to be used in construction and operation phase. We will use the village roads to transport the heavy materials and machinery, we must upgrade the existing road in order to do this. Mostly, we will avoid the village as the village roads are too narrow for our materials. We will repair the existing road and construct the sustainable road if necessary. The project will repair and develop the roads that are used in the area.

Response from Daw Khin Su Su Naing, ERM Myanmar

- To mitigate potential impacts, we plan to implement the project by avoiding the villages and residential areas as much as possible. If the project passes near the schools, houses and monasteries, we will implement mitigation measures in order to minimize the potential impacts. The mitigation measures will be included as one part in our report.

Attendance List

No	Name	Position	Department/Organization/ Address
100.	Ma Kyin Kyin Swe		Yae Nan Ma (South)
101.	Ma Tin Win		Yae Nan Ma (Ku Tin)
102.	Ma Hla Lay		Yae Nan Ma (South)
103.	Daw Than Kyi		Yae Nan Ma (South)
104.	Daw Toe		Yae Nan Ma (Thapyay Myaung)
105.	Daw Tin Tin Khaing		Yae Nan Ma (Thapyay Myaung)
106.	Daw Saw Thidar		Yae Nan Ma (Thapyay Myaung)
107.	Daw Khin Sein		Yae Nan Ma (South)
108.	Daw Myint Myint Thein		Yae Nan Ma (South)
109.	Daw Yadanar Soe		Yae Nan Ma (South)
110.	Ma Aye Win Maw		Yae Nan Ma (South)
111.	Daw Kyi Win		Yae Nan Ma (South)
112.	Ma Wae		Yae Nan Ma (North)
113.	Daw Sein Nyunt		Yae Nan Ma (North)
114.	Ma San Nwal		Yae Nan Ma (North)
115.	Ma Khin Mar Win		Yae Nan Ma (South)
116.	Ma Than Htay		Yae Nan Ma (North)
117.	Ma Aye Maw		Yae Nan Ma (North)
118.	Daw Aye San		Yae Nan Ma (North)
119.	Daw Htun		Yae Nan Ma (South)
120.	Ma San San Aye		Yae Nan Ma (North)
121.	Daw Myint Khaing		Yae Nan Ma (South)
122.	Daw Pyo Tin		Yae Nan Ma (South)
123.	Daw Khin Kyi		Yae Nan Ma (North)
124.	Daw Kyar Hla		Yae Nan Ma (North)
125.	Daw Than Aye		Yae Nan Ma (South)
126.	Daw Ma Kae		Yae Nan Ma (South)
127.	Daw Yin Yin Htay		Yae Nan Ma (South)
128.	Daw Aye Thein		Yae Nan Ma (South)
129.	U Khin Maung San	Village Administrator	Yae Nan Ma (Thapyay Myaung)
130.	U Nyi Nyi		Yae Nan Ma (North)
131.	U Aung Myo Zaw		Yae Nan Ma (South)
132.	U Cho		Yae Nan Ma (North)
133.	U Hla Min Htet		Yae Nan Ma (North)
134.	U Tin Kyawt		Yae Nan Ma (North)
135.	Ma Aye Htwe		Yae Nan Ma (North)
136.	Ma Sabal Oo		Yae Nan Ma (South)
137.	Ma Myint Myint Aye		Yae Nan Ma (South)
138.	Ma Nyein Myaing		Yae Nan Ma (South)
139.	U Zaw Min Htun		Yae Nan Ma (Thapyay Myaung)
140.	Daw Kyin San		Yae Nan Ma (Thapyay Myaung)
141.	U Win Maung		Yae Nan Ma (Thapyay Myaung)
142.	U Zaw Min Htay		Yae Nan Ma (Thapyay Myaung)
143.	U Ohn Maung		Yae Nan Ma (Thapyay Myaung)

No	Name	Position	Department/Organization/ Address
144.	U Phoe Htway		Yae Nan Ma (Thapyay Myaung)
145.	Ma Tin San		Yae Nan Ma (Thapyay Myaung)
146.	Daw Lay Nge		Yae Nan Ma (Thapyay Myaung)
147.	Ma San San Aye		Yae Nan Ma (Thapyay Myaung)
148.	U Than Ngwe		Yae Nan Ma (Thapyay Myaung)
149.	U Tin Lin		Yae Nan Ma
150.	U Sein Lwin		Yae Nan Ma
151.	U Moe Swe		Yae Nan Ma
152.	U Thar Din		Yae Nan Ma
153.	U Tin Myint		Yae Nan Ma
154.	U Ye Maung		Yae Nan Ma
155.	U Aung Than		Yae Nan Ma
156.	U Win Myint		Yae Nan Ma
157.	U San Nyein		Yae Nan Ma
158.	U Win Naing Mu		Yae Nan Ma
159.	U Kyaw Oo		Yae Nan Ma
160.	U Tin Shein		Yae Nan Ma (North)
161.	U Thar Htun		Yae Nan Ma (South)
162.	U Khin Zaw Oo		Yae Nan Ma (South)
163.	U Htun Thein		Yae Nan Ma (south)
164.	U Win Naing		Yae Nan Ma (North)
165.	U Lin Lin Aung		Yae Nan Ma (North)
166.	U Aung Kyaw Oo	Secretary	Yae Nan Ma
167.	U Thein Zaw Bo		Yae Nan Ma (North)
168.	U Tin Ngwe		Yae Nan Ma (North)
169.	U Aung Min Thu		Yae Nan Ma (Thapyay Myaung)
170.	U Yar Thein		Yae Nan Ma (Thapyay Myaung)
171.	U Waing		Yae Nan Ma (North)
172.	U Tin Hlaing		Yae Nan Ma (Thapyay Myaung)
173.	U Htay Aung		Yae Nan Ma (Thapyay Myaung)
174.	U Tin Htay		Yae Nan Ma (Thapyay Myaung)
175.	U Toe		Yae Nan Ma (Thapyay Myaung)
176.	U Bo Htay		Yae Nan Ma (Thapyay Myaung)
177.	U Mg Cho		Yae Nan Ma (Thapyay Myaung)
178.	U Naing Win		Yae Nan Ma (Thapyay Myaung)
179.	U Phyo Ko Ko		Yae Nan Ma (South)
180.	U Shwe Win		Yae Nan Ma (South)
181.	Ko Myo		Yae Nan Ma (South)
182.	Ko Htay		Yae Nan Ma (South)
183.	Ko Htay Aung		Yae Nan Ma (South)
184.	Ko Myo Kyaw		Yae Nan Ma (South)
185.	Ko Lwin Lwin Oo		Yae Nan Ma (Ywar Thar Hla)
186.	Ko Tun Tout Win		Yae Nan Ma (Thapyay Myaung)
187.	Ko Nay Lin		Yae Nan Ma (Thapyay Myaung)
188.	Ko Lwin Myo Khaing		Yae Nan Ma (North)
189.	U Than Htay		Yae Nan Ma (South)

No	Name	Position	Department/Organization/ Address
190.	U Thein Shwe		Yae Nan Ma (South)
191.	Ko Zin Ko Htet		Yae Nan Ma (South)
192.	U Bo Tint		Yae Nan Ma (South)
193.	U Maung Ngwe		Yae Nan Ma (South)
194.	U Myint Aung		Ka Tin Su
195.	U Maung Hlaing		Ka Tin Su
196.	U Naing Lin		Ka Tin Su
197.	Daw Khin Nwet		Yae Nan Ma (North)
198.	Ko Nyo Zin		Yae Nan Ma (North)
199.	Daw Mya San		Yae Nan Ma (South)
200.	U Than Aung		Yae Nan Ma (South)
201.	U Hein Min Ko		Yae Nan Ma (South)
202.	U Myat Tun Aung		Yae Nan Ma (North)
203.	U Aung Shwe		Yae Nan Ma (South)
204.	U Zaw Myo		Yae Nan Ma (South)
205.	U Hla Mg Than		Yae Nan Ma (South)
206.	U Myint Aung		Yae Nan Ma (South)
207.	U Shwe		Yae Nan Ma (South)
208.	U Win Zaw		Yae Nan Ma (South)
209.	Daw Tin May		Yae Nan Ma (South)
210.	U Win Nyunt		Yae Nan Ma (South)
211.	Daw Aye Than		Yae Nan Ma (South)
212.	Daw Mya Kyi		Yae Nan Ma (Thapyay Myaung)
213.	Daw Thaung Sein		Yae Nan Ma (South)
214.	Daw Kyi Shwe		Yae Nan Ma (South)
215.	U Soe Myint		Yae Nan Ma (South)
216.	U Myint Win		Yae Nan Ma (South)
217.	U Myo Win		Yae Nan Ma (South)
218.	U Than Kyaw		Yae Nan Ma (South)
219.	Daw Tin Yee		Yae Nan Ma (South)
220.	U Aung Ko Latt		Yae Nan Ma (South)
221.	U Myint Aung		Yae Nan Ma (South)
222.	Daw Saw Kyi		Yae Nan Ma (South)
223.	Daw Lae' Nu		Yae Nan Ma (South)
224.	Daw Khin Thein		Yae Nan Ma (South)
225.	U San Shwe		Yae Nan Ma (South)
226.	U Hla Sein		Yae Nan Ma (South)
227.	U Than Zaw		Yae Nan Ma (South)
228.	U Ye' Lwin Tun		Yae Nan Ma (South)
229.	U Sein Zaw		Yae Nan Ma (South)
230.	U Ko Ni		Yae Nan Ma (South)
231.	U Tun Yee		Yae Nan Ma (North)
232.	U Ye' Aung		Yae Nan Ma (South)
233.	U Thein Aung		Yae Nan Ma (North)
234.	U Zin Bo Aung		Yae Nan Ma (North)
235.	U Thein Zaw		Yae Nan Ma (Thapyay Myaung)

No	Name	Position	Department/Organization/ Address
236.	U Myint Mg		Yae Nan Ma (South)
237.	U Phoe Tot		Ka Tin Su
238.	U Nyein Chan Aung		Ka Tin Su
239.	U San Win Hlaing		Yae Nan Ma (South)
240.	U San Wa		Yae Nan Ma (South)
241.	U Zin Min Aung		Yae Nan Ma (Thapyay Myaung)
242.	U Aung Thu		Yae Nan Ma (Thapyay Myaung)
243.	U Aye Thu		Yae Nan Ma (North)
244.	U Tun Kyi		Yae Nan Ma (North)
245.	U Nyi		Yae Nan Ma (North)
246.	U Thein Mg		Yae Nan Ma (North)
247.	U Ohn Mg		Yae Nan Ma (South)
248.	U Hla Thaw		Yae Nan Ma (South)
249.	U Aung Myat Oo		Yae Nan Ma (South)
250.	U Thawtar Tun		Yae Nan Ma (South)
251.	U Min Min Tun		Yae Nan Ma (South)
252.	U San Oak		Yae Nan Ma (Thapyay Myaung)
253.	U Zin Bo		Yae Nan Ma (North)
254.	U Tin Nyunt		Yae Nan Ma (South)
255.	U Than Kyaw		Yae Nan Ma (South)
256.	U Kyaw Kyaw Naing		Yae Nan Ma (South)
257.	Daw Tin Tin Aye		Yae Nan Ma (South)
258.	Daw Khin Than New		Yae Nan Ma (Thapyay Myaung)
259.	Daw Tin		Yae Nan Ma (South)
260.	Daw Sein		Yae Nan Ma (Thapyay Myaung)
261.	Daw Naing		Yae Nan Ma (South)
262.	Daw San Shwe		Yae Nan Ma (South)
263.	Daw Tin		Yae Nan Ma (Thapyay Myaung)
264.	Daw Kyin Mya		Yae Nan Ma (South)
265.	Daw Shan		Yae Nan Ma (North)
266.	Daw Toe Sein		Yae Nan Ma (South)
267.	U Kyaw Myint		Yae Nan Ma (South)
268.	Daw Khin Win		Yae Nan Ma (South)
269.	U San Kyi		Yae Nan Ma (Ywar Thar Hla)
270.	Daw Mar Mar Hlaing		Yae Nan Ma (South)
271.	Daw Zin Mar Win		Yae Nan Ma (Ywar Thar Hla)
272.	Daw Than Than		Yae Nan Ma (South)

Photos

Explanation by U Tin Minn Latt, ICMRE

Explanation by Daw Khin Su Su Naing, ERM

Question by U Khin Mg San, Villlage Head

Question by U Sein Tun

Question by U Khin Maung Soe

Attendees of the Yan Nan Ma Village

Meeting of Minutes: Stakeholder Consultation of Wind Power Project (Kandok)

Detail			
Project	Kandok Wind Power Project		
Venue	Set Set Yo village	**Region/State**	Magway
District	Thayet	**Township**	Minhla
Objective	Stakeholder Consultation Meeting		
Date	14/7/2018		
Time	2:00 PM to 4:00 PM		

- U Tin Min Lat, Lead Project Developer, Infra Capital Myanmar (ICM), introduced Infra Capital Myanmar – ReEx and explained the brief information of Wind Power Project in Zin Taung sites.
- Daw Khin Su Su Naing, Senior Consultant, Environmental Resources Management (ERM), gave an overview of the EIA process as per the Myanmar EIA Procedure.

Question from U Myint Thein, Set Set Yo Village

- I would like to request you to explain the exact location of proposed project.
- Please tell us the benefits and impacts of the project to natural environment in the Set Set Yo village and Ye Ngan village tract. The project is located in the high hill area. And the villages are located in the lower land, there will be potential impacts to the local villagers. I would also like you to explain the negative impacts of the project to the community.
- If negative impacts occur, how will you be responsible for the damage? For example, when the wind turbine is installed, the public consultation will be undertaken and explained about the project.
- If the lighting strikes on the villages, can you compensate for the damage?

Answer from U Tin Min Lat, ICMRE Myanmar

- The exact of location of wind turbines will be confirmed at later stage. We negotiated with Township Administrator to conduct a land survey last month but it was cancelled because of the weather conditions.
- In terms of the water resources, we will implement our project in the area far from the people and according to international standards, we will not build our project near residential areas as there are the potential impacts such as noise, accidental dangers and shading [shadow flicker] from our project. As there is a monastery near the Project Site we have to move it to another location if the monk doesn't agree our project. We will also discuss this with the monk later.
- The wind turbines are likely to be strike by lighting, but they'll have lighting arrestors to deflect the strike There will be no issues from lighting strike and no impact to the villagers because of wind turbines.
-

Answer from Daw Khin Su Su Naing, ERM Myanmar

- We don't exclude any information in the presentation. We will explain all of our findings, assessment results, and potential impacts of the project to the local community. We will consult all stakeholders affected by the project activities. Assessment of biodiversity and habitats are included in our process. Magway Regional Chief Minister has requested us to assess the habitats of migratory birds. Foreign experts will also come to this village in order to study the habitats of bats. We are conducting these assessments before the project starts. The situation of water sources (ponds and dug-wells) has been assessed using villager interviews.

Question from U Soe Aung, Villager Leader, Set Set Yo Village

- I would like you to explain the detail of potential impacts as many in the villages are less well educated. Can the turbines cause strong wind in the village?
- What kind of opportunities for the village will come from this project?
- Is there any plan to construct roads and bridges for the village if the project is successful?

Answer from U Tin Min Lat, ICMRE Myanmar

- The turbines will not cause very strong winds near the area. There will be normal wind speed throughout the whole year in Set Set Yo village and Mindon Township. Lighting strike will not effect in the village due to the wind turbines. We are also concerned that the lighting or severe cyclone could strike our wind turbine.
- In term of local development, we must upgrade the existing road to transport our heavy materials.
- According to guidance of the government, we have planned to have a CSR program based on the requirements of the local community. The main reasons why the community is underdeveloped are poor transportation and lack of electricity. There will be a good access road when the project is implemented.
- In terms of electricity provision, the sub-station will be connected from our project to the government transmission line. There is opportunity for nearby village to access the electricity from this sub-station.

Answer from Daw Khin Su Su Naing, ERM Myanmar

- We will come to this village for another meeting again. Please inform us of any concerns you have about the proposed project.

Attendance List

No.	Name	Position	Department/ Organization/ Address
1	Daw San San Maw		Set Set Yo
2	Daw San Htay		Set Set Yo
3	U Han Kyi		Set Set Yo
4	U Soe Myint		Set Set Yo
5	Daw Aye Khaing		Set Set Yo
6	U Kyaw Mg		Set Set Yo
7	U Mg Htay		Set Set Yo
8	U Pipe Thein		Set Set Yo
9	Daw San Kyi		Set Set Yo
10	Daw Kyi Aye		Set Set Yo
11	U Htay Hlaing		Set Set Yo
12	U Hla Aung		Set Set Yo
13	Ma San Tin		Set Set Yo
14	Daw Thu Chaw		Set Set Yo
15	Daw Myint Myint Khaing		Set Set Yo
16	U Tin Mya		Set Set Yo
17	U Tun Aye		Set Set Yo
18	UMyo Win		Set Set Yo
19	U Myo Thura Aung		Set Set Yo
20	Daw Khaing Saw		Set Set Yo
21	Daw Nyunt Kyi		Set Set Yo
22	Daw Htay Htay Khine		Set Set Yo
23	Daw San Nyunt Wai		Set Set Yo
24	U Mya Thein		Set Set Yo
25	U Win Htay		Set Set Yo
26	U Shwe Than		Set Set Yo
27	U Zin Min Aung		Set Set Yo
28	Daw Aye Thein		Set Set Yo
29	U Myint Thein		Set Set Yo
30	U Tun Win		Set Set Yo
31	Daw Pu Tar		Set Set Yo
32	U Nyunt Win		Set Set Yo
33	Daw Aye Aye		Set Set Yo
34	Daw Aye Kyaing		Set Set Yo
35	Daw Nyein Tin		Set Set Yo
36	Daw Myint Myint Khine		Set Set Yo
37	Daw Than Oo		Set Set Yo
38	Daw Thida Soe		Set Set Yo
39	Daw Yee San		Set Set Yo
40	U Htay Mg		Set Set Yo
41	Daw Hla Ohn		Set Set Yo
42	Daw Thein Yin		Set Set Yo
43	Daw Hla Myint		Set Set Yo
44	Daw Thein Kyi		Set Set Yo
45	Daw Khine Su Mon		Set Set Yo
46	Daw Toe Shwe		Set Set Yo
47	Daw Than Myint		Set Set Yo

No.	Name	Position	Department/ Organization/ Address
48	Daw Aye Mar		Set Set Yo
49	U Than Sein		Set Set Yo
50	U Phoe Sein		Set Set Yo
51	U Nay Aung		Set Set Yo
52	U Thar Nyo		Set Set Yo
53	U Pu		Set Set Yo
54	U Aung Swe		Set Set Yo
55	U Kyaw Gyi		Set Set Yo
56	Daw Hla Win		Set Set Yo
57	Daw Ohn Yee		Set Set Yo
58	Ma Zin Mar Thin		Set Set Yo
59	Ma Cho Lay		Set Set Yo
60	Daw Htay Htay Maw		Set Set Yo
61	Daw Pipe		Set Set Yo
62	Daw Htay Kyi		Set Set Yo
63	Daw Thein Kyi		Set Set Yo
64	Daw Aye Khine		Set Set Yo
65	Daw Ni Ni Win		Set Set Yo
66	Daw Mya Thida		Set Set Yo
67	Daw Mon Mon Khine		Set Set Yo
68	Daw San Aye		Set Set Yo
69	U Khine Nyunt		Set Set Yo
70	U Thein Win		Set Set Yo
71	Daw Yee Yee Myint		Set Set Yo
72	Daw Ohn Yee		Set Set Yo
73	Daw Tin Shwe		Set Set Yo
74	Daw Yin Shwe		Set Set Yo
75	Ma Kyi Kyi Moe		Set Set Yo
76	Ma Nilar Win		Set Set Yo
77	U Naing Win		Set Set Yo
78	Daw Khin Oo		Set Set Yo
79	Daw Thein		Set Set Yo
80	Daw Han Yin		Set Set Yo
81	Ma Aye Mya Oo		Set Set Yo
82	Daw Khin Shwe		Set Set Yo
83	U Tein Nyo		Set Set Yo
84	U San Thein		Set Set Yo
85	U Than Naing		Set Set Yo
86	U Win Mg		Set Set Yo
87	U Win Naing		Set Set Yo
88	U Kyaw Win		Set Set Yo
89	Ma Khin Mar Myint		Set Set Yo
90	Ma Nwe New Mu		Set Set Yo
91	U Mg		Set Set Yo
92	Daw Aye Myint		Set Set Yo
93	Daw Ohn Kyi		Set Set Yo
94	U Win Naing		Set Set Yo

No.	Name	Position	Department/ Organization/ Address
95	U Tun Kyi		Set Set Yo
96	U Tun Kyi(2)		Set Set Yo
97	Daw San San Aye		Set Set Yo
98	U San Thaww		Set Set Yo
99	Daw Aye Win		Set Set Yo
100	U Aung Myo Win		Set Set Yo
101	U Aung Lay		Set Set Yo
102	U Soe Aung	Villager Leader	Set Set Yo

Photos

Presentation by U Tin Min Latt, ICMRE

Presentation by Daw Khin Su Su Naing, ERM

Question by Ko Myint Thein, Set Set Yo Village

Question by U Soe Aung, the village leader

Question by Daw A Thay Lay

Answered by U Tin Min Latt, ICMRE

Meeting of Minutes: Second Stakeholder Consultation of Kandok Wind Power Project

Detail			
Project	Kandok Wind Power Project	**Region / State**	Magway
Venue	Village Administrator House, Yae Ngan Village	**Township**	MinHla
District	Thayet		
Objective	Second Stakeholder Consultation Meeting.		
Date	6th November 2018		
Time	1:00 PM		

- U Tin Min Latt (Project Developer, Infra Capital Myanmar - ReEx) introduced Infra Capital Myanmar – ReEx and explained the brief information of Kandok Wind Power Project in MinHla Township.
- Daw Khin Su Su Naing (Senior Consultant, Environmental Resources Management (ERM)) gave an overview of the Environmental Impact Assessment (EIA) process as per the Myanmar EIA Procedure.

Comment from U Sein Win, Village Administrator

- The project is Yay-Ngyan group but it will be nearest to Set Set Yo village than Yay-Ngyan village.
- In the presentation, it is said that the generated electricity will be sent to National Grid and,then it will be distributed according to the government plan.
- Although the electricity generated will be sent to government, I would like to know whether there is any possibility to get electricity for nearest villages or not if the company presents the government along with the approval of responsible chief persons of the company when the project operates and generates electricity.

Response from U Tin Min Latt, ICMRE

- It is hard to answer as the electricity from the wind power will only be generated when the wind speed is enough. If the is no wind, no power will be generated. Because the electricity we generate is not stable unlike the constant electricity from the government because it depends on the situation of wind.
- So, it is difficult to sell directly to the users and villagers. It does not mean that we do not want to sell but it is due to the nature of generating electricity of this project.
- But there is one thing.
- (Showing the map) Here is Yay- Ngan village and our project is around here.
- We have to build transmission lines.
- And we have to build the sub-station in our project area to connect with the sub-station of the government. So, the electricity distribution is near to this village which is 40 to 50 miles away from the substation. As there is substation in Yay-Nan-Ma it will be okay for electricity to distribute this village.
- The village administrator can request the government for electricity because there will not be much to do for electricity distribution.
- We will support as much as we can.
- Although the substation is in our project area, the substation is related to the government. So, we only cannot decide for anything.
- As that substation is under the guidance of the government, accessing electricity to the near villages will be easier.

Comment from U Sein Win, Village Administrator

- My question was intended for the villagers for well-understanding.
- Our department said that there will be National Grid in the SetSetYo Village and YayNanMa Village in years 2018-2019.
- We are near to Pahthein-Monywa road which connects with National Grid to Min- Don.
- If it is connected to Pa- Dan, our village is nearer to Pathein-Monywa Road than the substation which is situated on the other side.
- If there is preference for within 2 to 3 miles, we can get the electricity.
- Last week, I also asked this question. I ask this question on behalf of the local people.
- The company will sell electricity to the National Grid. The responsible persons of government will give electricity according to the transmission lines.
- So, there is a possibility to get electricity, but the main point is their plan.

- There is priority to get the electricity will be within two miles to three miles.
- On the behalf of local people, I would like to request Daw Khin Su Su Niang that we would like to get electricity although the generated electricity will be sent to national Grid and we would like you to add our desire in EIA report.

Response from Daw Khin Su Su Naing, ICMRE

- Yes, I will acknowledge your request.

Attendance List

No	Name	Village Name
1.	U Tin Mya	Yae Ngan Village
2.	U Win Maung	Yae Ngan Village
3.	U Tin Win	Yae Ngan Village
4.	Daw Khin Htay	Yae Ngan Village
5.	Daw Wine Kyi	Yae Ngan Village
6.	Daw Khin Kyi	Yae Ngan Village
7.	Daw Aye Yee	Yae Ngan Village
8.	Daw Hnaung Htwe	Yae Ngan Village
9.	Daw Soe	Yae Ngan Village
10.	Daw Khin Yee	Yae Ngan Village
11.	Daw Mu Yee	Yae Ngan Village
12.	Daw Kyar Tin	Yae Ngan Village
13.	Daw Ohn Sein	Yae Ngan Village
14.	Daw Hla Aye	Yae Ngan Village
15.	Daw Than Yee	Yae Ngan Village
16.	Daw Than Win	Yae Ngan Village
17.	Daw Khin Nyunt	Yae Ngan Village
18.	Daw Kyin	Yae Ngan Village
19	Daw Mya Yee	Yae Ngan Village
20	Daw Khin Myint	Yae Ngan Village
21	Daw Yee MYint	Yae Ngan Village
22	Daw Khin Nyunt	Yae Ngan Village
23	U Nyunt Tin	Yae Ngan Village
24	U Aung Toe	Yae Ngan Village
25	U Aung Kyi	Yae Ngan Village
26	Daw Aye Yone	Yae Ngan Village
27	U Mya Ei	Yae Ngan Village

No	Name	Village Name
28	Daw Hla Kyi	Yae Ngan Village
29	Daw Khin Ohn Myint	Yae Ngan Village
30	Daw Zin Mar Myint	Yae Ngan Village
31	Daw Ohn Yee	Yae Ngan Village
32	U Khway	Yae Ngan Village
33	U Ohn Chit	Yae Ngan Village
34	U Pu Thaung	Yae Ngan Village
35	Daw Pann Mya	Yae Ngan Village
36	Daw Khin Sein	Yae Ngan Village
37	DawMyint	Yae Ngan Village
38	Daw Sandar Aung	Yae Ngan Village
39	U Kay	Yae Ngan Village
40	Daw Kyi Tin	Yae Ngan Village
41	U Myint Shwe	Yae Ngan Village
42	U Tin Oo	Yae Ngan Village
43	Daw Hla Kyi	Yae Ngan Village
44	U Daung	Yae Ngan Village
45	Daw Nwet	Yae Ngan Village
46	Daw Khin Mar Win	Yae Ngan Village
47	Daw Aw Thar	Yae Ngan Village
48	Daw Than Nwet	Yae Ngan Village
49	Daw Tin Tin Myint	Yae Ngan Village
50	U Win Myint Tun	Yae Ngan Village
51	Daw Aye Mi	Yae Ngan Village
52	U Sein Win	Yae Ngan Village
53	Daw KHin Htay	Yae Ngan Village
54	U Tun Tun Win	Yae Ngan Village
55	U Myint Thein	Yae Ngan Village
56	U Sein Win	Yae Ngan Village
57	U Aung Myaing	Yae Ngan Village
58	U Pann Aye	Yae Ngan Village
59	Daw Ma Tin	Yae Ngan Village
60	Daw Khin Nwet	Yae Ngan Village
61	Daw Cho Mar Sann	Yae Ngan Village

No	Name	Village Name
62	Daw Khin Nwet	Yae Ngan Village
63	U Thar Yin	Yae Ngan Village
64	Daw Aye Nyein	Yae Ngan Village
65	Ma Mi Zar	Yae Ngan Village
66	Mg Thant Zin Aung	Yae Ngan Village
67	Daw Phyu	Yae Ngan Village
68	U Aung Khaing	Yae Ngan Village
69	Ma Khin Mar Win	Yae Ngan Village
70	Daw Pu Tu	Yae Ngan Village
71	U Aung Yee	Yae Ngan Village
72	U Nay Nay Naing Aung	Yae Ngan Village
73	Mg Min Thu Ya	Yae Ngan Village
74	U Mya Thein	Yae Ngan Village
75	Daw Nyo	Yae Ngan Village
76	Mg Htet Phyoe Aung	Yae Ngan Village
77	Daw May Lone	Yae Ngan Village
78	Daw Mya May	Yae Ngan Village

Photo

ERM and ICM's project presentation to community people in Yae Ngan Village.

Meeting of Minutes: Second Stakeholder Consultation of Kandok Wind Power Project

Detail			
Project	Kandok Wind Power Project	**Region / State**	Magway
Venue	Monastery, Set Set Yo Village	**Township**	Min Hla
District	Thayet		
Objective	Second Stakeholder Consultation Meeting.		
Date	6th November 2018		
Time	03:30 PM		

- U Hang Dal (Lead Project Engineer, Infra Capital Myanmar - ReEx) introduced Infra Capital Myanmar – ReEx and explained the brief information of Kandok Wind Power Project in MinHla Township.
- Daw Khin Su Su Naing (Senior Consultant, Environmental Resources Management (ERM)) gave an overview of the Environmental Impact Assessment (EIA) process as per the Myanmar EIA Procedure.

Comment from U Soe Aung, Set Set Yo Village Leader

- The questions can be asked openly. What I would like to ask is if wind tower construction become successful, I heard that the junior villagers nearby will have training courses. Is that true?
- Health of the villagers depends on the transportation as it is difficult to go to and from Yay-Ngan village. If we have better roads, we can go with motorcycles or cars and we can invite the health staffs to the village with phone call when we have diseases. So, I would like to ask for the transportation.
- He asked the villagers to ask questions.
- I would like to know the opportunities and compensation for the owners of the Fallow lands. I have already known that the work can be only done only when the landlord is satisfied.
- There are three mining companies: those are Carbon Power, Linn and Winn companies. They said they collaborate with government. But we, local farmers, have to suffer the loss of land as they use out lands. So, I would like to know about the development and opportunities for the farmers.

Response from U Hang Dal, ICMRE

- For training for the development of the local people, we will inform and submit to the government about that and knowledge will be shared via training courses.
- As there will be the time for construction, the training may be given depending on the job opportunities.
- For transportation, the roads to each turbine will be built for carrying materials. As the weight of the machines is heavy and we have to build the roads which can withstand that weight, the roads can be used by the villagers afterwards.
- For the farmlands, in 69 acres, we still do not know about whose land will be included. We are currently assessing the farmlands with the government. We are collaborating with the government and will take their suggestions. And we will comply the international standards as an international organization. We will start the project after discussion with owners and surrounding people.

Comment from U Thein Htun

- Thank you very much. As the towers are high, the breakdown of towers can be possible after long duration. There is an example which the turbine has fallen down recently. As cows and buffaloes are kept in those areas and there are also farmlands, what will you do if any negative impacts happen?
- Can we let the cows go to for the grazing? We work not only for agriculture but also for breeding livestock. We do not have sufficient water and it is more difficult in summer. The water also has salty taste. We do not have good water supply. Our village will be a good place if you help the problem about water and to get better transportation.

Response from U Tin Min Latt, ICMRE

- We thought about the problem with animals before. Nowadays, our country is more developing and insurance programs are getting developed. We have Third Party Liability for other people and that is apart from the life Insurance or self-insurance for ourselves. That is for the damage of the house, animals and people by our company. The insurance company gives the compensation depending on the case.

- To prevent such cases, the insurance company comes and checks our workplace. We have to work decently and properly. According to the standards and policy of the insurance company, we have to build systematically. If anything happens, there will be the management for the responsibility of compensation and medical support according to the standard of insurance company.
- Next, the buffalos and cows can go around the nearby but we will also have the place where they are strictly prohibited such as around the base of the turbines to prevent unwanted problems.
- The tower which broke down last month is not due to the accident after construction but due to the extremely strong wind while it was still under construction. It is accidently happened as the weather was bad and the workers have less experience as this is the first project in Myanmar.
- We think about the water supply and transportation for village because we have to take care trees and for the living area of our staffs. Every foreign company must obey CSR program which a portion of benefits from the project will be used.

Comment from U Thein Htun

- My concern is for the bad weather, accidents and earthquakes. Please don't mind me for stating that.

Response from U Tin Min Latt, ICMRE

- I don't mind you. We have problems for who will take the responsibilities of such cases before. Now, our country is developing and we have insurance companies. We have to pay them regularly. We call it "Third party Liability Insurance" which is not for the cases inside the company. We have insurance for the negative impacts on other people and farmlands including crops by our company. The insurance company will pay for compensation. For such compensation, we have to give money regularly. It is like we are saving money at insurance company so that they will take the responsibility if anything happens.

Comment from U Maung Htay

- Will there be oil leakage into the pond for drinking water and stream for the cows which they drink?
- For migrating farmlands, as everybody does not have the legal document for the land, the compensation will be only for the farmland with documents?

Response from U Hang Dal, ICMRE

- For the machines, while the project is operating, we will have maintenance officers who will look after on the screen always daily and timely for the working of each machine by using computer system. They can control and stop if there is any mistake, storm or earthquake.
- For the breakdown or leakage from any machine, the staffs will repair and maintain.

Response from U Tin Min Latt, ICMRE

- For farmlands, we are currently collecting land information with the Administrative Department and Survey Department. We have noticed that there are fewer owners who registered for their farmlands. Being registered or not is not the main point in the process of compensation. That is why we will discuss with Land Management Committee which includes Village Administrator and local people. With the proof by them, we will do the process. Now the maps are started to be issued. We enter the village with the representatives from the Survey Department to avoid the conflicts in the future. We know that the local people are harvesting in those areas and we also know that they do not have the legal document for the ownership for their lands. So, we ask the village administrators and the farmers in the village to know who possess the land.
- We also take the history for the owner and we took note down even when we find the Fallow land which is left for three to five years. Farmers, who are still harvesting or the ones who did. will get the opportunities for compensation for their lands depending on the situation. And we will not take the land if the related farm owner does not allow.
- In Kandok, we are studying in nearly 2900 acres. We will use only 69 acres and we will discuss and negotiate as much as we can do for the satisfaction of the both sides. The company and the landlords have the right to choose the options and make decisions. Famers have the right for disagreement for the reason such as it is their grandparents' land. If they agree for the usage by the project, we will decide the price for that acre including the price for crops after discussion with the Land Management Committee including Village Leader and Township Administrative Department. The decision will not be made by our company only. Both sides have to be satisfied.

Comment from U Maung Htay

- Thank You. How much per unit as the farmers cannot afford too much?

Response from U Hang Dal, ICMRE

- Two hundred MW from this generator can be used instantly like using laptops but the generated electricity by Wind Power is thousand MW and it is technically hard to distribute directly to the village. We have to add first our electricity to the government's National Grid.
- According to the Government's Laws, the company did not have the right for selling electricity to end-users directly. We have to sell the electricity to the government and government will distribute to the citizens from substation. We have to sell the government with certain price and the government will sell it to the citizen with their price. The plan includes for distributing by the government to the nearby village via nearest substations.
- The price per unit will be the government's price.

Comment from U Maung Htay

- When the turbines operate and get electricity, how will you manage for main roads, monasteries and pagodas in the village?

Response from U Hang Dal

- Those can be considered in our plan. There will be around 20 turbines and each turbine will be connected with cables. We will construct a substation nearby. There will be maintenance officers and electricity to the monasteries and pagodas may be extended with their plans. That will be better to discuss after construction.

Comment from U Kyaw Hein

- The central industries of the project will be around village or away from the village? I would like to know about the matter which the presenter mentioned that the nearby areas will be examined. Please explain to me as I am not clear for that matter. I would like to know the Central Control system of the Wind Power?

Response from U Tin Min Latt, ICMRE

- Are you asking for the substation?

Comment from U Kyaw Hein

- Yes.

Response from U Tin Min Latt, ICMRE

- We have two parts for controlling. Those are for controlling electricity and controlling turbines. Electricity control is by the substation which will be in our project area. The Control offices will be located in Yangon and here.
- We have to build substation in project area to connect to the National Grid.

Comment from U Kyaw Hein

- Where will be the substation?

Response from U Tin Min Latt, ICMRE

- That will be built on the land of project area, here. In the last visit, I mentioned about the electricity whether it will be sold directly or not.
- As the generated electricity has the voltage difference and according to the nature of Wind Power, electricity is only generated when the wind is blowing. There is windy time and there is a moment when there is no wind. That is why the generated electricity cannot be distributed to the village directly and that have to be added to the National Grid.
- As a benefit for the villages, there is a fact by the government that the villages which are certain distance away from substations will be distributed with electricity within certain period of time. There will be a substation near to the village. The village is 40 miles away from the substation before, but the distance may be 4 miles only at that time. So, the village has more opportunities to get electricity. We have no right to distribute the electricity directly. Although we construct the substation, the government will take the responsibility for management.
- The villagers can urge the village administrator to get the electricity as there will be substation near to the village. When the government negotiates the company to distribute the electricity via our substation, we will not oppose

for that. The government has the right to sell it but not by us. The price will be the Government's price for all citizens in whole country which is 35 kyats per unit for households and 75 kyats per unit for business which is not like 400 kyats per unit for some places where cannot access government's electricity.

Attendance List

No	Name	Village Name
1.	U Chan Myae Thu	Ponna
2.	U Yee Naing	Set Set Yo
3.	U Aung Myo Lwin	Set Set Yo
4.	U Hein Linn Zaw	Set Set Yo
5.	U Tuu	Set Set Yo
6.	U Maung Sann	Set Set Yo
7.	U Htay Aung	Set Set Yo
8.	U Zaw Thein	Set Set Yo
9.	U Naing Linn Aung	Set Set Yo
10.	U Hla Myint	Set Set Yo
11.	U Kyaw Hein	Set Set Yo
12.	U Mya Thee	Set Set Yo
13.	U Aung Zaw Win	Set Set Yo
14.	U Htun Kyi	Set Set Yo
15.	U Paing Soe	Set Set Yo
16.	U Kyi Myint	Set Set Yo
17.	U Aung Naing Htun	Set Set Yo
18.	U Han Nyunt	Set Set Yo
19	U Soe Aung	Set Set Yo
20	U Maung Htay	Set Set Yo
21	U Thann	Set Set Yo
22	U Thein Htun	Set Set Yo
23	U Zaw Oo	Set Set Yo

No	Name	Village Name
24	U Han Maung	Set Set Yo
25	U Pu	Set Set Yo
26	U San Thaw	Set Set Yo
27	U Win Maung	Set Set Yo
28	U Pike Toe	Set Set Yo
29	U Naing Win	Set Set Yo
30	U Win Khaing	Set Set Yo
31	U Nyi To	Set Set Yo
32	U Tin Nyo	Set Set Yo
33	U Kyaw Gyi	Set Set Yo
34	U Thaung Khin	Set Set Yo
35	U Han Kyi	Set Set Yo
36	Daw San San Myint	Set Set Yo
37	Daw Nwe Nwe Moe	Set Set Yo
38	Daw Aye Khaing	Set Set Yo
39	Daw Yin Yin Myint	Set Set Yo
40	Daw Aye Mar	Set Set Yo
41	Daw Than Nwet	Set Set Yo
42	Daw Khin Shwe	Set Set Yo
43	Daw Tin Pyo	Set Set Yo
44	Daw Khin Oo	Set Set Yo
45	U Myat Nyunt	Set Set Yo
46	U Sein Aye	Set Set Yo
47	Daw Kyi Htay	Set Set Yo
48	Daw Pu Aye	Set Set Yo
49	Daw Yin	Set Set Yo

No	Name	Village Name
50	Daw TarTar	Set Set Yo
51	Daw Toe Shwe	Set Set Yo
52	Daw Thein Kyi	Set Set Yo
53	Daw Kyi Aye	Set Set Yo
54	Daw Shwe Kyi	Set Set Yo
55	Daw Hla Myint	Set Set Yo
56	Daw Aye MYInt	Set Set Yo
57	Daw Than Sint	Set Set Yo
58	Daw Pike	Set Set Yo
59	Daw Aye Aye Win	Set Set Yo
60	Daw Tin Moe	Set Set Yo
61	Daw Hla Ohn	Set Set Yo
62	Daw Tin Kyine	Set Set Yo
63	Daw Yee Yee Myint	Set Set Yo
64	Daw Ohn Myaing	Set Set Yo
65	Daw Pu Chaw	Set Set Yo
66	Daw Khaing	Set Set Yo
67	Daw Thein Aye	Set Set Yo
68	Daw Thein Yin	Set Set Yo
69	Daw Pu Tar	Set Set Yo
70	Daw San Yin	Set Set Yo
71	Daw Saw Yee	Set Set Yo
72	Daw Sann Aye	Set Set Yo
73	Daw Ohn Kyi	Set Set Yo
74	Daw Maw Tuu	Set Set Yo
75	Daw Than Nu	Set Set Yo

No	Name	Village Name
76	Daw Khin Ohn Myint	Set Set Yo
77	Daw Hmone Si	Set Set Yo
78	Daw Ohn Shwe	Set Set Yo
79	Daw Mi Tay	Set Set Yo
80	Daw Mar Mar Sann	Set Set Yo
81	Daw Cho Lay	Set Set Yo
82	Daw Aye Sann Win	Set Set Yo

Photo

ERM and ICM’s project presentation to community people in Set Set Yo Village

Meeting of Minutes: Second Stakeholder Consultation of Kandok Wind Power Project

Detail			
Project	Kandok Wind Power Project	**Region / State**	Magway
Venue	Chapel, Yae Nan Ma Village	**Township**	MinHla
District	Thayet		
Objective	Second Stakeholder Consultation Meeting.		
Date	8th November 2018		
Time	09:30 AM		

- U Tin Min Latt (Project Engineer, Infra Capital Myanmar - ReEx) introduced Infra Capital Myanmar – ReEx and explained the brief information of Kandok Wind Power Project in MinHla Township.
- Daw Khin Su Su Naing (Senior Consultant, Environmental Resources Management (ERM)) gave an overview of the Environmental Impact Assessment (EIA) process as per the Myanmar EIA Procedure.

Comment from U Khin Maung San, Yae Nan Ma Village

- The farm areas nearby and can the crops be destroyed by the turbines?

Response from U Tin Min Latt, ICMRE

- The farm areas nearby will not be destroyed but the construction area will be used.
- If there are any negative impacts to the village by the project, you can tell to us anytime and we will manage for that. For land use, the project area will be 69 acres among 2900 acres which we study. We will negotiate with the landowners. We will not build on the land if the owner disagrees and will only build on the area where the owner agrees. That is why we study on the big areas to choose the area for easy shifting of turbine areas. We will discuss with village administrator, local people, Township, District and Village Land Management Committee. And we will decide according to the international standards. For example, a place may be valued as one kyat according to the price of Land Management Committee but with international standards, that area may be valued as one and half kyats. So, the payment would be one and half kyats by the company although it is one kyat for the government's price. Sometimes, there may be less valued than the government's price. But we will try not to be lesser. But that is just an example for understanding.

Comment from U Khin Maung San, Yae Nan Ma Village

- We depend on agriculture for a living since our parent's time and although we have to use migrating farmlands, we do not have Land Form-7. They said that it cannot be issued if the farm is not cultivated. Some areas beyond the Pan-Nay steam do not have Land Form-7. According to the Agricultural Laws in March 2012, U Aung Kyaw Myint, officer from the Survey Department and the administrator for that time, did not process properly. So, the north part of the North Village does not have any Land Form-7 for the really cultivated farmlands. I have presented the farmlands in the project area. The project is currently studying for those farmlands.
- The project area will range west to the Ka-Thaung mountain, Kyauk-Ta-Khar(Rock Door) mountain, Tae-Gyi-Bway mountain and the area from Set-Set- Yo ,Yay- Si Mountain.
- There are U Sein Win's farmlands in the Moe Gaung mountain. I looked at those areas with U Tin Minn Latt.
- I am the chairperson of Village Land Management Committee and there are five persons including secretary of the Survey Department, local person- Ko Khin Maung Soe, Ko Hla Thein and a clerk. We will discuss with Township Land Management Committee and manage for the compensation. I do not know all farmlands for sure because now, they are forest. We can only know whose land will be used when the project starts.
- Now it is difficult to apply Form-7 because our villages do not currently cultivate the farms. I have presented that issue step by step. After finishing the raw map, we have to manage for the owner of land. They will not let any harm to the environment and farms. They will do it after assessing in all aspects.
- Electricity cannot be distributing to the village directly. They have to sell it to government and will combine to National Grid.
- Then the government will distribute to the villages. For transmission lines, there is a plan to build a substation in Set- Set-No in 2020-2021 by National Grid Plan. Yay-Nan-Ma cannot get electricity without transmission line. The cost for National Grid is very expensive. That is why government will distribute from the substation to Yay-Nan-Ma, Kandok from Min Don lines.

- In 2020-2021, the village can get electricity from the National Grid Plan of the government. Now, we cannot know whether it will make benefits or loss.
- With the government's plan and the electricity from the Wind Power, our village can access electricity.
- We can get electricity in 2025- 2030 by the government's plan. If there is no transmission line, there will be no electricity. We can get electricity when we have transmission lines and substation.
- We have no intention to harm the public and no plan to do harm to not only our village but also other villages. We will manage to get the compensation according to the government's standards.

Attendance List

No	Name	Village Name
1.	U Soe Thu Ya	Tha Pyay Myaung
2.	U Kyaw Naing	Tha Pyay Myaung
3.	U Phyu	Taung Ywa
4.	Daw Thandar Aung	Taung Ywa
5.	Daw Aye Aye Aung	Ywa Ta Hla Kone
6.	Daw Khin Moe Moe	Ywa Ta Hla Kone
7.	Daw Khin Sann Myint	Tha Pyay Myaung
8.	Daw Yin Kyi	Tha Pyay Myaung
9.	Daw Kyi Sann	Tha Pyay Myaung
10.	Daw Hla Aye	Tha Pyay Myaung
11.	Daw Sann Myint	Tha Pyay Myaung
12.	Daw Daung Sein	Taung Ywa
13.	U Ye Aung	Taung Ywa
14.	U Than Lwin	Taung Ywa
15.	U Khin Mg Aye	Taung Ywa
16.	U Kyaw Khaing	Taung Ywa
17.	U Kyaw Shwe	Taung Ywa
18.	U Kyaw Oo	Taung Ywa
19	U Kyi Hlaing	Tha Pyay Myaung
20	U Thar Tun	Taung Ywa
21	U Than Ngwe	Taung Ywa
22	U Khin Mg Tun	Taung Ywa
23	U Zaw Lwin	Ka Tin Nyaung
24	Daw Sann Sann Ngwe	Taung Ywa
25	U Twin Pin	Taung Ywa
26	U Kyi Aung	Tha Pyay Myaung
27	Daw Thin Thin Mya	Taung Ywa

No	Name	Village Name
28	U Hla Thein	Ka Tin Nyaung
29	Daw Han Kyi	Tha Pyay Myaung
30	U Win	Yae Nan Ma
31	U Kyi Than	Yae Nan Ma
32	Daw Myat Kyi	Yae Nan Ma
33	Daw Khin Nyunt	Yae Nan Ma
34	Daw Ma Toe	Yae Nan Ma
35	Daw Kyin Hla	Yae Nan Ma
36	Daw Kyi Win	Yae Nan Ma
37	U Myo Naing	Yae Nan Ma
38	U Htay Aung	Yae Nan Ma
39	U Tun Naing	Yae Nan Ma
40	U Min Min	Yae Nan Ma
41	Daw Khin Nwet Kyi	Yae Nan Ma
42	Daw Thin Thin Khaing	Yae Nan Ma
43	Daw Shwe Kyi	Yae Nan Ma
44	Daw Tin Hlaing	Yae Nan Ma
45	U Toe Maung	Yae Nan Ma
46	Daw Than Aye	Tha Pyay Myaung
47	Daw Aye Kyin	Taung Kone
48	Daw Tin Tin Khaing	Tha Pyay Myaung
49	U San Oak	Tha Pyay Myaung
50	U Toe	Tha Pyay Myaung
51	U Tin Hlaing Lay	Tha Pyay Myaung
52	U Aung Lwin Oo	Tha Pyay Myaung
53	U Khin Maung Soe	Taung Ywa
54	U Kyaw Kyaw Naing	Taung Ywa
55	Daw Khin Cho	Taung Ywa
56	Daw Khin Mar Cho	Tha Pyay Myaung
57	Daw Nge Nge	Taung Ywa
58	Daw Yadanar Soe	Taung Ywa
59	Daw Khin Than Nwe	Tha Pyay Myaung
60	Ko Tin Hlaing Win	Tha Pyay Myaung
61	Ko Min Min Tun	Ywa Thar Hla Kone

No	Name	Village Name
62	Daw Myint Myint Yee	Tha Pyay Myaung
63	Daw Thidar	Ka Tin Myaung
64	U Htain Win	Taung Kone
65	Daw Myint Khaing	Taung Ywa
66	U Aung Myo Win	Taung Kone
67	Daw Myint Myint Mu	Taung Ywa
68	U Moe Aung	Tha Pyay Myaung
69	U Kyaw Win	Taung Ywa
70	U Hla Phyoe	Tha Pyay Myaung
71	U Tin Maung	Tha Pyay Myaung
72	U Thaung Tun	Ku Tin
73	U Nyunt Win	Nyin Thwin
74	U Mya Thaung	Tha Pyay Myaung
75	U Nyo Maung	Tha Pyay Myaung
76	Daw Win Than Aye	Taung Kone
77	Daw Phyu Phyu	Taung Ywa
78	Daw Sann Hla	Taung Kone
79	Daw Kyin Twae	Taung Ywa
80	Daw Saw Kyi	Taung Ywa
81	U Hla Sein	Taung Ywa
82	U Zaw Mine	Taung Ywa
83	U Aye Kyu	Taung Ywa
84	U Than Naing Myo	Taung Ywa
85	U Zaw Zaw Oo	Taung Ywa
86	U Zaw Linn Aung	Tha Pyay Myaung
87	U Tin Hla Tun	Tha Pyay Myaung
88	Daw Win Win Than	Taung Ywa
89	Daw Ma Sar	Taung Ywa

Photo

ERM and ICM’s project presentation to community people in Yae Nan Ma Village.

Meeting of Minutes: Second Stakeholder Consultation of Kandok Wind Power Project

Detail			
Project	Kandok Wind Power Project	**Region / State**	Magway
Venue	MinHla Township GAD office	**Township**	Min Hla
District	Thayet		
Objective	Second Stakeholder Consultation Meeting.		
Date	9th November 2018		
Time	09:30 PM		

- U Tin Min Latt (Project Developer, Infra Capital Myanmar - ReEx) introduced Infra Capital Myanmar – ReEx and explained the brief information of Kandok Wind Power Project in MinHla Township.
- Daw Khin Su Su Naing (Senior Consultant, Environmental Resources Management (ERM)) gave an overview of the Environmental Impact Assessment (EIA) process as per the Myanmar EIA Procedure.

Comment from U Tun Tin, Staff officer, Dry Zone Greening Department

- There are five sub-departments under the Ministry of Natural Resources and Environmental Conservation Department. I would like to suggest you that for the environmental conservation aspect, you need to do assessment with advice and suggestions from the Environmental Conservation Department (ECD).

Response from Daw Khin Su Su Naing, ERM

- The Environmental Conservation Department (ECD) is one which checks and reviews the reports and we conduct the impact assessments under the instructions of this department. I'd like to appreciate for your suggestion. We have attained advice and suggestions from director of this department in Magwe Region at the meeting with Chief Minister. And also, we do assessment under the instructions and guidelines of ECD at the national level.

Comment from U Aung Myint Win, Township Electrical Engineer

- When will this project begin to implement? I would like to inform the Regional Engineer as I am working in the department of electricity.

Response from U Tin Min Latt, ICMRE

- It is difficult to respond this question. The company would like to implement as quick as possible and I try to produce electricity in 2021 if PPA contract starts in 2019. At the meeting with Chief Minister, he told to accomplish the project in 2020 if possible. We need the time to conduct feasibility study about the Wind Power Project. We have to study at least one year for the wind force and how much electricity can be produced and how much electricity can contribute to the existing transmission line system. The project implementation period may be one and half year to two years long. We have requested to Chief Minister to contract PPA as quick as possible. We are trying to accomplish in 2020 but we can't give the commitment. Our prediction would be 2021.

Comment from U Aung Myint Win, Township Electrical Engineer

- Which line will contribute to sub-station 132Kv or 230Kv?

Response from U Tin Min Latt, ICMRE

- We have to discuss and negotiate with DPTSC. There are two options including: will contribute with 132Kv or 230Kv? As being 113megawatt, 132Kv is being on the margin and it may obtain either permit or no permit. Therefore, there are two options we have and we are studying both. We have to do after negotiation if it is either 230Kv or 132Kv.

Comment from U Aung Myint Win, Township Electrical Engineer

- Do you have a plan to distribute local community from sub-station? I have heard that there will be the line for 66megawatt sub-station in Kandok region, 2023-24. I would like to know whether electricity from this station will distribute to public or not, will the fee be with government price or company price if available.

Response from U Tin Min Latt, ICMRE

- The fee of electricity will be paid with government price if available because our company has no right to directly distribute to the public. The concept of wind power is that electricity is unstable. That's why we can't distribute to the end users who use electricity directly. Company can only produce electricity and distribution is from the government sector. Our company or other company which has permit individually for distribution can be done. One sub-station is necessary in the project site thus, electricity can be contributed to the MinBu station if available and electricity may be distributed sub-station from MinBu station if not available. Thus, one sub-station may be located nearby local community and then opportunity for electricity may have become more than of the past. But the respective village head and the community need to try and request by themselves. It is appropriate if we connect to Kandok station but we cannot know in advance the long-term government plan. And also, contribution to the Kandok station can be easier I than contribution to the MinBu station. Being it is 113megawatt, we cannot contribute to the 66Kv station but it is appropriate to contribute after separating. It may not be different cost but we need to negotiate DPTSC.

Comment from U Aung Myint Win, Township Electrical Engineer

- I have heard that electricity may be available for the whole township of Min Hla including Sisnose, Kandok, Shan Tut Gyi which are located 20 miles from the station.

Response from U Tin Min Latt, ICMRE

- Our project is not only at the Kandok site. Our wind power project is proposed to generate 113 Megawatts from MinHla (Kandok site), 50 Megawatt from MinDone and 100 Megawatt from Chauk. Therefore, total electricity generation will be 263 Megawatt and then, Kilowatt of electricity which can be produced from 263 Megawatt may be more than the current Kilowatt of electricity in Magwe. The current electricity of Magwe Region is approximately 450 kilowatt and our project could produce 500 Kilowatts. Our project could distribute adequate electricity for the whole region of Magwe. But we can't distribute from only one source according to the generation mixed procedure. There are many electricity generation sources which are from gas, hydro power and something and then electricity from all of them contributes to Magwe station.

Comment from Dr. Paing Khant, Department of Public Health, Min Hla

- It is better to inform local people clearly whether the electricity is available or not. If not, many problems may come out later therefore, local people may have psychological impacts related to the project. The project will be implemented near local community but if you don't give no opportunity for them you may solve the problems from their psychological impacts according to my experience in the health aspect. I would like to suggest that you need to consider about this fact in your assessment and am worried about that it may be exceptionable issue when the project implements.

Response from U Tin Min Latt, ICMRE

- Local people of other villages have asked me like that question. We have no right to distribute directly although we want to distribute directly to them. But we can say about that the opportunity for electricity for local people may become possible than in the past if the sub-station is located nearby. We would respond that we cannot distribute directly from the wind power. They need to cooperate with the government to get electricity and we will help but we cannot give guarantee about that. Thank you for your suggestion.

Comment from U Naw Gyar, Deputy Township Education Officer, Min Hla

- I would like to suggest about the safety for students and children not to construct near to the schools.

Response from Daw Khin Su Su Naing, ERM

- When we do assessment, every project is needed to avoid the places where is situated nearby schools, monasteries, hospitals and clinics, households and so on. I would like to inform that we will contribute the report about the distance from project to local community.

Response from U Tin Min Latt, ICMRE

- In addition, we have no right to implement the project on places where is close to houses and schools according to the international law and guidelines. We will implement on mountain range at least from 400 meter to 1 kilometre away from houses.

Comment from U Soe Htay, Assistant Director, Planning Department

- How much investment will be cost?

Response from U Tin Min Latt, ICMRE

- It is hard to say. We have estimated range of investment generally 2 to 2.5 million for one megawatt. However, please understand that Investment depends upon the infrastructures which is needed to be constructed. In Min Hla, we have to construct new roads and update the existing roads for transportation of machineries and necessary materials for the project. It may cost 250 million for 113 Megawatt so that 2 to 2.5 million for one Megawatt, but please understand that this depends and it is hard to say clearly.

Comment from U Aung Thein Tun, Township Administrator, Min Hla

- I missed the last meetings because I attended the regional meeting in Magwe. Have you already chosen the definite location of 69 acre and area for 27 towers? And I have known that the approximate area for the project site is in the mountain range. But this area may contain forest land, protection area and also shifting cultivation land of local people. So, I would like to know how you manage for these cases and the definite location of 69 acre and area for 27 towers as it may have land compensation issues. And I also have been thinking about that we will get electricity as the comment of Dr. Paing Khant. Because the tower is very close our region. In case of the telecommunication tower in our township, there were some cases of exceptionable issues from local people because local people have knowledge gradually from social media, phones and so on. Therefore, you need to consider and assess for these cases.

Response from U Tin Min Latt, ICMRE

- I would like to respond your suggestion as an administrator. We are studying on 2899 acre that is nearly 3000 acres for location of 27 towers. And we are also studying the history of land with the cooperation of Land Record Department and Department of Administrative and it is nearly to finish. We will compensate not only land with document but also land without document with the approval of village head and Land Record Department regarding t the land compensation issues. We will contribute all area that is Coal Mining area, Oil wells and all land area. The 69 acre is our general prediction. We may use 27 acres for 27 towers if we use one acre for one tower and then places for road constructions and for sub-station as well. Therefore, we have predicted that it may consume 69 acres. About exceptionable issues, we need to follow our implementation in accordance with the international rules and discipline not to have these issues since we have provided the commitment to the partners who funded and invested the project.

Comment from U Aung Min Oo, Staff Officer, Department of Immigration

- I would like to say about the operational procedure. One foreigner came to our township for birds' study in the last trip. The company didn't take the responsibility to submit the permission letter when we asked about that case. There is an instruction that they need the permission to carry out anything from the Regional Government. The company said that they have already submitted to the Regional Government. But they didn't submit to the township level. When the Regional Government asked me, I couldn't give any response definitely.

Response from Daw Khin Su Su Naing, ERM

- I would like to apologize about the last trip of birds' study. First of all, let me explain our operational program of last trip. We submitted along with the documents certainly for this case and attained the permission at the meeting with the Chief Minister. And also, we submitted the detail information what and when we will carry out to the township administrative department. But I don't know exactly what I need to inform and submit to Min Hla. We will submit to all related departments later and we will record phone numbers, fax numbers of the related departments in order to submit not to happen again like that.

Comment from U Aung Min Oo, Staff Officer, Department of Immigration

- Have you seen the agreement for the foreigner before?

Response from Daw Khin Su Su Naing, ERM

- No, I haven't yet.

Comment from U Aung Min Oo, Staff Officer, Department of Immigration

- I think you need to know the agreement how company did the contract. There is no address to stay in this contract.

Response from Daw Khin Su Su Naing, ERM

- Which contract did you say?

Comment from U Aung Min Oo, Staff Officer, Department of Immigration

- This contract is the one which hired a house to stay in Sat Sat Yo for the birds' study. Actually, if foreigner stays in the village, you need to submit form-C. The company needs to inform to the lower level. How do you solve the problem if any accident happens?

Response from Daw Khin Su Su Naing, ERM

- I would like to apologize and I don't undertake all sections of our company. So, I didn't know the contract and this was undertaken by the admin of our company. And even I won't say the concept of bats and it is impossible to know all. But I did the operations with respect under the instructions from the respective departments. Please forgive me for the previous issue. Thank you.

Comment from U Aung Thein Tun, Township Administrator, Min Hla

- Other organizations came to our township and they must submit the detail information when they come, how long they stay and when they go back and so on. If foreigners come, they must submit the visa copy. We won't prevent and inspect them but we need to know whether they are fine or not. This is the fact what U Aung Min Oo wants to say. And then I would like to know how much distance in the yard will be limited for the prohibited zone of the project.

Response from U Tin Min Latt, ICMRE

- Although the boundary may be set for some area of our project site, there will be no prohibited zone in the project site. We will not allow only to enter into the buildings of the project because we concern about both safety and disturbance of the project work. The height of lowest wind tower is about 100 meters and the diameter of blade is 140m long. So, the height from bottom to the edge of down blade is 30m in length. If we choose the wind tower from Denmark, the height is 150 meter and diameter of blade is 150 meters. So, the height from bottom to the edge of down blade is 75m long. If the tower doesn't fall or blade doesn't break due to any serious case, there will be no impacts.

Comment from Dr. Aung Myint, Min Hla

- I have known that three points have been chosen to generate electricity from wind power in our country and ICM Company was surveying them. I'd like to suggest saying about that the electricity from these three sources will contribute to transmission line conducting public consultation at MinDone and Chauk townships like Min Hla. It is better to say in the township meetings how much megawatt will contribute from each source to national grid and how much electricity will distribute across the whole country per year. And then awareness of local people for the prevention for safety will be carried out intensively when project starts implementation. You need to study carefully both local birds, bats and especially migratory birds which sometimes migrate in the winter. The weight of some migrating birds are approximately 14 pounds according to my experience obtained while I am staying in the in the Rakhine Range.

Response from U Tin Min Latt, ICMRE

- Thank you for your valuable suggestions. We will note down and contribute in to the report. We will post the guide-boards and sign-boards for all special zones of the project sites for the safety.

Comment from Dr. Aung Myint, Min Hla

- It is important to do assessment on the noise pollution and air quality condition of this region in which hazardous gas will be contaminated in the atmosphere before project begins to implement. And you need to consider the mitigation measures and impact assessment.

Response from Daw Khin Su Su Naing, ERM

- In case of the project with special impacts for instance generation from LLD or HFO, we will consider air quality about these impacts. Being the wind power project, we have to focus mainly on the characteristics of land area and biodiversity especially birds. But we will include your suggestions both in the meeting minutes and the report.

Comment from Dr. Aung Myint, Min Hla

- If industries and office buildings will be constructed, trees will be cut for land clearing, it may result in air pollution. Therefore, I would like to suggest to conduct initial baseline data collection before the project begins to start.in order to compare with the data over the project period.

Response from Daw Khin Su Su Naing, ERM

- We will record and write in report and thank you for your suggestions.

Attendance List

No	Name	Position/Organization	Address
1	U Aung Thein Tun	Township Administrator	MinHla
2	U Mg Ko	Regional Hluttaw Representative	MinHla
3	U Hlaing Myint Than	Regional Hluttaw Representative	MinHla
4	Daw Theingi Kyaw	Information and Public Relations Department	MinHla
5	U Myo Thant	Administrator of Myoet Ma quarter	MinHla
6	U Thae Lwin	Town-person from South Quarter	MinHla
7	U Thein Htike Win	Town-person from South Quarter	MinHla
8	U Naw Gyar	TEO Company	MinHla
9	U Kyaw Than	Deputy township police officer	MinHla
10	Daw Nilar Tun	Town-person from No (2) Quarter, Khan Tat	MinHla
11	U Wai Phyo Aung	Deputy staff officer/Fire Service Department	MinHla
12	U Kyaw Kyaw Moe	Manager	MinHla
13	U Tun Tin	Staff Officer/Dry Zone Greening Department	MinHla
14	U Tun Oo	Forest Department	MinHla
15	U Than Oo	Staff Officer/ Road Transportation Administration Department	MinHla
16	U Aung Min Oo	Staff Officer/Department of Immigration	MinHla
17	U Soe Htay	Township Planning Department	MinHla
18	U Zaw	Township Statics Department	MinHla
19	U Nay Lin Tun	Department off Rural Development	MinHla
20	U Aung Kyaw Tun	Directorate of Communications	MinHla
21	U Min Zaw Han	Staff Officer, Department off Rural Development	MinHla

No	Name	Position/Organization	Address
22	Daw Khin Nyein Thu	Deputy Staff Officer/ Custom Department	MinHla
23	Daw Su Mar Phyo	Assistant Health Officer/ Department of Traditional Medicine	MinHla
24	Dr. Aung Myint	Town Elders	MinHla
25	U Win Ko	Town-person in Kwat Thit Quarter	MinHla
26	U Aung Myint Win	Township Electrical Engineer	MinHla
27	U Myint Oo	Department of Agriculture	MinHla
28	Dr. Win Thet	Livestock, Breeding and Veterinary Department	MinHla
29	U Nay Ko Aung	Law Officer	MinHla
30	U Hlwan Moe Than	Township Election Commission	MinHla
31	Dr. Paing Khant	Department of Public Health	MinHla
32	U Win Zaw Aye	Department of Sports and Physical Education	MinHla

Photo








ERM and ICM's project presentation to community people in Min Hla Township GAD Office.