Myanmar Electric Power Project

Environment and Social Assessment for the Thaton Gas-Fired Power Plant, Mon State, Myanmar

REPORT

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Norconsult

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List of Acronyms and Abbreviations

CCGT	Combined Cycle Gas Turbine
CO2	Carbon Dioxide
dB	A-weighted Decibel
DoE	Department of Environment
ECO	Environmental Control Officer
EERT	External Emergency Response Team
EHS-MS	Environmental Health & Safety Management System
EMS	Environmental Management System
ESMP	Environmental and Social Management Plan
ERT	Emergency Response Team
ERTL	Emergency Response Team Leader
ESO	Environmental Site Officer
FGD	Focus Group Discussion
GHG	Greenhouse Gas
GoM	Government of Myanmar
GT	Gas Turbine
GW	Giga Watt
HHs	Household heads
HHC	Households with connection to electric grid
HHN	Household without connection yet to electric grid
HRSG	Heat Recovery Steam Generator
HSE	Health, Safety and Environment
IPs	Indigenous Peoples
K	Kyat
KII	Key Informants' Interview
MDG	Millennium Development Goal
MEPE	Ministry of Electric Power Enterprise
MEPP	Myanmar Electric Power Project
MMCFD	Million Cubic Feet Per Day
MoEF	Ministry of Environment and Forestry
MW	Mega Watt
NOx	Nitrogen Oxide
PI	Performance Indicator
SIA	Social impact assessment
USD	United States Dollar
WB	World Bank

EXECUTIVE SUMMARY

Introduction

Myanmar is facing large electricity shortages (about 20% of electric power demand) and high risk of blackouts in the power system. The power system experienced more than 15 blackouts in 2012. Most of the time, the power grid operates at frequency below 50 Hz, and often as low as 49 Hz. The main causes of current situation are (a) fast increase in electricity demand during the last couple of years; and (b) lack of firm generation capacity in hydropower plants which account for about 75% of power generation mix in Myanmar; and (c) limited gas-fired power generation which is unable to compensate strong seasonal variations in hydropower production. The situation is further aggravated by the fact that the annual peak demand occurs at the end of dry season (April-May) when the production of hydropower plants is at the lowest level.

The Government of Myanmar through Ministry of Electric Power (MOEP) has requested the World Bank's (WB) support in scaling-up gas-fired power generation in order to rapidly reduce (in the near to medium term) and eventually eliminate (in the medium to longer term) electricity shortages and improve reliability and quality of power supply in the country. Also, MOEP and Myanmar Electric Power Enterprise (MEPE) have identified several existing Gas Turbine (GT) stations as locations for a possible quick expansion of gas-fired power generation by using Combined Cycle Gas Turbine (CCGT) technology.

This environmental and social assessment covers the phased replacement of the existing gas turbines at the Thaton GT Power Plant in Mon State, Myanmar. This activity is a component of the umbrella Myanmar Electric Power Project (MEPP) funded by the World Bank.

Environmental and Social Policy and Guidelines

The Environmental Policy in Myanmar is as per Law for Environmental Conservation, enacted in 2012. The Ministry of Environment and Forestry (MoEF) administers the legal framework and environmental legislation in Myanmar. At this time the regulations on environment and social impact assessment are only in draft form and have not been officially released.

The Department of Environment under the MoEF has indicated that the proposed activities at Thaton would require environmental impact assessment.

In Myanmar there is no specific policy required for social impact assessment before a development project is implemented. There is no specific law governing ethnic minorities. The Ministry of Immigration and Population is the agency responsible for data and issues on ethnic minorities. Clear provision on the rights and access to properties especially for ethnic minorities have not been defined

The current institutional capacity in Myanmar to administer an environmental and social impact process is very limited. Further, at the present time the environmental authorities in Myanmar have insufficient staff, training, facilities and resources to provide effective on-going environmental monitoring of new projects.

The operator of the Thaton GT plant, MEPE, similarly has extremely limited capacity for environmental management.

The Proposed Upgrade

The recommendation from the due initial technical study on the MEPP was to prioritise the development of a new CCGT power plant at Thaton. The conclusion was based on the fact that the old gas turbines at Thaton are very old and the existing electrical connections both to 66 kV and 230 kV grids are good. The assessment indicates that the existing electrical network can absorb the additional power produced at the new CCGT without any large modifications.

The fuel gas available at Thaton is limited to 25 MMCFD limiting the selected gas turbines with respect to maximum power output. High thermal efficiency, environmentally friendly gas turbine technology shall be selected and it essential to achieve an improvement in the working environment. The design proposed will meet all the goals set by the World Bank based on international standards and workmanship.

Since the high ambient temperature has a negative effect on the gas turbine performance, special measures are initiated to increase the power output and thermal efficiency. Combustion air intakes will be equipped with chillers cooling down the air entering the inlet of the gas turbines by more than 20 degrees Celsius. This will improve the thermal efficiency significantly. In addition to this water injection based on knock out water from the chillers may be considered.

As the demand of power is rapidly increasing in Myanmar, it is recommended to install and start operating the gas turbines generator sets as open cycle machines as fast as possible, probably less than one year after contract award. The steam cycle involves a higher degree of tailoring to the Thaton environment and needs longer delivery and construction time. The recommended solution (Alternative 2) will have an available capacity of about 106 MW and a thermal efficiency of about 49%.

The refurbished Thaton Plant is envisaged to move towards a Combined Cycle Gas Turbine (CCGT) operation. The gas turbines hot exhaust thus powers a steam power plant, this can achieve a higher thermal efficiency; in contrast to a single cycle steam power plant which is limited to efficiencies of around 35-42% in temperate climates. Cogeneration is also possible by utilising the hot exhaust gas for purposes other than electricity generation.

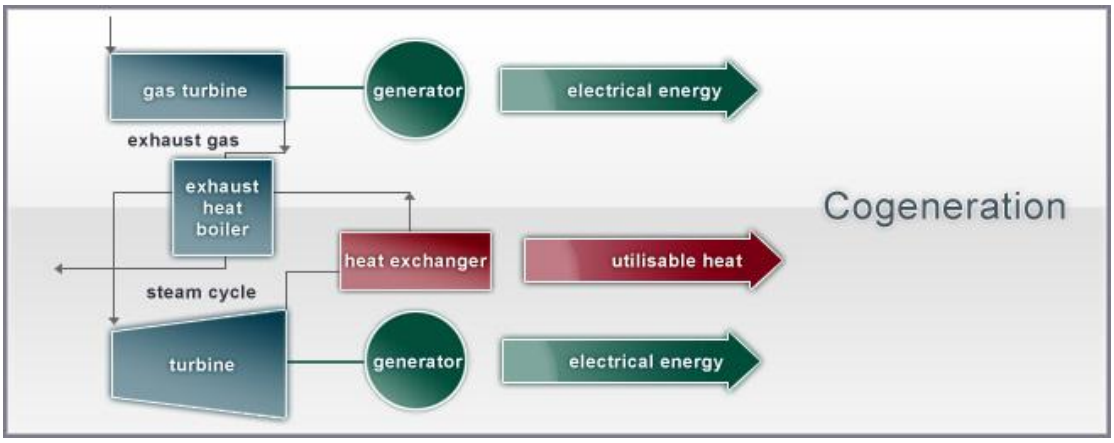


Figure a: Simplified process diagram for a CCGT

Project Setting

The Thaton GT station is located in a rural area approximately 5 km North-east of the township of Thaton. Thaton township is the administrative centre for Thaton District which is within Mon State, Myanmar.

Physically the land in the project area is relatively flat coastal plain. Land use surrounding the GT station is agricultural, dominated by rubber plantations. Adjoining the site to the west is a tyre factory. Closest habitation is some 500m from the site perimeter fence.

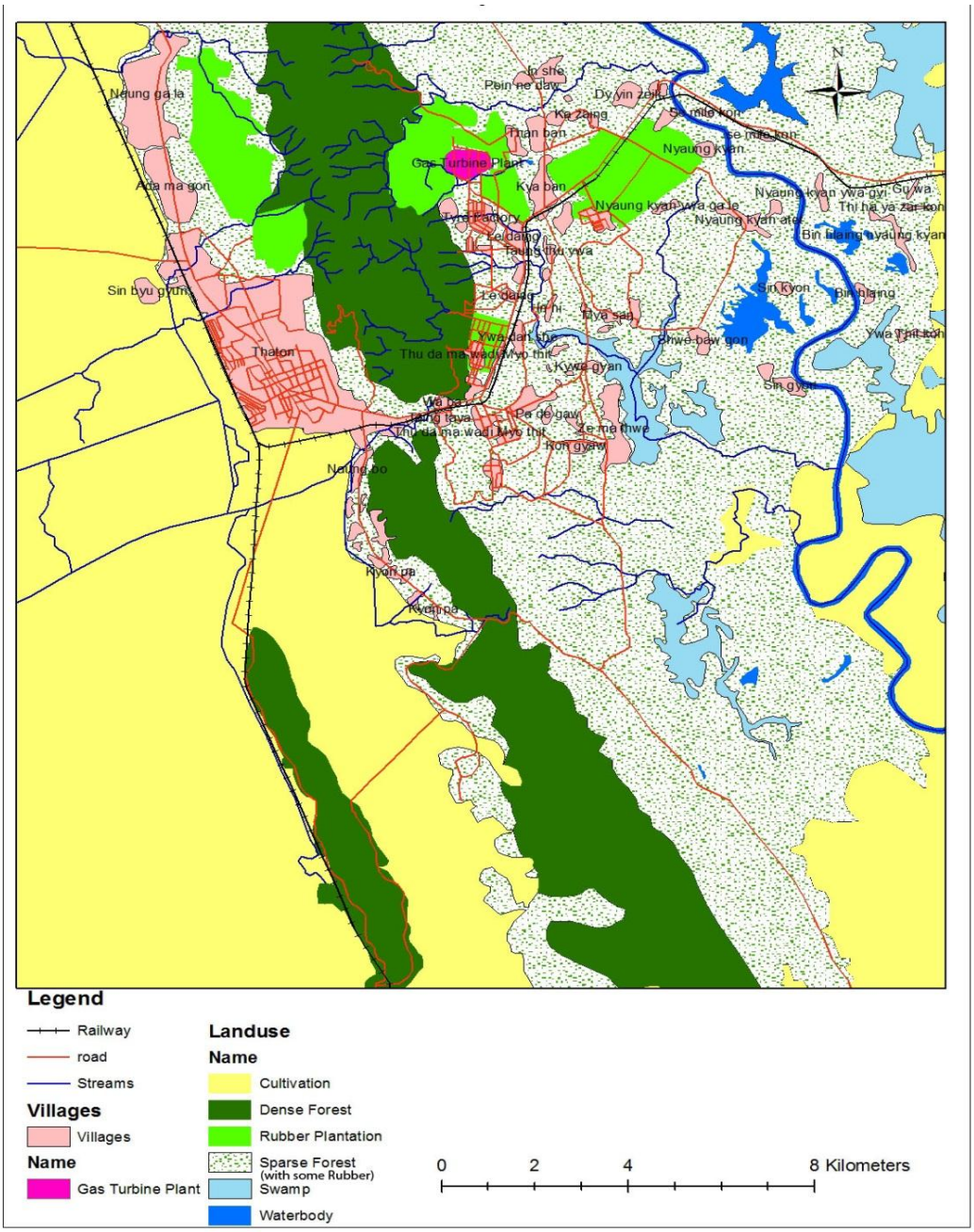


Figure b: Thaton GT station, location and landuse map

Environmental Issues

There are a number of environmental issues associated with the current operation of the Thaton GT plant; primarily related to HSE.

Table a: Environmental Issues

Issue	Comment
Health and Safety	There are 108 staff employed at the site; 69 male and 39 female. No health and safety manuals exist (only operation and maintenance manuals) There is no regular safety training conducted and no health and safety audits have been conducted. Staff are not issued with proper protective equipment (PPE) There are no first aid trained staff in the GT station itself; however a clinic with limited facilities and staffed by a nurse is contained on the compound. The nearest hospital is 10km away; there is no ambulance on site.
Noise	The current turbines operate at above the recommended noise levels in and around the plant. Staff are not issued with ear defenders.
Water supply	The site is not on mains water supply. Process water is delivered to the GT station from the neighbouring tyre factory facility where it is subject to limited treatment in settling ponds. Chemical treatment of the water takes place at the GT site to reduce lime concentrations (most treatment occurring in the dry season). Three kind of chemicals are used in treatment of water; Hydrochloric acid (HCl) used for alkylation, Caustic Soda (NaOH, used for neutralizing agents, and Trisodium phosphate (Na3PO4), used as a water softener. Process water is returned to the neighbouring factory as steam for use in that facility. Water supply for the staff is provided through tube wells.
Sanitation	The site is not on mains sewerage. All waste water and sewerage is discharged to ground. Discharges to the surroundings are not directed to and not a particular risk to fields with crops (edible produce).
Solid waste	There is no plan for handling of solid waste. Occasional collection occurs but much waste is either burnt or buried at site.
Flooding	Flooding of the site is not reported as an issue. Open drains carry away excess water to the surrounding fields in the rainy season. Discharges to the surroundings are not directed to and not a particular risk to fields with crops (edible produce).
Monitoring	No environmental monitoring currently takes place. There is no equipment to measure noise or air pollution levels. There are no wells to measure possible groundwater pollution in or around the site.

The premise for the study was that the existing turbines are old technology and the new ones would be an overall improvement in terms of noise and air pollution and also efficiency.

Following the establishment of the baseline and the environmental and social screening an initial assessment of potential impacts was been undertaken against a standardised checklist of potential issues.

Overall, the assessment concludes that only minor changes or impacts are expected to occur to the bio-physical and socio-economic environment as a result of project implementation.

For air quality the report takes indicative CO2 and NOx from the current technology turbines and compares it against indicative emissions per MW produced from new turbines - the result indicates higher CO2 emissions in total but a net reduction in NOx emissions. Further, particulate matter from gas turbine exhaust is generally less than one micrometer (micron) in diameter, thus, the emission rates of PM10, and PM2.5 from gas turbines are theoretically equivalent and are assumed not to be significant at Thaton.

For noise which is of greater concern, spot checks were made to establish baseline conditions. Results showed high noise levels within the turbine housing and the compound. It is assumed that the much quieter replacement turbines will gave a net benefit both for staff at the plant and surrounding communities. Noise levels at the fence surrounding the site currently reach levels of 60-70 dB(A) and at places (main entrance) levels up to 80 dB(A). The noise levels from the new turbines, in compliance with international standards, are expected to be reduced to between 50 (night-time) and 55 dB(A) (daytime) at the fence of the site.

There is not a process wastewater discharge component from the existing plant and it is assumed not for the new turbines. Solid waste generation is limited to office and domestic waste from the administration facilities and some limited waste from maintenance and workshop activities. There is no effective handling of this waste and disposal is an issue though on a small scale.

The new turbines will not run in parallel with the old turbines due to a shortage of a gas - they would be just an emergency reserve/backup thus cumulative impacts are not a significant issue.

Negative environmental impacts associated with the installation of new turbines will be almost entirely confined to the existing fenced compound and assuming implementation of an effective ESMP will not be significant.

In the operational phase the Project will deliver net environmental benefits through reduced noise levels and NOx emissions. Further benefit enhancement may take place if an integrated environmental, health & safety management system (EHS-MS) is established. However, introducing an EHS-MS will require investment by the owner in training, tools and professional support.

In addition, to verify the success of the ESMP through the installation phase and to ensure that environmental performance in the operational phase is acceptable relative to national and international standards an experienced independent third party environmental auditor will need to be appointed.

Environmental Management

To ensure the Project is implemented in an environmentally and socially responsible way mitigation measures should be applied to potential negative impacts and supported by a management and monitoring framework. The main recommendations are:

1. An environmental and social management plan (ESMP) should accompany the installation phase
2. The ESMP be followed-up in the operational phase and further developed as an environmental, health & safety management system for the Plant.
3. Health, safety and environment (HSE) routines be implemented and enforced for both construction/installation workers and permanent operational staff
4. Actions be taken to ensure that there is independent third party inspection and validation of the effectiveness of health, safety and environment controls

An ESMP has been prepared as part of project preparation, consisting of:

- mitigating measures to deal with impacts during installation, also to be incorporated in contractor contract at the start of project implementation
- responsibilities for mitigating actions
- monitoring / supervision requirements

The proposed roles and responsibilities for the ESMP are:

Environmental Control Officer (ECO)

A suitably qualified environmental control officer (ECO) should be nominated from MEPE and trained before installation begins. The ECO should ensure:

- implementation of the ESMP
- regular monitoring and site inspections
- Contractor abides by the ESMP

The ECO should undertake regular site inspections and the results should be recorded and as part of ESMP reporting.

Environmental Site Officer (ESO)

An ESO should be appointed/nominated by the Contractor from his site personnel to:

- Attend all construction site meetings.
- Undertake the activities required in the terms of the ESMP.
- Brief workers before installation commences (and regularly reinforce).
- Undertake regular monitoring during installation.
- Submit reports to the ECO on the implementation of the ESMP compliance with the conditions of approval and implementation of the mitigation measures in the ESMP.
- Report to the ECO any departures from the ESMP promptly with explanations for such.

Prior to installation the MEPE should prepare for environmental, health & safety management system which draws together environment mitigation measures, ESMP recommendations, HSE priorities and monitoring procedures for both the installation and operational phases. The EHS-MS should ensure adherence to USEPA, EU Directives, or equivalent and to the World Bank safety, health and environment (SHE) General Guidelines and the Bank's SHE Guidelines for Thermal Power Generation.

The EHS-MS should set-out in detail the standards to be applied, the organisational structure for implementation, the monitoring regime, the key performance indicators, the provisions for independent audit, the procedures to address non-conformity and the allocating of costs.

Environmental and Social Management Plan (ESMP).
The ESMP prepared includes policies requirements and applicable environmental and social standards; requirements for the development during project implementation of an EHS Management System to be applied to operations at the project site; and mitigation measures, monitoring plans, implementation arrangements, and capacity building for implementation of the ESMP. The ESMP also gives the estimated costs for the mitigation measures and monitoring programs for both the construction and operation phases. To ensure adequate implementation of the ESMP and development of the EHS-MS, the following activities and steps are to be followed during project implementation:

a) A firm will be contracted to give day-to-day support to MEPE for the implementation of the ESMP including supervision of the project investment works and the development of the EHS-MS.

b) Following the selection of the turn-key contractor, the contractor will be required to prepare an EHS plan for works implementation, subject to MEPE and World Bank review. The contractor's EHS plan need to comply to the ESMP and further specify environmental procedures, e.g. for the management of construction waste materials.

c) A comprehensive EHS due diligence audit will be conducted into the existing facilities and operational practices to form the basis for the development of the EHS-MS. The results of the audit are subject to MEPE and World Bank review.

d) The EHS-MS for the Thaton GT station will be developed and will be ready and adopted prior to the commissioning of the new facilities. The draft EHS-MS will be subject to MEPE and World Bank review and will be audited by a competent and internationally accredited agency. The EHS-MS will cover waste and wastewater management, environmental monitoring, worker's health and safety procedures, inspection regimes for these areas, basic emergency procedures, specifications for recurrent training programs, a three-year program for continuous performance improvements, reporting and supervision requirements including reporting of problems and near-misses, and a scheme for independent system audits.

The provisional cost estimate for implementing the EHS-MS including the ESMP is USD 678,500.

Social Assessment

The Social Assessment undertaken was based upon the screening process of WB OP 4.10. The objective of the assessment is to provide an integrated framework for incorporating consultation, participation, gender and social analysis into the project's planning. Overall, social assessment is undertaken in the interest of minimizing identified social risks and vulnerabilities, and towards identification of social protection measures enhancing anticipated project benefits and opportunities.

There are three villages surrounding the proposed project site. The two nearest villages include Than Ban, and Kyar Pan. Both villages lie about 1.5 kilometres from the project site. Than Ban has a total household population of 150 households (825 persons) while Kyar Pan, 330 households (1500 persons). Both Than Ban and Kyar Pan are administered by one Administrator. The majority of people living in Than Ban are Kayin (90%) and in Kyarpan (45%). The remaining are other ethnic groups. Another village, Nyaun Wyne, is located 2.5 kilometres away from the project site, it is comprised of 252 households (1416 persons) with varied ethnic groups composed of Keren (1138 persons); Bamar (180 persons) and Pao (158 persons). The majority in this village are Kayin, 80%.

The baseline social data were developed through a structured format and incorporate key data for the three IP village settlements highlighting ethnicity, education, living condition, occupation, gender aspects, poverty and livelihoods. These were administered taking into account proximity of the village households to the project site and based on noise and pollution level emanating from the current turbines.

A random sampling size of 10% was applied, representing 85 households, categorized into (i) households connected to the power supply, (HHC) and households without connection (HHN). The desegregation is useful to gain an understanding on the living condition of households where electric power supply plays an important role in the economy, particularly of ethnic village minorities.

Participatory techniques were used to gather reliable information from key informants and focus groups with discussion and consultation, structured to afford a level of cross-check and comparison. Key consultations and meetings have taken place in each village (and within the respective villages of Than Ban, Kyar Pan and Nyaun Wyne).

A stakeholder's workshop was also held on May 20, 2013 attended by 50 participants. This activity has allowed for wider public vetting and comments on the proposed project, affording both a more grounded understanding of local aspirations and needs, as well as securing stakeholder inputs/recommendations.

While there are varied ethnic groups, the IP villages are cohesive. Social integration and participation is observed in community affairs, children going to the same school, intermarriages, and women are involved within the community social network.

Table b: Population and ethnicity in the study area

Village name	No. Of HHs	No. Of Persons	Distance from project site	Ethnicity		
				Keyin	Burmese	Pao /Others
Than Ban	150	800	1.5 kms	90%	3%	7%
Kyar Pan	330	1,500	1.5 kms	45%	5%	40%
NyaunWyne	252	1,476	2.5 kms	80%	8.4%	19.6
Staff House	120	576	.50 kms		90%	10%

The perceived benefits and impacts arising from FGDs and Key Informants Interviews were.

Positive Impact

- Regular electric supply will enable households, business sector and health institutions to perform efficiently. Potential increase of opportunity for economic development through short term employment
- Increase in trade and industry resulting from urban and rural improvement usually associated with the presence of an efficient and regular supply of electricity.
- Expressed and felt need for the IP village to obtain grid connection.

It was emphasized during the consultation and workshop that job opportunities associated with the upgrading will be extremely limited.

Negative Impact

- Noise, pollution and possible waste materials affecting the environment

Overall, there will be no displacement of households associated with land acquisition, no loss of business establishments, productive assets, cultural heritage or livelihood.

A culturally appropriate grievance redress mechanism will be established in consultation with potentially affected IPs to address grievances by the affected Indigenous Peoples' communities and to ensure that any project related complaints are promptly addressed. A first instance of dispute handling where IPs are fully represented will be set up with the aim of settling any disputes amicably. If necessary, the project will establish a committee which will include IP representatives and project management. Court cases will be time consuming and expensive and it is therefore critical to establish more informal first and second tier grievance management mechanisms. Each case should be carefully documented and the nature of grievance, agreed actions to be taken and subsequent monitoring must be recorded.

Stakeholder Workshop

The Stakeholders Workshop was organized to disclose the draft environmental and social study. A total of 50 participants from various organizations and Ministries attended the Workshop on May 20, 2013, held at the Two Lakes Resort in Thaton Township. The following issues, comments and recommendations were raised during the workshop.

Main Issues:

- Waste and pollution emanating from the Project might affect productive land and other livelihood resources;

- Any educational, financial assistance considered for the villages;
- Other project benefits of the villages resulting from the project;
- Some could afford the connection fee while others could not;
- Generation capacity of the current plant and the proposed gas turbine

Stakeholders' Recommendations:

- There should be appropriate measures to manage environmental concerns such as pollution, noise and waste materials;
- Target for rural electrification is set at 100% full coverage by 2030;
- Inclusion of villages near the project site for electrification.

The social assessment showed high acceptability as affirmed by the FGDs, SES and stakeholder's workshop. There is a clear demand for improved power supply as over 90% of households especially among the HHN, who indicated their interest to connect to the grid. There is also willingness to pay more for improvement of services among the HHC.

The social assessment findings show that connection fee of is beyond the budget of the poor and near poor IP households. While most IPs interviewed welcomed the proposed project, there are viewed potentials in the process for either increasing social inclusion or exclusion, as the flow of services between rural-urban systems and in the IP villages vary in terms of the provision of basic services and the government's priority for local electrification.

The social assessment affirms that there will be no displacement of IPs, no loss of land or any assets, cultural heritage. The negative impact of the project is limited to noise and pollution in the installation phase which can be largely mitigated.

Overall. Broad Community Support (BCS) was established and the IP stakeholders supported the project based on a full understanding that this project would be limited to power generation/upgrading of turbines.

Safeguard Policies

The study concludes that no World Bank safeguard polices will be triggered concerning biodiversity or involuntary resettlement, however, OP 4.10 concerning indigenous peoples will be triggered.

Regarding OP 4.12 on Involuntary Resettlement; there will be no physical resettlement, land acquisition or loss of income associated with the project, and all construction-related activities will take place within the existing site. No other entity except the existing power plant which has been in operation since 1975, is currently using the project land. The review during Project preparation did not identify any legacy issues related to prior land use, and no issues were raised during the consultations.

The Indigenous Peoples policy is triggered because of the presence of ethnic minorities (EMs)/Indigenous Peoples (IPs) within the project's area of influence. The overwhelming majority (over 90 percent) of the beneficiaries and affected peoples in the Project influence area are IPs and, therefore, a separate Indigenous Peoples Plan (IPP) has not been prepared, but relevant elements of the policy will be integrated into project design. This includes continued consultation to be carried out during the project implementation of the ESMP.

Broad community support (BCS) based on a process of free, prior and informed consultation has been documented both during project preparation and subsequent public consultations. Access to electricity is one of the main priorities of local IPs, as 85 percent of households are not electrified, 73 percent of which cannot afford the connection fee. There are expectations that the project will help increase access to electricity in the three villages considered to be within the zone of influence of the project, but BCS was nevertheless reached based upon an understanding that electrification of villages is beyond the scope of this project. However, the

Bank will provide technical assistance and support to the government to prepare and accelerate rural electrification in the three IP villages in the Project's area of influence. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals which are connected to the grid, will be provided with more reliable power supply. The improved power supply in the region will result in considerable indirect benefits, which will include increased economic activities and job creation.

Environmental Classification

Given that there is a need to establish best practice for environmental and social impact assessment in Myanmar (and DoE indicates the project should undergo an EIA) the suggested category is "B" according to the World Bank classification.

1 Introduction

1.1 PROJECT OBJECTIVES

This environmental and social assessment covers the phased replacement of the existing gas turbines at the Thaton GT Power Plant in Mon State, Myanmar. The new turbines are not planned to run in parallel with the old turbines due to a shortage of a gas - they would be just remain as an emergency reserve/backup. This activity is a component of the umbrella Myanmar Electric Power Project (MEPP) funded by the World Bank.

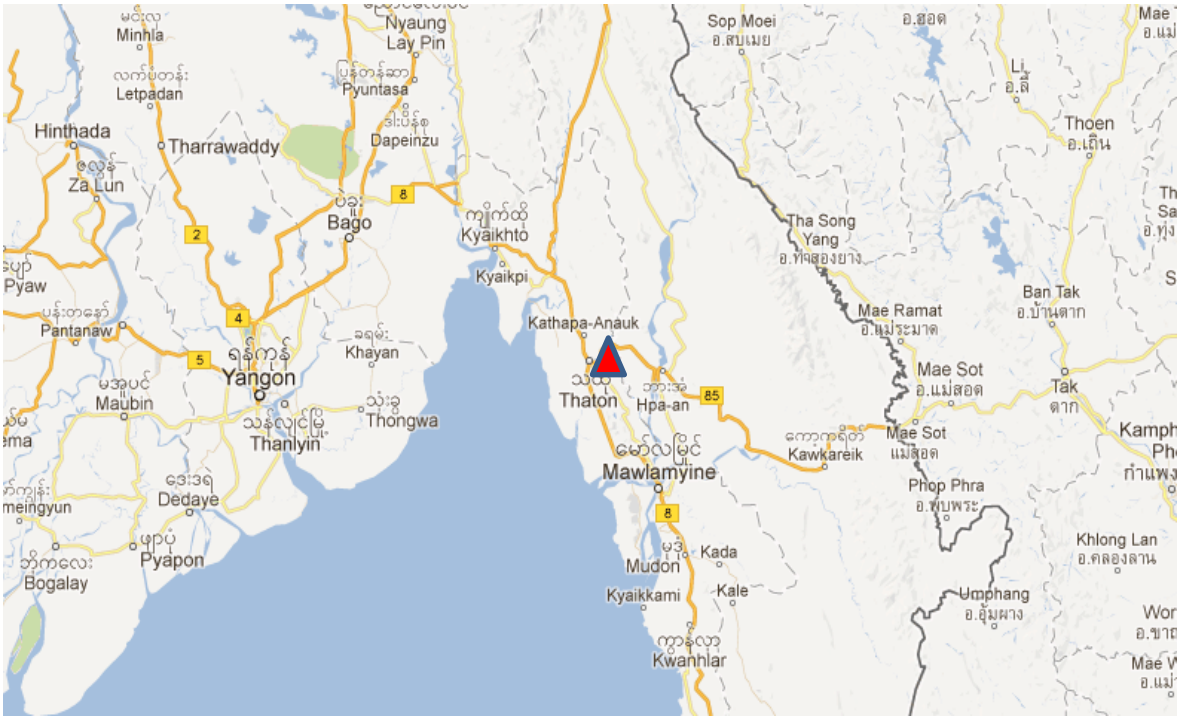


Figure 1: Thaton Location (source: Google Maps)

The main objective of the proposed Myanmar Electric Power Project is to increase capacity and efficiency of gas-fired power generation, and, therefore, help reduce electricity shortages in the country. An additional objective is to support the Ministry of Electric Power and Myanmar Electric Power Enterprise in strengthening their institutional capacity.

Achievement of the project development objectives will be measured by the: (i) capacity of gas-fired power generation (MW) added to the power system; (ii) electricity production (GWh) from new gas-fired power generation; (iii) increase in efficiency of gas-fired power generation (%); and (iv) reduction of emissions per kWh generated.

Myanmar is facing large electricity shortages (about 20% of current demand) and high risk of blackouts. The expansion of existing Gas Turbine (GT) stations through the installation of Combined Cycle Gas Turbines (CCGTs) has been identified as the fastest way to increase efficiency of gas utilization, increase generating capacity and reduce emissions.

Myanmar Electric Power Enterprise (MEPE) operates ten GTs and proposed four of them for the possible replacement of old and low-efficiency GTs, including Thaton GT station which is currently considered the leading candidate for possible WB support and it is expected to be the first component of the proposed project.

A lack of legal requirements and limited institutional capacity for ensuring effective safeguard preparation and implementation in infrastructure projects is one of major hurdles for international financial institutions and responsible investors in Myanmar. While this issue is not limited to the energy sector, new and large energy and power projects will be among the first to experience this bottleneck.

Addressing this constraint will require concerted efforts among several government agencies to introduce and start implementing appropriate social and environmental protection policies. A longer term initiative to build institutional capacity and provide adequate training must be developed. Initiatives to improve safeguard capacity should build upon the lessons learned from other countries in the region and should ideally involve other key donors in Myanmar.

1.2 ENVIRONMENTAL POLICY

The Environmental Policy in Myanmar is as per Law for Environmental Conservation, enacted in 2012. The Ministry of Environment and Forestry (MoEF) administers the legal framework and environmental legislation in Myanmar. At this time the regulations on environment and social impact assessment are only in draft form and have not been officially released.

The Department of Environment under the MoEF has indicated that the proposed activities at Thaton would require environmental impact assessment (Assistant Director DoE, pers comm).

In Myanmar there is no specific policy required for social impact assessment before a development project is implemented. There is no specific law governing ethnic minorities. The Ministry of Immigration and Population is the agency responsible for data and issues on ethnic minorities. Clear provision on the rights and access to properties especially for ethnic minorities have not been defined

Current projects undertaken by in Myanmar such as construction of roads and dams, mining, logging, as well as coal, oil, and gas extraction do not yet have any standardized EIA and the local people are not generally consulted. There are no requirements in the laws of Myanmar for mitigation measures of potential adverse impacts such as involuntary resettlement. Public participation is not considered mandatory, and usually done at the latter stage, and is determined by the government's discretion whether public participation is required or not, allowing the government to avoid public participation for controversial projects.

Within the context of the project's social assessment, relevant policies have been reviewed to ensure the protection on rights of vulnerable groups such as women, children and particularly the ethnic communities.

- **Constitution 2008 –**provision on the rights of the people and administration of the overall political, economic procedures of the nation, giving full power to the Union **Land Nationalization Act –** established in 1948 and amended in 1953, stipulating that the state maintains ownership of all lands.

Laws on Human Rights

- The State Protection Law 1975 - “The Law to safeguard the State against the dangers of those desiring to cause subversive acts”. This law was amended in 1991 increasing the time someone could be held without arrest, trial or sentencing from 3 to 5 years.
- Unlawful Association Act 1908 – Anyone deemed to be involved or connected with an organisation that is declared unlawful by the President of the Union, can be imprisoned.
- The Printer and Publishers Registration Law 1962 – All publications in Burma are subject to censorship and prior to publication must be approved by the Press Censorship Board. Individuals who violate this law can be sentenced to 7 years imprisonment and/or fined 30,000 Kyat (US$50).
- Emergency Provision Act 1950 – individuals seen to be disrupting the morality and stability of the country can be sentenced to up to 7 years imprisonment.
- Video Law 1985 - individuals making, copying or distributing unauthorised videos, including ammeter videos can be sentenced to up to 3 years imprisonment.
- Law 5/95 – this law prohibits individuals from initiating discussion about the national convention in Burma, which was tasked with creating guidelines for the drafting of the 2008 Constitution. Violators of this law can be sentenced to 20 years imprisonment.
- Penal code – Legislation against child abuse, child pornography, kidnapping and human trafficking.
- The Child Law, 1993, promulgated by the State Law and Order Restoration Council Law stipulating protection for children.
- Article 371 of the Penal Code prohibits "habitual dealing in slaves" or buying or disposing of any person as a slaver (Article 370).
- The Anti-Trafficking in Persons Law – prohibits human trafficking in any form.

The 1993 Child Law has noted national, divisional state and township child rights committees established. However, cases on violations of child rights continue, particularly the recruitment of children into the armed forces by the Burmese army and use of child labour are still rampant. There have been criticisms that these committees do not provide avenues for people to make complaints, particularly the forced recruitment of children in to the army, or assist families in locating children who have reported to have been forced into the military.

1.2.1 Institutional Capacity for Environmental Management in Myanmar

The current institutional capacity in Myanmar to administer an environmental and social impact process is very limited. In addition to staff and resource constraints, the updated EIA regulations and guidelines are only in draft form to date.

Further, at the present time the environmental authorities in Myanmar have insufficient staff, training, facilities and resources to provide effective on-going environmental monitoring of new projects.

The operator of the Thaton GT plant, MEPE, similarly has extremely limited capacity for environmental management.

1.2.2 Application of World Bank Safeguard Policies

The study indicates that no World Bank safeguard polices will be triggered concerning biodiversity or involuntary resettlement, however, OP 4.10 concerning indigenous peoples will be triggered.

The World Bank's policy on indigenous people is reflected in OP4.10, (July 2005). The policy, aims to ensure that the development process involving ethnic minority fosters full respect for their dignity, human rights, and culture uniqueness. More specially, the objective is to ensure that indigenous peoples do not suffer adverse effects during the development process, and that they receive benefits which are culturally appropriate to them. The Bank's policy is that the strategy of addressing the issue pertaining to indigenous peoples must be based on the free and informed participation of the indigenous people themselves which requires identifying local preferences through direct consultation.

Table 1: World Bank Safeguard Polices that may be triggered

Safeguard Policies	**Triggered**
Environmental Assessment OP/BP 4.01	**Yes**
Natural Habitats OP/BP 4.04	**No**
Forests OP/BP 4.36	**No**
Pest Management OP 4.09	**No**
Physical Cultural Resources OP/BP 4.11	**No**
Indigenous Peoples OP/BP 4.10	**Yes**
Involuntary Resettlement OP/BP 4.12	**No**
Safety of Dams OP/BP 4.37	**No**
Projects on International Waterways OP/BP 7.50	**No**
Projects in Disputed Areas OP/BP 7.60	**No**

1.2.3 Environmental Classification

Given that there is a need to establish best practice for environmental and social impact assessment in Myanmar and DoE indicates the project should undergo an EIA the suggested category at this stage is "B" according to the World Bank classification.

"*A Category B project has potential adverse environmental impacts on human populations or environmentally important areas - including wetlands, forests, grasslands, and other natural habitats - which are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects.*

The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A assessment. Like Category A, a Category B environmental assessment examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance."

2 Project Context

2.1 PROJECT LOCATION

The Thaton GT station is located in a rural area approximately 5 km North-east of the township of Thaton. Thaton township is the administrative centre for Thaton District which is within Mon State, Myanmar.

Figure 2: Administrative Setting (Source: UN Cartographic Section)

2.2 LANDUSE

The landuse of Mon State is mostly rice cultivation as well as rubber plantations and orchards. This characteristic is also representative of the Thaton area.

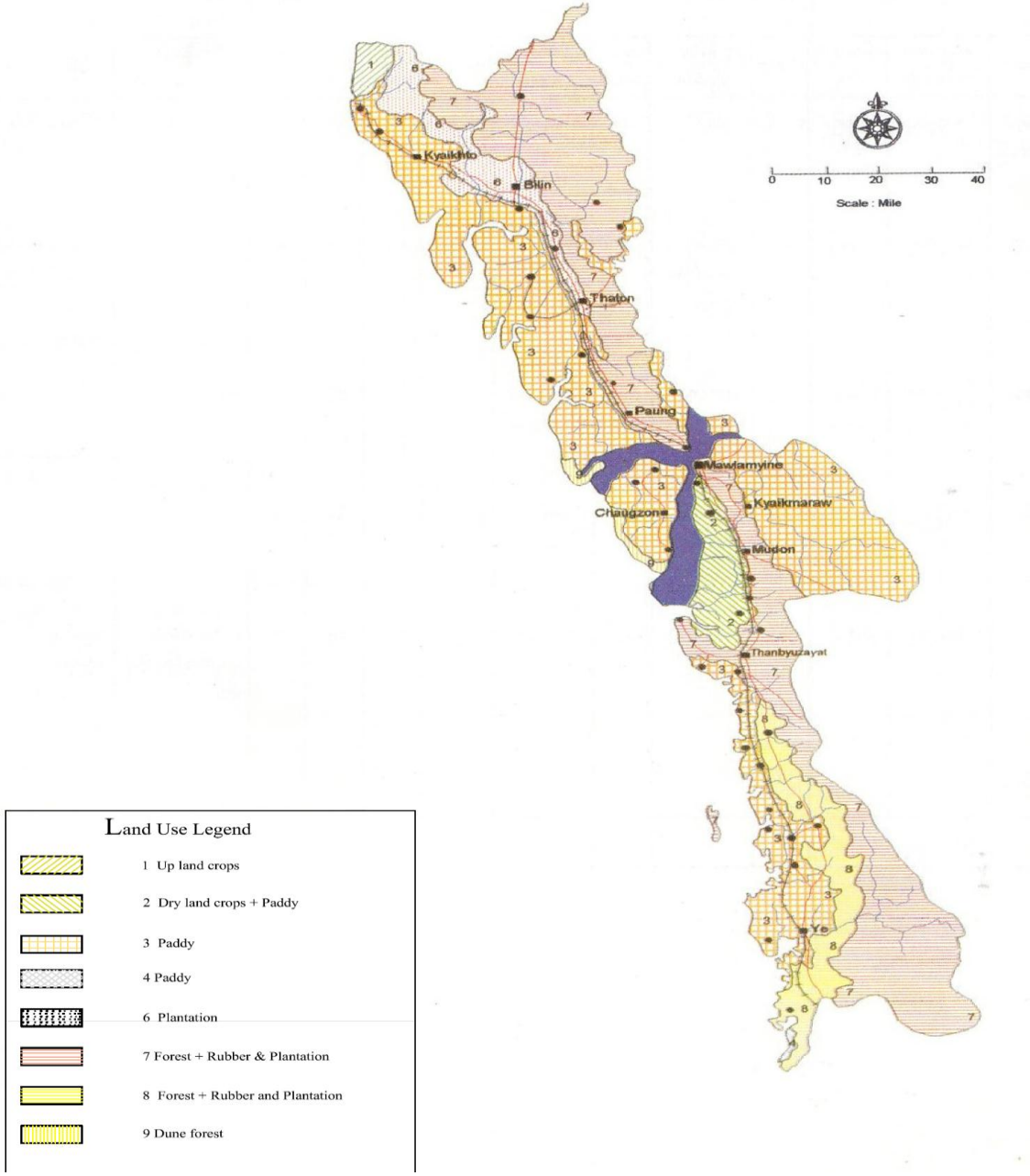


Figure 3: Landuse map of Mon State

Physically the land in the project area is relatively flat coastal plain. Land use surrounding the GT station is agricultural, dominated by rubber plantations. Adjoining the site to the west is a tyre factory. Closest habitation is some 500m from the site perimeter fence.

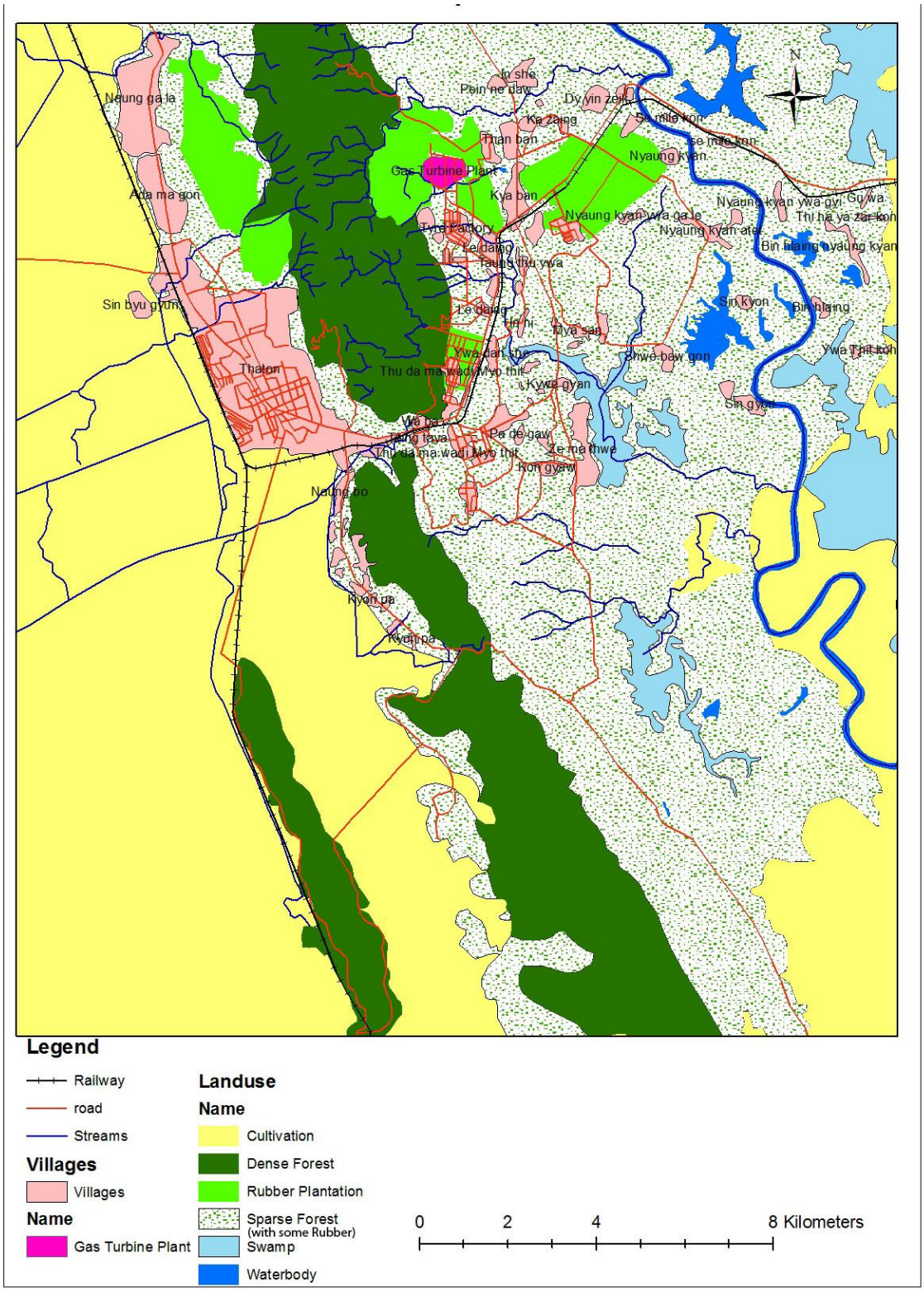


Figure 4: Landuse map of Thaton GT area

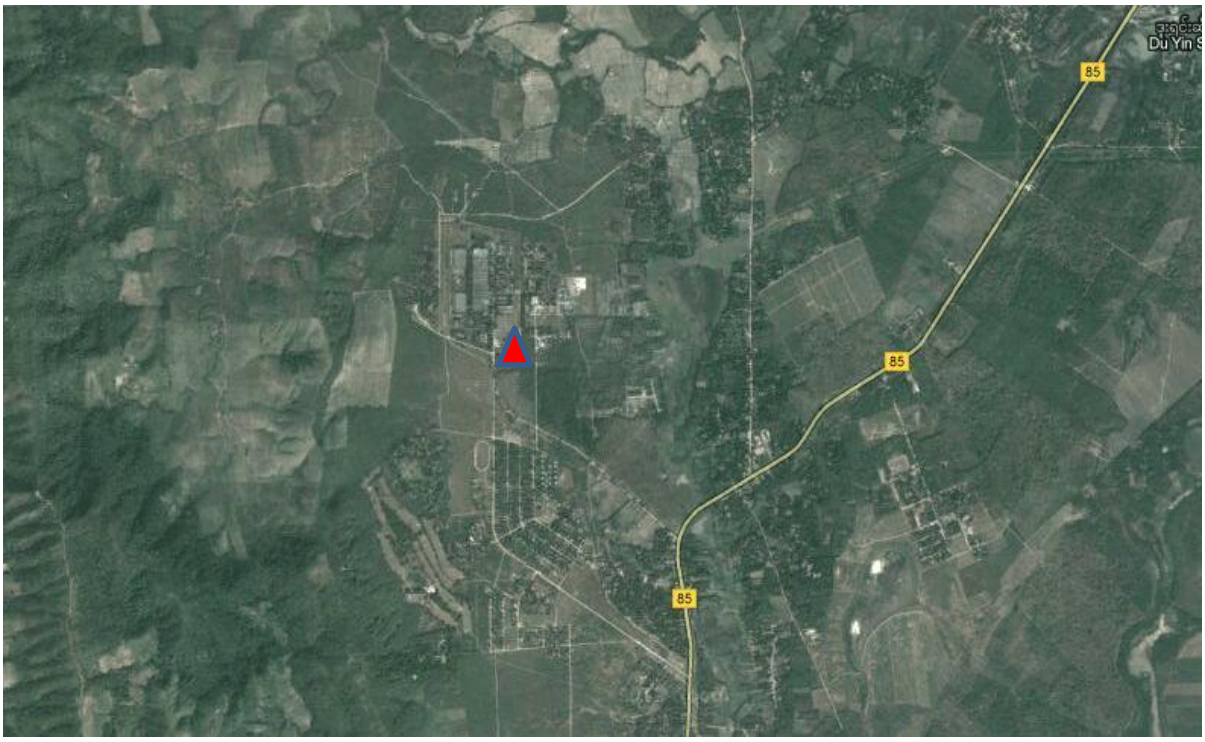


Figure 5: Aerial view of Thaton GT station (source: Google Earth)

Total area of the GT site is (87) acres[1] or 35 hectares, including 55 acres of for the power station, 23 acres of staff quarters and 9 acres of officer's quarters (Guest House).

There are no perennial streams or rivers running through the site or close to the immediate perimeter. The Donthami River flows at a distance of 8km east of the GT Plant. The Donthami River is the main water source for GT Plant and the tyre factory.

Located on the Northern Side of the GT site are Danu, Pha-yoe, Nyar-dewai, In-shae and Su-inn villages. A small stream is flowing during the rainy season and some small trees are growing in this area.

On the Eastern side is the Thaton-Myaingkalay Highway and villages namely Thanban and Kazai are. This area is flat with small trees act as a barrier between the GT Station and villages.

The Southern Side included the Thaton-Myaingkalay Highway, and the villages of Laytai, Kyarpan, Palenyaung and Privately owned Rubber plantations.

To the West the Tyre Factory is situated at about 137m far from the GT Station. Myathapake Hill (about 200 meters high) and Sutaungpjei Hill range with dense tree cover are also located on the Western Side of the Station.

[1] 1 acre = 0.4 hectares

2.3 CLIMATIC CONDITIONS

The Climate at site can be described as a tropical monsoon climate. It is characterized by strong monsoon influences, has a considerable amount of sun, a high rate of rainfall, and high humidity.

The tables following illustrate the main climatic characteristics of the site.

Table 2: Rainfall at Thaton

Monthly Rainfall of Thaton (2006-2012)

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
2006	-	-	0,2	7,56	10,1	31,13	62,63	51,92	20,97	9,09	-	-
2007	-	-	0,2	0,91	41,13	28,52	51,22	39,36	33,91	21,52	2,72	-
2008	-	0,24	1,18	11,7	49,89	37,17	62,64	43,39	22,8	7,84	2,72	-
2009	-	-	0,2	4,98	6,22	41,07	59,32	38,58	32,39	-	-	-
2010	-	-	-	0,51	14,26	27,64	34,64	48,21	26,51	12,61	-	4,02
2011	-	-	3,23	2,92	23,86	55,15	35,64	54,16	37,88	12,89	-	-
2012	-	0,12	0,55	3,11	25,96	44,13	60,71	58,03	20,28	8,27	2,65	-
Total	-	0,36	5,56	31,69	171,42	264,81	366,8	333,65	194,74	72,22	8,09	4,02
Mean		**0,18**	**0,93**	**4,53**	**24,49**	**37,83**	**52,40**	**47,66**	**27,82**	**12,04**	**2,70**	**4,02**

Table 3: Temperatures at Thaton

Monthly Mean Temperature in °C

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	25,5	26,7	28,8	31,2	27,3	26,8	26	26,3	27,1	28,4	25,9	25,8
2002	24,5	27,6	29,2	25,9	28,2	26,8	26,9	25,9	26,3	27,9	27,6	25,6
2003	24,5	26,7	28,4	30	28,3	26,5	27	26,1	27,1	28,4	24,7	25,3
2004	25,2	26,1	28,7	30,5	27,7	26,8	26,6	26	27,3	28,2	27,8	25,9
2005	25,2	29	29,6	30,9	29,1	26,9	26,4	26,3	26,9	28,9	27,8	25,7
2006	25,5	27,4	29,5	29,2	28,3	27,5	26	26,2	27,4	27,8	27,9	25,1
2007	25,1	26,3	28,4	31,1	27,3	27,9	26,4	26,4	26,7	27,4	26,5	25
2008	26	27	30	30	27	27	26	26,4	27	28,5	26,7	24,6
2009	24	27,6	29,6	29,7	28,9	26,7	25,8	27,1	27,1	28,4	27,4	25
2010	26,3	26,8	29,3	31,5	31	27,4	27,2	26,1	27	27,5	26,5	25,2
2011	24,9	26,8	27,4	29,3	28,2	26,9	27	26,5	26,7	28,4	27,4	26,2
2012	26	28	29,6	30,3	28,7	27,2	26,4	25,7	27,9	28,8	29,1	26,9
Mean	**25,23**	**27,17**	**29,04**	**29,97**	**28,33**	**27,03**	**26,48**	**26,25**	**27,04**	**28,22**	**27,11**	**25,53**

Table 4: Humidity at Thaton

Monthly Mean Humidity

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	66%	64%	70%	61%	85%	86%	92%	90%	86%	80%	72%	70%
2002	65%	64%	63%	59%	77%	91%	93%	93%	88%	80%	76%	76%
2003	75%	66%	67%	70%	81%	91%	86%	90%	85%	77%	70%	66%
2004	63%	61%	63%	64%	82%	88%	89%	92%	87%	82%	55%	69%
2005	70%	72%	63%	63%	77%	90%	91%	93%	89%	80%	79%	76%
2006	75%	70%	66%	73%	80%	88%	94%	93%	85%	81%	75%	72%
2007	67%	67%	70%	70%	88%	87%	90%	91%	88%	83%	79%	76%
2008	75%	68%	68%	75%	87%	88%	92%	90%	87%	80%	76%	72%
2009	64%	70%	68%	72%	77%	90%	93%	89%	86%	83%	79%	74%
2010	72%	68%	69%	64%	70%	87%	86%	90%	87%	83%	75%	80%
2011	75%	70%	73%	72%	85%	91%	89%	91%	91%	81%	75%	67%
2012	64%	66%	70%	72%	84%	90%	92%	93%	87%	84%	82%	78%
Mean	**69%**	**67%**	**68%**	**68%**	**81%**	**89%**	**91%**	**91%**	**87%**	**81%**	**74%**	**73%**

Table 5: Windspeed at Thaton

Monthly Mean Wind Speed

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2011	2	2	3	2	3	3	3	3	2	2	2	3
2012	2	2	3	3	3	3	3	2	2	2	2	2
Mean	**2**	**2**	**3**	**2,50**	**3,00**	**3,00**	**3,00**	**2,50**	**2,00**	**2,00**	**2,00**	**2,50**

3 Project Description

3.1 GAS TURBINE POWER PLANT

Myanmar and the Thaton region are short on power and load shedding is frequent. The power demand is significantly larger than the power production. The consequence is reduced power availability and frequent load shedding of local areas. It is therefore a goal to establish an operational power plant as fast as possible whilst also ensuring that a future expansion and further development of the plant is possible and cost efficient.

Due to the construction time for a complete Combined Cycle Gas Turbine Power Plant (CCGT) it is recommended to introduce a two stage development project.

Phase 1: Engineer a complete CCGT power station, construct, install and commission an open cycle gas turbine power plant based on two gas turbine driven generator sets.

Phase 2: Construct, install and commission the steam process including two Heat Recovery Steam Generator (HRSG), one steam turbine generator including condenser and condenser cooling unit.

By using this project execution philosophy the gas turbine power plant could be operating and producing power one to two years earlier than if a complete CCGT plant was being built all at once.

Two turbines with about 40 MW to 45 MW ISO rating are proposed installed during phase 1 of the project. Fuel consumption is for the installation is limited to 25 MMCFD.

3.2 CONCEPTS EVALUATED

Two alternative configurations have been evaluated. Both alternatives are based on a fully developed complete CCGT at the end of the project phase.

The main selection criteria for the future expansion of the Thaton CCGT power plant will be:

- High thermal efficiency of plant
- Fuel gas consumption (currently only 25 MMSCFD are available for use)
- Possibility for high thermal efficiency installation open cycle as fast track first phase development
- Second phase full CCGT installation

During the site visit in March 2013 a layout sketch indicating the area available for the future power plant was presented by the site manager. The space has been evaluated and found sufficient for the development of a complete CCGT plant at Thaton.

The Figure below identifies the main parts of the CCGT power plant, and also identifies the two phases of development.

In order to supply power to the 66 kV and 230 kV grid in Myanmar phase one of the project should include the installation of two turbines in the 40-50 MW ISO rating range meeting the limitations in gas fuel availability for power production at Thaton. Due to the high ambient temperature the gas turbines should be equipped with air inlet chilling process for performance boosting. The open cycle gas turbines should be set into operation as fast as possible, in parallel to the complete steam process erection and commissioning. It is foreseen a short stop in power production when the exhaust channels are connected to the HRSG.

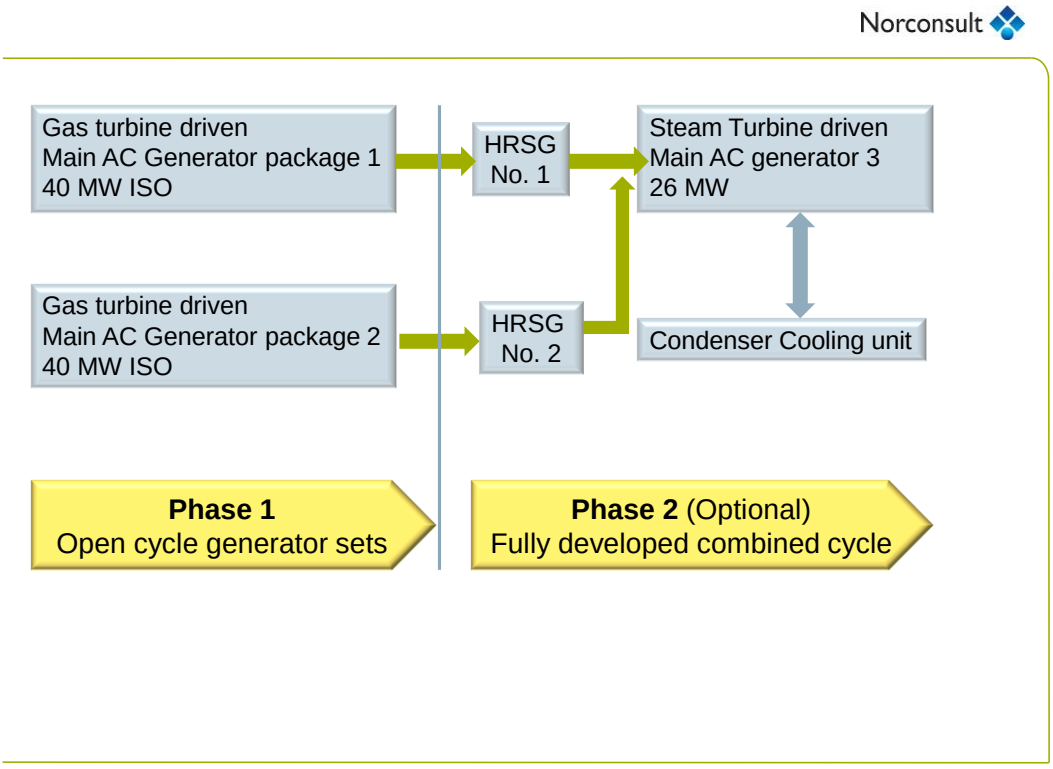


Figure 6: CCGT- plant development

3.2.1 *Alternatives evaluated*

Below is a brief overview and description of the five alternatives evaluated. A maximum design temperature of 45 degrees Celsius has been utilised:

Alternative 1

Two gas turbines with a heat recovery steam generator (HRSG) and one steam turbine with air cooled condenser

2x 30 MW gas turbine power + 18 MW steam turbine power, total net 77 MW at site condition +45 deg. C ambient

Alternative 2

Two gas turbines with inlet air chilling, HRSG and one steam turbine with air cooled condenser

2x 45 MW gas turbine power + 21 MW steam turbine power, total net 106 MW at site conditions, +45 deg. C ambient.

The constraint on fuel gas available to the power plant (25 MMSCFD) limits the power plant concept to a maximum size of 106 MW. This power is achieved with setup as indicated with additional inlet air chilling system. Alternative including the inlet chilling process are favouring the output power, and it is a clear recommendation to include this system in the basic design. Only alternative one described above does not include inlet air chilling.

There is a possibility for further boosting of the efficiency by using the knocked out water from the combustion air inlet chilling unit and for inject it into the gas turbine. Performance calculations indicate a boost in the magnitude of 4 MW. This feature is pending acceptance of water quality and process from the gas turbine and HRSG manufactures.

Alternative 2 has in construction phase one short construction time, and with the latest technology upgrades (BAT) the fuel efficiency levels are well above 40%. This is a significant improvement from the existing Frame 5 open cycle machines currently operating at a thermal efficiency of approximately 20% (+/- 2%).

3.3 TECHNICAL DESCRIPTION OF CCGT PLANT AT THATON

3.3.1 Main AC generator package

Due to the urgent need for power in the region a fast track project is proposed based on an open cycle gas turbine installation (phase 1). The design is based on gas turbines with ISO rating 40MW to 45 MW as there are several suppliers making engines in this segment. The turbines could both be of the industrial or the aero derivate gas turbines with speed decreasing gearbox matching synchronous speed of the 50Hz (3000 rpm or 1500 rpm). The design of such gas turbine driven main AC generator sets shall meet the Myanmar state authority requirements and international standards and best available technology (BAT) seen from an environmental and safety point of view.

The ambient air temperature is high during the day when the power demand is also at its highest. As the gas turbine performance is rather sensitive to ambient temperatures it is highly recommended to install inlet air chilling giving a significant increase of power output. There is a difference between the industrial or aero derivate turbines with respect to this subject as the industrial engines have higher air throughput compared to the aero derivate gas turbines. The design temperature for the existing gas turbines are 45 deg.

The two main AC generator packages should be able to give proximate net 40 MW to 45 MW at the generator terminals also for the high ambient temperature conditions. The figure illustrates that the energy output of a turbine under 45 degrees C are about 20% below the ISO rating.

3.3.2 Steam Turbine Setup

The exhaust heat from the gas turbine(s) is used as a source for heating the water cycle to steam through the heat recovery steam generator (HRSG). The steam is expanded through the steam turbine and cooled down in the condenser and pumped back to the steam boiler. The condenser will be air cooled as the availability of cooling water is limited. With respect to the layout the cooling process is the largest piece of equipment, but will fit into the available space at Thaton.

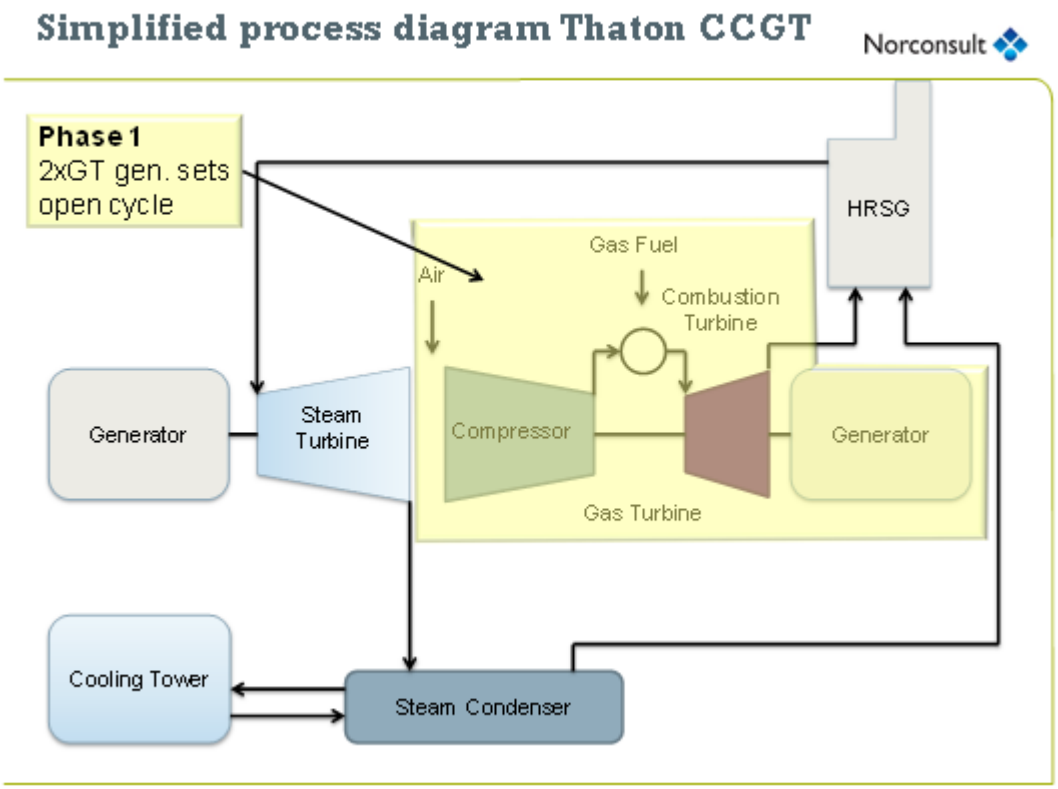


Figure 7: Simplified process diagram Thaton CCGT

The steam turbine will be single or dual pressure pending on the best technical and/or economic fit for the gas turbines exhaust flow and temperature.

The air cooled condenser cooling plant is large due to the high ambient temperature at Thaton. The high ambient temperature will have a negative effect on the plant efficiency as the backpressure will increase on the steam turbine discharge side.

3.3.3 *Layout of the Plant*

The Thaton power plant has released the area within the red line for further expansion of the power plant (see Figure following).

The plant layout for the new CCGT power plant is based on input from different CCGT power plant suppliers. The philosophy behind the layout is not to exclude any suppliers due to layout restrictions.

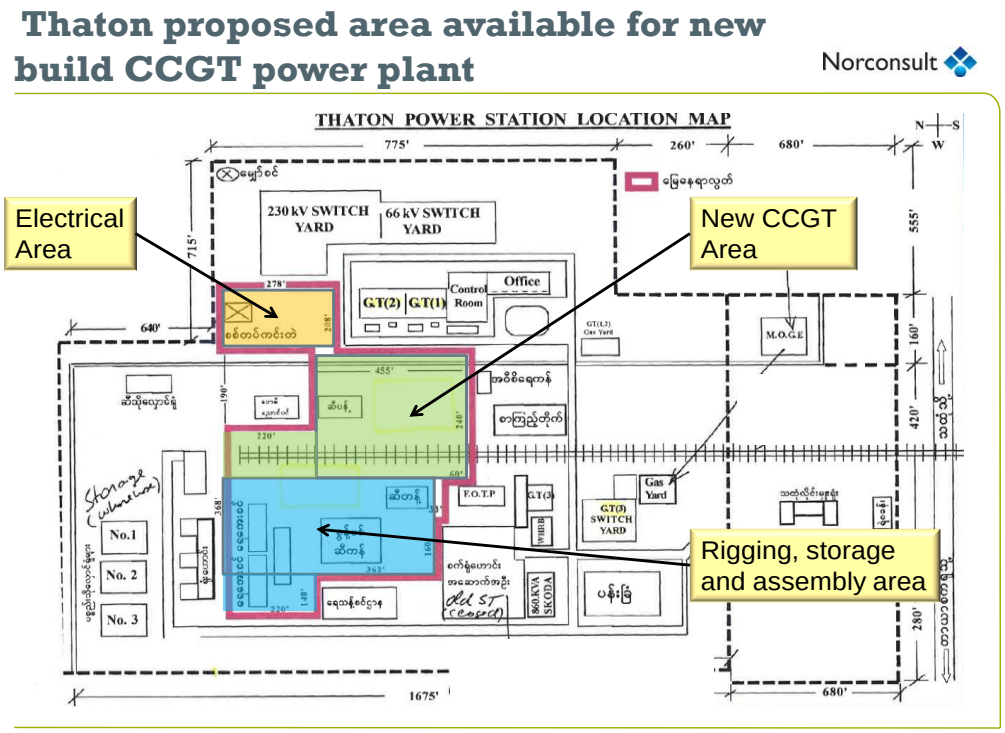


Figure 8: Available area for new plant at Thaton

- The electrical installations are located close to the existing 230 kV and 66kV switch yards.
- The steam turbine is located in the middle of the plant as the air cooled condenser is space consuming and more space is available in this area.
- The gas turbines with HRSG and other utilities are located in the corner of the plant with easy access from existing roads inside the plant
- The plant design is open to facilitate the maintenance and access to equipment and process modules as well as health, safety and environmental aspects.

3.3.4 *Interfaces to the existing plant*

Detailed interfaces to the existing plant will be evaluated when establishing the tendering documentation in cooperation with Thaton power plant management and MEPE. The main interfaces are:

- Control system interface, gas and steam turbines, AC generators including utilities
- Gas supply and treatment
- Instrument and plant air systems
- Emergency power
- UPS power for control system
- Electrical switchgear high, medium and low voltage

- Water for makeup to steam cycle, water storage

For the design of the Thaton power plant any need for cooling water to the power plant have not been considered. All cooling requirements are covered by separate air cooling units. Water is only needed for the make up to the steam process. The make-up consumption is estimated to be approximately $5m^3$/d. It is further recommended to have a limited reservoir of make-up water at the new plant. It is assumed that water required for potential water injection is taken from the water knocked out from the air chilling units. Calculations show that at 35 deg. C @ 40% relative humidity about 8-9 tons/h of water is available for both water injection and make up water in the steam process.

The fuel gas pressure will be different for the new gas turbines. A new fuel gas filter package is included in the cost estimate. The aero derivate gas turbine shall have fuel gas pressure at the turbine inlet proximate 40 Bara to 45 Bara. Fuel gas compressor will be evaluated if fuel gas pressure is too low.

Depending on the emergency power (black start) requirements from the selected supplier the capacity of Thaton's emergency power will be re-evaluated. The largest emergency power consumption is at the startup of a gas turbine with necessary utility systems.

Norconsult assumes the instrument air system at Thaton could be extended to the new power plant. The air consumption is limited to valve and control operations of the gas turbine and steam cycle process. If capacity or instrument air specifications from supplier are not being met, a new instrument air package will be included in the scope for the new build.

As the power production will more than double with the new build, the need for high capacity step up transformers from the generator voltage 11 kV to 66 kV and from 66 kV to 230 kV will be required. In order to locate all electrical high voltage equipment at one location, space is reserved in the new layout close to the existing 66 kV and 230 kV switch yard area.

Figure 9: The Thaton power plant

4 Environmental Issues

4.1 OVERVIEW

The current operation of the Thaton GT station is inefficient due to old and out-dated technology. Replacement of the existing gas turbines would result in a considerable reduction of noise and greenhouse gas (GHG) emissions as well as potentially doubling the energy obtained from any given volume of gas. In operation, therefore, a rehabilitated Thaton GT station would be expected to deliver a net environmental improvement as compared to existing conditions.

During the construction and installation phase of the new units there would be minor localised impacts on the bio-physical environment. The site is already in industrial use and physically demarcated, therefore, ground preparation will only result in the removal of limited amounts of re-growth vegetation. Given the highly disturbed nature of the area, the site does not provide significant habitat for small mammal or reptile species.

Other potential installation activities associated with noise and dust generation together with solid and liquid wastes are assumed to be managed effectively through an environmental management plan (ESMP) to guide the works.

The switchyard for a 230kV line exists adjoining the site so there will not be a need to construct new transmission lines. The existing paved access road to the site is likely to be sufficient for all installation and future operation needs as well.

4.2 SITE OPERATIONS

Some key elements relating to the current operations of the site are summarised in the following table (Survey Date 12. 03. 2013 – 13. 03. 2013):

Table 6: Site operations

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
security of tenure		X			The land at site is allocated to the Ministry of Industry No (2) for the Tyre and Rubber Production Factory. Hence, the approval order for land use, attached with location map, with the name of Tyre Factory (TF) is approved. After the 1990s, the GT station and some parts of the land (87 acres) were allotted from TF to MEPE. Officially the land transfer process for land ownership from Tyre and Rubber Production Factory No (1) under Ministry of Industry No (2) to Myanmar Electric Power Enterprise (MEPE) under Ministry of Electric Power, is not accomplished (from 1995 to date). Negotiation into details is still under way. Thus this land is not in the hands of MEPE but is government owned land.

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
land title clearly established and undisputed			X		Not clear, according to the GM of the Gas Turbine Station; land transferring process started from 1995 but has not finished yet.
land zoned for purpose	X				
land occupation not subject to litigation				X	
land not classified as heritage site or otherwise protected				X	
compliance with regulations					
construction and design works carried out in accordance with approved regulations		X			According to conversation with GM, at that time, construction and design works were carried out by Myanmar Government and Government of Czech Republic as a joint effort.
site complies with Health and Safety policy and regulations				X	Very weak at the present time.
buildings and site works received building and planning permission;	X				But documents are unavailable to prove
organisation and policy ***RC = risk control***					
RC policy statement exists for whole enterprise site.				X	
RC organogram exists.				X	
A senior manager is responsible for RC.		X			
An emergency planning committee exists and meets.		X			Mainly with regard to security issues

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
A fire prevention and response policy exists.		X			
Fire prevention and response is planned and organised.			X		
A safety code exists.				X	
Safety measures are planned and organised.				X	
Safety representatives are designated.				X	
Knowledge of first aid is disseminated widely.				X	Very weak in knowledge of first aid among the staff.
RC procedure is documented.				X	
RC is included in induction training.				X	
RC inspections are conducted regularly.				X	
physically risky situations and processes					
petroleum/diesel product storage areas site clean and without evidence of spillage		X			No evidence of oil spillage and leakage at the fuel oil store room. Some clearing to prevent bush fires near the garage.
gas pipelines clean and without evidence of rust/deterioration		X			No evidence of rust and deterioration of gas pipelines. They are coated with anti-rust paint. MOGE is generally responsible for the gas pipeline cleaning process from offshore to gas yard of Thaton. Regular cleaning once per year.
gas filters clean and without evidence of rust/deterioration			X		No regular maintenance. Cleaning the gas filters if the gas pressure is below standard on the pressure gate. But without records.

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
risky places enclosed and locked				X	During the survey period, some risk areas such as gas yards, switch yards and chemical storeroom were unlocked.
access to risky places regulated				X	The given reason is Every staff member of the Power Station is always checked by their own identity cards before entering the station compound so that only authorised personnel can enter the Power Station.
chemicals logged into site		X			
regulations relating to chemical products handling known				X	
incompatible hazardous materials not mixed or in proximity				X	
hazardous waste not mixed with other waste				X	Hazardous waste like asbestos piled at the roadside
oil water interceptor in operation				X	
drip trays under machinery				X	
waste oil storage tanks within bunds sufficient to contain 100% spill				X	Empty oil storage tanks are only placed in the storeroom and locked.
waste management policy exists				X	
visible soil contamination from facility		X			Patches of contaminated soil were seen at the chemical storage site caused by the leakage of some HCl tanks during the unloading from vehicles.
recorded groundwater contamination from facility		X			According to field observation, at the water treatment building, the water pump for removing accumulated waste water is broken.
visible surface water contamination from facility				X	
specific risks (other than fire)					

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
illumination – flood lights installed		X			
containment – no tanks/containers leaking			X		
containment – bunds in working order				X	
site drainage functioning; no blocked drains			X		Drainage system of the water treatment site has a problem so waste water gathering beneath the building.
flood risk foreseen and minimised			X		According to GM, no experience flood risk at the Station.
waste water/sewerage treatment/disposal functioning correctly				X	
fire risk and precautions taken					
flammable liquid storage and handling risks known and precautions taken				X	
gas risks known and precautions taken				X	
no smoking in vulnerable areas	X				Warning signs boards are displayed in vulnerable areas.
flashback arrestors fitted to welding equipment				X	
hydrants in sufficient number, at enough locations, working and labelled				X	Insufficient number (only 4 hydrants for whole compound), not enough for location, not working and unlabelled. An engineer working at GT station since 1998 has never seen tests on these hydrants.
appropriate extinguishers for the risk		X			All of the extinguishers are dry chemical powder agent (Mono ammonium phosphate) type. This type is suitable for fire of electrical equipment, flammable liquids and gases. Other types of extinguishers need to be supplied.

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
enough extinguishers				X	Only 11 extinguishers for the whole compound.
extinguishers clearly labelled		X			All of the instructions on fire extinguishers are clearly written in Myanmar language.
inventory of extinguishers exists		X			
maintenance schedule for extinguishers exists			X		
water reaches all parts				X	
special precautions for electrical equipment				X	
fire alarms and detection systems working				X	Fire alarms are out of order
hose reel systems present and working				X	Hose reel systems found at the TF, but not in GT station
Signage					
labels on equipment present and clear		X			
clear directions to safety		X			
labels in local languages, as appropriate		X			
perimeter security					

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
perimeter fencing	X				
security lighting		X			
security of premises and property					
access control	X				Strength of the security force are acquired from No (402) Artillery (6 persons) and from police force (5 persons). In addition, totally (17) staff are assigned rotationally day and night shifts for security of GT station. Police troop are responsible for inner circle security and have to check and inspect to every individual at the entrance gate.
identity cards used	X				
security records kept		X			
vehicle management					
drivers have licences			X		
drivers are trained				X	
vehicles in safe condition				X	Mostly old models. Only three out of the six vehicles are in running in condition.
workshop facilities have waste management procedures				X	Workshop is only using for small scale repairs. Thus, lack of waste management procedures.
vehicles fuelled safely			X		
accident procedure known				X	

ISSUE	yes, definitely	yes, to some extent	uncertain	no	Comment
other aspects					
Health and Safety representatives elected or appointed				X	
all accidents recorded and investigated				X	
safety training conducted				X	Never
occupational health training conducted				X	Never
preventative maintenance conducted			X		
visitors logged in and out		X			
contractors on site advised of all procedures				X	
safety promoted by written operating instructions		X			

4.3 HEALTH AND SAFETY

Currently health and safety conditions at the site are of concern. No health and safety manuals exist (only operation and maintenance manuals). There is no regular safety training conducted and no health and safety audits have been conducted. Staff are not issued with proper protective equipment (PPE). There are no first aid trained staff in the GT station itself; however a clinic with limited facilities and staffed by a nurse is contained on the compound. The nearest hospital is 10km away; there is no ambulance on site.

A lack of safety training and equipment for staff combined with only limited management plans creates a working environment that is in urgent need of improving.

4.4 EMISSIONS ISSUES

4.4.1 Greenhouse Gas

Although natural gas has relatively low greenhouse gas (GHG) emissions compared to other thermal options for electricity generation (eg coal, diesel generators etc), never-the- less there are air pollution issues associated with gas turbine plant operation.

The age of the current plant at Thaton combined with metrological conditions and the technology deployed results in comparatively high emissions and low efficiencies versus modern gas turbines.

Figure 10: GHG emissions from existing plant[2]

MS5001 PA Combustion Systems	FUEL GAS NOx (ppmvd) @ 15% O2	CO_2 (ppmvd)	Diluent	Operating range
Std	142	10	Dry	
DLN	25	25	Dry	50%-100%

4.4.2 Particulate Matter Emissions

For gas turbines, particulate matter (PM) emissions are assumed essentially equal to PM-10 emissions. PM-10 emissions are defined as particulate matter emissions that are less than ten microns in diameter. However, PM-10 emissions from natural gas combustion are essentially zero (no emissions from the combustion process itself) thus do not represent an environmental or human health risk at Thaton.

4.5 WASTE MANAGEMENT

4.5.1 Wastewater

The site is not on mains water supply. Water supply for the staff is provided through tube wells. The site is not on mains sewerage; all sewerage is discharged to ground. The introduction of modern septic tanks could be considered to improve sanitation.

Process water is delivered to the GT station from the neighbouring tyre factory facility where it is subject to limited treatment in settling ponds. Chemical treatment of the water takes place at the GT site to reduce lime concentrations (most treatment occurring in the dry season). Three kind of chemicals are used in treatment of water; Hydrochloric acid (HCl) used for alkylation, Caustic Soda (NaOH, used for neutralizing agents, and Trisodium phosphate (Na3PO4), used as a water softener. Process water is returned to the neighbouring factory as steam for use in that facility.

Therefore, at present wastewater from the process is not considered a significant issue.

[2] Note: applies to «new» plant

4.5.2 *Solid Waste*

No significant solid waste is generated through the process. However, small quantities of solid waste is produced through operational and maintenance activities, staff offices and canteen.

There is no plan for handling of solid waste. Occasional collection occurs but much waste is either burnt or buried at site.

4.6 NOISE

Measurements show that noise levels during operation of the existing GT Station at some locations close to the power plant boundary might exceed acceptable noise levels (see Annex 5).

The existing Thaton power plant generates high levels of noise when in operation. Noise surveys were carried out in 9 locations in the GT station and 4 residential areas on the southern side of the GT station. Measurable noise levels in the operating turbine chambers are highest, ranging between 104.8 and 108.2 dB. Noise levels at the vicinity of the power plant are ranging from 54.8 dB to 85.6 dB respectively. Noise levels generated by the existing power plant operation are from 54.8 dB in the centre of the Kyarpan village to 66.4dB some 50 meters from the power plant fence.

Significant noise levels resulted from operation of the turbines, ranging between 104.8 dB and 108.2 dB in the Turbine room. During the survey event, turbine operation crews were not wearing ear defence equipment. The human ear can tolerate on an average 45 to 60 dB without much discomfort, however beyond this limit. It can cause mental fatigue, irritation and other health hazards.

Table 7: Noise levels recorded at the Thaton site

Sr No.	Source	Coordinate	Date	Time	Noise Level (dB)	Map Reference No.
1	Gas Turbine (1&2)	16^0 57' 48.84" N	13.3.2013	10:20 AM	104.8	4
		97^0 24' 27.99" E		4:50 PM	108.2	
2	Gas Turbine (3)	16^0 57' 46.77" N	13.3.2013	10:25 AM	106.2	6
		97^0 24' 22.72" E		4:55 PM	106.8	
3	Office Building (inside)	16^0 57' 46.73" N	13.3.2013	10:30 AM	77.7	2
		97^0 24' 28.05" E		5:00 PM	83.9	
4	Office Building (outside)	16^0 57' 46.56" N	13.3.2013	10:38 AM	78.4	3
		97^0 24' 28.08" E		5:05 PM	83.4	
5	Library	16^0 57' 46.56" N	13.3.2013	10:45 AM	78.2	5
		97^0 24' 28.08" E		5:20PM	80.9	
6.	Water Treatment Plant	16^0 57' 50.73" N	13.3.2013	11:00 AM	71.3	7
		97^0 24' 20.36" E		4:20 PM	66.6	
7	Fence near Office Building	16^0 57' 46.44" N	13.3.2013	11:55 AM	71.3	1
		97^0 24' 33.13" E		5:15 PM	64.1	

Sr No.	Source	Coordinate	Date	Time	Noise Level (dB)	Map Reference No.
8	Fence over the garages	16^0 57' 58.57" N	13.3.2013	11:35 AM	62.3	8
		97^0 24' 21.04" E		4:30 PM	66.4	
9	Entrance Gate	16^0 57' 42.21" N	13.3.2013	10:15 AM	76.8	9
		97^0 24' 21.90" E		5:30 PM	81.0	
10	Entrance way to Staff Quarter	16^0 57' 19.56" N	31.3.2013	10:10 AM	66.4	
		97^0 24' 22.99" E		5:40 PM	60.1	
11	Kyarpan Village	16^0 57' 12.49" N	31.3.2013	5:55 PM	85.6	
		97^0 25' 02.19" E		6:00 PM	54.8	
12	Nyaungwine Village	16^0 56' 29.32" N	31.3.2013	6:15 PM	70.8	
		97^0 24' 52.77" E		6:20 PM	60.2	
13	Background noise (not interference from GT plant)	16^0 58' 31.27" N	31.3.2013	5:00 PM	50.0	
		97^0 25' 27.48" E				

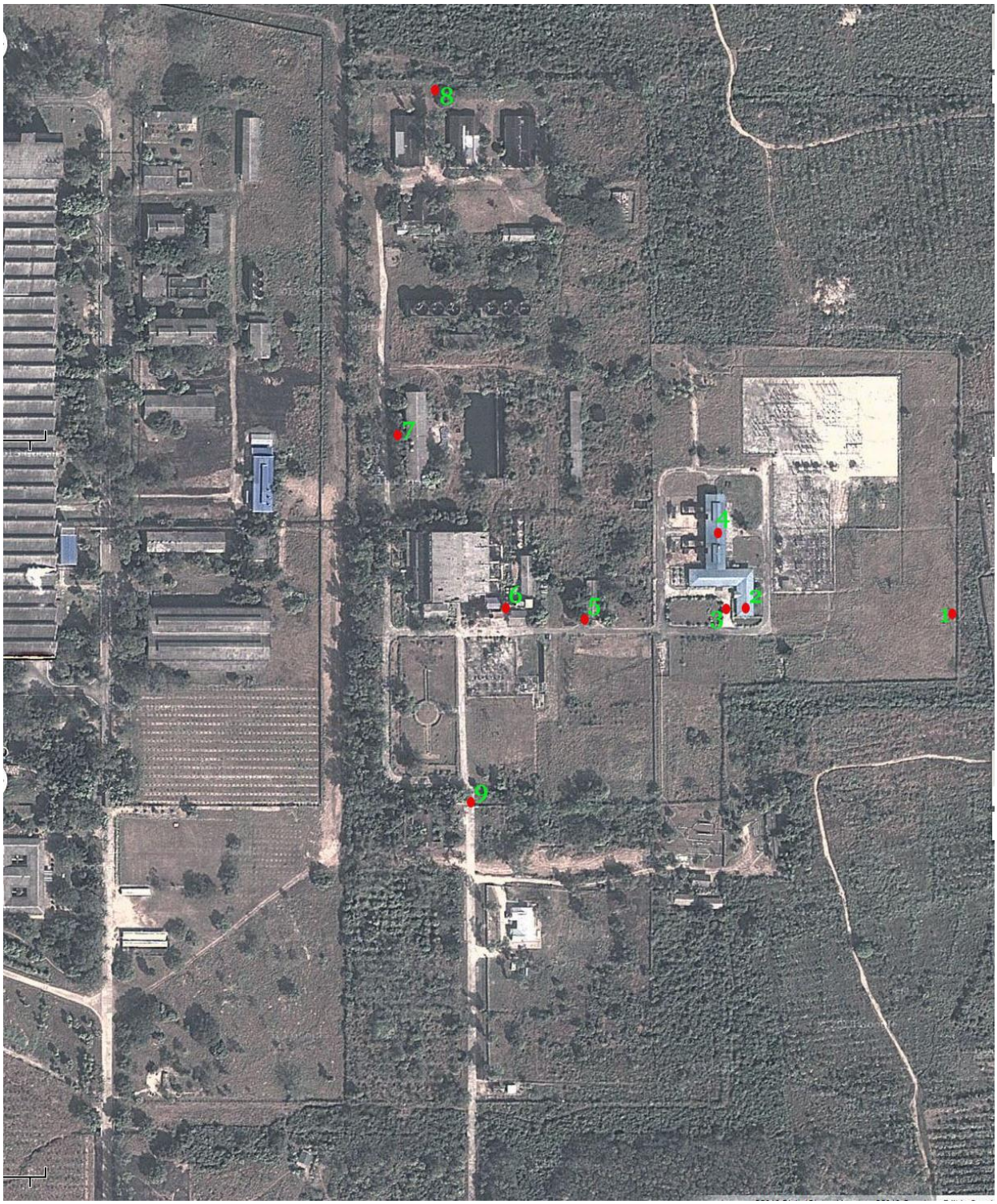


Figure 11: Thaton plant layout and location of noise sampling points

5 Social Study

5.1 OBJECTIVES

The social assessment (SIA) has been undertaken to characterize the project affected persons (PAPs) that may be affected by the Project at the Thaton site. The SIA outlines the nature and magnitude of direct and indirect impacts on the local communities and recommends appropriate mitigation measures and monitoring.

The objective of SIA is to provide a framework to integrate the consultation process and participation, gender and social analysis into the operational planning framework of the project. The overall goal is to minimize identified social risks and vulnerabilities, and provide mitigation measures to address adverse impacts and enhance project benefits and opportunities.

The screening procedures of the WB OP 4.10 have been followed and the process has been fully documented which includes:

a) Screening to identify whether ethnic minorities are present in or have collective attachment to the project area;

b) Social assessment to determine if the policy will be triggered, i.e. ethnic minorities will be negatively affected or can not participate in project benefits by virtue of their ethnicity;

c) Process of free, prior and informed consultation with the effected people ethnic minority communities in order to full identify their views and to ascertain whether there is broad community support for the project;

d) Social assessment concluding that ethnic minorities will be negatively affected by projects potential impacts and could participate in project benefits and a preparation of a social action plan.

5.2 METHODOLOGY

The socio- assessment preparation involved several activities which started with a reconnaissance survey undertaken by the study team on March 8, 2013 to identify the zone of influence of the project on neighbouring settlements.

Key consultations and meetings have thus far taken place within the three respective target villages and key informants between the periods of March 8-15, 2013. A second consultation/workshop took place in May 20, 2013.

5.2.1 Key Informants' Interview

This activity was administered through a semi structured questionnaire to institutional stakeholders, NGOs and government ministries to gather their views and solicit recommendations to improve project planning. A total of 19 key informants comprising of various sectoral groups were interviewed to afford a level of cross-check and comparison. This exercise is useful to building initial awareness of the project and its objectives in developing local counterpart responsibility.

5.2.2 Focus Group Discussions

Similarly, a semi structured survey topical questionnaire was administered through focus group discussions (FGDs) among the three ethnic villages and industrial workers living in the vicinity of the project site. This activity allowed wider public comments and a chance to identify issues affecting communities, affording both a more grounded understanding of local aspirations and needs, as well as securing community recommendations in developing positive social impacts and assisting with mitigating measures for any occurrence of potential adverse impacts. Consultations and meetings have been done within the respective target villages as indicated in the minutes of the FGD meetings annexed.

5.2.3 Socioeconomic Survey of Households

The socioeconomic survey was undertaken in order to gain an understanding of the living conditions of the IP households. The survey instrument data incorporated 95 respondents from the 3 villages of Than Ban, Kyarpan and NyaunWyne, and the staff house. First-hand data developed through the survey were combined/cross checked within group discussions. Data provided by administrative leadership and household in-depth interviews are expected to provide information highlighting the socioeconomic condition, gender aspects, ethnicity, perceptions, issues and recommendations of households on the project. It is anticipated that this information will serve as project baseline for poverty and living standards, as well as a range of other social and economic data for subsequent project monitoring.

A clustered random sampling technique allowed for 10 per cent (or every tenth household) of the settlement in the target villages. The survey was coordinated by the social team using local enumerators in gathering the data. Key local village partners have been engaged to help carry out the household survey, along with a team of trained interviewers. This process is viewed as useful to building initial 'ownership' and an early awareness of the project and its objectives in local counterpart staff.

The sites in which the surveys have been conducted are in the table below, taking into account two categories of households, i.e; households connected to the power supply,(HHC) and households without connection (HHN). The desegregation is useful to gain an understanding on the living condition of households where electric power supply plays an important role in the economy, particularly of ethnic village minorities.

Table 8: Sample size of surveyed IP Respondent Households

Village	Total No. Of HHs	Sample Size)	
		HHC	HHN
Kyar pan	330	13	20
Than Ban/Kyar Pan	150	5	10
Industrial workers /staff house	120	12	
NgayWaine	252	10	15
Total	**852**	**40**	**45**

Source: Field Study, 2013

The nearest villages are about 1.5 kilometres away from the project site, comprising of ethnic minorities. There is no anticipated displacement of households, loss of land or productive assets that will be affected by the project. However, the current noise levels emanating from the existing gas turbines reaches these villages at up to 85dB.[3] While these impacts can be fully mitigated and although the villages will not be directly affected with land acquisition or involuntary resettlement, the neighbouring villages are comprised of indigenous people (IPs)[4] which are considered as vulnerable households. Only a small percentage (15%) of the 480 households of Than Ban and Kyar Pan are connected to the power supply in spite of their proximity to the power station.

5.2.4 Stakeholders' Participation

Stakeholders' participation is considered as an important element in the project planning process of the MEPP. The approach involved the project proponent's initiative together with the study team to dialogue with local stakeholders through means that induced broad public participation. Overall, a participatory process was undertaken to achieve the specific objectives:

1. Establish a process that would ensure various stakeholders are informed of the project development;
2. Proactive involvement of stakeholders in the planning and enable them to participate in the assessment of impacts and risks of project outcomes;
3. Transparency in communication and obtain support and cooperation in future activities;
4. Understand and appreciate their roles in the various phases of the MEPP.

[3] From field survey, March 2013

[4] Indigenous' status is ascribed to Burma's 135 ethnic minorities by those sympathetic to their cause, but the terms `indigenous', `tribal' or even `ethnic minority' are considered offensive to many representatives of such groups as the Kachin or Buddhist Mon which are predominant in this Region.

Table 9: Types and Gender of Participants in the MEPP Consultation Meetings

Category of PAX	Time/Date	Venue	Total	Total	
				Male	Female
Focus Group Discussions					
1. Industrial workers	April 13, 2013 9:00-10:00	Library, Tire Industry	30	15	15
2. Than Ban Village	April 13,2013 1.30-2:30	Village Community Office	10	5	5
3. Kyar Pan			10	5	5
4 NyaungWyne	April 13, 2013 3:00 -PM	Village Community Office	12	8	4
Key Informants Interview (KII)	April 13-15, 2013	Various Offices*[5]	19	11	8
Total			81	44	37
Workshop	May 20, 2013 8:30 – 12:00	Two Lakes, Resort Tha Ton township			

5.3 SOCIAL CONTEXT

A brief overview of the socioeconomic condition of Thaton Township is presented below, taken from review of secondary data and Key Informants interview.

Table 10: Thaton population

Urban		Rural		Total
Male	Female	Male	Female	Male
23633	81348	78823	107864	102456
50,149 =23.8%		160,171 =76.2%		210320= 100%

Source: Statistics Office (2012)

Thaton comprises of 210,320 inhabitants, of which 23.8% are urban and 76.2% are rural residents. Main economic resource is agriculture representing 29 % of the town's GDP.

[5]Held at the Office of the Administrator, (Thaton town, Ministry of Health, Ministry of Industry, Statistics Office, Red Cross, Information Office, Fire Brigade, Women's and Child Affairs), Heads of Villages.

Table 11: Economic Resources – Thaton, 2013

Economic sources	Per cent (%)
1.Agriculture	29%
2. Services	18.9%
3.Industries	17.2
4. Construction	7.8%
5. Livestock/fishery	7.6%
6. Electrical	.5%
7. Mining	.4%
8. Forestry	.1%

Source: Statistics office, Thaton

There are three villages surrounding the proposed project site. The two immediate villages include Than Ban, and Kyar Pan. Both villages lie about 1.5 kilometres from the project site. Than Ban has a total household population of 150 households (825 persons) while Kyar Pan, 330 households (1500 persons). Both Than Ban and Kyarpan is administered by one Administrator. The majority of people living in Than Ban are Kayin (90%) and in Kyarpan (45%). The remaining are other ethnic groups. Another village, NyaunWyne, is located 2.5 kilometres away from the project site, It is comprised of 252 households (1416 persons) with varied ethnic groups composed of Keren (1138 persons); Bamar (180 persons) and Pao (158 persons). The majority in this village is Kayin, 80%.

While there are varied ethnic groups, the IP villages are cohesive. Social integration and participation is observed in community affairs, children going to the same school, intermarriages, and women are involved within the community social network.

Occasional noise is heard in the evening but people could not distinguish clearly whether the noise all comes from the existing turbines or the passing vehicles. Overall, the villages will not be directly affected by land acquisition and there will be no involuntary resettlement, loss of productive assets, loss of communal properties, or cultural heritage.

Table 12: Social study areas

Village name	No. Of HHs	No. Of Persons	Distance from project site	Ethnicity		
				Kayin	Burmese	Pao /Others
Than Ban	150	800	1.5 kms	90%	3%	7%
Kyar Pan	330	1,500	1.5 kms	45%	5%	40%
NyaunWyne	252	1,476	2.5 kms	80%	8.4%	19.6
Staff House	120	576	.50 kms		90%	10%

5.4 SURVEY RESULTS: HOUSEHOLDS WITHOUT CONNECTION

A total of 45 households were interviewed representing households without connection. Household size is 249 having an average of about 5.5 members per household. Of the total members, 52% (129) are male and 48% (120) are female. Majority of the respondents are Kayin (71%) which are predominant in all the villages of Kyarpan, Nyaung Wyne and Than Ban.

5.4.1 Education

Of the 45 IP respondents, 37% are male and 8% female. The majority which are all male have at least stepped into elementary grades, but only 10% have graduated. Only 4% have had high school units but never finished high school. About 29% of respondents have never been to school. Of these, 20% are male and 9% female.

On the other hand, of the 201 household members, 25% have elementary units, of which 11% are male and 14% female. Some 18% of male members and 14% female have finished elementary grades. A low percentage (6%) has high units and only 1% among female members has graduated from high school. Some 15% of male and 17% of female members have never been to school.

Overall, the SES results indicate that there are more male respondents as well as household members that have at least basic education, but a lower percentage of male than female that has never been to school.

Table 13: Households Size, Gender and Ethnicity

Village	# of Respondents	HH Members	Gender of HH Members		Ethnicity									
			Male	Female	Bamar	Mon	Kayin	Paoae+ Kayin	Muslim+ Bamar	Shan-Kayin	Rakhine-Kayin	Mon-Bamar	Paoae	TOTAL
Kyar Pan	20	113	60	53	1		15						4	20
NyaungWyne	15	80	40	40	4	1	9					1		15
Than Ban	10	56	29	27			8				1			10
TOTAL	**45**	**249**	**129**	**120**	**5**	**1**	**33**				**1**	**1**	**4**	45
Percentage	**100%**		**52%**	**48%**	**11.1%**	**2.2%**	**73.3%**	**0%**	**0%**	**0%**	**2.2%**	**2.2%**	**9%**	**100%**

Source: Social Survey, 2013

Table 14: Living Condition (HHN)

Village	Type of dwelling		Housing condition				Status of House			Status of land	
	[1] Single home	[2] Sharing w/ Extended Families	[1] Permanent House	[2] Semi-Permanent	[3] Temporary	[4] Dilapidated	[1] Owned	[2] Rented	[3] Free	[1] w/ Rights	[2] w/o Rights
Kyar Pan	20			4	16		20			13	7
NyaungWyne	15			7	8		13	1	1	14	1
Than Ban	8	1		5	5		10			10	
TOTAL	**43**	**1**		**16**	**29**		**43**	**1**	**1**	**37**	**8**
Percentage	**98%**	**2%**		**36%**	**64%**		**96%**	**2%**	**2%**	**82%**	**18%**

Source: Social Survey, 2013

Table 15: Table 3: Education status (HHN)

Educational Level	Respondents (%)		HH Members(%)	
	Male	Female	Male	Female
w/ Elem. Units	47	9	11	14
Elem. Graduate	10	0	18	14
High school units	4	0	3	3
High School Grad.	0	0	0	1
Under Graduate	0	0	1	0
College	0	0	0	1
w/ Masters unit	0	0	0	0
Vocational Training	2	0	0	0
Never been to school	20	9	15	17

Source: Social Survey, 2013

5.4.2 Living Standards

The qualitative assessment on living condition showed that the majority of the IP respondents (40%) felt they belong to "poor" households while 33% rated themselves as "near poor" and 27% as "average". None of the respondents felt they're better off. There is limited data as to the overall food poverty among IPs. Statistical information reveals that rural food poverty remains among the IP villages, in particular, the Kayin at 17% which is higher compared to rural food poverty which remains at 6%.[6]

Table 16: Household's Living Standard (HHN)

Village	[1] Poor	[2] Near Poor	[3] Average	[4] Better off
Kyar Pan	13	5	2	
NyaungWyne- Lay tine	3	8	4	
Than Ban	2	2	6	
TOTAL	**18**	**15**	**12**	
Percentage	**40%**	**33%**	**27%**	**0%**

Source: Social Survey, 2013

5.4.3 Household Income and Expenses

Sources of income are varied and contributed by household members. There are households with one or more sources of income. However, the majority (26%) are wage earners, followed by farming (21%), animal husbandry (17%), trading/buy and sell (8%), receiving pension (4%), and others (not specified) 24%).

[66] IHLCA Survey 2009-2010

Table 17: Sources of Income (HHN)

Village	[1] Farming/ Fishing	[2] Animal Husbandry	[3] Trade	[4] Wage-Earner	[5] Pension, Subsidies,	[6] others
Kyar Pan	6	8	4	13	2	10
NyaungWyne- Lay tine	6	5	3	8	1	6
Than Ban	7	2		2	1	6
TOTAL	**19**	**15**	**7**	**23**	**4**	**22**
Percentage	**21%**	**17%**	**8%**	**26%**	**4%**	**24%**

Source: Social Survey, 2013

The results showed that among the IP respondents, regular income earners comprise about 38%. These include wage earners (teachers, government employee, private employees, overseas workers, with own business and receiving pension. The remaining 62% have irregular incomes which are seasonal proceeds from farming and fishing and other casual work. These are also serving as additional income for some, and main income for other IP households.

The monthly income has to be taken with caution as most households tend not to reveal their true income but would be more transparent about expenses. The estimated monthly income of household members receiving regular income ranges from per below K80,000[7] up to 400,000. The overall results show that the majority 23% have an income range between 80,000 Kyat-120,000 Kyat of which the median is about K100,000 per month. There is an even distribution of 19% for households with an income range of K121,000-160,000 and K161,000-200,000. The remaining 11% are spread between different income groups over K221,000, but these are insignificant in numbers.

Table 18: Estimated Monthly Income (HHN)

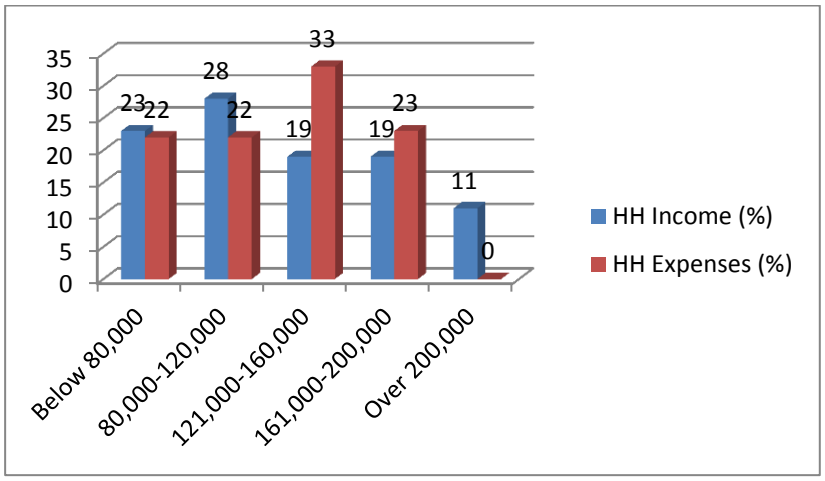
Village	[1] Below 80,000	[2] 80,000-120,000	[3] 121,000-160,000	[4] 161,000-200,000	[5] 221,000-240,000	[6] 241,000-280,000	[7] 281,000-320,000	[8] 321,000-400,000	No answer
Kyar Pan	5	7	3	2		1	1		1
NyaungWyne	1	2	4	6	1		1		2
Than Ban	4	3	1					1	2
TOTAL	**10**	**12**	**8**	**8**	**1**	**1**	**2**	**1**	**5**
Percentage	**23%**	**28%**	**19%**	**19%**	**2%**	**2%**	**5%**	**2%**	**11%**

Source: Social Survey, 2013

[7] 1.00 (MM)K =0.0011 USD (01.05.2013)

Average expenditures vary by income classification of which the average expenses of households is estimated at about 121,000-160,000 Kyat per month. Medicine, housing, transport and education represent the 4 major expenditure patterns in order of priority. Food is almost readily available within their own backyard. The overall results show that the expenditures among different income groups are slightly higher compared to households' income as indicated in the Figure following. Data on credit pattern show that about 20% of IP households avail themselves of credit which implies that the inadequacy of households' income results in utilizing credit in order to meet their daily expenses.

Figure 12: Summary of household's income and expenses (HHN)



Source: Social Survey, 2013

5.4.4 *Living Conditions*

The majority of the households (86%) have lived in the village for more than 10 years within the township of Thaton. Various reasons for staying longer include proximity to kinship, access to education, job and their affinity attached to the place as their ethnic village. The majority of the households (98%) have dwelling units which are single detached with temporary materials which are basically made of light materials. However, a significant 36% have semi permanent homes.

Ownership of housing units and land reveal stability of households. A high percentage (96%) of IP households own their dwelling units while 82% have rights to occupy the land for housing.

In terms of sanitation, a high percentage (84%) has their own separate toilets. Sanitary facilities are pour flush toilet (42%) double vault compost (45%) while the rest are using other means.

Table 19: Sanitary facilities (HHN)

Village	Separate Toilet		With septic tank		Kind of Toilet							
	[1] Yes	[2] No	[1] Yes	[2] No	[1]Flush Toilet, Sewage pipes	[2]Pour flush toilet	[3] Double vault compost latrine	[4] Directly over the water	[5] Wrap & throw	[6] anywhere	[7] others	[8] no used
Kyar Pan	16	4		8		4	11				2	
NyaungWyne	13	1		10		9	5					1
Than Ban	8	2	6	4		5	3				2	
TOTAL	**37**	**7**	**6**	**22**		**18**	**19**				**4**	**1**
Percentage	**84%**	**16%**	**21%**	**79%**		43%	45%	0%	0%	0%	10%	2%

Source: Social Survey, 2013

Water sources are generally hand dug well utilized by some 87% of households. Other households (11%) use rain water and filtered spring (2%). Water from hand dug wells is used also as drinking water which varies in depth from 25-30 feet deep.

Table 20: Sources of Water (HHN)

Village	[1] Drill well w/ pump	[2] Hand dug well	[3] Filtered spring H_2O	[4] use well from neighbor	[5] rain H2O	[6] River/ Lake/Pond	[7] Others
Kyar Pan		20			4		
NyaungWyne		10			1		
Than Ban		9	1				
TOTAL		**39**	**1**		**5**		
Percentage		**87%**	**2%**	**0%**	**11%**	**0%**	**0%**

Source: Social Survey, 2013

5.4.5 Gender Roles

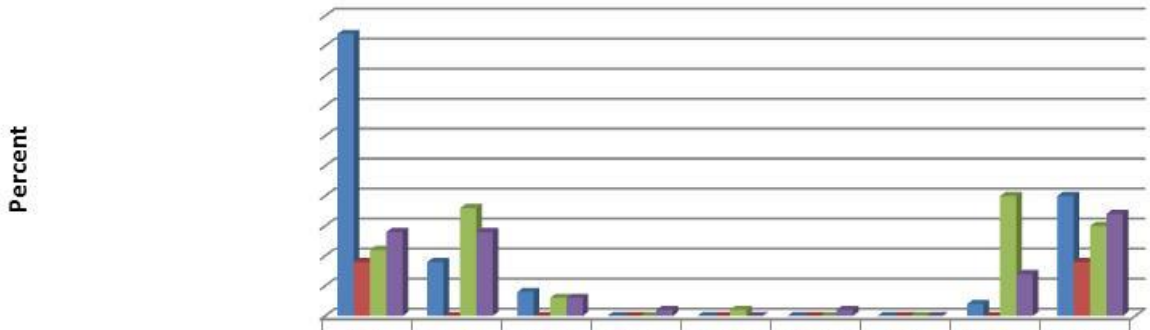
Gender roles of households are defined in terms of shared responsibilities and decision making in household management. The FGD and SES reveal that both husband and wife decide in matters related to repair or building a house, buying expensive items, number of children, education, financial contribution to public welfare or public infrastructure. However, there are instances when decisions are done by the elder female household heads in the absence of a male counterpart. Household members usually share in household responsibilities such as fetching water, cooking, and cleaning.

There is gender gap in terms of educational status among male and female respondents as well as members of households. The SES results indicate that while there is less percentage among male members (15%) as compared to female (17%) who have never been to school. There are also male members who have at least obtained basic education. Reasons for not finishing school are constrained basically by the need to help in household work, or assist in farm work.

In terms of access to job opportunities, female members have more access to regular jobs. However, more male are involved in seasonal jobs such as farming and fishing which are basically male's work.

Female members are generally constrained by lack of time, skills and opportunity to do other work that will contribute to augmenting household income. During the FGDs, women, youth as well as men signified interest to learn new skills such as handicrafts for women and automotive, electrician and computer (IT) for youth.

Figure 13: Gender gap in education (HHN)



	w/ Elem. Units	Elem. Grad	High school units	High School Grad.	Under Grad	College	w/ Masters unit	Vocational Training	Never been to school
Respondents (%) Male	47	9	4	0	0	0	0	2	20
Respondents (%) Female	9	0	0	0	0	0	0	0	9
HH Members(%) Male	11	18	3	0	1	0	0	20	15
HH Members(%) Female	14	14	3	1	0	1	0	7	17

5.4.6 *Community Infrastructure Facilities*

Basic infrastructure facilities in the villages reveal the access to various types of services which indicate the overall living condition of IPs.

Road –42% rated the road infrastructure as average while a significant 37% rated the road as poor. About 20% gave a rating as good. The FGD results in the three villages affirmed that there is a need to improve internal road condition in their villages.

Water – In the village of Than Ban, water is considered as good, but is rated as having poor quality in Kyar Pan and NyaungWyne by 47% or respondents. In spite of its poor quality, there has been only limited cases of water borne diseases as signified by 91% of respondents.

Drainage – There is no proper drainage system in all the villages, thus this area needs to be addressed and have been rated by all respondents as poor.

Garbage collection. In Than Ban, garbage is not considered as problem. The current method to dispose solid waste is by burning as practised by 99% of the respondents.

Electricity. Among the basic services, connection to electric power is considered as a priority need. There is very low percentage of households' (15%) dwelling units connected to the power supply. Affordability is a major deterrent in getting connection and capacity to pay for monthly tariff. However, there is generally willingness to pay for connection fee if the government provides full electrification of the villages.

Overall, in terms of community's felt needs, the following have been identified by the respondents in order of priority. (1) electricity, (2) livelihood 3) health services 3) school, 4) water 5) agricultural inputs. Electricity has been affirmed by the FGD participants as a priority need and efforts have been done by some village (NyaungWyne) to form local committees that deals with this issue.

5.4.7 Support System

There are existing community organizations among the IP villages which serve as social support system. About 40% of the respondents participate in community affairs and organizations. These organizations include Women's Associations, Hamlet Block, Farmers Association and Veterans Association. The most active is the youth organization.

Training activities have been provided by different humanitarian organizations. These include skills training, population and family planning, health care, environment protection, and other livelihood skills. These trainings have been considered as useful, and have been utilized by few households. In NyaungWyne, UNICEF has been providing training services on health and family. In Than Ban some organizations that have offered training include Teachers in village, Union of Kayin, Unigelf, Union of Padun. Most of the trainings are focused on health and family. Skills training has been provided but have not been followed up with referral services to utilize the skills learned.

Table 21: Types of Training

Village	[1] Technical Training	[2] Pop. & Family Planning	[3] Health Care	[4] Environment Hygiene	[5] Environment Protection	[6] Mass Org/Public Act.	[7] Other Livelihood Skills
Kyar Pan	9	2	10	2	2	2	2
NyaungWyne	11	6	12	6	6	5	7
Than Ban	4	1	5	4	5	3	3
TOTAL	**24**	**9**	**27**	**12**	**13**	**10**	**12**
Percentage	**22%**	**8%**	**25%**	**11%**	**12%**	**9%**	**11%**

Source: Social Survey, 2013

In order for this training to be meaningful and sustainable, there is a need to link referral services for skills as well as market demand for home based products, along with proper monitoring activities.

5.4.8 Affordability and Willingness to Pay

There is generally high support from 98% of the respondents among HHN on the proposed plant upgrading. It is expected that the project will provide significant positive impacts. There is also signified interest to connect to the electricity grid. However, several factors are a deterrent to getting a connection. Affordability is a major constraint as claimed by 42% of the respondents who can't afford the monthly tariff. Some 22% also claimed that connection fee is unaffordable while a significant 27% are mostly concerned about both connection fee and monthly tariff.

Table 22: Opinion regarding the Project

Village	Support for the MEPP		Reasons for not Connecting			
	[1] Yes	[2] No	[1]High connection fee	[2]Cant afford Monthly tariff	[3]Both connecttion& monthly Tariff is high	[4] Do not have communal post
Kyar Pan	19	1	4	14		
NyaungWyne	15		4	5	5	
Than Ban	10		2		7	1
TOTAL	**44**	**1**	**10**	**19**	**12**	**1**
Percentage	**98%**	**2%**	**22%**	**42%**	**27%**	**2%**

Source: Social Survey, 2013

5.5 SURVEY RESULTS: HOUSEHOLDS WITH CONNECTION

A total of 40 households were interviewed representing households that are connected to the power supply (HHC). Total number of household members are191 with an average size of 4.8. This figure is lower than households without connection (5.5). Ethnic groups found are basically similar with HHN which include Mon (5%) Kayin (20%) Paoae (3%) Muslim (Bamar) (3%) Shan-Kayin (3%) Kayin (10%) Pao (3%) and Kayin-Bamar (3%). The majority of the households that live in the village belongs to Kayin. However, households living in the staff house are mostly Bamar (53%).

Table 23: Households Size, Gender and Ethnicity (HHC)

Village	# of HH	Household Members	Gender		Ethnicity									Total
			Male	Female	Bamar	Mon	Kayin	Paoae + Kayin	Muslim + Bamar	Shan - Kayin	Kayin	Pa-o	Kayin-Bamar	
Staff House	12	45	24	21	11	1								12
Kyar Pan	13	67	32	35	1	1	8	1	1	1				13
NyaungWyne	10	55	31	24	6						3	1		10
Than Ban	5	24	13	11	3						1		1	5
TOTAL	**40**	**191**	**100**	**91**	**21**	**2**	**8**	**1**	**1**	**1**	**4**	**1**	**1**	**40**
Percentage	**100 %**	**4.8***	**52%**	**48%**	**52%**	**5%**	**20%**	**3%**	**3%**	**3%**	**10%**	**3%**	**3%**	**100 %**

Source: Social Survey, 2013 * Average household size

5.5.1 Education

In terms of educational status, of the 40 male respondents, a low percentage (18%) have had elementary units. The majority (23%) have at least finished elementary grades. This is higher as compared to HHN which is only 9%. About 15% of male respondents have had high school units and only 8% have at least finished high school. Again, this figure is higher compared to HHN with only 4% that have had high school units but never finished high school. There is an even distribution of respondents who have undergrad units (8%), and reached college (8%). Some 10% has never been to school. In comparison, this figure is lower as compared to 28% of HHN respondents who have never been to school.

On the other hand there is observed slight difference in educational opportunities between male and female members. Of the 151 school age household members, some 13% male members and 15% female have elementary units. About 17% male and 14% female have graduated from elementary grades. Only 5% of male household members have reached high school as compared to 10% female.

Overall, the SES results indicate that access to higher education is higher among household heads (HHC) than HHN. There is also lower percentage of household members (11%) who have never been to school as compared to HHC (32%).

Table 24: Educational status of HHC

Educational level	Respondents (%)		HH members (%)	
	Male	Female	Male	Female
w/ Elem. Units	18	0	13	15
Elem. Graduate	23	3	17	14
High school units	15	0	5	10
High School Grad.	8	0	1	0
Under Graduate	8	0	2	3
College	8	8	3	3
w/ Masters unit	0	0	0	0
Vocational Training	0	0	0	0
Never been to school	10	3	4	9

5.5.2 Living Standards

In terms of quality of life, HHC have higher assessment of themselves as compared to HHN. The majority of respondents that are living in the staff house who are working in the tyre industry viewed themselves as “near poor”, A high percentage (63%) rated themselves as average, while some 8 per cent viewed themselves as better off.

Overall, comparative findings show that the living standard of HHC is better as compared to HHN.

Table 25: Household's Living Standard

Village	[1] Poor	[2]Near Poor	[3] Average	[4] Better off
Staff House		8	4	
Kyar Pan	2		10	1
NyaungWyne		2	6	2
Than Ban			5	
TOTAL	**2**	**10**	**25**	**3**
Percentage	**5%**	**25%**	**63%**	**8%**

Source: Social Survey, 2013

5.5.3 *Income and Expenditures*

There are varied income sources and some households are engaged in one or more sources. All of the respondents in the staff house are wage-earner. However, the majority of respondents in the villages are engaged in farming (35%). Other sources include animal husbandry (18%) Trade/buy and sell (18%) receiving pension (8%) and others (not specified) 50%. Overall, regular income earners comprise about 63% while irregular earners are about 47%.

Seasonal incomes are sources from farming and planting of other crops as well as animal raising, which are sold or used as household consumption.

Table 26: Sources of Income

Village	[1] Farming/ Planting	[2]Animal Husbandry	[3] Trade	[4]Wage-Earner	[5]Pensions,Subsidies, Scholarship	[6] others
Staff House	3			12	1	5
Kyar Pan	4	1	1	4		8
NyaungWyne	5	5	3	4		5
Than Ban	2	1	3	2	2	2
TOTAL	**14**	**7**	**7**	**22**	**3**	**20**
Percentage	**35%**	**18%**	**18%**	**55%**	**8%**	**50%**

On the other hand, regular wage earners comprise of teacher (1) government employee (15) which are mostly employed at the Tire Industry, private employee (1) own business (5) vendors (1) Driver 1.

The estimated monthly income of household members are wide ranging which are spread almost evenly among different income groups. The ranges are within K80,000 up to K400,000. Those households falling under the bracket of 80,000 Kyat are receipts coming from farming, pensions and other business.

The overall results show that majority 23% have an average income range between K121,000-160,000, this is higher as compared to HHN (23%) whose average income range is K80,000-120,000 per month. There is an almost an even distribution between different income ranges. 10% of HHW have income range below K80, 000. Those within the range of K161-K200,000 are 20%, and K221,000-K240,000 (8%); K241,000-K280,000 (10%); K281,000-K320,000 (10%); K321,000-K400,000; (3%) and over K400,000 (4%). It is clear that there is higher income among the HHC as compared to HHN.

Table 27: Estimated Monthly Income

Village	[1] Below 80,000	[2] 80,000-120,000	[3] 121,000-160,000	[4] 161,000-200,000	[5] 221,000-240,000	[6] 241,000-280,000	[7] 281,000-320,000	[8] 321,000-400,000	[9] Over 400,000
Staff House	1	2	9						
Kyar Pan	1	2		3		1	2	1	3
NyaungWyne	1			5	3	1	1		
Than Ban	1	1				2	1		
TOTAL	**4**	**5**	**9**	**8**	**3**	**4**	**4**	**1**	**3**
Percentage	**10%**	**13%**	**23%**	**20%**	**8%**	**10%**	**10%**	**3%**	**8%**

Source: Social Survey, 2013

Average income expenditures vary by income classification. However, the average expenses of HHC are between the ranges of 121,000-200,000 Kyat. Again, this is higher compared to majority of HHN whose average expenditure pattern is between 121,000-160,000 Kyat. Food represents the common expenditures of households of which the majority spends below 80,000 Kyat per month. Other expenses include housing, transportation, education and medicines.

Table 28: Expenditures (HHC)

Village	[1] Below 80,000	[2] 80,000-120,000	[3] 121,000-160,000	[4] 161,000-200,000	[5] 221,000-240,000	[6] 241,000-280,000	[7] 281,000-320,000	[8] 321,000-400,000
Kyar Pan	5	6	5	1	2	1		
NyaungWyne	1	2	7	2	2		1	
Than Ban	4	2	3					1
TOTAL	**10**	**10**	**15**	**3**	**4**	**1**	**1**	**1**
Percentage	**22%**	**22%**	**33%**	**7%**	**9%**	**2%**	**2%**	**2%**

Source: Social Survey, 2013

The overall results show that average expenditure is higher compared to household income. Data on credit pattern show that about 28% of HHC avail of credit from various sources, This is higher compared to HHN (20%). This explains the coping mechanism of households to meet their daily needs. Friends and relatives are the common form of credit availed by households.

A majority of the households (78%) have lived in the village for more than 10 years within the township of Thaton. Various reasons for staying longer include free housing provided to staff working in the Tyre industry, proximity to work and kinship, access to education and work.

The majority of the households (98%) live in single dwelling units. About 13% of household units live in temporary houses. The majority (65%) owned their dwelling units while 30% rent the house; and 5% are living for free. In terms of land status, a high percentage (68%) have land rights use while 32% do not have rights to occupy land.

Table 29: Living Condition

Village	Type of Dwelling		Housing Condition				House Ownership			Land Status	
	[1] Single home	[2] Sharing w/ Extended Families	[1] Permanent House	[2] Semi-Permanent	[3] Temporary	[4] Dilapidated	[1] Owned	[2] Rented	[3] Free	[1] w/ Rights	[2] w/o Rights
Staff House	12		11	1				11	1		12
Kyar Pan	12	1	4	8	1		11	1	1	12	1
NyaungWyne	10		4	4	3		10			10	
Than Ban	5			4	1		5			5	
TOTAL	**39**	**1**	**19**	**17**	**5**		**26**	**12**	**2**	**27**	**13**
Percentage	**98%**	**3%**	**48%**	**43%**	**13%**		**65%**	**30%**	**5%**	**68%**	**32%**

Source: Social Survey, 2013

Overall, this finding indicates that HHC have better housing facilities and quality of life is much better compared to HHN.

In terms of sanitation, a high percentage (95%) has their own separate toilets. The common sanitary facilities are pour flush toilet with sewage pipe (8%) pour flush toilet (84%) double vault compost latrine (8%). 60% of households claimed that they have septic tank, while 40% do not have. All of the respondents in the staff house said that their septic tanks are linked to public drainage system. The staff house facilities (electricity, water, toilets) are provided by the Tire Factory.

While there are cases of flash flood occurring in the area, these are seldom and water recedes immediately afterwards.

Table 30: Sanitary Facilities

Village	Separate Toilet		w/ Septic Tank		Kind of Toilet						
	[1] Yes	[2] No	[1] Yes	[2] No	[1]Flush Toilet, Sewage pipes	[2]Pour flush toilet	[3] Double vault compost latrine	[4] Directly over the water	[5] Wrap & throw	[6] anywhere	[7] others
Staff House	12		2	10	2	10					
Kyar Pan	12		12	1	1	12					
NyaungWyne	10		8			8	2				
Than Ban	4	1		5		4					
TOTAL	**38**	**1**	**22**	**16**	**3**	**34**	**2**				1
Percentage	**95%**	**3%**	**55%**	**40%**	**8%**	**85%**	**5%**	**0%**	**0%**	**0%**	**2%**

Source: Social Survey, 2013

There are varied water sources which are generally used for domestic consumption which include drilled wells with pump, hand dug well (48%), well from neighbours (2%) and river (23%). Some households are using one or more sources. Water from hand dug wells vary in depth from 12 to 42 feet deep. Sources of drinking water are usually coming from wells with pumps which are 25-30 feet deep.

Table 31: Sources of Water

Village	[1] Drill well w/ pump	[2] Hand dug well	[3] Filtered spring H_2O	[4] use well from neighbor	[5] rain H2O	[6] River/ Lake/Pond	[7]Others
Staff House	12					12	
Kyar Pan	1	11		1			
NyaungWyne		10					
Than Ban	1	4					
TOTAL	**14**	**25**		**1**		**12**	
Percentage	**27%**	**48%**		**2%**		**23%**	

Source: Social Survey, 2013

5.5.4 Gender Dimension

The IP respondents disclosed that it is generally the men who are tasked with the responsibility of ensuring water provision for the entire household. However, if the men are not available, then the women have no choice but to assume the responsibility by themselves.

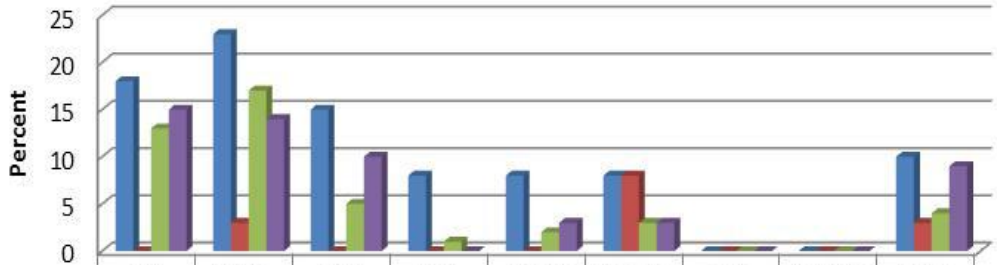
The issue here is not just providing access to water to women, but to both women and men. Where both HHC and HHN are concerned, women and men spend a considerable amount of time and effort accessing water for household and other production needs. Studies have shown that since women are the ones most affected by the lack of basic services. The provision of access to basic services such as safe/potable water, electricity significantly improves women's ability to participate in other productive activities

Water and sanitation and access to power services are often perceived as important cross cutting issues. Women gained more benefits because, the access to water and electricty result to more economic benefits due to time saved and they can engage in other economic activities.

Overall, both men and women, boys and girls participate in household activities, Husband and wife participate in decision making that affect their lives, in children's education, building homes, etc. In terms of education, there is observed gender gap between male and female household respondents and members in all levels of education as shown in Figure 2.

Women's participation on the project is targeted in the Social Action Plan (SAP). The SES and FGD report showed disaggregated data revealed women's involvement in various activities initiated in community level.

Figure 14: Gender gap in education-HHC



	w/ Elem. Units	Elem. Grad	High school units	High School Grad.	Under Grad	College	w/ Masters unit	Vocational Training	Never been to school
Respondents Male	18	23	15	8	8	8	0	0	10
Respondents Female	0	3	0	0	0	8	0	0	3
HH members Male	13	17	5	1	2	3	0	0	4
HH members Female	15	14	10	0	3	3	0	0	9

Source: Social Survey, 2013

5.5.5 *Community Infrastructure Facilities*

The presence of infrastructure facilities is viewed as contributing factors to economic development of a locality. The respondents' assessment of the community's infrastructure facilities shows the following:

Road –The majority 48% rated the road infrastructure as average while a significant 40% rated the road as poor. Only 10% said road condition is good. Internal road within the villages need improvement.

Water – In the village of Than Ban, and NyaungWyne water is considered as having poor quality. However, inspite of its poor quality, there has been limited cases of water borne diseases as signified by 91% of respondents.

Drainage – There is no proper drainage system in all the villages, thus this area needs to be addressed and have been rated by all respondents as poor.

Garbage collection. In Than Ban, garbage is not considered as problem. The current method to dispose solid waste is by burning as practised by 99% of the respondents.

Electricity. Among the basic services, connection to electric power is considered as a priority need. There is very low percentage of households (15%) with lighting facilities in their homes. Affordability is a major deterrent in getting connection and low capacity to pay for monthly services. However, there is generally willingness to pay for connection fee if the government provides full electrification of the villages.

Overall, in terms of community's felt needs, the following have been identified by the respondents in order of priority. (1) Electricity, (2) livelihood 3) health services 3) school, 4) water 5) agricultural inputs.

Electricity has been affirmed by the FGD participants as well as SES as a priority need and efforts have been done by the villages to form committees that deals on this issue.

5.5.6 Support System

There are existing community organizations among the IP villages which serve as social support system in the village level. About 55% of the respondents participate in community affairs and organizations. These organizations include Women's Union, Hamlet Block, Farmers Association and Veterans Association. The most active is the youth organization.

Training activities have been provided by different humanitarian organizations. These include skills training, population and family planning, health care, environment protection, and other livelihood skills. These training have been considered as useful, and have been utilized by few households. In NyaungWyne, UNICEF has been providing training services on health and family. In Than Ban some organizations that have offered training include Teachers in village, Union of Kayin, Unigelf, Union of Padun.

Table 32: Types of Training

Village	[1] Technical Training	[2] Pop. & Family Planning	[3] Health Care	[4] Environment Hygiene	[5] Environment Protection	[6] Mass Org/Public Act.	[7] Other Livelihood Skills
Staff House	11	12	12	12	12	11	1
Kyar Pan	3	2	11	13	8	1	3
NyaungWyne	8		5	3	1		
Than Ban	1	4	4	4	4	4	4
TOTAL	**23**	**18**	**32**	**32**	**25**	**16**	**8**
Percentage	**15%**	**12%**	**21%**	**21%**	**16%**	**10%**	**5%**

Source: Social Survey, 2013

5.5.7 Perceptions of Current Project

There is common assessment among the HHC that the current electricity supply is sufficient as signified by 88% of the respondents. There is limited number (13%) who signified that the current supply is not sufficient. While this claim is particularly true among HHC, there are contrasting opinions among some key informants from the health and other business sectors who use electricity regularly about constant fluctuation in power supply. In particular, the Health Department of Tha Ton has cited that the irregularity of power supply has affected their performance in emergency situation. As such, the need for the upgrading is also highly recommended by the Key informants.

With regards toto the proposed additional turbine, there is 100% support from the respondents among HHC. There is also signified willingness to pay for improved services which is at 10% more of current bill as indicated by 58% of the respondents.

Table 33: Perception of MEPP and willingness to pay

Village	ViewsCurrent Electricity Supply			Support MEPP		Willingness to pay		
	[1] Sufficient	[2] Not Sufficient	[3] Fluctuating	[1] Yes	[2] No	[1] 10% - 20% more	[2] <10% more	[3] don't know
Staff House	12			12			3	7
Kyar Pan	13			13			11	2
Nyaung Wyne	10			10			9	1
Than Ban		5		5				1
TOTAL	35	5		40			23	11
Percentage	88%	13%		100%			58%	3%

5.6 PERCEIVED BENEFITS AND IMPACTS

Positive Impact

The most significant benefit identified is the anticipated availability of regular power supply. Energy fluctuation and loss of power often occurs affecting business and domestic work of households, business communities, health and other institutions.

Another significant impact is the potential increase of opportunity for economic development. It is viewed that local job employment could be generated from the construction, land filling and digging, providing short-term job employment to un-skilled workers and also possible long term jobs during operations and maintenance. It is also perceived that there will be increase in trade and industry resulting from urban and rural improvement usually associated with the presence of an efficient and regular supply of electricity. However, It was emphasized during the consultation and workshop that job opportunities associated with the upgrading will be extremely limited.

Negative Impact

While there are some perceived negative impacts such as noise and pollution and waste, these can be fully mitigated by adopting a modern gas turbine facility that reduces such impacts.

Overall, the results from consultations with the FGD participants affirmed that there will be no displacement of households associated with land acquisition, no loss of business establishments, productive assets, cultural heritage or livelihood. On the contrary, the Project is expected to provide employment which is considered as beneficial impact to people that will be hired by the project.

A culturally appropriate grievance redress mechanism will be established in consultation with potentially affected IPs to address grievances by the affected Indigenous Peoples' communities and to ensure that any project related complaints are promptly addressed. A first instance of dispute handling where IPs are fully represented will be set up with the aim of settling any disputes amicably. If necessary, the project will establish a committee which will include IP representatives and project management. Court cases will be time consuming and expensive and it is therefore critical to establish more informal first and second tier grievance management mechanisms. Each case should be carefully documented and the nature of grievance, agreed actions to be taken and subsequent monitoring must be recorded.

Table 34: Assessment of Project Impacts (FGD Findings)

Impacts/Issues	Results	KII/FGD Rating
1. Natural Environment		
a. Loss of trees, vegetation	Less impact No impact	23% 77%
b. Forest, protected area	Less impact No impact	35% 64%
c., Pollution, Noise and vibration	Less Impact No Impact	46% 54%
2. Social Impact		
a. Loss of land and structure	No impact	98%
b. Displacement of business	No impact	98%
c. Cultural properties and historical settings	No impact	99%
d.Loss of productive land/livelihood	No impact	99%

5.7 STAKEHOLDERS' WORKSHOP

The stakeholders workshop was organized to disclose the draft environmental and social study. A total of 50 participants from various organizations and Ministries attended the Workshop on May 20, 2013, held at the Two Lakes Resort in Thaton. The following issues, comments and recommendations were raised during the workshop. The Minutes of the proceedings are attached as Annex 6.

Main Issues

- Waste and pollution emanating from the Project might affect productive land and other livelihood resources;
- Any educational, financial assistance considered for the villages;
- Other project benefits of the villages resulting from the project;
- Some could afford the connection fee while others could not;
- Generation capacity of the current plant and the proposed gas turbine

Stakeholders Recommendations

- Initiatives to manage environmental concerns
- Target for rural electrification is set at 100% full coverage by 2030
- Inclusion of villages near the project site for electric coverage

Responses from the Study Team

On waste management:. Mitigation measures will be established in the environmental Management Plan accompanying the project document, along with monitoring.

On Assistance, education and other benefits. The project does not deal directly with poverty alleviation or financial improvement.

Affordability of Connection fee and Tariff. Findings from the social analysis showed that some local residents have household debts and could not afford to pay for electrical connection as well as monthly tariff for electricity. It is because of their poverty that they cannot afford to pay extra for any other expenditure. Some elderly persons are even frightened of electrical hazards, so they are reluctant to take the facility.

6 Environmental & Social Impact Assessment

6.1 MAIN EXPECTED IMPACTS OF NEW PROJECT IMPLEMENTATION

6.1.1 Health and Safety

Any technical upgrade of the Thaton GT station would need to proceed in parallel with an upgrade in the health, safety and environment (HSE) management regime. Currently there are no effective routines and facilities for chemical handling, storage or disposal, nor are there effective waste management plans or procedures in existence.

6.1.2 Emissions to the atmosphere

Emissions of carbon dioxide correlate with the amount of gas burned on a more or less linear basis. Thus replacing the old turbines at Thaton with those of much greater efficiency (even in a high temperature, high humidity context) will mean much lower CO2 emissions for a given output. Therefore, although the total emissions of CO2 may not change significantly with the installation of new turbines given the increase in installed capacity, the CO2 produced per MW will be appreciably less.

New technology can also reduce nitrogen oxide (NOx) emissions as below:

- Existing; MS5001PA (in new and clean condition): NOx = 142 ppmvd (285 mg/Nm3)
- Example; new LM6000PF (in new and clean condition): NOx = 15 ppmvd (30 mg/Nm3)

Given the increase in the installed capacity after the installation of new turbines the actual reduction in NOx emissions at the Thaton site may be up to 70%. Overall, replacement of the current gas turbines with those of a more modern design will significantly reduce air pollution and GHG emissions per MW produced and improve the environmental profile of the plant.

For gas turbines, particulate matter (PM) emissions are assumed essentially equal to PM-10 emissions. PM-10 emissions are defined as particulate matter emissions that are less than ten microns in diameter. However, PM-10 emissions from natural gas combustion are essentially zero (no emissions from the combustion process itself) thus do not represent an environmental or human health risk at Thaton.

6.1.3 Waste

At present wastewater from the process is not considered a significant issue. Depending on the operation of the new turbines there may be a need to consider small retention ponds to avoid discharges from the site with high thermal loadings etc.

No significant solid waste is generated through the process. However, solid waste is produced through operational and maintenance activities, staff offices and canteen.

There is no plan for handling of solid waste. Occasional collection occurs but much waste is either burnt or buried at site. Although the quantities are small and will remain small even after the installation of the new turbines, better handling is required. At is simplest this could be an arrangement to ensure regular municipal collection of waste or a contract with a private service provider.

6.1.4 Noise

The new turbines will be equipped with individual noise enclosures, one for the turbine and one for the gearbox and HV-generator. Noise levels should, therefore, not exceed approximately 85 dB. The existing turbines may be expected to give noise levels of up to about 110 dB in the machine hall according to industry estimates which is in-line with the baseline survey.

Noise levels at the fence surrounding the site currently reach levels of 60-70 dB(A) and at places (main entrance) levels up to 80 dB(A). The noise levels from the new turbines, in compliance with international standards, are expected to be reduced to between 50 (night-time) and 55 dB(A) (daytime) at the fence of the site.

6.2 IMPACT ASSESSMENT

Following the establishment of the baseline and the environment and social screening an initial assessment of potential impacts has been undertaken against a standardised checklist of potential issues. The impacts are the changes that may be anticipated though the replacement of the existing turbines at site.

The impacts have been assessed on a qualitative basis according to four parameters, i.e. extent, duration, magnitude and probability. Reviewing potential impacts against these four parameters allows and assessment of significance to emerge. Impacts are indicated as being of low, medium or high significance and in addition are identified as being of a positive or a negative character (+ or -). Where no (or negligible) changes are anticipated or an issue does not apply a “NA” designation is awarded.

The assessment covers both the installation and the operational phase of the project. All impacts are assessed assuming no specific mitigation or management measures applied. Given the very limited scale of the project the assessment is essentially qualitative though the improvements in the operational phase for air pollution and noise parameters is outlined previously in this report.

Given that it is not planned to run the existing turbines in parallel with the new turbines it is assumed that there will be no cumulative impacts.

Table 35: Installation Phase Assessment of Impacts

Ref.	Impact/Issue	Significance	Comment
Bio-Physical & Chemical			
BPC/1	Changes in water quality	Low (-)	Some limited impacts may be anticipated from accidental spillages and leaking of oil/fuel from construction vehicles. Ground disturbance will result in higher silt loadings in stormwater runoff and hence higher turbidity. Greater pressure on existing sanitation facilities may result in possible overflows

Ref.	Impact/Issue	Significance	Comment
			and pollution of ground and surface water.
BPC/2	Changes in rates of erosion and siltation	NA	There are no major civil works planned as part of the project. Some ground clearance and backfill may take place but any possible erosion in the monsoon will be on a very small scale and entirely limited to a small part of the existing compound. Very minor silt transport may take place with stormwater runoff.
BPC/3	Changes to surface water regime	NA	There are no water courses running though the site. Existing drainage is limited to mainly unlined stormwater drains which will not be disrupted by the installation.
BPC/4	Changes to groundwater regime	NA	There will be no discharges to groundwater associated with the installation.
BPC/5	Changes to air quality	NA	Limited haulage of equipment and minor use of machinery for ground preparation will result in only negligible increase in exhaust gas emissions. Paved roads to site and within the compound combined with small footprint of the new housing will result in negligible amounts of dust generated.
BPC/6	Changes to ambient noise levels	Low (-)	Some intermittent noise from machinery anticipated during ground preparation and erection of the new turbine housing.
BPC/7	Changes to aquatic biota	NA	There are no natural water bodies on site.
BPC/8	Changes in disease vector populations	NA	No increase in numbers of disease carrying insects or small mammals is anticipated.
BPC/9	Changes to terrestrial biota	NA	There are no rare or endangered species of plant or animal recorded from the site and the project footprint is extremely

Ref.	Impact/Issue	Significance	Comment
			limited..
BPC/10	Changes to land cover	NA	There is no natural vegetation to be cleared as a result of the project.
BPC/11	Changes to areas of natural habitat	NA	No significant habitats will be impacted. The proposed site is already in industrial use.
Socio-Economic & Cultural			
SEC/1	Changes involving loss of private assets	NA	The project will be contained entirely within the existing compound and no loss of private assets will occur.
SEC/2	Changes involving loss of cultural heritage	NA	The project does not border any sites of cultural or archaeological significance and the area within the compound is already in industrial use.
SEC/3	Changes involving displacement of people	NA	There will be no voluntary or involuntary displacement of people as a result of the project. All the land required is within the existing MEPE compound.
SEC/4	Changes to traffic patterns	Low (-)	There may be some minor intermittent disruption of local traffic due to the slow movement of heavy haulage vehicles and construction machinery.
SEC/5	Changes in public health status	NA	The project will not affect public health; there are no settlements bordering the existing compound and no significant quantities of waste will be generated. The construction workforce will be small.
SEC/6	Changes in wage labour incomes/livelihood opportunities	Low (+)	Some opportunities for unskilled day labour may accrue.
SEC/7	Changes in trade/commercial incomes/opportunities	Low (+)	Local commercial establishments and small contractors may benefit by selling goods and services to the main project contractors and suppliers.
SEC/8	Changes in visual	NA	The new turbines will be located on the existing compound which is itself not

Ref.	Impact/Issue	Significance	Comment
	amenity		located on high ground or in a physically prominent setting.
SEC/9	Changes involving loss of public infrastructure/community resources	NA	There will be no loss of public infrastructure associated with the project; it will take place entirely on the MEPE compound.

Table 36; Operational Phase Assessment of Impacts

Ref.	Impact/Issue	Significance	Comment
Bio-Physical & Chemical			
BPC/1	Changes in water quality	NA	There will be no discharge of contaminated water from the new plant. Few if any additional personnel will be required for operation and hence the sanitation facilities will not be strained.
BPC/2	Changes in rates of erosion and siltation	NA	There will be no ground disturbance in operation.
BPC/3	Changes to surface water regime	NA	There will be no disruption to existing drainage patterns in operation.
BPC/4	Changes to groundwater regime	NA	There will be no discharges to groundwater in operation.
BPC/5	Changes to air quality	Low (+)	Given the increase in the installed capacity after the installation of new turbines the actual reduction in NOx emissions at the Thaton site may be up to 70%. CO2 emissions may not fall in absolute terms given the higher capacity but there will be less CO2 generated per MW. Overall, replacement of the current gas turbines with those of a more modern design will significantly reduce air pollution and GHG emissions per MW produced and improve the environmental

Ref.	Impact/Issue	Significance	Comment
			profile of the plant.
BPC/6	Changes to ambient noise levels	High (+)	Noise levels at the fence surrounding the site currently reach levels of 60-70 dB(A) and at places (main entrance) levels up to 80 dB(A). The noise levels from the new turbines, in compliance with international standards, are expected to be reduced to between 50 (nighttime) and 55 dB(A) (daytime) at the fence of the site.
BPC/7	Changes to aquatic biota	NA	There are no natural water bodies on site that will affected during operations..
BPC/8	Changes in disease vector populations	NA	No increase in numbers of disease carrying insects or small mammals is anticipated during operation.
BPC/9	Changes to terrestrial biota	NA	There are no rare or endangered species of plant or animal recorded from the site.
BPC/10	Changes to land cover	NA	There is no natural vegetation to be cleared as a result of the project operations.
BPC/11	Changes to areas of natural habitat	NA	No significant habitats will be impacted. The proposed site will remain in industrial use.
Socio-Economic & Cultural			
SEC/1	Changes involving loss of private assets	NA	The project will be contained entirely within the existing compound and no loss of private assets will occur in operation.
SEC/2	Changes involving loss of cultural heritage	NA	The project does not border any sites of cultural or archaeological significance and the area within the compound is already in industrial use.
SEC/3	Changes involving displacement of people	NA	There will be no voluntary or involuntary displacement of people as a result of the project operation. All the land required is within the existing MEPE compound.
SEC/4	Changes to traffic patterns	NA	No increase in vehicular traffic during operation is anticipated.

Ref.	Impact/Issue	Significance	Comment
SEC/5	Changes in public health status	NA	The project will not affect public health in the operational phase; there are no settlements bordering the existing compound and no significant quantities of waste will be generated.
SEC/6	Changes in wage labour incomes/livelihood opportunities	Low (+)	Some opportunities for work at the plant may arise
SEC/7	Changes in trade/commercial incomes/opportunities	Low (+)	Local commercial establishments and small contractors may benefit by selling goods and services to the operator and plant personnel.
SEC/8	Changes in visual amenity	NA	The new turbines will be located on the existing compound which is itself not located on high ground or in a physically prominent setting.
SEC/9	Changes involving loss of public infrastructure/community resources	NA	There will be no loss of public infrastructure associated with the project operations; they will take place entirely on the MEPE compound.

Overall, the assessment concludes that only minor changes or impacts are expected to occur to the bio-physical and socio-economic environment as a result of project implementation.

7 Environmental and Social Management Plan

7.1 OVERARCHING MEASURES

To ensure the Project is implemented in an environmentally and socially responsible way mitigation measures should be applied to potential negative impacts and supported by a management and monitoring framework. The main recommendations are:

5. An environmental and social management plan (ESMP) as detailed following should accompany the installation phase
6. The ESMP be followed-up in the operational phase and further developed as an environmental, health & safety management system (EHS-MS) for the Plant
7. Health, safety and environment (HSE) routines be implemented and enforced for both construction/installation workers and permanent operational staff
8. Actions be taken to ensure that there is independent third party inspection and validation of the effectiveness of health, safety and environment controls

Prior to commissioning the MEPE should prepare for an environmental, health & safety management system which draws together environment mitigation measures, ESMP recommendations, HSE priorities and monitoring procedures.

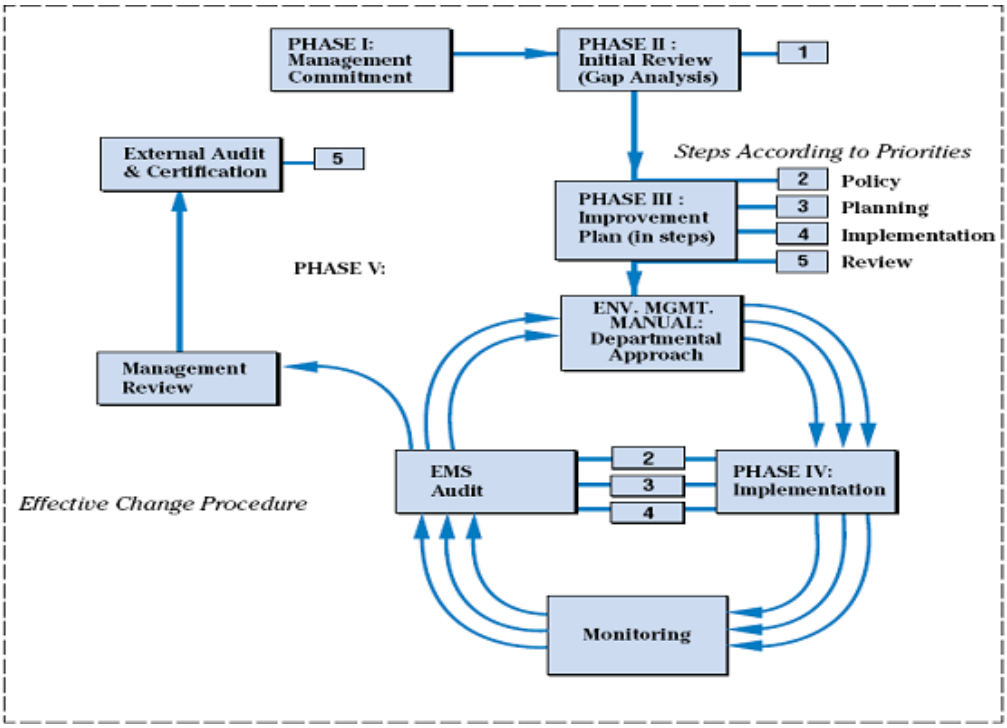


Figure 15: Environmental management system

7.1.1 Environmental and Social Management

The ESMP includes policies requirements and applicable environmental and social standards; requirements for the development during project implementation of an EHS Management System to be applied to operations at the project site; and mitigation measures, monitoring plans, implementation arrangements, and capacity building for implementation of the ESMP.

The ESMP also gives the estimated costs for the mitigation measures and monitoring programs for both the construction and operation phases. To ensure adequate implementation of the ESMP and development of the EHS-MS, the following activities and steps will be followed during project implementation:

a) A qualified firm will be contracted to give day-to-day support to MEPE for the implementation of the ESMP including supervision of the project investment works and the development of the EHS-MS.

b) Following the selection of the turn-key contractor, the contractor will be required to prepare an EHS plan for works implementation, subject to client and World Bank review. The contractor's EHS plan needs to comply with the ESMP and further specify environmental procedures, e.g. for the management of construction waste materials.

c) A comprehensive EHS due diligence audit will be conducted into the existing facilities and operational practices to form the basis for the development of the EHS-MS. The results of the audit will be subject to client and World Bank review.

d) The EHS-MS for the Thaton GT station will be developed and will be ready and adopted prior to the commissioning of the new facilities. The draft EHS-MS will be subject to client and World Bank review and will be audited by a competent and internationally accredited agency. The EHS-MS will cover waste and wastewater management, environmental monitoring, worker's health and safety procedures, inspection regimes for these areas, basic emergency procedures, specifications for recurrent training programs, a three-year program for continuous performance improvements, reporting and supervision requirements including reporting of problems and near-misses, and a scheme for independent system audits.

7.1.2 Environmental Policy

Construction phase

In the context of the project MEPE and Construction Contractors should commit to respect the following principles during the whole period of the construction activities:

- To manage construction activities with diligence and with the awareness that an important objective is to protect the environment and to minimize construction impacts, by employing the best control mechanisms, procedures and processes within the limits of their economic feasibility.
- To comply with GoM, and World Bank requirements and to provide self-monitoring to ensure compliance.
- To respect internationally recognized good practices in the fields of concern.
- To provide effective environmental briefing/training and equipment to construction staff.

- To ensure adherence to the ESMP throughout the construction stage.
- To efficiently implement measures outlined in this ESMP and submit to regular monitoring and auditing.

Operational Phase

In the context of the project MEPE must commit to respect the following principles during the whole period of the operations:

- Ensure that there is and effective and functioning waste management system for the Plant.
- Ensure that all staff are briefed/trained on their environmental and safety responsibilities and provided with the necessary equipment or and/or skills to ensure compliance.
- Ensure that all operational activities do not negatively impact natural eco-systems or the socio-economic and cultural environment of neighbouring communities.
- To remain committed to complying with all existing and possible future national environmental regulations and standards as well as international best practice and specific regulations or agreements applicable to this Project.
- To fully implement the EHS-MS and review, audit and update during the life of the Project.

7.1.3 Environmental Standards and Verification

The EHS-MS should ensure adherence to USEPA, EU Directives, or equivalent and to the World Bank safety, health and environment (SHE) General Guidelines and the Bank's SHE Guidelines for Thermal Power Generation.

Given the limited skills and capacity available within MEPE for setting up and monitoring an integrated environmental management system it is recommend that a suitable entity be identified to assist in development of the EHS-MS and the cost of this be built in to the overall project allocation.

Important in verifying the success of the various measures comprising the EHS-MS is independent third party audit and verification. To ensure that appropriate systems and routines are developed, implemented and monitored (and that they achieve the necessary results relative to compliance with national and international best practice) an experienced auditor will be required. At this time it is assumed that the state actors in Myanmar lack the capacity and resources to monitor and certify the environmental performance of the Project and the GT plant as a whole. Therefore, as for the implementation of the EHS-MS it is recommended that a suitable entity be identified to assist in development of the audit regime and the cost of this be built in to the overall project allocation.

The frequency of environmental audit should be calibrated to the project phases with enhanced oversight during implementation and thereafter perhaps reverting to an annual performance audit in the operational phase. Crucially, though, the audit must have an active feedback mechanism attached that allows the results and recommendations to be fed back in to the owner in such a way that senior management is involved and that actions are taken to rectify problems or improve procedures as appropriate.

7.2 ESMP

7.2.1 Implementation

All contractual and legal obligations relating to the ESMP should apply to both the Construction Contractors and their Sub-Contractors. It is the responsibility of the Construction Contractors to provide adequate resources to ensure effective implementation and control of the ESMP. Each Sub-Contractor should be responsible to its respective Contractor for compliance with the measures presented in the ESMP. Construction Contractors and their Sub-Contractors should ensure that all project staff are briefed and procedures are understood and followed.

7.2.1.1 Environmental Awareness

Each CC must ensure that its employees are adequately made aware of the ESMP; environmental legal requirements and other obligations. All employees should have an induction presentation on environmental awareness, to be conducted in the language relevant to the employee.

Three levels of training should be implemented:

1. General Environmental Awareness programme to all workers employed by the Construction Contractor or its Sub-contractors, raising environmental issues related to general issues as environmental conservation, waste management, health, hygiene and safety (suggested 2 hour presentation on site);
2. Health and Safety Awareness, including particularly AIDS/HIV and STD awareness programme (suggested 2 hour presentation on site);
3. Job Specific Environmental Training of workers on particularly sensitive environmental activities such as vehicle maintenance, waste management, refuelling operations, etc (time and venue as required).

Briefing should be conducted through short, focused and systematic site seminars/meetings.

7.2.1.2 Health & Safety Awareness Programme

General Occupational Health and Safety issues should be addressed under the implementation of the Contractor's OH&S Code (to be outlined in the bid document). The issues addressed under the awareness programme should complement those in the OH&S Code. The Contractor is expected to abide by all GoM and World Bank regulations on health and safety as a minimum requirement.

Personal protective equipment, or PPE, is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, PPE includes a variety of devices and garments such as goggles, coveralls, gloves, vests, earplugs, and respirators. It is incumbent on the Contractor to make available PPE to all employees as appropriate and enforce usage.

7.2.2 Proposed Roles and Responsibilities for the ESMP

7.2.2.1 Environmental Control Officer (ECO)

A suitably qualified environmental control officer (ECO) should be nominated from MEPE and trained before installation begins.

The ECO should ensure

- •implementation of the ESMP
- regular monitoring and site inspections

- Contractor abides by the ESMP

The ECO should undertake regular site inspections and the results should be recorded and as part of ESMP reporting.

7.2.2.2 Environmental Site Officer (ESO)

An ESO should be appointed/nominated by the Contractor from his site personnel to:

- Attend all construction site meetings.
- Undertake the activities required in the terms of the ESMP.
- Brief workers before installation commences (and regularly reinforce).
- Undertake regular monitoring during installation.
- Submit reports to the ECO on the implementation of the ESMP compliance with the conditions of approval and implementation of the mitigation measures in the ESMP.
- Report to the ECO any departures from the ESMP promptly with explanations for such.

7.2.3 ESMP Non-Compliance Detection, Correction and Prevention

To prioritise management attention on the most important issues, non-compliance observations should be separated into three levels on the basis of importance, and communications requirements for the observations should be commensurate with the severity of the non-compliance situation. The three levels of non-compliance situations are:

Non-Compliance Level I

Definition: A non-compliance situation not consistent with ESMP requirements, but not believed to represent an immediate or severe threat to people or to the environment. Repeated Level I concerns may become Level II concerns if left unattended.

Disposition: Level I situations should typically be addressed by the ESO. Corrective action should be agreed internally and implemented as expeditiously as practical. Formal communication to ECO not necessary.

Non Compliance Level II

Definition: A non-compliance situation that has not yet resulted in clearly identified damage or irreversible impact, but which potential significance requires expeditious corrective action and site-specific attention to prevent severe effects. Repeated Level II concerns may become Level III concerns if left unattended.

Disposition: Corrective action should be agreed to and initiated as expeditiously as practical, typically within the week following initial identification of the issue requiring attention. Special follow-up of corrective measures are required from the ECO. Formally noted noted in Monthly environmental reporting.

Non Compliance Level III

Definition: A critical non-compliance situation, typically including observed significant damage on the environment or a reasonable expectation of very severe impending damage and or danger to workers and local communities. Intentional disregard of specific key prohibitions is also classified as a Level III concern.

Disposition: Level III concerns are to be actioned by the ECO.

Corrective action should be agreed to and initiated within 1 day of original observation unless special circumstances require a longer period. Although a specific decision/response time frame may not be achievable in all instances, the general intent should be to define and initiate action to minimize adverse effects and/or curtail adverse effects as expeditiously as practical.. If necessary, the ECO should request the concerned Contractor to halt specific activities while corrective actions are implemented.

7.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Mitigation measures that compromise the ESMP are outlined below.

Table 37: ESMP

	Design Mitigation Measures	Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
1	Ensure adherence to national & internationally recognised design and safety standards	+	+	+	+		+	+	+	MEPE and Contractor
2	Include the ESMP requirement in all works contracts	+	+	+	+		+	+	+	MEPE
3	Ensure all emissions parameters are within national guidelines/regulations (or accepted international standards)	+	+	+					+	MEPE and Contractor
4	Ensure new drainage is sufficiently dimensioned to avoid/minimize blockages				+				+	MEPE and Contractor
5	Identify suitable borrow areas for fill material		+	+			+		+	ECO and ESO

Installation Mitigation Measures		Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
1	Use modern and new construction machines	+	+						+	Contractor
	Regularly maintenance of construction machinery	+	+						+	Contractor and ESO
	Avoid working between 19.00 – 07.00 when possible	+							+	Contractor and ESO
	Inform about installation schedules and time						+		+	Contractor and ESO
2	Fence all construction areas								+	Contractor and ESO
	Manage Excavated soil		+							Contractor and ESO
	Cover fine construction materials (cement)		+							Contractor and ESO
	Spray water on exposed areas in dry and windy conditions;		+							Contractor and ESO
	All trucks that transport soil, sand, and dispersible materials are covered		+						+	Contractor and ESO
	Limit truck speed in residential areas	+							+	Contractor and ESO
3	Install dustbin and collect solid waste generated during construction.			+					+	Contractor and ESO
	Ensure normal operation of existing utilities					+		+	+	MEPE and Contractor
4	Store all fuels, oils and chemicals on site in a covered area with an impermeable floor away from surface water resources			+					+	Contractor and ESO
	Use temporary ditches to adjust storm water flow out of construction area.			+	+		+			Contractor and ESO
	Excavated soil must be protected		+							Contractor and ESO
	Train workers in appropriate waste disposal practice			+					+	Contractor and ESO
	Any excavation areas must be		+	+	+					Contractor and ESO

	Installation Mitigation Measures	Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
	quickly reinstated.									
	Oil, grease or solid waste leakages must be cleaned immediately.			+					+	Contractor and ESO
	Preferential hire of local labour								(+)	MEPE and Contractor
5	Solid waste and soil generated within construction site should be collected to temporary holding area before transport to disposal site			+					+	Contractor and ESO
	Barrier and suction pump installed to pump water to the drainage in case of flooding;			+	+					Contractor and ESO
	Regularly maintain normal operation status of existing drainages				+					Contractor and ESO
6	Mark the location of underground facilities					+				Contractor and ESO
	Sewerage pipelines should be placed under water supply system.					+				MEPE and Contractor
	Emergency plan in placer	+	+	+	+	+	+	+	+	MEPE and Contractor
7	Applying regulated vehicle weight						+			Contractor and ESO
	Access road surface should be fully surfaced						+			Contractor and ESO
	Proper compensation for any violation/damages to existing infrastructure.					+	+	+		MEPE and Contractor
8	Check cable and electrical equipment, especially in rainy conditions							+	+	Contractor and ESO
	Only qualified people are allowed to install and maintain the electrical system.							+	+	MEPE and Contractor
	Upon installation completion, the Contractor is responsible to clean up any temporary power supply source							+	+	Contractor and ESO

Installation Mitigation Measures		Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
9	The workers, including those of sub-contractors, must be provided with and use proper safety equipment								+	Contractor and ESO
	The construction sites shall be kept clean and tidy			+					+	Contractor and ESO
	Proper sanitation facilities for workforce			+					+	Contractor and ESO
	Provide and maintain lights, protection fences, signboards and guards								+	Contractor and ESO
	Provide safety and emergency response equipment.								+	MEPE and Contractor
10	Implement ESMP during installation	+	+	+	+	+	+	+	+	MEPE Contractor with ESO and ECO

Operation Mitigation Measures		Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
1	Periodically clear drainage	+		+	+				+	MEPE
2	Conduct public awareness raising on environment								+	MEPE
3	Ensure the available budget and annual maintenance for the system	+	+	+				+	+	MEPE
4	Develop and implement full EHS-MS	+	+	+	+	+	+	+	+	MEPE
5	Secure site of existing turbines	+	+						+	MEPE

	Operation Mitigation Measures	Bio Physical			Socio-Economic					Responsibility
		Air Quality		Water Quality						
		Noise and vibration generation	Dust and polluting air emission	Impacts on water quality	Temporary flooding	Impacts on underground utilities	Impact on access and traffic	Security of power supply	Public and Worker Health and Safety	
6	Collect and treat any contaminated water			+					+	MEPE
7	Check no noise interference to local communities								+	MEPE
8	Operate waste management to best practice			+					+	MEPE
9	Ensure proper sewerage treatment through septic tanks or connection to municipal system			+					+	MEPE
10	Ensure emergency plan in place	+	+	+	+	+	+	+	+	MEPE
11	Ensure grievance redress mechanism remains effective								+	MEPE
12	Audit efficiency of ESMP	+	+	+	+	+	+	+	+	MEPE Independent Auditor

7.3.1 Specific Environmental Mitigation Measures

Some environmental priority mitigations are as follows:

- The noise levels from the new turbines should be in compliance with international standards and are expected to be reduced to between 50 (night-time) and 55 dB(A) (daytime) at the fence of the site.
- Contained storage should be provided for all liquid and solid waste prior to safe disposal.
- Removal of empty chemical drums from site and transport for recycling or industrial re-use.
- Prepare a procedures for management and (eventually) removal of asbestos and possibly PCBs from the site.
- Install a series of groundwater monitoring wells on the site periphery.
- Store all fuel in bunded tanks and not drums.
- Rehabilitate existing fire hydrants and install additional as required.
- Provide working fire extinguishers in all buildings.
- Co-ordinate an emergency preparedness plan with local government.
- Install a first-aid post on site and train key staff as first-aiders.

- Lock and restrict access to all sensitive areas.
- Provide a hazmat storage facility.
- Provide collector system for drainage of the workshop area and skim and safely dispose of floating hydrocarbons and filter for those in suspension or solution.
- Install septic tanks or connect to municipal sewerage system.
- Ensure ear defenders are worn inside the turbine building.
- Ensure gloves and protective boots and clothing are issued to staff as appropriate.
- All employees (including all site managers) exposed to health and safety as well as fire-explosion risks at the Station site should be subject to training and repeated re-training. Use of the established measures (e.g. equipment inspections and checking of all site personnel to use, for example, personal protection equipment--PPE) should be constantly monitored on site to ensure full compliance.
- Acquire fixed equipment for monitoring noise levels inside the turbine buildings and administration offices as well as mobile meters for spot checks in and around the compound.
- Contract with a laboratory and technicians to take regular samples of water quality and air quality as part of the EHS-MS.

7.3.2 Specific Social Mitigation Measures

Specific measures will be implemented to ensure that IPs receive social and economic benefits that are culturally appropriate. This will include technical assistance and support to the government to prepare and accelerate rural electrification in the three IP villages in the Project's area of influence. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals which are connected to the grid, will be provided with more reliable power supply.

The improved power supply in the region may result in considerable indirect benefits, which will include increased economic activities and job creation. Technical assistance for the electrification is included to establish (a) what technical option will be adequate and most sustainable; and (b) to determine the cost and implementation arrangements. Therefore, no cost or other implementation details are known at this stage, and will be determined during the early stages of project implementation. Monitoring, evaluation and reporting mechanisms appropriate to the project will include arrangements for the free, prior, and informed consultation with the affected Indigenous Peoples' communities. These arrangements will be finalized as soon as the most sustainable technical option for the rural electrification of the three IP villages has been determined.

7.4 PROJECT ENVIRONMENTAL AND SOCIAL (PERFORMANCE) MONITORING [8]

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
Design and Pre-installation Phase							
1. Environmentally Responsible Procurement. (ERP)	Contract follows World Bank Guidelines. Contractual clauses include implementation of environmental mitigation measures/ESMP tied to a performance bond.	Once, before Contract is signed.	Before Contract is signed.	All works areas and zone of influence	MEPE	World Bank	MEPE
2. Waste disposal	Disposal options for all waste, residually contaminated soils, etc agreed with local authority.	Monthly or as required 2. If necessary include in contracts for unit rates for re-measurement for disposal. 3. After agreement with local authority, designate disposal sites in the contract and cost unit disposal rates accordingly.	1.Prior to detailed design stage no later than pre-qualification or tender negotiations 2. Include in contract.	GT Plant compound	1. Contractor 2. MEPE	ECO	Contractor

[8] Implementation of monitoring activities for the project to evaluate conformity to activities procedures, specifications and/ or technical requirements in the ESMP.

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
3. Noise and air quality mitigation .	fuel efficient turbines selected and effective housing specified	1. Once during review of the final design	Completion of detailed design.	As defined in detailed design ESMP.	Contractor	MEPE	Contractor cost
4. Hydrological Impacts	Drainage Management plan.	During detailed design	One month before commencement of installation	All works areas	Contractor	MEPE	Contractor cost
5. Temporary drainage and erosion control	Erosion Control and Temporary Drainage Plans completed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before installation commences.	All low-lying areas and less consolidated areas.	Contractor.	MEPE	Contractor cost
6. Planning construction camps (if outside the existing compound)	Use of land agreed with surrounding residents & villages.	During detailed design updated by Contractor.	One month before installation commences.	Locations agreed by MEPE in consultation with community and the Contractor.	Contractor	MEPE	Contractor cost
7.Traffic Condition	Traffic Management Plan agreed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before installation commences.	Locations agreed in consultation with community and the Contractor.	Contractor	MEPE	Contractor cost
8. Institutional strengthening and capacity building	1. Strengthening plan agreed for MEPE at Thaton 2. Environmental support in place 3. ECO identified 4. Training of ECO initiated.	1. Once, 2. Once 3. Once 4. On-going	1. As soon as practicable 2, 3, 4. No later than one month before Contract award.	All works areas	MEPE	Auditor/ World Bank	MEPE
INSTALLATION PHASE							

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
1.Orientation for Contractor, and Workers	1. Contractor agreed to provide training to professional staff and workers. 2. Special briefing and training for Contractor completed. 3. Periodic progress review sessions.	1. Once 2. On-going 3. On-going	1. Before contract is signed 2. Before construction areas are opened up 3. Every six weeks	All Contractor staff members in all categories	Contractor	ECO	Contractor
2. Measures to control environmental impacts	1. Drainage managed 2. Temp. Pedestrian & Traffic managed, 3. Erosion Control & managed 4. Materials Management plan, 5. Waste managed; 6. Noise and Dust managed, 7. Safety Plan	As required / on-going.	One month before installation commences and thereafter as required during construction.	All works areas	Contractor	ECO	Contractor
3. Water quality	Key parameters (pH, turbidity, EC, temperature, BOD, fecal coliforms, heavy metals, other as required) water quality monitoring during construction.	Twice before construction begins and thereafter monthly	During detailed engineering design by Contractor and update to cover any unidentified impacts.	All works areas near flowing or standing water	Contractor	ECO	Contractor
4. Water Resources	1. No disruption to community water supplies.	1. Weekly 2. Monthly	Prior to submission of progress reports.	All local water supply networks / resources.	Contractor	ECO	Contractor

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
	2. Measures established to minimize water wastage.						
5. Spoil disposal and construction waste disposal	1. Use of designated disposal areas. 2. Waste Management Plan implemented. 3 No open burning	Monthly (line item when opening up construction site).	Prior to construction. Update monthly.	All works areas.	Contractor	ECO	Contractor
6. Noise	Noise mitigation measures implemented in line with ESMP.	Weekly or as required.	Prior to construction (equipment check). Update monthly.	All works areas.	Contractor	ECO	Contractor
7. Air quality	Noise and dust control plan implemented.	Monthly	Prior to construction. Update monthly.	All works areas.	Contractor	ECO	Contractor
8. Soil & Ground Contamination	Contractors workforce to instructed and train handling of chemicals	Monthly	Prior to construction. Update monthly.	All works areas.	Contractor	ECO	Contractor
9. Construction Camp Location and Operation (if outside compound)	1. Use of land agreed with surrounding residents & Villages. 2. Camp management Plan implemented	Weekly or as required (line item when mobilising).	Prior to construction. Update monthly.	All works areas.	Contractor	ECO	Contractor
10. Safety Precautions for Workers	HSE plan submitted by contractor	Once (update monthly as necessary)	One month before construction and update Monthly.	All works and storage areas etc.	Contractor.	ECO	Contractor
11. Social Impacts	1. Relevant gender measures adopted. 2. Complaints on	Monthly	During construction. Update monthly.	All affected areas.	Contractor	MEPE/ECO	MEPE/ Contractor

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
	construction nuisance or damages are responded to promptly by the Contractor. 3. Meetings with local communities for liaison purposes. 4. A culturally appropriate grievance redress mechanism (GRM) in place and fully operational. GRM developed in consultation with potentially affected IPs						
12. ESMP	Contractor has followed guidance from ESMP.	Weekly or as necessary	During construction and update Monthly.	All works areas	Contractor.	ECO / Auditor	MEPE/ Contractor
OPERATIONAL PHASE							
1. **Air Quality**	*1.* Reduced GHG emissions *2.* Reduced burning of waste	1. Annually 2. 6 monthly	During operation.	1. Flu 2. compound	MEPE	Auditor	MEPE
2. Water Quality	Surface and groundwater quality within national and World Bank guidelines	6 monthly	Throughout project operation	Affected areas/stormwater discharge areas	MEPE	Auditor	MEPE
3. Waste Management	1. garbage is not burned or buried in the compound; hazmats contained and system for disposal in place; garbage collection	Annually	Throughout project operation	Affected areas	MEPE	Auditor	MEPE

Environmental Issue	Performance indicator (PI)	Frequency to monitor	Timetable to check PI	Locations to implement PI	Responsible to implement PI	Responsible for PI supervision	Cost Assignment
	contract in place						
4. Social	Grievance redress mechanism in place; no complaints from local community	Annually	Throughout project operation	Affected areas	MEPE	Auditor	MEPE
5. Environment, Health & Safety Management System	EHS-MS manuals, tools and routines developed, staff trained to implement EHS-MS; HSE measures evident at site	Once on commissioning thereafter annually	Throughout project operation	Thaton compound and periphery	MEPE	Auditor	MEPE

7.4.1 Indicative Cost for Environmental Mitigation and Management

The indicative cost estimate for basic implementation of the environmental components under the EHS-MS is provisionally set at USD 678,500. It is assumed that the Design Consultant will cost in additional mitigation measures associated with best practice engineering. The Installation Contractor is assumed to include the cost of compliance with the ESMP in his bid.

Table 38: Indicative cost estimate for environmental management

Activity	Indicative Cost (USD)			
	Integrated in to Instalation Contract	EMP	IEMS	Training, Technical Assistance & Services
Environmental Mitigation				
A. Pre-Installation Phase				
A.1 design measures	X			
B. Installation Phase				
B.1 Implementation of construction engineering best practice as mitigation	X			
C. Operation Phase				
C.1 Implementation of mitigation measures in design	X			
C.2 Implementation of operational practices as mitigation measures			250000	80000
Environmental Effects Monitoring				
A. Pre-Installation Phase				
A.1 Measurement of baseline conditions		10000		
B. Installation Phase				
B.1 Monitoring of air, noise, vibration, water		20000		10000
B.2 Monitoring of community & workers' health and safety		20000		10000
C. Operation Phase				
C.1 Monitoring of air, noise, water (5 years)			25000	10000
C.2 Monitoring of community & workers' health and safety (5 years)			25000	10000
Sub-Total (USD)		50000	300000	120000
Performance Monitoring				
Environmental Auditor				60000
Environmental Control Officer		50000		10000
Environmental Site Officer	X			
Sub-Total (USD)		50000		70000
Contingency at 15%		15000	45000	28500
Sub-Totals (USD)		115000	345000	218500
Total (USD)				**678,500**

7.5 EMERGENCY/INCIDENT RESPONSE PROCEDURES

As part of the ESMP the Contractor should develop emergency or incident response procedures during installation. In the operational phase the owner/operator (MEPE) and civil authorities will have responsibility for any emergencies or serious incidents.

The installation phase should ensure:

- Emergency Response Team (ERT) of the Contractor as initial responder with MEPE staff support;
- The Thaton fire and police departments, emergency medical services, etc, collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

The Contractor will provide and sustain the required technical, human and financial resources for quick response during installation.

Table 39: Roles and responsibilities in emergency/incident response

Entity	Responsibilities
Contractor Team (ERT)	Communicates / alerts the EERT. Prepares the emergency site to facilitate the response action of the EERT, e.g., vacating, clearing, restricting site. When necessary & requested by the EERT, lends support / provides assistance during EERT's response operations.
External Emergency Response Team (EERT)	Solves the emergency/incident
Contractor Resources	Provide and sustain the people, equipment, tools & funds necessary to ensure Subproject's quick response to emergency situations. Maintain good communication lines with the EERT to ensure prompt help response & adequate protection, by keeping them informed of Subproject progress.

The ERT will be led by the senior Contractor engineer (designated ERTL) on site with a suitably trained foreman or junior engineer as deputy. Trained first-aiders and security crew will be the core members of the ERT.

The Contractor will ensure that ERT members are physically, technically and psychologically fit for their emergency response roles and responsibilities.

Prior to the mobilization of civil works, the Contractor, through its Construction Manager, ERTL, in coordination with MEPE, will meet with the ultimate response institutions to discuss the overall installation process, including, but not limited to:

- work sites
- installation time frame and phasing
- any special construction techniques and equipment that will be used

- any hazardous materials that will be brought to and stored in the construction premises and details on their applications and handling/management system
- the Contractor's Emergency Management Plan
- names and contact details of the ERT members

The objective of this meeting is to provide the ultimate response institutions the context for:

- their comments on the adequacy of the respective Emergency Management Plans
- their own assessment of what types, likely magnitude and likely incidence rate of potential hazards are anticipated
- the arrangements for coordination and collaboration.

To ensure effective emergency response, prior to mobilization of civil works, the Contractor will:

- set up the ERT
- set up all support equipment and facilities in working condition
- make arrangements with the EERT
- conducted proper training of ERT members, and encouraged and trained volunteers from the work force;
- conducted orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and
- conducted drills for different possible situations.

To sustain effective emergency response throughout implementation an adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism, the emergency response equipment, tools, facilities and supplies. Drills and reminders will take place regularly.

7.5.1 Alert Procedures

Means of communicating, reporting and alerting an emergency situation may be any combination of the following: i) audible alarm (siren, bell or gong); ii) visual alarm (blinking/rotating red light or orange safety flag); iii) telephone (landline); iv) mobile phone; v) two-way radio; and vi) public address system/loud speakers. Some rules relative to communicating/alerting will be:

- Whoever detects an emergency situation first shall immediately :
  - call the attention of other people in the emergency site,
  - sound the nearest alarm, and/or
  - report/communicate the emergency situation to the ERT.

Only the ERTL and, if ERTL is not available, the Deputy ERTL are authorized to communicate with the EERT. Exceptional cases to this rule may be necessary and should be defined in the Emergency Management Plans.

When communicating/alerting an emergency to the EERT, it is important to provide them with at least: i) the type of emergency situation; ii) correct location of the emergency; ii) estimated magnitude of the situation; iii) estimated persons harmed; iv) time it happened; v) in case of a spill, which hazardous substance spilled; and vi) in case of fire and explosion, what caused it. Such details would allow the EERT to prepare for the appropriate response actions.

For an effective reporting/alerting of an emergency situation:

- The names and contact details of the relevant persons and institutions should be readily available in, or near to, all forms of communication equipment, and strategically posted ie:
    - Most relevant construction/operations staffs namely, the ERTL, Deputy ERTL, first-aiders, supervising engineers, foremen
    - EERT institutions/organizations
    - Concerned village authority/ies
    - ECO

The site should have good access to any combination of audible and visual alarms, landline phones, mobile phones and two-way radio communication at all times.

7.5.2 *Emergency Response Situations*

The following tables suggest general procedures that will be refined in the final ESMP during detailed design, and described in more detail in the Emergency Management Plans of the Contractor.

Table 40: Evacuation Procedure

Procedure	Remarks
Move out as quickly as possible as a group, but avoid panic.	All workers/staff, sub-contractors, site visitors to move out, guided by the ERT.
Evacuate through the directed evacuation route.	The safe evacuation shall have been determined fast by the ERTL/Deputy ERTL & immediately communicated to ERT members.
Keep moving until everyone is safely away from the emergency site and its influence area.	A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
Once outside, conduct head counts.	Foremen to do head counts of their sub-groups; ERTL/Deputy ERTL of the ERT.
Report missing persons to EERT immediately.	ERTL/Deputy ERTL to communicate with the EERT.
Assist the injured in evacuation & hand them over to the ERT first-aiders or EERT medical group	ERT to manage injured persons to ensure proper handling.
If injury warrants special care, DO NOT MOVE them, unless necessary & instructed/directed by the EERT.	ERTL/Deputy ERTL communicates with EERT to get instructions/directions in handling the injured.

Table 41: Response Procedure During Medical Emergency

Procedure	Remarks
Administer First Aid regardless of severity immediately.	Fundamentals when giving First Aid: Safety first of both the rescuer and the victim. Do not move an injured person unless: victim is exposed to more danger when left where they are, e.g., during fire, chemical spill it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure instructed or directed by the EERT. First AID to be conducted only by a person who has been properly trained in giving First Aid.
Call the EERT emergency medical services &/or nearest hospital.	ERTL/Deputy ERTL or authorized on-site emergency communicator
Facilitate leading the EERT to the emergency site.	ERTL/Deputy ERTL to instruct: an ERT member on- site to meet EERT in access road/strategic location. He/she shall hold orange safety flag to get their attention & lead them to site. Other ERT members to clear access road for smooth passage of the EERT.
If applicable, vacate site & influence area at once, restrict site, suspend work until further notice.	Follow evacuation procedure.

Table 42: Response Procedure In Case of Fire

Procedure	Remarks
Alert a fire situation.	Whoever detects the fire shall immediately: call the attention of other people in the site, sound the nearest alarm, and/or Foreman or any ERT member among the construction sub-group contacts the fire department (in this case it should be agreed on that it is alright for any ERT member in the sub-group to alert the fire department) report/communicate the emergency situation to the ERTL/Deputy ERTL.
Stop all activities/operations and evacuate.	All (non-ERT) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
Activate ERT to contain fire/control fire from spreading.	Guided by the training they undertook, ERT members assigned to mitigate the fire shall assess their own safety situation first before attempting to control fire spread.

Procedure	Remarks
Call the nearest fire & police stations &, if applicable, emergency medical services.	When alerting the EERT, ERTL will give the location, cause of fire, estimated fire alarm rating, any injuries.
Facilitate leading the EERT to the emergency site.	ERTL/Deputy ERTL to instruct: an ERT member to meet the EERT in the access road or strategic location and lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site. some ERT members to stop traffic in, & clear, the access road to facilitate passage of the EERT.
ERT to vacate the site as soon as their safety is assessed as in danger.	Follow appropriate evacuation procedure.

8 Conclusions

The study concludes that no World Bank safeguard polices will be triggered concerning biodiversity or involuntary resettlement, however, OP 4.10 concerning indigenous peoples will be triggered.

8.1 SOCIAL FINDINGS

The characteristics of the populations within the 3 focal villages are defined by their ethnicity, their increase towards non-agricultural activities, the mobility of their populations, and a lack of basic service community infrastructure, e.g. drainage, water treatment, and electricity. Key statistical findings from socio economic survey show the current condition of the IP villages.

- 45% viewed themselves as poor, 33% as near poor;[9]
- Poor infrastructure such as inadequate drainage, water supply, roads.
- Low access to regular employment
- Low educational status
- Low access and coverage to power connection (85% of IP households do not have power connection.)

Overall, the key social issues locally may be summarized as socially inclusive development targeting both IP and non IP populations of the three villages and improved information dissemination and public participation towards a socially equitable and sustainable economic development.

The social assessment affirms that there will be no displacement of IPs, no loss of land or any assets, or impact on cultural heritage. While there are varied ethnic groups, the IP villages are cohesive and social integration and participation is observed in community affairs, children going to the same school, intermarriages, and openness within the community social network. The negative impact of the project is limited to noise and pollution in the installation phase which is not significant and can be made negligible through effective mitigation.

The social assessment showed high acceptability as affirmed by the FGDs, and socioeconomic survey and stakeholder's workshop. There is a clear demand for improved power supply as over 90% of households especially among the HHN, who indicated their interest to connect to the grid. There is also willingness to pay more for improvement on services among the HHC.

The social assessment findings show that connection fee of is beyond the budget of the poor and near poor IP households.

[9]Poor defined by consumption of minimal energy requirement.)

While most IPs interviewed welcomed the proposed project, there are viewed potentials in the process for either increasing social inclusion or exclusion, as the flow of services between rural-urban systems and in the IP villages vary in terms of the provision of basic services and the government's priority for local electrification. Marginalization may occur where urban-rural development and electrification have yet to reach. IP commune populations are generally poorer than their town or non-ethnic villages. Their current marginalization from neighbouring urban economic benefits and improved living standards is closely related to a lack of access to better roads, health facilities, electricity, water and drainage services. The poor, ethnic minorities and women in particular experience these changes, and tend to be more vulnerable to deficiencies in water supply, electricity, a lack of access to credit and markets, etc.

Overall. Broad Community Support (BCS) was established and the IP stakeholders supported the project based on a full understanding that this project would be limited to power generation/upgrading of turbines.

8.2 ENVIRONMENTAL FINDINGS

There are a number of environmental issues associated with the current operation of the Thaton GT plant; primarily related to HSE.

Table 43: Summary of Environmental Issues

Issue	Comment
Health and Safety	There are 108 staff employed at the site; 69 male and 39 female. No health and safety manuals exist (only operation and maintenance manuals) There is no regular safety training conducted and no health and safety audits have been conducted. Staff are not issued with proper protective equipment (PPE) There are no first aid trained staff in the GT station itself; however a clinic with limited facilities and staffed by a nurse is contained on the compound. The nearest hospital is 10km away; there is no ambulance on site. During the installation phase the contractor will have to submit his HSE plan for approval and the EHS-MS will design and implement HSE measures for the operational phase.
Noise	The current turbines operate at above the recommended noise levels in and around the plant. Staff are not issued with ear defenders.
Water supply	The site is not on mains water supply. Process water is delivered to the GT station from the neighbouring tyre factory facility where it is subject to limited treatment in settling ponds. Chemical treatment of the water takes place at the GT site to reduce lime concentrations (most treatment occurring in the dry season). Three kind of chemicals are used in treatment of the water; Hydrochloric acid (HCl) used for alkylation, Caustic Soda (NaOH, used for neutralizing agents, and Trisodium phosphate (Na3PO4), used as a water softener. Process water is returned to the neighbouring factory as steam for use in that facility. Water supply for the staff is provided through tube wells.
Sanitation	The site is not on mains sewerage. All waste water and sewerage is

	discharged to ground.
Solid waste	There is no plan for handling of solid waste. Occasional collection occurs but much waste is either burnt or buried at site.
Flooding	Flooding of the site is not reported as an issue. Open drains carry away excess water to the surrounding fields in the rainy season. The ESMP stipulates that measures need to be put in place to manage any future contaminated runoff and the performance monitoring requires this be checked. It should also be noted that the drums for water purification chemicals will not be used after rehabilitation as water will not be transferred to the tyre factory. As far as can be seen at this time stormwater runoff does not affect agriculture in general including edible agriculture; certainly it was not reported as a problem.
Monitoring	No environmental monitoring currently takes place. There is no equipment to measure noise or air pollution levels. There are no wells to measure possible groundwater pollution in or around the site. The EHS-MS incudes indicative costs for a monitoring programme.
Liabilities	The asbestos on site is partly as pictured stored (see Annex 4) and also contained within the exhaust system of the old plant; it needs to be managed as part of an overall waste management plan. There is some leakage from old drums but no serous spills were observed or reported. However, the chemical drums will need to be removed for safe disposal, recycling or industrial re-use. No PCB survey has ever been conducted at the facility; it may be assumed that there would be some issue here associated with the electrical installation and the switchyard given the age of the equipment. From limited surveys carried out, there is no significant migration of pollution off-site (noise is the only direct off-site problem at present). Environmental liabilities would thus mainly be removal of waste as visualised on the surface (old drums, surplus machinery, exhaust linings etc) and perhaps any contaminated soil on site. Future risk should be managed through the EHS-MS which would control waste management etc. Groundwater sampling and limited monitoring is suggested, however, to verify that there is no persistent pollution of the aquifer. Potential asbestos/PCB and other hazardous materials liabilities are not caused or affected by the project but at the start of implementation, supported by the Project, a comprehensive environmental due diligence audit will be conducted and the outcome of this will be used to guide management (and possibly removal) procedures for these materials under the EHS Management System to be developed.

Overall, negative environmental impacts associated with the installation of new turbines will be almost entirely confined to the existing fenced compound and assuming implementation of the ESMP will not be significant.

In the operational phase the Project will deliver net environmental benefits through reduced noise levels and selected GHG emissions. Further benefit enhancement may take place if an integrated environmental management system is put in place. However, introducing an EHS-MS will require investment by the owner in training, tools and professional support.

In addition, to verify the success of the ESMP through the installation phase and to ensure that environmental performance in the operational phase is acceptable relative to national and international standards an experienced independent third party environmental auditor will need to be appointed.

ANNEX

1. Record of Consultations
2. Second field survey record of consultations
3. Environmental Law of Myanmar
4. Photographic Record of the Thaton Site
5. Noise level chart
6. Stakeholder Consultation

Annex A-0

Overview of the MEPP consultation and disclosure process including a summary of IPP elements to be integrated into the project

A) Consultation and disclosure

1. Context

This is the first investment operation the WBG is supporting in Myanmar after more than two decades of absence. Also, the consultation and disclosure done under this operation is the first such public presentation of the government project in Myanmar, as the country has no such requirements and practices in place yet. Despite the lack of institutional capacity and experience in public consultations and disclosure of the government's investment projects, the Ministry of Electric Power (MOEP) and Myanmar Electric Power Enterprise (MEPE) did a very good job in pioneering this process in Myanmar, which is summarized below.

2. Initial consultations, 13 – 14 March 2013

Based on the Terms of Reference for the Environmental and Social Assessment (ESA) approved by the Bank, a first round of consultation was convened with local stakeholders in Thaton in March 2013. Consultations were held in Than Ban, Kyar Pan and Nyaun Wyne, the three villages considered to be within the zone of influence of the project.

3. Consultations with local stakeholders, 20 May 2013

Following the completion of the draft ESA, a stakeholder workshop with about 50 participants was convened in Thaton on May 20, 2013. Participants included representatives from government, civil society and local stakeholders.

4. Meeting with national NGOs in Yangon, 21 May 2013

In order to reach major national NGOs, a separate meeting was convened in Yangon immediately following the stakeholder consultation. More than 50 representatives from a wide range of organizations participated. Practically all comments and questions focused on the broader World Bank involvement in the energy sector rather than the specific project in Thaton, which was perceived as beneficial and did not raise any concerns among participants. Key issues raised by NGO representatives included reliability and efficiency of distribution services, rural electrification, affordability of access and electricity, and future subsidies.

5. Disclosure of safeguard documentation

The ESA summary was disclosed in-country July 9 and at the InfoShop July 10 (disclosure of full SA with annexes prior to end of appraisal – date to be determined. (Include information on where translated document is available as well as slides from May 20 stakeholder consultation).

B. Integration of IPP elements in project design

The policy is triggered because of the presence of IPs within the project's area of influence. Since IPs represent the overwhelming majority of the potential beneficiaries and affected population in the Project influence area, no separate Indigenous People Plan was prepared, but relevant elements of the policy have been directly integrated into project design. The policy further emphasized that the level of detail varies depending on the specific project and the nature of effects to be addressed. Key IPP elements include:

1. Social assessment: The preparation of a social assessment (SA) proportional to the anticipated impacts of the project has been prepared. The SA has identified the key project stakeholders and an

assessment of potential impacts on IP communities has been carried out. The SA contains detailed socio-economic information on the three IP villages considered to be within the zone of influence of the project.

2. Free, prior and informed consultation: As indicated in the main text, a process of free, prior, and informed consultation with the affected Indigenous Peoples' communities was carried out during project preparation that led to broad community support for the project. Access to electricity is one of the main priorities of local IPs, as 85 percent of households are not electrified, 73 percent of which cannot afford the connection fee. There are expectations that the project will help increase access to electricity in the three villages considered to be within the zone of influence of the project, but as documented in the SA, broad community support was nevertheless reached based upon an understanding that electrification of villages is beyond the scope of this project.
3. Ensure FPIC during implementation: In line with OP 4.10 requirements, continued consultation with IP households within the zone of influence of the project will be carried out during the project implementation.
4. IP communities to receive social and economic benefits that are culturally appropriate: Specific measures will be implemented to ensure that IPs receive social and economic benefits that are culturally appropriate. This will include technical assistance and support to the government to prepare and accelerate rural electrification in the three IP villages in the Project's area of influence. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals which are connected to the grid, will be provided with more reliable power supply. The improved power supply in the region will result in considerable indirect benefits, which will include increased economic activities and job creation.
5. Cost estimates and financing plan: Technical assistance for the electrification is included to establish (a) what technical option will be adequate and most sustainable; and (b) to determine the cost and implementation arrangements. Therefore, no cost or other implementation details are known at this stage, and will be determined during the early stages of project implementation.
6. Grievance Redress Mechanism: A culturally appropriate grievance redress mechanism will be established in consultation with potentially affected IPs to address grievances by the affected Indigenous Peoples' communities and to ensure that any project related complaints are promptly addressed. A first instance of dispute handling where IPs are fully represented will be set up with the aim of settling any disputes amicably. If necessary, the project will establish a committee which will include IP representatives and project management. Court cases will be time consuming and expensive and it is therefore critical that the project establishes more informal first and second tier grievance management mechanisms which will be fully budgeted. Each case should be carefully documented and the nature of grievance, agreed actions to be taken and subsequent monitoring must be recorded.
7. Monitoring, evaluation and reporting: Monitoring, evaluation and reporting mechanisms appropriate to the project will include arrangements for the free, prior, and informed consultation with the affected Indigenous Peoples' communities. These arrangements will be finalized as soon as the most sustainable technical option for the rural electrification of the three IP villages has been determined.

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ANNEX A-1
Myanmar Electric Power Project
Documentation of Key Informants' Interview

Date: March 14, 2013

Time: 3:30-5:00

Venue: Office of the Local Administration

Purpose of the Meeting: Awareness and perception of projects impacts and benefits

Categories of Participants: Administration Staff -2' Technical Staff -2; Workers -2

No of Male:11
No of Female: 8

Facilitator: NEPS , Consultant (5)
Project Proponent Present: Director , Ministry of Electric Power -1
Assistant -1

Background Information

The key informants Interview include key people who hold certain responsibilities representing sectoral groups, agencies, and village chiefs. A topical questionnaire was given and while the facilitator asked the key informant's to answer the question sheets, they are free to ask questions and make clarifications. The Director of the electric power together with the Consultants answered the questions. The following key informants were interviewed:

No	Sector/Office	Responsibility	No	Gender
1	Ministry of Electric Power	Director	1	Male
		Administration	2	Male 1
		Technical Staff	2	Female/Male
		Worker	2	Female/Male
2	Tyre Industry	Director	1	Male
		Chief –Finance	1	Female
		Chief -Technical	1	Male
3	Ministry of Health, Thah Ton	Director	1	Male
4	Women's Affairs	Chief	2	Female
5	Central Statistics Office	Director	1	Female
6	Office of Administration –Thah Ton	Administrator	1	Male
7	Red Cross	Representative	1	Male
8	Fire Department	Chief	1	Male
9	Information Department	Representative	1	Female

10	NGO	Retired Army	1	Male
Total			**19**	

Findings from KIIs

I) Awareness of the project

There is generally high level of awareness among the government's officials and NGO representatives. Of the 19 KIIs, 16 persons (84%) are aware of the proposed project. The majority heard it from the central government, district community and some people around. All of the KIs are in favour of the project.

2) **Perceived Benefits and Impacts**

(i) Positive Impacts

- Regular power supply

The key informants said that the current electric supply has been irregular and fluctuation of power often occurs. As such, there is a need to improve the current electric power supply. According to the Chief of the Health Department, the condition of the current power greatly affects the effectiveness and performance of the hospital facilities. "During emergency, it is important that power supply is reliable since we are dealing with lives. Could you imagine when one is operating a patient and the power goes off?"

- Increased opportunity for economic development

(i) Promote urban/rural development

The presence of an effective, reliable and regular electric supply is viewed as one of the contributing factors to speed up rural and urban development as investors are attracted to invest in a place where there are existing basic infrastructure facilities and services. The location of Thah Ton is strategic and its historical background attracts tourists and local visitors. It is expected that there will be more investment and tourists coming to town.

(ii) Promote industrialization

Along with urban/rural development, it is expected that industrialization will flourish, bringing additional opportunity for more local employment. Both urban development and industrialization are considered as most significant positive impacts resulting from improved power services. It is expected that expansion of benefits will accrue not only to Thah Ton, Mon estate but also to other neighbouring states.

(iii) Provide employment for local labour

The provision of local labour is expected although it is clearly understood that the Project does not guarantee long time permanent work. Nevertheless, it is perceived that a number of local people will benefit from short term casual work such digging of land for drainage, putting of infrastructure, etc.

Negative Impacts

There are no significant negative impacts perceived due to the nature of the Project and since it will be established on the current compound. The KIs are confident that the management will take precautionary and measures to mitigate any potential negative impacts. The majority rated the project from less to no impact in terms of environmental concerns.

Recommendations on Planning Issues

Overall, all of the key informants signified their support for an additional new gas turbine. While there are no significant negative impacts, some concerns have been articulated:

Questions	Response
1. Will the project be built on a new area?	The new turbine will be built within the present compound of the Ministry of Electric Power
2. Will the turbine produce smoke?	No, it will not generate smoke
3. Will it affect trees or any conservation area?	No, it will not affect trees nor any conservation area
4. Are there any households to be resettled?	No households, land or structures will be removed.
5. Are there any ethnic minorities in the project site and their economic activities affected?	Ethnic minorities are settled in the nearby village which is about 1.5 kilometres from the project site. The projects will not affect any economic activities of the EM.
6. Will the project affect any structure with national or cultural significance?	No, the project will not affect any structure with national or cultural heritage.

Recommendations on Planning Issues

There is general support and endorsement of the project from the KIs. However, as heads of government agencies and planners, the following planning issues were recommended in order of priority to ensure sustainability and improve services of the proposed project.

1. The Project needs to ensure a 24 hour power supply. The current supply has been irregular affecting efficiency of performance on power related tasks.
2. Project cost is considered critical thus, appropriation of funds must be secured.
3. The cost of tariff needs to consider household's affordability.
4. The Project must take into account potential impact on the environment and provide measures to mitigate the impacts such as pollution and noise.
5. The social consideration of the project must be incorporated as part of the planning design;
6. The Project should consider the existing land use plan.
7. Avoid involuntary resettlement.

KII- Office of the Administrator, Thah Ton

KII-Chief, Statistics Office, Thah Ton

KII-Director, Department of Health

Annex A.2
Myanmar Electric Power Project
Documentation of FGD/Community Meetings
Industrial Workers

Date: March 13, 2013
Venue: Tire Factory Library, Than Ban

Purpose of the Meeting: Awareness and perception of projects impacts and benefits

Categories of Participants: Industrial Workers

No of Male:15
No of Female: 15

Facilitator: NEPS , Consultant (5)

Project Proponent Present: Director , Ministry of Electric Power
Assistant -1

Background Information

The Tyre Factory is a government owned institution producing tires which are sold both locally and abroad. Currently, there are currently some 517 workers who are regular employees . Of these, 298 are men and 219 are women. The Tire Factory supplies the Electric Power with water which is utilized by the latter to produce steam and supplied back to the tire factory. Water is taken from the nearby stream. There is symbiotic interest between the two agencies and both are supportive of each other. The tire factory has appropriated about 87 acres of land for the proposed gas turbine. Negotiation to officially document the transfer of land is currently on-going.

Some 120 household who are employed in the tire factory are living in the staff house provided by the factory along with provision of facilities, light, roads and water. These households are settled about 500 meters away from the proposed gas turbine.

Purpose

The purpose of the meeting was to basically inform the industrial workers who are currently working within the immediate vicinity of the proposed project site about the proposed project. Topics revolved around awareness, perception of the project's positive benefits and negative impacts. The participants were further asked about issues that may affect their daily work in the compound and work area, as well as recommendations to mitigate the potential negative impacts.

The study Team comprises of the environmental team (2); Social Team (3); project proponent representatives (2) - joined by the Director of the Ministry of Electric Power.

The procedure utilized a semi structured questionnaire, jointly answered by the participants. The Facilitator explained first the purpose and the procedure for answering the guide questions. This was further reinforced by a meaningful question and answer approach to get a collective decisions and recommendation on issues raised. The responses were collated and segregated by gender.

Results of Meeting

I) Awareness of the project

There is generally high level of awareness of the proposed project among the industrial workers, particularly among women workers. Of the of the 30 participants, 15 (50%) were women. Of these 17(67%) affirmed that they are aware of the project which they heard from various source like people around. Only 6 (40%) out of 15 male participants have knowledge of the project. The majority heard of the project only now.

2) **Perceived Benefits and Impacts**

(i) Positive Impacts

- Regular power supply

There is 100% consensus among the participants in support of the proposed project. The most significant benefits perceived are the regular power supply. According to the participants, fluctuation is often experienced occurring during work hours and this is affecting their work in the industry.

- Increased opportunity for economic development

The effectiveness of a regular and efficient power supply is perceived to open avenues for industrialization of the local which will attract business opportunities and providing employment to local residents. The participants rated this economic variable as most significant to significant. It is also expected that the proposed project will provide temporary local employment during implementation which could contribute to increased family income.

(ii) Negative Impacts

There are no perceived negative impacts. The following assessment are presented as follows:

Impacts/Issues	**Responses and Recommendations**
1. Natural Environment	
a. Loss of trees, vegetation	No impact
b. Forest, protected area	No impact
c., Noise and vibration Pollution	Less –No Impact
2. Social Impact	
a. Loss of land and structure	No impact
b. Displacement of business	No impact
c. Cultural properties and historical setting	No impact
Loss of productive land/livelihood	No impact

With regards to noise, anecdotal evidence reveal that while the Tyre industry is just adjacent to the proposed site, noise generated from the turbine does not disturb them as the noise inside the factory is much more compared to the turbine.

Other concerns

The general concerns raised pertains to current the health facilities of the 120 households living in the staff designated area of the tyre factory. The health clinic serves about 90 persons a month which include the patients from the nearby village. A visit to the health clinic showed that there is apparent lack of maintenance of the facility and lack of medical supplies. The health officer informed that the Tyre Industry

has an in house clinic with 1 doctor and 3 health assistant officers. However, for the community, the current supply is inadequate to meet the health needs. One of the major concern is the quality of drinking water which are taken from deep well. There is recorded water related diseases and other common sickness which include flu, skin diseases and low blood pressure which is prevalent among women. The nearby community also utilizes the health clinic and with the little aid the clinic receives pose inadequacy in addressing the health concerns of both staff members and the nearby community. The clinic supplies are most appropriate for first aid and emergency cases, otherwise patients are recommended to go to Thah Ton district hospital.

Planning Issues

Overall recommendations show general support of the MEPP. However, some major planning issues that the project needs to address pertains to the following, in order of priority

- Power supply –the project needs to ensure regular 24 hour power supply.
- Tariff – current cost of tariff is 35 kyats/unit/kw/hr. While the government subsidizes the cost (about 3,000 Kyats per household), it is recommended that the cost of tariff will be maintained.
- Noise and Pollution – mitigation measures to control pollution. Modern technology to minimize noise level of the turbine.

Focus Group Discussions –Factory Workers, Tyre Library March 13, 2013

ANNEX A.3
Myanmar Electric Power Project
Documentation of FGD/Community Meetings
Than Ban/Kyar Pan

Date: March 13, 2013
Time: 1:30-2:30
Venue: Than Ban local Library

Purpose of the Meeting: Awareness and perception of projects impacts and benefits

Categories of Participants: Ethnic Minorities

No of male:10

No of female: 10

Facilitator: NEPS , Consultant (5)

Project Proponent Present: Director , Ministry of Electric Power
Assistant -1

Background Information

There are two villages surrounding the proposed project site of the gas turbine namely: Than Ban, and Kyar Pan. Both villages lie about 1.5 kilometres from the project site. Than Ban has a total household population of 100 households (400 persons) while Kyar Pan 330 households (1500 persons). Both villages are headed by one village chief. While the villages lie far away from the proposed gas turbine, the environmental assessment reveals that the village can be reached by the noise emanating from the turbine which is about 85 dB. It must be noted however that the noise level is also largely influenced by the vehicle passing since the villages are near the highway. Within the context of environmental and social assessment, these villages are considered as secondary impact areas. The villages will not be directly affected by land acquisition and there will be no involuntary resettlement, nor loss of productive assets.

However, the villages are occupied by the presence of ethnic minorities which fall under the category of vulnerable households. A low percentage (15%) of households in Than Ban and 36% of households Kyar Pan have electric power connection only.

Purpose

The purpose of the meeting was to basically to consult with the communities about the proposed turbine project and gather their opinions on their perceived benefits and impacts as well as solicit their recommendations to mitigate potential negative impacts. The study Team comprises of the environmental team (2); Social Team (3); project proponent representatives (2) - joined by the Director of the Ministry of Electric Power.

The procedure utilized a semi structured questionnaire, jointly answered by the participants. The Facilitator explained first the purpose and the procedures for answering the guide questions. This was further reinforced by a meaningful question and answer approach, to get issues and collective decisions and recommendations. The responses were collated and segregated by gender. They were in total 20 participants, of which 10 were females and 10 males.

Results of Meeting

I) Awareness of the project

All of the participants in Kyar Pan and Than Ban are not aware of the proposed project. They said they have heard it only now that the study team has consulted them. According to the participants, they were never

consulted before in any of governments project and they express appreciation of the process and being asked for their views. Overall 100% of the participants affirmed their support for the project.

2) **Perceived Benefits and Impacts**

(i) Positive Impacts

- Regular power supply

About 60% of the men said the most significant impact of the project is the regular power supply. Households in the village with connection to power are experiencing constant power failure or fluctuation. 75% of the women also probed that regular supply of power is most important for their domestic work. Households who do not have power connection also support this view Increased opportunity for economic development. It is beneficial for children who are studying in the evening, and other household work requiring electricity.

- Increased opportunity for economic development

Majority of the participants, 60% of men and 75% of women affirmed that the proposed project will contribute to more economic development of the locality in particular and the Mon State in general. The presence of electricity contributes to fast industrialization which implies increased opportunity for business and employment. It is perceived that the project will generate from short to long term local employment during construction and operation. The participants expressed hope that some of them will be considered for casual labour during construction period.

(ii) Negative Impacts

There are no perceived significant negative impacts. While there are identified impacts such as noise, pollution and dust, the impacts are less significant given their distance from the project site, and mostly, the impacts can be fully mitigated. The Project will not affect vegetation such as trees , rice ,rubber trees, aquatic life, protected areas. Overall, there will be no displacement of households, no loss of trees, cultural heritage or livelihood.

Overall, the results of assessments showed the following:

Assessment of Project Impacts

Impacts/Issues	Results	Male	Female
1. Natural Environment			
a. Loss of trees, vegetation	Less impact No impact	60% 40%	40% 60%
b. Forest, protected area	Less impact No impact	20% 80%	20% 80%
c., Pollution, Noise and vibration	Less Impact No Impact	60% 40%	45% 55%
2. Social Impact			
a. Loss of land and structure	No impact	100%	100%
b. Displacement of business	No impact	100%	100%
c. Cultural properties and historical	No impact	100%	100%

setting			
d. Loss of productive land/livelihood	No impact	100%	100%

Other concerns

The most immediate concern of the participants in the villages is to obtain connection to the power supply. The expressed hope that their village will be fully energized. They said that majority of them do not have access to electricity in spite of their proximity to the electric power. Several reasons were cited which include:

- Connection fee is not affordable.- the current connection fee which costs 500,000 Kyats ($600) is viewed by the majority as expensive.
- Monthly tariff –even with the government's subsidized tariff, the monthly tariff is still unaffordable to some households.
- Non-availability of a post for line connection particularly to the far houses away from the main line
- Not priority for electrification

Response from the Project Proponent

The Manager of the Electric Power responded that the government appropriates only 3 villages that are given priority connection every year. Unlike other areas where the houses are near each other the situation in the village require a line that would connect to houses which are far away in terms of distance. However, efforts to discuss the problems in this village will be discussed with proper authorities so that these issues will be addressed.

Response from the Study Team

Appropriate social action plan will be designed together with the project proponent and representatives of the village for discussion during the planned workshop on the first week of May. Representatives from the community would help in developing the plan that is suitable to the community's needs. The role of the community will be also discussed during the workshop so that appropriate action will be done with contributions from all concerned.

Recommendations on Planning Issues

Overall recommendations of the participants from Kyar Pan and Than Ban show general support of the MEPP as signified by 100% of the respondents. Below are recommendations on planning issues that the project needs to consider.

- Power supply – the project needs to ensure regular 24 hour power supply and consider the needs of the village for connection.
- Impact on the environment –careful consideration on environmental concerns.
- Pollution – Measures to minimize pollution, or noise.
- Tariff – cost of tariff for low income households needs to be reviewed and considered, a cheaper tariff options.
- Assistance from the government to put up a common post for line to maximize electrification coverage.
- More local ethnic labourers especially from their local village will be hired during construction

Other Issues and Recommendations

Will the Project provide livelihood training or employ local people? The participants signified interest to learn new skills to augment family income so that household expenses such as electricity can be paid and maintained.

Response from the Study Team: The Study Team will document these issues and will discuss with concerned authorities. We will also invite you to regularly participate in meetings and workshop that the Project will organize so that some issues such as livelihood will be directed to proper concerned agencies. Although the project does not guarantee long term employment, the project will try to discuss with contractors to include local people for priority employment.

Overall, there was appreciation coming from the participants on the process undertaken. It was recommended that more of consultation exercise should be done by government planners in the implementation of future projects.

The meeting ended at 1:30 P.M.

Focus Group Discussions –Kyarpan/Than Ban , Local Library, Than Ban March 13 2013, 20132013

Appendix A.4
Documentation of FGD/Community Meetings
Nyaun Wyne

Date: March 13, 2013
Time: 3:30-5:00

Venue: Local Administration Office, Nyaun Wyne

Purpose of the Meeting: Awareness and perception of projects impacts and benefits

Categories of Participants: Ethnic Minorities

No of male: 8
No of female: 4

Facilitator: NEPS, Consultant (5)
Project Proponent Present: Director, Ministry of Electric Power
Assistant -1

Background Information

Nyaun Wyne is located 2 kilometres away from the project site, It is comprised of 252 households with varied ethnic groups composed of Keren (1138 persons); Burmese (180 persons) and Pao (158 persons). Occasional noise is heard in the evening but people could not distinguish clearly whether the noise all comes from the existing turbine or the passing vehicles. Some 40 (15%) households have been provided with electricity last month. A taskforce on electrification has been organized by the village members to follow up and address community concerns related to electrification.

Purpose

The purpose of the meeting was to basically to consult with the communities about the proposed turbine project and gather their opinions on their perceived benefits and impacts as well as solicit their recommendations to mitigate potential negative impacts. The study Team comprises of the environmental team (2); Social Team (3); project proponent representatives (2) - joined by the Director of the Ministry of Electric Power.

The procedure utilized a semi structured questionnaire, jointly answered by the participants. The Facilitator explained first the purpose and the procedure for answering the guide questions. This was further reinforced by a meaningful question and answer approach, to get issues and collective decisions and recommendations. The responses were collated and segregated by gender. They were in to 120 participants, of which 8 were females and 4 males.

Results of Meeting

I) Awareness of the project

In Nyaun, Wyne, 3 out of 8 male participants heard of the project while 1 female participant heard about the proposed gas turbine. On the other hand, 5 out 8 have not heard of the project. The majority heard of the project only now. When asked whether they are in favour of the project, there is general consensus (100%) of both male and females that are in favour of the project.

2) **Perceived Benefits and Impacts**

(i) Positive Impacts

- Regular power supply

There are varied responses with regards to the benefits of the project pertaining to regular supply ranging from most significant (38%) significant (50%) and less significant 915%) as expressed by the male participants. On the other hand, women participants regard regular power supply as most significant (75%) and significant (25%) Women are mostly concerned about the availability of power to aid in their domestic needs. Usage of power is particularly useful during night time. Since only 15% of the village is energized, the village remains dark particularly inside the village and roads are difficult during night time. Most of the households utilize such as kerosene lamps or battery operated light (very minimal due to cost). Efforts have been done by the village taskforce to ensure some households who have raised money could get connection. They are currently raising more funds in order to put up a common post for line connection.

- Increased opportunity for economic development

Like other villages, increased economic activity is associated with improved electric power supply. The influx of investors and business opportunity is more in an area where there is electricity than in an area without electricity. It is expected that more employment will be generated brought about by more business if the village will be energized. It is generally recognized that with improved electricity, it will also lead to improvement in income generating activities and improvement on the environment. Fewer accidents will occur at night.

The project is perceived to overall contribute to urban/rural development (38%/male) and 50%female) as well as promote industrialization of local area significantly as indicated by 63% (male) and 50% female.

(ii) Negative Impacts

There are no perceived significant negative impacts pertaining to environment. Since the project is rather far from the village, there are no associated impacts. Mostly the benefits are perceived to have more positive than the negative impacts.

Assessment of Project Impacts

Impacts/Issues	Results	Male	Female
1. Natural Environment			
a. Loss of trees, vegetation	Less impact No impact	12% 88%	25% 75%
b. Forest, protected area	No impact	100%	100%
c., Pollution, Noise and vibration	Less Impact No Impact	25% 75%	17% 83%
2. Social Impact			
a. Loss of land and structure	No impact	100%	100%
b. Displacement of business	No impact	100%	100%
c. Cultural properties and historical setting	No impact	100%	100%
of productive land/livelihood	No impact	100%	100%

Source: Study Team, NEPS, 2013

Other concerns

There is a demand driven need for full electrification of the village so that all households will get connection. Efforts of the taskforce are being done to mobilize resources in order to pay for the required communal post. At the same time households are encouraged to save for connection fee and for installation of reading meter. Some households result to borrowing money or loan with 1% interest from lending institutions. Connection fee is viewed as expensive and many households do not have capacity to pay for connection.

Question: When will the village get full connection?

Response from the Project Proponent

The government of Myanmar allocates only a quota of 3 villages every year for electrification. Unlike other village in the urban area where houses are near each other, the common problem in most villages is that houses are far from each other. It would require a post and main line to connect to housing structure. Some households are far from the main line that it is difficult to reach them. If the government provides the line, households are responsible to pay for the meter which costs 85,000 kyat ($100).

Recommendations on Planning Issues

The results showed that participants in Nyaun Wyne are generally supportive of the project as signified by 100% of the respondents. Specific recommendations include the following:

- The new turbine must be able to provide 24 hour power supply;
- Tariff must be affordable to households;
- Wide coverage of power connection to households in Nyuan Wyne;
- Assistance to augment household income in a form of cottage industry or other income generating projects;
- Local employment to cater to ethnic minorities.

Currently there are no social organizations that provide assistance to the village. There is signified interest to learn new skills and trade.

Overall, there was appreciation coming from the participants on the process undertaken. It was recommended that more of consultation exercise should be done by government planners in the implementation of projects in the future.

The meeting ended at 5.15 P.M.

Focus Group Discussions –Nyaun Wyne Local Administration Office Library March 13,

ATTACHMENTS: List of meeting, FGD and KII Participants

Type Factory

Kers

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	Village	Signature
1			
2			
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12			

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	Village	Signature
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Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	~~Village~~	Signature
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13-3-13

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

	No	Name	Village	Signature
F	1	[illegible]	[illegible]	[illegible]
F	2	[illegible]	"	[illegible]
F	3	[illegible]	[illegible]	[illegible]
M	4	[illegible]	[illegible]	[illegible]
M	5	[illegible]	[illegible]	[illegible]
M	6	[illegible]	[illegible]	[illegible]
M	7	[illegible]	[illegible]	[illegible]
M	8	[illegible]	[illegible]	[illegible]
M	9	[illegible]	[illegible]	[illegible]
M	10	[illegible]	[illegible]	[illegible]
M	11	[illegible]	[illegible]	[illegible]
F	12	[illegible]	[illegible]	[illegible]

M 8
F 4

F (10)
M (10

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	Village	Signature
1 F	မသန္တာ	ကြာပင်း ရွာ	သန္တာ
2 F	ဓာသီတာ	"	[signature]
3 F	မငယ်	ကြာပင်း	[signature]
4 F	ဒေါ်ပန်းကြွယ်	"	[signature]
5 M	ကိုဝေဖြိုး	ကြာပင်း	[signature]
6 F	သင်းသင်းအေး	သမှာန် ရွာ	သင်း
7 F	ဖြူဝင်းရီ	"	[signature]
8 F	အေးအေးဝင်း	"	[signature]
9 F	အေးအေး	"	[signature]
10 F	ငြိမ်းအေး	"	အေး
11 F	ဒေါ်နှင်းယု	ကြာပင်း	[signature]
12 M	ဦးမောင်စိုး	"	စိုး

F (10)
M (10)

F (10)
M (10)

EPC

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation
March 13, 2013

No	Name	Village	Signature
1 F	မသဲနု	ကြာပင်း ရွာ	သဲနု
2 F	မသီတာ	〃	နိုင်း
3 F	မနုဝေ	ကြာပင်း	ဝေ
4 F	ဒေါ်ပန်းကြည်	〃	[illegible]
5 M	ကိုဝေဖြိုး	ကြာပင်း	[illegible]
6 F	သင်းသင်းအေး	သမှန် ရွာ	သင်း
7 F	ဖြူ့ဝင်းလှ	〃	[illegible]
8 F	အေးအေးဝင်း	〃	Aye
9 F	အေးအေး	〃	အေး
10 F	[illegible]အေး	〃	အေး
11 F	ဒေါ်နှင်းယု	ကြာ ပင်း	[illegible]
12 M	ဦးမောင်စိုးထွေး	〃	ထွေး

F (10)
M (10)

14/3/2013

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	Village / Designation	Signature
1			
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12			

Ministry of Forestry & Environmental
Maternity and child care
Women's Affairs
Public Information
Fire fighting
Retired Army (NGO)
Burma Red Cross.

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

No	Name	Village Desination	Signature
1 M	Dr Tin Maung Nyunt	District Medical Officer.	
2 F	Dr Khin Cho	A.D. Planning Office	
3			
4			
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12			

KII

[illegible]
Thaton Gas Turbine

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation
March 13, 2013

	No	Name	~~Village~~ / Occupation	Signature
(A) F	1	Daw Aye [illegible]	[illegible]	[signature]
(T) F	2	[illegible]	[illegible]	[signature]
(L) F	3	[illegible]	[illegible]	[signature]
( ) M	4	[illegible]	[illegible] (4)	[signature]
(A) M	5	[illegible]	[illegible]	[signature]
(T) M	6	[illegible]	[illegible]	[signature]
	7			
	8			
	9			
	10			
	11			
	12			

Total → M . 3
F . 3 .

U . [illegible]
[illegible]

108 men + women
69 men
39 female . + 14 casual.

အမှတ် (၂၁) ဟကြီး ခား စက်ရုံ (၁၁ရုံ)
Key Informant.
တာယာစက်ရုံ Tyre
~~Rubber~~ Factory

Myanmar Electric Power Project

Attendance Sheet: FGD Meetings/Consultation

March 13, 2013

	No	Name	Village	Signature
	1			
M	2	ဦးကျော်ကျော်စိုး	[illegible] ([illegible])	[signature]
F	3	ဒေါ်စန်းစန်းတင့်	လက်သောက်ဟလွှော်ဖန်ရော (ဘုရားလေး)	[signature]
M (A)	4	ဦးထွန်းလွင်	[illegible]	[signature]
	5			
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	12			

Thaton Socio-Economic Survey Plan for MEPP (Myanmar Electrical Power Plant Project)

27 March - 2 April 2013

Socio-Economic Survey: Every 10th HHs for connected to electricity and without connection HHs

Team 1 = U Than Shwe + U Kyaw Zin Htun, Team 2 = Daw Phyu Phyu Aye + Daw Phyu Phyu Myint, Team 3 = Daw Khin Khin Cho + Daw Haymar Hnin

28-3-2013 - 29-3-2013:

Team 1: Staff Housing: 12 HHs

Team 2: Kyaban Village HHs: With connection (electricity): 12 HHs

Team 3: Kyaban Village HHs: Without connection (electricity): 12 HHs

30-3-2013 - 31-3-2013:

Team 1: Remaining Kyaban Village HHs: Without connection (electricity): 9 HHs

+ Thanban Village HHs: With connection (electricity) 5 HHs

Team 2: Thanban Village HHs: Without connection (electricity) 10 HHs

Team 3: Nyaung Waing HHs: With connection (electricity) 10 HHs

1-4-2013:

Team 1: Nyaung Waing HHs: Without connection (electricity) 5 HHs

Team 2: Nyaung Waing HHs: Without connection (electricity) 5 HHs

Team 3: Nyaung Waing HHs: Without connection (electricity) 5 HHs

Total survey HHs = 85 HHs

27 March - 2 April 2013 Socio-Economic Survey for Gas Turbine Project, Thaton				
Sr. No.	**Location / Village**	**Total HHs**	**Total Survey HHs (10% Representative HHs)**	**Remark**
1	Staff Housing	120	12	
2	Kyaban	330	33	
3	Thanban	150	15	
4	Nyaung Waing	250	25	Ledaing - Nyaung Waing
			85	
Distance of each village from MEPP (km)				
1	Kyaban	0.59		
2	Thanban	1.58		
3	Nyaung Waing	0.61		
3 (a)	Ledaing	1.54		

Team 1

No.	Name of Village	Name of Interviewee	No.		No. of Persons	With Connection	Without Connection
			Male	Female			
	Kyaban						
1		U Aung Soe Win	3	1	4	-	√
2		Daw Saw Mon	3	2	5	-	√
3		Daw Ma Khine	0	1	1	-	√
4		Naw Paw Mu	1	1	2	-	√
5		Daw San San Thwe	1	2	3	-	√
6		Daw Hla Shwe	2	4	6	-	√
7		U Tun Tun	3	4	7	-	√
8		U Kyi Maung	1	5	6		√
9		U Tin Hla	3	1	4	-	√
	Total		**17**	**21**	**38**		**9**
	Nyaung Waing					-	
1	**Ledaing**	U Mar Theit Saw	1	4	5	-	√
2		U Kyi Lwin	2	1	3	-	√
3		U Htin San	3	3	6	-	√
4		Daw Mu Aye	4	2	6	-	√
5		Daw Su May	2	3	5	-	√

	Total		**12**	**13**	**25**		**5**
	Thanban						
1		Daw Nan Su	3	2	5	√	-
2		Daw Thidar Soe	2	2	4	√	-
3		U Kyaw Htay	4	1	5	√	-
4		U Hla Min	2	2	4	√	-
5		U Nay Win	3	3	6	√	-
	Total		**14**	**10**	**24**	**5**	
	Staff Housing						
1		U Ye Gaung	1	0	1	√	-
2		U Aye Thein	2	3	5	√	-
3		U Pe Myint	2	2	4	√	-
4		Daw Khine Khine Soe	2	2	4	√	-
5		U Myint Tin	3	4	7	√	-
6		U Wun Na Oo	2	1	3	√	-
7		U Kyaw Win Ko	2	1	3	√	-
8		U Win Mg	2	2	4	√	-
9		Daw Ye Myint	1	2	3	√	-
10		U Aung Myo Min	1	2	3	√	-
11		U Win Naing	1		1	√	-
12		U Kyaw Soe	4	3	7	√	-
	Total	**7**	**23**	**22**	**45**	**12**	

Team 2

No.	Name of Village	Name of Interviewee	No.		No. of Persons	With Connection	Without Connection
			Male	Female			
	Kyaban						
1		U Kyaw Tun	1	2	3	√	-
2		U Soe Than	2	2	4	√	-
3		U Bo Kay	2	3	5	√	-
4		U Saw Nay Lin	5	4	9	√	-
5		Daw Khin Cho Sat	4	3	7	√	-
6		Daw Yin Mya	3	2	5	√	-
7		Naw PhawAir	4	4	8	√	-
8		Daw Thin Thin Yu	2	2	4	√	-
9		Daw Shein Hla	2	2	4	√	-
10		Daw Moe	2	2	4	√	-
11		Daw Thein Kyi	1	1	2	√	-
12		Daw Mi Aye	3	3	6	√	-
	Total		**31**	**30**	**61**		
	Nyaung Waing						

1		Daw Myint Sein	0	3	3	-	√
2		Daw Yee Myint	3	4	7	-	√
3		Daw Win Ning	4	3	7	-	√
4		Daw Kaythe Tun	2	2	4	-	√
5		Daw Ei thandar way	2	2	4	-	√
	Total		**11**	**14**	**25**		
	Thanban						
1		U Tun Shein	6	2	8	-	√
2		U Pho Hla	4	4	8	-	√
3		U Thaung Sein	2	2	4	-	√
4		U Kyaw Kyaw	1	2	3	-	√
5		Naw Dar	4	2	6	-	√
6		Nan Ohmar	2	2	4	-	√
7		Naw Moe Thu	5	3	8	-	√
8		Daw Ma Thu	2	2	4	-	√
9		Naw Thwe Chit	2	6	8	-	√
10		Daw Nyunt Thein	1	2	3	-	√
	Total	**7**	**29**	**27**	**56**	**7**	

Team 3

No.	Name of Village	Name of Interviewee	No.		No. of Persons	With Connection	Without Connection
			Male	Female			
	Nyaung Waing						
1		U Mg Oo	3	4	7	√	-
2		Daw Sein Mya Mal	1	1	2	√	-
3		U Pho Ka Lar	7	3	10	√	-
4		U Aung Mya Kyi	2	2	4	√	-
5		U Aung Win Swe	2	2	4	√	-
6		U Chit Shwe	3	4	7	√	-
7		U Mg Aye	3	2	5	√	-
	Total	**7**	**21**	**18**	**39**	**7**	
	Nyaung Waing						
1		Daw May Aung	4	2	6	-	√
2		Daw Mi Yaung Shwe	4	2	6	-	√
3		Daw Ohn Myint	2	2	4	-	√
4		U Tar Tii	3	1	4	-	√
5		Daw Hla Kyi	3	4	7	-	√
	Total	**5**	**16**	**11**	**27**		**5**

	Le daing						
1		U Kyaw Hla	2	3	5	√	-
2		Daw Myint Kyi	4	2	6	√	-
3		U Hla Kyi	3	2	5	√	-
	Total	**3**	**9**	**7**	**16**	**3**	
	Kyaban						
1		Daw Tin Moe	4	3	7	-	√
2		Daw Mi Hla	8	4	12	-	√
3		Daw Khin Ohn Nwel	7	3	10	-	√
4		U Tun Si	3	3	6	-	√
5		Daw Naw Ta Wel	-	2	2	-	√
6		Daw Ngwe Thein	4	8	12	-	√
7		Daw Win Kyi	1	3	4	-	√
8		Daw Mi Aye	3	3	6	-	√
9		Daw Mu Ta Lel	3	3	6	-	√
10		Daw Ma Kyi	4	2	8	-	√
11		U Kyaw Shwe	3	2	5	-	√
12		Daw Aye Tin	1	2	3	-	√
	Total	**12**	**41**	**38**	**81**		**12**

The Republic of the Union of Myanmar

The Environmental Conservation Law

July, 2012

The Pyidaungsu Hluttaw Law No. 9 / 2012

The 8th Waxing Day of Tagu, 1373 M. E.

(30th March, 2012)

The Pyidaungsu Hluttaw hereby enacts this Law:

Chapter I

Title and Definition

1. This Law shall be called **the Environmental Conservation Law.**

2. The following expressions contained in this Law shall have the meanings given hereunder:

   (a) **Environment** means the physical factors in the human environment, including land, water, atmosphere, climate, sound, odour, taste, the biological factors of various animals and plants and historical, cultural, social and aesthetic factors;

   (b) **Environmental Quality** means the balance of nature including man made objects and also animals, plants, natural resources for the benefit of sustainability of nature and human beings;

   (c) **Environmental Quality Standard** means the parameters of general quality for enhancement and conservation of environmental quality for environmental situations;

   (d) **Environmental Audit** means periodic, systematically documented and objective evaluation to determine the followings:

      (i) correspond with regulatory requirements on environmental conservation;

      (ii) environmental management system;

      (iii) various possible environmental risks to the buildings, plots and premises.

   (e) **Pollution** means any direct or indirect alteration, effect of the physical, thermal, chemical or biological properties of any part of the environment

including land, water and atmosphere by discharging, emitting or depositing environmental hazardous substances, pollutants or wastes so as to affect beneficial use of environment, or to affect public health, safety or welfare, or animals and plants or to contravene any condition, limitation or prohibition contained in the prior permission issued under this Law;

(f) **Noise Pollution** means the occurrence of sound unit which causes annoyance, fatigue, loss of hearing or interference with the perception of other sounds;

(g) **Pollutant** means solid, liquid, or vapour which directly or indirectly alters the quality so as to affect beneficial use of any segment or element of the environment or is hazardous or potentially hazardous to health or causes pollution;

(h) **Waste** includes solid, liquid, or vapour and also includes anything which is classified as waste in accord with this Law including radioactive substance which is discharged, emitted or deposited in the environment in such volume, constituency or any manner which causes environmental pollution;

(i) **Hazardous Substance** means a substance or object which may affect health including explosive substance, substance which may be created and used as a biological weapon, substance which may be used as a nuclear weapon, inflammable substance, oxidizing and peroxidizing substance, toxic substance, pathogenic substance, radioactive substance, genetic transforming substance, corrosive substance, irritating objects, whether chemical or not, which can be harmful to human being, animal, plant, property or environment;

(j) **Beneficial Use** means the use of the environment or any element or segment of the environment after making required protections from the adverse effects of wastes, discharges, emissions and deposits so as to cause public health, safety or welfare;

(k) **Cleaner Production** means the continuous application of multi-strategy on environmental conservation to processes, products and services to improve the use of resource efficiently, minimize waste, polluted water and emissions and conserve the healthy nature and human environment;

(l) **Control Equipment** includes the followings:

(i) any apparatus for collecting waste;

(ii) any automatic device which can be used for more effective operation of any equipment;

(iii) any device for indicating or recording pollution or warning of excessive pollution;

(iv) any other device or facility used for the purpose of limitation of pollution;

(m) **Ecosystem** means the natural system existing living, non-living substances and plants in compatibility and the natural environment which have been evolving due to such system;

(n) **Owner** means owner, proprietor, operator in charge, lessor or receiver of any building, plots, or vehicle, or heir, trustee or representative of such person;

(o) **Occupier** means any person in occupation or control of any building, plot or any part of it, or any vehicle;

(p) **Environmental Emergency** means the situation which may affect the safety and health of the public or the environment and ecosystem if natural or man-made disaster or pollution is not taken action immediately;

(q) **Committee** means the Environmental Conservation Committee formed under this Law;

(r) **Ministry** means the Union Ministry assigned by the Union Government to perform the matters of environment;

(s) **Department** means the relevant Department formed under this Law.

Chapter II

Objectives

3. The objectives of this Law are as follows:

(a) to enable to implement the Myanmar National Environmental Policy;

(b) to enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process;

(c) to enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;

(d) to reclaim ecosystems as may be possible which are starting to degenerate and disappear;

(e) to enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;

(f) to enable to implement for promoting public awareness and cooperation in educational programmes for dissemination of environmental perception;

(g) to enable to promote international, regional and bilateral cooperation in the matters of environmental conservation;

(h) to enable to cooperate with Government departments, Government organizations, international organizations, non-government organizations and individuals in matters of environmental conservation.

Chapter III

Formation of the Environmental Conservation Committee

4. (a) The Union Government shall form the Environmental Conservation Committee with the Union Minister for the Union Ministry assigned by the Union Government as the Chairman and with suitable members to conserve the environment of the Republic of the Union of Myanmar;

(b) In forming the Committee, the Vice Chairman, Secretary and Joint Secretary shall be assigned among the members of the Committee;

(c) The Union Government may re-form the Committee.

5. The Union Government shall stipulate functions and duties of the Committee to enable to implement the objectives contained in this Law.

6. The powers of the Committee are as follows:

(a) carrying out organizational education and activities relating to environmental conservation;

(b) suggesting to enable to amend and insert, as may be necessary, the lessons on environmental conservation contained in school lessons after coordinating with the relevant departments;

(c) accepting donations, grants, materials and technological aids from local and foreign and managing and using such money, materials and technologies as may be necessary in environmental conservation works;

(d) sending suitable suggestions and encouragements relating to environmental conservation to the relevant Government departments and organizations;

(e) asking necessary proposals and suggestions from the relevant Government departments and organizations for conservation and enhancement of environment;

(f) prohibiting the relevant Government departments and organizations if the environmental damages arise or situations for damage arise and, if necessary, asking policy to the Union Government;

(g) laying down and carrying out the Myanmar national environmental policies and other environmental policies for conservation and enhancement of environment with the approval of the Union Government.

Chapter IV

Duties and Powers relating to the Environmental Consenvation of the Ministry

7. The duties and powers relating to the environmental conservation of the Ministry are as follows:

(a) implementing the environmental conservation policies;

(b) planning and laying down national or regional work plans relating to environmental management;

(c) laying down, carrying out and monitoring programmes for conservation and enhancement of the environment, and for conservation, control and abatement not to cause environmental pollution;

(d) prescribing environmental quality standards including standards on emissions, effluents, solid wastes, production procedures, processes and products for conservation and enhancement of environmental quality;

(e) submitting proposals to the Committee for economic incentive mechanisms and terms and conditions which may not affect the environment or cause least environmental affect for sustainable development in addition to legal affairs and guidelines relating to environment;

(f) facilitating for the settlement of environmental disputes and, if necessary, forming bodies to negotiate such disputes;

(g) specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry, agriculture, mineral production, sanitation and other activities;

(h) prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment;

(i) promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances;

(j) prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;

(k) negotiating, cooperating and implementing in respect of international, regional and bilateral agreements, instruments and programmes relating to matters of environment;

(l) implementing the international, regional and bilateral agreements accepted by Myanmar for environmental conservation and enhancement of environmental quality in accord with the guidance adopted by the Union Government or the Committee;

(m) causing to lay down and carry out a system of environmental impact assessment and social impact assessment as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment;

(n) laying down guidances relating to the management, conservation and enhancement of environment for the matters of protection of ozone layer, conservation of biologial diversity, conservation of coastal environment, mitigation and adaptation of global warming and climate change, combating desertification and management of non-depleting substances and management of other environmental matters;

(o) managing to cause the polluter to compensate for environmental impact, cause to contribute fund by the organizations which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses which explore, trade and use the natural resources in environmental conservation works;

(p) carrying out other functions and duties assigned by the Union Government relating to environmental conservation.

8. The Ministry shall establish an Environmental Management Fund in the Union Budget in accord with the financial regulations and by-laws of the Union for effective implementation of environmental conservation works in addition to the receipt from the Union Consolidated Fund.

Chapter V
Environmental Emergency

9. (a) If the Committee is aware that an event of environmental emergency has occurred or may occur in the entire Myanmar or any Region or State or any area, it shall immediately report to the Union Government so as to declare the occurrence of such event;

(b) The Committee, Ministry and Department shall carry out necessary measures relating to the environmental emergency.

Chapter VI

Environmental Quality Standards

10. The Ministry may, with the approval of the Union Government and the Committee, stipulate the following environmental quality standards:

(a) suitable surface water quality standards in the usage in rivers, streams, canals, springs, marshes, swamps, lakes, reservoirs and other inland water sources of the public;

(b) water quality standards for coastal and estuarine areas;

(c) underground water quality standards;

(d) atmospheric quality standards;

(e) noise and vibration standards;

(f) emissions standards;

(g) effluent standards;

(h) solid wastes standards;

(i) other environmental quality standards stipulated by the Union Government.

11. The Ministry may, with the approval of the Union Government and the Committee, insert, modify and stipulate the environmental quality standards for the interests of the public in accord with the scientific and technological advances or requirement of work according to time and area.

12. If any environmental quality standard stipulated by any Government department, Government organization under any existing law is more than the quality standard stipulated by the Ministry, it shall remain in force; however if it is less than such standard, only the standard stipulated by the Ministry shall be in force.

Chapter VII

Environmental Conservation

13. The Ministry shall, under the guidance of the Committee, maintain a comprehensive monitoring system and implement by itself or in co-ordination with relevant Government departments and organizations in the following matters:

(a) the use of agro-chemicals which cause to impact on the environment significantly;

(b) transport, storage, use, treatment and disposal of pollutants and hazardous substances in industries;

(c) disposal of wastes come out from exploration, production and treatment of minerals, industrial mineral raw materials and gems;

(d) carrying out waste disposal and sanitation works;

(e) carrying out development and constructions;

(f) carrying out other necessary matters relating to environmental pollution.

14. A person causing a point source of pollution shall treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.

15. The owner or occupier of any business, material or place which causes a point source of pollution shall 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 shall be arranged to dispose the wastes in accord with environmentally sound methods.

16. A person or organization operating business in the industrial estate or business in the special economic zone or category of business stipulated by the Ministry:

(a) is responsible to carry out by contributing the stipulated cash or kind in the relevant combined scheme for the environmental conservation including the management and treatment of waste;

(b) shall contribute the stipulated users charges or management fees for the environmental conservation according to the relevant industrial estate, special economic zone and business organization;

(c) shall comply with the directives issued for environnmental conservation according to the relevant industrial estate, special economic zone or business.

Chapter VIII
Management of Urban Environment

17. The Ministry shall, for the management of urban environment, advise as may be necessary to the relevant Government departments and Government organizations, private organizations and individuals in carrying out the following matters in accord with the guidances laid down by the Committee:

(a) land use planning and management including zoning;

(b) management of the construction industry in pivotal urban centres;

(c) management of housing settlements;

(d) management of wastes;

(e) pollution control including land, water, air and noise pollution;

(f) other necessary environmental management.

Chapter IX
Conservation of Natural Resources and Cultural Heritages

18. The relevant Government departments and Government organizations shall, in accord with the guidance of the Union Government and the Committee, carry out the conservation, management, beneficial use, sustainable use and enhancement of regional cooperation of the following environmental natural resources:

(a) forest resources;

(b) land resources;

(c) fresh water resources including underground water;

(d) mineral resources;

(e) agricultural resources;

(f) fisheries resources;

(g) marine resources;

(h) natural ecosystems;

(i) natural areas, wildlife, natural plants and biological diversity;

(j) other natural resources stipulated by the Union Government.

19. The Ministry shall cooperate with the relevant Government departments and Government organizations in the matters of environmental conservation for perpetual existence of cultural heritage sites and natural heritage sites, cultural monuments and natural areas stipulated under any existing law.

20. The Ministry shall provide necessary technologies to the relevant Government departments and Government organizations in implementing the matters contained in sections 18 and 19.

Chapter X
Prior Permission

21. The Ministry may, with the approval of the Union Government, stipulate the categories of business, work-site or factory, work-shop which may cause impact on the environmental quality that requires to obtain the prior permission.

22. The owner or occupier of the category of business, work- site or factory, workshop stipulated by the Ministry under section 21 shall apply for the prior permission to the Ministry in accord with the stipulations.

23. The Ministry may, after scrutinizing whether or not the application made under section 22 is in conformity with the stipulations, grant or refuse to issue the prior permission by stipulating terms and conditions.

24. The Ministry may, in issuing the prior permission, stipulate terms and conditions relating to environmental conservation. It may conduct inspection whether or not it is performed in conformity with such terms and conditions or inform the relevant Government departments, Government organizations to carry out inspections.

25. The Ministry may, if it is found that a holder of the prior permission fails to comply with any of the terms and conditions relating to environmental conservation contained in the prior permission, pass any of the following administrative penalties:

(a) causing to comply with in accord with the terms and conditions after warning, causing to sign the bond;

(b) causing to comply with in accord with the terms and conditions after paying a fine.

Chapter XI
Insurance

26. The holder of the prior permission shall effect insurance according to the category of his business, work-site or factory, workshop for any accident that may cause impact on the environment, in accord with the existing law.

27. The Ministry shall give the remark if it is requested by the Myanmar Insurance on the extent and potential environmental impact in respect of the business, department or organization which carries out the business to be insured under section 26.

Chapter XII

Prohibitions

28. No one shall, without the prior permission, operate business, work-site or factory, workshop which is required to obtain the prior permission under this Law.

29. No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law.

30. No one shall, without permission of the Ministry, import, export, produce, store, carry or trade any material which causes impact on the environment prohibited by the Ministry.

Chapter XIII

Offences and Penalties

31. Whoever, without the prior premission, operates business, work-site or factory, workshop which is required to obtain the prior permission under this Law shall, on conviction, be punished with imprisonment for a term not exceeding three years, or with fine from a minimum of one hundred thousand kyats to a maximum of one million kyats,or with both.

32. Whoever violates any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law shall, on conviction, be punished with imprisonment for a term not exceeding one year, or with fine, or with both.

33. Whoever shall:

(a) if convited under section 32, be passed an order to compensate for damage due to such act or omission;

(b) if ordered under sub-section (a), and fails to pay the compensation to be paid, be recovered in accord with the existing revenue laws.

34. Whoever imports, exports, produces, stores, carries or trades any material prohibited by the Ministry due to its impact on environment shall, on conviction, be punished with imprisonment for a term from a minimum of three years to a maximum of

five years, or with fine from a minimum of one hundred thousand kyats to a maximum of two million kyats, or with both. Moreover, he shall incur the expenditure for the treatment and disposal of such material until the process that has no impact on the environment.

Chapter XIV

Miscellaneous

35. In prosecuting an offender under this Law, prior sanction of the Ministry shall be obtained.

36. The Ministry may, with the approval of the Union Government, exempt or relieve any Government department, organization or private business from complying with any provision contained in this Law for the interests of the Union and its people.

37. If any Government department, organization or individual incurs the expenditures for any action due to the declaration of environmental emergency, such expenditures are entitled to claim from the environmental management fund.

38. The relevant Government department, Government organization authorized to issue licence, permit or register for enabling operation of category of business, work-site or factory, workshop which is required to obtain the prior permission shall issue such licence, permit, or register only to the business, work-site or factory, workshop which has obtained the prior permission under this Law.

39. (a) The Ministry shall, if the person obtained the prior permission who was imposed with administrative penalty under section 25 fails to comply with the terms and conditions, inform the relevant Government department, Government organization authorized to issue licence, permit or register for the relevant business, work-site or factory, workshop to enable to take action as may be necessary.

(b) The Government department, Government organization received information under sub-section (a) may, after making necessary inquiries if it is found that any terms and conditions of environmental conservation contained in the prior permission is not complied with, cancel the issued licence, permit or register or suspend it for a limited period.

40. The offence contained in section 32 is determined as the cognizable offence.

41. The provisions relating to environmental conservation contained in the laws, rules, orders, directives and procedures issued before the enactment of this Law shall remain in force unless it is contrary to the provisions contained in this Law.

42. In implementing the provisions contained in this Law:

(a) the Ministry may issue necessary rules, regulations and by-laws with the approval of the Union Government;

(b) the Committee and the Ministry may issue necessary notifications, orders, directives and procedures.

I hereby sign under the Constitution of the Republic of the Union of Myanmar.

(Sd.) Thein Sein

President of the Union

Republic of the Union of Myanmar

Gas pipelines coated with de-rusting paint seen in gas yard

Flood light installed at the gas yard

Unlocked gate of gas yard

Warning sing board ''Be Careful of Fire'' hanging at the gas yard.JPG

Unlocked switch yard

Current using welding equipment without fitted with flashback arrestors

Old plant established by Myanmar and Czech Governments

Waste of asbestoses-containing materials piled up at the roadside in the Power Station

Inlet gas pipeline (pink color) and water pipeline to the GT (3)

Environs of Gas Turbine (3) building

Current drainage system of the GT station

Lack of maintained condition of Steam Turbine

Water leakage from the rusted pipe at the Steam turbine

Water storage containment for filttration seen in Tyre Factory Compound

Some sludge in the water storage containment

Water treatment plant (WTP)

Safety first

In the WTP

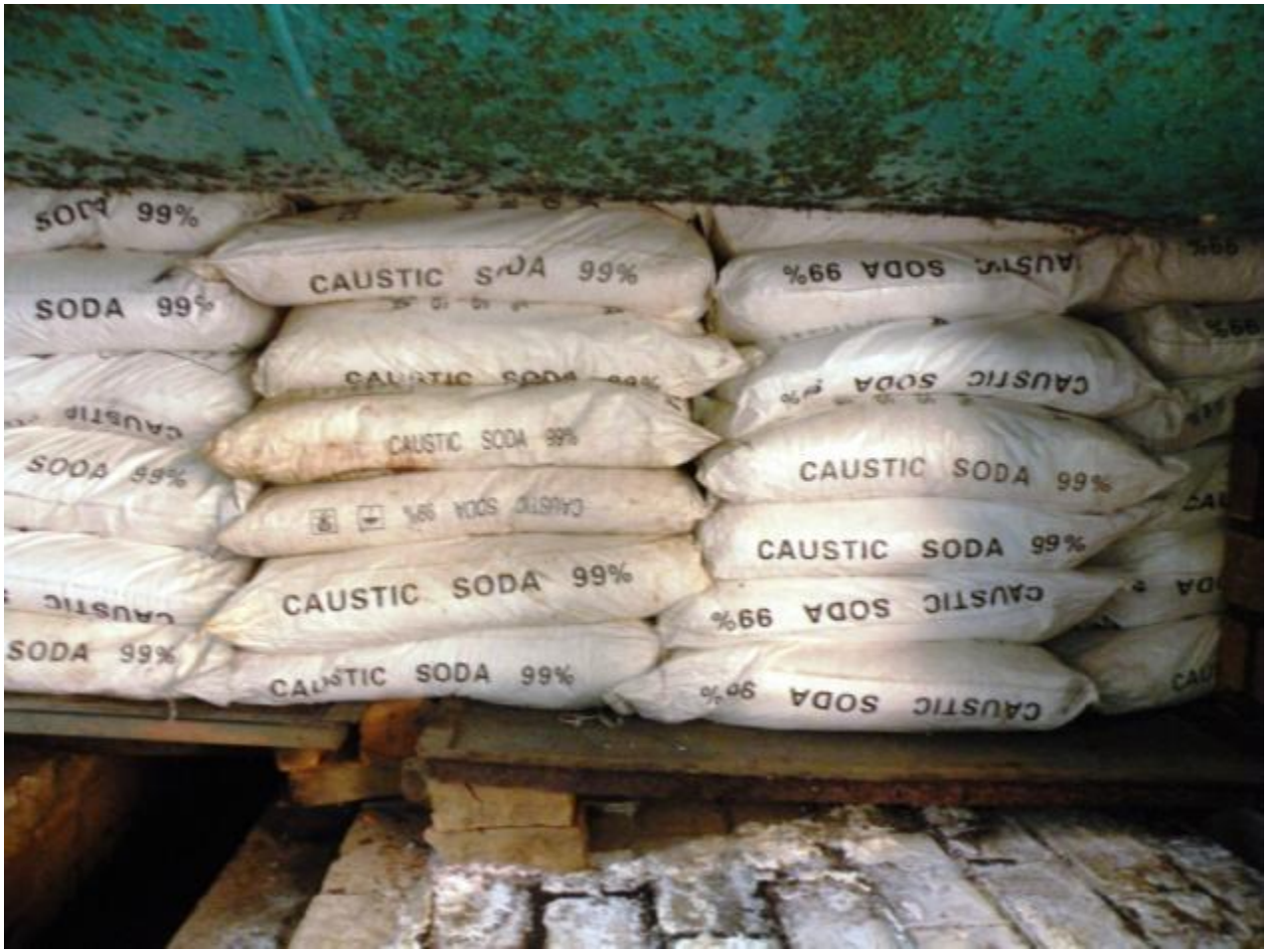
Broken Waste water pump of WTP

Waste water trapped beneath the floor due to broken of water pump

Storage condition of Chemicals inside the WTP

Trisodium Phosphate bags stored inside the WTP

Caustic Soda bags stored at the WTP



HCL drums

HCL drums placed along the road

HCL drums placed behind the water treatment plant

Empty chemical drums placed outside the ware house

An evidence of chemical spillage impacted to the soil

HCL spillage directly sink to the soil

Empty fuel drums seen inside the ware house

Ware houses

Type of fire extinguishers

Instruction label with Myanmar language hanging on the fire extinguishers

Fire extinguishers placed at the control room

Bullet prove wall to protect firing by heavy weapons from away

Installed flood light

Hydrant seen in Compound

Drain water are blocked by vegetation

Waste water from the canteen directly disposed to the ground

Rubbish disposed near the staff canteen

Environs of staff canteen

Burned rubbish

Staff quarter of GT Station

A heap of rubbish disposed in the Staff quarter

Clinic for GT staffs at the Staff quarter

Inside the clinic

Inside the clinic

Inside the clinic

Inside the clinic

Inside the clinic

Inside the clinic

Waste of clinic disposed outside the clinic

Comparative Examples of Noise Sources, Decibels & Their Effects

Noise Source	Decibel Level	Decibel Effect
Jet take-off (at 25 meters)	150	Eardrum rupture
Aircraft carrier deck	140	
Military jet aircraft take-off from aircraft carrier with afterburner at 50 ft (130 dB).	130	
Thunderclap, chain saw. Oxygen torch (121 dB).	120	Painful. 32 times as loud as 70 dB.
Steel mill, auto horn at 1 meter. Turbo-fan aircraft at takeoff power at 200 ft (118 dB). Riveting machine (110 dB); live rock music (108 - 114 dB).	110	Average human pain threshold. 16 times as loud as 70 dB.
Jet take-off (at 305 meters), use of outboard motor, power lawn mower, motorcycle, farm tractor, jackhammer, garbage truck. Boeing 707 or DC-8 aircraft at one nautical mile (6080 ft) before landing (106 dB); jet flyover at 1000 feet (103 dB); Bell J-2A helicopter at 100 ft (100 dB).	100	8 times as loud as 70 dB. Serious damage possible in 8 hr exposure
Boeing 737 or DC-9 aircraft at one nautical mile (6080 ft) before landing (97 dB); power mower (96 dB); motorcycle at 25 ft (90 dB). Newspaper press (97 dB).	90	4 times as loud as 70 dB. Likely damage 8 hr exp
Garbage disposal, dishwasher, average factory, freight train (at 15 meters). Car wash at 20 ft (89 dB); propeller plane flyover at 1000 ft (88 dB); diesel truck 40 mph at 50 ft (84 dB); diesel train at 45 mph at 100 ft (83 dB). Food blender (88 dB); milling machine (85 dB); garbage disposal (80 dB).	80	2 times as loud as 70 dB. Possible damage in 8 hr exposure.
Passenger car at 65 mph at 25 ft (77 dB); freeway at 50 ft from pavement edge 10 a.m. (76 dB). Living room music (76 dB); radio or TV-audio, vacuum cleaner (70 dB).	70	Arbitrary base of comparison. Upper 70s are annoyingly loud to some people.
Conversation in restaurant, office, background music, Air conditioning unit at 100 ft	60	Half as loud as 70 dB. Fairly quiet
Quiet suburb, conversation at home. Large electrical transformers at 100 ft	50	One-fourth as loud as 70 dB.
Library, bird calls (44 dB); lowest limit of urban ambient sound	40	One-eighth as loud as 70 dB.
Quiet rural area	30	One-sixteenth as loud as 70 dB. Very Quiet
Whisper, rustling leaves	20	
Breathing	10	Barely audible

SOURCE: Temple University Department of Civil/Environmental Engineering, USA

Workshop on Potential Environmental and Social Issues associated with the upgrade of the Thaton Gas Fired Power Plant, Mon State, Union of Myanmar

MINUTES OF WORKSHOP

Date: May 20, 2013

Venue: Two Lakes Resort, Tha Ton, Mon State

Purpose of the Meeting: Disclosure of the environmental and social assessment study

Participants: Various Organizations (see attached List of Participants, Annex B)

No of male_____34
No of female_____16
Total Number of Participants: 50 persons

Presentors: Ms. Beulah Pallana, Norconsult, U Aye Myint, NEPS and Dr. Saw Mon Theint, NEPS

Facilitators: Daw Phyu Phyu Aye and Daw Sandar Aung, NEPS

Documentors: Daw Khin Khin Cho, Daw Haymar Hnin, and U Kyaw Minn Aung, NEPS

Resource Panel: U Cho Cho, U Aye Myint, U Than Shwe, Dr. Saw Mon Theint (NEPS), Mr. Knut Kopsal (World Bank), U Wunna Oo (MOEP).

RESULTS OF PLENARY DISCUSSIONS

Open Forum	
Issues Raised/ Comments	**Responses**
Issue 1. U Tun Tun Win (Villager, Than ban Village) Question 1.1: I would like to know the location of the Project Area. Our village is near the project area. Therefore there might be potential impact on our village. Question 1.2 I would like to know where the factory's waste is discharged The waste is seen in the center of our village. It can destroy our cultivation and fish breeding. I'm worried that this anticipated project will also emit their waste into our village, which is very near to the Thaton Gas Turbine Plant. I would like to know if there is any	Answer, Q.1 U Aye Myint, NEPS: The Project Location is inside the Thaton Gas Turbine Plant compound. For the management of waste disposal, as Dr. Saw Mon Theint had explained to you earlier in her presentation, there will be EMP (Environmental Management Plan) to manage the waste of this project. With the approval from the consultancy, this EMP will be documented and then implemented by the proponent. Continuation of observance to the EMP will be the responsibility of the regional plant managers and will be monitored for its effectiveness. [Post Workshop Comment: The Project will not generate a solid waste or a liquid waste stream as part

initiatives to manage the waste of this project. Question 1.3: After implementation of this forthcoming project, what benefits will result for our village? Question 1.4: I would like to know if there is any educational, financial improvements considered for our village in connection to this project.	of the process. Waste will be limited to maintenance materials, canteen and office refuse.] Answer Q.2 by U Aye Myint, NEPS: This could be and had been before, because of our country's unawareness or weakness in environmental conservation experience and relevant methodology to deal with this matter. However, as we are progressing into this changing era, we have acquired relevant experiences concerning this matter and will certainly try to prevent this environmental pollution. Thank you for representing your village and bringing up this issue to us. The World Bank is also observing this project closely to ensure that least or no negative impact is affected to the nearby villages. It is not difficult to solve these issues with relevant engineering technology and we will recommend to the World Bank accordingly. Answer Q. 3 by U Cho Cho, NEPS: There is always more or less some negative impacts when a project is implemented. We are trying to ensure mitigation of negative impacts to have the least negative effect on environment. With outputs from this workshop's discussion, we will try for regional benefits from this project especially for nearby IP villages. Answer Q. 4 by U Cho Cho, NEPS: This project does not deal directly with poverty alleviation or financial improvement. However, electricity is crucial for regional development. Thank you for discussing this matter frankly. We will forward your hopes and anticipation accordingly.
Issue 2. U Zayar Pyne, (Chairperson, Village Electrification Committee, Kyar pan Village). We have no payment debts on monthly tariff recorded for electricity. Therefore, it is not	Answer :U Cho Cho, NEPS: It is natural that some people, especially elderly citizens are reluctant to take electrical connections. They are afraid of fire hazard or risk of explosion from electricity. However, once they witness other people

that the villagers cannot afford monthly tariff as you had mentioned earlier in your presentation. Every household that has electrical connections can pay their meter fees. There are some flexibility in payment. If they need electrical connections, they can pay within six months. First installment is 13,000 ks. Some don't want electrical connection. Those who take electrical connections are those born in our village. Those who do not take electrical connections are laborers who come from other places. Some stay in other people's compound where they had built their small houses. Some stay one or two miles away from our village. So it is impossible to connect electricity for them. It would cost 10 or 20 lakhs (10,00,000 – 20,00,000 ks) to connect electricity for them. They can only pay 5 lakhs (5,00,000ks). However, those who are connected presently, can pay their monthly tariff.	enjoying the comforts of having electricity, they would also desire this facility. Then it becomes necessary to strive for improving the coverage of electricity locally. However, people who live far away should be made aware that it is not easy to supply electricity for long range distance of one or two miles. Thus, patience and understanding of the situation and the importance of good motivation and compassion in social service would ultimately solve this problem. These social impact studies are carried out to mitigate any potential negative impacts to the least and all future projects would be needing this kind of social studies to be carried out conforming to international regulations. This project is the first project abiding to international regulations. However, many past projects had been implemented without consulting the local inhabitants, resulting in disappointments and undesirable social problems. It is best not to have any problem in implementing a project. If there is some problem, it becomes difficult to implement normally. It also affects all stakeholders concerned. Therefore, it is recommended to implement with the advice from relevant consultancy team. Answer from U Than Shwe (NEPS): When this study team did the social studies, it is found that some local residents have household debts in their poor financial situation. Therefore they could not afford to pay for any electrical connection. They cannot afford to pay monthly tariff for electricity as well. It certainly does not have any related dealings in payment to the village electrification committee. It is because of their poverty that they cannot afford to pay extra for any other expenditure. Some elderly persons are even frightened of electrical hazards, so they are reluctant to take the facility. Answer from U Aye Myint (NEPS):

	I wish to include this remark. The socio economic survey was carried out with a representative sampling size of 10%. Therefore, it does not cover all households in all the villages of the study area. From the statistical data acquired from this socio economic survey, assessment was done to get results of the social assessment. There might be a slight discrepancy in determining results. If so, this can be adjusted to get the nearest results of the real situation, that is, if there is really a need for correction.
Issues Raised/Comments	Responses
Issue/Comment 3. Daw Khin Cho, Staff Officer, Assistant Director, District Planning Department, Mon State. I am serving as Head of District Planning Department for Kayin and Mon State. It is very important to get electrical power for Kayin and Mon State. We are carrying out our planning works for all villages in these two states. We are planning to prioritize villages to get electricity and achieve 100% full coverage by year 2030. Some villages are difficult to connect from the main feeder. However, some villages are having electrical supply by a group of villagers serving as electrification committee: • One TV for one month cost 5000.Ks • One fluorescent lamp / bulb one night cost 100.Ks (6:30 p.m to 10:30 p.m lighting) • TV plus lighting one bulb for one night / one month will cost 10,000 Ks. • Three / Fourth (3/4) of the villages are using this kind of	Answer from Mr. Knut: It depends much upon the environmental and social documents to be submitted so that this project can be implemented within this financial year. If the necessary preparation including the safeguard documentation can be completed as planned, the project would be presented to the World Bank board before the end of 2013. Thank you. Answer from U Cho Cho: We are doing our best to compile all data and findings to complete our environmental and social documents for submission accordingly.

private electrical power source. Therefore, it is very important for the upgrading of the Thaton Gas Fired Power Plant to be successfully implemented. Presently, one electrical pole cost 120,000 Ks and transformer expenses are costly. Thus, if these concerned issues are well addressed, all households in Mon and Kayin state will surely get electrical coverage. I pray that this Upgrading of the Thaton Gas Fired Power Plant Project will be a real success. I wish to know which organization is implementing this development project and when it will commence implementing. The reason is that we would be including this in our planning phase.	
Issue/Comment 4 U Myo Nyunt, Villager, Kyar Ban Since our village is nearest to the proposed project, we would like to request that we also get coverage of the needed electrical power supply upon completion of this project. Issue/Comment 5. U Kyaw Tun, Village Administrator, Kyar Ban and Than pan Villages. We definitely support the implementation of this upgrading of the Thaton Gas Fired Power Plant. If possible, we would like to request you that after completion of this project, electrical coverage be considered and supplied to our nearby IP villages as well.	Answer: U Aye Myint, NEPS: This project is actually an upgrading of the Thaton Gas Fired Power Plant and it is not logical that the surrounding villages in the same area, are not getting coverage of electrical supply. It is necessary that all relevant local and regional administrative organizations in the area should initiate awareness of this fact to the concerned Ministry of Distribution of Electrical Power and related Management / Authorities to look into this matter for the well being of all local IP villages. We shall also submit our suggestions from the Environmental and Social impact assessments as necessary until the World Bank agrees to this matter.

Issue/Comment 6. Daw Thidar Hlaing, Member, Womens Affairs, Thaton. We welcome the regional development and employment opportunities in our local environment. I would like to know if there is any program to sell the produced electrical power abroad.	Answer from Dr. Saw Mon Theint (NEPS) Certainly there will not be any selling of the produced electrical power abroad. It is upgrading of the electrical power production at the Thaton Electrical Power Plant to meet the needed local electrical energy consumption. [Post Workshop Comment: The Project will feed energy in to the national grid system and local feeder network.]
Issue/Comment 7 U Bo Bo Myint, News Reporter, Weekly Eleven Media. I would like to kow the existing generated electrical power (MW) and the future improved MW after implementing the project.	Answer from U Wunna Lwin, Deputy Factory Manager, Thaton Electrical Power Plant, Thaton. The existing produced electrical power is 40 MW and the utilized energy is 45 MW. After completion of this project, the estimated generated electrical power is expected to be 120 MW. Answer from U Aye Myint (NEPS) It is expected to produce more than twice the present generated electrical energy as estimated by the consultancy team. [Post Workshop Comment: The Project upgrade should give capacity of around 120MW).]

The meeting ended at 11:30.

Attachments:

A: Agenda

B. List of Attendees

C. Photos of Workshop Activity

ATTACHMENT A.

Agenda for Thaton Workshop on Potential Environmental and Social Issues associated with the upgrade of the Thaton Gas Fired Power Plant, Thaton, Mon State

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Date – 20th May 2013

Time tcsdef	Description taMumif;t&m	Task Manager aqmif&Gufol
8:30 – 9:00 8;30 - 9;00	Registration / Attendance rSwfyHkwifjcif;^vufrSwfa&;xdk;jcif;	Daw Khin Khin Cho + Daw Haymar Hnin (NEPS) a':cifcifcsKd+a':a[rmeSif;(NEPS)
9:00 – 9:15 9;00 - 9;15	Opening Remarks tzGifhrdefYcGef;ajymMum;jcif;	U Soe Lwin (MOEP), Mr. Knut (WB), U Cho Cho (NEPS) OD;pdk;vGif(puf&HkrSL;)jrefrmhvQyfppf"gwftm;ay;puf&Hk? oxHk? Mr. Knut (WB), udk,fpm;vS,f OD;csKdcsKd(tkyfcsKyfrSL'g&dkufwm)(NEPS)
9:15 – 9:30 9;15 - 9;30	Presentation of the Workshop Agenda / Introducing the participants tpDtpOfzwfMum;jcif;ESifhwufa&mufolrsm;tm; rdwfqufjcif;	Daw Phyu Phyu Aye/Daw Sandar Aung(NEPS) a':jzLjzLat;(NEPS)/a':pE´matmif(NEPS)
9:30 – 10:00 9;30 - 10;00	Coffee Break vufzuf&nfESifh{nfhcHjcif;	
10:00 – 10:30 10;00 - 10;30	Summary Description / Proposed Plant Upgrade and Environmental Issues oxHk"gwftm;ay;puf&Hk jyKjyifajymif;vSJa&;ESifh obm0ywf0ef;usifqdkif&m tcsuftvuf wifjycsuftusOf;csKyf	U Aye Myint, Dr. Saw MonTheint (NEPS) OD;at;jrifh? a'gufwm apmrGefodrfU(NEPS)

10:30 – 11:30 10;30 - 11;30	Presentation of the Social Baseline and Potential Social Issues obm0ywf0ef;usifESifhvlrIa&;tusdK;oufa&mufrIavhvmawGU&Sdcsufrsm;tay: jzpfEdkifzG,f&mtcsuftvufrsm; wifjyNcif;	Ms. Beulah Pallana (Norconsult) / Daw Phyu Phyu Aye a':jzLjzLat;(NEPS)
11:30 – 12:30 11;30 - 12;30	Plenary Discussion / Questions / Answers – All wufa&mufolrsm;rSar;cGef;ar;jref;jcif;ESifhaqG;aEG;jcif;/	Facilitators – U Cho Cho (NEPS) U Aye Myint (NEPS),U Than Shwe,U Wunna U jyefvnfajzMum;ol - OD;csKdcsKd(tkyfcsKyfrSL'g&dkufwm) OD;at;jrifh? OD;oef;a&T(NEPS) OD;0PÖOD;('k-puf&HkrSL;)

ATTACHMENT B

ATTENDANCE RECORD OF WORKSHOP ON THE POTENTIAL ENVIRONMENTAL AND SOCIAL ISSUES ASSOCIATED WITH THE UPGRADE OF THE THATON GAS FIRED POWER PLANT,THATON, MON STATE

Date - 20th May 2013

Sr.No	Name	Designation	Department	Phone No / email
1	U Tun Tun Naing	Township Administrative Officer	Township Administrative Office	09-2025350
2	U Soe Lwin	Supretentive Engineer	Electrical Power Plant, Thaton	09-425260541
3	U Wanna Oo	Excecutive Engineer	Electrical Power Plant, Thaton	09-451234174
4	U Aung Myo Min	Assistant Manager	Electrical Power Plant, Thaton	09-425262873
5	U Tint Lwin	District Electrical Engineer	Myanmar Electrical power Enterprise	09-8725574
6	U Naung Soe Tun	Township Electrical Engineer	Myanmar Electrical power Enterprise	09-8725584
7	Daw Khin Cho	Assistant Director	Planning Department	09-449253753
8	Daw Khin Thida New	Staff Officer	Planning Department	09-449250264
9	Daw Mya Mon	Chief	Women's Affair, Thaton Township	
10	Daw Khin Thida Hlaing	Member	Women's Affair, Thaton Township	
11	Daw War War Cho	Member	Women's Affair, Thaton Township	
12	U Kyaw Win	Assistant Director (MID)	Irrigation Department	
13	U Myint Zaw	Deputy Rank Officer	Forest Department	
14	U Tun Lwin	Assistance Factory Manager	No.21 Heavy Industry Enterprise	09-43005895
15	U Tun Tun Zaw	General Manager	No.21 Heavy Industry Enterprise	09-49816038
16	Daw San San Tint	Assistant General Manager (Account)	No.21 Heavy Industry Enterprise	09-425318525
17	U Aung Thet Oo	Staff Officer	Information & Public relations Department	09-425300318
18	U Myo Aung	Staff Officer	Fire Fighting Department	
19	U War Lin	Staff Officer	Fire Fighting Department	
20	Daw Khin Saw Lin	Staff Officer	Information & Public relations Department	

21	Ms. Beulah Pallana	Social Development Specialist	Norconsult	bpallana@yahoo.com
22	U Cho Cho	Managing Director	NEPS Co., Ltd.	09-8635150 neps@mayanmar.com
23	U Aye Myint	Project Team Leader	NEPS Co., Ltd.	uamyint@gmail.com
24	U Than Shwe	Social Assessment Spacialist	NEPS Co., Ltd.	01-539552 information.neps@gmail.com
25	Daw Phyu Phyu Aye	Senior Environmental Engineer	NEPS Co., Ltd.	priscilla.boey1@gmail.com
26	Daw Khin Khin Cho	Senior Water Resource Engineer	NEPS Co., Ltd.	kkcho1951@gmail.com
27	Dr. Saw Mon Theint	Environmental Specialist	NEPS Co., Ltd.	09-5196159 smt.dimple@gmail.com
28	Daw Sandar Aung	Logistic Support	NEPS Co., Ltd.	information.neps@gmail.com
29	U Kyaw Min Aung	Data Processor	NEPS Co., Ltd.	kyawminaung132@gmail.com
30	Daw Haymar Hnin	Engineer	NEPS Co., Ltd.	haymarhnin18@gmail.com
31	U Kyee Shwe	Villager	Nyaung Wyne	
32	U Hla Myaing	Villager	Nyaung Wyne	
33	U Maung Oo	Villager	Nyaung Wyne	
34	U Aung Nyein	Villager	Nyaung Wyne	
35	U Kyaw Htun	Village Tract Administrator	Kyar Pan	09-425204919
36	U Aung Nyunt	Villager	Kyar Pan	
37	U Myo Nyunt	Villager	Kyar Pan	
38	U Zayar Paing	Villager	Kyar Pan	
39	U Htun Htun Win	Villager	Than Ban	
40	U Pha Lu	Villager	Than Ban	
41	U Htun Shein	Villager	Than Ban	
42	U Tin Maung Win	Villager	Than Ban	
43	Daw Hla Thein	Villager	Htaung Hmu	
44	Mr. Knut Opsal	Projects Manager	World Bank	kopsal@worldbank.org
45	Mr. Frank Van Woerden	Senior Environmental Specialist, Sustainable Development	World Bank	fvanwoerden@worldbank.org

46	Daw Theingi Min	Operation Analayst	World Bank	tmin@worldbank.org
47	U Swe Nyein	Staff Officer	Immigration Department	
48	U Myint Zaw	Staff Officer	Immigration Department	
49	Ma Kaung Su San	Hotel Manager	Two Lake Resort, Thaton	09-450028790
50	U Bo Bo Myint	News Reporter, Weekly Eleven	Weekly Eleven	09-425361733

Attachment C. Photos on Workshop Activities

Preparation for Workshop Thaton Title Board, Seating plans and Registration work on 19 – 20 May 2013


Registration of Participants on 20 May 2013, by Daw Khin Khin Cho and Daw Haymar Hnin (NEPS), Participants from IP Villages and Members from Women's Affairs, Thaton.

Opening Speech and by U Cho Cho, Managing Director, NEPS


Opening Speech by U Soe Lwin, Project Manager, MEPP. Opening Speech by Mr. Knut Opsal, Representative Officer, and translated into Burmese by Daw Theingi Min, Operations Analyst, World Bank


Presentation of Brief Explanation of Proposed Plant Upgrade by U Aye Myint (NEPS), and Environmental Site Report by Dr. Saw Mon Theint (NEPS)


Presentation of Social Baseline and Potential Social Issues by Ms. Beulah Pallana, Social Development Specialist, Norconsult / Daw Phyu Phyu Aye (NEPS)

Questions from U Tun Tun Win, Than Ban Village and U Zayar Pyne, Kyar Pan Village

Questions / Discussions from Daw Khin Cho, Assistant Director, District Planning Office and U Myo Nyunt, Kyar Pan Village.


Questions / discussions from U Kyaw Tun, Village Head, KyarPan and Than Ban Village and Daw Khin Thidar Hlaing, Womens Affairs, Thaton.

Question from U Bo Bo Myint, Reporter, Weekly 11.Answer from U Wunna Oo, Deputy Factory Manager, MOEP

Answer from Dr. Saw Mon Theint, NEPS.

Answer from U Aye Myint, NEPS.

Discussions from Daw Khin Cho (District Planning Department) and U Aye Myint (NEPS)

Closing Speech by U Cho Cho, MD, NEPS.

Fellowship with Participants from Workshop Thaton

Participants of Workshop Thaton: "The Potential Environment and Social Issues associated with the Upgrade of the Thaton Gas Fired Power Plant, Thaton, Mon State, Myanmar" on 20 May 2013