STC Cement Plant - Waste Heat Recovery Project in Mandalay Region, Myanmar

IEE Report

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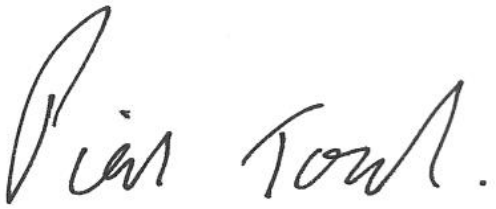

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Acronyms and Abbreviations

Name	Description
ALARP	As low as Reasonably Practicable
AOI	Area of Influence
APHA	American Public Health Association
AQC	Air quenching chamber
BOD	Biochemical Oxygen Demand
CO_2	Carbon dioxide
COD	Chemical Oxygen Demand
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
DEFRA	Department of Environment, Food and Rural Affairs
DL	Detection Limit
ECC	Environmental Compliance Certificate
ECD	Environmental Conservation Department
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EN	endangered
EPCC	Engineering, Procurement, Construction and Commissioning
ERM	Environmental Resources Management
ESIA	Environmental and Social Impact Assessment
GAD	General Administration Department
GHG	Greenhouse Gas
GIIP	Good international industry practice
ha	hector
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HH	Household
IEE	Initial Environmental Examination
IFC	International Finance Corporation
KBA	Key Biodiversity Area
kg	Kilogram
km	Kilometres
km^2	Squire kilometre
kV	Kilovolt
L	Litter
m	Meter
m^3	Cubic meter

Name	Description
mg	Milligram
MONREC	Ministry of Environmental Conservation and Natural Resources
MVA	Mega Volt AMP
MW	Megawatt
na	Not Available
NBSAP	National Biodiversity Strategies and Action Plans
NCEA	National Commission for Environmental Affairs
ND	Not Detected
NEQ	National Environmental Quality
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
NSRs	Noise Sensitive Receivers
OCHA	Coordination of Humanitarian Affairs
PH	Preheater
PS	Performance Standard
PM	Particulate Matter
SEZ	Special Economic Zone
SIA	Social Impact Assessment
SO2	Sulphur Dioxide
STC	Shwe Taung Cement
STG	Shwe Taung Group
SRC	Steam Rankine Cycle
S.U	Standard Unit
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
IUCN	International Union for Conservation of Nature
USEPA	United States Environmental Protection Agency
UKAS	United Kingdom Accreditation Service
UNFCCC	United Nations Framework Convention on Climate Change
VU	Vulnerable
WBG	World Bank Group
WHR	Waste Heat Recovery
WMP	Waste Management Plan
µg	Microgram
%	Percentage

1. EXECUTIVE SUMMARY

1.1 Introduction

Shwe Taung Cement Company Ltd. (STC), part of the **Shwe Taung Group** (STG) which owns and operates a variety of businesses across various sectors in Myanmar, is planning a brownfield expansion of cement production at its existing cement plant in Pyi Nyaung Village, Thazi Township in the Mandalay region of Myanmar. It aims to expand STC's clinker production capacity from 1,500 tonnes per day (tpd) to 5,500 tpd and cement capacity from 2,800 tpd to 7,200 tpd with the operation of first line and second line. A separate Environmental Impact Assessment (EIA) Report for the STC Cement Plant Expansion has been submitted to ECD for approval. Meanwhile, two waste heat recovery (WHR) units with a total installed capacity of 8.8 MW, are proposed to be installed respectively in both the first line and second line of the STC cement plant ("the Project"). The location of the STC Cement Plant (where the WHR Units will be installed) and its Ancillary Facilities are shown in *Figure 1.1*.

STC commissioned **Environmental Resources Management (ERM)-Hong Kong**, Limited to undertake the Initial Environmental Examination (IEE) for the WHR Project.

The cement plant area covers 400 acres leased under a 50-year agreement from the Forest Department on 31 March 2016 (following three lease agreements renewed annually) including 45 acres used by the cement plant first line, 15 acres used by the second line and 50 acres of dedicated water resources. Eight (8) acres are allocated for employee housing and catering services and the remaining 282 acres are planned or used for access roads. An adjacent area of 55 acres leased under a 50-year agreement from the Forest Department on 31 March 2016 is allocated to employees' family housing and recreation activities. The cement plant is situated in a valley surrounded by the mudstone quarry to the west and the limestone quarry to the east, which falls within the Tha Pyae mountain range (*Figure 1.1*). All land leased to date by the company for the cement plant is state-owned forest land.

There is no additional land requirement for the installation of the WHR units as the WHR units will be installed within the existing brownfield area of the cement plant. There will not be any direct loss of natural terrestrial habitat.

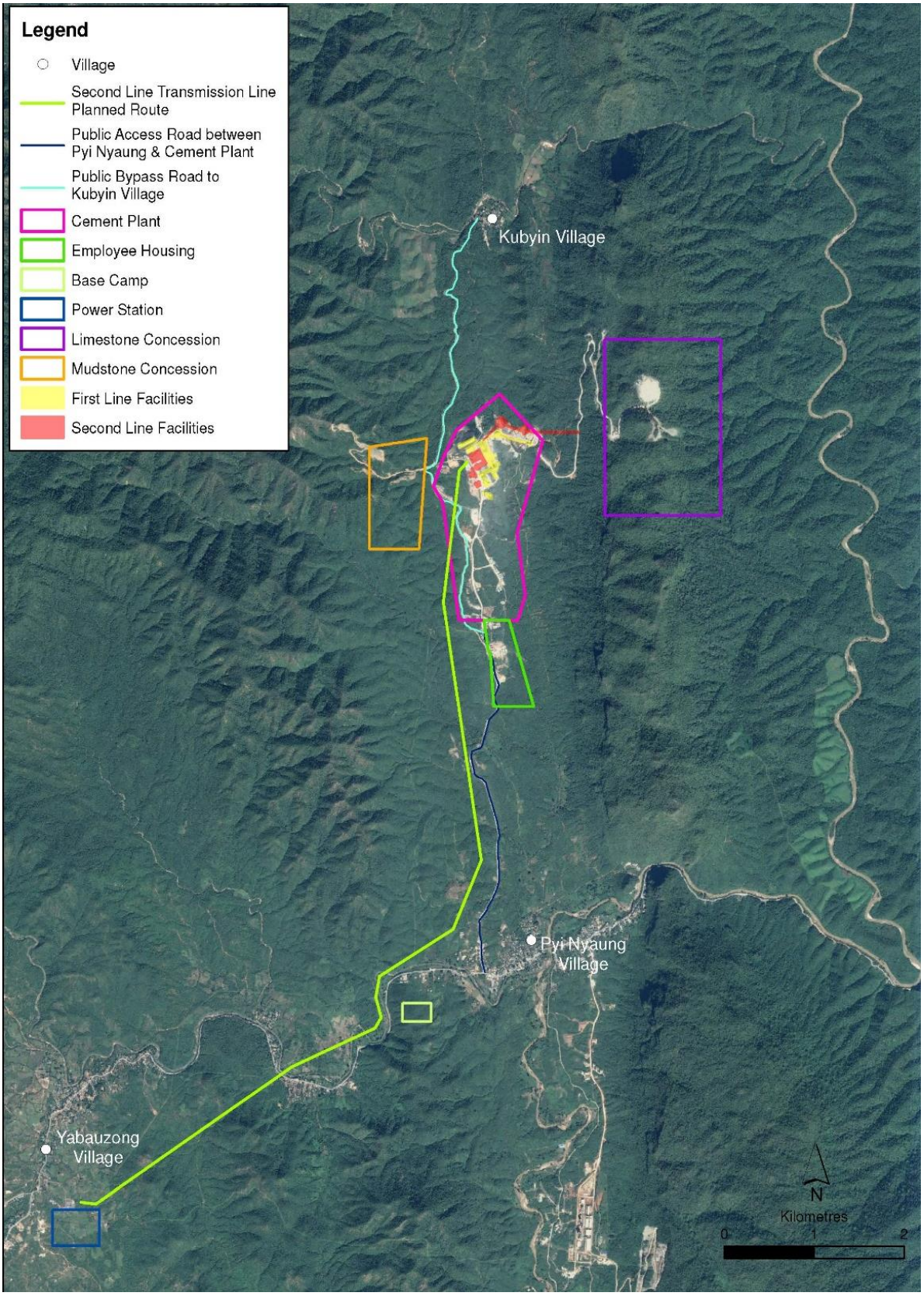


Figure 1.1 Location of STC Cement Plant (where the WHR Units will be installed) and its Ancillary Facilities

1.2 Policy and Regulatory Framework

Under Section 7 of the Environmental Conservation Law and Articles 52 and 53 of the Environmental Conservation Rules of the Republic of the Union of Myanmar, STC is required to undertake an IEE to obtain an Environmental Compliance Certificate (ECC) for the proposed WHR Project in the cement plant.

The Project will be undertaken in line with national regulation and international standards. Local laws relating to IEE include: Environmental Conservation Law (2012); Environmental Conservation Rules (2014); National Environmental Quality (Emission) Guidelines (2015); and the Environmental Impact Assessment (EIA) Procedure (2015).

With the release of the final Myanmar EIA Procedure in December 2015, the National Environmental Quality (Emissions) Guidelines were also released. These Guidelines provide the basis for regulation and control of noise and air emissions and effluent discharges from projects in order to prevent pollution and protect the environment and public health. These standards are equivalent to the World Bank Group General Environmental Health & Safety (EHS) Guidelines (2007).

1.3 Project Description and Alternatives

In the dry process clinker production line of the STC cement plant, there is a great quantity of waste heat in preheater and cooler exhaust gas which can be recovered via special WHR boiler. It can further generate steam to drive turbine to transfer heat energy to mechanical energy, finally driving the power generator to produce electricity used for the clinker production line.

The Project will adopt pure low temperature waste heat to generate electricity without additional fuel furnace. As such, there will not be any new air emission source. The boiler is static equipment and will not generate noise. Main noise source is dynamic equipment like turbine, generator and pumps, etc.

Two waste heat recovery units will be respectively installed on the first line and second line of the STC cement plan. The units will have a total installed capacity of 8.8 MW.

1.4 Description of the Environment

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

Baseline information has been collated from a range of sources including publicly available information, primary data collection and through consultation. Relevant baseline information have been adopted from the EIA for STC Cement Plant in Mandalay Region, Myanmar (ERM, 2018; hereafter referred to as “STC cement plant expansion EIA”), under which extensive baseline environmental and social data collection and consultation have been undertaken from 2016 to 2018 for the STC cement plant at which the WHR units will be installed [(1)].

Ambient air quality monitoring of NO_2 and SO_2 was undertaken for one week in January 2017 to provide an indication of baseline concentrations within the cement plant as well as at Pyin Nyaung Village and Kubyin Villages. In addition, ambient air quality monitoring of particulate matter (PM_{10} and $PM_{2.5}$) was undertaken in January 2018 for two weeks at Pyin Nyaung and Kubyin Villages. The results from the monitoring indicate that ambient concentrations of NO_2 and SO_2 are below the relevant air quality standards under the National Environmental Quality (Emissions) Guidelines (NEQ). The receiving airshed in the area can therefore be classified as ‘non-degraded’ with regard to these pollutants. For $PM_{2.5}$ and PM_{10}, the airshed throughout the study area has been classified as ‘degraded’. However it should be noted that the indicative annual average concentration of $PM_{2.5}$ and

[1] ERM (December 2018). EIA for STC Cement Plant in Mandalay Region, Myanmar

$PM1_0$ at both sites is based on the maximum 24-hour average concentration measured at each site during the dry season monitoring period and is therefore considered a worst case approach. In reality the annual average is expected to be lower given that ambient concentrations of particulate matter in the wet season will be substantially less.

Baseline noise monitoring and baseline water quality monitoring were also undertaken in January 2017. Background noise levels exceeded the noise limits set out in the NEQ during daytime and night-time periods at both temporary worker accommodation areas which are located several hundred metres from the cement plant. For baseline water quality, the levels of monitored parameters were compliant with the NEQ at the sampling points near Kubyin Village, however exceedances were noted in samples closer to the cement plant, likely as a result of uncontrolled runoff.

The WHR units will be located within the cement plant which is a developed brownfield area with negligible ecological value. Baseline biodiversity survey is thus not considered necessary for the Project.

From a socio-economic perspective, the WHR facilities will be installed entirely within the existing cement plant concession and is not used by local residents. According to the consultation meeting, household surveys and focus group discussions in Pyi Nyaung Village and Kubyin Village in 2016 and 2017, the establishment of STC has affected people collecting firewood for limekilns both positively and negatively. On the one hand, access to forest resources northwest of Pyi Nyaung Village has been improved by the construction of a concrete access road. STC also employs 17 permanent workers from Pyi Nyaung Village and employed over 100 for the construction phase of the cement plant. On the other hand, STC's cement plant may have resulted in a loss of resources for residents. The 6 km distance between the plant and Pyi Nyaung Village and the fact that residents collect wood from several different areas, suggest that the dependency of Pyi Nyaung Village residents on the forest resources occupied by STC is likely low to moderate which was confirmed by discussions with village leaders and through the engagement with 50 households in Kubyin and Pyi Nyaung villages over the course of 2017. Improved access has also resulted in increased timber extraction (as opposed to firewood collection) which is understood to be a main source of income for Kubyin Village and a significant source of income for residents of Pyi Nyaung Village. Based on observations and discussions with village leaders and local residents, loss of income from restriction of access to the forest resources that now comprise STC's concessions for the plant has been more than offset by the employment offered at STC's operations and the improved access to forest resources that the concrete access road has provided.

1.5 Impact Assessment

The IEE has assessed the potential impacts and proposed mitigation to reduce the level of the impact. It is concluded in the IEE that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts caused by the Project would be of no larger than moderate significance. The impacts are summarised in *Table 1.1*.

Table 1.1 Summary of Impact

Potential Impact/Issue	Phase	Significance of Impact	Significance of Residual Impact
Impacts from operation of the Project on use of water by the community	Operation	Moderate	Minor
Impacts from wastewater discharge and accidental spill on water quality	Construction	Negligible	Negligible
	Operation	Moderate	Minor
Impacts from operation of the Project on wastewater discharge and accidental spills	Construction	Negligible	Negligible
	Operation	Moderate	Minor
Positive Impacts from reduction in Greenhouse gas emission			

1.6 Cumulative Impact Assessment

The WHR units will be operated with the first and second lines of cement production and thus lead to cumulative impacts.

In terms of the extraction of water resources, STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the cement plant. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction. When correctly applying and actively managing the recommend mitigating controls, it is reasonable to conclude cumulative impacts from the WHR Project as well as the first and second line of cement production on use of water by the community would be of **Minor** significance.

In terms of wastewater discharge, wastewater generated from the operation of the WHR units will be treated by the wastewater treatment system of the cement plant. And STC is in the process of designing the wastewater treatment facilities for the whole cement plant which is designed to comply National Environmental Quality (Emissions) Guidelines. Given the above, it is reasonable to conclude that cumulative water quality impacts would be of **Minor** significance from operation of the WHR units as well as the first and second lines of cement production.

1.7 Environmental Management Plans

A Project-specific, dedicated Environmental Management Plan (EMP) has been developed to manage impacts associated with the Project and ensure legislative compliance and standards of good practice during the construction and operation of the proposed Project. The EMP includes a designation of responsibility for the implementation of mitigation measures presented in *Table 1.2*.

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts. The Environmental Monitoring Plan is provided in *Table 1.3*.

Table 1.2 Management Actions (Commitment Table)

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
Construction Phase					
C1.1	6.3.2	Impacts to water quality	Wastewater generated from the construction workers will be handled properly by the existing wastewater storage and treatment facilities within the cement plant.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report
C1.2	6.3.2	Impacts to water quality	Treated wastewater will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report
C1.3	6.3.2	Impacts to water quality	Fuel storage and refuelling should be undertaken at designated area which are concrete-paved and bunded to contain any potential spill.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report Spill Response Plan
Operation Phase					
O1.1	6.3.1	Impacts on water use by community	The waste heat recovery system is air-cooled to reduce the requirement of water usage.	STC HSSE Department Head WHR Unit Design Team	WHR Unit Specification
O1.2	6.3.1	Impacts on water use by community	STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and	STC HSSE Department Head STC Environmental Manager	Monthly Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			address potential impacts to the local community before such extraction.		
O1.3	6.3.1	Impacts on water use by community	STC has sponsored and installed water purification systems in Kubyin Village to improve the water supply quality at the area.	STC HSSE Department Head STC Environmental Manager	Monthly Report
O1.4	6.3.2	Impacts to water quality	Wastewater generated from the operation of the WHR units will be treated by the wastewater treatment facilities of the cement plant. All wastewater treatment systems will be designed to comply with Myanmar National Environmental Quality (Emissions) Guidelines for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application).	STC HSSE Department Head STC Environmental Manager	Monthly Report
O1.5	6.3.2	Impacts to water quality	Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application).	STC Environmental Manager	Monthly Report
O1.6	6.3.2	Impacts to water quality	Sludge generated from the units will be dewatered to meet with the Myanmar NEQ for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility. Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal.	STC Environmental Manager	Monthly Report

Table 1.3 Monitoring Programme for Project

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
Construction Phase			
Surface Water Quality	Treated wastewater from construction activities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: • Biological oxygen demand - 30 mg/l • Chemical oxygen demand - 125 mg/l • Oil and grease - 10 mg/l • pH - 6-9 (standard units) • Total coliform bacteria - 400 ml • Total nitrogen - 10 mg/l • Total phosphorus - 2 mg/l • Total suspended solids - 50 mg/l	Treated wastewater will be monitored monthly.	STC Environmental Manager Contractor HSE Manager
Waste	The HSSE team will review the Monthly Waste Reports (MWR) received from the contractor and report waste generation and disposal to MONREC.	Waste will be monitored monthly.	STC Environmental Manager Contractor HSE Manager
Operational Phase			
Surface Water Quality	Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application). The parameters will include: • Biochemical oxygen demand- 50 mg/l • Ammonia – 10 mg/l • Arsenic - 0.1 mg/l	Treated wastewater will be monitored monthly for BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine. Treated wastewater will be monitored annually for the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)	STC Environmental Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
	• Cadmium - 0.1 mg/l • Chemical oxygen demand - 250 mg/l • Chlorine (total residual) - 0.2 mg/l • Chromium (hexavalent) - 0.1 mg/l • Chromium (total) - 0.5 mg/l • Copper - 0.5 mg/l • Cyanide (free) - 0.1 mg/l • Cyanide (total) - 1 mg/l • Fluoride mg/l – 20 mg/l • Heavy metals (total) – 10 mg/l • Iron - 3.5 mg/l • Lead - 0.1 mg/l • Mercury - 0.01 mg/l • Nickel - 0.5 mg/l • Oil and grease – 10 mg/l • pH - 6-9 mg/l • Phenols - 0.5 mg/l • Selenium - 0.1 mg/l • Silver - 0.5 mg/l • Sulphide - 1 mg/l • Temperature increase - <3 °C • Total coliform bacteria - 400 / 100 ml • Total phosphorus - 2 mg/l • Total suspended solids – 50 • Zinc – 2 mg/l		
Surface Water Quality	Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal. The parameters will include: • Arsenic – 75 mg/kg • Cadmium – 85 mg/kg	Sludge will be monitored annually.	STC Environmental Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
	• Chromium (total) - 3,000 mg/kg • Copper - 4,300 mg/kg • Lead – 840 mg/kg • Mercury – 57 mg/kg • Molybdenum – 75 mg/kg • Nickel – 420 mg/kg • Selenium – 100 mg/kg • Total coliform bacteria - 1,000 g • Zinc - 7,500 mg/kg		
Water Use	STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction.	If required.	STC Environmental Manager

1.8 Public Consultation and Disclosure

As a part of the previous STC cement plant expansion EIA, consultation was carried out with the indirectly and directly affected population in two villages within the expansion Project's Area of Influence (AOI), which was the same as the AOI of the WHR Project. Consultation also covered Non-Governmental Organisations (NGOs) and Civil Society Organisations (CSOs) working in areas of interest to the cement plant expansion and Myanmar Government representatives. During these consultation, the stakeholders were also informed about the WHR Project and their comments were sought.

In summary, the following consultation was undertaken for between 2016 and 2017:

- Consultation with village leaders in Pyi Nyaung and Kubyin during Scoping in November 2016;
- Community briefings in Pyi Nyaung and Kubyin villages in January 2017;
- 50 Household surveys in Pyi Nyaung and Kubyin villages in January 2017;
- Focus Group Discussions with women and farmers in Pyi Nyaung and Kubyin villages in January 2017;
- A public forum held on 18 July 2017 at the Novotel hotel in Yangon attended by about 85 representatives of the Government, the public, CSOs, businesses, and other groups;
- A meeting in Thazi Township with local communities held on 21 July 2017; and
- A meeting in Pyi Nyaung Village with local communities held on 22 July 2017.

Concerns raised by stakeholders were incorporated into the IEE Report as appropriate to assess the Project impacts and to propose mitigation measures.

၁ အကျဉ်းချုပ် အစီရင်ခံစာ

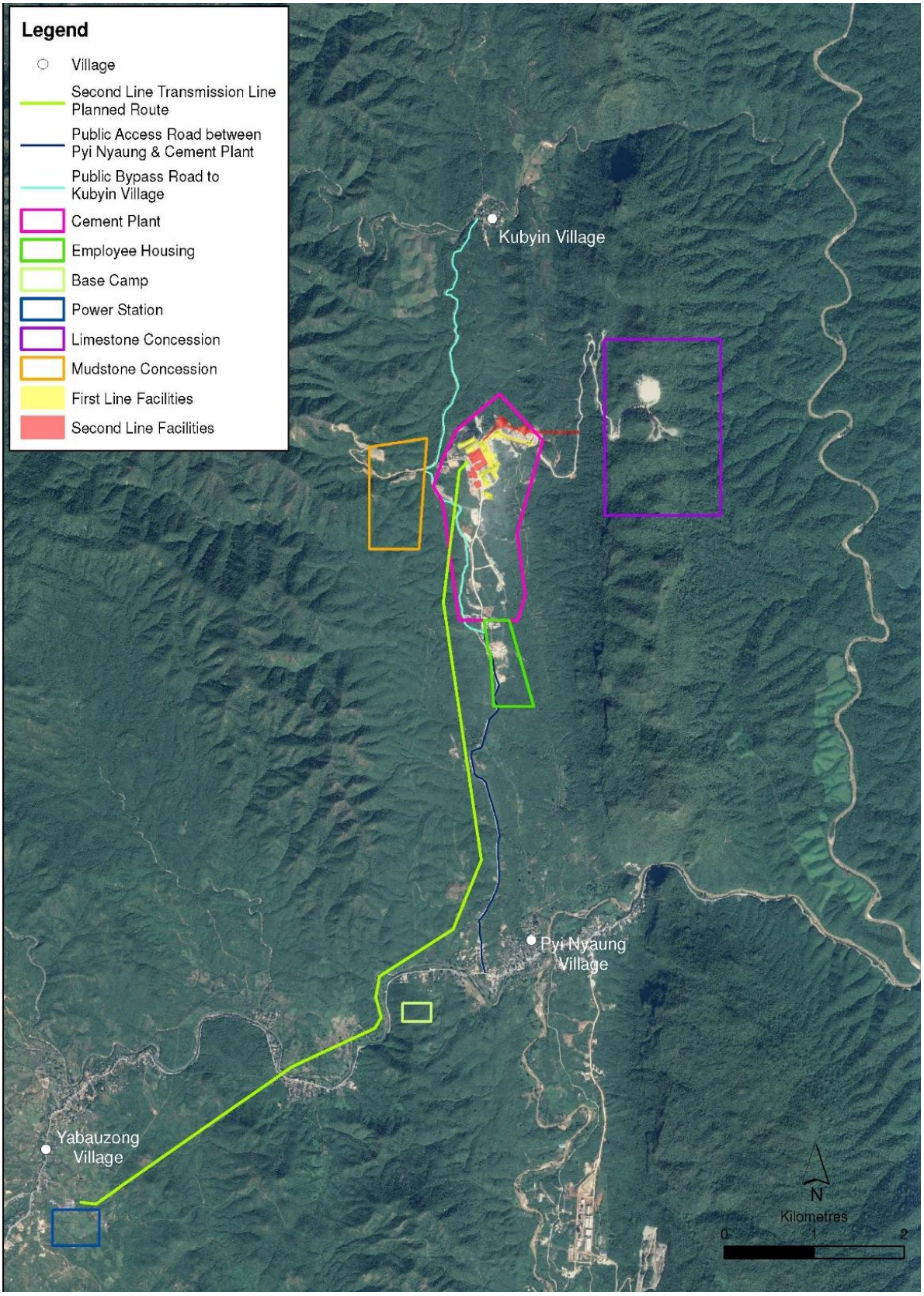
၁.၁ နိဒါန်း

မြန်မာနိုင်ငံတွင် စီးပွားရေးကဏ္ဍ အမျိုးမျိုးကို ပိုင်ဆိုင် လုပ်ကိုင်လည်ပတ်လျက်ရှိသည့် **Shwe Taung Group** (STG) ၏ အစိတ်အပိုင်းတစ်ရပ်ဖြစ်သော **Shwe Taung Cement Company Ltd.** (STC) သည် မြန်မာနိုင်ငံ၊ မွန္တလေးတိုင်း ဒေသကြီး၊ သာစည်မြို့နယ်၊ ပြည်ညောင်ကျေးရွာတွင် တည်ရှိနေပြီးသော ဘိလပ်မြေစက်ရုံ၌ ဘိလပ်မြေ တိုးချဲ့ ထုတ်လုပ်မှုတစ်ရပ်ကို ဆောင်ရွက်ရန် စီစဉ်လျက်ရှိပါသည်။ ၎င်းသည် STC ၏ မီးသင့်ကျောက် ထုတ်လုပ်နိုင်စွမ်းကို တစ်ရက်ထုတ်လုပ်နိုင်မှု တန် ၁,၅၀၀ (tpd) မှ တန် ၅,၅၀၀ (tpd) ထိတိုးချဲ့ပြီး ဘိလပ်မြေ ထုတ်လုပ်နိုင်စွမ်းကို တစ တစ်ရက် ထုတ်လုပ်နိုင်မှု တန်ချိန် ၂,၈၀၀ tpd မှ ၇,၂၀၀ tpd ထိ ပထမလိုင်း နှင့် ဒုတိယလိုင်းတို့၏ လည်ပတ်မှုတို့ဖြင့် တိုးချဲ့ထုတ်လုပ်နိုင်ရန် ရည်ရွယ်ပါသည်။ STC ဘိလပ်မြေစက်ရုံ တိုးချဲ့ဆောင်ရွက်မှုအတွက် ခွင့်ပြုချက်ရယူရန် သီးခြား ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) အစီရင်ခံစာကို ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (ECD) သို့ တင်သွင်းခဲ့ပြီး ဖြစ်ပါသည်။ တစ်ချိန်တည်းမှာပင်၊ စုစုပေါင်း တပ်ဆင်မည့်စွမ်းအင် ၈.၈ MW ရှိ စွန့်ပစ်အပူသုံး လျှပ်စစ်ဓါတ်အား ထုတ်လုပ်ခြင်း (WHR) ယူနစ်နှစ်ခုကို STC ဘိလပ်မြေစက်ရုံ၏ ပထမလိုင်း နှင့် ဒုတိယလိုင်းနှစ်ခုလုံးရှိ အသီးသီးတပ်ဆင်သွားရန် အဆိုပြုပါသည် ("စီမံကိန်း")။ STC ဘိလပ်မြေစက်ရုံ (WHR ယူနစ်များ တပ်ဆင်မည့် နေရာ) နှင့် ၎င်း၏ အထောက်အကူပြုနေရာအဆောက်အအုံများ၏ တည်နေရာကို *ပုံ ၁.၁* တွင် ပြထားပါသည်။

STC သည် WHR စီမံကိန်းအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ကို ဆောင်ရွက်ရန် **Environmental Resources Management (ERM)-Hong Kong, Limited** ထံသို့ တာဝန်ပေးအပ်ခဲ့ပါသည်။

၂၀၁၆ခုနှစ်၊ မတ်လ ၃၁ ရက်နေ့တွင် ချုပ်ဆိုခဲ့သော သစ်တောဦးစီးဌာနမှ နှစ် ၅၀ ငှားရမ်းမှုဆိုင်ရာ သဘောတူညီမှုအရ ဘိလပ်မြေစက်ရုံ၏ ပထမလိုင်းအတွက် အသုံးပြုသော ၄၅ ဧက၊ ဒုတိယလိုင်း (စီမံကိန်း) အတွက် အသုံးပြုမည့် ၁၅ ဧကနှင့် ရေအရင်းအမြစ်များ အတွက် ဧက ၅၀ တို့ပါ ၀င် သည့် ဘိလပ်မြေစက်ရုံဧရိယာသည် ဧက ၄၀၀ ရှိပါသည် (နှစ်စဉ် သက်တမ်းတိုး ငှားရမ်းမှုဆိုင်ရာ သဘောတူစာချုပ် သုံးခုကို လိုက်နာလျက်ရှိပါသည်)။ ၄င်းတို့အနက် ၈ ဧက မှာ အလုပ်သမားများ အိမ်ရာ နှင့် စားရိပ်သာနေရာများဖြစ်ပြီး ကျန်ရှိသည့် ၂၈၂ ဧကမှာ စက်ရုံနေရာ သို့မဟုတ် လမ်း အတွက် အသုံးပြုသောနေရာများဖြစ်ကြပါသည်။ ၂၀၁၆ မတ်လ ၃၁ ရက်နေ့တွင် ချုပ်ဆိုခဲ့သော သစ်တော ဦးစီးဌာနနှင့် နှစ် ၅၀ သဘောတူညီချက်အရ စက်ရုံဧရိယာ ဧက ၄၀၀ နှင့်ကပ်လျက် ရှိသည့် နေရာဖြစ်သည့် ၅၅ဧက ကို ဝန်ထမ်းမိသားစုနေထိုင်ရာနေရာနှင့် ၎န်ထမ်းများအတွက် အပန်းဖြေလှုပ်ရှားမှုများအတွက် နေရာသတ်မှတ်ထား ပါသည်။ ဘိလပ်မြေစက်ရုံသည် သပြေတောင်တန်းအတွင်း ကျရောက်ပြီး အနောက်ဘက်တွင် ရှုံ့ကျောက် လုပ်ကွက်နှင့် အရှေ့ဘက်တွင် ထုံးကျောက်လုပ်ကွက်တို့ဖြင့် ဝန်းရံထားသည့် ချိုင့်ဝှမ်းနေရာ၌ တည်ရှိ ပါသည် (*ပုံ ၁.၁* တွင်ဖော်ပြထားပါသည်)။ ယခုအချိန်ထိ ဘိလပ်မြေစက်ရုံအတွက် ကုမ္ပဏီက ငှားရမ်းထားသည့် မြေအား လုံးသည် နိုင်ငံတော်ပိုင်သစ်တောမြေများဖြစ်ပါသည်။

WHR ယူနစ်များကို ဘိလပ်မြေစက်ရုံ၏ ရှိနေပြီးသော နယ်မြေဧရိယာအတွင်း တပ်ဆင်သွားမည်ဖြစ်သဖြင့်၊ WHR ယူနစ်များတပ်ဆင်မှုအတွက် နောက်ထပ် မြေနေရာများ မလိုအပ်ပါ။ သဘာဝ နယ်နိမိတ်ဒေသရင်းနေရာများ တိုက် ရိုက်ဆုံးရှုံးမှုရှိမည် မဟုတ်ပါ။



ပုံ ၁.၁ STC ဘိလပ်မြေစက်ရုံ (WHR ယူနစ်များ တပ်ဆင်မည့် နေရာ) နှင့် ၎င်း၏ အထောက်အကူပြုနေရာအဆောက်အအုံများ၏ တည်နေရာပြပုံ

၁.၂ မူဝါဒ နှင့် ကြီးကြပ်ရေးဆိုင်ရာ မူဘောင်

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ ၏ ပုဒ်မ ၇ နှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ ၏ အပိုဒ် ၅၂ နှင့် ၅၃ တို့အရ၊ STC သည် ဘိလပ်မြေစက်ရုံ၌ အဆိုပြု WHR စီမံကိန်းအတွက် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံ လက်မှတ် (ECC) ကို ရရှိရန် ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း (IEE) ကို ပြုလုပ်ဆောင်ရွက်ဖို့ လိုအပ်ပါ သည်။

စီမံကိန်းကို မြန်မာနိုင်ငံစည်းမျဉ်းစည်းကမ်းနှင့် နိုင်ငံတကာစံချိန်စံညွှန်းနှင့်အညီဆောင်ရွက်သွား မည် ဖြစ်ပါသည်။ EIA နှင့်စပ်လျဉ်းသည့် ဒေသဥပဒေများတွင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်း ဥပဒေများ(၂၀၁၄)၊ အမျိုးသား ပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (၂၀၁၅)၊ နှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆိုင်ရာ လုပ်ထုံး လုပ်နည်း (၂၀၁၅) တို့ပါဝင်ကြပါသည်။

အပြီးသတ် မြန်မာ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ကို ၂၀၁၅ ဒီဇင်ဘာလတွင် ထုတ်ပြန်ခဲ့ခြင်းနှင့်အတူ၊ အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန် ချက်များကိုလည်း ထုတ်ပြန်ခဲ့ပါသည်။ ညစ်ညမ်းမှုကို တားဆီးရန် နှင့် ပတ်ဝန်းကျင်နှင့် အများပြည် သူကျန်းမာရေးကို ကာကွယ်ရန် စီမံကိန်းများမှ ထွက်ရှိလာသည့် စွန့်ပစ်ရည်များထွက်ရှိမှု၊ အသံ နှင့် အခိုးအငွေ့ ထုတ်လွှတ်မှုတို့ကို ထိန်းချုပ်ရန် စည်းကမ်းချက်များ အတွက် အခြေခံအချက်အလက် များကို ဤလမ်းညွှန်ချက်များမှ ပြဋ္ဌာန်းပေးပါသည်။ ဤစံနှုန်းများသည် ကမ္ဘာ့ဘဏ် အုပ်စု အထွေထွေ သဘာဝပတ်ဝန်းကျင်ဆိုင်ရာ၊ ကျန်းမာရေးနှင့်ဘေးကင်းလုံခြုံရေး (EHS) ဆိုင်ရာ လမ်းညွှန်ချက် များ (၂၀၀၇) နှင့်တူညီပါသည်။

၁.၃ စီမံကိန်းအကြောင်းအရာဖော်ပြချက်နှင့် အခြားနည်းလမ်းရွေးချယ်မှုများ

STC ဘိလပ်မြေစက်ရုံ၏ ချော်ကျောက်ထုတ်လုပ်မှုလိုင်းလုပ်ငန်းစဉ်တွင် အပူပေးကိရိယာ နှင့် အအေးပေးကိရိယာ အိုဗာမာတင်ငွေ့တို့တွင် စွန့်ပစ်အပူပမာဏများစွာရှိပြီး၊ ၎င်းကို WHR အထူးယူနစ်များဖြင့် ပြန်လည် အသုံးပြုနိုင်ပါသည်။ နောက်ဆုံးတွင် ချော်ကျောက်ထုတ်လုပ်မှုလိုင်းအတွက် အသုံးပြုမည့် လျှပ်စစ်ကို ထုတ်လုပ်ရန် ပါဝါဂျင်နရေတာကို မောင်းနှင်စေလျက် အပူစွမ်းအင်ကို စက်စွမ်းအင်အဖြစ် ပြောင်းလဲသည့် တာဘိုင်ကို မောင်းနှင်ရန် ရေနွေးငွေ့အား နောက်ထပ် ထွက်ရှိနိုင်ပါသည်။

စီမံကိန်းသည် နောက်ထပ်လောင်စာသုံး မီးပြင်းဖိုမလိုအပ်ဘဲ အပူချိန်အချည်းအနှီးဖြစ်သွားသောအပူကို လျှပ်စစ်ထွက်ရှိရန် အသုံးပြုဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ထို့ကြောင့်၊ အခိုးအငွေ့ထုတ်လွှတ်သော အရင်းအမြစ်အသစ်ရှိမည် မဟုတ်ပါ။ ဘွိုင်လာအိုးသည် တည်ငြိမ်သောကိရိယာဖြစ်ပြီး၊ ဆူညံသံများ ထွက်ရှိမည် မဟုတ်ပါ။ အဓိကဆူညံသံလာရာ နေရာမှာ တာဗိုင်၊ ဂျင်နရေတာ နှင့် မှုတ်စက် စသည်တို့ကဲ့သို့သော လှုပ်ရှားသော ကိရိယာတို့ဖြစ်ကြသည်။

စွန့်ပစ်အပူကို ပြန်လည်အသုံးပြုကာ လျှပ်စစ်ထုတ်လုပ်နိုင်မည့် ယူနစ်နှစ်ခုကို STC ဘိလပ်မြေစက်ရုံ၏ ပထမလိုင်း နှင့် ဒုတိယလိုင်း အသီးသီးတပ်ဆင်သွားမည် ဖြစ်ပါသည်။ ယူနစ်များသည် စုစုပေါင်း တပ်ဆင်မည့်စွမ်းအား ၈.၈ MWQ ရှိမည် ဖြစ်ပါသည်။

၁.၄ ပတ်ဝန်းကျင်ဆိုင်ရာ ဖော်ပြချက်

ဤအပိုင်းကို စီမံကိန်းလုပ်ငန်းခွင်နေရာ နှင့် ၎င်း၏ သက်ရောက်မှုရှိစေမည့်နယ်မြေဧရိယာ (AOI) တို့ရှိ ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ အခြေခံအချက်အလက်သွင်ပြင်လက္ခဏာများ နှင့် အနေအထားများနှင့်ပတ်သက်သော သတင်းအ ချက်အလက်များကို ထောက်ပံ့ပေးနိုင်ရန် ဖွဲ့စည်းထားပါသည်။ ဆွေးနွေးမှုကို စီမံကိန်းကိန်းအပေါ် တိုက်ရိုက်သက် ရောက်မှု ရှိနိုင်မည့် သို့မဟုတ် စီမံကိန်းမှ သက်ရောက်နိုင်မည့် ပတ်ဝန်းကျင် နှင့် လူမှုဆိုင်ရာ ကဏ္ဍများ၏ အကြောင်း အရင်းများသို့ ကန့်သတ်ထားပါသည်။

အခြေခံအချက်အလက်များကို အများပြည်သူ လက်လှမ်းမီသော သတင်းအချက်အလက်များ၊ မူလအချက်အလက်များ ကောက်ယူခြင်း နှင့် တိုင်ပင်ဆွေးနွေးမှုတို့အပါအဝင် အရင်းအမြစ်အပိုင်းအခြားအမျိုးမျိုးတို့မှ စုစည်းခဲ့ပါသည်။ သက်ဆိုင်ရာအခြေခံအချက်အလက်များကို မြန်မာနိုင်ငံ၊ မွန္တလေးတိုင်းဒေသကြီးရှိ STC ဘိလပ်မြေစက်ရုံ အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (ERM, 2018၊ နောက်ပိုင်းတွင် "STC ဘိလပ်မြေစက်ရုံ တိုးချဲ့မှုဆိုင်ရာ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း" ဟု သုံးနှုန်းသွားမည်)မှ ရယူထားပြီး၊ ၎င်းမှာ ၂၀၁၆ မှ ၂၀၁၈ အထိ WHR ယူနစ်များ တပ်ဆင်သွားမည့် STC ဘိလပ်မြေစက်ရုံအတွက် ကျယ်ပြန့်သော အခြေခံ ပတ်ဝန်းကျင် နှင့် လူမှု အချက်အလက်များ၊ နှင့် တိုင်ပင်ဆွေးနွေးမှုတို့ကို ကောက်ယူဆောင်ရွက်ခဲ့ပါသည်[1]။

အနီးဝန်းကျင် လေထုအရည်အသွေး စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအတွက် ဘိလပ်မြေစက်ရုံ အတွင်း နှင့် ပြည်ပြောင် ကျေးရွာ နှင့် ကူပြင်ကျေးရွာတို့အတွင်း NO_2 နှင့် SO_2 တို့၏ အခြေခံပါဝင်မှုကို သိရှိနိုင်ရန် ၂၀၁၇ ဇန်နဝါရီလတွင် တစ်ပတ်ကြာ ဆောင်ရွက်ခဲ့ပါသည်။ ထို့ပြင်၊ အနီးဝန်းကျင် လေထုအရည်အသွေး စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအတွက် ပြည်ပြောင်ကျေးရွာ နှင့် ကူပြင်ကျေးရွာ တို့၌ လေတွင်အမှုန်ပါဝင်မှု (PM_{10} and $PM_{2.5}$) တို့ကို ၂၀၁၈ ဇန်နဝါရီလတွင် နှစ်ပတ်ကြာ ဆောင်ရွက်ခဲ့ပါသည်။ အနီးဝန်းကျင်ရှိ NO_2 နှင့် SO_2 ပါဝင်မှုမှာ အမျိုးသားပတ်ဝန်းကျင်အရည် အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များ (NEQEG) ပါ သတ်ဆိုင်ရာ လေထု အရည်အသွေး အောက် ကျရောက်ကြောင်း စောင့်ကြပ်ကြည့်ရှုလေ့လာမှုမှ ရလဒ်များက ညွှန်ပြနေပါသည်။ ထို့ကြောင့် ဤ ညစ်ညမ်းမှုများနှင့် ပတ်သက်၍ ဇရိယာ၌ ရှိနေသောလေထုကို 'အရည်အသွေးမနိမ့်' ဟု သတ်မှတ်နိုင်ပါသည်။ $PM_{2.5}$ နှင့် PM_{10} တို့အတွက် လေ့လာမှုဇရိယာတစ်လျှောက်တွင် 'အရည်အသွေးနိမ့်' ဟု သတ်မှတ်နိုင်ပါသည်။ သို့ရာတွင် နေရာနှစ်ခုလုံးရှိ $PM_{2.5}$ နှင့် PM_{10} တို့၏ ညွှန်ပြနေသော နှစ်စဉ် ပါဝင်မှုကို ခြောက်သွေ့ရာသီစောင့်ကြည့်ရေးကာလအတွင် နေရာတစ်ခုချင်း စီ၌ တိုင်းတာခဲ့သော အမြင့်ဆုံး ၂၄ နာရီကြာ ပုံမှန်ပါဝင်မှုအပေါ် အခြေခံထားသောကြောင့် အဆိုးဆုံးအခြေအနေကို ချဉ်းကပ်သော နည်းလမ်းအဖြစ် စဉ်းစားရမည် ဖြစ်ပါသည်။ မိုးရာသီတွင် အနီးဝန်းကျင်အမှုန်ပါဝင်မှု မှာ သိသိ သာသာနည်းနိုင်ပြီး၊ လက်တွေ့တွင် နှစ်စဉ်ပုံမှန်အနေအထား နိမ့်မည်ဖြစ်ကြောင်း ခန့်မှန်း ထား ပါသည်။

၂၀၁၇ ဇန်နဝါရီလတွင် အခြေခံ ဆူညံမှု စောင့်ကြည့်လေ့လာခြင်း နှင့် အခြေခံ ရေအရည်အသွေး စောင့်ကြည့်လေ့လာမှု တို့ကို ဆောင်ရွက်ခဲ့ပါသည်။ ဘိလပ်မြေစက်ရုံမှ မီတာ ရာကျော်ကွာဝေးသည့် ယာယီအလုပ်သမား လူနေဆောင် နေရာ နှစ်ခုဌ နေ့ဘက် နှင့် ညဘက် ကာလအတွင်းရှိ နောက်ခံ ဆူညံသံအဆင့်မှာ NEQEG ပါ ဆူညံသံကန့်သတ်မှုကို ကျော်လွန်ခဲ့ပါသည်။ အခြေခံရေအရည်အသွေး နှင့် ပတ်သက်၍ ကူပြင်ကျေးရွာအနီးရှိ နမူနာကောက်ယူမှုနေရာများ တွင် လေ့လာစောင့်ကြည့် ခဲ့သော သတ်မှတ်ချက်ညွှန်းကိန်းတို့သည် NEQ နှင့်ကိုက်ညီမှု ရှိပါသည်။ သို့ရာတွင် ဘိလပ်မြေ စက်ရုံနှင့် ပိုနီးသော နမူနာကောက်ယူမှုတို့တွင် ကျော်လွန်နေကြောင်းတွေ့ရပြီး ၎င်းတို့မှာ မထိန်းချုပ်ထားသော စီးဆင်းမှုကြောင့် ဖြစ်နိုင်ပါသည်။

WHR ယူနစ်များသည် မပြောပလောက်သော ဂေဟဆိုင်ရာတန်ဖိုးရှိသည့် ဖွံ့ဖြိုးရေးလုပ်နေသည့်နယ်မြေဇရိယာ ဖြစ်သည့် ဘိလပ်မြေစက်ရုံအတွင်း တည်ရှိမည် ဖြစ်ပါသည်။ ထို့ကြောင့် စီမံကိန်းအတွက် အခြေခံ ဇီဝမျိုးစုံ မျိုးကွဲ စစ်တမ်းကို ထည့်သွင်းစဉ်းစားခြင်း မရှိပါ။

လူမှုစီးပွားရှုထောင့်အရဆိုင်ရလျှင် ဒေသတွင်နေထိုင်သည့်လူများမှ အသုံးမပြုသည့် ရှိနေပြီးသောပိုင်ခွင့် နေရာ အတွင်း၌သာ အဆင့် ၂ တိုးချဲ့မှုကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ STC တည်ဆောက်မှု သည် ထုံးဖိုများအတွက် ထင်းခုတ်ကြသော လူများပေါ် ဆိုးကျိုး နှင့် ကောင်းကျိုး နှစ်ရပ်လုံးဖြင့် သက် ရောက်ခဲ့ပါသည်။ တစ်ဖက်တွင် ကွန်ကရိတ်လမ်းတည်ဆောက်ထားခြင်းကြောင့် ပြည်ပြောင် ကျေးရွာ၏ အနောက်မြောက်ရှိ သစ်တော အရင်း အမြစ်နေရာများသို့သွားလာရေးမှာ ပိုမိုကောင်းမွန် လာခဲ့ပါသည်။ STC သည် ပြည်ပြောင်ကျေးရွာမှ အမြဲတမ်း အလုပ်သမား ၁၇ ဦးကို ငှားရမ်းခဲ့ပြီး၊ တည်ဆောက်ရေးအဆင့်အတွက် လုပ်သားပေါင်း ၁၀၀ ကျော်ကို အလုပ်ခန့် ခဲ့ပါသည်။ အခြား တစ်ဖက်တွင်၊ STC ၏ ဘိလပ်မြေစက်ရုံသည် ဒေသခံများအတွက် အရင်းအမြစ်ဆုံးရှုံးမှုကို ဖြစ်ပေါ် ခဲ့ပါသည်။ စက်ရုံ နှင့် ပြည်ပြောင်ကျေးရွာအကြား ၆ ကီလိုမီတာ ကွာဝေးပြီး၊ မတူညီသော ဇရိယာ များမှ ဒေသခံများ

[1] ERM (December 2018)။ မြန်မာနိုင်ငံ၊ မွန္တလေးတိုင်းဒေသကြီးရှိ STC ဘိလပ်မြေစက်ရုံအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း

သည် ထင်းခုတ်သစ်ခုတ်ကြပါသည်။ ပြည်ညောင်ကျေးရွာရှိ ဒေသခံများမှီခိုနေ သော သစ်တောအရင်းအမြစ်နေရာကို STC မှ အသုံးပြုနေကြောင်းနှင့် ၎င်း အတွက် ကူပြင် နှင့် ပြည်ညောင်ကျေးရွာများ၌ ၂၀၁၇ တွင် အိမ်ထောင်စု ၅၀ နှင့် တွေ့ဆုံခြင်းအပြင် ကျေးရွာ ခေါင်းဆောင်များနှင့် ဆွေးနွေးမှုများမှ နည်းပါးသော အဆင့် မှ အတန်အသင့် အဆင့် သို့ ဖြစ်ပေါ်နိုင်ကြောင်း အတည်ပြုပါသည်။ သွားလာရေးကောင်းမွန်မှုကြောင့် ကူပြင်ကျေးရွာအတွက် အဓိကဝင်ငွေ ဖြစ်ပြီး ပြည်ညောင်ကျေးရွာရှိ ဒေသခံများအတွက် အရေးပါသော ဝင်ငွေအရင်းအမြစ်ဖြစ်သော သစ်ထုတ်လုပ်မှု (ထင်းမဟုတ်)မှာ တိုးမြင့် ခဲ့ပါသည်။ သစ်တောအရင်းအမြစ်များသို့ သွားလာရန် ကန့်သတ်ထားမှုကြောင့် ဝင်ငွေဆုံးရှုံးခြင်း နှင့် စက်ရုံအတွက် STC ၏ ပိုင်ခွင့်နေရာများနှင့်ပေါင်းစပ်လျှင် STC လုပ်ငန်းများမှ အလုပ်အကိုင်ရရှိနိုင်မှု နှင့် သစ်တောအရင်းအမြစ်များသို့ ကွန်ကရိုက်လမ်းများမှတဆင့်သွားလာနိုင်မှုမှာ မြင့်မားကြောင်း စောင့်ကြည့်ခြင်းများ နှင့် ကျေးရွာခေါင်းဆောင်များ နှင့် ဒေသခံတို့နှင့် ဆွေးနွေးမှုများအရ သိရှိရပါသည်။

၁.၅ ထိခိုက်မှုဆန်းစစ်ခြင်း

ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းသည် ဖြစ်ပေါ်လာနိုင်သောသက်ရောက်မှုများ နှင့် သက်ရောက်မှု အဆင့်ကို လျော့ချနိုင်ရန် အဆိုပြုလျော့ချရေးအစီအမံတို့ကို ဆန်းစစ်ခဲ့ပြီးဖြစ်ပါသည်။ အကြံပြုထားသော လျော့ချရေးအစီအမံများကို စနစ်တကျအကောင်အထည်ဖော်ဆောင်ရွက်ခြင်းဖြင့် စီမံကိန်းမှဖြစ်ပေါ်လာနိုင်သည့် ကြွင်းကျန်ပတ်ဝန်းကျင် နှင့် လူမှုဘဝ အပေါ် သက်ရောက်မှုများသည် အတန်အသင့် အရေးပါမှု အဆင့်ထက် ကြီးမားမည် မဟုတ်ကြောင်း ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းတွင် နိဂုံးချုပ်ထားပါသည်။ သက်ရောက်မှုများကို ဇယား ၁.၁ တွင် အကျဉ်းဖော်ပြ ထား ပါသည်။

ဇယား ၁.၁ သက်ရောက်မှုအကျဉ်းဖော်ပြချက်

ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှု/ထိခိုက်မှု	အဆင့်	သက်ရောက်မှု၏ အရေးပါမှု	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
စီမံကိန်းလည်ပတ်မှုကြောင့် ရပ်ရွာမှအသုံးပြုသည့်ရေ အပေါ် သက်ရောက်မှုများ	လည်ပတ်ရေး	အတန်အသင့်	သာမည
စွန့်ပစ်ရေ စွန့်ထုတ်မှု နှင့် မတော်တဆ ယိုဖိတ်မှုကြောင့် ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	တည်ဆောက်ရေး	မပြောပလောက်	မပြောပလောက်
	လည်ပတ်ရေး	အတန်အသင့်	သာမည
စီမံကိန်းလည်ပတ်မှုကြောင့် စွန့်ပစ်ရေ စွန့်ထုတ်မှု နှင့် မတော်တဆယိုဖိတ်မှုများအပေါ် သက်ရောက်မှုများ	တည်ဆောက်ရေး	မပြောပလောက်	မပြောပလောက်
	လည်ပတ်ရေး	အတန်အသင့်	သာမည
ဖန်လုံအိမ်ဓာတ်ငွေ့ထုတ်လွှတ်မှုလျော့ကျခြင်းကြောင့် အပြုသဘောဆောင်သောသက်ရောက်မှုများ			

၁.၆ ဆက်စပ်ထိခိုက်မှုဆန်းစစ်ခြင်း

WHR ယူနစ်များကို ဘိလပ်မြေထုတ်မှု၏ ပထမလိုင်း နှင့် ဒုတိယလိုင်းတို့တွင် လည်ပတ်ဆောင်ရွက်သွားမည်ဖြစ်သ ဖြင့် ဆက်စပ်သက်ရောက်မှုများကို ဦးတည်စေနိုင်ပါသည်။

ရေအရင်းအမြစ်များရယူမှုနှင့်ပတ်သက်၍၊ STC သည် ဘိလပ်မြေစက်ရုံက အသုံးပြုမှုအတွက် ဒေသခံရပ်ရွာလူထုတို့ အသုံးပြုသည့် ကူပြင်ချောင်း သို့မဟုတ် အနီးအနားရေအရင်းအမြစ်နေရာများမှ ရေကို မယူရန် ကတိကဝတ် ထားရှိပါသည်။ အကယ်၍ ကူပြင်ချောင်း သို့မဟုတ် အနီးအနားရေအရင်းအမြစ်နေရာများမှ ရေရယူရန်လိုအပ်လာပါက၊ ၎င်းကဲ့သို့ ရယူမှုမပြုလုပ်မီ၊ STC သည် ကူပြင်ချောင်း နှင့် အနီးအနား ရေအရင်းအမြစ်နေရာများ၏ နှစ်စဉ် နှင့် ရာသီလိုက် ရေစီးဆင်းမှုပမာဏ နှင့် ရေစီးနှုန်းတို့ကို ဆန်းစစ်ရန် နှင့် ဒေသခံရပ်ရွာလူထုအပေါ် သက်ရောက်နိုင်မှုအပေါ် ထည့်ထွက်ရန် ကတိကဝတ်ပြုပါသည်။ အကြံပြုထားသော လျော့ချထိန်းချုပ်မှုများကို မှန်မှန်ကန်ကန် အသုံးပြုပြီး တက်တက်ကြွကြွ စီမံဆောင်ရွက်ပါက၊ WHR စီမံကိန်း အပြင် ဘိလပ်မြေထုတ်လုပ်မှု၏ ပထမလိုင်းနှင့် ဒုတိယ လိုင်းတို့မှ ရပ်ရွာလူထုမှ အသုံးပြုသည့် ရေထုအပေါ် ဆက်စပ်သက်ရောက်မှုမှာ **သာမည** အရေးပါမှုသာ ဖြစ်ပေါ်မည်ဖြစ်ကြောင်း နိဂုံးချုပ်လျှင် ကျိုးကြောင်းဆီလျော်မည် ဖြစ်ပါသည်။

စွန့်ပစ်ရေစွန့်ထုတ်မှုနှင့်ပတ်သက်၍၊ WHR ယူနစ်များလည်ပတ်မှုက ထွက်ရှိသော စွန့်ပစ်ရေကို ဘိလပ်မြေစက်ရုံ၏ စွန့်ပစ်ရေ သန့်စင်ရေးစနစ်ဖြင့်သန့်စင်သွားမည်ဖြစ်ပါသည်။ ထို့ပြင်၊ STC သည် အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်များနှင့်အညီဖြစ်ရန် ဒီဇိုင်းလုပ်ထားသော ဘိလပ်မြေစက်ရုံတစ်ခုလုံးအတွက် စွန့်ပစ်ရေသန့်စင်သော အခြေခံအဆောက်အအုံနေရာများ ဒီဇိုင်းဆွဲနေသည့် အနေအထားတွင် ရှိပါသည်။ အထက်ပါအကြောင်းအရာများကြောင့်၊ WHR စီမံကိန်း အပြင် ဘိလပ်မြေထုတ်လုပ်မှု၏ ပထမလိုင်းနှင့် ဒုတိယ လိုင်းတို့မှ ရေထုအရည်အသွေးအပေါ် ဆက်စပ်သက်ရောက်မှုမှာ **သာမည** အရေးပါမှုသာ ဖြစ်ပေါ်မည်ဖြစ်ကြောင်း နိဂုံးချုပ်လျှင် ကျိုးကြောင်းဆီလျော်မည် ဖြစ်ပါသည်။

၁.၇ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်များ

စီမံကိန်းအခြေပြုထားသည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP)ကို စီမံကိန်းနှင့် ဆက်နွယ်သော သက်ရောက်မှုများကို စီမံခန့်ခွဲရန် နှင့် အဆိုပြုစီမံကိန်း တည်ဆောက်ရေး နှင့် လည်ပတ်ရေးကာလအတွင်း ဥပဒေနှင့်အညီဖြစ်စေရန် နှင့် ကောင်းမွန်သောအလေ့အကျင့်စံသတ်မှတ်ချက်များကို ပြည့်မီစေရန် ရေးဆွဲဆောင်ရွက်ပါသည်။ EMP တွင် *ဇယား ၁.၂* ၌ တင်ပြထားသည့် လျော့ချရေးအစီအမံများအကောင်အထည်ဖော်မှုအတွက် တာဝန်ပေးအပ်ခြင်း တို့ ပါဝင်ပါသည်။

စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်းကို ကြီးကြပ်ရေးဆိုင်ရာသတ်မှတ်ချက်များနှင့် ကိုက်ညီမှုရှိစေရန် နှင့် ဖြစ်ပေါ်လာနိုင် သော သက်ရောက်မှုများကို လျော့ချရန် ရည်ရွယ်ထားသည့် လည်ပတ်ရေးဆိုင်ရာ ထိန်းချုပ်မှုများ နှင့် အခြားအစီအမံများ၏ ထိရောက်မှုကို တွက်ချက်ရန် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအစီ အစဉ်ကို *ဇယား ၁.၃* တွင် ဖော်ပြထားပါသည်။

ဇယား ၁.၂ စီမံခန့်ခွဲမှု လုပ်ငန်းများ (ကတိကဝတ်ဆိုင်ရာ ဇယား)

စဉ်	EIA အပိုင်း	ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	လျှော့ချရေး အစီအမံများ	တာဝန်ရှိသည့် အုပ်စု	အစီရင်ခံခြင်း
တည်ဆောက်ရေးအဆင့်					
C1.1	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	တည်ဆောက်ရေးလုပ်သားများမှ ထွက်ရှိသော စွန့်ပစ်ရေကို ဘိလပ်မြေ စက်ရုံအတွင်းရှိ ရှိနေပြီးသော စွန့်ပစ်ရေသိုလှောင်မှု နှင့် သန့်စင်မှုဆိုင်ရာ အဆောက်အအုံများဖြင့် စနစ်တကျ ကိုင်တွယ်သွားမည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ ကန်ထရိုက်တာ HSE မန်နေဂျာ	ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးမှု အစီရင်ခံစာ
C1.2	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	လုပ်ငန်းခွင်အတွင်း စီးကျမှု နှင့် စွန့်ပစ်ရေ စွန့်ထုတ်မှုတို့နှင့်စပ်လျဉ်း၍ သန့်စင်ထားသည့် စွန့်ပစ်ရေကို အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး (ထုတ်လွှတ်မှုများ) ဆိုင်ရာ လမ်းညွှန်များနှင့်အညီ လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ ကန်ထရိုက်တာ HSE မန်နေဂျာ	ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးမှု အစီရင်ခံစာ
C1.3	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	ဖြစ်ပေါ်လာနိုင်သည့် ယိုဖိတ်မှုများကို ထိန်းထားနိုင်မည့် ကွန်ကရိတ်ခင်းပြီး ကာရံထားသည့် ရွေးချယ်သတ်မှတ်ထားသော ဇရိယာတွင် လောင်စာ သိုလှောင်မှု နှင့် လောင်စာဖြည့်သွင်းမှုတို့ကို ဆောင်ရွက်သင့်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ ကန်ထရိုက်တာ HSE မန်နေဂျာ	ပတ်ဝန်းကျင် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးမှု အစီရင်ခံစာ ယိုဖိတ်မှု တုံ့ပြန်ရေး အစီအစဉ်
လည်ပတ်ရေးအဆင့်					
O1.1	6.3.2	ရပ်ရွာမှ ရေအသုံးပြုမှုအပေါ် သက်ရောက်မှုများ	စွန့်ပစ်အပူသုံး လျှပ်စစ်ဓါတ်အား ထုတ်လုပ်ရေးစနစ်အတွက် ရေအသုံးပြုမှု လိုအပ်ချက်လျှော့ချရန် လေဖြင့်အေးစေမှုကို အသုံးပြုပါသည်။	STC HSSE ဌာနခေါင်းဆောင် WHR ယူနစ်ဒီဇိုင်းအဖွဲ့	WHR ယူနစ် အသေးစိတ် ဖော်ပြချက်
O1.2	6.3.2	ရပ်ရွာမှ ရေအသုံးပြုမှုအပေါ်	STC သည် ဒေသခံရပ်ရွာလူထုတို့ အသုံးပြုသည့် ကူပြင်ချောင်း သို့မဟုတ်	STC HSSE	လစဉ် အစီရင်ခံစာ

စဉ်	EIA အပိုင်း	ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	လျော့ချရေး အစီအမံများ	တာဝန်ရှိသည့် အုပ်စု	အစီရင်ခံခြင်း
		သက်ရောက်မှုများ	အနီးအနားရေအရင်းအမြစ်နေရာများမှ ရေကို မယူရန် ကတိကဝတ် ထားရှိပါ သည်။ အကယ်၍ ကူပြင်ချောင်း သို့မဟုတ် အနီးအနားရေအရင်း အမြစ်နေရာများမှ ရေရယူရန်လိုအပ်လာပါက၊ ၎င်းကဲ့ သို့ ရယူမှုမပြုလုပ်မီ၊ STC သည် ကူပြင်ချောင်း နှင့် အနီးအနား ရေအရင်းအမြစ်နေရာများ၏ နှစ်စဉ် နှင့် ရာသီလိုက် ရေစီးဆင်းမှုပမာဏ နှင့် ရေစီးနှုန်းတို့ကို ဆန်းစစ်ရန် နှင့် ဒေသခံရပ်ရွာလူထုအပေါ် သက်ရောက်နိုင်မှုအပေါ် ထည့်သွင်းထုတ်ရန် ကတိကဝတ်ပြုပါသည်။	ဌာနခေါင်းဆောင် STC ပတ်ဝန်းကျင် မန်နေဂျာ	
O1.3	6.3.2	ရပ်ရွာမှ ရေအသုံးပြုမှုအပေါ် သက်ရောက်မှုများ	STC သည် နယ်မြေဧရိယာရှိ ထောက်ပံ့ရေအရည်အသွေးကို တိုးတက် ကောင်းမွန်စေရန် ကူပြင်ကျေးရွာ၌ ရေသန့်စင်ရေးစနစ်များကို ပံ့ပိုးကူညီ တပ်ဆင်ပေးထားပါသည်။	STC HSSE ဌာနခေါင်းဆောင် STC ပတ်ဝန်းကျင် မန်နေဂျာ	လစဉ် အစီရင်ခံစာ
O1.4	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	WHR ယူနစ်များလည်ပတ်မှုမှ ထွက်ရှိသော စွန့်ပစ်ရေကို ဘိလပ်မြေ စက်ရုံ၏ စွန့်ပစ်ရေသန့်စင်ရေး အဆောက်အအုံတို့တွင် သန့်စင်သွားမည် ဖြစ်ပါသည်။ စွန့်ပစ်ရေသန့်စင်မှုစနစ်များအားလုံးကို စွန့်ပစ်ရေ၊ စီးကျရေ၊ ရေဆိုး နှင့် မိလ္လာရေဆိုးစွန့်ထုတ်ခြင်း (အထွေထွေအသုံးပြုမှု) တို့အတွက် မြန်မာနိုင်ငံ အမျိုးသား ပတ်ဝန်းကျင် အရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်များနှင့်အညီ ဒီဇိုင်းဆင်သွားမည် ဖြစ်ပါသည်။	STC HSSE ဌာနခေါင်းဆောင် STC ပတ်ဝန်းကျင် မန်နေဂျာ	လစဉ် အစီရင်ခံစာ
O1.5	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	BOD၊ COD၊ pH၊ SS၊ ဆီ နှင့် ကြေးဆီ၊ TN၊ TP နှင့် ကြွင်းကျန် ကလိုရင်း တို့နှင့်ပတ်သက်၍ သန့်စင်ထားသော စွန့်ပစ်ရေတို့ကို NEQ နှင့် ကိုက်ညီမှုရှိစေရန်အတွက် ဗဟိုသိုလှောင်ကန်တွင် လစဉ် စောင်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်းကို ဆောင်ရွက်သွားမည်ဖြစ်ပြီး၊ စွန့်ပစ်ရေ၊ စီးကျရေ၊ ရေဆိုး နှင့် မိလ္လာရေဆိုး စွန့်ထုတ်ခြင်း (အထွေထွေအသုံးပြုမှု) တို့နှင့်ပတ်သက်၍ NEQ ၏ ပါရာမီတာစာရင်းအပြည့်အစုံနှင့် ကိုက်ညီမှုရှိစေရန်အတွက် နှစ်စဉ် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးသွားမည် ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ	လစဉ် အစီရင်ခံစာ

စဉ်	EIA အပိုင်း	ဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများ	လျော့ချရေး အစီအမံများ	တာဝန်ရှိသည့် အုပ်စု	အစီရင်ခံခြင်း
O1.6	6.3.2	ရေအရည်အသွေးအပေါ် သက်ရောက်မှုများ	ဇီဝအစိုင်အခဲများ နှင့် အနှစ်စွန့်ထုတ်မှုတို့အတွက် အန္တရာယ်မရှိသော အစိုင်အခဲ စွန့်ပစ်ပစ္စည်း စီမံခန့်ခွဲမှုအဆောက်အဦသို့ မစွန့်ထုတ်မီ မြန်မာနိုင်ငံ NEQ နှင့် ကိုက်ညီမှုရှိစေရန် ယူနစ်များမှ ထွက်သည့် အနှစ်များကို ရေခန်းခြောက်အောင်ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ဇီဝအစိုင်အခဲများ နှင့် အနှစ်စွန့်ထုတ်မှုတို့အတွက် NEQ နှင့်ကိုက်ညီမှုရှိစေရန် သိုလှောင်ကန်တစ်ခုချင်းမှ အနှစ်များကို နှစ်စဉ် စစ်ဆေးသွားမည် ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ	လစဉ် အစီရင်ခံစာ

ဇယား ၁.၃ စီမံကိန်းအတွက် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးမှုအစီအစဉ်

စီမံကိန်းလုပ်ငန်း / ပတ်ဝန်းကျင်ရှုထောင့်	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေး အစီအမံများ	ကြိမ်နှုန်း	တာဝန်ရှိသူ
တည်ဆောက်ရေးအဆင့်			
မြေပေါ်ရေ အရည်အသွေး	လုပ်ငန်းခွင်အတွင်း စီးကျရေ နှင့် စွန့်ပစ်ရေ စွန့်ထုတ်မှုများနှင့်ပတ်သက်၍ အမျိုးသား ပတ်ဝန်းကျင် အရည်အသွေး (ထုတ်လွှတ်မှုများ) လမ်းညွှန်များနှင့် ကိုက်ညီမှုရှိစေရန် တည်ဆောက်ရေးလုပ်ငန်းများမှ သန့်စင်ထားသော စွန့်ပစ်ရေများကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည်ဖြစ်ပါသည်။ ပါရာမီတာတို့တွင် အောက်တို့ ပါဝင်သည် - • ဇီဝအောက်ဆီဂျင်ပါဝင်မှု - 30 mg/l • ဓာတုအောက်ဆီဂျင်ပါဝင်မှု - 125 mg/l • ဆီနှင့်ကြေးဆီ - 10 mg/l • pH - 6-9 (စံယူနစ်များ) • ဘက်တီးရီးယားပါဝင်မှု - 400 ml • နိုက်ထရိုဂျင်ပါဝင်မှု - 10 mg/l • ဖော့စဖရတ်ပါဝင်မှု - 2 mg/l • အစိုင်အခဲပါဝင်မှု - 50 mg/l	သန့်စင်ထားသော စွန့်ပစ်ရေများကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် မည်ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ ကန်ထရိုက်တာ HSE မန်နေဂျာ

စီမံကိန်းလုပ်ငန်း / ပတ်ဝန်းကျင်ရှုထောင့်	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေး အစီအမံများ	ကြိမ်နှုန်း	တာဝန်ရှိသူ
စွန့်ပစ်ပစ္စည်း	HSSE အဖွဲ့သည် ကန်ထရိုက်တာထံမှ လက်ခံရရှိသော လစဉ်စွန့်ပစ်ပစ္စည်း အစီရင်ခံစာများ (MWR) နှင့် MONREC သို့ စွန့်ပစ်ပစ္စည်းထွက်ရှိမှု နှင့် စွန့်ထုတ်မှု များဆိုင်ရာအစီရင်ခံစာတို့ကို ပြန်လည်သုံးသပ်သွားမည် ဖြစ်ပါသည်။	စွန့်ပစ်ပစ္စည်းများကို လစဉ် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးသွားမည် ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ ကန်ထရိုက်တာ HSE မန်နေဂျာ
လည်ပတ်ရေးအဆင့်			
မြေပေါ်ရေ အရည်အသွေး	BOD၊ COD၊ pH၊ SS၊ ဆီ နှင့် ကြေးဆီ၊ TN၊ TP နှင့် ကြွင်းကျန် ကလိုရင်း တို့နှင့် ပတ်သက်၍ သန့်စင်ထားသော စွန့်ပစ်ရေတို့ကို NEQ နှင့် ကိုက်ညီမှု ရှိစေရန် အတွက် ဗဟိုတိုင်ကီတွင် လစဉ် စောင်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်းကို ဆောင်ရွက်သွားမည်ဖြစ်ပြီး၊ စွန့်ပစ်ရေ၊ စီးကျရေ၊ ရေဆိုး နှင့် မိလ္လာရေဆိုး စွန့်ထုတ်ခြင်း (အထွေထွေအသုံးပြုမှု) တို့နှင့်ပတ်သက်၍ NEQ ၏ ပါရာမီတာစာရင်းအပြည့်အစုံနှင့် ကိုက်ညီမှုရှိစေရန်အတွက် နှစ်စဉ် စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးသွားမည် ဖြစ်ပါသည်။ ပါရာမီတာတို့တွင် အောက်တို့ ပါဝင်သည် - • ဇီဝဓာတုအောက်ဆီဂျင်ပါဝင်မှု - 50 mg/l • အမိုးနီးယား – 10 mg/l • အာဆင်နစ် - 0.1 mg/l • ကက်ဒမီယံ - 0.1 mg/l • ဓာတုအောက်ဆီဂျင်ပါဝင်မှု - 250 mg/l • ကလိုရင်း (ကြွင်းကျင်ပါဝင်မှု) - 0.2 mg/l • ခရိုမီယမ် (ဟက်ဆာဗေးလင့်) - 0.1 mg/l • ခရိုမီယမ် (ပါဝင်မှု) - 0.5 mg/l • ကြေးနီ - 0.5 mg/l • ဆိုင်ယာနိုက် (မပါဝင်မှု) - 0.1 mg/l • ဆိုက်ယာနိုက် (ပါဝင်မှု) - 1 mg/l • ဖလူအိုရိုက်(ဒ်) mg/l – 20 mg/l • ကြေခဲသော သတ္တုများ (ပါဝင်မှု) – 10 mg/l • သံ - 3.5 mg/l • ခဲ - 0.1 mg/l	BOD၊ COD၊ pH၊ SS၊ ဆီ နှင့် ကြေးဆီ၊ TN၊ TP နှင့် ကြွင်းကျန်ကလိုရင်းတို့အတွက် သန့်စင်ထားသော စွန့်ပစ်ရေကို လစဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။ စွန့်ပစ်ရေ၊ စီးကျရေ၊ ရေဆိုး နှင့် မိလ္လာရေဆိုး စွန့်ထုတ်ခြင်း (အထွေထွေအသုံးပြုမှု) တို့နှင့် ပတ်သက်၍ NEQ ၏ ပါရာမီတာစာရင်းအပြည့် အစုံနှင့် ကိုက်ညီမှုရှိစေရန်အတွက် သန့်စင်ထား သော စွန့်ပစ်ရေများကို နှစ်စဉ် စောင့်ကြပ် ကြည့်ရှု စစ်ဆေးသွားမည် ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ

စီမံကိန်းလုပ်ငန်း / ပတ်ဝန်းကျင်ရှုထောင့်	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေး အစီအမံများ	ကြိမ်နှုန်း	တာဝန်ရှိသူ
	• ပြဒါး - 0.01 mg/l • နီကယ် - 0.5 mg/l • ဆီ နှင့် ကြေးဆီ – 10 mg/l • pH - 6-9 mg/l • ဖီးနော့ - 0.5 mg/l • ဆလီနီယံ - 0.1 mg/l • ဇွေ - 0.5 mg/l • ဆာလဖိုက် - 1 mg/l • အပူချိန်မြင့်တက်မှု - <3 °C • ဘက်တီးရီးယားပါဝင်မှု - 400 / 100 ml • ဖော့စဖရတ်ပါဝင်မှု - 2 mg/l • အစိုင်အခဲပါဝင်မှု – 50 • သွပ် – 2 mg/l		
မြေပေါ်ရေ အရည်အသွေး	ဇီဝအစိုင်အခဲများ နှင့် အနှစ်စွန့်ထုတ်မှုတို့အတွက် NEQ နှင့် ကိုက်ညီမှုရှိစေရန် အတွက် သိုလှောင်ကန်တခုချင်းမှ အနှစ်နမူနာများကို နှစ်စဉ်စစ်ဆေးသွားမည် ဖြစ်ပါ သည်။ ပါရာမီတာတို့တွင် အောက်တို့ ပါဝင်သည် - • အာဆင်နစ် – 75 mg/kg • ကက်ဒမီယံ – 85 mg/kg • ခရိုမီယံ (ပါဝင်မှု) - 3,000 mg/kg • ကြေးနီ - 4,300 mg/kg • ခဲ – 840 mg/kg • ပြဒါး – 57 mg/kg • မာလီဒီနမ် – 75 mg/kg • နီကယ် – 420 mg/kg • ဆလီနီယံ – 100 mg/kg	ရှဲ့နှစ်ကို နှစ်စဉ် စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးသွားမည် ဖြစ်ပါသည်။	STC ပတ်ဝန်းကျင် မန်နေဂျာ

စီမံကိန်းလုပ်ငန်း / ပတ်ဝန်းကျင်ရှုထောင့်	စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေး အစီအမံများ	ကြိမ်နှုန်း	တာဝန်ရှိသူ
	• ဘက်တီးရီးယားပါဝင်မှု - 1,000 g • သွပ် - 7,500 mg/kg		
ရေအသုံးပြုမှု	STC သည် ဒေသခံရပ်ရွာလူထုတို့ အသုံးပြုသည့် ကူပြင်ချောင်း သို့မဟုတ် အနီးအနား ရေအရင်းအမြစ်နေရာများမှ ရေကို မယူရန် ကတိကဝတ် ထားရှိပါ သည်။ အကယ်၍ ကူပြင်ချောင်း သို့မဟုတ် အနီးအနားရေအရင်း အမြစ်နေရာများမှ ရေရယူရန်လိုအပ်လာပါက၊ ၎င်းကဲ့ သို့ ရယူမှုမပြုလုပ်မီ၊ STC သည် ကူပြင်ချောင်း နှင့် အနီးအနား ရေအရင်းအမြစ်နေရာများ၏ နှစ်စဉ် နှင့် ရာသီလိုက် ရေစီးဆင်းမှု ပမာဏ နှင့် ရေစီးနှုန်းတို့ကို ဆန်းစစ် ရန် နှင့် ဒေသခံရပ်ရွာလူထုအပေါ် သက် ရောက် နိုင်မှုအပေါ် ထည့် ထွက်ရန် ကတိကဝတ်ပြုပါသည်။	လိုအပ်မှသာ။	STC ပတ်ဝန်းကျင် မန်နေဂျာ

၁.၈ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် ထုတ်ဖော်တင်ပြခြင်း

ယခင် STC ဘိလပ်မြေစက်ရုံ တိုးချဲ့မှုဆိုင်ရာ EIA ၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့်၊ စီမံကိန်း၏ သက်ရောက်မှုရှိစေမည့် နယ်မြေဧရိယာ (AOI) အတွင်းရှိ ကျေးရွာနှစ်ရွာ၌ သွယ်ဝိုက်၍သော်လည်းကောင်း၊တိုက်ရိုက်သော်လည်းကောင်း ထိခိုက်ခံစားရနိုင်သည့်သူများနှင့် တိုင်ပင်ဆွေးနွေးမှုကို ဆောင်ရွက်ခဲ့ပါသည်။ ၎င်း AOI မှာ WHR စီမံကိန်း၏ AOI နှင့် အတူတူပင် ဖြစ်ပါသည်။ တိုင်ပင်ဆွေးနွေးမှုတွင် ဘိလပ်မြေစက်ရုံတိုးချဲ့မှုအပေါ် စိတ်ဝင်တစားဆောင်ရွက် နေကြသည့် အစိုးရမဟုတ်သောအဖွဲ့အစည်းများ (NGOs) နှင့် အရပ်ဖက်လူမှုအဖွဲ့အစည်းများ (CSOs) နှင့် မြန်မာ နိုင်ငံအစိုးရကိုယ်စားလှယ်များလည်း ပါဝင်ခဲ့ကြပါသည်။ ၎င်းတိုင်ပင်ဆွေးနွေးမှုများအတွင်း၊ WHR စီမံကိန်းနှင့် ပတ်သက်သည်များကို သက်ဆိုင်သူများထံ အကြောင်းကြားတင်ပြခဲ့ပြီး၊ သူတို့၏ မှတ်ချက်များကိုလည်း ရယူခဲ့ပါ သည်။

အတိုချုပ်ဆိုရလျှင်၊ ၂၀၁၆ နှင့် ၂၀၁၇ တို့အကြား အောက်ပါ တိုင်ပင်ဆွေးနွေးမှု တို့ကို ဆောင်ရွက်ခဲ့ပါသည် -

- ၂၀၁၆ နိုဝင်ဘာလ နယ်ပယ်အတိုင်းအတာသတ်မှတ်မှုကာလအတွင်း ပြည်ညောင် နှင့် ကူပြင် ကျေးရွာတို့တွင် ကျေးရွာခေါင်းဆောင်များနှင့် တိုင်ပင်ဆွေးနွေးခြင်း။
- ၂၀၁၇ ဇန်နဝါရီလတွင် ပြည်ညောင် နှင့် ကူပြင်ကျေးရွာတို့တွင် ရပ်ရွာအစည်းအဝေးများ။
- ၂၀၁၇ ဇန်နဝါရီလတွင် ပြည်ညောင် နှင့် ကူပြင်ကျေးရွာတို့တွင် အိမ်ထောင်စု ၅၀ ကို စစ်တမ်းကောက်ယူခြင်း။
- ၂၀၁၇ ဇန်နဝါရီလတွင် ပြည်ညောင် နှင့် ကူပြင်ကျေးရွာတို့တွင် အမျိုးသမီးများ နှင့် လယ်သမားများနှင့် အဖွဲ့လိုက်ဆွေးနွေးခြင်း။
- ၂၀၁၇ ဇူလိုင်လ ၁၈ ရက်နေ့တွင် အများပြည်သူဆိုင်ရာဖိုရမ်ကို ရန်ကုန်မြို့ရှိ Novotel ဟိုတယ်၌ အစိုးရ၊ အများပြည်သူ၊ CSO များ၊ စီးပွားရေးလုပ်ငန်းရှင်များ နှင့် အခြားအုပ်စုများ၏ ကိုယ်စားလှယ် ၈၅ ဦးခန့်ဖြင့် ကျင်းပခဲ့ပါသည်။
- ၂၀၁၇ ဇူလိုင်လ ၂၁ ရက်နေ့တွင် ဒေသခံရပ်ရွာလူထုနှင့် သာစည်မြို့နယ်တွင် အစည်းအဝေးကျင်းပခဲ့ပါသည်။ ထို့ပြင်၊
- ၂၀၁၇ ဇူလိုင်လ ၂၂ ရက်နေ့တွင် ဒေသခံရပ်ရွာလူထုနှင့် ပြည်ညောင်ကျေးရွာတွင် အစည်းအဝေး ကျင်းပခဲ့ပါသည်။

သက်ဆိုင်သူများက ဆွေးနွေးမေးမြန်းခဲ့သည့် စိုးရိမ်မှုများကို စီမံကိန်း သက်ရောက်မှုများဆန်းစစ်ရန်နှင့် လျော့ချရေး အစီအမံများကို အဆိုပြုရန်သင့်လျော်သလို ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာတွင် ထည့်သွင်းရေးသားခဲ့ပါသည်။

2. INTRODUCTION

Shwe Taung Cement Company Ltd. (STC) is planning a brownfield expansion of cement production at its existing cement plant in Pyi Nyaung Village, Thazi Township in the Mandalay region of Myanmar. It aims to expand STC's clinker production capacity from 1,500 tonnes per day (tpd) to 5,500 tpd and cement capacity from 2,800 tpd to 7,200 tpd. A separate Environmental Impact Assessment (EIA) Report for the STC Cement Plant Expansion has been submitted to ECD for approval.

Meanwhile, two waste heat recovery (WHR) units, with a total installed capacity of 8.8 MW, are proposed to be installed and used in the expanded cement plant ("the Project").

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

This Project submitted a Project Proposal Report (PPR) to the Environmental Conservation Department (ECD) of Ministry of Environmental Conservation and Natural Resources (MONREC) on 22 February 2019. The ECD responded on 12 April 2019 that the Project falls under the IEE Type. Environmental Resources Management (ERM)-Hong Kong, Limited (ERM) has been commissioned by STC to undertake the IEE Process.

This document is the Initial Environmental Examination (IEE) Report for the Environmental and Social Impact Assessment (ESIA) of the Project and is submitted to the ECD of the MONREC in order to fulfil Myanmar permitting requirements.

2.1 Presentation of the Project Proponent

Contact details for STC are provided below:

Contact Person:
Mr Aung Khaing Nyi
Head of Health, Safety, Social and Environmental Department

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No (94), Building (A), Nat Mauk Road,
Bo Cho Ward, Bahan Township,
Yangon, Myanmar

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Fax: 95-1-8603347
Website: www.apachecement.com
Email: info@schwetaungcement.com

2.2 Presentation of IEE Experts

The environmental and social consultants that conducted the IEE Study are presented in *Table 2.1*: Key Environmental and Social Consultants for the Project

Table 2.1: Key Environmental and Social Consultants for the Project

Name	Organisation	Academic Experience	Years' Experience	Area of Expertise	MONREC Consultation Registration Scheme
Piers Touzel	ERM	MA Business Administration	15	Socio-Economy, Land use	ERM (No. 0016)
Tam Man Cheong (Jovy Tam)	ERM	Mphil Environmental Science	>10	Ecology and Biodiversity, Socio-Economy	ERM (No. 0016)
Myat Mon Swe	ERM	MSc Energy and Environmental Management	>10	Socio-economic. Facilitation of Meeting	ERM (No. 0016)
Stuart Mackenzie	ERM	BSc Environmental Geography	10	Waste Management	ERM (No. 0016)
Man Ping To (Mandy To)	ERM	MSc Environmental Management	20	Noise and Vibration	ERM (No. 0016)
Edmund Taylor	ERM	MSc	5	Air Pollution Control, Modelling for Air Quality	ERM (No. 0016)
Tom Glenwright	ERM	PhD Marine Ecology	16	Water Pollution Control, Modeling for Water Quality, Ground water and Hydrology	ERM (No. 0016)

3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

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

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

3.1 Corporate Environmental and Social Policies

STC is a subsidiary of the Shwe Taung Group (STG) which has been a member of the UN Global Compact since 2013. The Group is committed to the principles of the UN Global Compact and has integrated them into its business strategies and practices, in its Code of Conduct and its various policies, as follows:

- Conflict of Interest Policy;
- Intellectual Property Policy;
- Media Relations and Disclosure Policy;
- Privacy and Confidentiality Policy;
- Sustainability Policy;
- Transparency Policy;
- Whistle Blowing Policy;
- Anti-Corruption Policy;
- Environmental Policy;
- Employees' and Human Rights Policy;
- Safety and Health Policy (and Safety and Health Plan in GTS, Safety and Health Activities in HTC and HTCT);
- Land Acquisition Policy; and
- Grievance and Dispute Resolution.

STC commenced its cement plant project in Pyi Nyaung Village, Thazi Township, in 2010 and began commercial production in 2014, selling its end-product, namely Portland cement, under the brand name "APACHE". The company is committed to focusing on the development of environmentally-friendly technologies, consuming less energy, sustaining resources and reducing pollution. STC is also committed to maintaining a dedicated management team and providing opportunities to enhance technical skills and knowledge of all its employees through ongoing professional training.

STC's policy encompasses a commitment to protect the health and safety of all people working at or visiting STC's cement plant and to comply with all relevant legislation, code of practices and regulations while continuously improving performance and striving for excellence in occupational health, safety and environment.

STC's health and safety goals include:

- Maintaining completely safe and health work environments at the mines and the cement plant;

- Nurturing a positive health and safety culture that includes understanding, awareness and behavior at all staff levels of the company's employees and those of its contractors;
- Yielding zero accident and no injury; and
- Committing to not discharge any employee because of occupational diseases.

STC's strategy to nurture a health and safety culture is based on people-oriented principles and evidenced by:

- Colleagues sharing in decision-making and problem solving processes;
- An atmosphere of trust where people feel comfortable questioning and challenging assumptions, being pro-active and reporting issues; and
- Staff, employers and contractors conducting activities and behaving in such a manner that are conducive to good health and safety.

With regard to the community residing around STC's Project site, STC is committed to contributing to the community health and safety through the implementation of various corporate social responsibility (CSR) programs in education promotion, environment protection, infrastructure improvement, health, natural disaster relief and general social matters, with a financial focus on education facilities and medical support, as well as on the provision of water treatment systems and of electricity. STC has also been providing reconstruction support for post-emergency events such as fire or flooding. Further information on STC's CSR Programme is provided in *Section 9.7*.

3.2 Policy and Legal Framework

3.2.1 Myanmar EIA Procedure

The Myanmar EIA Procedure (dated 29 December 2015) sets out the requirements for development, assessment, and subsequent monitoring of an IEE, EIA and/or EMP. The requirements to conduct an IEE / EIA are outlined in the Environment Conservation Law (2012) and Environment Conservation Rules (2014). The IEE Process undertaken for the Project is shown in *Figure 3.1*.

STC undertook a systematic assessment of the proposed activities. Screening was conducted as part of the assessment to identify all potential environmental risks. A summary of the screening and the preliminary identified environmental and social impacts was submitted to MONREC in the form of a Project Proposal Report. MONREC used this document to decide whether an IEE or an EIA Study would be required. For this Project, an IEE Study was required in line with Annex I of the EIA Procedure.

The subsequent IEE Report (this Report) has been prepared to address potential adverse environmental and social impacts and propose appropriate mitigation measures. The report includes the results of public consultations and addresses public concerns when assessing impacts, designing mitigation measures and selecting monitoring parameters. This IEE Report will be submitted to MONREC for approval.

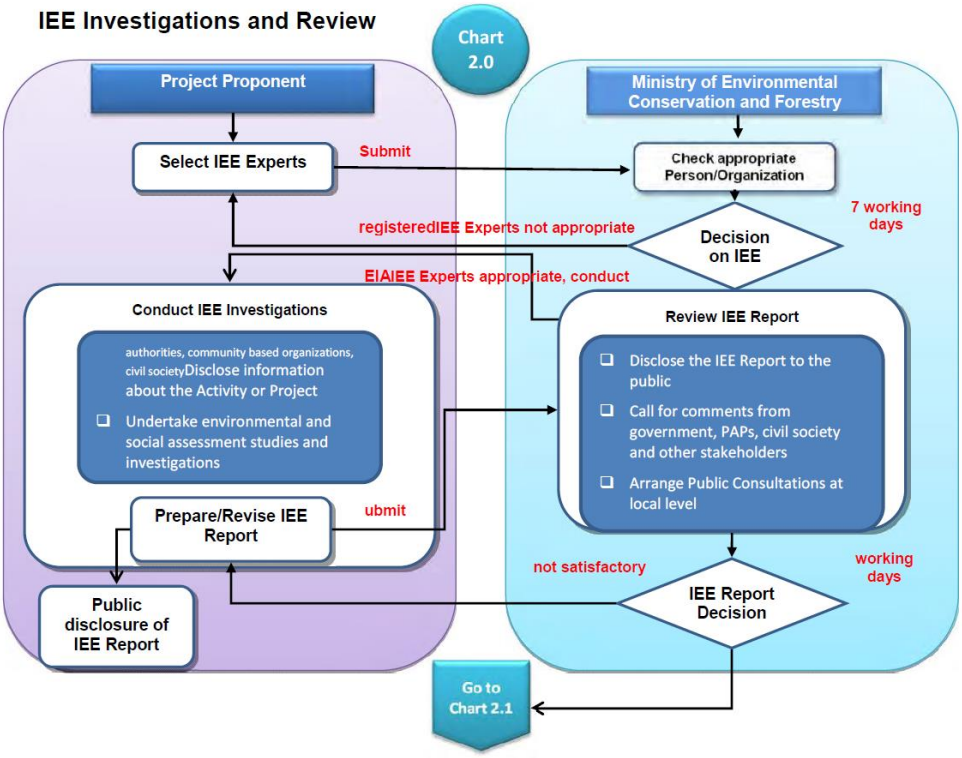

Figure 3.1 EIA Process in Myanmar

3.2.2 Myanmar Legislation Relevant to the Project

Laws relating to environmental and social issues of waste heat recovery project and hence their relevance to the IEE Study are included in *Table 3.1*. STC is committed to comply with these relevant legislation.

3.2.3 International Agreements and Conventions

Relevant international conventions to which Myanmar is a signatory include those related to waste management, biodiversity conservation and labour conventions. The key international conventions of relevance to the Project are included in *Table 3.2*.

Table 3.1 Myanmar Legislation Relating to the Project

Laws and Regulations	Description
Constitution of the Republic of the Union of Myanmar, 2008	
The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. Articles in the Constitution relevant to environmental protection are Articles 37, 45 and 390. They are quoted below:	
Article 37	The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces;
Article 45	The Union shall protect and conserve natural environment.
Article 390	Every citizen has the duty to assist the Union in carrying out the following matters: preservation and safeguarding of cultural heritage; environmental conservation; striving for development of human resources; protection and preservation of public property. These three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment.
The Environmental Conservation Law, 2012	
Section 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;

Laws and Regulations	Description
	(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 biological 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.
Section 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.
Section 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.
Section 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.
Section 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.

Laws and Regulations	Description
Section 29:	No one shall violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law.
The Environmental Conservation Rules, 2014	
The Ministry of Natural Resources and Environmental Conservation, in exercise of power conferred under sub-section (a) of section 42 of the Environmental Conservation Law, issues this rules by No. 50 of 2014 on the date of 5 June, 2014.	
Act 68	For improvement of environmental management, the small scaled private enterprise, factory and workshop which are not included in the categories stipulated in sections 52 and 53 and 62 shall obtain a comment from the Department concerning the environment impacts before applying a permission and a license to the Ministry concerned to construct or operate the business.
Act 69	Any person shall not emit, ask to emit, dispose, ask to dispose, pile and ask to pile, by any means, hazardous waste or hazardous substances stipulated by notification according to any rules in this rules at any place which may affect the public directly or indirectly. Nobody shall carry out any activity which can damage the ecosystem and the natural environment which is affected due to such system, except for the permission of the Ministry for the interests of the people
EIA Procedure (2015)	
The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorisation, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues.	
Section 102	The Project Proponent shall bear full legal and financial responsibility for: a) all of the Project Proponent's actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and b) PAPs until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.
Section 103	The Project Proponent shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.
Section 104	The Project Proponent shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC, applicable Laws, the Rules, this Procedure and standards.
Section 105	The Project Proponent shall timely notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential Adverse Impacts.
Section 106	The Project Proponent shall, during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post-closure), engage in continuous, proactive and comprehensive self-monitoring of the Project and

Laws and Regulations	Description
	activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, standards, the ECC, and the EMP.
Section 107	The Project Proponent shall notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.
Section 108	The Project Proponent shall submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.
Section 109	The monitoring reports shall include: a) documentation of compliance with all conditions; b) progress made to date on implementation of the EMP against the submitted implementation schedule; c) difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties; d) number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation; e) accidents or incidents relating to the occupational and community health and safety, and the environment; and f) monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.
Section 110	Within ten (10) days of completing a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor.
Section 113	For purposes of monitoring and inspection, the Project Proponent: a) shall grant to the Ministry and/or its representatives, at any time during normal working hours, access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed; and b) from time to time as and when the Ministry may reasonably require, shall grant the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed.
Section 115	In the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements, the Project shall grant full and immediate access to the Ministry at any time as may be required by the Ministry.

Laws and Regulations	Description
Section 117	The Project Proponent shall further ensure that the Ministry's rights of access hereunder shall extend to access by the Ministry to the Project's contractors and subcontractors.
National Environmental Quality (Emission) Guidelines (2015)	
The NEQ sets out emission standards for air, noise and effluent discharges for oil and gas operations. The project shall consider emissions standards in its environment impact assessment and environmental management plan.	
The Prevention and Control of Communicable Diseases Law 1995	
Section 3	In order to prevent the outbreak of Communicable Diseases, the Department of Health shall implement the following project activities: (a) immunization of children by injection or orally; (b) immunization of those who have attained majority, by injection or orally, when necessary; (c) carrying out health educative activities relating to Communicable Disease.
Section 4	When a Principal Epidemic Disease or a Notifiable Disease occurs: (a) immunization and other necessary measures shall be undertaken by the Department of Health, in order to control the spread thereof: (b) the public shall abide by the measures undertaken by the Department of Health under subsection (a).
Section 8	For prevention of the outbreak of Communicable Disease and effective control of Communicable Disease when it occurs, the public shall, under the supervision an guidance of the Health Officer of the relevant area, undertake the responsibility carrying out the following environmental sanitation measures: (a) in-door, out-door sanitation or inside the fence, outside the fence sanitation; (b) well, ponds and drainage sanitation; (c) proper disposal of refuse and destruction there of by fire: (d) construction and use of sanitary latrines; (e) Other necessary environmenta1 sanitation measures.
Section 9	The head of the household or any member of the household shall report immediately to the nearest health department or hospital when any of the following events occurs: (a) rat fall (b) outbreak of a Principal Epidemic Disease; (c) outbreak of a Notifiable Disease
Section 11	In order to prevent and control the spread of a Principal Epidemic Disease, the Health Officer may undertake the following measures: (a) investigation of a patient or any other person required: (b) medical examination; (c) causing laboratory investigation of stool, urine, sputum and blood samples to he carried out: (d) causing investigation by injection to he carried out; (e) carrying out other necessary investigations.
The Protection and Prevention of Antique Object Law, 2015	
Section 3	The objectives of this law are as follows:

Laws and Regulations	Description
	(a) to implement the policy of protection and preservation for the perpetuation of antique objects; (b) to protect and preserve antique objects so as not to deteriorate due to natural disaster or man-made destruction; (c) to uplift hereditary pride and to cause dynamism of patriotic spirit by protection and preservation of antique objects; (d) to have public awareness of the high value of antique objects; (e) to carry out in respect of protection and preservation of antique objects in conformity with the International Convention and Regional Agreement ratified by the State.
Section 12	The person who finds any object which has no owner or custodian, he shall promptly inform the relevant Ward or Village-Tract Administrator if he knows or it seems reasonable to assume that the said object is an antique object.
The Factories Act , 1951 (Amended in 1953, 1954, 1962, 2016)	
This act contains the provisions for chemicals management and storage. Some chemicals are likely to require permits. It also requires all factories to have proper pollution control measures such as air pollution, sewage and wastewater treatment system. The Project Proponent must surely acknowledge all the prescriptions and ensure to be free from any hazards and take necessary care regarding for occupational health and safety.	
The Occupational Health and Safety Law (Pyidaungsu Hluttaw Law no.8/2019)	
8 (a), 9(a,b)	• Anyone who wishes to begin establishing a business in any of the industries to which this Law applies shall apply for Permission, for the purposes of safety and health, to the Department in accordance with the prescribed requirements. • Anyone who wishes to construct a new building, extend or demolish an existing building, in accordance with the process therein, arrange machines according to the layout, to install, extend, or modify any machines in any industries to which this Law applies, shall apply to the Department for prior approval with respect to occupational safety and health.
The Conservation of Water Resources and Rivers Law, 2006	
No. 8	No person shall: (a) carry out any act or channel shifting with the aim to ruin the water resources and rivers and creeks. (b) cause the wastage of water resources wilfully.
9	No person shall destroy, cause damage or cause collision of vessel with the river training structure either wholly or partly.
11	dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk. catch aquatic creatures within river-creek boundary, bank boundary or waterfront boundary with poisonous materials or explosives.
12	No person shall carry out growing of garden, digging, filling, silt trapping, closing pond, dyke building or erecting spur in the river-creek boundary, bank boundary and waterfront boundary without the permission of the relevant government department and organization.

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13	No person shall carry out sand suction, sand dredging, sand excavating, river shingle suction, panning for gold, gold mineral dredging or resource production for commercial purpose in the river-creek boundary, bank boundary and waterfront boundary without the recommendation of the Directorate.
19	No one shall dispose of any substance into the river-creek that may cause damage to waterway or change of watercourse from the bank or vessel which is plying, vessel which has berthed, anchored, stranded or sunk.
21	No one shall: build lavatories unsuitable to the urban and rural community lifestyle in the bank area and watercourse area. drill well or pond or dig earth without the permission of the Directorate.
22	No one shall, without the permission of the Directorate, pile sand, shingle and other heavy materials for business purposes in the bank area and waterfront area.
24(b)	No one shall: (b) violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks.
30	Any government department and organization or any person desirous of constructing drainage, utilizing river water intake, constructing bridges spanning rivers, connecting underground pipe, connecting underground electric power cable, connecting underground telecom cable or digging in rivers and creeks, bank boundary and waterfront boundary, under the requirement of work, shall in order not to adversely affect the water resources and rivers and creeks, carry out only after obtaining the approval of the Ministry of Transport.
The Forest Law (2018) The Forest Law is enacted by Pyihtaungsu Hluttaw in September, 2018. It empowers, to declare for the reserved forest for the maintaining a sustained yield of the forest produce, to manage the forest land.	
Section 12	(a) mentioned that it needs prior approval from the Ministry if desirous to implement the development work or economic project within a forest land and forest covered land. (c) Whoever desirous to undertake as in sub-section (a), has to comply the Environmental Conservation Law and the stipulations from respective Laws.
The Protection of Biodiversity and Protected Area Law (2018)	
Section 3	There it described its objectives as: (a) To implement the National Biodiversity Strategy and policy; (d)To control the trade of production of wildlife and wildplants; (e)To protect the areas which are significant in geological conditions, the habits of endangered wildlifes and wildplants.
Section 40	There it is mentioned the penalties up to five years imprisoment and fines three hundred thousands kyats in any or both for finding guilty in breaching the undermentioned prohibitions. (a)Hunting or selling the partially protected wildlifes, storing, carriage or transferring part of its without permission; (b)Collecting, Extracting and Destroying in any ways the protected wildplants without permission

Laws and Regulations	Description
	(d)The altering, transferring, destroying or deforming in any ways to the marks for Protected Areas, Zoological Gardens or Botanical being involved in financing by Government without permission.
Section 41	There it mentioned the penalties to three years and up to ten years imprisonment for finding guilty in breaching (a) Hunting or selling the fully protected wildlifes, storing, carriage or transferring part of its without permission; (c) The exporting, sub-exporting, importing the animals and plants which are protected and control in international trade without recommendation issued according to section 23, sub-section (a) and (b)

National Sustainable Development Strategy (2009)

Sustainable management of natural resources in Myanmar, from environmental perspective comprises 11 areas, in which mining sector development concerned are as follow:
Sustainable forest resources management;
Biodiversity conservation;
Sustainable fresh water resources management ;
Environmental quality management and enhancement;
Sustainable management of land resources;
Sustainable management for mineral resources utilization;
Sustainable energy production and consumption; and
Sustainable industrial, transport and communication development.

National Environmental Policy (1994)

Under this policy, the main environmental body was the NCEA. Prior to the establishment of MONREC, environmental conservation was undertaken by various ministries and departments. In 1990, the NCEA was established to advise the government on environmental policy, to act as a focal point and as a coordinating body for environmental affairs and to promote environmentally sound and sustainable development. The NCEA's main mission is to ensure sustainable use of environmental resources and to promote environmentally sound practices in industry and other economic activities, objectives and mandates.

Public Health Law, 1972

Purpose: to ensure the public health include not only employees but also resident people and cooperation with the authorized person or organization of health department. It is concerned with the protection of peoples' health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics. The project owner will cooperate with the authorized person or organization in line with the section 3(1), 4 and 5 of said law.
Section 3: There mentioned that the Government can undertake advising, inspection, maintaining, prohibiting the activities including the environmental health for the purpose of protection of public health, for better improvement of public health no matter what had been prescribed in any act and rules.
The clause (1) of section (3) specifies for the activities of environmental health as:
The collection and disposing wastes, rubbishes from the public area.
The protection of drinking water quality for the public in accordance with the international standard.
The protection of air pollution around public area from hazardous emissions, odors, particulates, noise and radiation.
The undertaking for healthy and cleanness for the buildings or places where public utilize and for the purposes of civils development, housing.
The project owner will abide by any instruction or stipulation for public health.
Section 4: Prescribed as that the Government has the right to organize and empowered to any department, organization under Government to undertake any activity in accordance with this law.

Laws and Regulations	Description
Section 5: There mentioned to inspect in any time at the factories, business, shops, premises, places, buildings for the purposes of public health.	
Myanmar Investment Law, 2016	
Act 50(d)	The investor shall register the land lease contract at the Office of Registry of Deeds in accordance with the Registration Act.
Act 51	The investor: (a) may appoint of any citizen who is a qualified person as senior manager, technical and operational expert, and advisor in his investment within the Union in accordance with the Laws; (b) shall appoint them to replace, after providing for capacity building programs in order to be able to appoint citizens to different level positions of management, technical and operational experts, and advisors; (c) shall appoint only citizens for works which does not require skill; (d) shall appoint skilled citizen and foreign workers, technicians, and staff by signing an employment contract between employer and employee in accordance with the labor laws and rules; (e) shall ensure to obtain the entitlements and rights in the labor laws and rules, including minimum wages and salary, leave, holiday, overtime fee, damages, compensation of the workman, social welfare, and other insurance relating to workers in stipulating the rights and duties of employers and employees and occupational terms and conditions in the employment contract; (f) shall settle disputes arising among employers, among workers, between employers and workers, and technicians or staff in the investment in accordance with the applicable laws.
Act65	It is prescribed that the investor: (e) shall immediately inform to the Commission if it is found that natural mineral resources or antique objects and treasure trove are not related to the investment permitted above and under the land on which the investor is entitled to lease or use and not included in the original contracts. If the Commission allows, the investor shall continue to carry out the investment in such land, and if not allowed, the investor shall transfer and carry out, by obtaining the permission, at the substituted place which is selected and submitted by him; (f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or to use, without the approval of the Commission; (g) shall abide by applicable laws, rules, procedures and best standards practiced internationally for this investment so as not to cause damage, pollution, and loss to the natural and social environment and not to cause damage to cultural heritage; (h) shall list and keep proper records of books of account and annual financial statement, and necessary financial matters relating to the investments performed by permit or endorsement in accordance with internationally and locally recognized accounting standards; (i) shall close and discontinue the investment only after payment of compensation to employees in accordance with applicable laws for any breach of employment contracts, closure of investment, sale and transfer of investment, discontinuation of investment, or reduction of workforce; (j) shall pay wages and salaries to employees in accordance with

Laws and Regulations	Description
	applicable laws, rules, procedures, directives and so forth during the period of suspension of investment for a credible reason; (k) shall pay compensation and indemnification in accordance with applicable laws to the relevant employee or his successor for injury, disability, disease and death due to the work; (l) shall supervise foreign experts, supervisors and their families, who employ in their investment, to abide by the applicable laws, rules, orders and directives, and the culture and traditions of Myanmar; (m) shall respect and comply with the labor laws; (o) shall pay effective compensation for loss incurred to the victim, if there are damage to the natural environment and socioeconomic losses caused by logging or extraction of natural resources which are not related to the scope of the permissible investment, except from carrying out the activities required to conduct investment in a permit or an endorsement. (p) shall allow the Commission to inspect in any places, when the Commission informs the prior notice to inspect the investment; (q) shall take in advance permit or endorsement of the Commission for the investments which need to obtain prior approval under the Environmental Conservation Law and the procedures of environmental impact assessment, before undertaking the assessment, and shall submit the situation of environmental and social impact assessment to the Commission along the period of activities of the investments which obtained permit or endorsement of the Commission.
Act 73	The investor shall insure the types of insurance stipulated in the provision of the rules at any insurance enterprise which is entitled to carry out insurance businesses within the Union.
The Labour Organization Law 2011	
Section 17 to 22	17. The labour organizations shall have the right to carry out freely in drawing up their constitution and rules, in electing their representatives, in organizing their administration and activities or in formulating their programmes. The Labour Organizations have the right to negotiate and settle with the employer if the workers are unable to obtain and enjoy the rights of the workers contained in the labour laws and to submit demands to the employer and claim in accord with the relevant law if the agreement cannot be reached. 18. The labour organization has the right to demand the relevant employer to re-appoint a worker if such worker is dismissed by the employer and if there is cause to believe that the reasons of such dismissal were based on labour organization membership or activities, or were not in conformity with the labour laws. 19. The labour organizations have the right to send representatives to the Conciliation Body in settling a dispute between the employer and the worker. Similarly, they have the right to send representatives to the Conciliation Tribunals formed with the representatives from the various levels of labour organizations. 20. In discussing with the Government, the employer and the complaining workers in respect of worker's rights or interests contained in the labour laws, the representatives of the labour organization also have the right to participate and discuss. 21. The labour organizations have the right to participate in solving the collective bargains of the workers in accord with the labour laws.

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	22. The labour organizations shall carry out peacefully in carrying out holding of meetings, going on strike and carrying out other collective activities in accord with their procedure, regulations, by-laws and any directives prescribed by the relevant Labour Federation.
Myanmar Investment Rules, Notification No. 35 / 2017 by Ministry of Planning and Finance	
Section 202	The Investor must comply with the conditions of the Permit and other applicable laws when making an Investment.
Section 203	The Investor shall fully assist while negotiating with the Authority for settling the grievances of the local community that have been effected due to Investments.
Section 206	If the Investor is desirous to appoint a foreigner as senior management, technician expert or consultant according to section 51 (a) of the Law, it shall submit such foreigner's passport, expertise evidence or degree and profile to the Commission Office for approval.
The Settlement of Labour Dispute Law 2012	
Section 38	No employer shall fail to negotiate and coordinate in respect of the complaint within the prescribed period without sufficient cause.
Section 39	No employer shall alter the conditions of service relating to workers concerned in such dispute at the consecutive period before commencing the dispute within the period under investigation of the dispute before the Arbitration Body or Tribunal, to affect the interest of such workers immediately.
Section 40	No party shall proceed to lock-out or strike without accepting negotiation, conciliation and arbitration by Arbitration Body in accord with this law in respect of a dispute.
Section 51	If any employer, in the course of settlement of dispute, commits any act or omission, without sufficient cause, which by causing a reduction in production resulting so as to reduce the workers' benefits shall be liable to pay full compensation in the amount determined by the Arbitration Body or Tribunal. Such money shall be recovered as the arrear of land revenue.
The Leaves and Holidays Act 1951	
Under the Leave and Holidays Act (1951), every employee shall be granted paid public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year, depending on the date of the variable holidays. Myanmar law recognizes various types of leave. Leave is governed by the Leave and Holidays Act (1951), but additional rules may apply in accordance with other laws, such as the Social Security Law (2012) for employees contributing to the Social Security Fund.	
Section 4	Every employee who has completed a period of twelve months continuous service shall be granted earned leave with average wages or average pay for a period of ten consecutive days by his employer during the subsequent period of twelve months.
The Minimum Wage Law, 2013	
Section 12	The employer: (a) shall not pay wage to the worker less than the minimum wage stipulated under this Law; (b) may pay more than the minimum wage stipulated under this Law;

Laws and Regulations	Description
	(c) shall not have the right to deduct any other wage except the wage for which it has the right to deduct as stipulated in the notification issued under this Law; (d) shall pay the minimum wage to the workers working in the commercial, production and service business in cash. Moreover, if the specific benefits, interests or opportunities are to be paid, it may be paid in cash or partly in cash and partly in property, with prevailing regional price, jointly according to the desire of the worker; (e) in paying minimum wage to the workers working in the agricultural and livestock business, some cash and some property at prevailing regional price may be paid jointly according to local custom or desire of the majority of workers or collective agreement. Such payment shall be for any personal use and benefit of the worker and his family and the value shall also be considerable and fair.
Section 13(a) to (g)	The employer: (a) shall inform the workers the rates of minimum wage relating to the business among the rates of minimum wage stipulated under this Law and advertise it at the workplace to enable to be seen by the relevant workers; (b) shall prepare and maintain the lists, schedules, documents and wages of the workers correctly; (c) shall report the lists, schedules and documents prepared and maintained under subsection(b) to the relevant department in accord with the stipulations; (d) shall accept the inspection when summoned by the inspection officer. Moreover, he shall produce the said lists and documents upon asking to submit; (e) shall allow the entry and inspection of the inspection officer to the commercial, production and service businesses, agricultural and livestock breeding workplaces and give necessary assistances; (f) if the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations; (g) if the funeral matter of the member of the family of worker or his parent occurs, shall give holiday without deducting from the minimum wage, in accord with the stipulations.
The Payment of Wages Act 2016	
Section 3	The employer must… (a) Pay in local currency or foreign currency recognized by the Central Bank of Myanmar. This may be in cash, check or deposit into the bank account of Employee. (b) Moreover, pay can be in the means of… (1) Totally in cash OR half the cash and half in things set according to the local price to those employees working in trade, manufacturing and service sectors. (2) Totally in cash OR half the cash and half in things set as local price according to local traditions or common agreement to those working in agriculture and livestock sectors. But, this must be for the sake of the employees and their families. And, it also must be reasonable/fair. (3) An employee shall receive the payment for 60 days when he/she is in Alternative Civil Service.
Section 4	An employer must pay for…

Laws and Regulations	Description
	(a) Part-time, daily, weekly or other part-time job, temporary or piecework when the work is done OR at the agreed time. (b) According to the Article (a), the time frame shall not exceed one month. (c) Wages for the permanent work must pay per monthly basis. If so… (1) Must pay at the end of the payment period when there are not more than 100 workers. (2) If there are 100 workers and above, pay must not be administered later than 5 days after the end of the payment period. (d) Upon termination, wages must be paid within 2 days from the date of termination. (e) If a resignation letter is submitted, wages must be paid at the ending day of the payment period. (f) If an employee dies, wages must be paid to the legally recognized heir within 2 working days after the day he/she has died. (g) All wages must be paid during the working day.
Section 5	If the owner encounters difficulty to pay the wages according to Section 4 sub-section (c) because of significant happenings, including natural disaster, the employer must report to the Department with solid evidence that wages will be paid at the mentioned day upon the workers' agreement.
Section 7	The Employer… (a) Can deduct from wages for absences except when such absence is during a public holiday or entitled leave, according to the law. (b) Accommodation charges and transportation charges, meal allowances, charges for water and electricity, taxes and errors in payment shall be allowed for deduction. (c) Can deduct from pre-issued, expensed and saved (or) contributed amount according to the law upon the employee contract. (d) The Employer can deduct with the judgment of the Court of Arbitrator Jury Council.
Section 8	The Employer cannot deduct except the deduction in accordance with Section 7 and Section 11.
Section 9	The total amount of other deductions, except when the employee fails to perform their duties, shall not be more than 50% of the employee's wages.
Section 11	Employers shall fine for the following actions or performance failure by the employees… (a) Direct damage which is either intentional or due to negligence or due to the failure of the employee concerned with company property to take proper care. (b) A breach of the employment contract or breech of any rules for which a fine had been previously set.
Section 12	If a worker… (a) Encounters any one of the following situations, he/she shall ask directly or via a registered Labor Organization or by the in-house Workplace Coordination Committee to the Employer: (1) Any unreasonable deduction from wages (2) Payment which is not made by the due date. (b) If the Employer takes no action, although asked in accordance with Section 12 Sub-Section (a), the Employee can present this to the Inspector within 6

Laws and Regulations	Description
	month from the date of the deduction or from the date of the failure to render payment.
Section 13	(a) The Inspector shall issue a decree after reviewing the case presented in accordance with Section 12 Sub-Section (b). (b) Not only the Employee, but also the Employer, has 30 days to appeal to the Chief of Inspector if they are not satisfied with the order. (c) The Chief of Inspector shall decree after reviewing the appeal applied in accordance with Sub-Section (b). (d) The Chief of Inspector's decision will be the final decision.
Section 14	If an Employee carries out overtime work, he/she must be allowed the presiding overtime rate as set by the Law.
Employment and Skill Development Law 2013	
Section 5	This section described in detail for making contract of employment
Section 14	The skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present. The work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.
Section 30(a)	The employer of the industry and service business shall put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%;
Section 30(b)	Put in money paid under sub - section (a) shall not be deducted from the wage and salary of the employees.
The Social Security Law 2012	
Section 11 (a)	The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board: (i) industries which carry out business whether or not they utilize mechanical power or a certain kind of power, businesses of manufacturing, repairing and servicing, or engineering businesses, factories, warehouses and establishments; (ii) Government departments, Government organizations and regional administrative organizations which carry out business; (iii) development organizations; (iv) financial organizations; (v) companies, associations, organizations, and their subordinate departments and branch offices which carry out business; (vi) shops, commercial establishments, public entertaining establishments; (vii) Government departments and Government organizations which carry out business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body; (viii) constructions carried out for a period of one year and above under employment agreement; (ix) businesses carried out with foreign investment or citizen investment or joint ventured businesses; (x) businesses relating to mining and gem contained in any existing law;

Laws and Regulations	Description
	(xi) businesses relating to petroleum and natural gas contained in any existing law; (xii) ports and out-ports contained in any existing law; (xiii) businesses and organizations carried out with freight handling workers; (xiv) Ministry of Labour and its subordinate departments and organizations; (xv) establishments determined by the Ministry of Labour, from time to time, that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law in co-ordination with the Social Security Board and with the approval of the Union Government;
Section 15 (a)	The following funds are included in the Social Security Fund: (i) health and social care fund; (ii) family assistance fund; (iii) invalidity benefit, superannuation benefit, and survivors' benefit fund; (iv) unemployment benefit fund; (v) other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of Labour, in co-ordination with the Social Security Board, under clause (ii) of sub-section (e) of section 13; (vi) other social security fund stipulated that contribution may be paid after voluntary registration under clause (ii) of sub-section (e) of section 13; (vii) Social Security Housing Plan fund;
Section 18 (b)	The employer shall deduct contributions to be paid by worker from his wages together with contribution to be paid by him and pay to the social security fund. The employer shall also incur the expense for such contribution;
Section 48	(a) The employer shall effect insurance by registering at the relevant township social security office in order to get employment injury benefit by the workers applied to provisions of compulsory registration for employment injury benefit insurance system contained in section 45 and by paying contribution to employment injury benefit fund in accord with the stipulations; (b) The employers may effect insurance by registering voluntarily for the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system and by paying stipulated contribution to employment injury benefit insurance fund; When registering to effect insurance for employment injury benefit under sub-sections (a) and (b), the worker shall submit medical certificate.
Section 49	The employers and insured of establishments where the employer had registered compulsorily under sub-section (a) of section 48 or where the employer had registered voluntarily under sub-section (b) of section 48 who have paid contribution to employment injury benefit fund shall not apply to the provisions contained in the Workmen's Compensation Act in respect of the employment injury benefit; (b) The insured who has effected insurance for employment injury benefit under sub-sections (a) and (b) of section 48 shall only be entitled to employment injury benefits contained in this Law.
Section 75	The employers of establishments applied by this Law: (a) shall prepare and keep the following records and lists correctly and submit to the relevant township social security office in accord with the stipulations: (i) records and lists of workers' daily attendance; (ii) records on appointment of new workers, employing worker by changing of work, termination, dismissal and resignation;

Laws and Regulations	Description
	(iii) records on promotion and paying remuneration ; (iv) records and lists of employer, manager, and administrator and records on change of them; (b) shall inform the relevant township social security office if the following matters arise: (i) changes in number of workers and address of establishment; (ii) change of employer, change of business, suspension of work, and close-down of work; (iii) employment injury, decease and contracting diseases; (c) shall submit records of work and lists if requested by inspectorate or official assigned by the Social Security Head Office and various levels of Regional Social Security Office under this Law.
Law protecting Ethnic Right, 2015	
This is for the Equal right between the Ethnics living in Myanmar. It enacted that if an ethnic loose the right, he can complain to the Regional or State Government to get the equal chance and find the equal right. Clause 5 of Chapter IV provides that project matters shall be informed, coordinated and undertaken in consultation with ethnic groups if projects are in areas with ethnic groups. The Succeeding laws to protect the right of Myanmar national similar in nature to this are: ***Monogamy Law (2015):*** Concerning all those who are living in Myanmar, Myanmar Citizens who live outside of Myanmar, and foreigners who marry Myanmar citizens while living in Myanmar for preventing misconducting marriages. ***Buddhist Women Special Marriage Law (2015):*** Concerning the marriage between Buddhist Woman and other religious man. There prescribed the legal procedure, the conditions to be complied by non-Buddhist husband, the customs for dividing property when divorcing. ***Religious Conversion Law (2015):*** This is enacted for the freedom to convert from one religion to another, or a person without a religion has the freedom to convert to a religion. There prohibited to apply for a religious conversion with an intent to insult, disrespect, destroy, or abuse a religion. **Population Control Healthcare Law (2015);** This is for alleviate poverty, provide adequate quality healthcare, and ensure that family planning improves maternal and child health in the country. This Empowers region or state government that concerned with the special zone for healthcare to form region or state population control healthcare group to implementing the task as per the directives of the Ministry and region or state government and the Union Territory Governing body.	
Control of smoking and consumption of Tobacco product law 2006	
Section 9	The person-in-charge shall: (a) Keep the caption and mark referring that it is a non-smoking area at the place mentioned in section 6 in accordance with the stipulations. (b) Arrange the specific place where smoking is allowed as mentioned in section 7, and keep the caption and mark also referring that it is a specific place where smoking is allowed, in accordance with the stipulations. (c) Supervise and carry out measures so that no one shall smoke at the non-smoking area. (d) Accept the inspection when the supervisory body comes to the place for which he is responsible.
The Protection and Preservation of Ancient Monuments Law 2015	
Section 12	If a person who finds an ancient monument of over one hundred years old and above or under the ground or above or under the water which has no owner or custodian knows or it seems reasonable to assume that the said monument is an ancient monument, he shall promptly inform the relevant Ward or Village-Tract Administrative Office.

Laws and Regulations	Description
Section 15	A person desirous of any of the followings within the specified area of an ancient monument shall apply to get prior permission to the Department: (a) extending towns, wards and villages; (b) constructing or extending or repairing new buildings including hotels, factories and residential buildings or fencing or extending a fence; (c) digging to search petroleum, natural gas, gem or mineral, piping petroleum and natural gas, constructing factories, connecting national grid, constructing communication tower, constructing or extending infrastructures such as road, bridge, airfield, irrigation and embankment; (d) connecting underground electric cable, communication cable and other underground works; (e) digging or extending wells, lakes, cannels and ponds; (f) gold sieving, digging, burning bricks, digging well, lake, creek, ditch, gully, pit digging, refilling, levelling, mining, quarry, gravel digging and unearth sand, removing the mounds and hills which can damage the physical feature of the land (g) placing and fencing ancient monuments in a private compound and area; (h) constructing a building which is not consistent with the terms and conditions stipulated according to the region by the Ministry near and at the surrounding of an ancient monument.
Section 20	No one shall carry out any of the following acts which is assumed to cause damage to an ancient monument within the specified area of an ancient monument or of a listed ancient monument without a written prior permission: (a) taking photo, video, film or copying and modeling an ancient monument stipulated as a listed ancient monument for commercial purposes; (b) using machines which causes vibration within the specified place of an ancient monument and running various types of vehicles (c) cultivating, gardening, breeding, fencing by blocking nearby an ancient monument or doing any other act which can affect an ancient monument; (d) emission of gas such as hot-air balloon which can affect an ancient monument; (e) landing and taking off and, flying aeroplane and helicopter which can directly or indirectly affect an ancient monument (f) discarding chemical substance and rubbish which can affect an ancient monument and the environment.
The Protection and Preservation of Cultural Heritage Regions Law, 1998	
The State Peace and Development Council Law enacted this law by Law No. 9/ 98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones / region: a) Ancient monumental zone; b) Ancient site zone.	
Section 13	A person desirous of carrying out one of the following shall abide by the provisions of other existing laws and also apply to the Department in accordance with stipulations to obtain prior permission under this Law (a) within the ancient monumental zone or the ancient site zone:- (1) constructing or extending a building; (2) renovating the ancient monument or extending the boundary of its enclosure;

Laws and Regulations	Description
	(b) within the protected and preserved zone, constructing, extending, renovating a hotel, motel, guest house, lodging house or industrial building or extending the boundary of its enclosure; (c) within the cultural heritage region:- (1) carrying out the renovation and maintenance work of the ancient monument without altering the original ancient form and structure or original ancient workmanship; (2) carrying out archaeological excavations; (3) building road, constructing bridge, irrigation canal and embankment or extending the same.
Section 16	The Department of Archaeology:- (a) may, after scrutinizing in accordance with the stipulations the application submitted under section 15, grant or refuse permission; (b) shall, when permission is granted under section (a), issue the permit to the applicant together with the conditions to be observed.
Section 18	No person shall, without prior permission granted under this law, construct, extend, renovate a building or extend the boundary of its enclosure in the ancient monumental zone or ancient site zone.
Section 22	No person shall construct a building which is not in conformity with the conditions prescribed region wise by the Ministry of Culture in the cultural heritage region.
The Myanmar Insurance Law 1993	
Section 15	Owners of motor vehicles shall effect compulsory Third Party Liability Insurance with the Myanmar Insurance.
Section 16	An entrepreneur or an organization operating an enterprise which may cause loss to State-owned property or which may cause damage to the life and property of the public or which may cause pollution to the environment shall effect compulsory General Liability Insurance with the Myanmar Insurance.
Myanmar Engineering council 2013	
Section 20	If the holder of a technological degree or technological diploma, conferred by any engineering university, any technological university, any technological college or any technological institute within the country or abroad, wishes to obtain a registered graduate technologist certificate or a registered technician certificate, he shall apply to the council in accordance with the stipulations.
Section 24	(a) A registered technician certificate holder may apply to the council in accordance with the stipulations to obtain a registered graduate technologist certificate upon the specified period having elapsed; (b) The executive committee shall, on behalf of the council, issue a registered graduate technologist certificate to a registered technician who has passed the examination held by the council in the respective specialized engineering subject and who meets the specified qualifications of a registered graduate technologist, and fix the terms and conditions of the registration.

Laws and Regulations	Description
Section 25	(a) A registered graduate technologist certificate holder may apply to the council in accordance with the stipulations to obtain a registered engineer certificate upon the specified period having elapsed. (b) The executive committee shall, on behalf of the council, issue a registered engineer certificate to a registered graduate technologist who has passed the examination held by the council in the respective specialized engineering subject and who meets the specified qualifications of a registered engineer, and fix the terms and conditions of the registration.
Section 31(a)(b)	(a) If a foreign engineer who meets the requirements applies to the council for issuance of a registered limited engineer certificate, the executive committee shall, on behalf of the council, fix the permitted engineering subjects, the permitted status, the permitted region, the permitted time and other terms and conditions and issue, upon payment of the registration fee and the annual fees, the registered limited engineer certificate. (b) If a foreign registered professional engineer who meets the requirements in accordance with the ASEAN Mutual Recognition Arrangement on Engineering Services applies to the council for issuance of a registered limited professional engineer certificate, the executive committee shall, on behalf of the council, fix the permitted engineering subjects, the permitted status, the permitted region, the permitted time and other terms and conditions and issue, upon payment of the registration fee and the annual fees, a registered limited professional engineer certificate.
Section 37	No one shall perform any engineering work and technological work which are specified as being dangerous to the public by a rule enacted under this law without having received a registration certificate issued by the council, except for engineers appointed in a government department or an organization in the performance of their duties.
Myanmar Fire Service Law, 2015	
N0. 25	No person shall fail to abide by the directives in respect of fire precaution and prevention issued under section 17 by the Township Fire Services Department.
Prevention from Danger of Hazardous Chemical and Associated Material Law (Pyidaungsu Hluttaw Law No 28/2013)	
Section 8	The duty and powers of the central supervising team are as follows: (a) Supervising and directing whether the chemical and associated materials produced by the chemical and associated materials business are in compliance with the standard norm or not; (b) Forming and specifying the duty and responsibility of the supervising teams of the region, the state, the union territory, self - administered division, self - administered region, district or township, with the consent of central body; (c) Specifying safety rules and regulations in connection with the chemical and associated materials businesses; (d) Advising the central body the names of the chemical and associated materials which should be amended or supplemented or abolished from the list of the national level chemical and associated materials; (e) Carrying out the educating work in the permitted and used chemical and associated materials for transporting, keeping, buying, distributing, selling, storing, using and disposing systematically;

Laws and Regulations	Description
	(f) Attending local and foreign trainings for keeping and using the safety devices and personal protective equipment systemically, in order to prevent and alleviate occurring of accidents with respect to chemical and associated materials; (g) Specifying rules and regulations relating to the transporting, storing, using and disposing methods for the chemical and associated materials; (h) Prohibiting the importing and exporting of deterred chemical and associated materials or the equipment utilized for these materials, in accord with the international agreement; (i) Specifying regulations and inspecting whether the specified regulations are followed or not in connection with the vapor, liquid, oil and solid waste emitted from chemical and associated materials businesses, destroying, dumping, disposing of damaging or expired chemical and associated materials; (j) Issuing or refusing the recommendation for transit trading from the country, importing or exporting the chemical and associated materials; (k) Specifying danger level and danger types of the chemical and associated materials; (l) Specifying the regulation for license and registered certificate; (m) Performing the duty and responsibilities assigned by the central body.
Section 15	Before doing the business for the relevant chemical and associated materials, the license holder: (a) Shall be inspected by the relevant supervising team and inspecting team for the safety and endurance of the equipment; (b) The persons, who are discharging the duty shall be asked to attend the relevant foreign training or for the trainings for prevention from the danger of chemical and the associated materials conducted by the government department and organizations.
Section 16	The license holders: (a) Shall follow the principles contained in the license; (b) Shall follow the directives for safety in handling the chemical and associated materials and shall ask the workers to follow strictly ; (c) Shall keep the necessary safety equipment sufficiently in the chemical and associated materials business and shall issue personal protective equipment and clothing to the workers free of charge; (d) Shall give the course to use personal protective equipment and clothing systematically, to give the training and shall instruct as necessary the chemical and associated materials business; (e) In respect of whether affecting the danger to the health of man and animals, environment or not, shall be examined by the relevant supervising teams and inspection teams; (f) Shall give the medical check - up to the workers who shall do the chemical and associated material business and shall allow to working in the said business if they have the recommendation to fit for the health. Shall keep the records of the medical check - up of them systematically; (g) If the dangerous chemical and associated materials are allowed to store, shall give the copy of the permit to the relevant township general administration department; (h) If the business is prone to the fire hazard using inflammable materials or explosives, the prior consent, directive of the relevant fire service department must be taken;

Laws and Regulations	Description
	(i) Shall transport the allowed amount in accord with the stipulations upon transporting the chemical and the associated materials in the country; (j) Shall get the approval of the central supervising body if the chemical and the associated materials are transported from the permitted region to any other region; (k) Shall follow to abide by the law relating to the environment in order not to impact the environment in doing the chemical and the associated materials business.
Section 17	The license holder shall keep the insurance in accord with the stipulations to pay for the compensation if any loss occurred to man and animals or environment in respect of the chemical and associated materials business.
Section 20	License holder shall apply to the central supervising body in accord with the stipulation for the relevant chemicals and associated materials using for his chemicals and associated materials business.
Section 22	The registered certificate holder shall abide by the regulations contained in the registered certificate and shall follow the order and directives issued from time to time by the central supervising body.
Section 23	The registered certificate holder: (a) Shall apply again to the central supervising body to register if he wants to use the chemical in the associated materials which are not contained in the registered list; (b) Shall inform to the central supervising body if he does not want to use the chemical in the associated materials which are contained in the registered list.
Section 27	The license holders shall follow the stipulations of the following items to control, prevent and alleviate the danger relating to the chemical and associated materials: (a) To classify the danger level according to the properties of the chemical and associated materials so as to prevent the danger in advance; (b) To reveal the danger warning sign and safety level certificate; (c) To attend the training for keeping the personal protective equipment and using them systematically to prevent and elevate accident; (d) To carry out in accord with the stipulations in connection with transporting, keeping, storing, using and disposing the chemical and associated materials; (e) Importing or exporting the chemical and associated materials which are prohibited by the central supervising team, the equipment which are used inside the said materials.
The Private Industrial Enterprise Law 1990	
Section 4	(a) Any person desirous of conducting any private industrial enterprise; (b) Any person conducting any private industrial enterprise on the day this Law is enacted; by using any type of power which is three horsepower and above or manpower of ten wage-earning workers and above shall register under this Law.
Section 13	The duties of the entrepreneur are as follows:- (b) shall abide by the terms and conditions of the registration certificate;

Laws and Regulations	Description
	(c) shall conduct the enterprise by opening an account with the relevant bank in the name of its registered enterprise; (d) shall maintain systematically and fully as prescribed by the Directorate, the statement of accounts relating to the registered private industrial enterprise and shall submit the same to the relevant Government department, organization or Supervisory Body when required to do so; (g) shall abide by the orders and directives issued from time to time by the Ministry and the Directorate;
Section 15	The entrepreneur has the right to carry out the followings:- (a) appointing foreign exports and technicians with the approval of the Ministry; (b) carrying out change of the name of enterprise, transfer of ownership, temporary suspension or permanent closing down of the enterprise in the manner prescribed and with the approval of the Directorate.
Myanmar Agenda 21 (1997)	
The Myanmar Agenda 21 makes recommendations for the drafting and promulgation of a framework law which can further promote the integration of environmental and developmental concerns in the decision-making processes of the country. The Myanmar Agenda 21 contains guidelines to address the following issues: increasing energy and material efficiency in production processes; reducing wastes from production and promoting recycling; promoting use of new and renewable sources of energy; using environmentally sound technologies for sustainable production; reducing wasteful consumption; increasing awareness for sustainable consumption.	
The Import and Export Law, 2012	
7. A person who obtained any license shall not violate the conditions contained in the license.	
The Workmen Compensation Act, 1923 (amended 2005)	
The Workmen's compensation act had been promulgated in 1923, amended in 2005, to provide for the payment by certain classes of employers to their workmen of compensation for injury by accident. There it clearly described for the liability for compensation of employer's, amount of compensation, compensation to be paid when due and penalty for default, method of calculating wages, review, commutation of half-monthly payments, payment of a lump sum amount, distribution of compensation, compensation not to be assigned, attached or charged, notice and claim, power to require from employers statements regarding fatal accidents, reports of fatal accidents and serious bodily injuries, medical examination, contracting, remedies of employer against stranger, compensation to be first charge on assets transferred by employer, special provisions relating to masters and seamen. The amendment law is for revising the monetary amount to update.	
Fresh Water Fisheries Law, 1991	
Section 36	No one shall erect, construct place, maintain or we any obstruction such as a dam, bank or weir in a freshwater fisheries waters without the permission of the Department.
Section 40	No one shall cause harassment of fish and other aquatic organisms or pollution of the water in a freshwater fisheries water.
Section 41	No one shall alter the quality of water, volume of water or the water -course in a leasable fishery, reserved fishery and creeks contiguous thereto or in water-courses.

Laws and Regulations	Description
Combating AIDS Act, 1995 , THE PREVENTION AND CONTROL OF HIV AND AIDS ACT, 2007	
Section 3	Integrate instructions on the causes, modes of transmission, prevention and protection against HIV and AIDS and other sexually transmitted infections in subjects taught in public and private schools at primary, secondary and tertiary levels, including formal and non-formal systems
Section 4	HIV and AIDS education and information dissemination shall form part of the delivery of healthcare services by healthcare providers.
Section 9	Consultation with the relevant registered professional associations of healthcare providers prescribe guidelines
Sectioin10	Any person or institution who, in the course of his professional practice, knowingly or negligently causes another person to be infected with HIV through unsafe or unsanitary practices or procedures contrary to this Act or any prescribed guidelines commits an offence.
The Motor Vehicles Law, 2015	
Chapter I, 2 (v)	Taking actions to conserve the green environment and the reduction in pollution of air, water, land and noises caused by motor vehicles.
The Myanmar Mines Law 1994	
Section 29	The Ministry may with the approval of the Government issue prohibitions In respect purchasing obtaining, storing, possessing, transporting, selling, transferring of any mineral obtained from mineral production.
Mandalay City Development Law, 2002	
Section 8	The Committee shall, in respect of the following functions and duties lay down policy, give guidance, supervise and implement within the City territory:- (h) carrying out environmental conservation works;
Section 24, 25, 26, 27	These section mentioned offences and penalties for violating any rules, regulations, orders and directives issued by Committee.
Mandalay Region Freshwater Fishery Law, 2012	
This is enacted in accordance with the power conferred in accordance with Constitution (2008), This is for purposes of Fishery sector, conserve Fish Species, protect the degrading of fresh water, to obtain taxes for the regional government, to manage and taking action for fishing sector in accordance with rules and regulations.	

Table 3.2 International Conventions relevant to the Project

Legislation	Relevance to the Project	Ratification Status (in Myanmar)
United Nations Framework Convention on Climate Change 1992 (UNFCCC) and Kyoto Protocol 1997	The Project construction will form part of Myanmar's total emissions output. However, it is expected that emissions of the cement plant will be reduced due to operation of the WHR Project.	Entered in force 23rd Feb 1995 (UNFCCC) and 16th Feb 2005 (Kyoto Protocol)
Workmen's Compensation (Accidents) Convention 1925	The Project has risks to occupational health and safety.	Entered in force 16 February 1956

Workmen's Compensation (Occupational Diseases) Convention 1925 and its Revision 1934	The Project has risks to occupational health and safety.	Entered in force 30 Sept 1927; Revision entered in force 17 May 2016

3.2.4 Good International Industry Practice Guidelines

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

- IFC PSs on Environmental and Social Sustainability (2012); and
- World Bank Group (WBG) General Environmental, Health and Safety (EHS) guidelines (2007).

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

The IFC PS represent the 'policy framework' for the ESIA and sustainable social and environmental management for projects [(1)], whereas the World Bank Group's EHS Guidelines provide guidance on general and industry best practice as well as recommended numerical limits for emissions to the atmosphere, noise, liquid and solid wastes, hazardous wastes, health and safety, and other aspects of industrial facilities and other types of development projects. The IFC PSs are summarised in *Table 3.3.*

Table 3.3 IFC Performance Standard [2]

Performance Standards	Objectives
Performance Standard 1 –Assessment and Management of Environmental and Social Risks and Impacts *Underscores the importance of managing social and environmental performance throughout the life of a project (any business activity that is subject to assessment and management).*	■ *Impact identification and assessment.* To identify and assess social and environmental impacts, both adverse and beneficial, in the project's area of influence. ■ *Mitigation.* To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment. ■ *Stakeholder engagement.* To ensure that affected communities are appropriately engaged on issues that could potentially affect them. ■ *Effective management.* To promote improved social and environment performance of companies through the effective use of management systems.
Performance Standard 2 – Labour and Working Conditions *Recognises that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers.*	■ To promote fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws. ■ To establish, maintain and improve the worker management relationship. ■ To promote compliance with national employment and labour laws. ■ To protect the workforce by addressing child labour and forced labour. ■ To promote safe and healthy working conditions, and to protect and promote the health of workers.

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

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

Performance Standards	Objectives
Performance Standard 3 - Resource Efficiency and Pollution Prevention *Recognises that increased industrial activity and urbanisation often generate increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level.*	■ To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. ■ To promote more sustainable use of resources, including energy and water. ■ To reduce project –related greenhouse gas (GHG) emissions.
Performance Standard 4 – Community Health, Safety and Security *Recognises that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development.*	■ To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. ■ To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimises risks to the Affected Communities.
Performance Standard 5 – Land Acquisition and Involuntary Resettlement *Outlines that involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition*	■ To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. ■ To avoid forced eviction. ■ To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected. ■ To improve, or restore, the livelihoods and standards of living of displaced persons. ■ To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.
Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Natural Resources *Recognises that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development*	■ To protect and conserve biodiversity. ■ To maintain the benefits from ecosystem services. ■ To promote the sustainable management of living natural resources through the adoption of practices that integrated conservation needs and development priorities.
Performance Standard 7 – Indigenous Peoples *Recognises that Indigenous Peoples, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population.*	■ To ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples. ■ To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner. ■ To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. ■ To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the

Performance Standards	Objectives
	Indigenous Peoples affected by a project throughout the life of the project. ■ To ensure the Free, Prior and Informed Consent (FPIC) of the Affected Communities of the IPs when the circumstances described in this Performance Standard are present. ■ To respect and preserve the culture, knowledge and practices of Indigenous Peoples.
Performance Standard 8 – Cultural Heritage *Recognises the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities.*	■ PS 8 aims to protect the irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations. In addition, the requirements of this PS on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. PS 8 recognises the importance of cultural heritage with an objective to: ■ Protect cultural heritage from the adverse impacts of project activities and support its preservation; and ■ Promote the equitable sharing of benefits from the use of cultural heritage in business activities. ■ The PS requires the project proponent to comply with relevant national law on the protection of cultural heritage, including national law implementing the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage and other relevant international law.

3.3 Contractual and Other Commitments

STC commit to following all applicable local and international laws listed in this IEE Report.

3.4 Institutional Framework

3.4.1 Myanmar Regulatory Authorities

In Myanmar, matters pertaining to IEE / EIA are generally under the jurisdiction of the ministries and state-owned enterprises. Key ministries, agencies and state-owned enterprises that have jurisdiction over HSE matters in power projects are included in *Table 3.4*.

Table 3.4 Key Ministries, Agencies and State-Owned Enterprises Involved in IEE/EIA

Ministry/Agency	Responsibility
Ministry of Natural Resources and Environmental Conservation (MONREC)	The Environmental Conservation Department (ECD) of MONREC has ultimate responsibility in the review and approval, or otherwise, of submissions under the IEE/EIA process.

3.5 Projects Environmental and Social Standards

The National Environmental Quality (Emissions) Guidelines (NEQ) were enacted in 2015. These Guidelines provide the basis for regulation and control of noise and air emissions and effluent discharges from sector specific projects in order to prevent pollution and protect the environment and public health. These guidelines, which are presented in *Table 3.5* to

Table 3.9, are noted to be similar to those recommended by the WBG General EHS Guidelines (2007).

It should be noted that the NEQ for thermal power is not applicable to the Project since the total installed capacity of the WHR units is 8.8 MW, which is less than 50 MW as specified in the NEQ for thermal power.

Table 3.5 National Environmental Quality (Emissions) Guidelines for Air Quality

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

Note:
a Particulate matter ≤ 10µm
b Particulate matter ≤ 2.5µm

Table 3.6 National Environmental Quality (Emissions) Guidelines on Noise Levels

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

Note:
a Equivalent continuous sound level in decibels (at the nearest sensitive receptor)

Table 3.7 National Environmental Quality (Emissions) Guidelines on Site Runoff and Wastewater Discharges (Construction Phase)

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

Parameter	Unit	Maximum Concentration
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

a Standard unit

Table 3.8 Guideline Values for Parameters from Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)

Parameter	Unit	Maximum Concentration
5-day Biochemical oxygen demand	mg/l	50
Ammonia	mg/l	10
Arsenic	mg/l	0.1
Cadmium	mg/l	0.1
Chemical oxygen demand	mg/l	250
Chlorine (total residual)	mg/l	0.2
Chromium (hexavalent)	mg/l	0.1
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Cyanide (free)	mg/l	0.1
Cyanide (total)	mg/l	1
Fluoride	mg/l	20
Heavy metals (total)	mg/l	10
Iron	mg/l	3.5
Lead	mg/l	0.1
Mercury	mg/l	0.01
Nickel	mg/l	0.5
Oil and grease	mg/l	10
pH	S.U.a	6-9
Phenols	mg/l	0.5
Selenium	mg/l	0.1
Silver	mg/l	0.5
Sulphide	mg/l	1
Temperature increase	°C	<3
Total coliform bacteria	100 ml	400
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50
Zinc	mg/l	2

Table 3.9 Guideline Values for Biosolids and Sludge Disposal

Parameter	Unit	Maximum Concentration
Arsenic	mg/kg	75
Cadmium	mg/kg	85
Chromium (total)	mg/kg	3,000
Copper	mg/kg	4,300
Lead	mg/kg	840
Mercury	mg/kg	57
Molybdenum	mg/kg	75

Parameter	Unit	Maximum Concentration
Nickel	mg/kg	420
Selenium	mg/kg	100
Total coliform bacteria	gb	1,000
Zinc	mg/kg	7,500

4. PROJECT DESCRIPTION AND ALTERNATIVES

The waste heat recovery (WHR) units will include:

- Preheater (PH) boiler and auxiliaries
- Air quenching chamber (AQC) boiler and auxiliaries
- Steam turbine and auxiliaries
- Cooling system and water
- Mechanical auxiliary equipment
- Generator and electrical equipment
- Control and instrumentation system
- Spare parts and special tools

4.1 Project Background

The proposed Project consists of two WHR units to be installed at the STC cement plant in the Mandalay Region of Myanmar. A summary of the proposed Project is provided in *Table 4.1*.

Table 4.1 Project Details

Component	Details
Name of the Project	STC Cement Plant – Waste Heat Recovery (WHR)Project in Mandalay Region, Myanmar
Project Owner	Shwe Taung Cement Company Ltd. (STC)
Installed Capacity of the Project	8.8 MW
Type of infrastructure	Two (2) waste heat recovery (WHR) units

4.2 Project Location

The two WHR units are proposed to be installed at the STC cement plant, which is located in a brownfield area of 455 acres in Thazi Township, Pyi Nyaung Village and Kubyin Area within the Mandalay Region (*Figure 4.1*).

The plant area covers 400 acres leased under a 50-year agreement from the Forest Department on 31 March 2016 (following three lease agreements renewed annually) including 45 acres used by the cement plant first line, 15 acres used by the second line and 50 acres of dedicated water resources. Eight (8) acres are allocated for employee housing and catering services and the remaining 282 acres are planned or used for access roads. An adjacent area of 55 acres leased under a 50-year agreement from the Forest Department on 31 March 2016 is allocated to employees' family housing and recreation activities. The cement plant is situated in a valley surrounded by the mudstone quarry to the west and the limestone quarry to the east, which falls within the Tha Pyae mountain range (*Figure 4.1*)). All land leased to date by the company for the cement plant is state-owned forest land.

There is no additional land requirement for the installation of the WHR units as the WHR units will be installed within the existing brownfield area of the cement plant. There will not be any direct loss of natural terrestrial habitat.

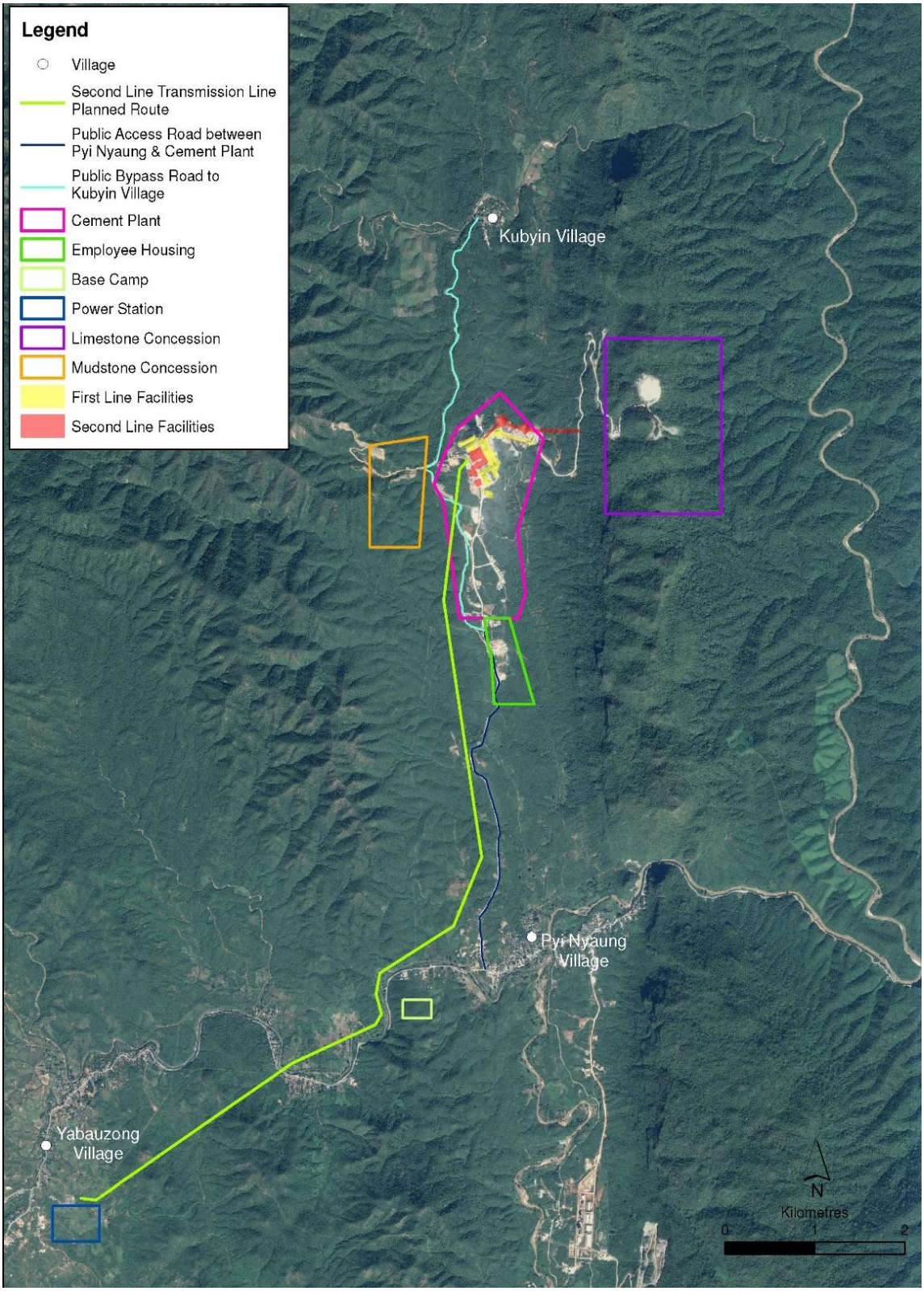


Figure 4.1 Location of STC Cement Plant (where the WHR Units will be installed) and its Ancillary Facilities

4.3 Project Development and Implementation Time Schedules

Mobilization of WHR contractor will be within 2019 and construction is expected to be completed in 16 months followed by the operation of the WHR units.

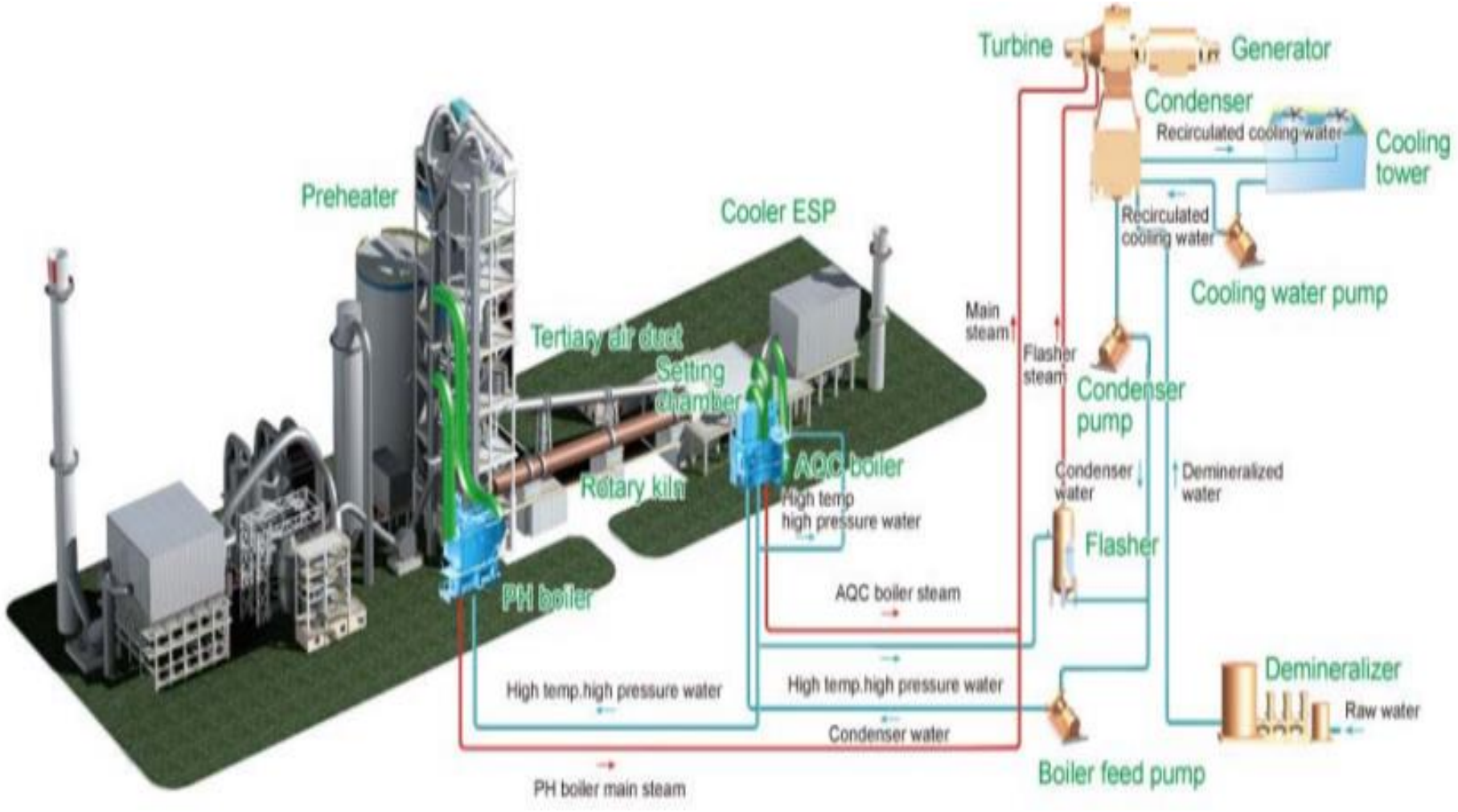
4.4 Description of the Project

In the dry process clinker production line of the STC cement plant, there is a great quantity of waste heat in preheater and cooler exhaust gas which can be recovered via special WHR boiler. It can further generate steam to drive turbine to transfer heat energy to mechanical energy, finally driving the power generator to produce electricity used for the clinker production line.

The WHR system STC will use is the Steam Rankine Cycle (SRC). The system uses water as the working fluid and involves generating steam in a waste heat boiler, which then drives a steam turbine. shows the flow diagram and *Figure 4.3* shows the general layout of WHR System proposed to be used in STC's cement plant. The steam produced by the PH and AQC boilers is utilized by the steam turbine to generate electric power.

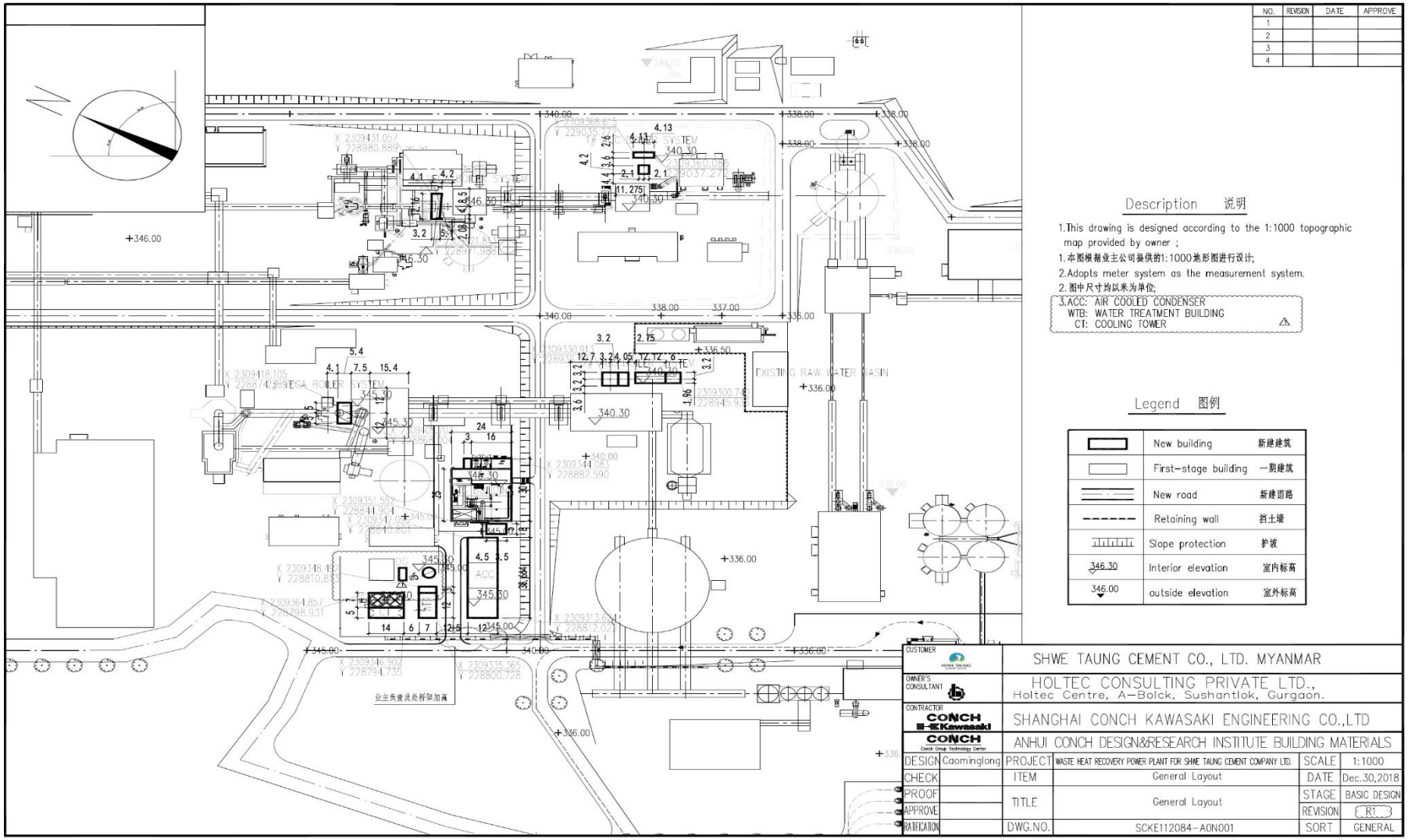
Two waste heat recovery units will be respectively installed on the first line and second line of the STC cement plan. The units will have a total installed capacity of 8.8 MW.

The Project will adopt pure low temperature waste heat to generate electricity without additional fuel furnace. As such, there will not be any new air emission source. The boiler is static equipment and will not generate noise. Main noise source is dynamic equipment like turbine, generator and pumps, etc.



Source: Shwe Taung Cement Ltd., 2018

Figure 4.2 Flow Diagram of WHR System in STC's Cement Plant



Source: Shwe Taung Cement Ltd., 2018

Figure 4.3 General layout of WHR's System in STC Cement Plant

4.5 Construction Activities

Components of the WHR units will be delivered from Shanghai, China to Yangon, Myanmar. It will then be transported from Yangon Port to STC cement plant via existing road Yangon-Mandalay road. Installation works will involve the use of mobile or tower cranes, depending on the construction location and space available for crane standing radius. Construction of the WHR unit will not require any site clearance as the Project is located within the cement plant which is a developed brownfield area. Only small scale excavation will take place for the foundation at boiler station, air conditioning condenser, turbine generator and water treatment. The excavated soil will be backfilled for the construction of WHR's facilities. Excavation and backfilling works will be undertaken within an area of approximately 775 m^2.

4.5.1 Workforce

During construction, it is estimated that around 200 workers will be required to construct the WHR units. The dedicated areas for construction workers' camps are to the west of the process plant area, near the main entrance gate to the plant area and within the staff family housing area.

4.5.2 Power and Water Supply

Electricity required for the operation of the cement plant is sourced from the Yay Paung Sone (Yabauzong, Yebokson) Power Station which is located 11km away from the plant. This will also be the source of power for the construction of the WHR units. Two (2) diesel generators will also be used for the construction activities.

Limited water will be required for the construction activities which mainly involve installation works. Water will be supplied from the two reservoirs situated within the plant area, with capacities of 6 million US gallons (equivalent to approximately 22,712 m3) and 45 million US gallons (equivalent to approximately 170,343 m^3), respectively. Water was pumped into the reservoirs from Kubyin Stream at Kubyin Village, approximately 4 km north of the cement plant, during the dry seasons of 2014, 2015 and 2016 (the rivers surrounding the cement plant are highlighted in ***Error! Reference source not found.***). In the 2017 dry season, water was not pumped from the Kubyin Stream as there was sufficient capacity in the reservoirs. During the wet season, the reservoirs are replenished by rain water and there is no need to pump water from the Kubyin Stream.

Photo of the water intake point of Kubyin Stream is shown in *Figure 4.4* and the width of the corresponding stream section is ~7 m.

Figure 4.4 Panoramic View of Water Intake Point at Kubyin Stream

4.5.3 Waste Generation

Solid waste generated from the construction activities will be managed through the existing Waste Management Plan (WMP) of the cement plant (*Annex A*).

Non-hazardous waste will be recycled and reused as far as possible or disposed in the non-hazardous solid waste management facility which will be lined with leachate collection facility. Total volume of the non-hazardous solid waste management facility will be around 3,400 m^3.

Organic waste generated from the canteens is recycled as pig food or used as compost.

Hazardous waste generated from fuel, lubricants, used engine oil and used hydraulic oil and fluid, is limited in volumes. Hazardous waste and materials storage are confined to the heavy mechanical equipment area, the petrol station and near the laboratory which are in the process of being fully paved. STC is in the process of upgrading the waste management system. Hazardous waste will be transported and disposed of at suitable facilities of Golden Dowa Eco-system Myanmar Co.Ltd, which is located at Thilawa SEZ of Yangon Region.

Medical waste is regularly collected by Thazi Township municipal waste collection system and mixed with waste from the Thazi hospital at the cemetery in Thazi Township.

Wastewater will be generated during construction of the Project. The generation of stormwater runoff with suspended solid from the excavation work is expected before the backfilling of the excavated soil. Stormwater runoff will be diverted to existing sedimentation ponds within the cement plant to allow suspended solids to settle before being discharged. Wastewater will also be generated from the construction workers. Nineteen wastewater discharge points/toilet pits have been identified throughout the plant area as illustrated in *Figure 4.5* which will be used by the construction workers. The majority of these are storage tanks that are emptied as they fill (approximately twice per year). Some domestic wastewater is collected through a two-stage pond treatment system with the first pond filtering wastewater with pebbles, charcoal and river sand before entering the second pond. Locations and photos of the existing sedimentation ponds of the cement plant are illustrated in *Figure 4.6.* Greywater from washing and showering in the three canteens and the housing areas is used for greening.

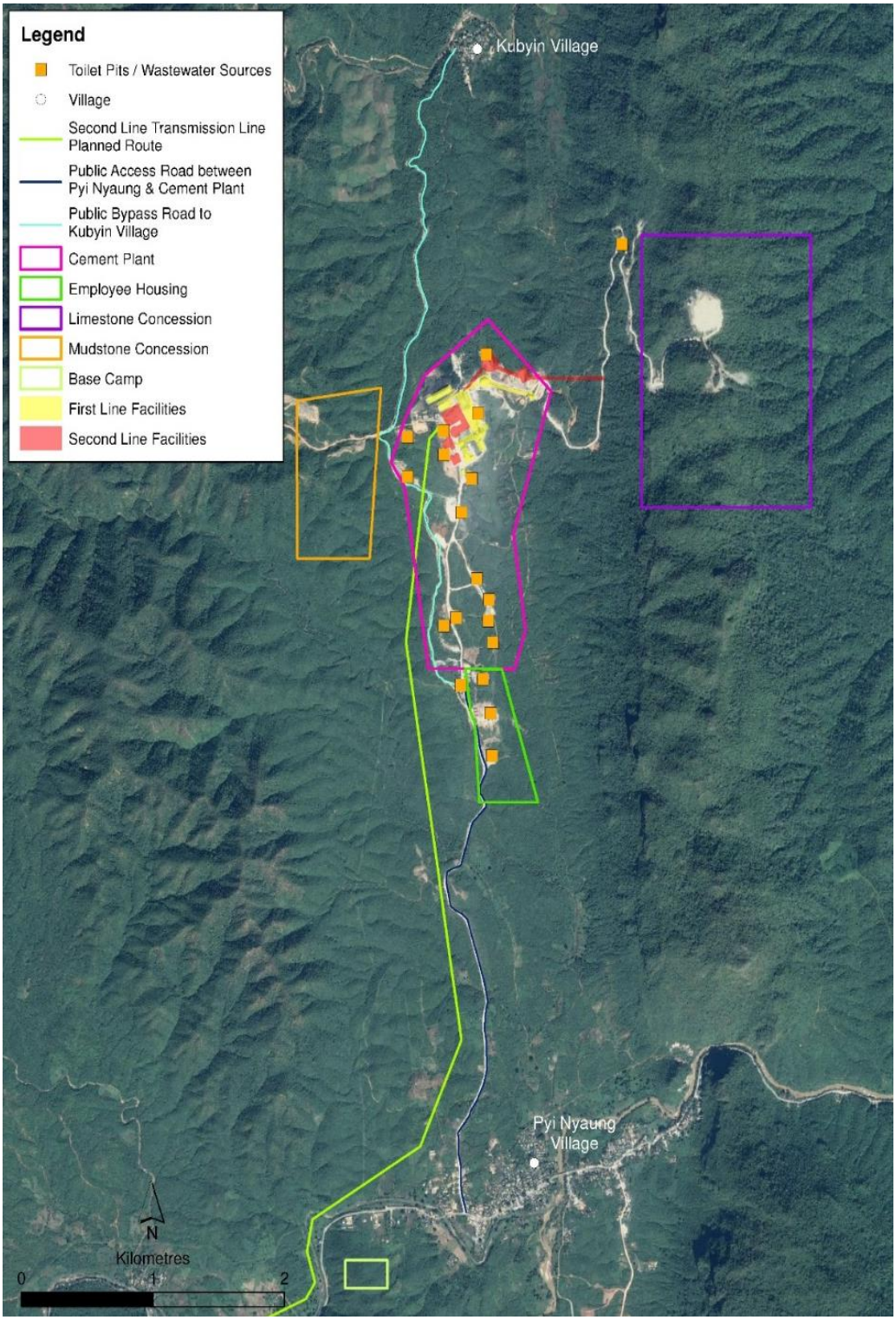


Figure 4.5 Locations of Wastewater Sources and Toilet Pits

At Limestone quarry near the Line 2 conveyor stretch (Limestone sedimentation Pond)

In front of HME, Top soil stockpile area (2nd Limestone Sedimentation Pond)

North of HME Area (HME sedimentation Pond)

At Coal Staging Area (501 sedimentation Pond)

Beside 103 Area near 501 Area

Pond No. 7 near Upper water reservoir

Figure 4.6 Locations and Photos of Sedimentation Ponds of the Cement Plant

4.6 Operation and Maintenance

4.6.1 Workforce

A total of about 2,500 to 3,000 people are based at the cement plant to support the operation. No additional staff will be required for the operation of the WHR units.

4.6.2 Power and Water Supply

For the first line of cement production, the average water consumption is ~200-250 m^3 per day for plant usage.

For the second line, it is anticipated average actual water consumption would be ~350-550 m^3 per day based on STC experience on actual water consumption of the first line.

The waste heat recovery units, which will be air-cooled, will use water at the rate of 10.42 m^3 per hour or 250 m^3 per day (*Figure 4.7*).

According to latest estimation by STC, water supply from the two reservoirs within the plant area would be adequate to supply water required for the cement plant and the WHR units. STC did not take any water from the Kubyin Stream or any nearby water bodies used by the communities since the dry season of 2017. Nevertheless, STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction.

Operation of the WHR units will lead to reduction in power consumption by the cement plant. The planned reduction in power specific consumption is 38% for each tonne of cement produced and the planned reduction in fuel specific consumption is 17% for each tonne of clinker produced.

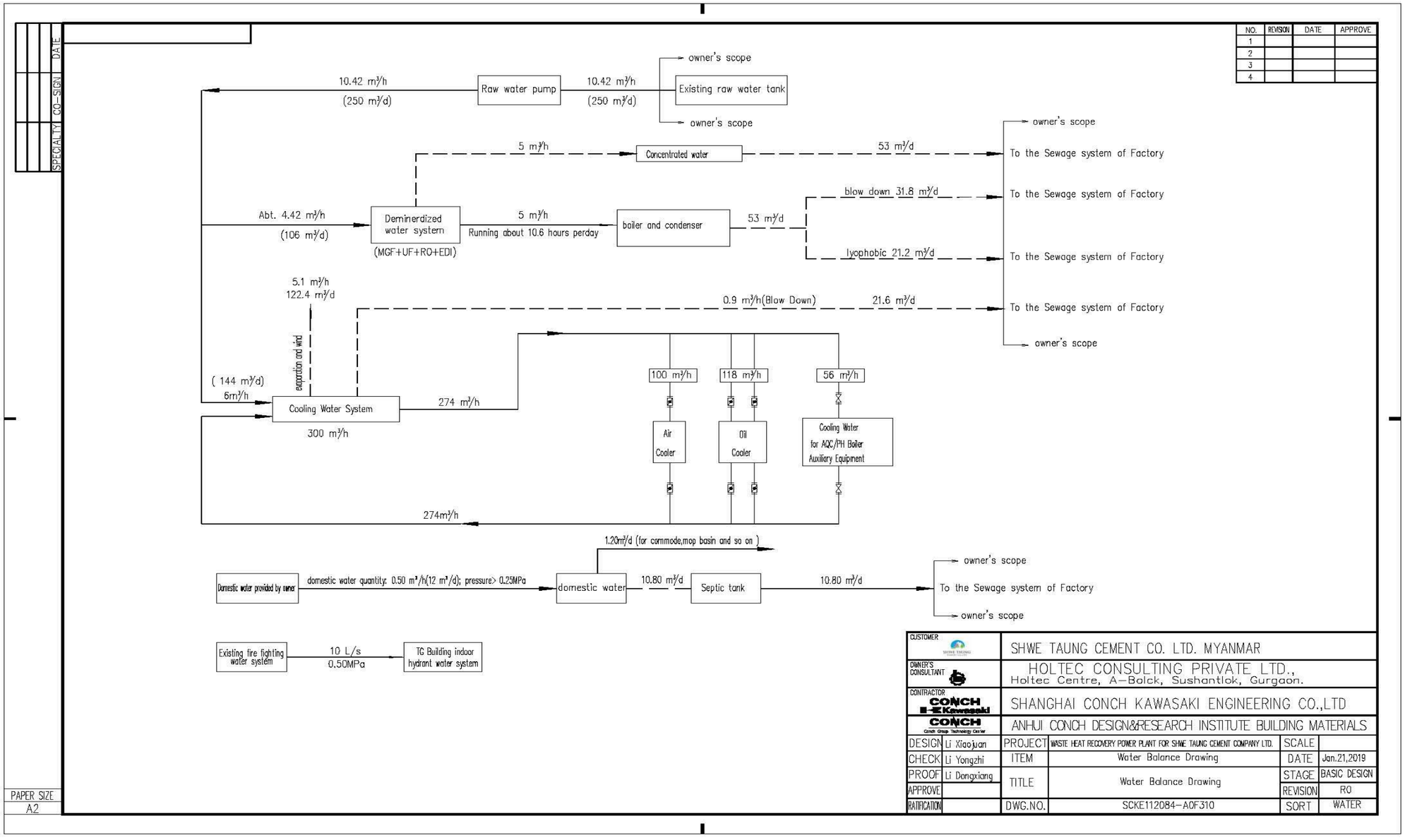


Figure 4.7 Water Balance Diagram of the WHR Units

4.6.3 Waste Generation

Operation of the WHR units will not generate any solid wastes.

Wastewater generated from the WHR units will be ~128 m^3/day which will be treated by the wastewater treatment system of the cement plant. STC is in the process of designing the wastewater treatment facilities for the whole cement plant. It is intended to install separate wastewater treatment systems to collect and treat wastewater from different zones of the site considering the technically and economically feasibility of the piping arrangement. All wastewater treatment systems will be designed to comply with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges.

STC is in the process of designing the wastewater treatment facilities. It is intended to install separate modular wastewater treatment units to collect and treat wastewater from different zones of the site considering the technically and economically feasibility of the piping arrangement. Treated wastewater from these units will be conveyed to a centralized tank for reuse in the cement plant. Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) (*Table 3.8*). Sludge generated from the units will be dewatered to meet with the Myanmar NEQ for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility (

Table 3.9). Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal.

5. DESCRIPTION OF THE ENVIRONMENT

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

5.1 Setting the Study Limits

The AOI of the Project encompasses:

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

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

5.2 Methodology and Approach

Baseline information has been collated from a range of sources including publicly available information, primary data collection and through consultation. Relevant baseline information have been adopted from the EIA for STC Cement Plant in Mandalay Region, Myanmar (ERM, 2018; hereafter referred to as “STC cement plant expansion EIA”), under which extensive baseline environmental and social data collection and consultation have been undertaken from 2016 to 2018 for the STC cement plant at which the WHR units will be installed [(1)] .

5.3 Public Administration and Planning

Two public socio-economic development plans in the same region of the Project have been identified. The Thazi-Nyaung Yan, Nyaung Yan Substation project is being developed and should include a 33/11kV substation (5MVA), a 10-mile long 33kV single-pole with earthing wire line as well as a 24-mile long 11kV aluminium-conductor steel-reinforced cable (ACSR). The Thazi Township (Myoma) 33/11kV substation (10MVA) is another project in the same region of the Project; it is part of a wider regional development program for poverty reduction and aims to enhance existing agro-productions to enable self-sustaining local development [(2)].

5.4 Protected and Environmentally Sensitive Areas

As of 2019, there are a total of 39 Protected Areas in Myanmar covering an area of 38,906 km^2. Based on Myanmar’s NBSAP for 2015 to 2020, there are plans to establish nine (9) more Protected Areas in three phases from 2020 to 2021. With the addition of these nine (9) proposed areas, the total area under protection in Myanmar will be 52,932 km^2, representing a coverage of 7.82% of the country’s total land area [(3)].

(1) ERM (December 2018). EIA for STC Cement Plant in Mandalay Region, Myanmar

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

(3) Republic of the Union of Myanmar, National Biodiversity Strategy and Action Plan 2015-2020 (Oct, 2015) Retrieved from https://www.cbd.int/doc/world/mm/mm-nbsap-v2-en.pdf

National Protected Areas within a 50 km buffer of Project Site are listed in *Table 5.1* below and their locations in relation to the Project Site is shown in *Figure 5.1*.

Internationally recognised areas [1] within 50 km of Project Site are listed in *Table 5.2* below. The location of these sites in relation to the Project Site is shown in *Figure 5.1*.

None of the above areas are located within the Project Site and the nearest Protected Area is located 6 km north of the Project Site.

Table 5.1 Protected Areas within 50 km of Project Site

Project Site	Protected Area	Details and Triggers [2]
WHR Units of the STC Cement Plant	Panlaung-Pyadalin Cave Wildlife Sanctuary (6 km north from the Project Site)	Lat: 96.3738 Lon: 21.0218 IUCN Category IV Wildlife Sanctuary Banteng (*Bos javanicus*) EN; Gaur (*Bos gaurus*) EN; Dhole (Cuon alpinus) EN; Serow (*Capricornis sumatraensis*) VU; Asian Elephant (*Elephas maximus*) EN; Clouded Leopard (*Neofelis nebulosi*)VU;

Table 5.2 Internationally Recognised Areas within 50 km of Project Site

Project Sites	Internationally Recognised Area	Type	Details and Triggers
WHR Units of the STC Cement Plant	Panlaung-Pyadalin Cave Wildlife Sanctuary (6 km north)	Protected Area KBA	Lat: 96.3738 Lon: 21.0218 IUCN Category IV Wildlife Sanctuary 33,380ha Banteng (*Bos javanicus*) EN; Dhole (*Cuon alpinus*) EN; Asian Elephant (*Elephas maximus*) EN; Northern Pig-tailed Macaque (*Macaca leonina*) EN
	Paunglong Catchment Area (29 km south)	KBA	Lat: 96.4979 Lon: 20.2326 254,750ha Gaur (*Bos gaurus*) EN; Dhole (Cuon alpinus) EN; Serow (*Capricornis sumatraensis*) VU; Asian Elephant (*Elephas maximus*) EN; Northern Pig-tailed Macaque (*Macaca leonina*) EN; Clouded Leopard (*Neofelis nebulosi*)VU; Himalayan Black Bear (*Ursus thibetanus*) VU

(1) According to IFC PS6, internationally recognized areas are exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (Ramsar Convention)

(2) Istituto Oikos and BANCA (2011) Myanmar Protected Areas. Context, Current Status and Challenges. Milano, Italy. Ancora Libri.

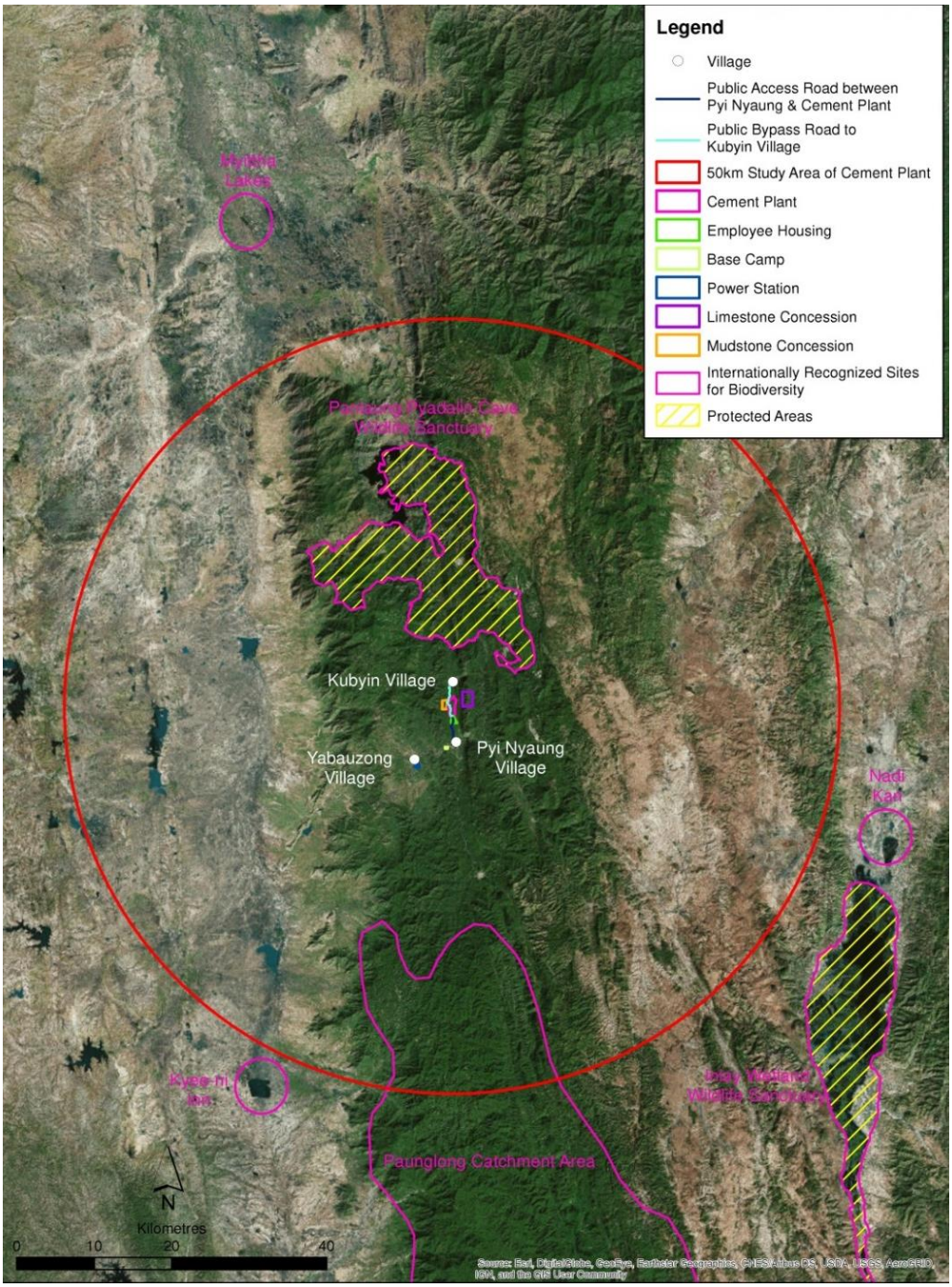


Figure 5.1 Area of Interest, Protected Areas and Internationally Recognised Sites for Biodiversity near the Project Site

5.5 Physical Components

The WHR units will be constructed at the STC cement plant which is an existing developed area. Given that the Project will only involve minor excavation works at existing brownfield location, potential impacts to groundwater quality and soil quality are not expected. As such, presentation of baseline survey data for groundwater quality and soil quality are not considered necessary.

Baseline data for air quality, noise and water are presented below as there may potentially be impacts to air quality due to gaseous emission and noise generation from construction plant as well as wastewater discharged and accidental spills causing impacts to water quality.

5.5.1 Air quality

5.5.1.1 Monitoring Method

During the previous STC cement plant expansion EIA, a number of representative human sensitive receptors were identified in the vicinity of the Project as presented in *Table 5.3* and *Figure 5.2*. Of the identified sensitive receptors, it should be noted that AQ1 and AQ4 - AQ6 are onsite worker accommodation. The main offsite villages are Kubyin Village and Pyi Nyaung Village, more than 2 km to the north and more than 5 km to the south of the Project Site, respectively.

Table 5.3 Representative Air Sensitive Receptors

Receptor ID	Receptor Name (1)	Type	Approximate Location		Approximate Distance to the Project Site (2)
			Latitude	Longitude	
AQ1	Worker Accommodation	Human	20°50.56.15'N	96°23.35.97'E	<2000m
AQ2	Kubyin Village	Human	20°53.25.83'N	96°23.25.07'E	<2500m
AQ3	Pyi Nyaung Village	Human	20°49'6.34"N	96°23'35.42"E	<5000m
AQ4	Worker Accommodation	Human	20°51'59.29"N	96°23'15.09"E	<500m
AQ5a	Worker Accommodation	Human	20°51'52.66"N	96°23'13.16"E	<500m
AQ5b	Worker Accommodation	Human	20°51'49.43"N	96°23'16.43"	<500m

Notes:
Each receptor identified is not necessarily a single point and may represent a cluster of receptors.
Distances from project components have been estimated using aerial imagery.

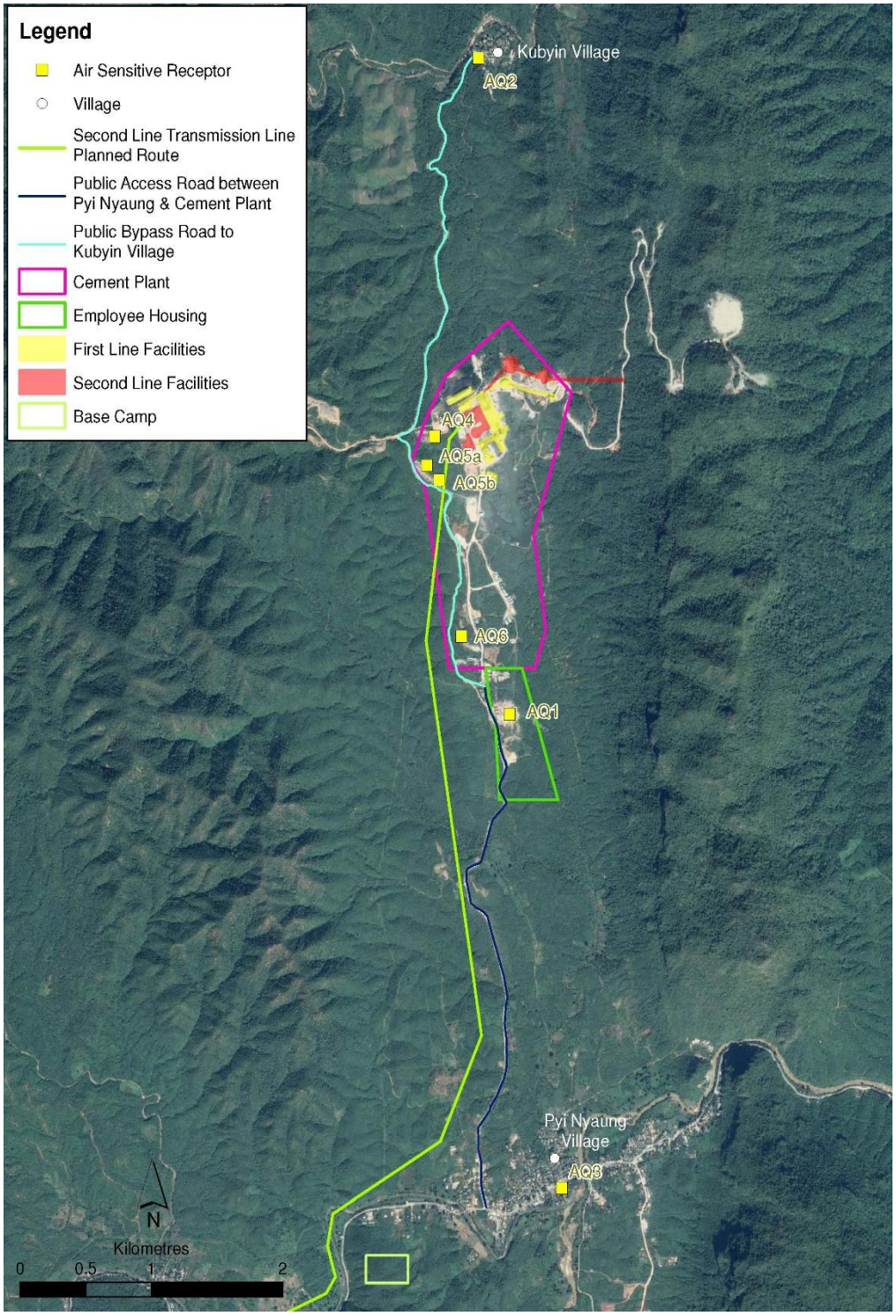


Figure 5.2 Representative Air Sensitive Receptors at Cement Plant

Ambient air quality monitoring of NO_2 and SO_2 was undertaken for one week in January 2017 to provide an indication of baseline concentrations within the cement plant as well as at Pyi Nyaung Village and Kubyin Villages. The monitoring locations identified are presented in *Figure 5.2* with photos shown in *Figure 5.3* to *Figure 5.4* Air Quality Monitoring Station at AQ2: Kubyin Village

and further information is provided in *Table 5.4.*

Table 5.4 Air Quality Monitoring Summary

Site	Name	Location		Monitoring	Period
		Latitude	Longitude		
AQ1	Worker Accommodation Housing	20°50'56.15"N	96°23'35.97"E	NO_x, NO_2, SO_2	17 to 23 January 2017
AQ2	Kubyin Village	20°53'25.83"N	96°23'25.07"E		
AQ3	Pyi Nyaung Village	20°49'8.19"N	96°23'51.55"E		

Figure 5.3 Air Quality Monitoring Station at AQ1: Worker Accommodation Quarters

Figure 5.4 Air Quality Monitoring Station at AQ2: Kubyin Village

Figure 5.5 Air Quality Monitoring Station at AQ3: Pyi Nyaung Village

At each monitoring location, measurement of NO_2 and SO_2 was undertaken using Palmes type diffusion tubes in triplicate. Diffusion tubes are passive samplers that consist of small plastic tubes which contain a chemical reagent to absorb the pollutant to be measured directly from the air. The use of triplicate diffusion tubes enhances the robustness of the data set and allows potentially outlying values to be identified and investigated. Preparation and analysis of the diffusion tubes was undertaken in accordance with BS EN 13528. There is best practice guidance, adopted by this assessment, available from the US EPA (1) and from the UK Department for the Environment, Food and Rural Affairs (DEFRA) (2) on the siting and deployment of tubes. The analysis of the exposed tubes was undertaken using Ion Chromatography (United Kingdom Accreditation Service (UKAS) Accredited Method ISO/IEC 17025:2005).

In addition, ambient air quality monitoring of particulate matter (PM_{10} and $PM_{2.5}$) was undertaken in January 2018 for two weeks at Pyin Nyaung and Kubyin Villages. The monitoring locations are presented below in *Table 5.5*, *Figure 5.6* and Figure 5.7. PM_{10} was monitored using a High Volume Air Sampler with a flow rate of 1.13 m^3/minute. Air was drawn through a quartz fiber filter continuously for a 24 hour period before being replaced. The filters were analyzed using the USEPA approved reference method (3). $PM_{2.5}$ was monitored using a Low Volume Air Sampler with a flow rate of 16.67 litres/minute. Air was drawn through a PTFE filter continuously for a 24 hour period before being replaced. The filters were analyzed using the USEPA approved reference method (4).

Table 5.5 Monitoring Locations

Monitoring Site	Location	Parameters Monitored	Monitoring Period
Pyin Nyaung Village (AQ3)	20º49’5.09” N 96º23’44.24” E	PM_{10}, $PM_{2.5}$	07/01/2018 – 21/01/2018
Kubyin Village (AQ2)	20º53’28.00” N 96º23’24.94” E	PM_{10}, $PM_{2.5}$	07/01/2018 – 21/01/2018

(1) United States Environmental Protection Agency (USEPA) Ambient Monitoring Technology Information Centre [Online] Available at: https://www3.epa.gov/ttn/amtic/ [Accessed 12th September 2016]

(2) AEA Energy and Environment on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2008) Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users

(3) The United States Environmental Protection Agency (USEPA) Code of Federal Regulation, 40 CFR- Chapter 1 Part 50, Appendix J to Part 50 (High Volume Method) by using Electronic Balance 4pt

(4) The United States Environmental Protection Agency (USEPA) Code of Federal Regulation, 40 CFR- Chapter 1 Part 50, Appendix L to Part 50 by using Electronic Balance 6pt

Figure 5.6 Monitoring Location at Pyin Nyaung Village

Figure 5.7 Monitoring Location at Kubyin Village

5.5.1.2 Monitoring Results

The monitoring data from the air quality survey undertaken by ERM between 17 and 23 January 2017 for NO_2 and SO_2 are presented below in *Table 5.6*.

Table 5.6 NO_2 and SO_2 concentrations measured by ERM, 17 - 23 January 2017

Site	Name	Tube No.	NO_2 µg/m³	SO_2 [1] µg/m³
Annual Mean Air Quality Standard[2][3]			**40**	**n/a**
AQ1	Worker Accommodation	Tube 1	3.68	<DL
		Tube 2	3.61	
		Tube 3	3.59	
		Average	3.63	
AQ2	Kubyin Village	Tube 1	10.5	<DL
		Tube 2	10.3	
		Tube 3	10.1	
		Average	10.3	
AQ3	Pyi Nyaung Village	Tube 1	9.09	<DL
		Tube 2	10.6	
		Tube 3	10.7	
		Average	10.1	

Note:
Results reported as <0.03µgS on tube are below the reporting limit.
WBG General EHS Guidelines, 2007
Myanmar Environmental Quality (Emission) Guidelines, 2015

The data presented in *Table 5.6* have conservatively been used to represent indicative annual background concentrations of NO_2 and SO_2. A review of the baseline data collected concludes that the baseline concentrations are consistently below the relevant annual AQS presented in *Table 3.5*. Baseline concentrations of SO_2 were found to be below the limit of detection at all monitoring sites.

The baseline also needs to be interpreted for short-term periods. The United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) [1] recommends that the short-term baseline is derived by multiplying the long-term by a factor of two. This conversion has been undertaken using the figures presented in *Table 5.6* to provide baseline concentrations for comparison against the one hour NO_2 air quality standards presented in *Table 3.5.* This is considered a conservative approach. The results from applying this methodology are presented below in *Table 5.7.*

Table 5.7 Derived Hourly NO_2 Background Concentrations

Site	Name	Hourly concentration (µg/m³)
AQ1	Family Housing	7.26
AQ2	Kubyin Village	20.6
AQ3	Pyi Nyaung Village	20.2
Average		16.0
Air Quality Standard[1][2]		200

Notes:
WBG General EHS Guidelines, 2007
Myanmar Environmental Quality (Emission) Guidelines, 2015

([1]) Department for Environment, Food and Rural Affairs (DEFRA) (2016) Air emissions risk assessment for your environmental permit [Online] Available from: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 2nd March 2017]

The results from the monitoring conducted in the area indicate that ambient concentrations of NO_2 and SO_2 are below the relevant air quality standards. The receiving airshed in the area can therefore be classified as 'non-degraded' with regard to these pollutants.

The monitoring results for PM_{10} and $PM_{2.5}$ are presented in *Table 5.8* and *Table 5.9.*

Table 5.8 Monitoring Results at Pyin Nyaung Village (µg/m³)

Monitoring Site	Date on	Date off	Period	PM_{10}	$PM_{2.5}$
Pyi Nyaung Village (AQ3)	07-01-2018	08-01-2018	24-hrs	57	25
	08-01-2018	09-01-2018	24-hrs	54	22
	09-01-2018	10-01-2018	24-hrs	51	25
	10-01-2018	11-01-2018	24-hrs	76	36
	11-01-2018	12-01-2018	24-hrs	66	32
	12-01-2018	13-01-2018	24-hrs	99	38
	13-01-2018	14-01-2018	24-hrs	100	42
	14-01-2018	15-01-2018	24-hrs	103	53
	15-01-2018	16-01-2018	24-hrs	84	48
	16-01-2018	17-01-2018	24-hrs	76	47
	17-01-2018	18-01-2018	24-hrs	68	37
	18-01-2018	19-01-2018	24-hrs	76	45
	19-01-2018	20-01-2018	24-hrs	83	43
	20-01-2018	21-01-2018	24-hrs	75	30
Maximum (µg/m³)				103	53
Average (µg/m³)				76.3	37.4
Air Quality Standard (µg/m³) (1,2)				50	25

Notes:
WBG General EHS Guidelines, 2007
Myanmar Environmental Quality (Emission) Guidelines, 2015

Table 5.9 Monitoring Results at Kubyin Village (µg/m³)

Monitoring Site	Date on	Date off	Period	PM_{10}	$PM_{2.5}$
Kubyin Village (AQ2)	07-01-2018	08-01-2018	24-hrs	31	18
	08-01-2018	09-01-2018	24-hrs	26	17
	09-01-2018	10-01-2018	24-hrs	18	12
	10-01-2018	11-01-2018	24-hrs	39	17
	11-01-2018	12-01-2018	24-hrs	30	14
	12-01-2018	13-01-2018	24-hrs	49	19
	13-01-2018	14-01-2018	24-hrs	29	20
	14-01-2018	15-01-2018	24-hrs	39	28
	15-01-2018	16-01-2018	24-hrs	18	19
	16-01-2018	17-01-2018	24-hrs	31	27
	17-01-2018	18-01-2018	24-hrs	42	26
	18-01-2018	19-01-2018	24-hrs	31	22
	19-01-2018	20-01-2018	24-hrs	33	25
	20-01-2018	21-01-2018	24-hrs	35	14
Maximum (µg/m³)				49	28
Average (µg/m³)				32.2	19.9
Air Quality Standard (µg/m³) (1,2)				50	25

Notes:
WBG General EHS Guidelines, 2007
Myanmar Environmental Quality (Emission) Guidelines, 2015

The baseline also needs to be interpreted for long-term periods. Using the DEFRA approach previously discussed, the annual average concentrations at monitoring locations has been derived by dividing the 24-hour maximum concentration by a factor of 2. This conversion has been undertaken using the maximum PM_{10} and $PM_{2.5}$ concentration from any 24-hour monitoring period at each site presented in *Table 5.8* and *Table 5.9*. This is considered a conservative approach. The results from applying this methodology are presented below in *Table 5.10.*

Table 5.10 Derived Annual Average PM_{10} and $PM_{2.5}$ Background Concentrations

Name	PM_{10} Annual average concentration ($\mu g/m^3$)	$PM_{2.5}$ Annual average concentration ($\mu g/m^3$)
Pyi Nyaung Village (AQ3)	51.5	26.5
Kubyin Village (AQ2)	24.5	14
Air Quality Standard[(1)(2)]	20	10

Notes:
WBG General EHS Guidelines, 2007
Myanmar Environmental Quality (Emission) Guidelines, 2015

Analysis of the data indicates that concentrations of PM_{10} and $PM_{2.5}$ at Pyi Nyaung Village exceed the Myanmar 24-hour average air quality standard continuously over the 14 day monitoring period with the exception of one 24-hour period where $PM_{2.5}$ is below the standard. The maximum PM_{10} and $PM_{2.5}$ concentrations were 103 $\mu g/m^3$ and 53 $\mu g/m^3$ respectively, over two times higher than the relevant air quality standards in Myanmar. The indicative annual average concentration is also in exceedance of the Myanmar annual average air quality standard for both PM_{10} and $PM_{2.5}$. The elevated concentrations of PM_{10} and $PM_{2.5}$ at Pyi Nyaung Village are likely associated with vehicles on the main road that runs through the village, the operation of lime kilns, and the combustion of wood for domestic use which is common in rural Myanmar.

In contrast, the baseline data collected at Kubyin Village indicates no exceedances of the PM_{10} am24-hour air quality standard with a maximum of 49 $\mu g/m^3$ during the monitoring period. The $PM_{2.5}$ monitoring information indicates fewer exceedances of the relevant air quality standard and a maximum of 28 $\mu g/m^3$ which is substantially less than that found at Pyi Nyaung Village but still in exceedance of the 24-hour average air quality standard of 25$\mu g/m^3$. The derived annual average concentration is in exceedance of the Myanmar annual average air quality standard for both PM_{10} and $PM_{2.5}$. However it is noted that this is likely a conservative assumption given that PM levels will be considerably higher in the dry season than in the wet season.

It is considered likely that the relatively higher concentrations at Pyi Nyaung Village are associated with traffic movements along the main and the operation of some 30 lime kilns. Kubyin Village is accessed by an unpaved road, however the use of this road is less frequent. There are no lime kilns in Kubyin Village and at a distance of 7-8 km from Pyi Nyaung, the operation of these kilns is unlikely to substantially affect air quality in Kubyin Village.

The evidence presented suggests that ambient $PM_{2.5}$ and PM_{10} concentrations at both Pyi Nyaung Village and Kubyin Village are likely to exceed the Myanmar 24-hour air quality standards for the protection of human health during the dry season. The indicative annual average concentration at both sites is based on the maximum 24-hour average concentration measured at each site during the monitoring period and is therefore considered a worst case approach. In reality the annual average is expected to be lower given that ambient concentrations of particulate matter in the wet season will be substantially less.

The airshed throughout the study area has been classified as ‘degraded’ for both $PM_{2.5}$ and PM_{10} as a worst case approach.

5.5.2 Noise

5.5.2.1 Monitoring Method

During the previous STC cement plant expansion EIA, a number of representative noise sensitive receivers (NSRs) that may potentially affected by the noise impacts due to the cement plant expansion project are identified with locations shown in *Figure 5.8* and summarized in *Table 5.11* below.

Table 5.11 Representative Noise Sensitive Receivers

Receptor ID	Receptor Name (1)	Type
N1	Proposed Permanent Housing	Planned permanent residential
N2	Temporary Housing	Worker's camp during construction phase
N3	Temporary Housing	Will be removed when N1 is ready
N4	Existing Permanent Housing	Existing permanent residential

Note:
N2 and N3 are temporary housing during the construction phase.

Baseline noise monitoring was conducted on 18 to 23 January 2017 at three selected noise sensitive receivers (NSRs), which are N1, N2 and N3, located near the Project Site to establish the background levels. Based on the site visit carried out in January 2017, the operational noise from existing cement plant is not noticeable at both N1 and N4. Only noise from occasional traffic could be observed. Background noise environments for both N1 and N4 are considered to be similar. Therefore, baseline noise monitoring was not conducted at N4. Photos of the noise monitoring locations are shown in *Figure 5.9* to *Figure 5.11.*

Hourly A-weighted equivalent continuous sound pressure levels (L_{Aeq}, 1 hour) were recorded 24 hours continuously at each location. Daytime and night-time L_{Aeq} were calculated by averaging the hourly sound pressure levels measured between 0700 and 2200 hours and between 2200 to 0700 hours, respectively.

Noise levels (LAeq) were recorded by a Type I sound level meter, 01dB-Stell Solo, at about 1.5m above ground with no reflecting surface within 3m in accordance with the IFC Guidelines.

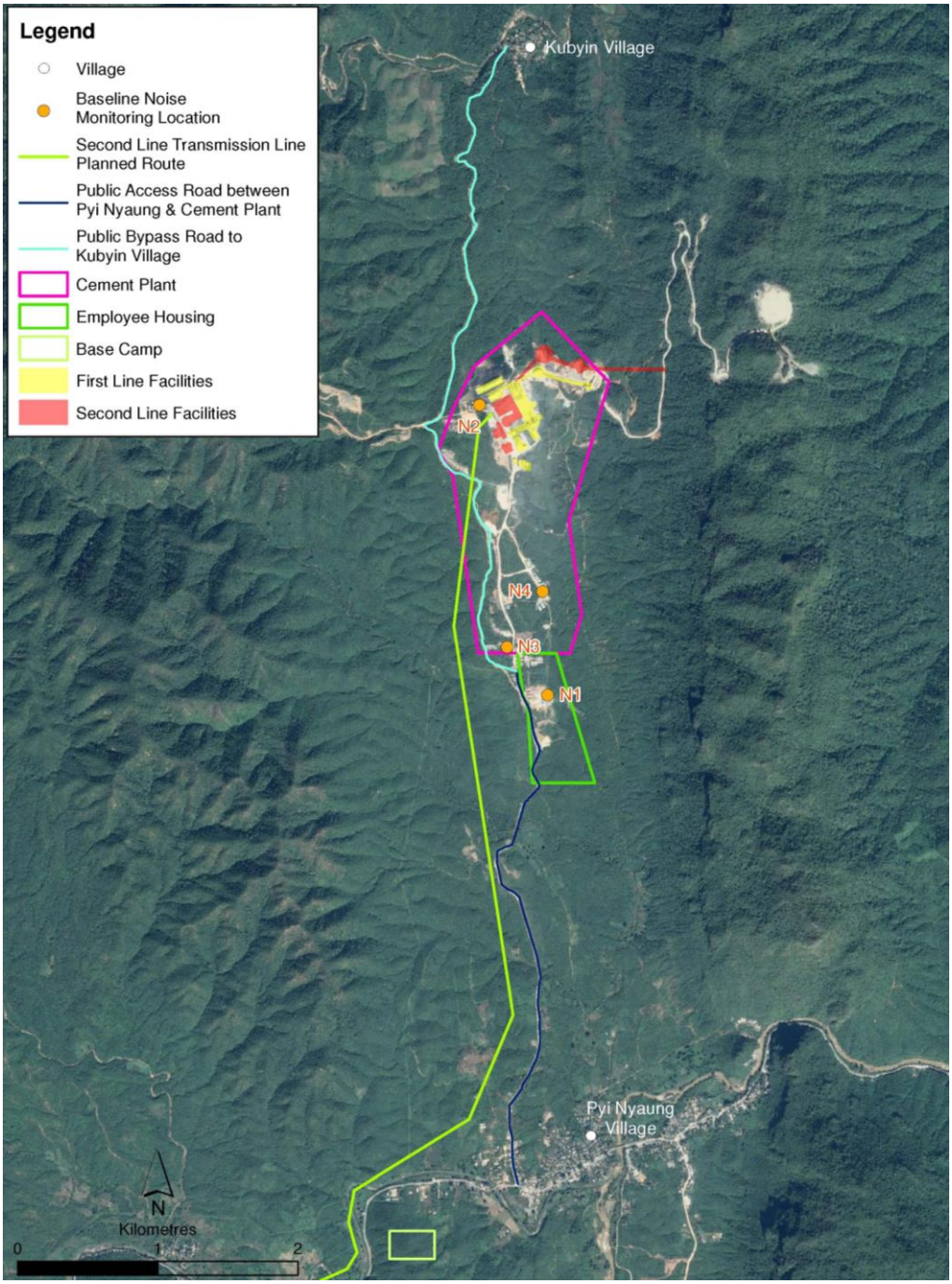


Figure 5.8 Representative NSRs in the vicinity of the Cement Plant

Figure 5.9 Noise Monitoring Station at N1

Figure 5.10 Noise Monitoring Station at N2

Figure 5.11 Noise Monitoring Station at N3

5.5.2.2 Monitoring Results

Results of the baseline noise monitoring are summarised in *Table 5.12*.

Table 5.12 Summary of Baseline Noise Monitoring and Noise Criteria

NSR	Type of Uses	Averaged Background Noise Levels, dB(A)		NEQ and WBG Noise Level Guidelines, dB(A)	
		Daytime	Night-time	Daytime	Night-time
N1	Residential	49	44	55	45
N2	Residential	58	57	55	45
N3	Residential	56	54	55	45

Notes:
Daytime refers to the hours from 0700 hrs to 2200 hrs while night-time refers to the hours from 2200 hrs to 0700 hrs.

Background noise levels exceeded the noise limits set out in the NEQ during daytime and night-time periods at both temporary worker accommodation areas which are located several hundred metres from the cement plant. The dominant source of noise was mainly from the traffic along the access road.

5.5.3 Surface Water Quality

5.5.3.1 Monitoring Method

A baseline water quality survey was conducted in January 2017 at Kubyin Village and the cement plant as part of the previous STC cement plant expansion EIA. The sampling locations are presented in *Table 5.13* and *Figure 5.12.* Photos of the sampling locations are shown in *Figure 5.13-Figure 5.16*.

Table 5.13 Baseline River Water Quality Sampling Locations

Station	Approximate Location		Approximate Distance to the Project Site
	Latitude	Longitude	
WP1	20° 51' 58.850" N	96° 23' 35.700" E	Located at the cement plant reservoir. Reported to release water during the wet season.
WP2	20° 52' 11.900" N	96° 23' 25.000" E	Discharge point from the drainage of the coal staging area.
WP3	20° 52' 11.876" N	96° 23' 25.316" E	Discharge point from the drainage of the coal staging area.
WP4	20° 51' 55.770" N	96° 22' 51.370" E	Stream located down gradient of the mudstone quarry and upstream of Kubyin Village.
WP5	20° 53' 25.640" N	96° 23' 20.560" E	Section of Kubyin River besides Kubyin Village which is near the freshwater intake point of the cement plant.

Two water samples were taken at each sampling location using sampling bottles provided by a laboratory certified under the Hong Kong Laboratory Accreditation Scheme (HOKLAS). These samples were stored at chilled condition and sent to the laboratory for analysis. Water quality parameters measured include *in-situ* measurement of pH and temperature as well as laboratory analysis of chemical oxygen demand (COD), 5-day biochemical oxygen demand (BOD_5), oil and grease, total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) and total coliform. These parameters covered pollutants of concern specified in the Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges (*Table 3.7*), which are the same as those specified for treated sanitary sewage discharge by WBG *General EHS Guidelines* (2007).

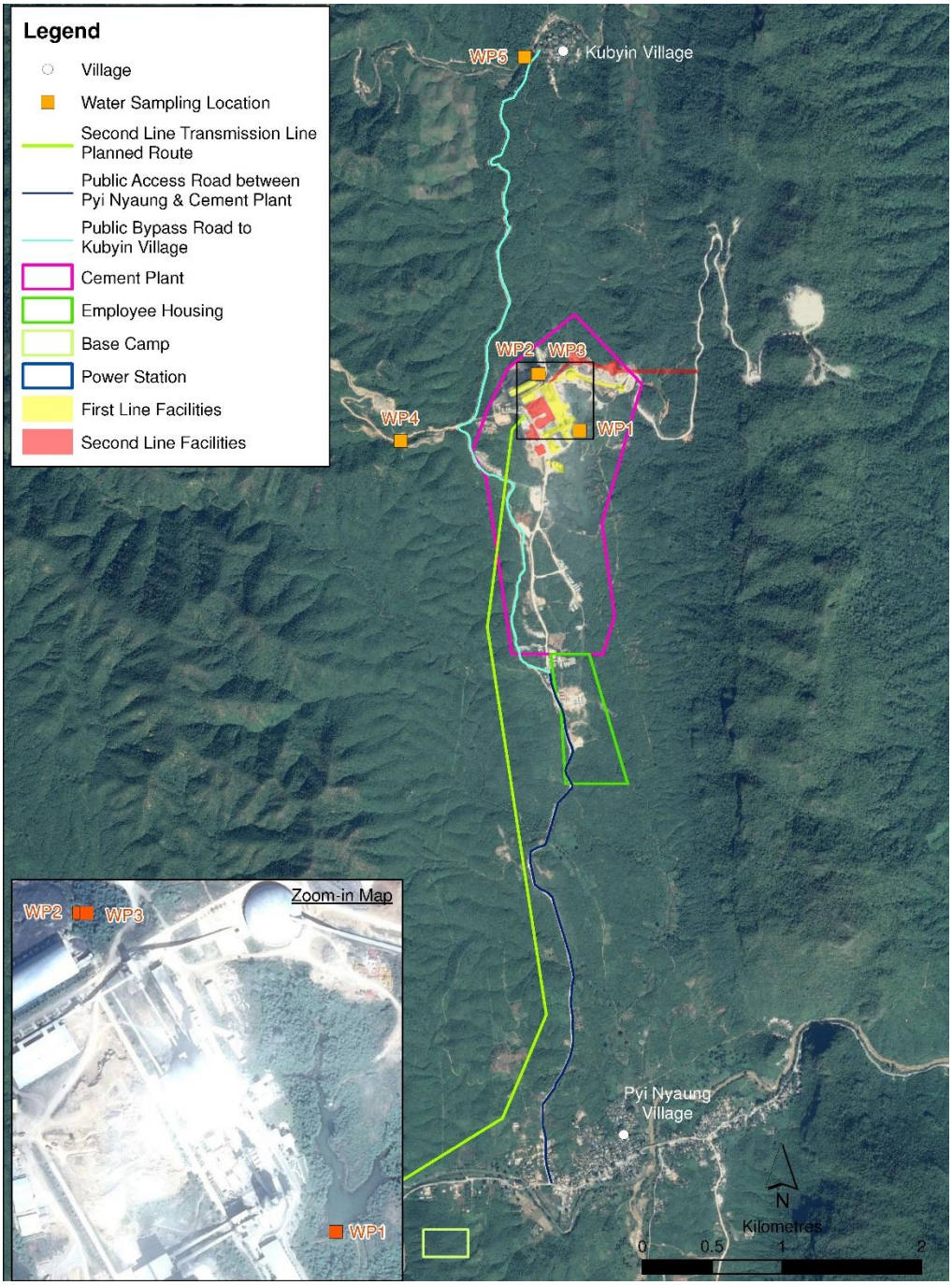


Figure 5.12 Water Sampling Locations Stations at the Cement Plant and Quarries

Figure 5.13 Water Quality Sampling Station at WP1

Figure 5.14 Water Quality Sampling Stations at WP2 and WP3

Figure 5.15 Water Quality Sampling Station at WP4

Figure 5.16 Water Quality Sampling Station at WP5

5.5.3.2 Monitoring Results

The baseline water quality data collected in January 2017 are presented in *Table 5.14*. At WP2 and WP3, which are discharge locations of the coal staging area, the level of TSS exceeded the NEGEQ for site runoff and wastewater discharges (the same as those specified in WBG *General EHS Guidelines* (2007) for treated sanitary sewage discharge). The *E. coli* level at WP2 also exceeded the NEGEQ site runoff and wastewater discharges. These exceedances indicate contamination due to existing operations at the coal staging area through sediment loaded discharge and possibly sewage. In addition, higher COD levels were reported at the coal staging area when compared to other locations which indicated potential issues of contaminated run-off from the coal staging area.

Other measurements were generally within the NEGEQ with no specific concern identified. For WP5 at the Kubyin River, baseline water quality data are compared with the applicable WHO Drinking Water Quality Standard which showed compliance in general (*Table 5.14*). Only one exceedance of WHO Drinking Water Quality Standard for pH level is recorded which is marginal and did not appear to indicate any contamination of concern since other parameters are complied with the standards.

Table 5.14 Baseline Water Quality at the Cement Plant and Associated Quarries, January 2017

Parameter	Unit	Detection Limit [2]	Analytical Method Reference	WP1 - Reservoir	WP2 – Coal Downstream Staging Area	WP3 – Coal Downstream Staging Area	WP4 – Downstream Mudstone Quarry	WP5 – Kubyin Village	NEGEQ for Site Runoff and Wastewater Discharges	WHO Drinking Water Quality Standard
TSS	mg/L	2.00	APHA 2540 D	11.00	118.00	215.50	9.00	23.00	50	-
TP	mg/L	0.01	APHA 4500P:J	0.01	0.03	0.06	0.01	0.06	2	-
TN	mg/L	0.10	APHA 4500P:J APHA 4500-NO3:I	0.40	1.25	1.70	0.30	0.30	10	-
Total Coliforms	CFU/100mL	1.00	DoE Sec 7.8 & 7.9	7.00	2,00.00	45.50	N.D. [3]	14.50	400	-
BOD_5	mg/L	2.00	APHA 5210 B	1.00	5.50	6.50	1.00	1.00	30	3
COD	mg/L	5.00	APHA 5220 C	10.00	21.50	41.50	2.50	4.75	125	250
Oil & Grease	mg/L	5.00	APHA 5520 B	D.L. [1] [4]	D.L.	D.L.	D.L.	D.L.	10	10
pH	Standard Unit	n.a.		7.60	8.00	7.60	5.60	6.30	6-9	6.5-8.5
Temperature	^oC	n.a.		24.50	24.00	24.00	20.50	24.00		-

Notes:
D.L. = value detected below detection limit for all samples at the station.
n.a. = not applicable
N.D. = not detected
To determine the average level at a station with one of the two samples reported to be below detection limit, value below detection limit is halved for the calculation.

5.5.4 Natural Disasters

Myanmar regularly experiences cyclones, storm surges, floods, landslides, earthquakes, drought and forest fires. Over the last 10 years, Myanmar has been impacted by two major earthquakes, three severe cyclones, floods and other smaller-scale hazards, according to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). OCHA works closely with the Ministry of Social Welfare, Relief and Resettlement and humanitarian partners to ensure a more systematic, inclusive and coordinated approach to disaster management, preparedness and response.

In 2015-2016, the El Niño phenomenon has been one of the strongest since 1950, with a significant influence on weather patterns. This resulted in drought conditions with intermittent 'very severe' category cyclones in different parts of Asia and the Pacific. Myanmar sits on two major faults, including the Sagaing (Silver) Fault that runs north to south of the country over about 1,000km, and the Chittagong-Tripura Fold Belt. At least 18 major earthquakes have occurred during the 20th century in Myanmar with the largest measured at a magnitude of 8.0 on 23 May 1912 in the Sagaing Region.

Figure 5.17 highlights Myanmar natural hazard risks and *Figure 5.18* highlights natural disaster risks and most recent past events as at 2016 in Myanmar.

Pyi Nyaung area is not situated in the areas classified as most prone to flooding and cyclones in Myanmar.

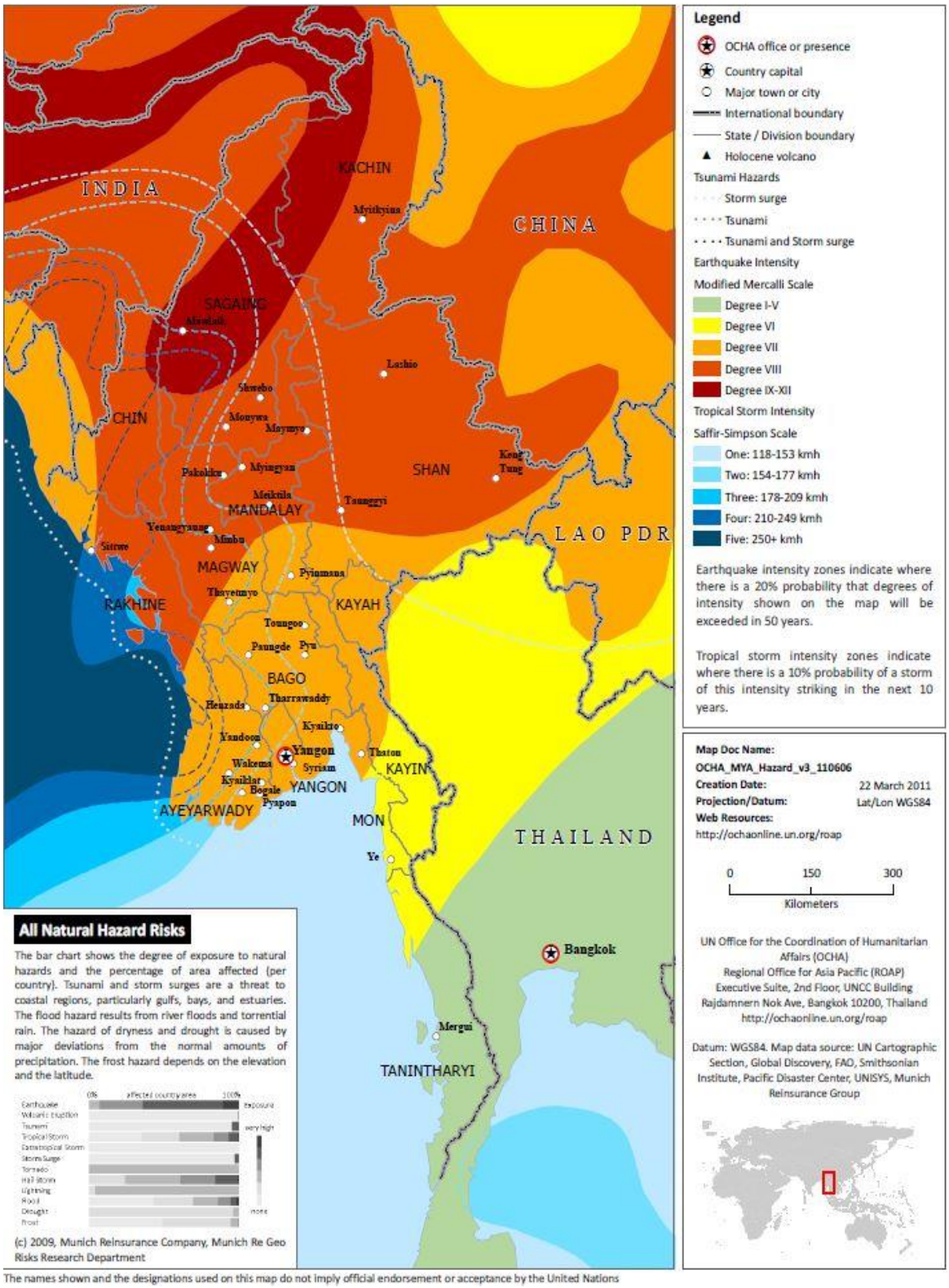


Figure 5.17 Myanmar Natural Hazards Risks by OCHA (March 2011)

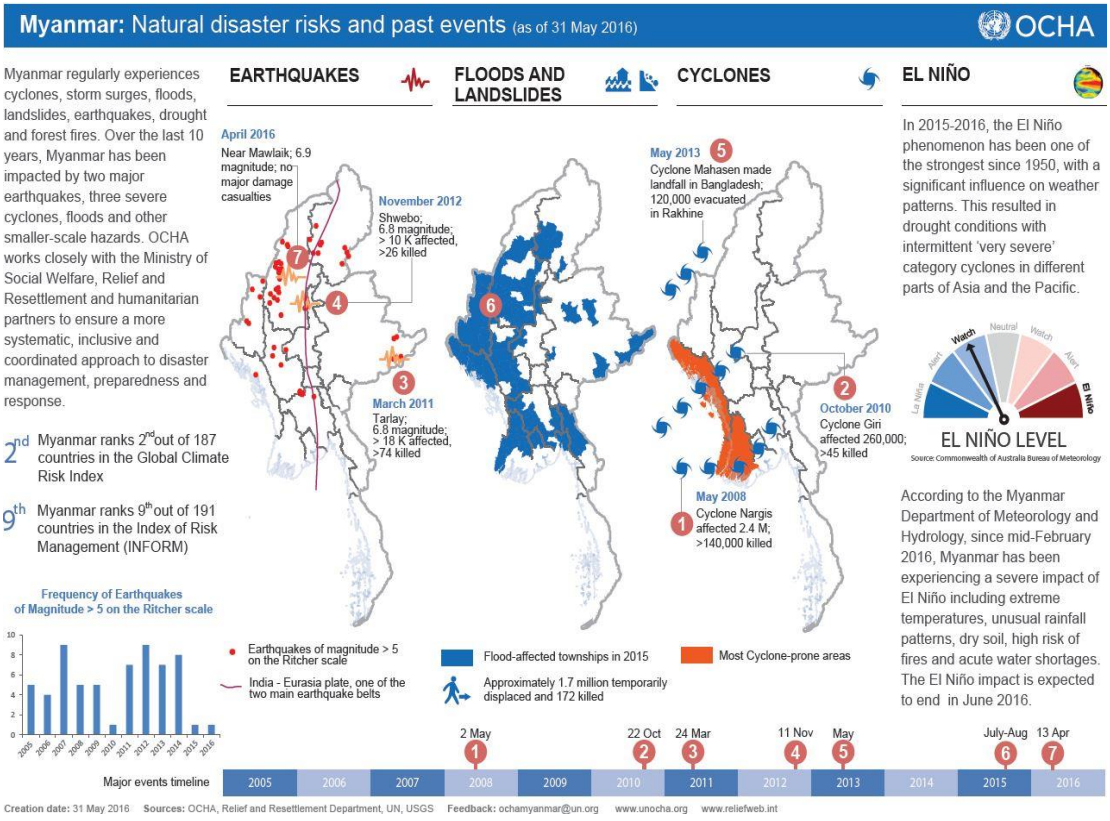


Figure 5.18 Myanmar Natural Disaster Risks and Past Events by OCHA (May 2016)

5.6 Biological Components

The WHR units will be located within the cement plant which is a developed brownfield area with negligible ecological value. Baseline biodiversity survey is thus not considered necessary for the Project.

5.7 Social Baseline

During the previous STC cement plant expansion EIA, baseline socio-economic data were collected through the following:

- Consultation with village leaders in Pyi Nyaung Village and Kubyin Village during Scoping in November 2016.
- Community briefings in Pyi Nyaung Village and Kubyin Village in January 2017.
- 50 Household surveys in Pyi Nyaung Village and Kubyin Village in January 2017.
- Focus Group Discussions with women and farmers in Pyi Nyaung Village and Kubyin Village in January 2017.

During the data collection, the community was firstly briefed on details of the cement plant expansion which include the WHR units. Relevant findings from the baseline data collection were presented below.

5.7.1 Demographics and Population

The socio-economic baseline is derived from engagement with village leaders, groups of farmers and women and a survey of 50 households from two villages in the vicinity of the Project Site. These villages were selected for study on the basis of them being potentially affected by STC's operations

and include all villages within 5 km of the Project Site. Pyi Nyaung (approximately 7 km from the cement plant), within the Project's Area of Influence, was also included in the study. STC's base camp is located in this village and all cement trucks pass through this village. The surveyed households in each village were selected at random by ERM.

Basic information concerning the surveyed households and villages is summarised in *Table 5.15* and *Table 5.16*.

Table 5.15 Population Data of Surveyed Households

Village Name	Number of respondents	Ethnic Group - Bamar	Ethnic Group - Karen	Average number of members per HH	Total number of residents in village	Male / Female Respondents (%)	Average Age of Respondent (years)
Kubyin	25	19	6	4.84	271	12%/88%	42
Pyi Nyaung	25	25	0	4.80	2,569	48%/52%	49

Table 5.16 Economic Data of Surveyed Villages

Village Name	Average Monthly Income (Kyat per HH)	Average Monthly Expenditure (Kyat per HH)	Land Holdings (number of HH / surveyed) (1)	Average Land Holding per household (acres) (1)	Total Land Holding of the Surveyed HH (acres) (1)
Kubyin	284,400	52,020	16 (of 25)	1.81	29
Pyi Nyaung	264,400	180,520	18 (of 25)	3.56	64

Note:

(1) The farmland is state owned forest area which villagers cleared to grow crop, except for Kubyin Village. The farmers of Kubyin Village are farming government owned forest, which is a replantation area under the management of the Forest Department.

5.7.2 Health

The residents consulted in the two villages stated that they considered themselves healthy and do not face any serious diseases. Generally speaking, malaria was noted as the main cause of adult mortality, however, villagers have not suffered new cases of malaria for a long time. In the dry season, sometimes they suffer from minor skin irritation allegedly due to the water shortage.

Thazi Township counts four public hospitals, located in Thazi (50 beds), NyaungYan (16 beds), Yin Mar Pin (16 beds) and Hanzar (16 beds), as well as eight private clinics and 7 rural clinics. Thazi Township's population is currently about 200,000 and on a decreasing trend, being subject to rural exodus. The township has 12 registered medical doctors, 20 nurses and 5 medical township officers.

The most common diseases affected the population are malaria, diarrhoea, tuberculosis, dysentery and hepatitis; 25 people were affected by AIDS over 2015 and 2017 and 10 people died of AIDS during the same period. According to communication with GAD officer in Thazi, the infant mortality rate was about 14.8 deaths of infants under one year old per one thousand live births for a birth rate of 0.8 per one thousand midyear population as at March 2017. The company is in the process of putting together, and will be implementing a community health program including activities to raise local awareness of health issues.

5.7.3 Education

Of those consulted in January 2017, a significant percentage were illiterate. Only one village (Pyi Nyaung) has people that had attended university education. The illiteracy rate in the households consulted ranged from 32 to 44%. Data collected are presented in *Table 5.17*.

Table 5.17 Number of Households (surveyed) within Education

Village Name	Illiterate	Primary	Middle School	Secondary School	University
Kubyin	11 (44%)	9 (36%)	5 (20%)	0	0
Pyi Nyaung	8 (32%)	8 (32%)	6 (24%)	1 (4%)	2 (8%)

5.7.4 Cement Plant

The Project is located within Pyi Nyaung Village of Thazi Township in Mandalay Region. The populations of Pyi Nyaung and Kubyin are 2,569 (53% male) and 271 (50% male), respectively. The household surveys indicate that most of the people in both villages are of Bamar ethnicity and are predominantly Buddhist, and there were also persons of mixed Bamar and Danu descent. There are six ethnic Karen (Christian) households in Kubyin (of the six households; four were met) and one was met in Pyi Nyaung. Consultation with officials and the community revealed that there are no areas or sites of special cultural importance within the Project AOI.

5.7.4.1 Pyi Nyaung Village

Located 5.52 km south of the cement plant (distance from kiln stack to Pyi Nyaung junction) and founded in 1946, Pyi Nyaung Village is home to some 594 households for a population of 2,569. About 500 households include a working age member. The survey was run among 25 households, reaching out to 120 people (4.8 members per household on average). According to the Pyi Nyaung Village Tract leader, 60 HH have a member working at STC on a full time or casual basis and approximately 300 households (80% of the working population) are engaged in lime production from kilns scattered throughout the village: approximately 53 households manage lime kilns, 60 extract limestone from a nearby hill (does not overlap with any other concession) and approximately 56 collect firewood for lime production, which is the main economic activity in the village. About 250 households have at least one member engaged as casual labour for the lime kilns. Another 40 households package and trade lime or run small shops, restaurants, market stalls or are engaged in hawking.

A majority of the households surveyed hold land (72% or 18 households) for an average size of 2.56 acres per household. The farming land for the 25 surveyed households spreads over 64 acres (including 30 acres belonging to the same household). According to the Village Tract Leader, about 55 households are small scale gardeners. Of the 25 surveyed households, only one household is involved in large scale farming and holds 30 acres of land.

Rice cultivation is widespread on the outskirts of the village. The average land holding size in the village is two to four acres and a total of five households are engaged in this activity. The main crops grown in the area are summer paddy rice, banana and mango. Rice is sown in June or July and harvested in September or October. Bananas are grown in April through May. Of the 25 surveyed households, a quarter owns livestock (chicken, buffalo, pig, goat and duck) for consumption (chicken and pigs) or sale (buffalos, cows and goats).

Within Pyi Nyaung Village, three households are engaged in electric fishing (which is illegal) and another seven households work for the government in administration, education and health functions.

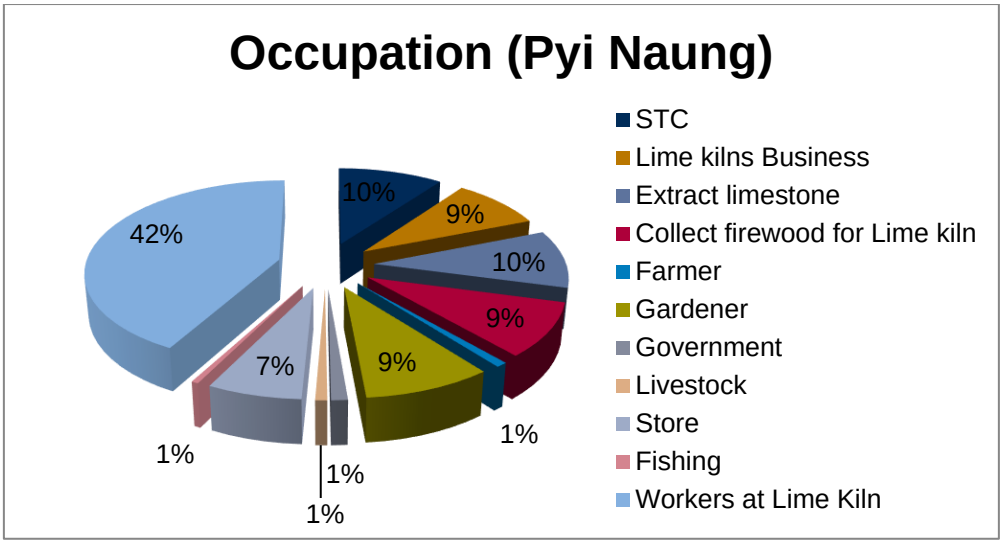


Figure 5.19 Employment in Pyi Nyaung Village (Source: ERM, 2017)

While limestone production, including the extraction of limestone and firewood, is reportedly the main source of income for residents of Pyi Nyaung, an unknown number of residents are involved in logging of teak and other hardwood timber and its transportation to the nearby towns of Taunggyi, Thazi and Meikhtila.

The average monthly income is Kyat 264,400 per household with 5 households earning double and one more than triple that amount, from his business. The median monthly income of those surveyed is Kyat 210,000. One respondent declared earning double the average from “other sources”.

Over half of the respondents (56% or 14 households) stated having taken a loan for their business (28%), to buy food (16%) or for education or medical expenses (12%) but only two-thirds (36%) of those declaring loans mentioned repaying a loan as part of their expenditures.

The majority of the respondents (64% or 25 households) buy purified drinking water and the remaining respondents (36%) source their water for drinking and other domestic usage from the nearby creek. The village relies on water in the Myithar (Myit Tha) Stream and the Panlaung River as its natural water source and there is a supply of piped water from a hand–dug well near to the river that serves a few areas. All of the respondents described the drinking water quality as “good”. According to the Village Tract Leader, there is a shortage of water each year in the summer months and this was confirmed by 40% of those interviewed.

Virtually all surveyed respondents (96%) use dry pit latrines and consider sanitation satisfactory for the community’s needs (the remaining respondent found it good). The respondents are satisfied with arrangements for solid waste disposal: 24 found it satisfactory and 1 good. There are mixed views concerning the changes in water quality and quantity over the last three years, with an equal number of respondents reporting a decline in quality/availability as those saying that it has not changed.

The electricity supply for Pyi Nyaung Village is from the national grid via a transmission line provided by STC and three other companies. This arrangement has been in place since 2014. Only 60 % of HH have access to electricity from the national grid, which is reflected in the household survey, with the remainder reliant on diesel generators (20% of surveyed households) and solar energy (one surveyed household). Four surveyed households (16%) have no regular access to electricity. A majority of respondents (88%) believes the electricity supply is adequate for the community, including the respondents with no regular access to electricity, with 12 % (or 3 households) describing it as satisfactory (two are connected to the national grid, one to a power generator).

Pyi Naung has a relatively good road network connected to a main highway and all the surveyed respondents described the roads and transport options as good (100%). However, most of the smaller access roads are impassable during the rainy season. The terrain and nature of the soils

requires regular maintenance of roads, hence making road maintenance important. An induced impact of the improvement to access routes brought about by the development of the STC cement plant is the increased pressure on forest resources from activity by residents of Pyi Nyaung Village and from settlements further afield. The improved access allows larger trees to be harvested using equipment and transportation that would previously not been able to access these areas. Those travelling from Thazi, Taunggyi and Meikhtila are generally seeking the larger teak and other hardwood north of Kubyin Village rather than competing with local residents for firewood.

The majority of the surveyed respondents (56% or 14 households) use fire as a cooking fuel. The consumption of firewood per day is about 3 kg for one household (90-100kg a month) and one household of three members consuming three times that average. All surveyed respondents but three buy firewood. The firewood can be collected in forest areas 30 minutes by foot from the village. Up to 1 kg of charcoal per day is also used for cooking by about a quarter of villagers. Half of the surveyed households use electricity for cooking.

Three households (12%) described themselves as entirely dependent on forest products for their livelihood for lime production or to sell as firewood: these same households indeed stated that all of their income comes from their business activities. Nearly half (48%) stated they are half dependent on such resources and ten households (40%) assessing themselves as a quarter dependent. A total of 16% (4 households) stated they rely on forest products for lime production and 80% (20 households) for firewood.

No household raised any concern associated with firewood and none described the deforestation that may be happening in their area as a source of concern. Residents reported having multiple options for places to collect firewood for domestic use and for sale.

The respondents spend on average 28% of their income on education: this represents 27% of the total income of the 25 households that is spent by 17 of them. All the respondents described the education services as good (100%) – there is a secondary school. A slight majority (52%) described the medical services as also good or satisfactory (32%) but 16% (4 households) as unsatisfactory. Nearly a third of respondents incurred recent healthcare expenses with one particular household spending over 60% of its income on healthcare.

About 36% of respondents described the law and order as satisfactory and the remaining respondents as good.

Figure 5.20 Socio-economic Survey at Pyi Nyaung Village

5.7.4.2 Kubyin Village

Located approximately 4 km north of the cement plant, Kubyin Village is home to some 65 households. Situated within the Kubyin Forest Reserve that is under the local administration of the Meikhtila Forest Department, Kubyin is a relatively isolated village established in 1970 by the Forest Department to manage and log the teak plantation. The household survey interviewed 25 households and with an average of 4.8 members per household, the surveyed respondents represented 121 of the 271 residents in the Village.

Prior to the construction of the STC plant, the village was only accessible by bullock-cart or on foot from Pyi Nyaung, approximately 10km to the south. No Kubyin residents owned motor vehicles prior to the construction of the concrete access road to the cement plant and the bypass road to Kubyin Village that were constructed by STC.

There is no grid-supplied electricity in Kubyin. In 2015, the Forest Department donated 46 solar panels to the village. Water supply is from the Kubyin Stream and a single well installed on the bank of the river that is used mainly in the dry season when the water level is low. Drainage from STC's operations flows into the Kubyin Stream.

There is very little cultivation within Kubyin Village but the majority (96%) of the surveyed respondents described themselves as farmers, with 16 households earning income from their land and an additional 7 involved in labour work. The Village Tract Leader stated that 58 out of 65 households are engaged in agriculture (summer paddy, maize, sesame). The farmers of Kubyin Village are farming in government owned forest, which is a replantation area under the management of the Forest Department. Agriculture provides 66% of the total income of the sample and on average 56% of the income of those involved in farming on their own land (average plot size of 1.16 acres), and 30% of

the income of those involved in labour work. The farming land for the 25 surveyed households spreads over 29 acres. While it was not reported by residents in the surveys, it is clear that a large number of residents in Kubyin village extract forest products as their main source of income.

Of the 25 surveyed households, 80% reported owning livestock (210 chickens, 56 buffalos, 23 cows, 12 pigs) mainly for consumption and a smaller amount for sale.

According to the Village tract Leader, some households collect firewood for delivery to the lime kilns in Pyi Nyaung (there are no kilns in Kubyin). All the respondents (25) of the household survey stated that they rely on firewood as a source of cooking fuel and 92% (23 households) get it from the forest. Only one household (of 4 members) buys it, dedicating 64% of its monthly expenditure to that item (with the outstanding entirely spent on telephone costs), while the other household, the monastery, receives it from donation. It takes households nearly 40 minutes to reach a place in the forest where they can get firewood and the respondents declared consuming on average 465kg of firewood per household a month. Eight households consume on average 886 kg a month (225 kg per household member) while the remaining 18 households consume on average 267 kg a month (63 kg per household member). Academic research carried out in the Taungyi District, Shan State[14], reports that the monthly average rural household consumption of fuelwood is 222 kg.

About 9 households (36%) described themselves as entirely dependent on forest products for their livelihood while 11 households (44%) stated they are half dependent on such resources and 5 (20%) assessing themselves as a quarter dependent. A large proportion of this income is understood to be related to timber extraction, transportation and trade.

No household raised any concern associated with firewood, however several households and the village leader described the deforestation in their area as a source of concern.

None of the residents of Kubyin work at STC's cement plant. The market prices for forest products advised by residents of Kubyin Village indicate that the economic incentives favour collection of forest products over working at STC.

Table 5.18 Market Price of Forest Products vs Wages at STC

Item	Market Price (MMK)
Length of regular bamboo	100
Length of elephant bamboo	1,500
Small tree (kiln fuel)	5,000
Large teak tree	120,000-150,000
Minimum Daily Wage at STC	3,600-5,000

Reportedly, residents of Kubyin are not attracted to working at STC's plant given the significant difference between salaries offered at the cement plant compared with what can be earned through timber extraction and harvesting of other forest products. Reportedly, the main source of income for most households in Kubyin is the extraction and sale of teak and other timber. This has intensified since the start of STC's operations due to improved accessibility afforded by the upgraded road to the cement plant. Prior to the construction of STC's cement plant, Kubyin residents transported timber via bullock cart 10 km to Pyi Nyaung and onwards to market. Today, the use of six-wheeled trucks and tractors by Kubyin residents is common. One resident that ERM spoke with sold his house in Pyi Nyaung in 2015, moved to Kubyin and purchased three six- wheel trucks that he rents out to extract timber.

Due to a rapid decline in hardwood timber in and around Kubyin over the last few years, in 2015 residents of Kubyin constructed a 6 km road north along the valley floor to Shan Gate (at the border of Shan State) to allow for timber extraction.

([14]) Chaw Sein C., Min Aye Z., Razafindrabe Bam H.N. (2015), Study on consumption of fuel wood and its impacts to forest resources in Taungyi District, Global Journal of Wood Science, Forestry and Wildlife, 2449-1780 Vol. 3 (2), pp.43-51

The average monthly income of those interviewed is Kyat 284,400 with 7 households earning more than that amount (the median monthly income was Kyat 180,000 and the Village tract Leader mentioned that all the households earn Kyat 100,000 to 200,000 per month with three earning up to Kyat 300,000 per month). One respondent declared earning an agricultural income which represents 8 times the average agricultural income declared by all the surveyed households. The source of this "agricultural" income is very likely timber extraction.

The average monthly expenditure is Kyat 52,020 per household mostly spent in small amounts on education, diesel/petrol, loan repayments and telephone. The nearest market is in Pyi Nyaung Village, 30 minutes away by motorbike.

Some of the respondents declared having a loan (9 households or 36%) to buy seeds but only two-third of those with a loan mentioned repaying a loan as part of their expenditure.

The feedback from respondents regarding employment is negative, with 88% describing local employment as unsatisfactory and 8% stating it is unavailable. As context, respondents stated that they can generate higher incomes from timber extraction compared with working at the STC cement plant.

The majority of the respondents (96% or 24 households) source their water for drinking and other domestic usage from the Kubyin Stream. About 76% of households described the drinking water quality as "good" and 24% as "poor". Regarding the adequacy of the drinking water supply to the community, 76% found it satisfactory and 24% good.

About 84% of respondents use dry pit latrines and overall, 76% of respondents found the sanitation satisfactory and 24% "good" for the community's needs. About 28% of respondents found that the water quality, and 32% that its quantity, have declined over the last three years (the remaining respondents found no change, with the monastery not responding). Whether this has been occurring in the rainy or summer season, or every day or sometimes only, is not conclusive. The respondents raised concerns about the adequacy of the waste disposal system with 68% describing it as unsatisfactory and 16% as non-existent.

As recorded in January 2017, most households (56%) are connected to solar panels donated from the Forest Department for their power supply and about 40% rely on a generator. One household does not have access to electricity supply. It is reported by STC that the company has donated a 60 kVA generator to Kubyin Village in February 2017 and now the whole village has access to electricity supply.

Respondents described the roads and transport options as either satisfactory (32%) or good (68%).

The respondents spend on average 25% of their income on education. All the respondents described the education services as satisfactory (60%) and even good (40%) – there is a middle school - but medical services are not available (except the household representing the monastery). Residents reported that there have been no malaria cases for a long time. Just over a third of the respondents (9 households) reported healthcare expenditure, with three households spending less than 5% of their income on healthcare, 5 spending between 25% and 38% and one spending 55% of its income on healthcare.

Half (48%) of respondents described the law and order as satisfactory or good (16%) but 36% found it unsatisfactory, with concerns raised about "outsiders" coming to the area to (illegally) extract timber and other forest products.

Figure 5.21 Socio-economic Survey at Kubyin Village

5.8 Cultural Heritage

Thari Township hosts about 160 Buddha statues, 207 pagodas, 302 monasteries, 2 convent schools and 143 Dhamma Halls, as well as 2 churches, 7 mosques and 2 Hindi temples and an ancient Pyu Cemetery classified as a historical building.

There is no cultural heritage of importance identified in the vicinity of the cement plant in Pyi Nyaung.

Pyi Nyaung is situated on the road from Meiktila in Mandalay region to Taunggyyi in Shan State, in Thazi (Thazi) Township, between Yin Mar Bin and Kalaw. Kalaw is in Shan State on the way to He Hoe and Tanuggyi from where the Inle Lake can be accessed.

There are records of ancient sites from bronze and iron ages at Bwe Char Village, Kan Thit Kone Village and Ywar Kone Kyi Village of Thazi Township. These villages are more than 6 km from the Project Site and thus the cultural heritage resources are unlikely to be affected by the construction and operation of the Project.

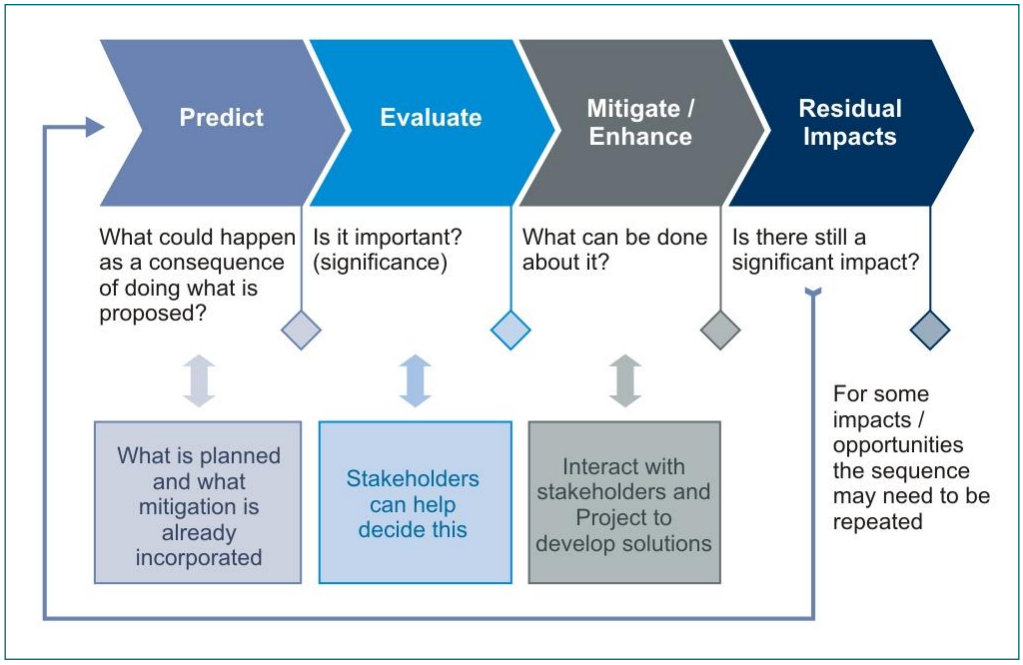
6. IMPACT ASSESSMENT

6.1 Impact Assessment Methodology

The principal impact assessment steps are summarised in *Figure 6.1* and comprise:

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

Figure 6.1 Impact Assessment Process



6.1.1 Prediction of Impacts

Prediction of impacts is an objective exercise to determine what could potentially happen to the environment as a consequence of the Project activities. Potential interactions between the Project and the baseline environment are identified at this stage. The diverse range of potential impacts considered in the impact assessment process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

Potential interactions that are deemed not to result in a potentially significant impact will be scoped out with justification and will not be considered in more detail in the IEE phase. Impacts which are anticipated to have potential to generate significant impacts are defined as requiring further detailed assessment and are carried out to the next stage of the impact assessment process below.

6.1.2 Evaluation of Impacts

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

Table 6.1 Impact Characteristic Terminology

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

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

Table 6.2 Impact Type Definitions

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

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

Table 6.3 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.

Likelihood	Definition
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

6.1.3 Impact Magnitude, Receptor/Resource Sensitivity and Impact Significance

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

- Extent
- Duration
- Scale
- Frequency

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

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

- Positive
- Negligible
- Small
- Medium
- Large

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

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

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

- Low
- Medium
- High

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in *Figure 6.2.*

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

Figure 6.2 Impact Significance

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix. *Box 6.1* provides a context for what the various impact significance ratings signify.

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

Box 6.1 Context of Impact Significances

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

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

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

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major

residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.1.3.1 Identification of Mitigation and Enhancement Measures

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

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

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

6.1.3.2 Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

6.1.3.3 Management and Monitoring

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

An Environmental and Social Management Plan, which is a summary of all actions which the Project Proponent has committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the IEE report. The Environmental and Social Management

Plan includes mitigation measures, compensatory measures and offsets and management and monitoring activities.

6.2 Identification of Impacts

6.2.1 Scoped Out Impacts

Potential interactions that were deemed not to result in a potentially significant impact have been scoped out with justification and will not be considered in more detail in the IEE phase. The rationale for scoping out impacts associated with the construction and operation of the Project is provided in *Table 6.4.*

Table 6.4 Aspects scoped out and not carried over into the detailed Impact Assessment

Resource / Receptor	Justification for Expectation of non-significance of Impacts
Air Quality – Construction and Operation	Air quality impacts on sensitive receptors will be **negligible** since the nearest ASR (Kubyin Village) is located more than 2 km from the Project Site and is unlikely to be affected by the construction activities of the Project. The Project will adopt pure low temperature waste heat to generate electricity without additional fuel furnace. As such, there will not be any operational emission from the Project.
Noise – Construction and Operation	The impact on noise will be **negligible** since the nearest NSR (Kubyin Village) is located more than 2 km from the Project Site and is unlikely to be affected by the construction and operation activities of the Project.
Soil and Groundwater Quality - Construction and Operation	Given that the Project only involve minor excavation works at existing brownfield location, potential impacts to groundwater quality and soil quality are not expected to occur.
Biodiversity - Construction and Operation	The WHR units will be located within the cement plant which is a developed brownfield area with negligible ecological value. Potentially significant impacts to biodiversity impacts are thus not expected to occur.
Waste Management – Construction and Operation	The construction and operation activities would be covered by the WMP of the STC cement plant. Potentially significant impacts on waste management are thus not expected to occur.
Landscape and Visual – Construction and Operation	The WHR units will be located within the cement plant which is a developed brownfield area with negligible landscape and visual value. Potentially significant impacts to landscape and visual values are thus not expected to occur.
Land Use - Construction and Operation	The WHR units will be located within the cement plant which is a developed brownfield area with no additional land requirement. Potentially significant impacts to land take are thus not expected to occur.

Resource / Receptor	Justification for Expectation of non-significance of Impacts
Cultural Heritage - Construction and Operation	There is no cultural heritage of importance identified in the vicinity of the cement plant in Pyi Nyaung. There are records of ancient sites from bronze and iron ages at Bwe Char Village, Kan Thit Kone Village and Ywar Kone Kyi Village of Tharzi Township. These villages are more than 6 km from the Project Site and thus the cultural heritage resources are unlikely to be affected by the construction and operation of the Project.
Community Health and Safety and Livelihood Impacts – Construction and Operation	The nearest community at Kubyin Village is located more than 2 km from the Project Site and is unlikely to be affected by the construction and operation activities of the Project.
Water Use Impact to Community during Construction	The Project will not significantly increase the workforce on site during construction (around 200 works required for construction). A very small volume of water will be required for the construction activities which mainly involve installation works and this will be sourced from the reservoir operated by STC. Potentially significant impacts on water use by community during construction is thus not expected occur.
Occupational Health and Safety – Construction and Operation	The Project will not significantly increase the workforce on site (around 50 works required for construction and no additional workforce to existing cement plant operation required for the WHR units). As such, impacts on occupational health and safety are not expected to be potentially significant.

6.2.2 Scoped-In Impacts

The following impacts which are anticipated to have potential to generate significant impacts are defined as requiring further detailed assessment and are carried out to the next stage of the impact assessment process.

- Impacts from operation of the Project on use of water by the community;
- Impacts from wastewater discharge and accidental spills on water quality during construction and operation of the Project; and
- Positive impact from reduction in greenhouse gas emission due to operation of the Project.

6.3 Impact Assessment and Mitigation Measures

6.3.1 Impacts from Operation of the Project on Use of Water by the Community

6.3.1.1 Potential Impacts

It is estimated that the WHR units will use water at a rate of 10.42 m^3/hour during the operation phase (*Figure 4.7*). In addition, the average water consumption for the first line of cement production is ~200-250 m^3 per day. The maximum domestic water usage is ~500 m^3 per day. For the second line, it is anticipated average actual water consumption would be ~350-550 m^3 per day based on STC experience on actual water consumption of the first line. The maximum domestic water usage would be ~250 m^3 per day.

Water for the WHR units, the two lines of the cement production and domestic uses will be supplied from the two reservoirs situated within the plant area, with capacities of 6 million US gallons (equivalent to approximately 22,712 m^3) and 45 million US gallons (equivalent to approximately 170,343 m^3), respectively. The reservoirs are connected to the Kubyin Stream at Kubyin Village, from which water will be extracted to the reservoirs if necessary. Since the Kubyin Steam is also used by the community as a water source, extraction of water for use at the cement plant may affect water supply to Kubyin Village.

The waste heat recovery system is air-cooled, thus reducing the requirement of water usage for such a system i.e., as opposed to a water-cooled system. According to STC, water supply from the two reservoirs within the plant area would be adequate to supply water required for the cement production lines, domestic usage as well as the WHR units. STC did not take any water from the Kubyin Stream or any nearby water bodies used by the communities since the dry season of 2017. Nevertheless, STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction.

Given the above, the magnitude of this impact is considered small. The receptor sensitivity is high given that the Kubyin River is used as a drinking water supply by the local community. The overall impact significance is therefore **Moderate**.

6.3.1.2 Mitigation Measures

- STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction.
- STC has also sponsored and installed water purification systems in Kubyin Village to improve the water supply quality at the area.

Table 6.5 Summary of Impact Assessment from Operation of the Project on Use of Water by the Community

Impact	Operation of the Project on Use of Water by the Community				
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Impact may occur on community at Kubyin Village which use Kubyin Stream as water source.				
Frequency	Infrequent during operation of the Project in dry season.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major

6.3.1.3 Residual Impact

When correctly applying and actively managing the mitigating controls outlined above, it is reasonable to conclude that residual impacts from operation of the Project on use of water by the community would be of **Minor** significance.

6.3.2 Impacts from Wastewater Discharge and Accidental Spills on Water Quality during Construction and Operation of the Project

6.3.2.1 Potential Impacts

Impacts to surface water courses may arise from the following sources during construction and operation of the Project:

- Wastewater discharge during construction and operation of the WHR units; and
- Accidental spill during construction of the WHR units.

Wastewater will be generated during construction of the Project. The Project mainly involves installation works of WHR unit components with minor excavation and backfilling works. Runoff from the Project Site will be diverted to sedimentation pond to allow settlement of suspended solids, thus reducing the level of suspended solids in the runoff before being discharged. Wastewater will also be generated from the construction workers which is expected to be limited in volume with 200 workers and would be handled properly by the existing facilities within the cement plant which are described in details in *Section 4.5.3*. The impact magnitude is thus considered to be negligible.

During construction of the Project, accidental spill of fuel, for example during fuelling operation of the construction plants, may affect water quality if the spilled fuel enters nearby water bodies. Accidental spill at fuel storage and refuelling area, if occurred, is expected to be well-controlled due to the concrete-paved and bunded areas to contain the spill (*Figure 6.3*). The impact magnitude is thus considered to be negligible.

Wastewater generated from the operation of the WHR units will be ~128 m^3/day (*Figure 4.7*). Wastewater will be treated by the wastewater treatment facilities of the cement plant to comply with the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) (*Table 3.8*). Treated wastewater will be reused within the cement plant. The impact magnitude is thus considered to be low.

No fuel is required to be used for operation of the WHR units. As such, spill impacts are not expected to occur during operation.

Given that the nearby water bodies may be used by the community downstream, the receptor sensitivity is considered high for water quality impacts.

Overall, the impact significance is considered **Negligible** for construction phase and **Moderate** for operation phase.

Table 6.6 Summary of Impact Assessment from Operation of the Project on Wastewater Discharge and Accidental Spills

Impact	Impacts from Wastewater Discharge and Accidental Spills on Water Quality during Construction and Operation of the Project				
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Impact may occur on nearby water bodies and community using such water sources.				
Frequency	May occur during construction and operation of the Project.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major

Figure 6.3 Fuel Storage Area at the Cement Plant

6.3.2.2 Mitigation Measures

- For construction phase, treated wastewater will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges.
- Fuel storage and refuelling should be undertaken at designated area which are concrete-paved and bunded to contain any potential spill.
- STC is in the process of designing the wastewater treatment facilities. It is intended to install separate modular wastewater treatment units to collect and treat wastewater from different zones of the site considering the technically and economically feasibility of the piping arrangement. Treated wastewater from these units will be conveyed to a centralized tank for reuse in the cement plant. Wastewater will be treated to comply with the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) (*Table 3.8*).
- For operation phase, treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine

and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) (*Table 3.8*).

- For operation phase, sludge generated from the units will be dewatered to meet with the Myanmar NEQ for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility (*Table 3.9*). Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal.

6.3.2.3 Residual Impact

When correctly applying and actively managing the mitigating controls outlined above, it is reasonable to conclude that residual water quality impacts would be of **Negligible** significance from construction of the Project and of **Minor** significance from construction of the Project.

6.3.3 Positive Impact from Reduction in Greenhouse Gas Emission due to Operation of the Project

According to IFC estimates, the CO_2 emissions per tonne of cement produced will reduce by 17% between the first line and the second line of cement production with the WHR Project implemented. This is driven by a planned reduction in power specific consumption of 38% for each tonne of cement produced and a planned reduction in fuel specific consumption of 17% for each tonne of clinker produced.

IFC estimates are based on a production at 90% of the design capacity of the respective cement lines, on 100% coal use and a coal emission of 96 kg CO_2 per GJ, on a Myanmar grid factor of 0.26 kg CO_2 per KWh and a calcination of 525 kg CO_2 per tonne of clinker. The first cement line would emit 855 kg CO_2 per tonne of cement produced, according to IFC estimates. The process optimisation of the line, planned in parallel to the Project, would enable a decrease in the coal energy per tonne of clinker factor, a lower cement energy use (in kWh per tonne of cement) and a lower clinker to cement ratio, leading to the first line emitting 743 kg CO_2 per tonne of cement produced. The second line is designed and expected to emit 716 kg CO_2 per tonne of cement produced without the WHR unit and 710 kg CO_2 per tonne of cement produced with the WHR unit in place.

In summary, the existing Line 1 currently emits approximately 423,153 tpa of CO_2 emissions. As a result of the planned refurbishment of Line 1 and the installation of WHR unit, annual emissions from the existing Line 1 will drop to around 353,742 tpa. CO_2 emissions from Line 2 are calculated to be approximately 984,013 tpa. The breakdown of emissions generated form the clinker production (Scope 1) vs emissions associated with the use of imported electric power (Scope 2) are provided below in

Table 6.7.

As can be seen, the newly installed Line 2 produces considerably less emissions than Line 1 on a unit basis. WHR units will be installed to reduce emissions as far as practical.

Table 6.7 Breakdown of Project Greenhouse Gas Emissions

	Scope 1 Emissions- (From Cement Production)						
	Cement Production (Mtpa)	Operation Capacity (%)	Clinker/Cement Ratio (%)	Calcination (kgCO2/t clinker)	CO2 emissions per GJ	GJ/ton clinker	CO2 (tpa)
Line 1 (Original)	0.55	90%	92%	525	96	3.86	407,838
Line 1 (Refurb)	0.55	90%	83%	525	96	3.5	353,742
Line 2 (with WHR)	1.54	90%	83%	525	96	3.2	957,346

	Scope 2 Emissions - (From Electricity Consumption)				Total Scope 1 and Scope 2 CO2 Emissions (tpa)
	kWh/ton cement	Myanmar Grid coefficient (CO2 kg per kWh)	kg CO2 per ton cement	CO2 (tpa)	
Line 1 (Original)	119	0.26	30.94	15,315	423,153
Line 1 (Refurb)	108	0.26	28.08	13,900	367,641
Line 2 (with WHR)	74	0.26	19.24	26,667	984,013
		Total GHG from Refurbished Line 1 + Line 2			**1,351,654**

7. CUMULATIVE IMPACT ASSESSMENT

7.1 Methodology and Approach

Cumulative impacts encompass impacts that result from the incremental impact, on areas or resources used or directly impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. The IFC (2012) defines cumulative impacts as those generally recognised as important on the basis of scientific concerns and or concerns from affected communities.

Cumulative impacts in this section refer to the additional impacts that may be generated by other developments or activities in the vicinity of the Project Site, that when added to the impacts of the construction and operation of the proposed Project combine to cause a greater impact. Such impacts may arise due to spatial overlap (e.g. overlap in spatial extent of air quality changes) or temporal overlap (e.g. noise impacts caused by construction activities at the same time from different sources).

7.2 Potential Impacts and Mitigation Measures

The WHR units will be operated with the first and second lines of cement production and thus lead to cumulative impacts. Extraction of water resources by the WHR Project as well as the first and second lines of cement production has been assessed in *Section 6.3.1*. STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the cement plant. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction. When correctly applying and actively managing the recommend mitigating controls presented in *Section 6.3.1*, it is reasonable to conclude cumulative impacts from the WHR Project as well as the first and second line of cement production on use of water by the community would be of **Minor** significance.

In terms of wastewater discharge, wastewater generated from the operation of the WHR units will be treated by the wastewater treatment system of the cement plant. STC is in the process of designing the wastewater treatment facilities for the whole cement plant, including the first and second line of cement production. It is intended to install separate wastewater treatment systems to collect and treat wastewater from different zones of the site considering the technically and economically feasibility of the piping arrangement. All wastewater treatment systems will be designed to comply with Myanmar National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. Given the above, it is reasonable to conclude that cumulative water quality impacts would be of **Minor** significance from operation of the WHR units as well as the first and second lines of cement production.

At this time, there is limited information on other planned projects for the area and, as such, the cumulative impacts from subsequent projects should be considered as and when their development is confirmed.

8. ENVIRONMENTAL MANAGEMENT PLAN

This document provides the Environmental Management Plan (EMP) for the planning and operation of the Project. This EMP provides the procedures and processes which will be applied to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which STC has committed. In addition, this EMP is used to ensure compliance with statutory requirements and corporate sustainability policies.

Engineering, Procurement, Construction and Commissioning (EPCC) Company will be responsible for the implementation of the mitigation for the construction, while STC will implement the mitigation for the operation. Project Management Consultant will supervise EPCC on their construction activities and performances. STC will be responsible for both construction and operation phases monitoring.

8.1 Project Description by Project Phase

The proposed Project consists of two waste heat recovery (WHR) units to be installed at the STC cement plant in the Mandalay Region of Myanmar. A summary of the proposed Project is provided in *Table 8.1*.

Table 8.1 Project Details

Component	Details
Name of the Project	STC Cement Plant – Waste Heat Recovery (WHR)Project in Mandalay Region, Myanmar
Project Owner	Shwe Taung Cement Company Ltd. (STC)
Installed Capacity of the Project	8.8 MW
Type of infrastructure	Two (2) waste heat recovery (WHR) units

Mobilization of WHR contractor will be within 2019 and construction is expected to be completed in 16 months which will be followed by the operation of the WHR units.

8.2 Project's Environmental, Socio-Economic and, Where Relevant, Health Policies and Commitments, Legal Requirements, and Institutional Arrangements

The Project is being conducted in line with STC environmental policies as well as Myanmar regulatory requirements, and international conventions, standards and guidelines. Detailed information on the Project legal requirements and commitments are provided in *Section 3*. A summary of the Project environmental and social standards are shown in *Table 8.1*.

It should be noted that the NEQ for thermal power is not applicable to the Project since the total installed capacity of the WHR units is 8.8 MW, which is less than 50 MW as specified in the NEQ for thermal power. In addition, air quality and noise impacts are not expected to occur since the Project site is more than 2 km from the nearest sensitive receivers. As such, the NEQ for air quality and noise levels are considered not relevant to the Project.

Table 8.2 Project Environmental and Social Standards

Parameter	National Environmental Quality guidelines
Site Runoff and Wastewater Discharges -Construction Phase	Biological oxygen demand - 30 mg/l Chemical oxygen demand - 125 mg/l Oil and grease - 10 mg/l pH - 6-9 (standard units) Total coliform bacteria - 400 ml Total nitrogen - 10 mg/l Total phosphorus - 2 mg/l Total suspended solids - 50 mg/l
Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application) -Operation Phase	Biochemical oxygen demand- 50 mg/l Ammonia – 10 mg/l Arsenic - 0.1 mg/l Cadmium - 0.1 mg/l Chemical oxygen demand - 250 mg/l Chlorine (total residual) - 0.2 mg/l Chromium (hexavalent) - 0.1 mg/l Chromium (total) - 0.5 mg/l Copper - 0.5 mg/l Cyanide (free) - 0.1 mg/l Cyanide (total) - 1 mg/l Fluoride mg/l – 20 mg/l Heavy metals (total) – 10 mg/l Iron - 3.5 mg/l Lead - 0.1 mg/l Mercury - 0.01 mg/l Nickel - 0.5 mg/l Oil and grease – 10 mg/l pH - 6-9 mg/l Phenols - 0.5 mg/l Selenium - 0.1 mg/l Silver - 0.5 mg/l Sulphide - 1 mg/l Temperature increase - <3 °C Total coliform bacteria - 400 / 100 ml Total phosphorus - 2 mg/l Total suspended solids – 50 Zinc – 2 mg/l
Biosolids and Sludge Disposal – Operation Phase	Arsenic – 75 mg/kg Cadmium – 85 mg/kg Chromium (total) - 3,000 mg/kg Copper - 4,300 mg/kg Lead – 840 mg/kg Mercury – 57 mg/kg Molybdenum – 75 mg/kg Nickel – 420 mg/kg Selenium – 100 mg/kg Total coliform bacteria - 1,000 g Zinc - 7,500 mg/kg

8.3 Summary of Impacts and Mitigation Measures

The EIA has assessed the potential impacts and proposed mitigation and management measures to reduce the level of the impact. Through the Project development and the EIA process, STC has made commitments to ensure appropriate environmental and social performance. A summary of the Project impacts and the committed measures designed to manage and mitigate those impacts is presented in *Table 8.3*.

Table 8.3 Summary of Impacts and Mitigation Measures

Potential Impact/Issue	Control / Mitigation Measures	Significance of Residual Impact
Construction Phase		
Impacts from Wastewater Discharge and Accidental Spills on Water Quality	■ Wastewater generated from the construction workers will be handled properly by the existing wastewater storage and treatment facilities within the cement plant. ■ Treated wastewater will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. ■ Fuel storage and refuelling should be undertaken at designated area which are concrete-paved and bunded to contain any potential spill.	**Negligible**
Operation Phase		
Impacts from Operation of the Project on Use of Water by the Community	■ The waste heat recovery system is air-cooled, thus reducing the requirement of water usage for such a system i.e., as opposed to water cooled. ■ STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction. ■ STC has also sponsored and installed water purification systems in Kubyin Village to improve the water supply quality at the area.	**Minor**
Impacts from Wastewater Discharge on Water Quality	■ STC is in the process of designing the wastewater treatment facilities. It is intended to install separate modular wastewater treatment units to collect and treat wastewater from different zones of the site considering the technically and economically feasibility of the piping arrangement. Treated	**Minor**

	wastewater from these units will be conveyed to a centralized tank for reuse in the cement plant. Wastewater will be treated to comply with the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application). ■ Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application). ■ Sludge generated from the units will be dewatered to meet with the Myanmar NEQ for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility. Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal.	

8.4 Overall Budget for Implementing the EMP

It is estimated that the overall annual budget for implementing the EMP is between USD $150,000 and $200,000.

8.5 Management and Monitoring Sub-Plans

Given that there are no significant impacts from the Project (under *Section 6* of this EIA Report); no separate management plans are required for the following:

- Air: the impact on local air quality will be negligible since the nearest ASR (Kubyin Village) is located more than 2 km from the Project Site and is unlikely to be affected by the construction activities of the Project. The Project will adopt pure low temperature waste heat to generate electricity without additional fuel furnace. As such, there will not be any operational emission from the Project;
- Noise: the impact on noise will be negligible since the nearest NSR (Kubyin Village) is located more than 2 km from the Project Site and is unlikely to be affected by the construction and operation activities of the Project.
- Soil and Groundwater Quality: given that the Project only involve minor excavation works at existing brownfield location, potential impacts to groundwater quality and soil quality are not expected to occur.
- Waste Management: the construction and operation activities would be covered by the Waste Management Plan (WMP, *Annex A*) of the STC cement plant. Potentially significant impacts on waste management are thus not expected to occur.
- Biodiversity: the WHR units will be located within the cement plant which is a developed brownfield area with negligible ecological value. Potentially significant impacts to biodiversity impacts are thus not expected to occur.
- Landscape and Visual – the WHR units will be located within the cement plant which is a developed brownfield area with negligible landscape and visual value. Potentially significant impacts to landscape and visual values are thus not expected to occur.

- Land Use - the WHR units will be located within the cement plant which is a developed brownfield area with no additional land requirement. Potentially significant impacts to land take are thus not expected to occur.
- Cultural Heritage - there is no cultural heritage of importance identified in the vicinity of the cement plant in Pyi Nyaung and thus the cultural heritage resources are unlikely to be affected by the construction and operation of the Project.
- Community Health and Safety and livelihood impacts – the nearest community at Kubyin Village is located more than 2 km from the Project Site and is unlikely to be affected by the construction and operation activities of the Project.
- Water Use Impact to Community during Construction - the Project will not significantly increase the workforce on site during construction (around 50 works required for construction). Limited water will be required for the construction activities which mainly involve installation works. Potentially significant impacts on water use by community during construction is thus not expected occur.
- Occupational Health and Safety – the Project will not significantly increase the workforce on site (around 50 works required for construction and no additional workforce to existing cement plant operation required for the WHR units). As such, impacts on occupational health and safety are not expected to be potentially significant.

A summary of the monitoring for the Project is provided in *Table 8.4*. All the commitments for the Project are included in *Table 8.5.*

Table 8.4 Monitoring Programme for Project

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
Construction Phase			
Surface Water Quality	Treated wastewater from construction activities will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges. The parameters will include: • Biological oxygen demand - 30 mg/l • Chemical oxygen demand - 125 mg/l • Oil and grease - 10 mg/l • pH - 6-9 (standard units) • Total coliform bacteria - 400 ml • Total nitrogen - 10 mg/l • Total phosphorus - 2 mg/l • Total suspended solids - 50 mg/l	Treated wastewater will be monitored monthly.	STC Environmental Manager Contractor HSE Manager
Waste	The HSSE team will review the Monthly Waste Reports (MWR) received from the contractor and report waste generation and disposal to MONREC.	Waste will be monitored monthly.	STC Environmental Manager Contractor HSE Manager
Operational Phase			
Surface Water Quality	Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application). The parameters will include: • Biochemical oxygen demand- 50 mg/l • Ammonia – 10 mg/l • Arsenic - 0.1 mg/l	Treated wastewater will be monitored monthly for BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine. Treated wastewater will be monitored annually for the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application)	STC Environmental Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
	• Cadmium - 0.1 mg/l • Chemical oxygen demand - 250 mg/l • Chlorine (total residual) - 0.2 mg/l • Chromium (hexavalent) - 0.1 mg/l • Chromium (total) - 0.5 mg/l • Copper - 0.5 mg/l • Cyanide (free) - 0.1 mg/l • Cyanide (total) - 1 mg/l • Fluoride mg/l – 20 mg/l • Heavy metals (total) – 10 mg/l • Iron - 3.5 mg/l • Lead - 0.1 mg/l • Mercury - 0.01 mg/l • Nickel - 0.5 mg/l • Oil and grease – 10 mg/l • pH - 6-9 mg/l • Phenols - 0.5 mg/l • Selenium - 0.1 mg/l • Silver - 0.5 mg/l • Sulphide - 1 mg/l • Temperature increase - <3 °C • Total coliform bacteria - 400 / 100 ml • Total phosphorus - 2 mg/l • Total suspended solids – 50 • Zinc – 2 mg/l		
Surface Water Quality	Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal. The parameters will include: • Arsenic – 75 mg/kg • Cadmium – 85 mg/kg	Sludge will be monitored annually.	STC Environmental Manager

Project Activity/ Environmental Aspect	Monitoring Measures	Frequency	Responsibility
	• Chromium (total) - 3,000 mg/kg • Copper - 4,300 mg/kg • Lead – 840 mg/kg • Mercury – 57 mg/kg • Molybdenum – 75 mg/kg • Nickel – 420 mg/kg • Selenium – 100 mg/kg • Total coliform bacteria - 1,000 g • Zinc - 7,500 mg/kg		
Water Use	STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and address potential impacts to the local community before such extraction.	If required.	STC Environmental Manager

Table 8.5 Management Actions (Commitment Table)

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
Construction Phase					
C1.1	6.3.2	Impacts to water quality	Wastewater generated from the construction workers will be handled properly by the existing wastewater storage and treatment facilities within the cement plant.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report
C1.2	6.3.2	Impacts to water quality	Treated wastewater will be monitored monthly for compliance with the National Environmental Quality (Emissions) Guidelines for site runoff and wastewater discharges.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report
C1.3	6.3.2	Impacts to water quality	Fuel storage and refuelling should be undertaken at designated area which are concrete-paved and bunded to contain any potential spill.	STC Environmental Manager Contractor HSE Manager	Environmental Monitoring Report Spill Response Plan
Operation Phase					
O1.1	6.3.1	Impacts on water use by community	The waste heat recovery system is air-cooled to reduce the requirement of water usage.	STC HSSE Department Head WHR Unit Design Team	WHR Unit Specification
O1.2	6.3.1	Impacts on water use by community	STC is committed not to extract any water from the Kubyin Stream or any nearby water bodies used by the local communities for use by the Project. If it is required to extract water from the Kubyin Stream or any water bodies, STC is committed to assess the annual and seasonal water flow volume and speed of Kubyin Stream or any water bodies and	STC HSSE Department Head STC Environmental Manager	Monthly Report

No.	EIA Section	Potential Impacts	Mitigation Measures	Responsible Party	Reporting
			address potential impacts to the local community before such extraction.		
O1.3	6.3.1	Impacts on water use by community	STC has sponsored and installed water purification systems in Kubyin Village to improve the water supply quality at the area.	STC HSSE Department Head STC Environmental Manager	Monthly Report
O1.4	6.3.2	Impacts to water quality	Wastewater generated from the operation of the WHR units will be treated by the wastewater treatment facilities of the cement plant. All wastewater treatment systems will be designed to comply with Myanmar National Environmental Quality (Emissions) Guidelines for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application).	STC HSSE Department Head STC Environmental Manager	Monthly Report
O1.5	6.3.2	Impacts to water quality	Treated wastewater will be monitored monthly at the centralized tank for compliance with the NEQ on BOD, COD, pH, SS, oil and grease, TN, TP and residual chlorine and monitored annually for compliance with the full list of parameters on the NEQ for Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges (General Application).	STC Environmental Manager	Monthly Report
O1.6	6.3.2	Impacts to water quality	Sludge generated from the units will be dewatered to meet with the Myanmar NEQ for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility. Sludge samples from each modular tank will be checked yearly for compliance with the NEQ for Biosolids and Sludge Disposal.	STC Environmental Manager	Monthly Report

8.5.1 Waste Management Plan

8.5.1.1 Objectives

A Waste Management Plan (WMP) has been developed for the STC cement plant (*Annex A*) that covers construction of the Project. Operation of the WHR units will not generate any solid wastes and the WMP will thus not be applicable.

The objectives of the Waste Management Plan (WMP) are to:

- Ensure waste is managed in a controlled and environmentally sound manner;
- Comply with all statutory and contractual requirements concerning the management of waste;
- Ensure resources are recovered where possible and safe to do so, for re-use and recycling; and
- Ensure appropriate recording and tracking occurs for all wastes generated.

8.5.1.2 Legal Requirements

Under the WMP, good housekeeping practices for waste storage and handling will be referencing good international industry practice (GIIP).

8.5.1.3 Implementation Schedule

The WMP will be implemented during the construction phase of the Project.

8.5.1.4 Management Actions

The following will be implemented for wastes generated from the construction phase of the Project. No waste is expected to be generated from the operation phase of the Project.

- The WMP includes a waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes (hazardous and non-hazardous) expected from the construction and to identify appropriate disposal routes;
- Construction materials should be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
- Construction wastes should be separated into reusable items and materials to be disposed of or recycled whenever possible;
- Waste suitable for reuse should be stored on site and reintroduced to the construction process as and when required;
- The WMP identifies disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase;
- A hazardous waste management system covering waste classification (including hazardous chemical waste), separation, collection, storage, transfer and disposal should be set up and operated. The waste management system should comply with applicable regulation of the government, if any, or in its absence, GIIP;
- Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers);
- Wastewater should be stored in such a way as to avoid contaminating surface and groundwater sources. It should be collected regularly and taken offsite for treatment at a suitable facility;
- Waste should be collected regularly by reputable waste collectors;

- Recyclables such as scrap steel, metals, plastics, and paper items should be collected for recycling wherever possible;
- Disposal of construction waste in or off the construction site should be prohibited;
- Chain of custody documents should be used for construction waste and hazardous waste to monitor disposal; and
- Waste segregation should be practiced at the workers camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate.

8.5.1.5 Monitoring Plans

Chain of custody documents should be used for construction waste and hazardous waste to monitor disposal. The contractor should record the waste type, volume and disposal method which should be reported in the Environmental Monitoring Report to be submitted to MONREC quarterly during construction of the Project.

8.5.1.6 Projected Budgets and Responsibilities

The cost for the WMP is included in the overall budget for the EMP.

9. PUBLIC CONSULTATION AND DISCLOSURE

As a part of the previous STC cement plant expansion EIA, consultation was carried out with the indirectly and directly affected population in two villages within the expansion Project's Area of Influence (AOI), which was the same as the AOI of the WHR Project. Consultation also covered Non-Governmental Organisations (NGOs) and Civil Society Organisations (CSOs) working in areas of interest to the cement plant expansion and Myanmar Government representatives. During these consultation, the stakeholders were also informed about the WHR Project and their comments were sought. The consultation findings are thus considered relevant for the WHR Project and is summarised in this section.

9.1 Objectives of the Stakeholder Engagement

The objectives of stakeholder engagement were to:

- Identify stakeholders and communities potentially affected by Project activities;
- Update stakeholders about the Project; and
- Engage with potentially affected groups and individuals to understand their views, concerns and perceptions in order to inform the IEE.

9.2 Overview of Consultation Undertaken

In summary, the following consultation was undertaken for between 2016 and 2017:

- Consultation with village leaders in Pyi Nyaung and Kubyin during Scoping in November 2016;
- Community briefings in Pyi Nyaung and Kubyin villages in January 2017;
- 50 Household surveys in Pyi Nyaung and Kubyin villages in January 2017;
- Focus Group Discussions with women and farmers in Pyi Nyaung and Kubyin villages in January 2017;
- A public forum held on 18 July 2017 at the Novotel hotel in Yangon attended by about 85 representatives of the Government, the public, CSOs, businesses, and other groups;
- A meeting in Thazi Township with local communities held on 21 July 2017; and
- A meeting in Pyi Nyaung Village with local communities held on 22 July 2017.

Concerns raised by stakeholders were incorporated into the IEE Report as appropriate to assess the Project impacts and to propose mitigation measures.

9.3 Disclosure and Stakeholder Consultation of the Project from November 2016 to January 2017

In November 2016, a scoping site visit was undertaken at the cement plant in Mandalay. The purpose of the visit was to identify potential stakeholders of the Project to inform the subsequent disclosure and stakeholder consultation plan of the Project which were conducted in January 2017.

In January 2017, community meetings were arranged by STC in collaboration with the Township General Administration Department (GAD) and Village leaders. The purpose of these briefings was for STC to provide an update on the Project and for ERM to describe the processes for consultation and baseline studies. The community briefings included a question and answer session for the communities to express their views on the Project and associated environmental and social impacts. Socio-economic data were collected through community meetings, household surveys and face to face discussions with stakeholders. The data were used to understand current socio-economic conditions in the AOI of the Project, historical impacts associated with the construction of the cement

plant as well as potential issues associated with the ongoing operation of the Project. Special attention was given to potentially vulnerable groups such as women.

During these consultations, the community mainly raised their concerns on the cement plant expansion project but not on the WHR Project. Representative photos taken during the consultation are shown in *Figure 9.1* and *Figure 9.2.*

Figure 9.1 Consultation at Pyi Nyaung Village in January 2017

Figure 9.2 Consultation at Kubyin Village in January 2017

9.4 Disclosure and Stakeholder Consultation in July-November 2017

Following disclosure of the Draft EIA for the cement plant expansion project in April 2017, a series of public consultation meetings were undertaken from July to September 2017 to collect stakeholder feedback of the Draft EIA. Photos of the community meetings are presented in *Figure 9.3* and *Figure 9.5.* Meeting minutes are appended in *Annex B* of this report and are disclosed on STC website (https://www.apachecement.com/category/news/).

In general, the stakeholder did not raise any concern directly in relation to the WHR Project. Instead, a group of CSO (EarthRights International, MATA and IFI Watch Myanmar) concerned that greenhouse gas assessment was not undertaken for the cement plant expansion project. In response, brief information of the WHR Project and the relation greenhouse gas reduction was presented in the Final EIA Report for the cement plant expansion project. A full assessment of the WHR Project is presented in this IEE Report.

Figure 9.3 Public Forum in Yangon in July 2017

Figure 9.4 Consultation at Thazi Township in July 2017

Figure 9.5 Consultation at Pyi Nyaung in July 2017

9.5 Ongoing Consultations

Stakeholder consultation undertaken to date confirmed that potential impacts as a result of Project activities will be small in scale and of limited extent.

Future engagement activities will consist of the following.

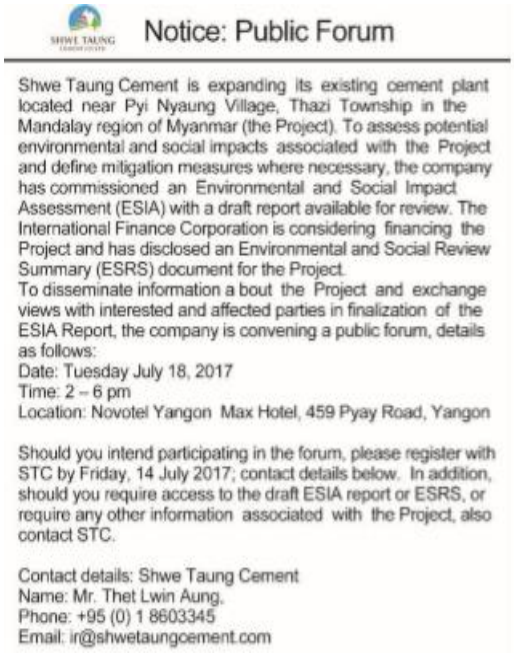
- Further disclosure of Project information and IEE Report, including opportunities to provide feedback;
- Engagement with relevant regional officials/authorities and government organizations on the outcomes of the IEE; and
- Ongoing communications with interested and potentially affected stakeholders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

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

9.6 Disclosure

As per the requirements of the EIA Procedure, STC has disclosed information on the Project on their website, IFC website and in two newspapers. The newspaper advertisement as printed in The Global New Light of Myanmar (English) and The Mirror (Burmese) is provided in *Figure 9.6.*

The IEE Report will also be disclosed on STC's website as well as the executive summary of the IEE Report in Myanmar and English. The IEE Report will also be provided for public inspection at STC community centre at the Pyi Nyaung Village. Hard copies of the IEE will be provided upon request at STC's offices in Yangon as well as in Thazi GAD offices.



Notice: Public Forum

Shwe Taung Cement is expanding its existing cement plant located near Pyi Nyaung Village, Thazi Township in the Mandalay region of Myanmar (the Project). To assess potential environmental and social impacts associated with the Project and define mitigation measures where necessary, the company has commissioned an Environmental and Social Impact Assessment (ESIA) with a draft report available for review. The International Finance Corporation is considering financing the Project and has disclosed an Environmental and Social Review Summary (ESRS) document for the Project.
To disseminate information a bout the Project and exchange views with interested and affected parties in finalization of the ESIA Report, the company is convening a public forum, details as follows:
Date: Tuesday July 18, 2017
Time: 2 – 6 pm
Location: Novotel Yangon Max Hotel, 459 Pyay Road, Yangon

Should you intend participating in the forum, please register with STC by Friday, 14 July 2017; contact details below. In addition, should you require access to the draft ESIA report or ESRS, or require any other information associated with the Project, also contact STC.

Contact details: Shwe Taung Cement
Name: Mr. Thet Lwin Aung.
Phone: +95 (0) 1 8603345
Email: ir@shwetaungcement.com

Figure 9.6 Newspaper Advertisement

9.7 Corporate Social Responsibility Programme

STC, believes that community development is a key aspect of sustainability. STC aim is to go beyond contributing and be actively involved in projects that have positive impact for the community and the society.
The objectives of STC related with CSR programme for the affected area of their operation are:

- To support and construct village schools to promote education which is require to develop the country and local content;
- To promote health awareness among local people and provide health care service for local people;
- To create more job opportunities and improve the local communities from unskilled labour to skilled labour;
- To implement sustainable agriculture like organic farming in the operation affected area especially in Pyi Nyaung, Kubyin, Oak Kyin village, Mone Pyin and Ye Paung Sone village; and
- To encourage local development.

STC started community development programme since 2010 before the construction of the cement plant started. Since 2010, STC has spent 1,065,237,213 kyats on social investment, especially in the areas of education and health for the communities around the sites and the whole country of Myanmar where STC operate. STC has developed an annual “Stationary Donation Programme”, supplying stationery items to all students attending the schools in the vicinity of Pyi Nyaung and Kubyin Villages, as well as Thazi Township. Tree planting activity was organized and developed at the surrounding area of the cement plant. STC cooperates with Shwe Taung Group of Companies’ activities to support and donate necessary materials, cement and other necessary support as “Disaster Relief Program” every year since 2014.

“Apache Scholarship programme” has been implemented in Thazi Township since 2014, supported a large number of students. In March 2017, STC constructed and donated a Reverse Osmosis (RO) water purification plant that was capable of purifying 1,500 gallons of water a day to Kubyin village in Thazi. Kubyin’s villagers now have better access to safe and affordable drinking water. In August 2017, STC built and donated a larger capacity water purification plant to Pyi Nyaung Village. The plant purifies 3,000 gallons of water a day. STC also donated a 9,000-Gallon concrete tank and purified water bottles that can hold 20-litres of water to Pyi Nyaung village who has over 2,600 residents.

STC organized Traffic Awareness Programme especially for the youth in the local community, as part of the Community Health and Safety Plan. On 12th June 2018, STC held Traffic Awareness Programme at Pyi Nyaung High School and Road Transport Administration Department and Traffic Police were invited to the awareness seminar. STC planned to hold more traffic awareness programme with Tharzi Township to reduce car and motor bikes accidents.

STC has budgeted 69,248,300 Kyats for infrastructure development especially for road upgrade and access of electricity which is important to upgrade the living standard of community, particularly in the sector of education and health for the rural areas around the cement plant and the nearby villages within Thazi Township from 2018 to 2019. For Kubyin village, the donation amount is 603,260 Kyats for fueling the diesel generator which provide electricity to the entire village. For community health care, company will contribute 300,000 Kyats to purchase medicine and necessary support. STC also subsidized the salary of teachers who worked in the village.

A total of 30,000 Kyats is offered to each of the five outstanding students every month as scholarship in Pyi Nyaung Village. Health care services are provided twice per month.

STC provides water supply to high school for four times per month. STC has planned to pave and upgrade the road at Pyi Nyaung village and will contribute about 44,900,000 kyats.

For scholarship programme, STC awarded 3 middle school students and 5 high school students from Thazi Township every month. Also, STC will award 212 students who passed the matriculation exam with distinctions at the end of November 2018.

STC has planned and will build a 5,000 L water storage tank for Yinmarpin village and 5,000,000 Kyats will donate for supplying electricity for Monpin village.

STC intends to work directly with local communities, alongside their development partners, in order to deliver specific and targeted capacity building, education and awareness modules. The flagship training programme will be designed to assist local residents to be "job ready" when operational roles commence.

STC is and will continue monitoring individual operation periodically in order to evaluate the effectiveness of STC's community development programmes. Monitoring will be performed by:

- STC's internal staffs, led by the Social Manager, focusing on accomplishments; community participation and contribution, impact, lessons learned.
- STC's partner organizations each have their monitoring and evaluation plans including regular site visits, progress and financial reports, end of project evaluations.

Monitoring methods will include: entrance and exit surveys, structured interviews with key stakeholders, local and regional statistics and records of community events. Participatory monitoring may also be implemented in some cases (e.g. infrastructure projects, projects involving capacity buildings for community).

9.8 Community Grievance Mechanism

STC has developed a Community Grievance Mechanism which is presented in *Annex C*. The grievance mechanism is developed in order to contribute to the Project's integration in its community by enabling dialogue (grievance lodging and communication) and specify how STC will receive and respond to grievance raise by the local communities.

Annex A

Waste Management Plan

SHWE TAUNG CEMENT CO.,LTD.	Waste Management Procedure		EHSS-SOP-XXX
	Revision	Effective Date	EHSS Department
	XX-XX-2018	XX-XX-2018	

Change History		
Rev #	**Description of Change**	**Paragraph**
01	Initial Release 23 March 2018	All

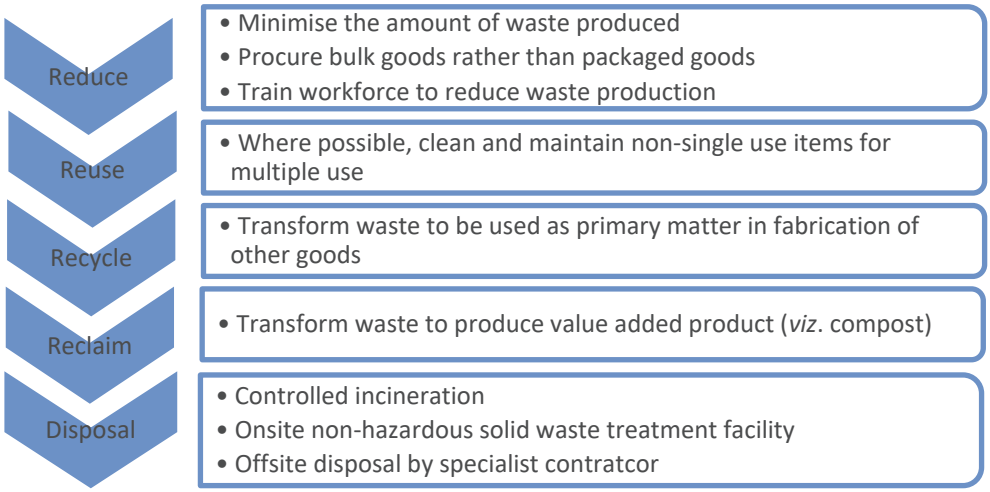
Prepared by		
Name	**Designation**	**Signature**
	EHSS Head	
Verified by		
Name	**Designation**	**Signature**
	Head of Cement / Head of Concrete	
Approved by		
Name	**Designation**	**Signature**
	Shwe Taung Building Materials CEO	

1 Purpose

This document is the Waste Management Procedure of Shwe Taung Building Materials' entities (ST): Shwe Taung Cement Co. Ltd (STC), Shwe Taung Mining Company (STM) and High Tech Concrete Company (HTC). This Waste Management Procedure incorporates the recommendations of the 2017 Supplementary Environmental and Social Impact Assessment process of STC, and in particular of its Environmental and Social Management Plan with respect to waste management good practices. This document aims to guide ST on how to implement these recommendations in a practical manner given the contexts and locales of ST's premises (i.e. the cement plant, the quarries, the coal mine, the concrete batching plants, etc.).

ST aims to adhere to the principles of the waste hierarchy favouring waste reduction over reuse, recycling over energy recovery and disposal as a last resort (the "4Rs") as follows, from the most preferred option (at the top) to the least preferred option (at the bottom):

Figure.1 The Waste Hierarchy (the "4Rs")



The purpose of this document is to provide workers, employees, contractors and, generally, anyone generating, handling, collecting and managing waste at any of Shwe Taung Building Materials' facilities and/or wastes generated from Shwe Taung Building Materials' activities with general guidance on responsible waste management.

The overall objective of responsible waste management is to avoid or, when avoidance is not feasible, minimise, reuse and recycle waste when it is generated, handled, collected (i.e. sorted) for transfer to collection points where it should be treated, recycled or disposed of in a manner that protects ST's workforce (own and contractors), as well as surrounding communities and natural environment. This objective can be achieved through the following plans:

- ST will comply with the local regulations;
- ST will align with the good practice requirements set out in the International Finance Corporation (IFC) Performance Standards and World Bank Environmental, Health and Safety Guidelines;
- ST will identify and monitor the anticipated waste streams generated from its construction and operational activities on an ongoing basis;

- ST will categorise the waste streams in accordance with the local regulations and international best practices (ref Section 5.1.1 of this procedure) based on the waste characteristics and practicable waste handling, treatment and disposal methods;
- ST will apply to each waste stream the principles of the waste hierarchy in the most responsible manner (reduce, reuse, recycle, reclaim, dispose);
- ST will adopt responsible methods for collection, storage, transportation and treatment/disposal of all waste streams;
- ST will be responsible for implementing this procedure; and
- ST will put in place mechanisms (in terms of procedures, logistics, budget, training, communication) to ensure continuous monitoring, verification and improvement are carried out throughout the lifetime of ST's activities to enable responsible management practices.

The construction, expansion, operation, decommissioning and closure phases of STC will, in particular, result in several waste streams that have the potential to impact on the environment. This procedure provides guidelines on waste reduction, segregation, collection and disposal practices that avoid impacts on the physical, biophysical and social environments and that is in accordance with both international (IFC) and national (Myanmar) requirements and good practices. This procedure aligns with ST's Code of Conduct and policies.

This procedure will be reviewed regularly and revised as ST's activities and the local context on certain waste disposal routes change. This will allow the information contained herein to be improved to the benefit of ST's activities, stakeholders and surrounding environment as a whole. Responsibility for the revision and update of this document is assigned below.

2 Scope

This procedure is applicable for any type of waste entering ST's premises (at the cement plant and the quarries in Pyi Nyaung, at the coal mine in Paluzawa, at the Mandalay and Yangon offices, at HTC's batching plants, etc.) or generated by ST's activities and that will be handled, stored, collected, transported and then disposed of inside and outside ST's premises.

ST employees, contractors and visitors to ST's premises shall comply with the requirements of this Procedure.

3 Definitions and Abbreviations

3.1 Abbreviations

CEO	The Chief Executive Officer of Shwe Taung Building Materials' entities
FOM	Form
Environmental Manager	Person-in-charge of environmental aspects
EPC Contractor	Engineering, Procurement and Construction company responsible for the design, procurement, construction, commissioning and handover of the expansion project (second clinker and cement line) at STC; the EPC Contractor must appoint a health and safety manager (HS EPC

	Manager) and a manager responsible for the expansion project (Project EPC Manager)
Head of Cement Business	Person-in-charge of STC and STM
Head of Concrete Business	Person-in-charge of HTC
EHSS	Environmental, Health, Safety and Social
EHSS Head	Environmental, Health, Safety and Social Department Head
HS Manager	Health and Safety Manager or person-in-charge of Health and Safety matters
HTC	High Tech Concrete Company
OHS	Occupational, Health and Safety
Social Manager	Person-in-charge of social aspects or social accountability manager
SOP	Standard Operating Procedure
ST	Shwe Taung Building Materials' entities i.e. STC, STM and HTC and their associated facilities and assets
STC	Shwe Tang Cement Co., Ltd.
STC Plant Operation Manager	
	Person-in-charge of the operations at STC (first clinker and cement line) and of the expansion project at STC (second clinker and cement line) until it is commissioned and incorporated in the operations at STC
STM	Shwe Taung Mining Company
WIS	Working Instruction

3.2 **Definitions**

Hazardous Waste	Waste that shares the properties of a hazardous material (flammable, corrosive, reactive, toxic or radioactive) and has a high degree of hazard for public health and the environment. Hazardous waste includes materials which are flammable, corrosive, reactive, toxic or radioactive. A substance is defined as hazardous depending on its physical and chemical properties as well as applicable regulations and international good practices. For instance, all recovered spills from industrial hazardous material are hazardous waste and cannot be disposed of directly to non-hazardous solid waste management facility.
Inert Waste	Waste that does not undergo significant biological, physical or chemical transformations. It will not dissolve, burn or react physically or chemically with other substances in such a way so as to negatively impact on the environment or human health.
Non-hazardous Waste	Waste which is not hazardous; and which can be recycled, composted, incinerated, disposed or is inert.
ST's premises	ST's premises are defined as ST's premises, sites and facilities including the cement plant (including ancillary facilities, the cement plant expansion, the mudstone and limestone quarries) located in

	Thazi township of Mandalay region (STC), the coal mine located in the Kalaywa township of the Sagaing region (STM), HTC's premises and facilities in Myanmar as well as STC's, STM's and HTC's offices and head offices in Mandalay and Yangon.
Waste	Waste is a solid, liquid or contained gaseous material that is no longer needed for its originally intended purpose within the company; it includes material to be recycled and reclaimed. Waste is typically defined as a material or product that is discarded and no longer used for its original purpose. Solid waste generally includes any garbage, refuse. Examples of such waste include domestic trash and garbage, inert construction / demolition materials, refuse such as metal scraps and empty containers (except those previously used to contain hazardous materials which should be managed as hazardous waste) and residual waste form industrial operations such as boiler slag, clinker and fly ash.
Waste Classification	For the purposes of this procedure, waste will be classified as either hazardous or non-hazardous.
Waste Management	Action of keeping the working environment clear of all waste and unnecessary materials.
Waste Types	Apart from the two main classes of waste, waste may be grouped into different types based on its chemical makeup, composition or constituent parts, e.g. medical, glass, metal, plastics, paper, organic. Different types of waste can be re-used or recycled to varying degrees of efficacy. Typically, different hazardous properties have threshold values above which the waste within which they are contained is deemed to be hazardous.

4 Responsibility and Authority

4.1 **CEO**

CEO shall be responsible in overseeing that this Procedure is implemented throughout ST operations. CEO shall endorse this Procedure and have overall accountability for its management. **CEO** shall be responsible to ensure that wastes are managed in such a way as to protect the workforce and prevent and control impacts to the communities and the environment.

CEO shall enable and regularly check that this Procedure is implemented and regularly reviewed, including through the ongoing work of ST's audit function unit.

4.2 **Managers and Executives**

Managers and Executives shall be responsible for ensuring good housekeeping practices and regularly checking that wastes are managed in such a way as to protect the workforce as well as prevent and control impacts to the communities and the environment. Managers and Executives

should also plan and ensure adequate resources and facilities required are provided for the execution of this procedure, in collaboration with other departments or units as relevant.

Managers and Executives shall be responsible for ensuring waste management is carried out in accordance with this procedure during construction and operations and for promoting a culture of responsible waste management in the operations of site staff.

4.3 **EHSS Head**

EHSS Head is the person-in-charge of the EHSS Department.
EHSS Head shall ensure this Procedure is undertaken as required and coordinate support to the Environmental Manager when needed for this Procedure to be applied.

EHSS Head shall have accountability for the following:

- Handle waste management issues;
- Delegate waste handling responsibilities; and
- Review waste-related reports and statistics.

EHSS Head shall also ensure that this Procedure aligns with the other plans and procedures developed by ST. EHSS Head shall facilitate communication between the various ST employees, ST Divisions and departments, the EHSS Managers and Executives and the Maintenance Team.

4.4 **Environmental Manager**

Environmental Manager shall provide adequate support to workers, employees, contractors working at ST's premises in the implementation of this procedure to enable responsible waste management practices throughout ST.

Environmental Manager shall be responsible for determining appropriate waste management methods for different waste streams from ST activities and liaise with the EHSS Head, EHSS Committee, Managers and Executives, EPC Contractor and other Contractors in implementing this procedure.

Environmental Manager shall be responsible for administering waste management training to staff and contractors including induction and ongoing training as well as ongoing communication to ST workers, employees and contractors, for authoring reports related to waste management, for overseeing waste management annual reporting, for liaising with EPC Contractor and other Contractors on waste management issues, for scheduling and executing inspections related to waste management, for maintaining a waste inventory for ST detailing all waste management movements off site and for undertaking regular 3rd party audits of waste management facilities used by ST to ensure regulatory and good international practices compliance.

Environmental Manager shall be responsible for supporting Maintenance Team to enable there is enough and adequate waste collection points on site and to liaise with the engineering and design

teams to design and maintain suitable facilities for hazardous and non-hazardous waste storage and handling.

4.5 **EHSS Committee**

The EHSS Committee gathers the EHSS Head, HS Manager, Environmental Manager, Social Manager, CLO, Head of Cement / Head of Concrete, STC Plant Operation Manager (who is also in charge of the expansion project), representatives from the EPC Contractor (the HS EPC Manager and the Project EPC Manager), is chaired by the Head of Cement / Head of Concrete and is managed by a secretary (the HS Manager).

EHSS Committee shall follow, enable and check every six months during the monthly EHSS Committee Meetings that the Environmental Manager enables this Procedure, advise when needed and for any incident/ accident/ deviation to the Procedure that occurs, corrective actions are taken and lessons shared.

4.6 **Maintenance Team**

Maintenance Team shall be responsible for negotiating appropriate contract terms with suitable waste collectors and waste disposal entities to safeguard ST and ensure regulatory and international good practices compliance.

Maintenance Team shall be responsible for supporting the Procurement Team to negotiate supply contracts for oils, lubricants and any other material that will produce hazardous wastes which include takeback agreements for the disposal of any hazardous residues to the extent possible.

Maintenance Team shall be responsible for liaising with the Environmental Manager, the engineering and design teams to design, construct and maintain suitable facilities for hazardous and non-hazardous waste storage, handling and disposal on site.

Maintenance Team shall be responsible for designing, building and managing in accordance with good international practices a non-hazardous solid waste management facility close to STC's activities. In particular, such non-hazardous solid waste management facility should be constructed with environmental protection systems and properly secured. A liner system should be installed at the bottom, as an impenetrable barrier between soil and groundwater and what is disposed of in the non-hazardous solid waste management facility, and made of clay and synthetic material. In the absence of such liner, only inert (i.e. non-active) waste should be disposed of in the non-hazardous solid waste management facility. Waste disposed of at such non-hazardous solid waste management facility should be covered daily with soil so as to isolate it from the surrounding environment (groundwater, air, rain) and keep it dry.

Maintenance Team shall be responsible for providing sufficient and appropriate waste handling receptacles, will supervise the cleaning team which will collect waste on-site and will support the cleaning team and the gardening team in the establishment of composting systems.

Maintenance Team shall be responsible for storing and labelling hazardous waste and non-hazardous waste in accordance with ST's procedures and for providing the appropriate containers, labelling and storage capacities for hazardous waste.

4.7 EPC Contractor and other Contractors (or Contractors)

ST's EPC Contractor and ST's other Contractors, and their sub-contractors, are responsible for ensuring this Procedure and its requirements are communicated to their staff and for ensuring their staff follow them as relevant.

For instance, where relevant, ST shall communicate and work with its EPC Contractor or other Contractors to implement corrective actions that are relevant to them. The EPC Contractor or other Contractors must participate.

4.8 HS Manager

HS Manager shall support the Environmental Manager in implementing this Procedure and thus shall, in particular, support the Environmental Manager in identifying and purchasing appropriate PPE for uses at site (with the support of the Purchasing Team) and assessing the conditions of the PPEs used and replacing them as needed.

4.9 All Persons

All persons employed by ST, directly or indirectly, have a responsibility to be familiar with the requirements of this procedure and to ensure it is carried out in full with regards to their day to day work. All persons are responsible for taking ownership of any waste management issues observed in their day to day work highlighting any non-compliance to the Environmental Manager.

4.10 Audit Function Unit

ST's audit function unit, under ST's CEO, is responsible for, on a regular basis, auditing that this document is implemented and for providing post-audit recommendations to be communicated to the EHSS Committee.

5 Procedure

5.1 Waste Generation

5.1.1 Type of Waste

Key waste streams that can be generated at ST's premises are summarised in Table 5.1.1. (non-hazardous wastes) and Table 5.1.2 (hazardous wastes)

Table 5.5.1 Non-Hazardous Waste Streams at ST's Premises

Waste Type	Generation Source
Food Waste, Organic Waste	Canteen
Used Cooking Oil	Canteen
Other Domestic Waste	All
Paper, Cardboard	Office, Canteen, Medical Centre
Metal Tins	Canteen, Process
Scrap Metal	Construction
Plastic Containers, Plastic Bottles	All
Printer and Toner Cartridges	Office, Medical Centre
Glass	Canteen, Process
Air Conditioning Filters	All
Sodium Light Bulbs	All
Fly Ash, Kiln Dust	Cement Clinker
Wood	All
Inert Material	Process, Quarries, Construction
Soil, Spoil Rocks, Topsoil	Construction, Maintenance
Sewage (Grey Water – Domestic)	All

Table 5.5.2 Hazardous Waste Streams at ST's Premises

Waste Type	Generation Source
Oil, Oily Rags, Oil Materials, Lubricants, Oil-Contaminated Solids, Oily waters	All
Batteries (Lead Acid, Nickel Cadmium)	All
Aerosol Cans (Empty)	Process
Empty Chemical Drums	Laboratory, Process

Waste Type	Generation Source
Paint Cans/Drums, Brushes, etc	All
Solvents	All
Medical Waste, Expired Medication	Medical Centre
Fluorescent Light Bulbs	All
Filters (Fuel / Diesel Oil) - Instrumentation	Heavy Mechanical Equipment, Fuel Storage, Petrol Station
Tank / Silo / Process Washings	Process
Electrical and Electronic Equipment	All

5.1.2 Minimising Waste Generation

Waste should be minimized at source by All Persons with support from ST's procedures, logistics, training, communication:

- Drinkable water sources should be installed throughout the ST premises to minimise the purchase of one way drink plastic bottles (single use), which remains difficult to recycle.
- A composting system should be put in place to treat biodegradable food wastes and gardening wastes by the Maintenance Team (and gardening team) with location of compost heaps / boxes (designed in such a way as to prevent rodents) near canteens and staff housing.
- Implement ongoing promotion campaigns championed by CEO, Head of Cement / Head of Concrete and EHSS Head to encourage workers, employees and contractors to implement responsible waste management practices. The campaigns should be renewed from time to time.
- Organise clean-up days on-site every 6 to 12 months.

5.2 General Waste Management Operations Guidance

5.2.1 Waste Handling

All Persons, Managers and Executives, EPC Contractor and other Contractors are responsible for ongoing responsible housekeeping practices for waste handling. These include avoiding over-ordering, poor storage and maintenance, mishandling or improper operation procedures. This will reduce waste that can be generated at ST's premises.

Waste segregation should be practiced at ST's premises. Waste segregation will help with reducing, reusing and recycling the different waste streams. The Environmental Manager should ensure that all workers, employees and contractors are well trained and provided enough information to recognise the types of waste being generated at ST's premises and to

ensure they are being handled and sorted out in accordance with good international practices. The Environmental Manager should also ensure ongoing communication on responsible waste handling practices (e.g. posters in canteens, staff housing, offices, laboratory, etc.).

Once segregated, and when not contaminated, recyclable waste has a higher market value.

5.2.2 **Storage**

Maintenance Team, with the support of the Environmental Manager, is responsible for good housekeeping practices for waste storage. These include separating non-hazardous waste into reusable items and materials to be disposed of or recycled whenever possible. Waste suitable for reuse will be stored on site and reintroduced to the construction or operation processes as and when required. Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible and feasible i.e., the material that is recycled can be reutilized. .

Organic and food waste should be:

- composted (in such a way as to prevent rodents) and used on-site by the Maintenance Team, supported by the cleaning team and gardening team, for the plantation, landscaping and gardening; or
- collected for offsite use as animal feed.

Waste should be stored in clearly labelled containers / skips. Colour coded receptacles labels should clearly state the waste types in languages that are understandable to the workforce and any coding system that is used should also be presented on the labels.

Containers should be allocated depending on the waste type. Light weight waste articles such as light plastics or paper / cardboard should be stored in enclosed skips and should be kept securely closed at all times to prevent such waste from flying around and clogging stormwater and wastewater systems or rivers.

For liquid wastes e.g. used oils, all containers should be provided with secondary containments. Each containment capacity should be at least 110% in volume of the largest stored container. Extreme conditions due to climatic factors, such as risks or seasons of heavy rains or strong winds, should be considered.

Waste receptacles should be installed at key areas of ST's premises on higher grounds or poles. Waste receptacles should be placed on impermeable surfaces to prevent the contamination of ground conditions in the case of an accidental release, such as on paved areas not prone to flooding.

Suitable storage for the main waste streams (general waste, wood, cardboard, metals, plastics and oil contaminated solids) should be set up at each of the canteens, staff housing areas and main offices to facilitate waste segregation.

Oily waters from waste/oil separators and potentially hazardous waste e.g., sludge from oil water separators, should be stored in such a way as to avoid contaminating surface and groundwater sources (i.e. in a paved area not prone to flooding) and with cutoff drains diverted to sedimentation basin before discharged. Such type of waste should be collected regularly and either filtered and monitored before on-site or offsite release or treatment at a suitable facility.

5.2.3 Waste Transport

Waste should be collected regularly by reputable waste collectors that should be identified and managed in accordance with the Supply Chain Screening Procedure and Contractor Management Procedure.

Disposal routes (transport options and disposal sites) will be pre-identified for all wastes generated at ST's premises.

Waste should be transported from source to waste management facilities and/or final disposal sites (managed in accordance with good international standards), in the most appropriate manner, taking the following into account:

- The nature, composition and integrity of transport packaging and containers will be appropriate to the type and class of waste being transported;
- Transport vehicles will cater for the type, class and quantity of waste being transported in terms of its composition, load capacity, covering etc.;
- Transport will be scheduled according to the weather / weather forecasts to prevent potential accidental releases to the natural environment, for instance in case of heavy rains or winds;
- Loading and unloading procedures that avoid spills and releases will be followed;
- Employees will be trained to address accidental releases of hazardous wastes and related emergencies as per the relevant procedures (e.g. Incident Report Procedure, Emergency Response Procedure, Storage and Handling of Hazardous Material Procedure);
- All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spillages;
- Vehicles carrying hazardous wastes shall be labelled appropriately.
- Waste must NOT be scattered in heaps onsite nor burned onsite or offsite (unless in an incinerator run in accordance with international good practices).

5.2.4 Waste Disposal

Waste disposal vendors or waste disposal facilities will be identified, with priority given to the closest facilities that are being operated in accordance with referenced standards (including Myanmar regulations and IFC guidelines). Waste disposal vendors or facilities will be regularly

audited by the Environmental Manager and their activities related to waste generated at ST's premises will be recorded and monitored. If suitable waste disposal sites are not available in the locale of ST's premises then this waste should be either:

- transported back to the closest place where more suitable recycling, treatment and disposal facilities are available (e.g. Mandalay for the cement plant and the quarries, Yangon for the Yangon office, etc.) or
- treated on-site in one or more non-hazardous solid waste management facilities to be designed, built and managed in accordance with good international practices. Such non-hazardous solid waste management facility should be on ST's own areas or close to STC's activities, as agreed with the relevant authorities. In particular, such non-hazardous solid waste management facility should be constructed with environmental protection systems and properly secured. A liner system should be installed at the bottom, as an impenetrable barrier between soil and groundwater and what is disposed of in the non-hazardous solid waste management facility, and made of clay and synthetic material. In the absence of such liner, only inert (i.e. non-active) waste should be disposed of in the non-hazardous solid waste management facility. Waste disposed of at such non-hazardous solid waste management facility should be covered daily with soil so as to isolate it from the surrounding environment (groundwater, air, rain) and keep it dry. Leachate should be collected via pipe collection system (a sump) that disposes of the leachate in a leachate storage tank (such tank will have a size proportional to the non-hazardous solid waste management facility capacity and should ideally use the natural gradient to avoid the need for a pump). The tank will be emptied periodically and the leachate transported to the wastewater treatment plant (to be designed to treat such wastewater type in accordance with good international practices).

Wastes with monetary values are likely to be collected by the local recycling market and proper segregation, none contamination, containment of sharp objects, will help protect the waste handlers.

Waste suitable for use as fuel can be considered as an alternative to coal. Plastics crushed in pellets and tyres are typical examples of waste that are used in cement production as fuel[1]. Other refuse derived fuels (such as oily rags) are also used in cement production globally providing they meet the required calorific value for the process. Additional air pollution controls may be needed when burning wastes as fuel.

Disposal of construction waste on or off the construction site should be prohibited unless they are to be reused safely. Process residues such as fly ash which are recycled in the process are not considered construction wastes. Fly ash should be stabilised before being disposed of at

[1] http://www.alf-cemind.com/cd/AF_and_ARM_used_tires.htm; http://www.letsrecycle.com/news/latest-news/lafarge-to-increase-waste-tyre-fuel-input-by-over-60/; http://www.cemex.co.uk/fuel-from-tyres.aspx

suitable facilities or non-hazardous solid waste management facilities that are run in accordance with good international practices.

5.2.5 Design and Emergency Preparedness

It is recommended that all waste management locations throughout ST's premises have measure in place in case of accidental release of waste in accordance with the Emergency Response Procedure. Each location should have ready access to:

- Spill kits;
- Absorbents;
- Firefighting equipment;
- Cleaning equipment.

5.3 General Hazardous Waste Management Operations Guidance

Hazardous waste should be handled, stored, transported and disposed of as per the non-hazardous waste guidance described under *Section 5.1* as well as in accordance with the Storage and Handling of Hazardous Material Procedure.

Hazardous waste should be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers, paved areas, proper drainage systems, oil/water separator), in a dedicated enclosed paved area not prone to flooding.

The reuse of containers by scavengers is a possibility. It is suggested that prior to discarding any hazardous waste container that such containers be pierced to prevent reuse that could cause health impacts and/ or environmental contamination.

5.4 Specific Non-Hazardous Waste Management Operations Guidance

5.4.1 Soil/ Spoil Rocks/ Kiln Dust

Soil, spoil rocks and kiln dusts will be stored on site in stockpiles and reuse for reinstatement as per a soil plan to be drawn and kept updated by the Maintenance Team.

Bottom ash can be reused for road construction / maintenance or disposed of at suitable facilities or non-hazardous solid waste management facilities that are run in accordance with good international practices.

5.4.2 Domestic Waste

Organic and food solid waste will be segregated and stored in standard general waste containers, to prevent odours and public health hazards, and composted onsite for organic and food waste or disposed of onsite or offsite in a suitable non-hazardous solid waste management facility or by a suitable waste contractor (food waste can be used as animal feed in the locale of the site).

Domestic waste will be segregated to the extent possible and stored in enclosed containers and / or dedicated enclosed skips for general waste. Containers will be clearly labelled "General Waste".

Domestic waste resulting from general rubbish, industrial (non-hazardous), glass, paper, plastics and related materials will be collected for recycling or disposed of at suitable facilities that are run in accordance with good international practices.

Domestic waste quantities can be monitored by Maintenance Team / cleaning team supporting Managers and Executives or tracked through waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.4.3 **Recyclables**

Recyclables include:

- glass;
- aluminum cans;
- plastic bottles, welding rods, paper;
- printer cartridges;
- packaging material;
- cardboard;

Recyclables should be prepared for the local recycling markets through sorting and storing. ST should endeavor to identify local recycling markets that actually reutilize recyclables and to use such markets to the extent possible to manage its recyclable waste. If all avenues for recycling have been exhausted recyclables should be disposed of in onsite or nearby non-hazardous solid waste management facilities that are run in accordance with good international practices.

Receptacles should be provided throughout ST's premises for main recyclables i.e. plastics, metals, wood, cardboard, other. These should be clearly labelled describing the wastes to be targeted in languages corresponding to the needs of the workforce with photos or images encouraging non-contamination.

Metals will be stored in open skips. Paper and cardboard will be stored in enclosed skips located at strategic locations throughout ST's premises (near the offices and facilities generating substantial cardboard waste). Plastic bottles will be collected and stored in enclosed skips and dedicated containers throughout ST's premises. Clear signage should be provided at each location describing the wastes that are to be targeted for recycling. These signs should be multilingual commensurate with the needs of the workforce with photos or images encouraging non-contamination. Baled or suitably aggregated recycling products will be stored in a dedicated storage area prior to collection for recycling in country.

Recyclable quantities can be monitored by Maintenance Team / cleaning team supporting Managers and Executives or tracked through waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.4.4 Scrap metals

Scrap metals will be collected separately and stored securely on site. Their value may create a security issue and this should be addressed through security measures such as lockable areas and a robust mechanism for transferring waste off ST's premises.

Scrap metal will be stored in open skips. Scrap metal containers will be clearly labelled describing their contents in languages corresponding to the needs of the workforce with photos or images encouraging non-contamination. Scrap metals should be prepared for the local recycling markets or for export, by cutting or tidying them up.

Scrap metal quantities can be monitored by Maintenance Team / cleaning team supporting Managers and Executives or tracked through waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.4.5 Wood

Wood pallets should, wherever possible, be reused on site until such time as they are no longer suitable for reuse (i.e. damaged). The most common application will be for the storage of waste drums and / or recyclables baled at ST's premises prior to onward transportation.

Wood waste can also be used through ST's premises, for landscaping or reinforcing soil areas to prevent erosion and runoff (as sedimentation control mitigating factor). Wood waste that cannot be recycled onsite may be marketable locally as a fuel. If all other avenues for recycling have been exhausted wood waste should be disposed of in onsite or nearby non-hazardous solid waste management facilities that are run in accordance with good international practices.

Wood will be stored in open skips clearly labelled describing their contents in languages corresponding to the needs of the workforce with photos or images encouraging non-contamination. Pallets will be stockpiled for reuse. Wood should be prepared for onsite reuse or for the local recycling markets, by cutting or tidying it up.

Wood quantities sent to non-hazardous solid waste management facility can be monitored by Maintenance Team / cleaning team supporting Managers and Executives or tracked through waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.4.6 Concrete

Waste concrete or concrete overspill should be allowed to dry prior to being used on ST's premises to the extent possible, for landscaping or reinforcing soil areas to prevent erosion and runoff (As sedimentation control mitigating factor). Waste concrete or concrete overspill

that cannot be recycled onsite may be marketable locally as fill. If all other avenues for recycling have been exhausted, waste concrete or concrete overspill should be disposed of in onsite or nearby non-hazardous solid waste management facilities that are run in accordance with good international practices.

Waste concrete or concrete overspill will be stored in open skips with clear signage. These signs should be multilingual commensurate with the needs of the workforce with photos or images encouraging non-contamination.

Waste concrete or concrete overspill quantities sent to non-hazardous solid waste management facility can be monitored by Maintenance Team / cleaning team supporting Managers and Executives or tracked through waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.5 Specific Hazardous Waste Management Operations Guidance

5.5.1 Duty of Care

STC has a duty of care to ensure that appropriate disposal of hazardous waste streams takes place. Maintenance Team will retain copies of all records of disposal at ST's premises or off-site for the purpose of audit. The Environmental Manager will periodically spot check the hazardous waste disposal process on site and off site to audit it is implemented in accordance with the Supply Chain Screening Procedure and the Contractor Management Procedure. Accountability for hazardous waste remains with ST.

For all its hazardous wastes, ST should enter into hazardous waste collection and disposal contracts with the hazardous waste management company Dowa in Thilawa. It is understood that a hazardous waste management facility is to be built and operated in Mandalay, which is closer to ST cement plant and quarries; when such facility is being developed and in operation, STC should enter into hazardous waste collection and disposal contracts with this closest facility. The same applies for the other ST companies: they should enter into hazardous waste collection and disposal contracts with the hazardous waste management facilities that are closest to their premises.

5.5.2 Waste Oils and Lubricants

Waste lubricants and oils will be stored in appropriate containers prior to disposal. The storage area should be bunded with a capacity 110% of the largest container stored within. Waste lubricants and oils should be kept away from non-compatible waste types to prevent any chemical reaction during storage or transportation.

Such hazardous waste quantities should be sent for recycling either as secondary oil products or for energy recovery. Takeback agreements should be put in place with suppliers to the extent possible. Waste lubricants and oils that cannot be sent for recycling should be used in an onsite energy recovery process. If all other avenues for recycling have been exhausted,

waste oils and lubricants should be disposed of at suitable facilities of Golden Dowa Eco-system Myanmar Co.Ltd which is located at Thilawa SEZ of Yangon Region.

Quantities stored, collected and disposed of should be tracked through hazardous waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.5.3 Oil Contaminated Solids

Oil contaminated solids may include oily rags, filters, absorbents, spill kits, etc.

STC should enter into supply contracts for products that will produce hazardous wastes which include takeback agreements for their disposal to the extent possible.

Oil contaminated solids will be stored in appropriate containers prior to disposal. Ideally the high calorific value of this waste type would be suited to an onsite energy recovery process. If all other avenues for recycling have been exhausted, oil contaminated solids should be disposed of at suitable facilities of Golden Dowa Eco-system Myanmar Co.Ltd, which is located at Thilawa SEZ of Yangon Region. Waste oils should be kept away from non-compatible waste types to prevent any chemical reaction during storage or transportation.

Such hazardous waste should be sent back for energy recovery via takeback agreements put in place with suppliers, via agreements with recyclers (waste oil sold for reuse) or to a suitable hazardous waste management facility. The quantities can be tracked through hazardous waste transfer notes / trip tickets when collected by a suitable waste contractor.

5.5.4 Oily Water

Waste oils will be skimmed routinely from oily wastewater through waste-oil separators to be put in place, in particular, Heavy Mechanical Equipment and fuel storage areas. Filtered waste oils should be stored in onsite waste oil tanks for recycling or disposed of by suitable or licensed waste contractors. Oily water interceptors will be pumped out periodically using vacuum tanker and should be treated via the on-site wastewater treatment systems (WWTS). The resultant sludge from the WWTS should be dewatered and can be reused onsite in an energy recovery process, collected by suitable or licensed waste contractors for reuse or disposed of in an onsite or a nearby local non-hazardous solid waste management facility that is operating in accordance with good international practices. Sludge should be dewatered to meet the Myanmar NEQEG for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility or being reused. Sludge samples from each modular tank of the WWTS will be checked yearly for compliance with the NEQEG for Biosolids and Sludge Disposal.

5.5.5 Edible waste oil

Edible waste oils will be skimmed routinely from oily wastewater through grease trap to be put in place in the canteens. Filtered edible waste oils should be stored in onsite waste oil tanks for recycling or disposed of by suitable or licensed waste contractors. Oily water

interceptors will be pumped out periodically using vacuum tanker and should be treated via the on-site wastewater treatment systems (WWTS). The resultant sludge from the WWTS should be dewatered and can be reused onsite in an energy recovery process, collected by suitable or licensed waste contractors for reuse or disposed of in an onsite or a nearby non-hazardous solid waste management facility that is operating in accordance with good international practices. Sludge should be dewatered to meet the Myanmar NEQEG for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility or being reused. Sludge samples from each modular tank of the WWTS will be checked yearly for compliance with the NEQEG for Biosolids and Sludge Disposal.

5.5.6 **Process dust collected via baghouses / dust waste from the cleaning process**

Process dust will be collected via baghouses. Baghouses should be periodically washed and the resulting wastewater leachate collected to be treated via the onsite wastewater treatment plant. Baghouses that need to be replaced should be aggregated on site and stored in appropriate covered areas. Baghouses that cannot be reused or sold should be disposed of at suitable facilities of Golden Dowa Eco-system Myanmar Co.Ltd, which is located at Thilawa SEZ of Yangon Region.

Wastewater leachate containing dust waste from maintenance cleaning process (e.g. from boiler tubes, refractory bricks, etc.) should be collected to be treated via the onsite wastewater treatment plant.

5.5.7 **Waste Batteries**

Waste batteries should be aggregated on site and stored in appropriate containers. Smaller batteries should be stored by type and away from non-compatible wastes.

Waste batteries will be collected for recycling / recovery in-country and the quantities leaving ST's premises can be tracked through hazardous waste transfer notes / trip tickets when collected by a suitable waste contractor.

If all avenues for recycling have been exhausted, waste batteries should be disposed of at suitable facilities of Golden Dowa Eco-system Myanmar Co.Ltd, which is located at Thilawa SEZ of Yangon Region.

5.5.8 **Medical Waste**

Medical waste should be treated on-site in an autoclave or equivalent decontaminating system to be then handled as non-hazardous general waste. Sharp objects such as syringes should be disposed of in enclosed containers to prevent accidents.

5.5.9 **Instrumentation**

Repatriation will be replaced in an ad-hoc manner as required. ST will enter into repatriation agreement with equipment suppliers, especially in the case of those instruments (e.g. measuring equipment, etc.) containing hazardous substances.

Such hazardous waste quantities recovered via repatriation agreements put in place with equipment suppliers will be tracked through export manifest.

5.6 **Domestic Wastewater Guidance**

Domestic wastewater represents another form of waste to be managed.

Domestic wastewater, mainly generated from the accommodation / housing areas, is currently collected via septic tanks. Following completion of the wastewater treatment system study and of its development, domestic wastewater will be collected and channeled towards onsite wastewater treatment systems which will treat the wastewater as per pre-agreed levels before being either reused onsite for greening or discharged to nearby stream/river. Wastewater qualities and quantities will be monitored periodically (for pre-agreed or required characteristics) at the entrance to the wastewater treatment plant and at the exit by Maintenance Team.

Sludge will be disposed of in onsite or nearby non-hazardous solid waste management facilities that are run in accordance with good international practices. Sludge should be dewatered to meet the Myanmar NEQEG for Biosolids and Sludge Disposal before disposal to the non-hazardous solid waste management facility. Sludge samples from each modular tank of the WWTS will be checked yearly for compliance with the NEQEG for Biosolids and Sludge Disposal.

5.7 **Safety Precautions for Staff**

Adequate safety training, information and equipment for workers, employees or any other persons involved in handling waste should be arranged by the Environmental Manager with the support of the Maintenance Team / cleaning team. Refresher courses should also be carried out on a regular basis to ensure all ST staff and waste handlers remain well aware of the safety good practice requirements.
While handling any sort of waste all staff should be wearing appropriate PPE to limit contact with the waste, such as:

Eye protection	Hand Protection	Foot Protection

Safety glasses, Safety goggles to prevent any injuries to the eyes. 	Rubber gloves to limit the contact of waste to the skin. 	Closed toe, water proof wellies, non-slip sole to prevent staff from accidently kicking or stepping on sharp objects or slipping in the refuse room. 
Respiratory Protection		
To protect staff against airborne contaminants use a face mask. 		

5.8 Verification and Monitoring

5.8.1 Waste Data Collection

Managers and Executives, with the support of Maintenance Team / cleaning team, shall maintain inventory records of waste streams and associated quantities of waste generated, recycled, reused, disposed of at the locations under their responsibility. The inventory shall comprise of:

- Type of waste;
- Generation source (machine, facility, building, area, etc.);
- Quantity (kg);
- Collection and storage arrangements;
- Disposal method;
- Disposal contractor / Destination.

The waste generation data shall be collected on a monthly basis (or as appropriate) and the inventory updated. An example of waste inventory record is provided in *Attachment 6.3.1*.

This information will be provided to, and aggregated by, the Environmental Manager in a database that the Environmental Manager will manage. Different waste types could be coded in accordance with the requirements of the local regulator or the EU list of wastes[2].

[2] Accessible from: http://ec.europa.eu/environment/waste/framework/list.htm (accessed 31 August 2017)

5.8.2 Waste Reports

Waste audits will be performed by the Environmental Manager with the assistance of the Maintenance Team twice a year. The outcomes will be presented to the EHSS Committee in waste audit reports. The audits will help refine waste streams and associated waste management taking into account the"4Rs" waste management concept, taking into account the Key Performance Indicators detailed in *Section 5.8.3*.

The waste audit reports, based on the questions suggested in *Attachments 6.3.2* and *6.3.3* will also contain the following information:

- Inventory of waste leaving the site in the preceding months;
- Findings from any internal or regulatory site inspections carried out in the previous months including:
  - Loss of containment;
  - Accidental releases / spillages;
  - Non-compliances;
- Aggregate year to date totals for waste generation and disposal;
- Year on year comparison to date for waste disposal;
- Details of any improvement measures implemented at the site.

Any regulatory reporting to the relevant authorities must be delivered in the form and at intervals stipulated by the relevant authorities, as applicable.

5.8.3 Key Performance Indicators

The following Key Performance Indicators (KPI's) should be used:

- Annual volumes of waste (per waste stream – i.e. hazardous and non-hazardous) disposed of at the non-hazardous solid waste management facility (on-site / off-site) and/or incinerated and not reused, recycled or reclaimed;
- Annual volume of waste (per waste stream – i.e. hazardous and non-hazardous) reused, recycled or reclaimed;
- Annual percent change of volume of waste (per waste stream – i.e. hazardous and non-hazardous) produced compared to previous year;
- Annual percent change of volume of waste reused, recycled, reclaimed and disposed of compared to the previous year;
- Annual volume of contaminated soils generated and treated on-site;
- Description of implementation of segregation of waste streams (recyclables, general waste and hazardous waste): excellent / good / not good;
- Identification of reports of hazardous waste being mixed with general waste and vice versa: number; and
- Reports of illegal dumping of wastes: number.

Objectives of improvement in the KPIs' results should conclude the waste audit reports with a corresponding action plan.

5.8.4 Continuous Improvement and Waste Action Plan

Continuous improvement is sought via a programme of ongoing training and communication to be arranged by the Environmental Manager. Findings from the audit programme will be communicated to All Persons by posters in the canteens and main offices. Improvements measures will be devised by the Environmental Manager and the Maintenance Team / cleaning team.

Training sessions and communication on responsible waste practices will include sharing information such as:

- Where non-hazardous and hazardous wastes can be disposed of in the first place, then stored on-site before finally being disposed of safely inside or outside ST's premises;
- Hazardous waste disposal procedures (what must be collected vs. what can be disposed of safely down the drains);
- How non-hazardous and hazardous wastes must be segregated (which chemicals / hazardous materials and wastes cannot be mixed together);
- All personnel is responsible for keeping waste containers appropriately closed and labelled;
- Appropriate handling of hazardous and non-hazardous containers;
- Location and use of (chemical) spill kit.

5.9 Decommissioning

Prior to the commencement of the decommissioning stage, a dedicated waste management plan will be developed by the demolition contractor detailing estimations of quantities of all wastes expected during the demolition. It will be the responsibility of the demolition contractor and of ST in accordance in accordance with the Supply Chain Screening Procedure and the Contractor Management Procedure, to ensure that responsible avenues in accordance with the 4R's ethos are identified and used during the decommissioning phase.

5.10 Audit and Review Policy

This procedure will be reviewed annually by the EHSS Committee to ascertain the progress it has made in achieving the set aim, and on an ad-hoc basis by ST's Audit Function Unit.

Any significant changes made to the procedure will be announced to all staff, and training provided to ensure relevant staffs are made aware of updates.

6 Related Documents and References

6.1 **External Document**

- National legislation and policy on non-hazardous and hazardous waste
- International Guidelines and Standards:
  - Basel Convention (1989) ratified by Myanmar in January 2015
  - IFC Performance Standards 1 and 3
  - World Bank Group EHS Guidelines 1.3 Wastewater and Ambient Water Quality, 1.5 Hazardous Materials Management and 1.6 Waste Management

6.2 **Internal documents**

- [Communication, Participation and Consultation Procedure]
- [Incoming and Outgoing Document Procedure]
- [Legal Compliance Procedure]
- [Incident Classification table]
- Risk Matrix
- Storage and Handling of Hazardous Material Procedure
- Supply Chain Screening Procedure
- Incident Reporting Procedure
- Emergency Response Procedure

6.3 **Attachments**

6.3.1 Waste Inventory Format
6.3.2 Audit Checklist – Non-Hazardous Waste
6.3.3 Audit Checklist –Hazardous Waste
6.3.4 Waste Management Flowchart

Attachment 6.3.1 Waste Inventory Format

Waste Type	Generation Source (machine, facility, building, area, etc.)	Quantity (kg)	Collection locations	Receptacles / Bin Type	Disposal Method	Disposal Contractor/ Destination
General Waste						
Drink Cans						
Other metal items						
Plastic bottles/containers						
Paper (printing paper, packaging cardboards)						
Glass container						
Food Waste						
Cooking Oil						
Chemical Waste						
Clinical Waste						
Light bulbs						
Other						

Attachment 6.3.2 Audit Checklist – Non-Hazardous Waste

ST Department/ Area Name:		Date of Audit:
Name of staff completing checklist:		

Non-Hazardous Waste Management Audit Checklist	Yes	No	N/A	Comments / Action required	Action required by
1. Are waste containers appropriate for their intended use? (for example, food waste containers should have lids)					
2. Are different waste streams properly handled separately?					
3. Are bins clearly labelled?					
4. Is the number of bins / dumpsters adequate? (for example, the number is not adequate if waste overflows)					
5. Are bins / dumpsters in appropriate locations? (for example, away from air intakes, from doors, in relation to prevailing winds)					
6. Are bins / dumpsters emptied regularly? (for example, check the last three times when they were emptied)					
7. Is the waste removal schedule commensurate to the volume of waste generated and stored?					
8. Is waste stored in a well-ventilated room?					
9. Is waste stored leaking or negatively impacted on its surrounding environment (e.g. waste blowing, waste clogging waterways)					
10. If exhaust fans are use, do they operate properly?					
11. Are there any signs of odors, contaminants, vermin in the waste storage areas? (if yes, where)					

Attachment 6.3.3 Audit Checklist –Hazardous Waste

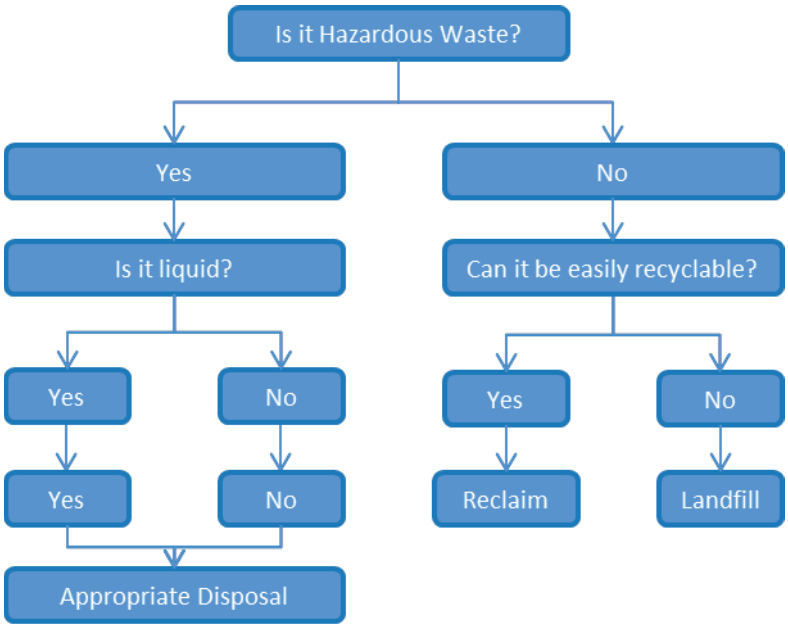
ST Department/ Area Name:		Date of Audit:
Name of staff completing checklist:		

Hazardous Waste Management Audit Checklist	Yes	No	N/A	Comments / Action required	Action required by
Hazardous Waste Labelling and Containers					
1. Are hazardous waste labels on all hazardous waste containers?					
2. If the waste container previously held other contents, are the previous labels removed or significantly defaced?					
3. Are waste containers kept closed at all times, except when adding or removing waste? Hazardous waste cannot be stored in open containers.					
4. Is hazardous waste container labelled as soon as the first hazardous waste is added to the container?					
5. Are full chemical names spelled out on the hazardous waste label?					
6. From the time the hazardous waste container is full, is it brought to the hazardous waste storage area as soon as possible?					
7. Are waste containers in good shape, leak-resistant and chemically compatible with the waste?					
8. For liquid waste, is it in puncture-proof, sealed container such that if it gets knocked over it won't spill?					
9. Is waste stored leaking or negatively impacted on its surrounding environment (e.g. waste blowing, waste clogging waterways)					
Hazardous Waste Storage Areas					
10. Are hazardous waste storage areas clearly designated and identified with a "Hazardous Waste Storage Area" sign?					
11. Is there easy access to the hazardous waste storage area? (for instance the instance is not blocked by equipment or supplies)					
12. Area areas where hazardous waste is generated and stored uncluttered and cleanable if there is a spill?					
13. Is the hazardous waste storage area communication board up-to-date about the chemical hazards, personnel and phone numbers?					
Other Waste Management					
14. Are there any not-compatible hazardous wastes stored in close proximity?					
15. Is a chemical spill kit available in the hazardous waste storage area? (N.B: the spill kits can be as simple as gloves, garbage bags, kitty litter, paper towel / blue pads, etc. in a plastic container)					

Hazardous Waste Management Audit Checklist	Yes	No	N/A	Comments / Action required	Action required by
16. Is the chemical spill kit located in a suitable enclosed (not locked) high box clearly visible to anyone?					
17. Does everyone in the Maintenance Team know how to use the chemical spill kit?					
18. Is there an emergency plan in case of emergency? And when was the last drill?					
19. Do hazardous waste containers have secondary containment, such as trays or tubs to contain a spill or in case of leakage from the primary waste containers?					
20. Who is designated to bring the hazardous waste items from the waste collection to the hazardous waste storage area?					

Attachment 6.3.4 Waste Management Flowchart

Hazardous Waste		*Non-Hazardous Waste*			
Oil, Oil Materials, Lubricants, Oily waters	Solvents	Food Waste, Organic Waste	*Recyclable*	Glass	*Recyclable*
Oily Rags, Oil-Contaminated Solids	Medical Waste, Expired Medication	Used Cooking Oil	*Recyclable*	Air Conditioning Filters	*Recyclable*
Batteries (Lead Acid, Nickel Cadmium)	Fluorescent Light Bulbs	Other Domestic Waste	*General*	Sodium Light Bulbs	*Recyclable*
Electrical and Electronic Equipment	Printer and Toner Cartridges	Paper, Cardboard	*Recyclable*	Fly Ash, Kiln Dust	*Recyclable*
Aerosol Cans (Empty)	Filters (Fuel / Diesel Oil) - Instrumentation	Metal Tins	*Recyclable*	Wood	*Recyclable*
Empty Chemical Drums	Tank / Silo / Process Washings	Scrap Metal	*Recyclable*	Inert Material	*Recyclable*
Paint Cans, Brushes, etc		Plastic Containers, Plastic Bottles	*Recyclable*	Soil, Spoil Rocks, Topsoil	*Recyclable*
		Sewage (Grey Water – Domestic)	*Recyclable*		



Annex B

Stakeholder Engagement Meeting Minutes

Minutes of Meeting (18.7.2017)

Meeting Details				
Project :	Supplementary ESIA for Shwe Taung Cement (STC) Cement Plant & Associated Facilities in Myanmar			
Venue	Novotel Hotel		**Region/ State**	Yangon
	Township		Village	-
Objectives	Public Forum to: 1. Share information about the Project "Expansion of a Cement Plant & Associated Facilities by the Shwe Taung Cement (STC) Company Limited in Myanmar". 2. Present findings of the draft Supplemental ESIA. 3. Exchange views with interested and affected parties which will be taken into account for finalisation of the Environmental and Social Impact Assessment (ESIA) Report for the Project.			
Date	18th July 2017 (Tuesday)			
Time	2:00 to 6:00 PM			
Attendee:	1) U Aung Zaw Naing, Group CEO, STG 2) U Kyaw Naing Soe, DMD, STC 3) U Ze Lum, SE, STC 4) U Aung Khaing Nyi, EE, STG 5) U San Myaing, Manager, STC 6) Mr. Piers Touzel, Partner, ERM 7) Ms. Becky Summons, Senior Consultant, ERM 8) Daw Khin Su Su Naing, Senior Consultant ERM 9) Daw Myat Mon Swe, Senior Consultant, ERM Government (6) NGOs (28) Media (2) Public (29) **Total No. of Attendees: (74)**			

Agenda:

Agenda Item	Time
Welcome Remarks by Emcee Daw Thida Swe **- Meeting objectives, agenda & introductions**	**2.00 – 2.15**
Introduction about STC & Project Overview *Speakers:* *Group CEO Aung Zaw Naing, STG* *MD Kyaw Naing Soe, STC*	**2.15 – 2.45**
Findings of Supplementary ESIA Study- General Overview *Speaker: Mr Piers Touzel, ERM*	**2.45 – 3.15**
Q&A Session *Moderated by ERM Representative Daw Mya Mon Swe*	**3.15 – 3.45**
Coffee Break	**3.45 – 4.00**
Findings of Biodiversity Impact Assessment / Mitigation *Speaker: Mr Piers Touzel, ERM*	**4.00 – 4.30**
Findings of Social Impact Assessment / Mitigation *Speaker: Mr Piers Touzel, ERM*	**4.30 – 5.00**
Q&A Session **Moderated by ERM Representative Daw Mya Mon Swe**	**5.00 – 6.00**

Detailed note of discussion (Part I)

Q1 (U Ye Lin Myint, National Coordinator, MATA):

1. MATA has already sent our comments in an open letter to the IFC. How were impacts on the livelihoods of local people considered in the Supplemental ESIA and how were these impacts assessed?

2. How did you scope the Supplemental ESIA?

3. Was a health impact assessment undertaken? What was the finding of the health impact assessment? We would like to know detailed data of the dust assessment which you have explained that there is no unacceptable risk.

4. We understand that biodiversity impact will be discussed later and we would like you to disclose the detailed study data.

5. We would like to know the amount of coal consumption per day for existing plant and expanded plant and how do you manage the environmental impact of coal consumption.

6. How do you manage the waste generated from the Project activities? We also would like to know the impact of waste management and its mitigation measures?

7. How did you study the noise and vibration impact on villages around the cement plant?

8. As you said that 55% of the employees come from within 50 miles of the cement plant. We would like to know how many STC employees are from Pyi Nyaung and Kubyin villages? Why I have to ask this question is that most investors mentioned creating job opportunities, but they never mentioned the loss of job for local people because of the Project. So that I would like to know the impact assessment on livelihood and loss of current local job opportunity due to this Project.

9. How will you manage the water shortage issue at both communities around the cement plant and water usage which will be required for next line? How will you consider the water shortage issue for the local agricultural sector?

10. How will STC help the electricity supply for the villages along the power transmission line when STC connect the power from Ye Paung Son for second line?

A1 (Mr. Piers Touzel, ERM):

1) ***Livelihood Assessment:*** ERM undertook a socio-economic survey through discussions with village leaders; focus group discussions with women and famers and through a direct survey of 100 households sampled at random. If you don't mind we will explain this in a later session today.

2) ***Health Impact Assessment***: We did not specifically do a health impact assessment. However a number of concerns related to health issues were raised by communities around the cement plant and coal mine. One comment raised in Kubyin was that there was an increase in skin disease in children which was thought to be related to a lack of water in the Kubyin River in the dry season. At the coal staging area in Paluzawa along the Chindwin River, residents said that the burning of coal was causing heath impacts from the smoke.

   Post Meeting Note:

   i. STC has made a doctor available to residents of Pyi Nyaung and Kubyin village who prescribed medication for the skin disease; and

   ii. STC has not drawn water from the Kubyin River in the last 12 months so any water shortage in Kubyin this year is unrelated to the Project.

3) ***Biodiversity survey***: It will be explain in a separate session later today.

4) ***Noise***: We undertook noise sampling at Kubyin and Pyi Nyaung villages as well as at the cement plant office area and staff quarters. The monitoring result indicates that there is noise from the plant near the operation area, but residents in Kubyin and Pyi Nyaung villages should not be able to hear any noise from the plant because they are too far away. For noise from blasting in the limestone quarry, it is noted that there are no residents in the vicinity of

the area. Furthermore, the blasting is on the other side of the hill from Kubyin village and there is not a direct line of sight to Kubyin village and so blasting noise will be screened by the terrain.

A1 (U Kyaw Naing Soe, STC):

1) ***Coal Usage***: We are using coal as fuel for the kilns. One of the raw materials for cement production is calcium which will be obtained by taking away CO and CO2 from Calcium Carbonate of the raw materials through gas suspension in preheater. The kiln temperature is 1,450 Degree Celsius which is fuelled by coal. A maximum of 0.18 tonnes of coal is used per day and depends on the quality of the coal. It will be less if the coal quality is good. The coal ash is combined with other materials to produce cement, so that there is low ash content in air discharged unlike coal fired power plant. There is thus no waste in cement production process, however, the runoff from the coal storage area discharged to the stream is assessed as wastewater impacts in the ESIA study. We are now taking action to follow up ERM's advice on mitigation measures.

2) ***Employment***: 343 STC employees are from within a 50 mile radius of the plant and 6 people are from Pyi Nyaung and Kubyin. We welcomed local people to work at STC, but other business could generate more income for them. However, we will invite local people to try working at our plant and vocational training which will be arranged in the future for kiln operators, heavy vehicle drivers, administration etc. at STC.

3) ***Environmental survey data***: Environmental survey data were obtained in February and June by the Environmental Conservation Department of Mandalay Region for which we can provide the hard copy.

A1 (U Aung Zaw Naing, STG):

1) ***Water management***: The difference between the first and second line is that the first line is not included the waste heat recovery and thus the water usage in first line is less than the second line. It is correct that, overall, water usage will increase due to production of both lines. Our current plan is to pump water from Myithar stream and we will consider water supply for villages around the plant especially for Pyi Nyaung when installing this water supply. After the feasibility study, we will provide information on how water will be supplied to the plant and how much water we can supply to Pyi Nyaung.

2) ***Health Risk***: With regard to the health problem related to skin disease in Kubyin, we have plans to set up water purification plants in Kubyin and Pyi Nyaung.

Q2 (U San Lin, Managing Director, Pyinyawaddy Shwe Pyi Construction Company Limited):

1) We welcome the improvement of cement production for our country's infrastructure development. Good production practices according to national and international EIA standards for the Project activities and disclosure of project information should be pushed to other cement companies as well. I would like to know how to continuously monitor this good practice during production to follow the ESIA recommendations.

A2 (U Aung Zaw Naing, STG):

2) The impact assessment and mitigation measure explained in the presentation are initial findings. Firstly, we will follow relevant national and International ESIA standards to disclose the findings.

3) Secondly, environmental study findings / data obtained by third parties will be made available at an Information Centre which will be set up in Pyi Nyaung soon for disclosure. Not only for the current impacts identified but for the impacts in the future they will be assessed and with mitigation measure identified and implemented.

4) The third measure is that a HSE manager will be appointed at our new Environmental and Safety Department. We will also train employees at all levels to improve their environmental awareness.

5) The forth measure is we will comply with all environmental commitment if we contract with international organization such as IFC. We thus need to be transparent for all our activities. An independent director will have to be appointed to the board of directors. While local staff will be continuously trained, we will also hire foreign experts to manage compliance with procedures and guidelines.

Q3 (U Nyi Nyi Tun, Secretary, MRPZA):

1) Please explain if rice husk can be used as alternative fuel for heating. A lot of rise husks were disposed directly to the river everywhere which caused environmental impact.

A3 (U Kyaw Naing Soe, STC):

1) Rice husks are being used for the heating for cement production in other countries. In order for this to be a feasible option, we must have a continuous supply of rise husk . The rice production in Myanmar is about 12 million tonnes per year and rice husk is 20 % of rice production. Rice mills are using 50 % of the rise husk, but 2 million tonnes of rice husk is waste in Myanmar. The main rice cultivation areas are Mandalay, Magwe, Bago and Ayeyarwady regions. So we have to study the numbers of rice mills and usage of rice husk by them in Mandalay region and Naypyitaw for the long term sustainable supply as fuel. The benefit of using rise husk it is flammable, but transportation cost is expensive because it is so light. So we are considering using surplus rice husk from rice mills which are within 100 miles of the plant. Another benefit to use the rice husk is Silica content of rice which contributes to high strength of clinker. We will undertake a study of the feasibility of using rise husk to displace 10-15% of the coal used as fuel. Also waste engine oil is another alternative fuel that may be considered in the future. After the feasibility study on the rice husk use is complete, information will be disclosed to the public.

Q4 (U Win Maw, Deputy Director, Forestry Department, Yangon Region):

1) There are only 6 people from Pyi Nyaung working for STC now because of the illegal logging around Kubyin and Pyi Nyaung area. Creating job opportunities with good salaries for permanent and daily works can attract people to work in STC rather than logging which can be a CSR programme for forest conservation.

A4 (U Aung Zaw Naing, STG):

1) ***Job Opportunities***: We will try to create the job opportunities as we mentioned.

Q5 (U Hla Tun Tun Min, MATA, Mandalay):

1) ***Land and crop compensation:*** Communities have not yet been paid compensation for land and crops for the access road construction and power transmission line connected from Yay Paung Sone Substation.

2) ***Water shortage***: There is water shortage for the community because of the dam/ reservoir STC constructed which blocked the Poe Hlaung and Ye Shin Streams. How will STC manage this?

3) **Job opportunities**: All people around the plant said no jobs are available when they applied to STC and how can you arrange to have jobs for those people living in Pyi Nyaung?

A5 (U Aung Zaw Naing, STG):

1) ***Land and crop compensation:*** The access road was constructed along a former bullock cart track and 14 households have already been compensated for their land and crops in 2009-2010. We have documentation of these compensation records. Since the road was constructed nobody else has come forward seeking compensation from us till now.

2) ***Water shortage***: We use only Poe Hlaung stream. If water is available from Myittar Stream, water supply for nearby community like Kubyin and Pyi Nyaung will also be considered as I mentioned earlier.

A5 (U Kyaw Naing Soe, STC):

3) ***Land and crop compensation*** For the transmission line, it was done by four companies as a Joint Venture in 2011-2012. At that time, we knew that the area covered Yay Paung Sone reserve forest, natural forest, military owned land and vacant land. However, 4 Households in Oat Kyin village were compensated for their mango and banana plants. Up to now in 2017, nobody else has come forward claiming unpaid compensation. We will construct the second power line and all affected households will be compensated by coordination with related authorised departments.

Q6 (U Aung Thu Kyaw, Deputy Director, ECD, Yangon Region):

1) ***Environmental Data*****:** Environmental survey data obtained by ECD of Mandalay region is only representative for short-time period. As such, the survey data collected by third parties in the future monitoring surveys will have to be disclosed.

2) ***Livelihood restoration and resettlement action plan:*** For the affected people who lose their properties of land and crops, ERM has to consider those people.

3) ***Explanation of the production process***: should not include technical terms so people at all education levels can understand.

4) ***Air Modelling***: As ERM said that there is no impacts from air emission to people because all residential areas are far away from the plant and the emission especially NO_x, SO_X will be

dispersed to the hill area where no residents are living due to wind direction. However, the impact on natural areas and on people due to air emission and its mitigation measure should be explained without technical terms.

A6 (Mr Piers Touzel, ERM):

1) ***Air Pollution***: The chimney from the cement kiln is the main source of air emission from the cement plant. The second line will be constructed next to the existing line with similar discharge and similar chimney. The dominant wind direction is from the east to the west across the plant. If the wind direction is south west to north east what that means is that you do not get the impact in Pyi Nyaung village. Mainly because of the wind direction is east to the west, the air modelling indicates that the exceedance occurs at the top of the hill where there are no residents. In terms of long term monitoring, air monitoring equipment will be installed inside the chimney to measure the concentration of air pollutants. Dust deposition monitoring will be undertaken in Pyi Nyaung and Kubyin villages and data will be shared with local communities.

Q7 (U Thein Win, villager, Pyi Nyaung):

1) ***Water Shortage and impact of wastewater*:** My garden is near the end of Poe Hlaung Stream. How will the issue of water shortage by the blocking of this stream by the weir in summer be managed? And how will impacts from wastewater discharges to this stream be managed?

2) ***The labour charges of road construction:*** There are different labour charges for the road construction in Pyi Nyaung village. How STC is going to manage that?

3) ***Baseline survey***: Why was ERM's baseline survey for air quality done in one day? All villagers should be informed about the baseline survey requirement.

4) ***Public consultation***: Public consultation was done by ERM only with children in Pyi Nyaung. All villagers need to be invited to understand the ESIA. So next time, please invite all villagers.

5) ***Impact***: Information on all impacts has to be disclosed.

A7 (U Aung Zaw Naing, STG):

1) We will discuss with your entire group after this forum.

2) ***Water Shortage and impact of wastewater*:** Recycled water is being used and there is no industrial wastewater discharge. We will address water supply as I mentioned earlier.

3) ***Labour charges of road construction:*** We have donated concrete for road construction. Labour charges were arranged by subcontractor and we will rearrange this if there are any concerns.

A7 (Mr Piers Touzel, ERM):

4) The consultation undertaken by ERM has three main components: i) an initial consultation at scoping with village leaders; ii) community briefings at each of the affected villages; iii) 100 Household surveys and 15 focus group discussions in villages close to the project area.

During the consultation, STC shared information on Project activities and ERM explained the Supplementary ESIA, followed by socio-economic survey undertaken by ERM. We then conducted focus group discussion with women and farmers. A final round of consultation and disclosure on the draft ESIA findings is now being undertaken. I apologise if any individuals were unaware of the consultation sessions undertaken to date. It was not our intention to exclude anyone. We have another consultation meeting in Pyi Nyaung on this coming Saturday and will ensure that those represented here today are invited to attend.

Q8 (U Kyaw Thet Win, Upper Chindwin Youth Network, Paluzawa, Kalay District):

1) ***Coal Storage in Paluzawa*:** Was there any consideration on impact of coal transportation like accidental coal spill while carrying them by barges in Chindwin River.

2) ***Biodiversity survey***: do you have study / survey on biodiversity? Given Paluzawa area is most critical for biodiversity ERM has to cooperate with local experts for biodiversity survey.

3) ***CSR***: Community awareness on environmental issues needs to be improved such as by organizing workshops rather than only supporting community development through donations. What is the plan on this?

4) ***Grievance Mechanism in Paluzawa:*** If there is no contact manager at the coal mine, who will receive our grievance? STC need to arrange a Grievance Mechanism.

A8 (U Aung Zaw Naing, STG):

1) We apologise that further public consultation in Paluzawa has to be postponed because of flooding in Kalaywa, but the public consultation meeting will be held in Pyi Nyaung this coming Saturday.

2) We will try to upgrade the community awareness of environmental issue.

3) Because of the impact assessment and monitoring requirements as you mentioned, we engaged ERM as an International ESIA Consultant in order to comply with the International Standards and we will continuously monitor the environmental and social impacts.

A8 (Mr Piers Touzel):

Biodiversity:

4) In the next session, biodiversity survey results in Paluzawa of the coal mine area will be explained. This biodiversity survey was done by international biodiversity experts working alongside local specialists. To survey mammals at the forest, camera traps were installed in the forest. In the next presentation, photographs will be shown on we found.

5) We did not assess impacts due to accidental spills from barging coal in the river.

A8 (U Aung Zaw Naing, STG):

6) We will upgrade the local practice and address local concern of coal transportation downstream.

Detailed note of discussion (Part II)

Q9 (Daw Moe Moe Tun, Sein Lan Pyin Oo Lwin Environmental Conservation Association):

1) ***Job Opportunities*:** Mr. Piers said that ERM invited 100 Households and "all respondents described the existing Project as important for the community because they have job opportunities". However, STC said that there are only 6 peoples working at STC plant from Kubyin and Pyi Nyaung. Please explain discrepancy between the two pieces of information.

2) ***Question to the local people:*** how did you ask people the question related to "importance of the project to them"?

3) ***Lime Kiln:*** Mr Piers shows the local lime kiln business and villagers can work in lime kiln which causes big environmental impact. Why can't those people work at STC?

A9 (Mr Piers Touzel, ERM):

1) ***Lime Kiln:*** The lime kilns are the main source of employment in Pyi Nyaung and employ people in the extraction and transportation of limestone and fuel wood, transportation, lime production and trading. The reality is that taking firewood from the forest generates higher income than working at the cement plant.

2) ***Question to the local people:*** During the socio-economic surveys, we asked people to rate how important they considered the project to their community on a scale of 1-5, 1 being very important and 5 being not important at all. The households that were asked this question were selected at random by ERM.

3) **A9 (Mr Ben Li, IFC)**:

1) ***Question to the local people:*** For the question on how important the project is, it should be noted that the importance can mean it is important but it can be good or not good to them.

Q10 (Ms Lis Hlaing, IFI Watch Myanmar):

1) ***Public consultation***: ERM said that the words "Everyone that we spoke to". What is meant by the word "Everyone" and who are they? As per IFC policy, the invitation to the community should include all local people. Also information related to project activities should be disclosed before the consultation. The local people said that this invitation was made to 25 people through GAD officer which is not representative of the local community. Did the consultation include women or farmers or workers? Is that only with students? ERM said that "All respondents". What is the sample size of the respondents that you mentioned in your presentation?

2) ***Project Category***: Now that you have done the EIA. What is the category of this project? If the category is A, can you let us know? IFC has Performance Standard mentioned that the EIA should have thorough consultation with the community. You should have consulted with the community at least twice before preparing the EIA. Another point is that the Category A Project has very high risk of negative impact.

A10 (Mr Nicholas Michael, IFC):

Yes, the Project is Category "A".

A10 (Mr Piers Touzel, ERM):

1) ***Public consultation:*** 100 Households were selected at random for the survey. Those households were not selected by local government. There is another consultation opportunity for the community in the next couple of days in Pyi Nyaung. Ms Myat Mon Swe, Senior Consultant of ERM, will undertake the public consultation at the end of this week and will be happy to provide you details of the time and venue. This ESIA is not yet finished and the outcomes of this round of consultation will be incorporated into the Final Supplementary ESIA, which will also be disclosed.

A10 (Myat Mon Swe, ERM):

2) ***Public consultation:*** We did not only invite 25 people to the meeting. Before meeting with people to collect the socio-economic data, we informed communities about the meeting three days in advance. One of the focus group discussions with women was made in one of the local lime kiln business area with women workers. The "25 households per village" means we surveyed socio-economic data from the community through a questionnaire administered to 25 households in each village. 100 HH questionnaires were collected in total with 25 HH in Pyi Nyaung, 25 HH in Kubyin and 50 HH in Nanmawke, Paluzawa and Chaung Sone villages. We did not ask the village leader to select the people to attend the meeting. The meeting attendees of each consultation meeting were recorded. These consultation meetings were intended to disclose information of the new line project activities and to collect the socio-economic data of affected communities.

Q 11 (U Ye Lin Myint, National Coordinator, MATA):

1) ***Public Consultation***: We welcome further public consultation in local communities, but we would like to know when did you inform or invite people to attend this meeting. Who did the sharing of the information and what was the method of the invitation? All presentations should be explained using Myanmar language and using handouts. The invitation through the GAD leader by the company is not the right way to ensure that all villagers receive this invitation. How long we have for the invitation before the meeting is important. So we want to know the facts about the method of invitation. Our people cannot use internet and email. So if you have not yet invited them, please postpone the date of the upcoming consultation meeting. Also we want to have the women group discussion data. We thank you for inviting us to this public forum so that we can understand about the Project and give comments. Please let us know the procedure used for data collection.

2) ***Livelihoods and income***: We wold like to know the method of community livelihood impact assessment? ERM mentioned that there is no cultivation area, but how do you assess the water shortage for the local agriculture by the Project expansion? In this EIA report there is no information about income generation of the community. ERM said there is no footprint to the forest and nobody relies on the forest.

3) ***Access to water***: There is both traditional agriculture and orchards that may be affected. One of the villagers said that his orchard has water shortage due to construction of a water reservoir for the cement plant. The assessment of water supply is really important.

4) ***Concern of the public***: We also want to know people's concerns on the new line project.

5) ***Indigenous People***: We are wondering why the previous EIA has identified Indigenous Peoples (IP), but the Supplementary ESIA has not included an IP assessment which is an important part of IFC's Performance Standards. We would like to know why this ESIA did not address impacts to IPs?

6) ***Role of Flora and Fauna International (FFI)***: Was FFI a consultant and subcontractor of ERM for biodiversity issues?

A11 (Mr Piers Touzel, ERM):

1) ***Public Consultation***: I apologise that we did not give you the information in Myanmar language for today. The next round of public consultation will be held using local language. Please contact Myat Mon Swe for detailed information about the upcoming public consultation.

2) ***Data collection***: Data collection was done using questionnaires which include questions related to livelihood, sanitation and health impacts. We collected relevant data and used this to inform the social impact assessment. All survey result can be found in the social baseline chapter of the Supplementary ESIA Report. It was collected by randomly selecting households from five villages.

3) ***Role of FFI:*** In relation to the ESIA, FFI was a subcontractor of ERM to lead the biodiversity baseline surveys. We have a representative of FFI here who will explain their work to you.

A11 (Mr Ben Li, IFC):

4) ***Indigenous Peoples***: There are numerous reasons why we decided not to trigger PS7. These were based on the findings in the field (by IFC and ERM). There are various minorities in area but these are mostly second generation. They do not speak their ethnic language in their day to day lives and their cultures and traditions are integrated with Burmese culture. There are no significant ethnic traditions except those for Burmese culture. For example, in some other communities or cultures, there is an elder based decision making structure, such as local indigenous courts making decisions, but these were not found in area. Although this is not triggered, this Project also has secondary impacts of opening up access to areas and therefore livelihoods have been improved. The material adverse impacts are very limited on these communities. Therefore, we made the decision not to trigger PS 7 (IPs). This is not to say that we do not recognize that there are ethnic minorities in this community.

A11 (Mr Frank Momberg, FFI):

5) ***Role of FFI:*** Prior to Supplementary ESIA done by ERM, we have 7 years' experience in Myanmar on biodiversity surveys with our team of national and international experts with limestone specific expertise. Before this Supplementary ESIA, FFI had commenced surveys of limestone ecosystems at all the cement plants in Myanmar. Thanks for this forum which is the first national workshop for limestone ecosystem conservation as part of the consultation

for the ESIA of Shwe Taung Cement plant. I very much appreciate the commitment and openness of STC for funding the Biodiversity Action Plan which is the only limestone conservation programme to date in Myanmar. The biodiversity survey undertaken for STC's cement plant can serve as an example for other cement companies and limestone areas.

6) ***Cumulative impact***: One specific comment I have is about the lime kiln around the area which is not sustainable and impact also the community and cause deforestation. I appreciate if there is mitigation on reducing impact on the limestone extraction, firewood collection and lime production by other companies and local communities, with cumulative impact assessment through community and related forest department, community forestry programme to improve the lime production with sustainable way for reducing the environmental impact. Perhaps I would like to request that ERM consider a bit more on the cumulative impacts of the local limestone production not only for the cement site but also for the community of coal site where other companies are working.

A11 (Mr Piers Touzel, ERM):

1) ***Cumulative impacts:*** In relation to the limestone cumulative impact assessment I agree with you. The local communities extract the limestone from the limestone range and firewood from the forest and clear vegetation. Mitigation measures are important to reduce the impact to the community, including the biodiversity action plan to be funded by STC. In relation to the coal mine in Paluzawa area, there are another 3 or 4 companies mining coal, although and some of these are underground mines with smaller footprints. Auto ignition of coal is reported to be a problem by the local community and we have proposed measures to mitigate this.

Q12 (U Kyaw Thet Win, Upper Chindwin Youth Network, Paluzawa, Kalay District):

1) ***Biodiversity assessment*****:** We want to express our concern on impact to forest species and deforestation by illegal logging using the STC road in Paluzawa. We want to know if ERM has already assessed the loss of forest. The loss of the forest product such as bamboo, bamboo shoots, fruits and corn is also important and needs to be assessed. Do you have any flora assessment? Did you collect the data of the loss of properties of the community people and forest species by the coal production?

2) ***Transportation***: How to account for the responsibility for pollution in the Chindwin River from coal transportation, runoff from the coal mine area, impacts of road construction, and impacts on fishing grounds from accidental coal and oil spills in transportation. We have information how the environment was damaged and ERM should consider using this information and cooperating with us for the assessment.

A12 (Mr Piers Touzel, ERM):

1) Thank you for your offer of information on environmental damage. We agree that construction of the coal mine access road is having a serious impact and have recommended that its use in the upper sections be discontinued. In terms of the water quality assessment, we took water quality samples downstream of the coal mine and found that water quality was generally acceptable with the exception of elevated levels of suspended solids and some metals. We have recommended that alternative options be considered to the seasonal construction of the access road and Shwe Taung has indicated that they will discontinue use

of the upper section of this road from the end of the dry season this year. For your information on environmental damage, please pass this Ms Myat Mon Swe for our consideration.

A12 (U Aung Zaw Naing, STC):

2) We will keep in touch with the local expertise and CSO of Paluzawa to improve the habitat condition at the existing mine.

Q13 (U Hla Min Min Tun, MATA, Mandalay):

***Pollution*:**

1) ERM said that there is no dust impact on the community, however, community said that ash from cement plant can be seen on the leaves of trees, agricultural plantation that we have photos as proof. Dust and ash can be also seen on the surface of uncovered water containers. If they use the water, people suffer from skin disease. So we would like to clarify how to manage the dust impact? Also fish kills have been observed in the stream, and we want to know that it is being caused by the waste discharged from the cement plant to water resources or it is happened by other reasons. So how to control the waste and wastewater impact?

2) Why was consultation only undertaken with people related to the GAD officers? Most of the 25 people who attended this meeting were young people.

A13 (Mr Piers Touzel, ERM):

1) ***Ash***: We modelled air emissions from the cement plant kiln stacks together with dust from exposed areas of the mudstone and limestone quarries. Our assessment indicates that there should not be unacceptable dust impacts at either Pyi Nyaung or Kubyin Villages as a result of the project. This is a function of the prevailing wind direction and distance between the source of dust and the receptors. I would also point out that lime kilns in Pyi Nyaung village could be a source of ash and dust. In Kubyin village, all houses are located close to a dirt road that is not related to the project and each of these houses burns wood as fuel. The dirt road and wood burning are likely to be the sources of dust in Kubyin. We have installed 10 dust deposition gauges at various locations in Pyi Nyaung and Kubyin villages and around the cement factory to monitor long term changes in dust levels.

2) ***Representatives of the consultation*:** For our previous consultation the invitation was through village leaders. We apologise if we inadvertently missed some people who wished to attend and we will improve this as well as our means of invitation for the upcoming round of consultation.

Q14 (U Nyo Maung, GAD, Pyi Nyaung):

1) Representatives of the consultation: The number of only 25 consulted people that has been raised by others is wrong because I was there when ERM did the consultation. The invitation was open to all villagers before the meeting and for the socio-economic survey.

2) Fish death: Gold mining in the upstream reaches of Myint Thar is the cause of the fish kill that has been referred to. It is correct that we can see a layer of lime on the surface of water

containers, especially in winter season because our area is within a limestone range. But this does not mean it is caused by cement companies. It may be, but I would like to explain the existing condition in the surrounding area. The land problem is happening all over the country and not only in our area. I think that the land problem is less serious compared with other areas. According to what the company mentioned, this problem will be settled I believe. On the other hand, nobody doubts investors in our area support the communities' development. However, if there is impact on the communities please avoid any impact and please support development of the communities.

A14 (U Aung Zaw Naing, STG):

1) Thank you for the comments and we will commit to emphasize community development activities.

Q15 (Mr Ben Hardman, EarthRights International -ERI):

1) You mention earlier about the grievance redress mechanism. Can you please elaborate?

A15 (U Aung Zaw Naing, STG):

1) Managing grievance is very important to us as we want to hear any complaints from the community. Whatever national and international standard we are going to comply with, I would like to tell all of you that we are Burmese and we will work honestly for our national development. The people's benefit from our hearts is more important than just standards.

Q16 (Mr Ben Hardman, EarthRights International -ERI)

1) Have you already informed the local consultation meeting to the community?

A16 (U San Myaing, STC):

1) We have already invited people of 5 surrounding villages of our Project through GAD of Thazi Township, by placing notice on signboard in the main/ central areas of those villages and distribute the invitation letter to the people directly. We will undertake public consultation meeting with related departments and CSOs in Tharzi on 21st July and community consultation meeting will be held in Pyin Naung on 22nd July.

Photo:

Minutes of Meeting (21.7.2017)

Meeting Details				
Project :	Supplementary ESIA for Shwe Taung Cement (STC) Cement Plant & Associated Facilities in Myanmar			
Venue	GAD Office Meeting Room (Thazi Township)		**Region/ State**	Mandalay
	Township	Thazi	Village	-
Objectives	Township Level Meeting to: 1. Share information about the Project "Expansion of a Cement Plant & Associated Facilities by the Shwe Taung Cement (STC) Company Limited in Myanmar". 2. Present findings of the draft Supplemental ESIA. 3. Exchange views with interested and affected parties which will be taken into account for finalisation of the Environmental and Social Impact Assessment (ESIA) Report for the Project.			
Date	21st July 2017 (Friday)			
Time	9:00 am to 11:00 am			
Attendee:	1) U Kyaw Naing Soe, DMD, STC 2) Daw Nang Maw Maw Aye, Assistant Director, STC 3) U Ze Lum, SE, STC 4) U Ye Myint, SE, STC 5) U Thein Myint Win, Senior Manager, STC 6) U Aung Khaing Nyi, EE, STG 7) U Thein Htay, EE, STC 8) U San Myaing, Manager, STC 9) U Kyaw Thiha, HSE Manager, STC 10) U Zaw Tint, Production Manager, STC 11) U Kyaw Win Thant, Assistant Manager, STC 12) Daw Ni Ni Aung, Staff -2 , STC 13) Daw Myat Mon Swe, Senior Consultant, ERM Government Representatives (32) CSO / NGO Representatives (3) Political Party Representatives (1) General Public (11) **Total No. of Attendees: (60)**			
Agenda:	1) Presentation of Project Details by U Kyaw Naing Soe, STC Representatives (presentation materials attached) – 9:00 am – 9:30 am			

	2) Presentation of Key Findings of Supplementary Environmental and Social Impact Assessment by Daw Myat Mon Swe, ERM Representatives (presentation materials attached) – 9:30 am – 9:50 am 3) Question and Answer Session (see below on detailed notes of discussion) – 9:50 am – 11:00 am.

Detailed Note of Discussion

Q1 (Community Leader, Thazi):

i. Appreciate STC's CSR activities and consideration of the safety of communities.

ii. Question is raised on the way to control and maintain blasting materials storage of the quarry as well as noise and vibration impact to the people.

iii. It is recommended that handout in Myanmar language including Project activities and objectives of the meeting to be distributed at the meeting for better understanding.

A1 (U Ze Lum, STC):

i. Noted the appreciation and recommendations.

ii. To respond to the concerns, blasting has to be registered with the Military Department and be approved based on detailed consideration of safety requirements. Transportation of the explosives to the storage will be in strict compliance with safety requirements and the storage is constructed in compliance with safety requirements of the Ministry of Defence. All explosives are stored as per required regulations. There is also security guard for 24 hours and the two main keys of the storage are kept and checked by heads of administration and mining departments of STC. The material in-out record is systemically recorded and must be carried out with strict material handling procedures.

iii. Vibration from mining is being controlled systematically with advanced technology so that there is no issue of noise and vibration which will affect local people.

Q2 (U Ko Oo, White Marker Group, Thazi):

i. To prevent conflicts between employee and employer, suggested that the Labour Laws and Regulations be explained clearly to all staff and contractors.

A2 (U Kyaw Naing Soe, STC):

i. Noted the comment. STC is currently doing this for all staff.

Q3 (Thazi Development Committee):

i. Environmental monitoring should be required and undertaken by third parties who are registered with the government or should be undertaken by government departments.

ii. What is the percentage of profit for the CSR budget?

A3 (U Kyaw Naing Soe, STC):

i. Environmental monitoring surveys were undertaken by the Environmental Conservation Department in February and June of 2017.

ii. STC has been undertaking monitoring of dust deposition around the cement plant and in two nearby villages since January 2017. This will be continued during the plant operations.

iii. Monitoring will also be undertaken according to recommendations of the Supplementary ESIA.

iv. For CSR, STC is continually implementing the CSR programme.

Q4 (Community leader, Thazi):

i. Given that Pyi Naung and Kubyin are Malaria areas previously, how does STC deal with Malaria in the area?

ii. Noted that STC contributed to the Pyi Nyaung's community development by upgrading the road for better transportation, is it possible for STC to support Thazi community development programs such as religious and social needs by selling cement directly from the plant for cost effectiveness?

A4 (U Kyaw Naing Soe, STC):

i. Direct purchase of cement from the STC may not be the cost effective way. However, STC will consider contributing to the Thazi's community development programs with the cement supply after discussion with relevant departments in detail on where it will be required.

ii. STC has test kits for Malaria in the company clinic for our staff. STC's doctor visits Pyi Nyaung and Kubyin once every two weeks to provide medical support for the local community to deal with Malaria.

(U Ze Lum, STC):

iii. Malaria is now rare is the area after the Malaria combat program of Thazi Township Health Department. STC has a plan to implement Malaria check program in communities.

Q 5 (Daw Min Min Naing, White Marker Group):

i. Is there any replantation program in the area for the cement plant expansion?

ii. We heard that the rate of infant mortality is increasing after using coal fuel at the cement plants in Thazi Township.

A5 (U Kyaw Naing Soe, STC):

i. Yes, there will be a replantation program associated with the cement plant expansion. STC plantation program will include at least 120 acres of German Acacia for the 600 acres of limestone quarry.

ii. We will get back to you about the data on infant mortality after checking with our medical doctor and consulting with township medical department.

Q6 (NLD Member):

i. The cement plant expansion project has to be built free from the cultivation area of the local peoples to avoid the any conflict of land/crop acquisition.

A6 (U Kyaw Naing Soe, STC):

i. The expanded cement plant is only 20 acres which is entirely within the existing plant area. Therefore, additional land acquisition is not required. The second power transmission line from Yay Paung Sone to Pyi Nyaung can use the same Right of Way (RoW) as the existing first line or about 100- 200 meter away from the existing RoW. We have already arranged to meet the potentially affected people who may own / use land along the second transmission line today at 2:00 pm at our base camp to inform and discuss with them about the second transmission line. For the access road constructed in 2009-2010, we have already compensated 14 people, however, recently we found out one person said that he was not being compensated. We will consider compensating him. For the first transmission line construction, 4 households were compensated. A Grievance Redress Mechanism will be set up that will involve STC, local government authorities, CSO and local people for transparency. An information centre will be established in Pyi Nyaung like a library to share the Project information and to receive any complaints from the people directly. Everybody can post the complaint directly to the post box at this information centre.

A6 (U San Myaing, STC):

ii. There are 8 IFC Performance Standards. We will do land acquisition, crop compensation and livelihood restoration, according to the IFC Performance Standard and government law. Moreover we also care about public awareness and protection of people.

Q7 (Township Election Committee, Thazi):

i. Request Shwe Taung to support reward program for the students who pass matriculation in Thazi Township and to contribute to the education sector.

A7 (U Kyaw Naing Soe, STC):

i. Yes we will support the reward program and we are supporting government scholarship programs in Pyin Naung and Thazi Township.

Q 8 (Thazi Development Committee):

i. Can STC provide discount to cement price for the road construction by Thazi Development Committee considering their donation in Pyi Nyaung?

ii. Can STC provide information regarding tax payment?

A8 (U Kyaw Naing Soe, STC):

i. Welcome to discuss the road construction as required.

ii. STC has paid 2.2 billion Kyats commercial tax for 2016-2017 Budget year and more than 9.6 billion Kyats for income and commercial tax by the Shwe Taung Development Co., Ltd in 2015-2016.

Q 9 (Staff Officer, Seain So):

i. With CO_2 emission from the cement plant, this can be offset by maintenance of existing forest by STC.

ii. For the illegal logging enhanced by the improved access road, STC has to prevent illegal logging together with relevant governmental department.

A9 (U Kyaw Naing Soe, STC):

i. STC is maintaining the forest by replantation as required by the Forestry Department. We also want to cooperate with the Forestry Department to ensure successful replantation program.

ii. Please also share your thoughts on how to prevent degradation of the existing condition of the forest.

Photo:

Minutes of Meeting (22.7.2017)

Meeting Details				
Project :	Supplementary ESIA for Shwe Taung Cement (STC) Cement Plant & Associated Facilities in Myanmar			
Office/ Department/ Organization	Aung Theintdi Monastery (Pyi Nyaung)		**Region/ State**	Mandalay
	Township	Thazi	Village	Pyi Nyaung
Objectives	Village Level Meeting to: 1. Share information about the Project "Expansion of a Cement Plant & Associated Facilities by the Shwe Taung Cement (STC) Company in Myanmar". 2. Present findings of the draft Supplemental ESIA 3. Exchange views with interested and affected parties which will be taken into account for finalisation of the Environmental and Social Impact Assessment (ESIA) Report for the Project.			
Date	22th July 2017 (Saturday)			
Time	14:45 to 17:30			
Attendee:	1) U Aung Zaw Naing, CEO, STG 2) U Kyaw Naing Soe, DMD, STC 3) Daw Nang Maw Maw Aye, Assistant Director, STC 4) U Ze Lum, SE, STC 5) U Ye Myint, SE, STC 6) U Thein Myint Win, Senior Manager, STC 7) U Aung Khaing Nyi, EE, STG 8) U Thein Htay, EE, STC 9) U San Myaing, Manager, STC 10) U Kyaw Thiha, HSE Manager, STC 11) U Zaw Tint, Production Manager, STC 12) U Kyaw Win Thant, Assistant Manager, STC 13) Daw Ni Ni Aung, Staff -2 , STC 14) Daw Myat Mon Swe, Senior Consultant, ERM NGOs (4) Political Party (6) Government (9) Public (120) **Total No. of Attendees: (153)**			

Agenda:	1) Presentation of Project Details by U Kyaw Naing Soe, STC Representatives (presentation materials attached) – 14:45 – 15:30 2) Presentation of Key Findings of Supplementary Environmental and Social Impact Assessment by Daw Myat Mon Swe, ERM Representatives (presentation materials attached) – 15:30– 16:20 3) Question and Answer Session (see below on detailed notes of discussion) – 16:20 – 17:30.

Detailed note of discussion

Q1 (Villager, Pyi Nyaung):

i. Appreciate STC and ERM efforts to organize this public consultation meeting for the ESIA.

ii. Feel satisfied with STC's commitment to handle grievances of the affected people.

iii. Understand the need of cement production for national development.

iv. Point out that STC should enhance opportunities of local Pyi Nyaung villagers to be employed by STC.

A1 (U Kyaw Naing Soe, DMD, STC):

i. Thanks for welcoming us and we will implement all our commitments.

ii. STC's priority is to create job opportunities for the communities around the cement plant. However, our positions require job related skills and education including passing matriculation and achieving Standard 10.

iii. Most people in Pyi Nyaung do not meet the education requirement because the village is far from town and education has not been a priority for a long time. A high school was established last year with support from STC, but most students are still studying. All students that pass matriculation must go to Meiktila for higher education. STC do not prefer to only require education level of achieving Standard 10 for their job as STC want to encourage students to continue education as graduate. I would like to request the parents of students of Pyi Nyaung to encourage students to be graduates. If there is difficulty in supporting the students to continue their education, STC will provide scholarship. To employ people who do not pass the matriculation for villages such as Oat Kyin, Mon Bin, Yay Paung Sone, Kubyin, Pyi Nyaung and Kyaw Saung Gyi, we will consider employing them in the field of machinery handling with vocational training. We will inform the community of upcoming employment opportunities. STC prefers to have employees from local communities near the plant rather than other areas.

Q2 (Villager):

i. How waste from the cement plant can cause impact on community health?

ii. How are you going to manage pollution? How are you going to disclose information regarding pollution from the cement plant?

iii. Environmental monitoring should be undertaken regularly with results disclosed to people living around the cement plant.

iv. Request STC to provide a library urgently. This has been a wish from the community for a long time but the local community cannot afford by themselves.

v. Request STC on behalf of the public to provide water supply.

A2 (U Kyaw Naing Soe, DMD, STC):

i. The information centre will be provided at a place available for rent and the location should be central to the public area. Community leaders will be consulted for the location.

ii. For pollution control, we will make sure by controlling according to the emission standards because our employees living in the staff compound at the cement plant will suffer first if there is pollution caused by Project activities and unhealthy condition can lead to loss of production. There are now 10 dust deposition gauges to monitor dust deposition; four in Pyi Nyaung and Kubin villages and 6 at the cement plant. In Pyi Nyaung, one gauge is in the GAD official's house and one is in the Chairman of the NLD' house. Also we will add more gauges between Pyi Nyaung and cement plant.

iii. We have also undertaken environmental surveys to inform the ESIA and to try to identify the cause of pollution, if any, to see if it is caused by STC Project or other sources. With the results, we can decide how to mitigate the impacts caused by STC and how to reduce the impacts of others. We have already monitored dust deposition for six months and all results will be disclosed soon.

iv. For pollution caused by dust, there are two parameters of concern, $PM_{2.5}$ and PM_{10}. $PM_{2.5}$ is very fine particle which can cause health problem if inhaled. We will distribute the pamphlet including information about monitoring at the Information Centre and also to public directly.

v. For water supply, STC will study water pumping from the Myitthar Stream and water will be supplied via pipeline with meter. We will request maintenance cost of the water supply to individual water usage as we would prefer community involvement. So I commit that STC will arrange the water supply to the Pyi Nyaung area together with 2nd line water supply to cement plant.

vi. The water quality of the Myitthar and Tharlun Streams will be examined and information will be disclosed at the Information Centre.

Q3 (Villager, Car Pyi Nyaung Qr.,):

i. Thanks to STC and ERM. All villagers have no grievances to STC for existing and new transmission lines. We, as parents, also appreciate STC donation of the two-storey school building and all education materials such as school bag, books and stationaries in Pyi Nyaung since 2013 and the care of health to the community up to now.

ii. For the water supply, the Myitthar Stream has water for the whole year which is the main source of water for community. For Yae Shin Stream water is only available in rainy season. We are concerned about water shortage due to the usage of water by the Project from the Myitthar Stream.

iii. Pollution: No concern on dust from the Project. However, the related departments and NGOs have to consider health impact of dust on behalf of local people because it is difficult for us to understand cement manufacturing technology and its potential impacts.

iv. Livelihood: Our livelihood is depending on transportation using the STC's roads. So request STC to allow using the roads as usual in the future.

v. Education: Thanks for the new school building which is being built by STC and STC donation of 5 million Kyats for funding the school.

vi. Job opportunities: We have no opportunities to be employed because of our education status which is understood. So we are trying to upgrade the education level. On the other hand, we need help from STC for students who have passed the matriculation with lack of finance by parents to continue to graduate level.

A3 (U Kyaw Naing Soe, DMD, STC):

i. Thanks for the recommendation and community support for STC activities. STC committed to set up the education fund.

ii. We will also undertake water supply assessment of Myintthar Stream and we will supply water to Pyi Nyaung.

Q4 (Village leader, Ya Htar Pyi Nyaung):

i. STC has already supplied electricity and stationary for the students. Request STC to support the educational fund, renovate the primary school built in Ya Htar Pyi Nyaung and access road to school which is destroyed. Also request for job opportunity for the people who did not pass the matriculation.

A4 (U Kyaw Naing Soe, STC):

i. Yes. We will fund the education and we will also fund 5 million kyats for support on electricity supply. We will further discuss renovation of the primary school. Our HR Department will inform people about job opportunities at STC.

A5 (Ya Htar Pyi Naung):

i. The number of households in Ya Htar Pyi Nyaung has increased from 50 to 120 now. Request STC to support educational fund for local residents. After primary education, they have to study in Pyi Nyaung School, so that the transportation fee is required for the students and requested STC to provide such.

A5 (U Kyaw Naing Soe, STC):

ii. We will donate 5 million Kyat for electricity supply and will further discuss on renovation of the school.

Q6 (Pyi Nyaung):

i. We would like to invite STC to visit to our village.

A6 (U Kyaw Naing Soe, DMD, STC):

i. Yes, we will visit your village.

Q7 (U Kyaw Naing Soe, DMD, STC):

i. Is there anyone in the villages who does not understand Burmese?

A7 (Leaders of the villages):

i. No.

Q8 (NLD member):

i. We would like to know how the biodiversity mitigation measures will be implemented in limestone area by STC. If the biodiversity action plan is implemented, please disclose relevant information in future.

ii. Suggest to set up village representative committee.

A8 (Mr. Jovy Tam, ERM):

i. We are helping STC to prepare a Biodiversity Action Plan. Under the plan, we will consider different options of offsetting the critical habitat which will be affected by the Project. The plan is being prepared in consultation with relevant government departments such as MONREC and NGOs such as FFI and WCS. The plan will be ready in September 2017 based on which actions will be implemented accordingly.

(**U Kyaw Naing Soe, DMD, STC):**

ii. We have already discussed with related department to undertake our biodiversity offset at Panlaung-Pyadalin Cave Wildlife Sanctuary. All relevant information, including but not limited to biodiversity, will be disclosed at the information centre.

Q9 (Villager, Pyi Nyaung):

i. Will road construction in Pyi Naung area be continued or not? Some roads are only 10 feet wide, so that they need to be widen for fire fighting vehicles to access. After finish the road construction, GAD and village head will need to extend the road to every house.

A9 (U Kyaw Naing Soe, DMD, STC):

i. Yes, we will support the road construction.

Photo:

Annex C

Stakeholder Grievance Mechanism

SHWE TAUNG CEMENT CO.,LTD.	Stakeholder Grievance Mechanism		HSSE-XXX-XXX
	Revision	Effective Date	HSSE Department
	XX-XX-2018	XX-XX-2018	

Change History		
Rev #	**Description of Change**	**Paragraph**
01	Initial Release 2 May 2018	All

Prepared by		
Name	**Designation**	**Signature**
	Social Manager	
Verified by		
Name	**Designation**	**Signature**
	HSSE Head	
Approved by		
Name	**Designation**	**Signature**
	Shwe Taung Building Materials CEO	

TABLE OF CONTENT

Definitions and Abbreviations

AOI	Area of Interest
CEO	The Chief Executive Officer of Shwe Taung Building Materials' entities
CLO	Community Liaison Officer or on-site person-in-charge of social aspects with the communities, reporting to the Social Manager
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
Environmental Manager	Person-in-charge of environmental aspects
EPC Contractor	Engineering, Procurement and Construction company responsible for the design, procurement, construction, commissioning and handover of the expansion project (second clinker and cement line) at STC; the EPC Contractor must appoint a health and safety manager (HS EPC Manager) and a manager responsible for the expansion project (Project EPC Manager)
ESIA	Environmental and Social Impact Assessment
ESIA Process	An Environmental and Social Impact Assessment (ESIA) process is a systematic approach to identify, predict and assess the type and scale of potential environmental and social impacts associated with business activities of projects; the ESIA process includes associated control and mitigation measures to prevent, reduce or offset these potential environmental and social impacts. Three local ESIA studies were carried out throughout 2014-2016 and Supplementary ESIA in 2016-2017 for STC's development projects.
Grievance	An issue, concern, problem, or claim (perceived or actual) that an individual or community group wants a company (such as ST) or contractor (such as ST's Contractors or their sub-contractors) to address and resolve.
Grievance Mechanism	A locally-based and formalised way to receive, assess, and resolve stakeholder complaints about the performance or behavior of ST, as project proponent and company, including its contractors or employees.
Head of Cement Business	Person-in-charge of STC and STM
HS Manager	Health and Safety Manager or person-in-charge of Health and Safety matters or Chief Safety Officer
HSSE	Health, Safety, Social and Environmental
HSSE Head	Health, Safety, Social and Environmental Department Head
HTC	High Tech Concrete Company
NGO	Non-Governmental Organisation
OHS	Occupational, Health and Safety
Plant Operation Manager	Person-in-charge of the operations at STC (first clinker and cement line) and of the expansion project at STC (second clinker and cement line) until it is commissioned and incorporated in the operations at STC
SGM	Stakeholder Grievance Mechanism

Social Manager	Person-in-charge of social aspects or social accountability manager
SOP	Standard Operating Procedure
Stakeholder(s)	Persons or groups who are directly or indirectly affected by a project or entity (such as STBM and STBM operations) as well as those who may have interests in a project or entity and/or the ability to influence its outcome, either positively or negatively. They may include locally affected communities or individuals and their formal or informal representatives, national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, the academic community, or other businesses.
STBM	Shwe Taung Building Materials. This is the entity which holds STC, STM, HTC and their associated facilities and assets.
STC	Shwe Tang Cement Co., Ltd.
STM	Shwe Taung Mining Company
ST's premises	ST's premises are defined as ST's premises, sites and facilities including the cement plant (including ancillary facilities, the cement plant expansion, the mudstone and limestone quarries) located in Pyi Nyaung in the Thazi township of Mandalay region (STC), the coal mine located in Paluzawa in the Kalaywa township of the Sagaing region (STM), HTC's premises and facilities in Myanmar as well as STC's, STM's and HTC's offices and head offices in Mandalay and Yangon.

1. INTRODUCTION, OBJECTIVES, AND SCOPE

1.1 Introduction

Shwe Taung Cement Co. Ltd (STC) operates or manages an existing cement plant, a cement plant expansion project for a second line as well as the associated quarries (limestone quarry and mudstone quarry) and transmission lines located in Pyi Nyaung, Thazi Township, Mandalay Region. STC also includes Shwe Taung Mining Company (STM) that operates a coal mine in Paluzawa, Kalaywa (Kalewa) Township, Sagaing Region, to supply fuel for the cement kilns. The construction, operation and decommissioning of the above STC facilities are collectively referred to as "the Project".

STC is implementing a Stakeholder Grievance Mechanism (SGM) in order to manage and properly address complaints made by the communites located within the Project's Area of Influence (AOI) or any other stakeholders during its different phases (i.e., construction, operation and decommissioning). This procedure will help to track the social performance of the Project since the number and nature of the received complaints can be indicators of the manner in which the Project is conducted. An analysis of the number and proportion of complaints towards different issues (e.g. waste management, dust, water quality) will help to identify the need for changing some procedures and practices (e.g. waste manage plan, construction site practices) in order to reduce the level of negative impacts or conflict with the stakholders and improve performance of the Project.

This document describes the objectives, scope and mechanisms of the SGM, and is an internal document of STBM. A condensed version will be available to any person, group and community potentially impacted by the Project - and will define procedures as to how they can communicate their viewpoints and complaints to STC or its contractors.

The SGM is part of the Stakeholder Engagement Plan (SEP) which is presetned under a separate cover and should be read in conjunction.

1.2 Objectives

The overall goal of the SGM is to ensure that all grievances and complaints related to the project (including its contractors and sub-contractors) are duly received, fully documented, and responded to and addressed in a timely manner. In doing so, the project aims to avoid as much as possible any conflict and/or potential judicial processes.

The specific objectives of this SGM are to:

- Develop an easily-accessible, minimal-cost, efficient and culturally acceptable complaint procedure for the stakeholders involved / interested / impacted by the Project
- Implement effective dialogue and open lines of communication with the stakeholders.
- Help to prevent unrealistic expectations and/or negative perceptions from the stakeholders towards the Project.

- Establish a system of investigation, response and quick complaint resolution.
- Reduce gradually the number of stakeholder grievances regarding the Project.
- Improve the Project's social performance through the analysis of complaints.

1.3 Scope

This SGM is applicable to all concerns, complaints, grievances, and questions received by STBM representatives either directly or indirectly from the stakeholders. Such concerns may be actual or perceived. Use of the SGM is voluntary.

The scope of the SGM (as well as of the associated SEP) includes construction, operation and decommissioning of both the STC cement plant and associated facilities (quarries, transmission lines, transport, and other ancillary components such as labor camps, worker accommodation, etc) in Thazi Township as well as the STM coal mine in Kalaywa Township. As such, the SGM includes the various stakeholders positively or adversely affected by all of STC's operations described above. STBM employees, contractors and subcontractors shall comply with the requirements of this SGM.

The Project AOI has been defined in the Supplementary ESIA of the project (Note: publicly disclosed and available from the STC HSSE Department upon request) and is aplicable to both the SGM and SEP. For most aspects, the AOI includes residential areas within a 5km radius of all Project Sites. This AOI encompasses the following villages as shown in *Figures 1.1-1.2.*

- **Cement Plant and Quarries**: Pyi Nyaung and Kubyin Villages;
- **Cement Plant Transmission Line**: Kyawuk Saung Kwae, Oat Kyin, Mon Bin and Yay Paung Sone and Popagone Villages;
- **Coal Mine and Staging Areas**: Chaunzong, Paluzawa and Namwake Villages.

In addition to those communities living within the Project's primary AOI, this SGM will also be used to manage and properly address complaints of non-community stakeholders, including members of the general public, CSOs, NGOs, government officials, etc.

The scope of this document shall be communicated to local government officials (including Village Tract Leaders), potentially affected people and entities, STBM company employees and contractor representatives responsible for addressing or responding to grievances, directly or indirectly.

Figure 1.1 **Cement Plant (STC) and Transmission Lines Area**

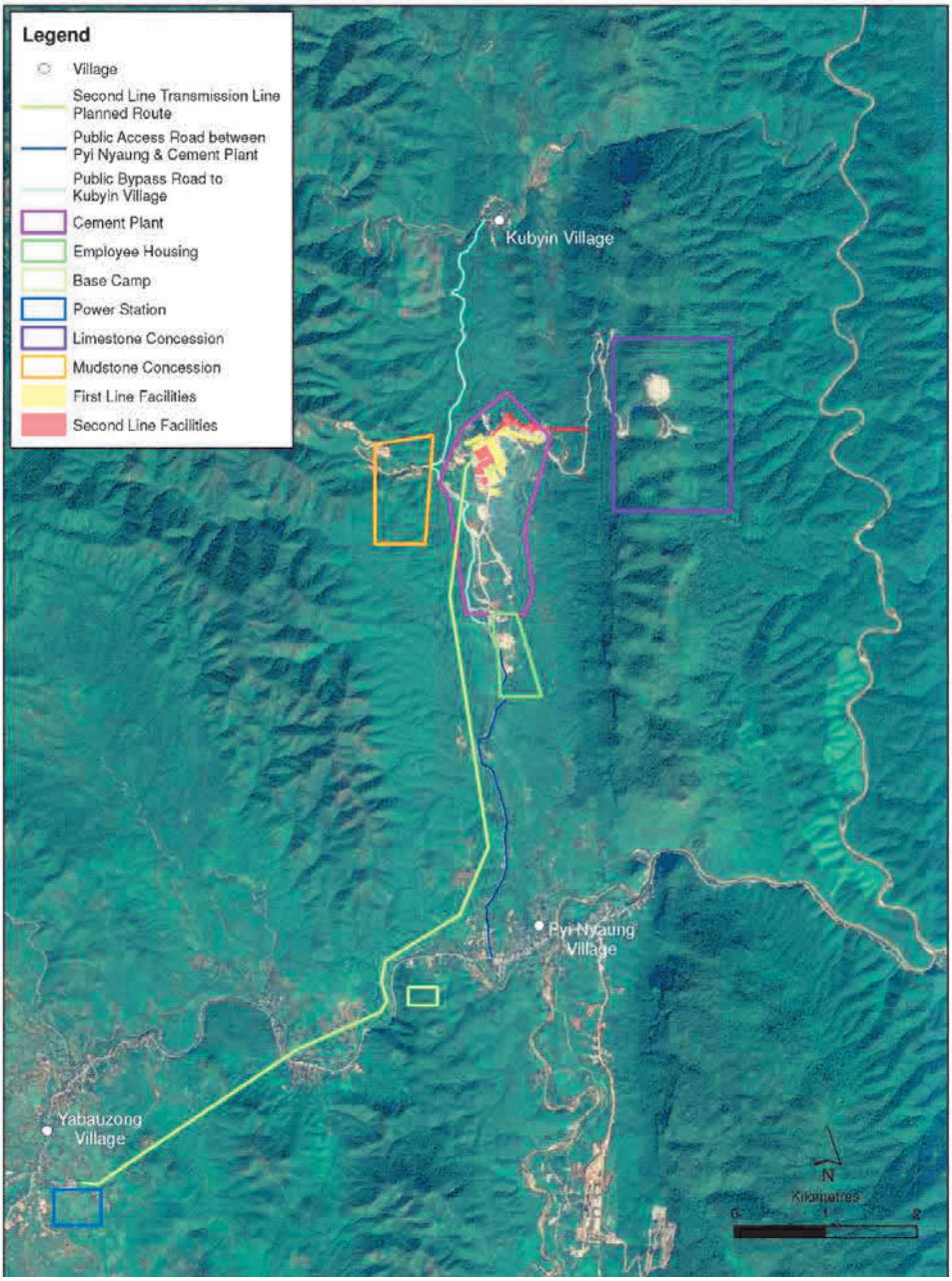
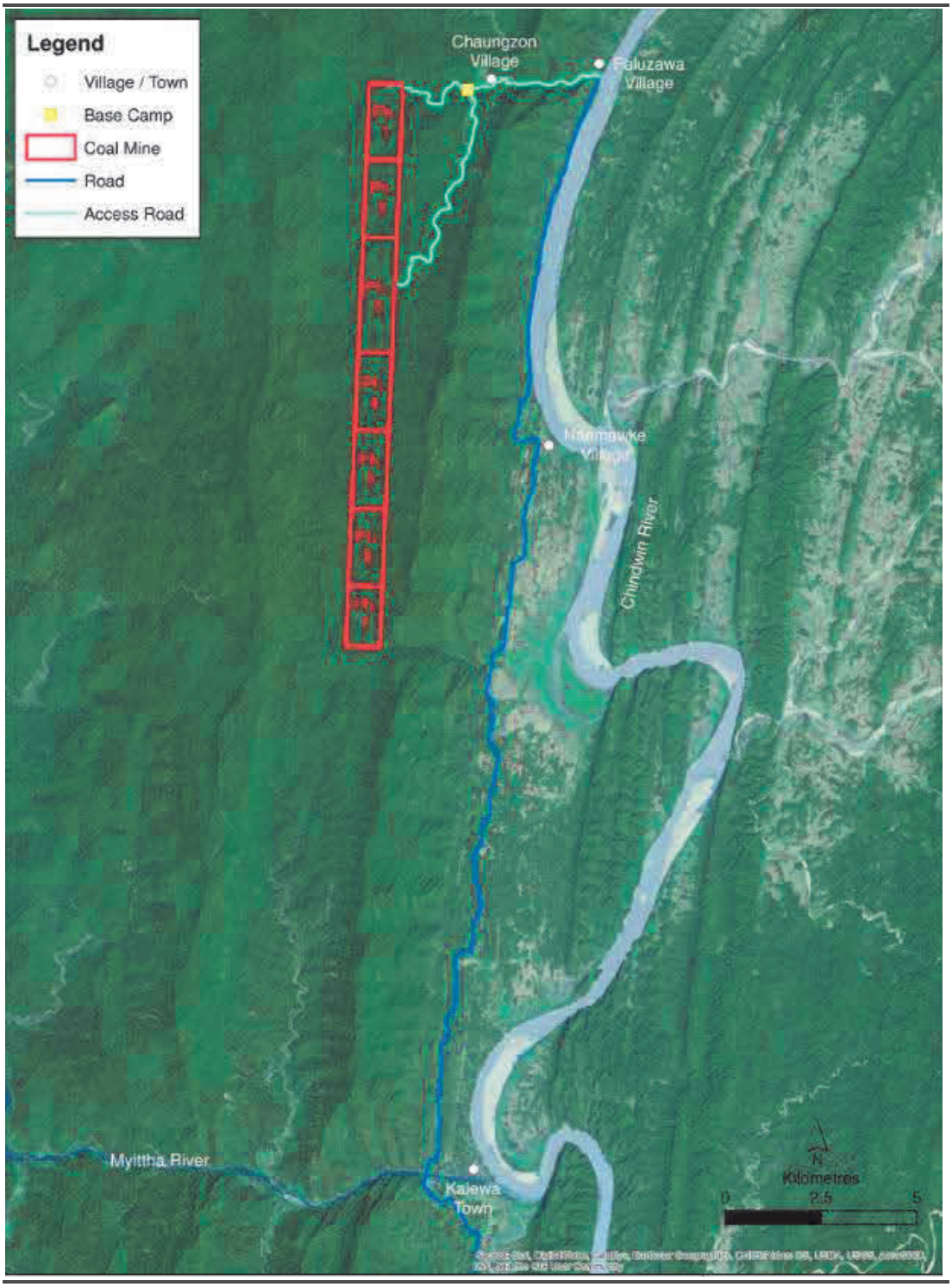


Figure 1.2 *Coal Mine (STM) Area*



1.4 Incorporating Stakeholder Feedback

In July to September 2017, disclosure of Draft ESIA findings was undertaken to cover the following village:

- **Cement Plant and Quarries**: Pyi Nyaung and Kubyin Villages;
- **Cement Plant Transmission Line**: Kyawuk Saung Kwae, Oat Kyin, Mon Bin and Yay Paung Sone and Popagone Villages;
- **Coal Mine and Staging Areas**: Chaunzong, Paluzawa and Namwake Villages.

During the meeting in Pyi Nyaung Village, STC was requested by the villagers, and committed, to provide an information centre for the community which can be a place where STC and the communities can interact, including on submission of griveances. An information centre was established in Pyi Nyaung Village in February 2018 with an Information Centre Executive hired from Pyi Nyuang Village. The Information Centre Executive manages the information centre under the responsibility of the Community Liaison Officer (CLO). The information centre also has a suggestion box. The function of the information centre and responsibility of the CLO over community engagement are described under this SGM.

Stakeholders' feedback collected during the disclosure of the condensed SGM should be addressed and incorporated into the further updated versions of the full and condensed SGM.

2. KEY PRINCIPLES AND PROCEDURES

2.1 Key Principles & Key Performance Indicators

2.1.1 Key Principles

The SGM aims to implement the five principles of good grievance mechanism process, in accordance with good international industry practice:

- Proportionality: the SGM under the framework of this document can be scaled to the risk and adverse impact of STBM's activities on affected communities;
- Cultural appropriateness: the SGM is designed to take into account culturally appropriate ways of handling community and stakeholder concerns;
- Accessibility: the SGM is to be clear and accessible to all segments of the affected communities and at minimal cost;
- Transparency of this mechanism and accountability of STBM for STBM operations to all stakeholders; and
- Appropriate protection: the SGM aims to prevent retribution and does not impede access to other remedies (e.g. legal, administrative). It also means that the identity of complainants will be kept strictly confidential at all stages of a grievance.
- Accepting anonymous complaints: Anonymous complaints will be accepted but it will be made known to all stakeholders that the follow-through investigation rate on these will likely be much lower than cases with known complainants. It will also be made known that STC will only accept anonymous complaints that are legitimate: they will thus need to be accompanied by enough evidence. Anonymous complaints will be received through the letter boxes or via the websites or the information centres. The proposed resolution to anonymous complaints will be communicated to the public via a generic response provided on posters at the information centres and or via posts STC websites and Facebook pages, as most appropriate. STC will endeavour to provide responses in such a way that the complainant cannot be identified.

2.1.2 Key Performance Indicators

The key performance indicators (KPIs) of the SGM is presented in *Table 2.1* below.

Table 2.1 Key Performance Indicators of SGM

Theme	Key Performance Indicator (KPI)	Description	Performance Targets	Monitoring Frequency	Responsibility
Grievances and complaints	Response to complaints	• % of complaints responded with respect to those received • % of grievances initially responded to / acknowledged within 3 days of receipt, when received via phone to the CLO or provided in-perosn at the information centre, or within 10 days of receipt when posted in a suggestion box (suggetsion boxes are checked weekly)	100% 100%	Quarterly Quarterly	Implementation: CLO at Cement Plant, HS Executive at Coal Mine, Social Manager ; HSSE Head

Grievances and complaints	Grievance resolution rate	% of complaints solved in the first and second response	Over 80%	Monthly	Implementation: Social Manager ; HSSE Head
System in place	System[1] in place to fully document grievances	% of grievances fully documented in system	100%	Monthly	Implementation: Social Manager; HSSE Head
		Monthly SGM report prepared	100%	Monthly	
		Lessons-learned analysis report of received/handled grievances available for review by STBM/STC senior managers	100%	Annually	
		Down time of system	<1%	Monthly	
		Weekly backup of all system data	100%	Weekly	

2.1.3 Resources

STBM will allocate sufficient and adequate resources to the Stakeholder Grievance Mechanism, in terms of people, processes and associate financial resources.

The Stakeholder Grievance Mechanism will be managed by the CLO at the cement plant and the HS Executive at the coal mine, aggregated by the Social Manager. The HSSE Head and the STC CEO (Note: with involvement from STBM/HTC as needed) will have overall responsibility. Grievances will be reported to the HSSE Committee, copying the HSSE Head, in aggregate on a monthly basis and on an ad-hoc basis for significant grievances. The STC CEO will remain available to intervene should the need arises.

2.2 Structure of the SGM

2.2.1 Structure

The overall structure of the SGM is illustrated in *Figure 2.1* below, which are further elaborated in *Sections 2.2-6* below.

[1] The "System" is a database consisting of: (i) stakeholder grievance log / complaint register; (ii) full record of each step/action taken to address each grievance, including scanned copy of all important documents/evidence uploaded into the system; (iii) with assigned staff member responsible for following-up on each grievance identified; (iv) detailed statistics and summary statistic on all grievances, classifying them by category, severity, nature, and other attributes; (v) a "lesson-learned" narrative analysis report of received/handled grievances and statistics. The "System" should be placed in an internal and secure location e.g. intranet of STBM, or internal server and with differential levels of access granted to different staff members according to need.

Figure 2.2.1.1 Overall structure of the SGM – Non-Anonymous grievance

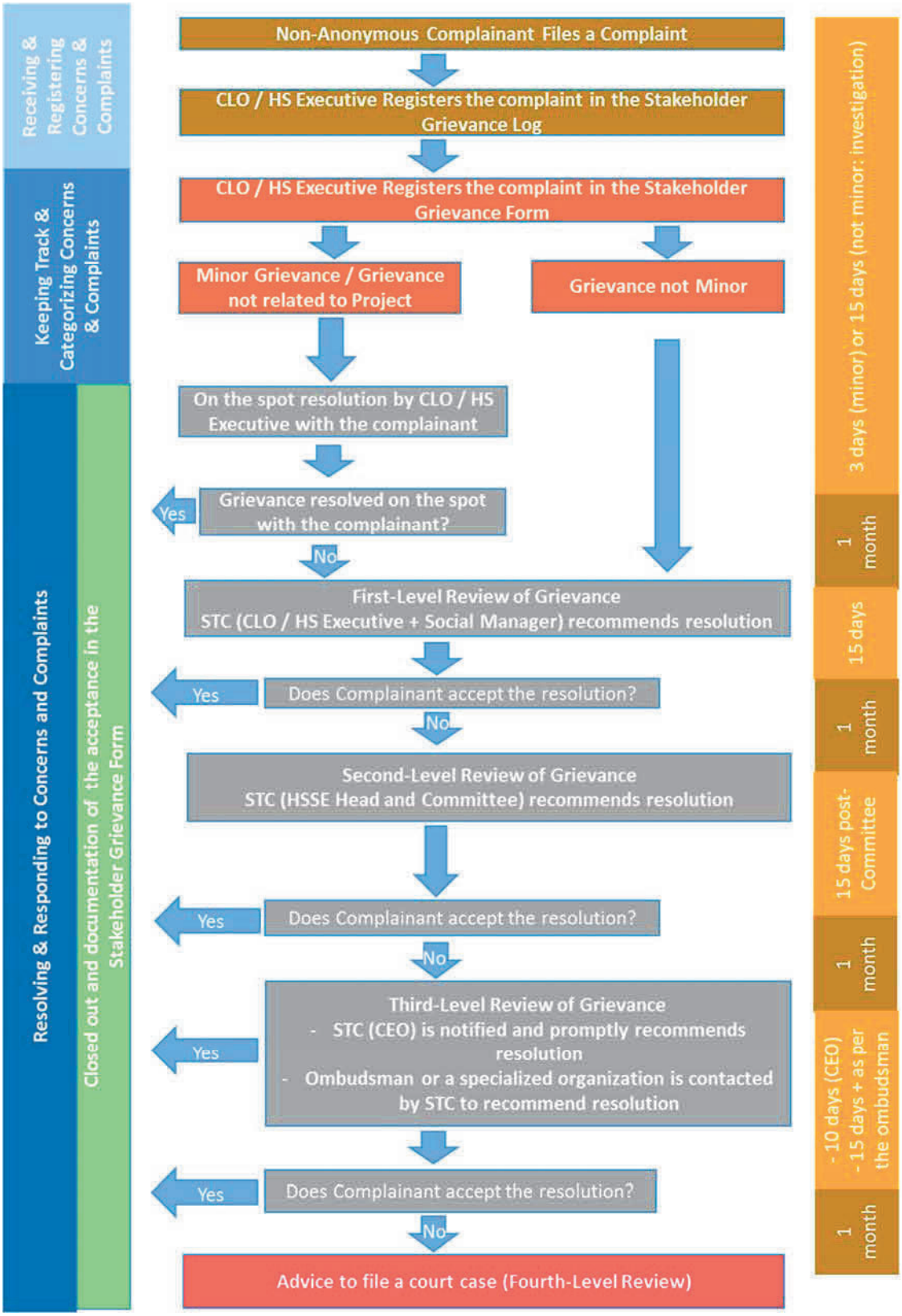
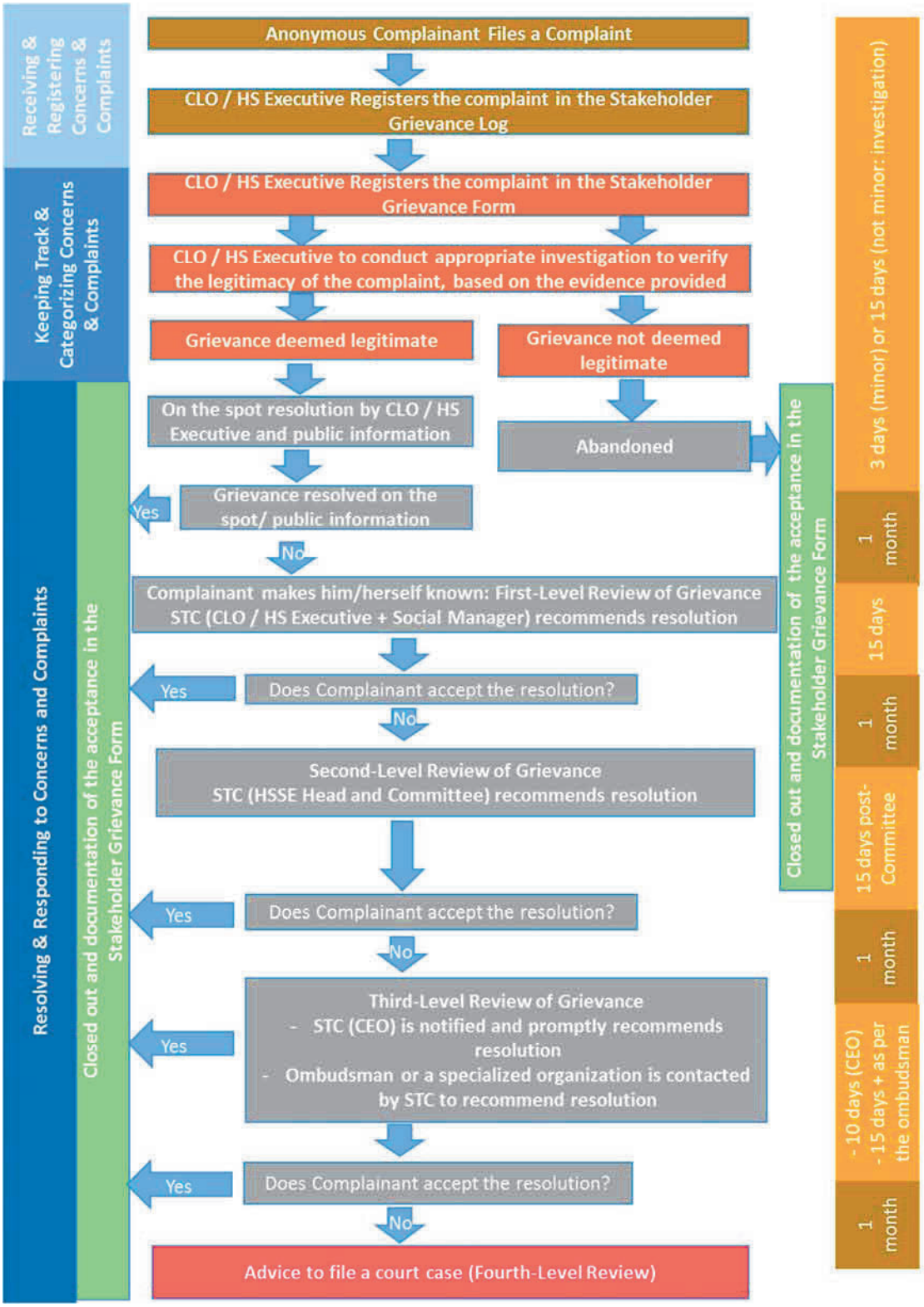


Figure 2.2.1.2 Overall structure of the SGM – Anonymous grievance



2.2.2 Key Components

The key components of the SGM includes:

- Publicizing SGM Procedures to Communities
- Receiving & Registering Concerns & Complaints
- Keeping Track of Grievances
- Categorizing Concerns & Complaints
- Resolving & Responding to Concerns and Complaints
- Monitoring Grievance Resolution
- Auditing.

These components are further elaborated in the following sections.

The establishment of the key components of the SGM consists of:

- Appointing at least one Community Liaison Officer (as soon as possible at the cement plant and to retain at least a CLO on an ongoing basis) and giving the CLO a work mobile phone with its number advertised to communities for them to know they can use it;
- Giving the HS Executive at the coal mine a work mobile phone with its number advertised to communities for them to know they can use it;
- Opening the information centres in Pyi Nyaung (status: done) and Paluzawa (status: planned after the 2018 wet season);
- Setting up community / public suggestion boxes in key places accessible to the public (e.g. information centres at Pyi Nyaung and Paluzawa, main entrance of STC's premises, water purification systems in Pyi Nyaung and Kubyin, STC's offices in Mandalay and Yangon);
- Communicating this document to new employees and contractors, including their sub-contractors, during induction sessions, reminding its contents to STC current employees and contractors at regular internal meetings and ensuring this document is kept accessible to anyone working at STC's premises (on the internal website/ intranet, in hard copies in canteens, at the main office and at the medical centre);
- Informing and reminding STC employees and STC's contractors, including their sub-contractors, of their obligations with respect to confidentiality and treatment of complaints that they become aware of, during induction sessions, ongoing training, regular internal meetings, on posters in canteens, main office and medical centre, etc.
- The HSSE Head shall ensure, through induction sessions / ongoing training, that all STC employees or Contractors, including their sub-contractors, are well aware of this Stakeholder Grievance Mechanism, that they could happen to receive a written or oral Stakeholder Grievance and that, in such case, they must immediately transfer such grievance to the CLO at the cement plant or HS Executive at the coal mine and that they commit to keep any such information receive confidential at all times as per the ST Code of Conduct and this Stakeholder Grievance Mechanism.

2.3 Receiving & Registering Concerns & Complaints

2.3.1 Receiving Complaint

Mechanisms to identify and/or receive complaints must be easy and accessible to all Project stakeholders. The following mechanisms will be implemented.

- Direct Receipt of Complaints by STBM
  - Face-to-face meetings or telephone calls with the CLO at the cement plant and the HS Executive at the coal mine who will be stationed at STC information centres in Pyi Nyaung and in Paluzawa;
  - By letter / note deposited in the community /table public suggestion boxes in key places accessible to the public. The community / public suggestion boxes will be emptied weekly with content sent to the CLO at the cement plant and the HS Executive at the coal mine (e.g. information centres at Pyi Nyaung and Paluzawa, GAD offices near STC's premises, main entrance of STC's premises, water purification systems in Pyi Nyaung and Kubyin, STC's offices in Mandalay and Yangon); and,
  - If an anonymous complaint is received, the CLO under supervision from the Social Manager and HSSE Head will conduct appropriate investigation to verify the legitimacy/validity of the complaint before deciding whether to pursue further. The complaint must be provided with enough evidence for its legitimacy to be verified by STC.
- Contact through local authorities
  - The CLO at the cement plant and the HS Executive at the coal mine will be in constant contact with the local village tract leaders, so that the leaders may articulate any type of complaint with the CLO at the cement plant and the HS Executive at the coal mine. The contact will be weekly during the extension project at STC and during the seasonal operations at the coal mine, reduced to fortnightly in the absence of major community issue for four (4) weeks in a row, reduced to monthly in the absence of issue for eight (8) weeks in a row. The frequency will increase from monthly back to fortnightly and back to weekly in case of unsolved community issue.
- Visit to local communities
  - Complaints will be received through the CLO at the cement plant and the HS Executive at the coal mine who will visit the communities to received their complaints, if any, etc. The visits will be weekly during the extension project at STC and during the seasonal operations at the coal mine, reduced to fortnightly in the absence of major community issue for four (4) weeks in a row, reduced to monthly in the absence of issue for eight (8) weeks in a row. The frequency will increase from monthly back to fortnightly and back to weekly in case of unsolved community issue.

- Complaints may also be received by email or online post via the websites the ST Building Materials' entities.

Apart from the above channel, any STC representative can happen to receive a written or oral grievance from stakeholders. That STC representative should immediately pass it to the CLO at the cement plant or the HS Executive at the coal mine. As part of his/her job duties and commitments to STC Code of Conduct, that STC representative should treat any such information confidentially and record it in its original entirety into the SGM system/database.

Note: for internal transparency, as soon as a complaint is received by the Information Centre Executive or CLO at the cement plant or the HS Executive at the coal mine, s/he will record details in the SGM and also notify the Social Manager & HSSE Head.

2.3.2 Registering Complaint

As soon as a grievance is received by the CLO at the cement plant or the HS Executive at the coal mine, the grievance should be acknowledged using the same channel as it was received. This will help to assure the complainant that STC is responding properly. To help STC register, keep track of and respond to the grievance, a Stakeholder Grievance Log will be used as presented in Annex A, which include the following information:

- Data on the person lodging the complaint: name, address, national identification number, place or community of residence (it is voluntary for the affected party to divulge personal information i.e. anonymous complaints will also be accepted)
- Date, time, place where the complaint was received.
- Description of the complaint.
- Data for further contact (it is voluntary for the affected party to divulge personal information).
- Date when implementation action(s) began and ended.
- Dates when the required notifications were sent to the affected part

The Stakeholder Grievance Log will be kept in the secured internal system (intranet/ Google Drive) of STC which will be managed by the Social Manager. A grievance identification number will be assigned for each grievance in the Stakeholder Grievance Log which will be used also in the Stakeholder Grievance Form. The CLO at the cement plant or the HS Executive at the coal mine should be responsible for filling in the Stakeholder Grievance Log when a complaint is received at their AOI. If requested by complaints, their identity can be kept confidential. In such case, their identity and contact information will be recorded on a Stakeholder Grievance Confidentiality Log which is only accessible by the CLO at the cement plant, the HS Executive at the coal mine, the Social Manager and the HSSE Head.

All complaints will be handled according to the following steps in *Sections 2.5-2.8*, except for government complaints that may require special attention due to legal and regulatory consideration or in resolving issues at the appropriate level of management.

2.4 Keeping Track of Grievances

As soon as a grievance is received and registered on the Stakeholder Grievance Log, the CLO at the cement plant or the HS Executive at the coal mine is then in charge of transcripting the grievance or concern on one (internal) Stakeholder Grievance Form. All plans and actions taken to address the grievance and results are presented in this form. Stakeholder Grievance Form will detail:

- Grievance information;
- Investigation findings including relevancy of grievance to STC Project:
- Resolution plan and timing;
- Implementation results; and
- Grievance closeout timing.

CLO at the cement plant and HS Executive at the coal mine will prepare a monthly report to the Social Manager and assist the Social Manager will report to the HSSE Committee on a monthly basis. The monthly report will include the updated Stakeholder Grievance Log showing grievance closed out in the last reporting monthly and active in the current reporting month, Stakeholder Grievance Form closed out in the last month and active as of the reporting monthly. Achievement of KPIs of the SGM will also be reported.

2.5 Categorizing Concerns & Complaints

The most frequent cases anticipated include those related to the following:

- Air pollution;
- Job access and perceived unfair hiring practices;
- Soil contamination;
- River contamination;
- Noise;
- Mechanical;
- Access to project benefits: education, sports, arts/culture;
- Community activities / communities;
- Inappropriate intrusion into communities;
- Road and traffic safety risks;
- Wastewater;
- Waste management and dumping of sanitary and other wastes by outsiders;
- Inappropriate access and use of local natural resources by outsiders;
- Land acquisition;
- Harassment including sexual harassment and gender-based-violence;
- Security personnel;

- Other.

When a grievance is received, the nature and significance must be established by the CLO or HS Executive to determine its legitimacy (Note: the determination of legitimacy must be reviewed by both the Social Manager and the HSSE Head before being finalized) and the measures needed for review and investigation, as shown in *Table 2.2* below.

Table 2.2 Types of Grievances and Examples

Types of Grievances	Examples
Relatively minor and one-time problems related to STC operations	STBM equipment causes damage to an individual's livestock Questions regarding blasting calendar and timings
Relatively minor but repetitive problems related to STC operations	Noise and dust complaints during the construction phase of the Project, brought up by a group of people or repetitively raised by individual complainants Destruction of landscape, local greenery STC operations and/or Project traffic blocks the local access roads
Significant, larger problems related to operations	During construction phase of the Project, use of community land for traffic parking without prior approval Project's right-of-way allegedly infringing on people's land Misconduct of in-migrant workers (do not pay for local services, such as hotels, restaurants, shops; damage crops)
Major claim, significant adverse impact on a larger group or several groups	Employment opportunities do not meet expectation of local communities (no clarity regarding employment policies) Significant water contamination (less fishing, unclean water, and so on), water shortage Violence against women due to shifting power roles in the community
Major allegations regarding policy or procedure	Complaint about lack of irrigation water from the local river, or quality of the water Communities not provided with disclosure of project information and fear, uncertainty, or rumors leading to civil unrest and violence

Source: IFC (2009) Addressing Grievances from Project-Affected Communities (adapted)

2.6 Resolving & Responding to Concerns and Complaints

Resolution options are developed by STC once a grievance is well understood. Resolution options should be commensurate with the nature of the grievance and may include:

- A unilateral solution proposed by STC;
- A bilateral solution discussed and agreed between STC and the complainant;
- A solution reached through third party (formally or informally or through mediation);
- A solution reached through traditional and customary practices.

Cases are closed out when a written agreement on the resolution with the complainant is reached. The first and second review procedures to investigate and resolve the complaint are discussed below.

2.6.1 First-level Review Procedures

If the grievance is minor, such as request for information, the CLO at the cement plant or the HS Executive at the coal mine, after discussion with the Social Manager as relevant, should handle it on the spot or attempt to settle the grievance through discussion and negotiation directly with the complainant within 3 working day on receipt of grievance by the STC. If the discussion is successful, then the CLO at the cement plant or the HS Executive at the coal mine and, if applicable, the complainant will undertake preventive or corrective measures directly following the discussion and in accordance with the decisions agreed upon during the discussion.

If the grievance is not minor or if the minor grievance could not be settled through direct discussion, within 15 days of receiving the grievance, investigations should be conducted following good practices, such as:

- Meetings should be conducted with the complainant and site of incident/ accident should be visited and inspected by the CLO at the cement plant or the HS Executive at the coal mine. The CLO at the cement plant or the HS Executive at the coal mine should speak with the person who lodged the complaint to learn as much as possible about the case. It is important to listen attentively to the person while he/she expresses his/her complaint. In many cases, simply listening with empathy helps to calm the situation.
- Communicate and explain the complaint to the Social Manager and appropriate person in the HSSE Committee. For example, if the complaint involves wastewater nuisance from construction activities at the cement plant, the Environmental Manager of the cement plant should then be involved. An appropriate, relevant and neutral investigation team should then be appointed by the Social Manager which should at least include the Social Manager, CLO and/or HS Executive and appropriate person in the HSSE Committee or other departments;
- Determine the possible corrective action(s) or mitigation of the complaint with tasks and responsibilities clearly developed (investigation plan and report, corrective actions and report). The nature of the corrective action, the time in which it must be implemented and the person responsible for said implementation will be written in the Stakeholder Grievance Form.
- Notify and discuss with the affected party within 15 days of having received the request, the corrective action proposed and the time required for its implementation.
- When needed, obtain in writing from the affected party the authorization to proceed with implementing the corrective action.
- If the complaint expresses his/her acceptance of the implemented solution, the CLO at the cement plant or the HS Executive at the coal mine will document the acceptance in

the Stakeholder Grievance Form for approval by the HSSE Head and close out the grievance in the Stakeholder Grievance Log.

- If the complainant does not accept the implemented solution after the first review, STC will proceed with a second review of the complaint.

2.6.2 Second-level Review Procedures

If the complainant does not feel satisfied with the procedure or with the response and considers it pertinent to continue with his/her request, he/she may appeal for a second review.

In the second review, the documentation pertaining to the unresolved complaint and gathered during the first-level review will be given to the HSSE Head who will discuss the complaint at the next monthly HSSE Committee meeting. At the meeting, and with the support of the HSSE Committee members, the HSSE Head will review and redetermine the possible corrective action(s) or mitigation of the complaint with tasks and responsibilities clearly developed (investigation plan and report, corrective actions and report). The HSSE Committee will be given authority to opine on financial complaints up to a certain amount (maximum MMKXXXX) and on natures of complaints that should be escalated to the CEO. The Social Manager, in attendance of the monthly HSSE Committee meeting, will write in the Stakeholder Grievance Form the nature of the corrective action, the time in which it must be implemented and the person responsible for said implementation.

The Social Manager, with the CLO at the cement plant or the HS Executive at the coal mine, will then notify and discuss with the affected party the revised proposed corrective action (s) or mitigation and the time required for its implementation, within 15 days of the HSSE Committee meeting. When possible, they will seek to obtain in writing from the affected party the authorization to proceed with implementing the corrective action.

- If the complaint expresses his/her acceptance of the implemented solution, the CLO at the cement plant or the HS Executive at the coal mine will document the acceptance in the Stakeholder Grievance Form for approval by the HSSE Head and close out the grievance in the Stakeholder Grievance Log.
- If the complainant does not accept the implemented solution after the second review, STC will proceed with a third review of the complaint.

2.6.3 Third-level Review Procedures

If the complainant does not feel satisfied with the procedure or with the response and considers it pertinent to continue with his/her request, he/she may appeal for a third review which includes two steps.

In the first step of the third review, the documentation pertaining to the unresolved complaint and gathered during the first-level and second-level reviews will be provided to STC CEO or STBM CEO for notification, within 5 days of receiving from the complainant his/her appeal for a third review. The STC CEO/ STBM CEO will review and redetermine the possible corrective action(s) or mitigation of the complaint with tasks and responsibilities clearly developed (investigation plan and report, corrective actions and report) and informs the HSSE Head of his/her proposition within 3 days. The HSSE Head will pass this information to the Social Manager who will write in the Stakeholder Grievance Form the nature of the corrective action, the time in which it must be implemented and the person responsible for said implementation within 1 day.

The HSSE Head and the Social Manager, with the CLO at the cement plant or the HS Executive at the coal mine, will then notify and discuss with the affected party the revised proposed corrective action (s) or mitigation and the time required for its implementation, within 2 days of receiving the STC CEO / STBM CEO's proposition. When possible, they will seek to obtain in writing from the affected party the authorization to proceed with implementing the corrective action.

- If the complaint expresses his/her acceptance of the implemented solution, the CLO at the cement plant or the HS Executive at the coal mine will document the acceptance in the Stakeholder Grievance Form for approval by the HSSE Head and close out the grievance in the Stakeholder Grievance Log.
- If the complainant does not accept the implemented solution after the third review, STC will proceed with a fourth review of the complaint.
  In parallel, and as a second step of the third level review, , the documentation pertaining to the unresolved complaint will be given to an ombudsman, qualified third party arbitrator/ mediator or a specialized organization contacted and contracted out by STC within 15 days of receiving from the complainant his/her appeal for a third review. The ombudsman, qualified third party arbitrator/ mediator or a specialized organization \will give an external opinion about how to resolve the case and will attempt to resolve the case through mediation/ arbitration before going to court. STC will endeavour to keep the timing of the process as short as possible.

  If the complaint expresses his/her acceptance of the recommended solution, the CLO at the cement plant or the HS Executive at the coal mine will document the acceptance in the Stakeholder Grievance Form for approval by the HSSE Head and close out the grievance in the Stakeholder Grievance Log.

  If the complainant does not accept the external opinion, the case (and a legal copy of all the documents connected with it) will be turned over to the complainant, in case the complaint wishes to file legal procedures, and the complainant shall be advised to file a formal court case (fourth-level review).

2.6.4 Grievance Resolution Timelines

The complainant will have one month after receiving each proposed complaint resolution to accept it or not accept it.

In the first review the estimated time of proposing a resolution is 15 days (as maximum) from STC receiving the complaint.

In the second review, the estimated time of proposing a resolution is within 15 days from the monthly HSSE Committee meeting immediately following the reception of the rejection of the first complaint resolution proposition by the complainant. The Complainant should be informed of the revised complaint resolution proposition within 15 days of the HSSE Committee meeting.

In the third review, the estimated time of proposing a resolution under the first step (CEO review) is 10 days from receiving the second rejection of the complaint resolution proposition by the complainant. The Complainant should be informed of the revised complaint resolution proposition within 2 days after the STC CEO / STBM CEO informs the HSSE Head of his/her revised proposition.

In the third review, the estimated time of proposing a resolution under the second step (ombudsman) will depend upon the work of the ombudsman, qualified third party arbitrator/ mediator or specialized organization, whom STC will contact within 15 days from receiving the third rejection of the complaint resolution proposition by the complainant. STC will endeavour to keep the timing of the process as short as possible. The Complainant should be informed of the revised complaint resolution proposition within 15 days of receiving the revised complaint resolution proposition from the ombudsman, qualified third party arbitrator/ mediator or specialized organization.

If the resolution is delayed, the complainant should be provided with regular updates on progress (directly, if not anonymous, or if anonymous via the information centres and STC websites, as most appropriate).

2.7 Monitoring Grievance Resolution

A visit will be made by the CLO at the cement plant or the HS Executive at the coal mine, together with relevant STC staffs, to the affected parties 15 days after resolving the grievance to verify that the situation has been resolved to the satisfaction of all involved, and to secure a signature from the complainant confirming resolution.

The CLO at the cement plant and HS Executive at the coal mine will prepare a monthly report to the Social Manager. The monthly report will include the updated Stakeholder Grievance Log showing grievance closed out in the last reporting monthly and active in the current

reporting month, Stakeholder Grievance Form closed out in the last month and active as of the reporting monthly. Achievement of KPIs of the SGM will also be reported. The HSSE Committee will review the status of stakeholder grievances on a monthly basis based on the monthly report. In particular, the subject of some grievances and/or the high number of some complaints will indicate the need for adjusting some procedures and practices in order to reduce the level of negative impacts or potential or existing conflicts with the local population.

An annual "Lessons-learned" report on the SGM should be drafted by the CLO/HS Executive and finalized by the Social Manager and HSSE Head, and this report should include:

- Stakeholder Grievance Log and Statistics;
- Stakeholder Grievance Report;
- Achievement of KPIs;
- Recommended Actions to achieve the KPIs in the next reporting year;
- An analysis of the number and proportion of complaints towards different issues (e.g. waste management, dust, water quality) for the HSSE Committee to identify the need for changing some procedures and practices (e.g. waste manage plan, construction site practices) in order to reduce the level of negative impacts or conflict with the stakeholders and improve performance of the Project.
- Areas of non-compliance with national laws and international standards, and identifies measures that will be undertaken to improve performance.
- Summarize key lessons-learned from the past 12 months of managing grievances.

2.8 Auditing

This SGM (in tandem with the annual "Lessons-Learned" report) will be reviewed annually by the HSSE Committee to ascertain the progress it has made in achieving its goals and objectives, by reviewing against the requirements, procedures, and KPI's detailed in this document, to determine if they have been met. The annual review will be performed by a qualified person appointed by the HSSE Head, duly documented with a gap analysis and reported to the HSSE Committee, copy Head of Cement Business and CEO, within two months of the completed review process.

Ad-hoc unannounced audits by STBM's Audit Function Unit may also be conducted from time to time, in accordance with STBM Audit Function's procedures.

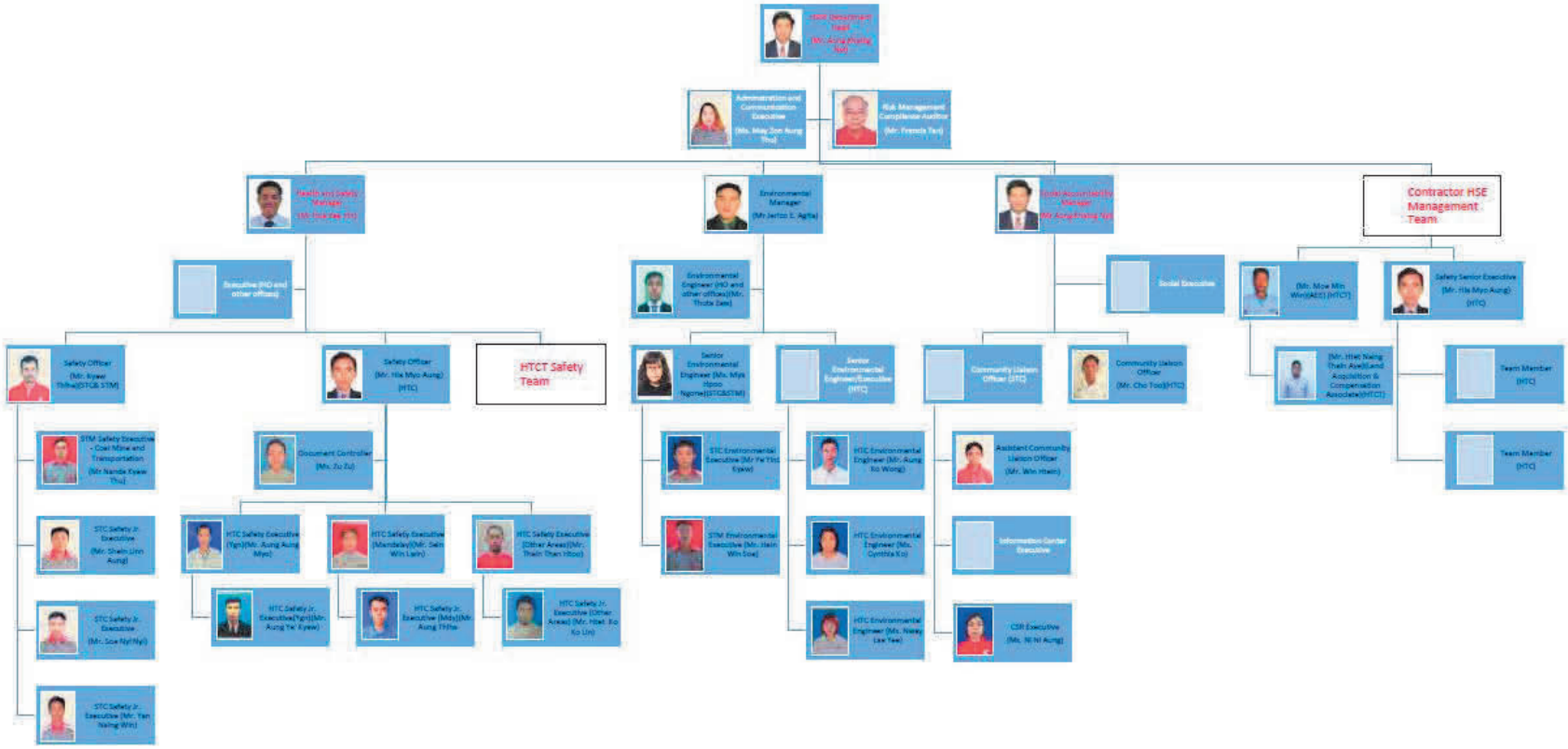
Any significant changes made to the SGM, following its annual review or any ad-hoc audit, will be announced to all staff, and with training provided to ensure relevant staff are made aware of updates. Material changes which impact external stakeholders will be publicized.

3. ROLES, RESPONSIBILITIES, AND AUTHORITY

3.1 HSSE Department Organisational Structure

The following *Figure 3.1* illustrates ST's HSSE Department organizational structure. The HSSE Department falls under STBM i.e. the holding company for STC/STM/HTC. This Department has overall responsibility for leading the implementation of this SGM.

Figure 3.1 **STC and STM HSSE Department Organisational Structure (as at February 2018)**



The HSSE Department Head reports to ST CEO and works alongside Head of Cement Business, Cement Plant Manager (at Cement Plant) and Head of Mining (at Coal Mine).

HSSE Department is divided into health and safety (HS) division, environmental division and social division. They will be the main contribution to the SGM by providing accurate and timely health and safety, environmental and social information, respectively, and responsible for overseeing, leading or participating in the investigation, resolution proposal, implementation and monitoring as relevant to their division and requested by the Social Manager.

ST's other departments should also contribute and provide support to implement the SGM as requested by the Social Manager and relevant HS division, environmental division and social division. Contractors, being expected to follow ST's company policies, are expected to do the same as ST's other departments. This coordination across departments mainly transpires through the HSSE Committee (refer to *3.11* below).

The HSSE Committee is the forum through which progress and performance of the SGM will be monitored.

3.2 CEO of Shwe Taung Cement Co. Ltd.

The Shwe Taung Cement Co. Ltd. CEO shall be kept apprised of key developments arising from this Stakeholder Grievance Mechanism and the associated Stakeholder Engagement Plan, particularly those that have implications for business continuity. The CEO shall be responsible in overseeing that this SGM is implemented throughout STBM operations. CEO shall endorse this SGM and have overall accountability for grievance (including stakeholder feedback) management.

CEO shall enable and regularly check that this Mechanism is implemented and regularly reviewed, including through the ongoing work of STBM's audit function unit. The CEO should review and sign off the Annual Report and Audit Report of SGM.

Applicable KPI's:

- Endorse of this SGM.
- Review and Sign off Annual Report and Audit Report of SGM within two weeks of receipt;

Means of Verification: SGM, Annual Report of SGM, Audit Report of SGM

3.3 Cement Plant Manager (based at Pyi Nyaung, who is also the Head of Cement Operations)

The Cement Plant Manager shall be responsible for:

(a) Overseeing the implementation of this SGM;

(b) Providing enabling conditions (including required financial and manpower resources and full senior management support from the CEO and from STC); and

(c) Regularly check reporting information and statistics to ensure effective implementation of this SGM throughout STC operations.

Applicable KPI's:

- 90% Attendance to the monthly HSSE Committee meetings where SGM implementation is discussed;
- 100 % of attendance of annual briefing sessions to staffs at the cement plant
- Review and Sign off Annual SGM report within one week of receipt.

Means of Verification: Monthly and Annual SGM Report; HSSE Committee meeting minutes

3.4 Head of Mining (Coal Mine)

The Head of Mining shall be responsible for:

(a) Overseeing the implementation of this SGM;

(b) providing enabling conditions (including required financial and manpower resources and full senior management support from the CEO and from STM); and

(c) Regularly check reporting information and statistics to ensure effective implementation of this SGM throughout STM operations.

Applicable KPI's:

- 90% Attendance to the monthly HSSE Committee meetings where SGM implementation is discussed;
- 100 % of attendance of annual briefing sessions to staffs at the coal mine
- Review and Sign off Annual SGM report within one week of receipt.

Means of Verification: Monthly and Annual SGM Report; HSSE Committee meeting minutes

3.5 HSSE Head

HSSE Head is the person in charge of the HSSE Department, and will report to the STC CEO.

Head shall ensure the SGM is undertaken as required and coordinate support to the HS, Environmental and Social Managers when needed for this Procedure to be applied. HSSE Head shall also ensure that the SGM aligns with the other plans and procedures developed by ST. HSSE Head shall facilitate communication between the various ST employees, ST Divisions and departments, the Social Manager, the Community Liaison Officer and ST stakeholders.

HSSE Head shall also be responsible for identifying and logging gaps and issues which need to be addressed before they become a significant risk to ST operations and for capturing and sharing lessons learned.

HSSE Head and HR Department shall recruit and manage the required staff under this Stakeholder Grievance Mechanism.

The HSSE Head should be responsible for the approval of the Stakeholder Grievance Form.

Applicable KPI's:

- 100% Attendance to the monthly HSSE Committee meetings where SGM implementation is discussed;
- Review and Sign off Monthly and Annual SGM report within one week of receipt.
- 50 % of attendence to biannual information sessions for local communities to disclose the SGM and its implementation and obtain their feedback on this;
- 100 % of attendence of annual briefing sessions to staffs at the cemenet plant and coal mine
- Participate as witness on the investigation and resolution of at least 10% or 10 cases of the grievance received whichever is higher.

Means of Verification: Monthly and Annual SGM Report, SGM Audit Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.6 Social Manager

The Social Manager, reporting to HSSE Head, shall be responsible for the day-to-day management of the SGM. The Social Manager shall lead the CLO at the cement plant and the HS Executive at the coal mine in managing SGM.

Social Manager shall oversee the Stakeholder Grievance Logs and Forms are filled in, updated and reported on by the CLO at the cement plant and the HS Executive at the coal mine on an ongoing basis, and that grievances are addressed in a timely manner. The Social Manager is also responsible to lead the preparation of the Monthly and Annual SGM Report.

Applicable KPI's:

- 100% Attendance to the monthly HSSE Committee meetings to report the SGM implementation;
- 100 % of attendence to biannual information sessions for local communities to disclose the SGM and its implementation and obtain their feedback on this;
- 100 % of attendence of annual briefing sessions to staffs at the cemenet plant and coal mine
- 100% % of complaints responded with respect to those received
- Over 80 % of complaints solved in the first and second review
- Submission of Monthly SGM Report within 2 weeks of the reporting month.
- Submission of Annual SGM Report within 4 weeks of the reporting year.

Means of Verification: Monthly and Annual SGM Report, SGM Audit Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.7 Community Liaison Officers (CLO) (at the cement plant)

The Community Liaison Officer at the cement plant, reporting to the Social Manager, shall support the Social Manager and HSSE Head in ensuring SGM is implemented. The CLO has primary responsibility for receiving, registering, investigating, resolving and reporting grievance at the cement plant.

The CLO at the cement plant is the interface between STC and its external stakeholders across the Project's Area of Influence.

The CLO is responsible for day-to day management of grievance activities and will be stationed at the information centre in Pyi Nyaung with the Information Centre Executive.

Applicable KPI's:

- 100% % of complaints responded with respect to those received
- Over 80 % of complaints solved in the first and second review
- 70% of the grievance under the first review resolved within 15 days of receipt of grievance.
- 70% of grievance under second review resolved within 1 month of commencement of second review.
- 100% attendance to the weekly visits to the affected communities and local authorities.
- 100 % of attendence to biannual information sessions for local communities to disclose the SGM and its implementation and obtain their feedback on this;
- 100 % of attendence of annual briefing sessions to staffs at the cemenet plant;
- Submission of Monthly SGM Report within 2 weeks of the reporting month.
- Submission of Annual SGM Report within 4 weeks of the reporting year.

Means of Verification: Monthly and Annual SGM Report, SGM Audit Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.8 Health & Safety (HS) Executive (at the coal mine)

The HS Executive at the coal mine, reporting to the Social Manager, shall support the Social Manager and HSSE Head in ensuring SGM is implemented. The HS Executive has primary responsibility for receiving, registering, investigating, resolving and reporting grievance at the cement plant.

The HS Executive at the coal mine is the interface between STC and its external stakeholders across the Project's Area of Influence.

The HS Executive is responsible for day-to day management of grievance activities and will be stationed at the information centre in Paluzawa.

Applicable KPI's:

- 100 % of complaints responded with respect to those received
- Over 80 % of complaints solved in the first and second review
- 70% of the grievance under the first review resolved within 15 days of receipt of grievance.
- 70% of grievance under second review resolved within 1 month of commencement of second review.
- 100% attendance to the weekly visits to the affected communities and local authorities.
- 100 % of attendence to biannual information sessions for local communities to disclose the SGM and its implementation and obtain their feedback on this;
- 100 % of attendence of annual briefing sessions to staffs at the cemenet plant;
- Submission of Monthly SGM Report within 2 weeks of the reporting month.
- Submission of Annual SGM Report within 4 weeks of the reporting year.

Means of Verification: Monthly and Annual SGM Report, SGM Audit Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.9 Environmental Manager

The Environmental Manager, reporting to HSSE Head, shall support the Social Manager and HSSE Head in ensuring the SGM is undertaken as required. They should provide inputs to the investigation of grievance as well as planning, implementation, monitoring and reporting of resolution.

Applicable KPI's:

- 100% Attendance to the monthly HSSE Committee meetings
- 70% of the grievance, if assigned to him / her, under the first review resolved within 15 days of receipt of grievance.
- 80% of grievance, if assigned to him / her, under second review resolved within 1 month of commencement of second review.
-

Means of Verification: Monthly and Annual SGM Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.10 Health & Safety (HS) Manager

The HS Manager, reporting to HSSE Head, shall support the Social Manager and HSSE Head in ensuring the SGM is undertaken as required. They should provide inputs to the investigation of grievance as well as planning, implementation, monitoring and reporting of resolution.

The HS Manager is also the secretary of the HSSE Committee.

Applicable KPI's:

- 100% Attendance to the monthly HSSE Committee meetings

- 90% of the grievance, if assigned to him / her, under the first review resolved within 15 days of receipt of grievance.
- 90% of grievance, if assigned to him / her, under second review resolved within 1 month of commencement of second review.

Means of Verification: Monthly and Annual SGM Report, HSSE Committee meeting minutes, Stakeholder Grievance Log, Stakeholder Grievance Report.

3.11 HSSE Committee

The HSSE Committee gathers the HSSE Head, HS Manager, Environmental Manager, Social Manager, CLO, Head of Cement Operations, STC CEO (who is also in charge of the expansion project), Head of Mining, and also where needed: heads of other departments within STC, and representatives from the EPC Contractor and sub-contractors (the HS EPC Manager and the Project EPC Manager), to facilitate cross-department coordination on HSSE actions and to ensure that EPC contractors follow HSSE requirements. The HSSE Committee is chaired by the Head of Cement Operations and is documentation of its discussions and decisions are documented by a secretary (the HS Manager).

The HSSE Committee is also the forum through which the communication coming from the stakeholders and the communication coming from the company is exchanged. During the HSSE Committee monthly meetings, important stakeholder feedback (e.g. concerns from communities) are discussed, and actions taken as needed. The members of the HSSE Committee shall review the documentation provided to them in advance of the monthly HSSE Committee meetings, including the Monthly SGM Report. The members shall thus check that this SGM is implemented and that for any incident/ accident that occurs, corrective actions are taken and lessons are shared.

Applicable KPI's:

- 100% monthly circulation of relevant written documentation in preparation to the HSSE Committee monthly meetings. Follow-up on decisions made.

Means of Verification: HSSE Committee Monthly Meeting Notes. Confirmation of follow-up actions undertaken.

3.12 EPC Contractor and other Contractors (or Sub-Contractors)

STC's EPC Contractor and other Contractors, including their sub-contractors, are responsible for ensuring this document and its requirements are communicated to their staff and for ensuring their staff adhere to the associated processes and procedures under this SGM.

STC's contractors and sub-contractors are expected to strictly follow rules of engagement with local communities/stakeholders. These rules are set out in the agreements signed between the company and them, and are also found in the Project's construction environmental and social (E&S) management plans.

For instance, where relevant, STC shall communicate and work with its EPC Contractor or other Contractors, including their sub-contractors, to implement corrective actions and address stakeholder questions and grievances that are relevant to them. The EPC Contractor or other Contractors, including their sub-contractors, must participate.

Applicable KPI's:

- This SGM is referred to in the Contractors' management system / contractual documentation with STBM
  Means of Verification: Biannual spot-check of the Contractors' management system / contractual documentation by the Social Manager, and also verification by the HSSE Department that contractors and subcontractors have actually complied with HSSE requirements.

3.13 Audit Function Unit

STBM's audit function unit, under the STC CEO, is responsible for, on a regular (i.e. annual) basis, auditing that this document is implemented and for providing post-audit recommendations to be communicated to the HSSE Committee for follow-up.

Applicable KPI's:

- Annual audit of this SGM
  Means of Verification: Audit report prepared and circulated to STBM Audit Committee within two months of completing the annual audit, copy to the HSSE Committee and STC CEO.

4. DISCLOSURES AND PROVIDING FEEDBACK

A condensed version of the Stakeholder Grievance Mechanism (or in the form of flyers/leaflets/posters) will be prepared by STBM and publicised to STC stakeholders and people who are affected or potentially affected by STC Project in Myanmar language and in English, orally and in writing, including through the use of images, as relevant, via:

- Annual information sessions for local communities to disclose the SGM and its implementation and obtain their feedback on this;
- Annual Briefing sessions to staffs at the cement plant and coal mine to be conducted by the CLO at the cement plant and HS Executive at the coal mine;
- Distribution of Printed materials: leaflets and/or posters at the GAD offices of ST operations, at STC information centres in Pyi Nyaung and in Paluzawa. Printed materials can also be distributed to the communities during the community visits[2] by the CLO at the cement plant and the HS Executive at the coal mine;
- Public displays: on stands, wall mounts, billboards, STC's public suggestion boxes around STC and STM's premises (by the water purification systems in Pyi Nyaung and Kubyin, at the Pyi Nyaung GAD office, at the cement plant and coal mine's information centres); and
- Online: websites and Facebook pages of the ST Building Materials' entities.

The following principles should be followed for the disclosure of the SGM:

- Making provisions for those who may be unable to read through face-to-face meetings and general use of images on written media, for instance;
- Explaining the grievance mechanism and its purpose, who can raise complaints and what sort of complaints, where, when and how, through the use of a clear poster or leaflet and clear oral explanations during ad-hoc or regular meetings;
- Identifying who is responsible for receiving and responding to complaints by sharing the contact details (mobile phone number, email address) of the CLO at the cement plant, the HS Executive at the coal mine and of the STBM entity's switchboard that is relevant in the community (STC, STM or HTM or a combination);
- Describing what sort of response can be expected, as captured in this Procedure;
- Mentioning any other rights and protections that are guaranteed and, in particular, that this mechanism does not replace or compete with existing legal and administrative processes in Myanmar.

Stakeholders' feedback collected during the disclosure of SGM should be fully documented, addressed, and incorporated in the further version of the SGM.

[2] The visits will be weekly during the extension project at STC and during the seasonal operations at the coal mine, reduced to fortnightly in the absence of major community issue for four (4) weeks in a row, reduced to monthly in the absence of issue for eight (8) weeks in a row. The frequency will increase from monthly back to fortnightly and back to weekly in case of unsolved community issue.

5. ANNEXES

Attachment 5.1 Non-Anonymous Stakeholder Grievance Log Template

Grievance ID No.	Date Received (dd/mm/yy)	Received by (name of STC representative and channel of reception)	Brief description and contact of complainant (occupation, residence)	Brief description of grievance / concern	Type/ category (if applicable)	Assigned to (name, entity)	Grievance Form No.	Next Steps (By whom/when)	Date of Corrective Actions began	Date of Corrective Actions completed	Date of Notification of Corrective Actions Completion to Complaints	Names of relevant files and attachments and their location within SGM database/system

Attachment 5.2 Anonymous Stakeholder Grievance Log Template

Grievance ID No..	Date Received (dd/mm/yy)	Received by (name of ST representative and channel of reception)	Name of complainant (if known)	Brief description of (likely) complainant (occupation, residence)	Confidentiality of complaint specifically requested by the complainant?	Next steps (By whom/when)	Date of Corrective Actions began	Date of Corrective Actions completed	When/Where Corrective Actions Completion Publicized (as appropriate)	Names of relevant files and attachments and their location within SGM database/system

Attachment 5.3 Stakeholder Grievance Form

Grievance ID No.		
Name, job title and department of staff completing grievance form:		Date (and time) of Grievance Form (dd/mm/yyyy)):
Assigned to (ST Department and name of staff):		
To complete before (dd/mm/yyyy):		
Date completed (dd/mm/yyyy)		
Resolution accepted by Complainant?	Y/N	

Type of Grievance:

1		Air pollution	9		Inappropriate intrusion into communities
2		Job access and perceived unfair hiring practices	10		Road and traffic safety risks
3		Soil contamination	11		Wastewater
4		River contamination	12		Waste management and dumping of sanitary and other wastes by outsiders
5		Noise	13		Inappropriate access and use of local natural ressources by outsiders
6		Mechanical	14		Land acquisition
7		Access to project benefits: education, sports, arts/ culture	15		Harassment including sexual harassment and gender-based-violence
8		Community activities / communities	16		Security personnel
			17		Other

Grievance description and timing:

_____
_____
_____

Brief description of complainant (and whether the complaint is anonymous or not) and channel of complaint (how was the grievance received?):

_____
_____
_____

Investigation, review description and closeout and related timing:

_____
_____
_____

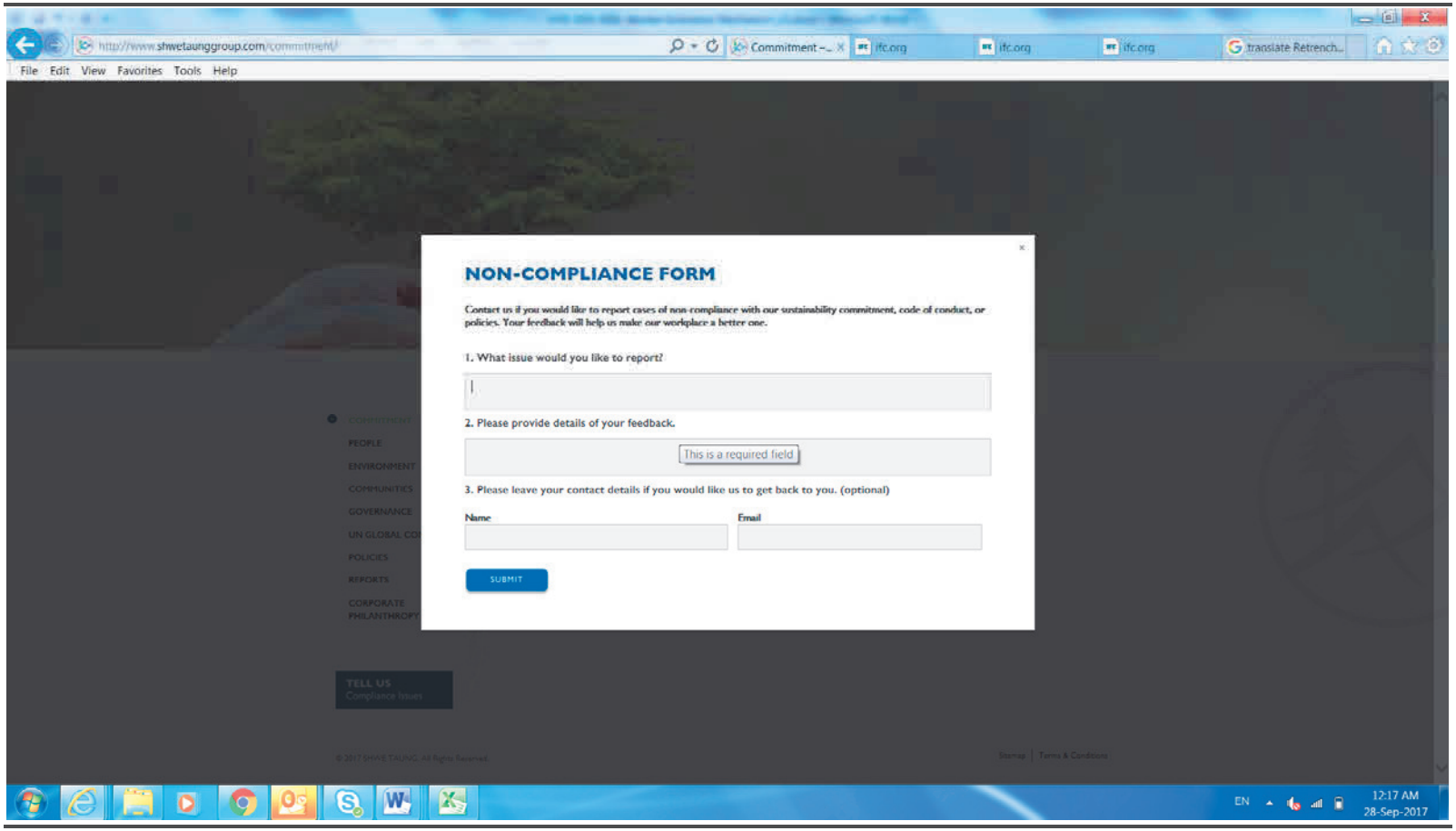
Grievance resolution response plan and timing:

_____
_____

Prepared by:	**Approved by:**	**Accepted by (if non-anonymous):**
Signature:	**Signature:**	**Signature:**
CLO / HS Executive Name:	Social Manager Name:	Complainant Name:
Date:	Date:	Date:

Attachment 5.4 Error! Reference source not found.

Shwe Taung Group Website for Grievance Reporting - **http://www.shwetaunggroup.com/commitment/**



Apache Cement Website for Grievance Reporting - **http://www.apachecement.com/compliance-form/**