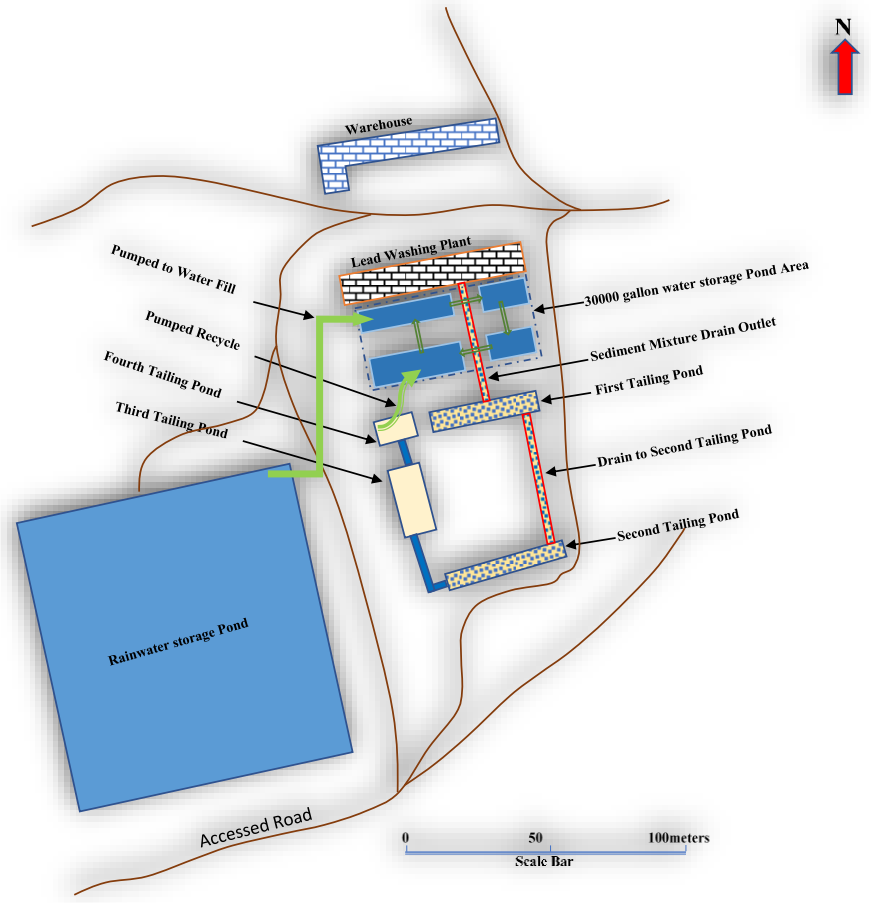
Top Ten Star Production Co.,Ltd.

Environmental Management Plan Report



Lead Washing Plant and Storage Building Construction Project

December, 2024

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIXES

Appendix 1	A list of third parties approved by the Department of Environmental Conservation
Appendix 2	Permit Issuance by the Ministry of Industry (MOIN)
Appendix 3	Laboratory Results Certificate
Appendix 4	CSR Budget Status

1. EXECUTIVE SUMMARY

2. Introduction

Top Ten Star Production Company Limited has obtained registration permits from the Ministry of Industry (MOIN). Furthermore, the worksite has been authorized under a permit issued by the Ministry of Natural Resources and Environmental Conservation, Myanmar, through the Department of Mining. The company is conducted in Lead mining and Lead refining operations. It has already obtained permission to share production benefits through Permit No. (1012/2010) dated 1.7.2010 and the Myanmar Investment Commission (MIC) has also obtained permission through Permit No. (MaNaTha-001/2011) dated 18.3.2011. In accordance with these permits, the company is refining Lead ore in Bawhseng, Kalaw Township, Southern Shan State and exporting it abroad to generate revenue for the State.

The company's proposed Lead Washing Plant Project is located near a Metal Refinery Plant (150 tons). Metal Refinery Plant (150 tons) has received permits from relevant ministries and has an approved IEE Report. The Lead Washing Plant that can be used temporarily to clean Lead using human power if the Metal Refinery Plant (150 tons) is shut down for various reasons. The lead washing plant is located in Bawhseng Village, approximately 37.15 km northeast of Kalaw Township in Southern Shan State. The site lies within the Map Index 93D/9 on Myanmar's One-Inch Map. The plant covers an area of 0.013274 square kilometers (3.28 acres).

Project Proponent

	Top Ten Star Production Company Limited
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3. Policy, Legal and Institutional Framework

The primary objective of the environmental management and monitoring is to record environmental impacts resulting from the project activities and to ensure implementation of the "mitigation measures" identified earlier to reduce adverse impacts and enhance positive impacts from specific project activities. The project proponent (Top Ten Star Production Company Limited) shall undertake the following legislation.

3.1 Myanmar Legislation Relevant to the Project

Laws relating to environmental and social issues related to the Project and hence their relevance to the EMP Study are included in Table 3.1. The project proponent commits to follow the laws and regulations stated in Table 3.1.

Table 3.1 Myanmar Legislation and Relevance to Project

No	Law, Regulation or Guidelines
1	Environmental Conservation Law, (2012)
2	Environmental Conservation Rules, (2014)
Guidelines/ Procedures	
3	EIA Procedures (2015), Amended in 2019
4	National Environmental Quality (Emission) Guidelines (2015)
Mining	
5	Mining Law (2015)
Forestry/Biodiversity	
6	The protection of Biodiversity and Protected Area Law, 2018
7	Forest Law, 2018
Public Health and Safety	
8	The Public Health Law (1972)

No	Law, Regulation or Guidelines
9	The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)
Occupational Health and Safety	
10	The Fire Brigade Law (2015)
11	Occupational Health and Safety Law (2019)
12	Tobacco and Tobacco Products Consumption Control Act, No. 5/2006
13	Traffic Safety and Motor Vehicle Management Law, (2020)
14	Traffic Safety and Vehicle Management Rules, No. 1/2022
15	Occupational Substances Explosives Act 2018
16	Natural Disaster Management Law (2013)
Investment	
17	Myanmar Investment Law, No. 40/2016
18	Myanmar Investment Rules, No. 35/2017
19	Myanmar Companies Law 2017
20	Myanmar Insurance Law, 2015
21	The Export and Import Law No.17/2012
Working Environment	
22	The Minimum Wage Law (2013)
23	Labor Organization Law (2011)
24	Employment and Skills Development Law (2013)
25	The Leave and Holiday Act, 1951; Amendment in (2014)

No	Law, Regulation or Guidelines
26	Social Security Law (2012)/ Came into force 1 April 2014
27	Payment Wages Law (2016)
28	Labor Dispute Resolution Act, No.5/2012 (Amended: 2014, 2019)
29	Workmen' Compensation Act 1923
Cultural Heritage	
30	The Protection and Preservation of Antique Objects Law (2015)
31	Cultural Heritage Areas Protection and Conservation Law, No.6/2019
Water Resources/ Pollution	
32	The Conservation of Water Resources and Rivers Law (2006)
33	Water Resources and Rivers Conservation (2013)
34	Underground Water Act (1930)
Land Acquisition	
35	Land Acquisition Act No.1/1894
36	Land Nationalization Act 1953
37	Farmland Law 2012
38	Farmland Rule 2012
39	Vacant, Fallow & Virgin Lands Management Law 2012
40	Vacant, Fallow & Virgin Lands Management Rules 2012
Chemical Substances	
41	Prevention of Hazard from Chemical Substances law 2013

No	Law, Regulation or Guidelines
42	Chemical Substances and Related Substances Hazard Prevention Regulation (2016)
Petroleum	
43	Petroleum Rules, 1937
44	Petroleum and Petroleum Product Act, No. 20/2017
Protection of Ethnic	
45	The Law on the Protection of the Rights of Ethnic People, No.8/2015
46	The Ethnic Rights Protection Rules-2019

3.2 International Agreements and Conventions

In addition to the domestic laws listed above, Myanmar is also a signatory to the following international conventions, and these may have relevance to the proposed survey activities. Refer to the following table.

Table 3.2 International Agreements and Conventions Relevant to the Proposed Project

International Agreements and Conventions	Status	Purposes
Vienna Convention for the Protection of the Ozone Layer, 1985	1998	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	1993	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Basel Convention, 1989	2015	The Convention regulates the transboundary movements of hazardous wastes and provides obligations to its parties

International Agreements and Conventions	Status	Purposes
		to ensure that such wastes are managed and disposed of in an environmentally sound manner.
United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992 and Kyoto Protocol 1997	1995 and 2005	Provide a framework for intergovernmental efforts to tackle climate change. Recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.
Convention on Biological Diversity, Rio de Janeiro, 1992	1994	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.
Asia Least Cost Greenhouse Gas Abatement Strategy (1998 ALGAS)	1998	Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country.
United Nations Agenda 21	1997	Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmers and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.
Relevant ILO Conventions in force in Myanmar C14 Weekly Rest (Industry) C17 Workmen's Compensation (Accidents) C19 Equality of Treatment (Accident Compensation) C26 Minimum Wage		Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers.

International Agreements and Conventions	Status	Purposes
Fixing Machinery C29 Forced Labour Convention C42 Workmen's Compensation		
Workmen's Compensation (Accidents) Convention,	1956	Entered in force 16 February 1956 the Project has risks to occupational health and safety
Workmen's Compensation (Occupational Diseases) Convention 1925 and its Revision 1934	2016	Entered in force 30 Sept 1927; Revision entered in force 17 May 2016. The Project has risks to occupational health and safety.

4. PROJECT DESCRIPTIONS

The Lead Washing Plant is designed as a temporary solution for processing lead ore during the shutdown of the 150-ton Metal Refinery Plant, ensuring uninterrupted operations without the use of chemicals. It efficiently recovers high-purity lead ore with a minimum metal content of 15%, using a mechanical washing process to maximize output. The project emphasizes environmental sustainability by incorporating a water recycling system, significantly reducing freshwater consumption and minimizing environmental impact. Furthermore, the plant operates in full compliance with local regulations and environmental guidelines set by the Ministry of Natural Resources and Environmental Conservation. By maintaining operational continuity through an economically efficient process, the plant meets lead production demands while aligning with both environmental and economic goals.

Description	Top Ten Star Production Company Limited
Location	Near Bawhseng Village Tract in Kalaw Township, southern Shan State, Myanmar
Area	3.28 acres (13,278 square meters)
Boundary	Map No. No. 93 D/9
Permission Department	Ministry of Industry (MOIN)

Description	Top Ten Star Production Company Limited
Allowed washing metal type	Lead
Project Method	Sluicing Method
Permission Period	1 year (30.11.2023 to 30.11.2024)
Annual washing lead production	2800 tones (1 years)

Production Rate of the Lead Washing Plant

Parameter	Details
Sediment mixture per tank	1.5 tons
Refined lead recovered per tank	0.6 tons
Residue (mud and sand) per tank	0.9 tons
Number of washing tanks	20
Daily refined lead production	12 tons
Annual refined lead production	2,800 tons

4.1 Lead Washing Process

If the Metal Refinery Plant (150 ton) cannot operate due to various reasons, the Lead Washing Plant have been built to wash the mud using sluicing method using manpower. In the operation, the water required for lead cleaning is first pumped from the rainwater storage pond into (30,000) gallon water storage pond. The mud and lead mixture are poured into small washing tanks, water is injected with a pressure pump, the mud, sand and lead particles are diluted with water, and the remaining solid Lead are obtained. The clean solid lead obtained after washing is put in bags and sent to the warehouse for storage.

The mud, sand and lead particles (sediment mixture) were washed away by the water and reached the First Tailing Pond. After flowing through the First, Second and Third Tailing Pond, the water arriving in the Fourth Tailing Pond and water is pumped into the 30000-gallon water storage pond and recycle. The sediment mixture from First and Second Tailing Pond are excavated with a backhoe. The excavated sediment mixture is loaded onto the dump trucks and transported to Metal Refinery Plant (150 ton) where the remaining lead is further refined. When

the washing process is need for water, the water from the Rainwater storage Pond is pumped and used again into 30000-gallon water storage Pond.

4.1.1 Lead Washing Activities and Storage During the Operation Phase

The proposed project is located near Bawhseng Village Tract in Kalaw Township, Southern Shan State, Myanmar. The lead washing activities and operational processes during the project's operation phase include the following:

- Sluicing Method
- Mud, Sand, Lead Particles and Lead Ratio
- Water Storage and Drain System
- Mud, Sand and Lead Particles (Sediment Mixture)
- Solid Waste Sediments Management
- Storage.

Working Time in Lead Washing Plant

Operation Activities	Working Shift
Lead Washing and Storage	8:00 - 12:00 (4 Hour) 13:00 - 17:00 (4 Hour)

4.2 Water Consumption

Water is a critical resource for the Lead Washing Plant, as it is essential for the washing and cleaning of lead ore. The plant relies on water from the Rainwater Storage Pond, which is pumped into a 30,000-gallon water storage pond to facilitate the washing process. The rainwater storage pond is strategically designed to provide a substantial water reserve, with precise geographic coordinates at 20°55'49.69"N latitude and 96°44'27.42"E longitude. The pond spans a length of 300 feet, a width of 317 feet, and a depth of 20 feet, enabling it to store up to 12 million gallons of water. This storage capacity ensures an ample and reliable water supply for various operational and environmental purposes, reflecting an efficient and well-planned water management system.

4.3 Power Requirement

The power requirements for the Lead Washing Plant are planned to support its operational efficiency. With 7.5 kW submersible pumps and an optimized piping system, the plant is capable of effectively managing water transfer to 20 small washing tanks. Consuming approximately 240 units of electricity daily over 8 hours of operation, the plant will rely on a stable electricity supply from the government's grid.

5. Description of the Natural and Social Environment

The following section briefly describes the surrounding environments such as physical environment, biological environment and socioeconomic profile that characterize the potential area of influence of the present project.

5.1 Physical Components

Climate and Meteorology	Kalaw Township, located in Taunggyi District in the southern part of Shan State, Myanmar, experiences a tropical monsoon climate characterized by distinct wet and dry seasons due to the influence of the southwest monsoon. The mean maximum temperature of Kalaw is 35.8ºC and mean minimum temperature is 1.00 ºC.
Topography	Kalaw Township is located on the Shan Plateau, an elevated region that stretches across eastern Myanmar. The township itself is at an elevation of approximately 1,320 meters (4,330 feet) above sea level, making it one of the higher-altitude areas in the country.
Geology	The project area is surrounding at the Wunbye Formation of the Pindaya Group. Wunbye Formation has largest distribution and thickness among the formation of the Pindaya Group. Bawsaing Range is predominantly built up with the rocks of the Wunbye Formation. Wunbye Formation locality consists of a succession of thick-bedded limestone, siltstones and dolomites. The limestones are finely crystalline, grey to bluish grey coloured and silstone are thin, medium hard, and light greenish siliceous marlstone occur within the siltstones.

Natural Hazards	According to the data of Government Administration Department (2023), the disasters of fire, cyclone, and landslide are occurred.
Hydrology	Kalaw Township is characterized by a network of rivers, streams, and lakes that are integral to its hydrological landscape. The most significant water body in the region is the Kalaw River, which flows through the township and serves as a critical source of water for domestic, agricultural, and ecological needs.

Summary of Physical Environmental Survey

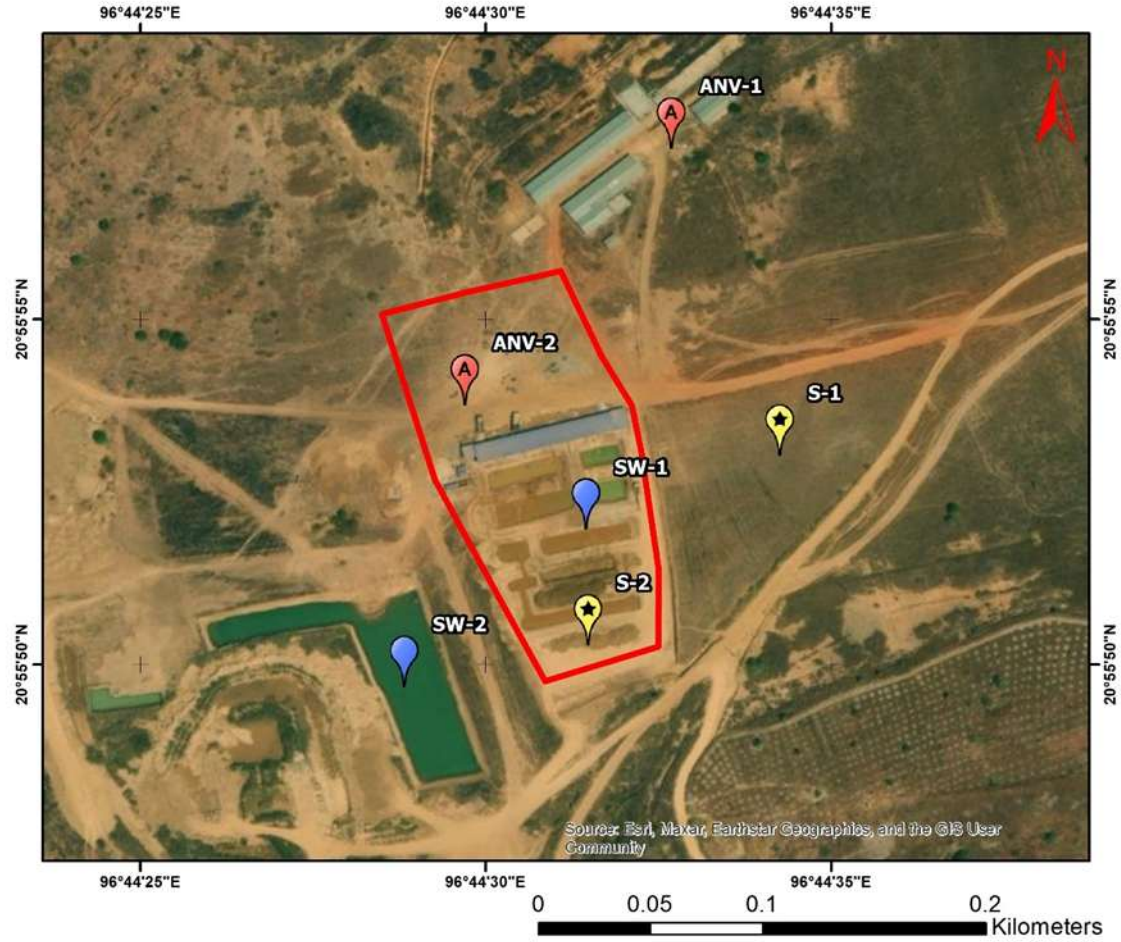
Air Quality & Meteorology	Number of samples	Two points
	Parameter	Nitrogen dioxide, Particulate matter PM10, Particulate matter PM2.5, Sulphur dioxide, Ozone (O3), Carbon Monoxide, Humidity, Temperature
	Period	For 24 hours duration at one time
	According to the survey results, the average 24-hour concentrations of PM2.5 and PM10 are within the limits set by the National Environmental Quality (Emission) Guidelines (NEQG). While 24-hour concentrations of NO_2 are not expressed under the applied standard, the measured NO_2 levels were assessed by the one-hour standard outlined in the NEQG. The hourly results indicate that NO_2 concentrations are below the permissible limit. Additionally, sulfur dioxide (SO_2) concentrations comply with the 10-minute standard specified in the NEQG. Carbon monoxide (CO) concentrations are also well within the applicable standards. These findings demonstrate that the project activities are effectively managed and are not contributing to air pollution levels exceeding regulatory limits, thereby ensuring the health and safety of workers and the surrounding environment.	
Noise Level	Number of samples	Two points
	Parameter	LAeq (A-weighted loudness equivalent)

	Period	For 24 hours duration at one time
	The daytime noise levels recorded at monitoring points N-1 and N-2 were 42 dB and 48 dB, respectively, which are well within the NEQG (National Environmental Quality Guidelines) standard of 55 dB. Similarly, the nighttime noise levels at N-1 and N-2 were 39 dB and 33 dB, which are significantly below the NEQG guideline of 45 dB. These results indicate that noise levels at both monitoring points are compliant with the national standards, ensuring minimal disturbance to the surrounding environment and community.	
Vibration level	Number of samples	Two points
	Parameter	Lveq (Equivalent Continuous Level)
	Period	For 24 hours duration at one time
	Based on the calculated results, the vibration levels at all monitored points were compared with the Japanese road traffic vibration standards. Both daytime and nighttime vibration levels were found to be within the target values specified by the standard, indicating compliance and minimal impact on the surrounding environment.	
Surface Water Quality	Number of samples	Two points
	Parameter	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel
	Period	One time
	These results were evaluated with the established drinking water quality guidelines and the National Surface Water Quality Standard (NSWQS). Most of the water quality parameters were found to be within the applicable standards, confirming that the water is generally suitable for use and capable of supporting local communities and ecosystems without posing significant health risks.	

<table>
<tr><td></td><td colspan="2">However, total suspended solids (TSS) were observed to exceed the standard. This is attributed to the sampling source of SW-1, which was collected from the drain outlet of the washing plant within the project area, where higher suspended solids are expected due to operational processes. Additionally, SW-2, collected from the rainwater pond, likely exhibited elevated Total Suspended Solids (TSS) levels. This increase could be attributed to sediment runoff or particulate matter accumulation within the pond, a phenomenon commonly observed in rainwater collection systems, especially during or after rainfall events.

Furthermore, the total coliform bacteria levels were found to exceed the standard limits. This is primarily attributed to the sampling source of SW, which was collected from the drain outlet and the rainwater pond associated with the washing plant within the project area. The elevated coliform levels could result from organic matter accumulation, contamination by decaying vegetation, or the presence of microorganisms often found in recycled or stagnant water sources. Rainwater ponds, in particular, are prone to bacterial growth due to runoff carrying organic debris and animal waste.</td></tr>
<tr><td rowspan="4">Soil Quality</td><td>Number of samples</td><td>Two points</td></tr>
<tr><td>Parameter</td><td>Lead, Cadmium, Chromium, Nickel, Copper</td></tr>
<tr><td>Period</td><td>One time</td></tr>
<tr><td colspan="2">The lead concentration in soil sample S-1 exceeded the Japanese standard. This elevated lead level could be attributed to historical activities, such as the use of pesticides containing lead-based compounds or contamination from runoff transporting lead particles from nearby operations. Similarly, the lead concentration in soil sample S-2 exceeded the Japanese standard, likely due to its collection from the second tailing pond within the project area. This pond may have concentrated lead particles through processes like sedimentation of residues from the washing plant, runoff containing lead contaminants, or recycling of lead-laden water.</td></tr>
</table>

Location of Physical Environmental Survey



Legend

- Project Area
- Air, Noise and Vibration Station
- Surface Water Sampling Point
- Soil Sampling Point

5.2 Biological Component

Flora	Flora surveys were conducted to assess the diversity of flora taxa in the area. A total of 50 species were identified during the survey. These species were classified as follows: 12 species were of 'Least Concern' according to the IUCN Red List, 37 species were 'Not Yet Assessed,' and one species was classified as 'Data Deficient.' No endemic species were found in the area.
Fauna	During the survey period, 7 Species of Mammal, 8 Species of Herpetofauna, 22 Butterfly and 5 species of Dragonfly and Damsel flies, and 55 species of Bird in the survey area. Based on the Globally Threatened species IUCN Red List (2022), there were no threatened species in this area.

5.3 Socio Economic Components

Administrative Organization and Limits	The project area is situated in the Bawhseng area, approximately 37.15 km northeast of Kalaw Township in southern Shan State, Myanmar. The absence of villages on the map is presented as part of a preliminary study conducted within a 3 km radius Area of Interest (AOI) surrounding the project area.
Social Profile	
The project area is located in Bawhseng area within Bawhseng village tract, Kalaw Township, Taunggyi District, Southern Shan State. According to the 2023 report by the General Administration Department, Kalaw Township encompasses 253 villages, 26 village tracts, 3 sub-townships, and 1 township.	
Demography	Kalaw Township has a total population of 171,161, comprising a diverse community with distinct urban and rural characteristics. Of this total, 61,892 residents live in urban areas, where they enjoy access to various amenities and services, while the remaining 109,269 people reside in rural settings, often engaged in agriculture and traditional livelihoods.
Population, Household and House Status	The population, households, and housing status across three towns in Kalaw Township, based on data from the General

	Administration Department (2023). The largest town, Kalaw, has a population of 92,051, with 30,057 households and 29,624 houses. Aungpan follows with a population of 25,545, comprising 7,249 households and 6,759 houses. The smallest town, Heho, has 8,276 residents, 2,899 households, and 2,772 houses.
Above and Under 18 years old	In this case, above 18 years old are more in all the three sub-townships, especially in Kalaw which township was a large population size than others.
Economic Status	Kalaw Township is located in South of Shan State and the economy of local people in the township mainly depends on the agricultural sector.
Per Capita Income	Based on the secondary data received from the related GAD office, the annual per capita income of Kalaw Township was gradually increasing.
Employment and Unemployment	The labor force was 87221 in Kalaw, 20722 in Aungpan, and 8009 in Heho Town. The total labor force of 91.6 percent was employed and only 8.4 percent was unemployed.
Livelihood	The total Employed of Kalaw Township was 106251 persons in 2023. According to the General Administration Department shows that most of the people from the township were working in Agriculture, Casual work, Trade and other.
Social Infrastructures	
Education	Kalaw has 13 high schools, 21 middle schools, and 121 primary schools but lacks monastery education schools. Aungpan has 6 high schools, no middle schools, 11 primary schools, and 2 monastery education schools. Heho has only 1 high school, 1 middle school, and 10 primary schools, with no monastery education schools.
Literacy Condition	According to the General Administration Department of Kalaw Township (2023), the total population of the township is 171,161. Among them, 120,389 individuals are aged 15 years or older, and all are recorded as literate.
Healthcare Facilities	The public health condition, the township had 6 hospitals, 37 clinics, and 28 rural health care centers.

Life expectancy (male/female)	For Kalaw Township, the reported life expectancy at birth is 66.3 years (MIMU), which is indeed slightly higher than the national average. Additionally, like the national trend, women in Kalaw have a higher life expectancy than men, with female life expectancy reported at 69.4 years compared to 63.2 years for males (WHO).
Major Diseases	According to the General Administration Department of Kalaw Township (2023), Diarrhea was more happened in the Kalaw Township.
Transportation information	
Transportation	Kalaw Township is strategically located along the Yangon-Taunggyi Road, providing crucial connectivity to various regions within southern Shan State. Heho Airport, also situated within Kalaw Township, serves as a major regional hub for air travel.
Cultural Characteristic	
Cultural Components	Many historic monasteries and temples are spread across the township, including the famous Aung Chan Tha Zedi and the Hnee Pagoda, which houses a 500-year-old bamboo Buddha statue, revered by locals and visitors alike.
Visual Components	Kalaw Township is nestled among the Shan Hills, offering breathtaking views and a serene mountain landscape that is among the most beautiful in Myanmar. Known for its cool climate and natural charm, Kalaw is a popular destination for outdoor activities and cultural experiences.

6. Impact Assessment and Mitigation Measures

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
Operation			
Air Quality	▪ Potential Impact from Dust Emissions on Surrounding Environment ▪ Dust Emission from transportation of raw materials ▪ Exhaust emissions from mobile source (truck)	▪ Implement effective dust control measures during the pouring and washing processes. ▪ Ensure that all machinery, including pressure pumps and dump trucks, is well-maintained to reduce emissions and minimize dust generation. ▪ Schedule transportation and handling activities during times of lower wind conditions to minimize the dispersion of dust and emissions. ▪ Provide appropriate PPE, including respirators or dust masks, to workers who may be exposed to elevated levels of dust and lead particles during operations. ▪ Conduct regular air quality monitoring to assess levels of particulate matter and emissions.	Insignificant
Noise and Vibration	▪ Potential Impacts on Noise and Vibration	▪ Regular maintenance of machinery, including pumps and shovel tools, is essential to ensure they operate efficiently and quietly. ▪ Turn off all machinery and equipment when not in use. ▪ Use machinery and equipment only during specified working hours.	Insignificant

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		▪ Ear muffs and other personal protective equipment (PPE) will be provided to workers as needed. ▪ Regularly monitor noise and vibration levels to ensure compliance with the Myanmar National Environmental Quality (Emission) Guidelines.	
Water Quality	▪ Water contamination from the lead washing process	▪ Conduct regular monitoring of water quality in the washing process, and tailing ponds, etc. ▪ To prevent contamination from the washing process, a concrete drain will be constructed to connect the washing tanks to the tailing ponds. This drainage system will effectively channel the washing water, minimizing the risk of pollutants and sediments entering the surrounding environment. ▪ Regular maintenance of the drain system will be essential to ensure its effectiveness and to prevent blockages that could lead to overflow or contamination. ▪ Install sediment control measures, such as silt fences and sediment traps, around the washing area and tailing ponds to prevent sediment from entering water bodies, especially during heavy rainfall.	Insignificant

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		▪ Maximize the recycling of water used in the washing process. Implement systems to treat and reuse water, reducing the overall volume of wastewater generated and minimizing environmental impact. ▪ Regularly maintain all equipment involved in the washing process to prevent leaks and spills that could introduce contaminants into the water system. ▪ Regularly monitor water quality to ensure compliance with the Myanmar National Environmental Quality (Emission) Guidelines.	
Solid Waste	▪ Solid Waste Generation from Tailing Ponds	▪ Schedule regular removal of solid waste from the site to prevent accumulation. ▪ Develop a plan for the regular excavation and transport of sediment from the tailing ponds to the Metal Refinery Plant. ▪ Waste management system will be developed including requirements for handling and disposal of all generated waste. ▪ Provide training for all employees on proper waste disposal practices and the importance of minimizing waste generation.	Insignificant

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		▪ Educating workers about the importance of proper waste disposal and recycling can foster a culture of environmental responsibility.	
Soil	▪ Soil contamination from spills or leaks from washing tanks, drains, and storage area ▪ Excavated sediment	▪ The excavated sediment, including mud, sand, and lead particles, must be carefully collected and transported to the Metal Refinery Plant for further processing and refinement of the remaining lead. ▪ All sediment and soil containing contaminants will be contained using appropriate barriers or liners during excavation and transport to prevent further dispersal of lead particles or other harmful materials. ▪ Ensure that all washing tanks, drains, and storage areas are equipped with containment systems such as secondary containment trays, leak-proof liners, or bund walls to prevent spills or leaks from reaching the surrounding soil. ▪ During excavation and washing operations, effective water management practices will be implemented to prevent runoff from carrying contaminated sediments into surrounding soil or water bodies.	Insignificant

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		▪ Create drainage systems to manage surface runoff, ensuring that any rainwater or washing water is directed away from the contaminated area to prevent runoff from carrying dissolved lead particles into the surrounding environment. ▪ Store and handle lead in sealed, durable containers or bags to prevent leakage of lead particles into the ground. Implement regular inspections and maintenance of storage facilities to ensure integrity and prevent contamination. ▪ Conduct periodic soil sampling and analysis around the washing plant, storage areas, and wastewater discharge points to monitor contamination levels. ▪ Workers involved in sediment excavation and handling will be provided with appropriate personal protective equipment (PPE), such as gloves, masks, and boots, to prevent direct exposure to contaminated soil or materials. ▪ Implement regular inspections and maintenance of washing tanks, storage areas, drainage systems, and wastewater treatment equipment to	

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		ensure they function as intended and are free of damage.	
Biodiversity	▪ Impact on Flora and Fauna	▪ Do not clear vegetation than necessary in the project area; restrict the removal of vegetation avoid as far as possible the cutting of big trees. ▪ Provide basic firefighting training for a few workers. ▪ Identify sensitive species and habitats and try to avoid such spots as far as possible. ▪ Implement rehabilitation to promote natural vegetation establishment after completion of washing plant at a site. ▪ Plan and implement the protection and conservation of wildlife as far as possible, ensure the work have minimal disturbance or wildlife. ▪ Prohibit the hunting and / or trapping of wild animals, big and small including rodent, bird, reptiles, and amphibians by workers. ▪ Prevent the potential injury or death of wildlife due to vehicular movements especially awareness workers.	Insignificant
Socioeconomic	▪ Employment ▪ Local Business ▪ Agriculture ▪ Social Concerns	▪ To conduct the project activities in accordance with instructions suggested by the respective government departments and guidelines mentioned in the EMP report	

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		▪ To have liaison officer to consult the concerns between the ones who complaint and the project proponent ▪ To have proper grievance mechanisms to solve concerns ▪ The project proponent has to solve the complaints in timely manner. ▪ The liaison officer has to receive the complaints and make sure what the problem is and negotiate between project proponent and the ones who complaints. ▪ For the labor workforce, the site responsible persons ensure the labors to follow the instructions mentioned in occupational health and safety policies. Besides, the project proponent should have stipulations of rules and regulations for the labors to avoid conflicts within the project site. ▪ To avoid the disputes through employment and to enhance the project benefits, the project will implement the following mitigation measures: ▪ To prioritize local hiring for any available positions to support the local economy and provide economic benefits to the community, even if the workforce is limited. ▪ To provide clear communication to the community regarding the limited	

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		scope of employment opportunities to manage expectations, especially due to the temporary nature of the lead washing plant's operations. ▪ To implement a grievance mechanism to address concerns or conflicts related to employment or environmental impacts. ▪ Regularly engage with community leaders and representatives from the nearby villages to discuss project updates, employment opportunities, and environmental monitoring results, ensuring community awareness and involvement. ▪ To regularly monitor the tailing ponds to check for any potential seepage or overflow to minimize impacts on surrounding agricultural lands. ▪ To conduct periodic soil and water testing around the plant to detect any trace of contamination.	
Health and Safety	▪ Operation activities	▪ Provide workers with appropriate PPE, including gloves, masks, goggles, and coveralls, to prevent direct contact with lead and other contaminants. ▪ Conduct regular training sessions on safe handling procedures, the use of machinery. ▪ Emphasize the importance of hygiene practices, such as washing hands	

Environmental Components	Potential Impacts	Mitigation Measures	Residual Impact Significance
		before eating and showering before leaving the worksite, to minimize lead exposure. ▪ Monitor air quality in and around the plant for lead dust levels and test wastewater before disposal. ▪ Implement a medical surveillance program for workers exposed to lead. ▪ Recruit the workers with medical recommendation letters including medical history record. ▪ First aid facilities, medicines and ambulance are available to meet any emergency situation. ▪ Develop and implement an emergency response plan that includes procedures for dealing with accidental spills or leaks of lead-contaminated materials. ▪ Make rules and restrictions to avoid criminal cases in the local area committed by the project workers.	

7. Public Consultation and Development Program

7.1 Public Consultation

Public consultation, a key component of the Environmental Management Plan (EMP), effectively engaged local people and stakeholders to familiarize them with the proposed project, gather valuable feedback, and identify potential data gaps. The process included interviews with representatives from Bawhseng Village, Kalaw Township, Shan State, and Focus Group Discussions (FGDs) with small, homogenous groups. These efforts provided insights into community perspectives on factory-related issues and the project's potential impacts. The interviews and FGDs revealed a predominantly positive response to the project, with participants expressing support while emphasizing the need for job creation and village development programs. In-depth interviews with mine workers and key employees further highlighted concerns and suggestions, aligning the project with local expectations. The consultation process reinforced the importance of ongoing engagement to address community needs and integrate their feedback into project planning and implementation for sustainable development.

7.1.1 Stakeholders Participation and Details of Consultation Meeting

A public consultation meeting was held on 18 November 2024 at the office hall of Top Ten Stars Company Ltd., located in Bawhseng Village, Kalaw Township. The meeting was attended by approximately 35 participants, including representatives from relevant government departments and local community members directly or indirectly affected by the proposed project.

Opening Ceremony

The public consultation meeting commenced at 10:00 AM with a welcoming ceremony attended by stakeholders, government representatives, local elders, and other participants.

Opening Remarks by U Soe Tun Aung (Manager, Top Ten Stars Production Co., Ltd.)

U Soe Tun Aung greeted all attendees, extending a warm welcome to the heads of relevant government departments, organizations, local elders, and community members. He briefly introduced the company, emphasizing its status as a local investment entity committed to implementing the lead washing plant and storage building project over the next 10 years. He

assured the audience of the company's commitment to prioritizing environmental safety and encouraged participants to share their valuable suggestions and feedback during the meeting.

Presentation on the Environmental Management Plan (EMP) by U De Hlaing Zaw (EIA/ESIA Freelance Consultant)

U De Hlaing Zaw began by emphasizing the neutral role of his organization as a third party, independent of both the company and the government. He explained the primary purpose of their work as striving to minimize environmental impacts while simultaneously promoting the economic development of the project developers and enhancing the socio-economic well-being of the local community. Utilizing a PowerPoint presentation, he detailed the findings of the environmental baseline survey, which assessed parameters such as air quality, noise and vibration levels, water quality, and soil conditions.

7.2 Comments and suggestion from PCMs

The Public Consultation Meetings (PCMs) provided valuable feedback, showcasing significant support for the project while addressing various concerns and recommendations from stakeholders. U Hlyuan Moe Htet, Assistant Director of the Environmental Conservation Department, emphasized the need for monitoring plans for natural disasters, comparison of baseline environmental data with other projects, and placing suggestion boxes for public feedback. U Sein Maung Htay, District Commissioner, suggested testing water samples from tailing ponds, reducing water spraying frequency due to local water scarcity, and implementing a Corporate Social Responsibility (CSR) plan with proper waste management. U Thein Nyunt of the Mining Department highlighted the company's extensive operations over 7,000 acres and called for ongoing disaster relief efforts and expert guidance. Health-related concerns were raised by Daw Aye Aye Myint from the Public Hospital, who recommended linking the company's operations with the local hospital for emergencies and providing first-aid training. Fire safety measures were proposed by U Khun Kyar Myat Sitt, including ensuring adequate fire-extinguishing supplies and forming prevention groups.

Community leaders like Daw Thin Thin, Chairperson of the Greening Organization, praised the company's annual tree-planting initiatives, free seedling distribution, and provision of electricity, urging these efforts to continue. Village elders such as U Sein Hlaing Toe and U Hla Oo Maung expressed gratitude for job opportunities and regional development projects, affirming no adverse impacts like noise or odor from the factories. Others, like U Win Naing

and U Sein Aung Htay, requested ongoing support for community needs and confidence in the project's environmentally responsible approach.

In conclusion, the PCM discussions emphasized the importance of disaster preparedness, enhanced health and safety measures, transparent updates on environmental commitments, and sustained CSR activities. The proactive engagement and responsiveness of the company have fostered trust and a positive outlook among stakeholders, strengthening its partnership with the local community.

7.3 Result of Public Consultation Meeting

The Public Consultation Meeting (PCM) for the Environmental Management Plan (EMP) was successfully conducted. A significant number of invitees attended the meeting, and their opinions and concerns were effectively addressed through the question-and-answer session and discussions held during the meeting.

At the PCM, the environmental consultant provided a comprehensive explanation of how public concerns were integrated into the project plan. This included:

- Assessing environmental impacts.
- Designing appropriate mitigation measures.
- Developing management and monitoring plans.

The attendees, including government representatives and local residents, engaged in meaningful discussions on several key topics, including:

- Water quality and discharge from tailing ponds.
- The waste management system.
- Workers' health and safety.
- Natural disaster preparedness and response.
- Creation of job opportunities.
- Strengthening the relationship between the local community and the company.

The overall sentiment from local participants was positive regarding the project implementation. However, as the project owner, it is essential to diligently address and fulfill the concerns and suggestions expressed by the local community throughout the entire project operation. This proactive approach will ensure the project remains aligned with the expectations a need of stakeholders while minimizing any potential adverse impacts.

7.4 Corporate Social Responsibility (CSR)

Corporate Social Responsibility (CSR) is the consistent application of core values to meet community expectations while improving social, economic, and environmental performance. The company envisions sustainable development by ethically engaging with the local community to achieve lasting benefits across these sectors. Key CSR measures include allocating an environmental fund in line with the monitoring plan, sharing knowledge on environmental conservation, and providing training for employees to enhance environmental performance. By addressing socio-economic challenges and acting as a constructive partner for the local populace, the company will allocate 2% of its post-tax net profit to implement CSR initiatives, focusing on capacity building and fostering industrial development.

8. Environmental Management Plan

Top Ten Star Production Company Limited has committed to fully protection of the environment in the proposed project area with developing and implementation of environmental management plan which will act as an adequate tool to mitigate the potential adverse impact and enhance the beneficial impacts associated with the project during the operation phase.

8.1 Summary of Environmental and Management Plan

Component	Management Plan	Implementation Schedule
Air Quality	▪ Install dust suppression systems, such as water sprays, during the pouring and washing processes to reduce dust. ▪ Ensure regular maintenance of all machinery, including pressure pumps, dump trucks, and other equipment, to ensure they are in good working condition and do not contribute to excessive emissions or dust generation. ▪ Coordinate transportation and handling activities during times when wind conditions are low to minimize the dispersion of dust and emissions. ▪ Provide workers who may be exposed to elevated dust levels and lead particles with appropriate personal	During operation, and closure phase

Component	Management Plan	Implementation Schedule
	protective equipment (PPE), including respirators, dust masks, gloves, and protective clothing.	
Noise and Vibration	▪ Perform regular maintenance on all machinery, including pumps and shovel tools, to ensure they are functioning efficiently and with minimal noise emissions. ▪ Turn off machinery and equipment when not in use to reduce unnecessary noise. ▪ Restrict machinery and equipment use to designated working hours to limit noise disturbances during non-working hours. ▪ Provide ear muffs and other noise-protective equipment to workers as needed, especially for those working in high-noise areas. ▪ Conduct regular noise and vibration monitoring to ensure adherence to the Myanmar National Environmental Quality (Emission) Guidelines.	During operation, and closure phase
Water Quality	▪ Conduct regular water quality monitoring in critical areas, such as the washing process and tailing ponds, to detect and address any contamination early. ▪ Construct a concrete drainage system to direct washing water from the washing tanks to the tailing ponds. ▪ Schedule regular maintenance for the drain system to ensure it remains clear of blockages, preventing potential overflow or contamination issues. ▪ Install silt fences, sediment traps, and other sediment control barriers around the washing area and tailing ponds, especially in preparation for heavy rainfall events.	During operation, and closure phase

Component	Management Plan	Implementation Schedule
	▪ Enhance systems for collecting and storing rainwater to reduce reliance on external sources and minimize excess runoff during wet seasons. ▪ Maximize water recycling within the washing process by reusing water, thus lowering the total wastewater generated and its environmental impact. ▪ Regularly monitor water quality to ensure adherence to the Myanmar National Environmental Quality (Emission) Guidelines.	
Solid Waste	▪ Schedule periodic removal of sediment from the site to prevent buildup and maintain a clean working environment. ▪ Develop a systematic plan for regularly excavating and transporting sediment from tailing ponds to the Metal Refinery Plant to manage waste buildup effectively. ▪ Provide ongoing training for employees on proper waste disposal practices. ▪ Educate employees on the significance of proper waste disposal and recycling to foster a culture of environmental responsibility throughout the workforce.	During operation, and closure phase
Soil	▪ The excavated sediment, including mud, sand, and lead particles, must be carefully collected and transported to the Metal Refinery Plant for further processing and refinement of the remaining lead. ▪ All sediment will be contained using appropriate barriers during excavation and transport to prevent the dispersal of lead particles or other harmful materials. ▪ Ensure that all washing tanks, drains, and storage areas must be constructed with concrete to prevent spills or leaks from reaching the surrounding soil.	During operation, and closure phase

Component	Management Plan	Implementation Schedule
	▪ Create drainage systems to manage surface runoff, ensuring that any rainwater or washing water is directed away from the contaminated area to prevent runoff from carrying dissolved lead particles into the surrounding environment. ▪ Store and handle lead in sealed, durable containers or bags to prevent leakage of lead particles into the ground. Regular inspections and maintenance of storage facilities will be conducted to ensure their integrity and prevent contamination. ▪ Conduct periodic soil sampling and analysis around the washing plant, storage areas, and wastewater discharge points to monitor contamination levels. ▪ Workers involved in sediment excavation and handling will be provided with appropriate PPE, such as gloves, masks, and boots, to prevent direct exposure to contaminated soil or materials.	
Biodiversity	▪ All waste will be appropriately stored and disposed of to prevent attracting both native and alien species to the project area. ▪ Hunting or disturbing wild animals will be strictly prohibited for all personnel working on the site. ▪ Vegetation clearance and habitat disturbance will be minimized by clearly demarcating the boundaries for site clearing. Efforts will be made to preserve as much of the natural environment as possible. ▪ Areas temporarily disturbed during construction will be reinstated with trees, shrubs, and grass upon completion of the works to restore the local ecosystem.	During operation phase
Community Engagement	Grievance Mechanism Management Employment Plan	Operation phase

Component	Management Plan	Implementation Schedule
and Development	Local Economic Development Corporate Social Responsibility (CSR) Program	
Occupational Health and Safety	Top Ten Star Production Company Limited organized the Health and Safety Committee to be implemented the Occupational Health and Safety Management Measure.	During operation phase
Community Health and Safety	If occupational disease is found in the workers or there are outbreaks of infectious disease, public health department, Kalaw Township, Southern Shan State will be notified, and the project will cooperate in accordance with the instructions.	During operation phase

8.2 Environmental Monitoring Plan in Operation Phase

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
Operation Phase							
1	Water quality (Surface water)	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel	▪ From Drain outlet of washing plant ▪ At rainwater pond	**SW-1** 20°55'52.02"N96°44'31.47"E **SW-2** 20°55'49.03"N96°44'27.47"E	Twice per year	Environmental Contractor	2,000,000.00 MMK per monitoring session
2	Air Quality	Nitrogen dioxide, Particulate matter PM10, Particulate matter PM2.5, Sulphur dioxide, Ozone (O3), Carbon monoxide	▪ Near the project area ▪ Between the washing plant and warehouse within the project area	**AQ-1** 20°55'57.84"N96°44'32.68"E **AQ-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	2,000,000 MMK per monitoring session

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
3	Noise and Vibration	LAeq (A-weighted loudness equivalent), Lveq (Equivalent Continuous Level)	▪ Near the project area ▪ Between the washing plant and warehouse within the project area	**NV-1** 20°55'57.84"N96°44'32.68"E **NV-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	1,200,000.00 MMK per monitoring session
4	Soil Quality	Lead, Cadmium, Chromium, Nickel, Copper	▪ At plantation within the project area ▪ In the second tailing pond within the project area	**S-1** 20°55'53.40"N96°44'34.25"E **S-2** 20°55'50.90"N96°44'31.75"E	▪ Twice per year ▪ Visual observation of surface soil	Environmental Contractor	1,200,000.00 MMK per monitoring session
5	Solid Waste	▪ Records of visual inspections ▪ Volume of waste ▪ Voices and complaints from the local	▪ In the tailing pond ▪ Inspection of storage areas ▪ Confirmation of voices and complaints	Within the project area	▪ Biannually ▪ Visual inspection ▪ In response to complaints	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd.	1,200,000.00 MMK per monitoring session
6	Flora and Fauna	Identification on	▪ Quadrant sampling	▪ Direct Impact Zone – Project Area	Biannually (once during	Environmental officer and Health	3,000,000.00 MMK per

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
		▪ Species & Family ▪ Conservation Status (IUCN and Myanmar, 2016) ▪ Plant Important Value Index (I.V.I)	▪ Data analysis ▪ Species occurrence	▪ Indirect Impact Zone – 1 km radius of project	dry season and once during wet season)	& Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	monitoring season
7	Occupational and Community Health and Safety	▪ Number of injuries and frequency in workplace ▪ Community service program in the form of health care assistance for the significant affected people	▪ Records of Accidents ▪ Health check-up	Project Site	Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	1,000,000.00 MMK
8	Social economic	▪ Complain logs from community ▪ Employment record	▪ Hearing the opinion on project from community ▪ Provide the suggestion box for local	▪ Within the project AOI	Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or	1,000,000.00 MMK

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
			community and announcement			Environmental Contractor	

8.4 Environmental Monitoring Plan in Decommission Phase

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
Decommission Phase							
1	Water quality (Surface water)	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel	▪ From Drain outlet of washing plant ▪ At rainwater pond	**SW-1** 20°55'52.02"N96°44'31.47"E **SW-2** 20°55'49.03"N96°44'27.47"E	Twice per year	Environmental Contractor	2,000,000.00 MMK per monitoring session
2	Air Quality	Nitrogen dioxide, Particulate matter PM10, Particulate matter PM2.5,	▪ Near the project area ▪ Between the washing plant	**AQ-1** 20°55'57.84"N96°44'32.68"E	Twice per year	Environmental Contractor	2,000,000 MMK per monitoring session

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
		Sulphur dioxide, Ozone (O3), Carbon monoxide	and warehouse within the project area	**AQ-2** 20°55'53.95"N96°44'30.77"E			
3	Noise and Vibration	LAeq (A-weighted loudness equivalent), Lveq (Equivalent Continuous Level)	▪ Near the project area ▪ Between the washing plant and warehouse within the project area	**NV-1** 20°55'57.84"N96°44'32.68"E **NV-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	1,200,000.00 MMK per monitoring session
4	Soil Quality	Lead, Cadmium, Chromium, Nickel, Copper	▪ At plantation within the project area ▪ In the second tailing pond within the project area	**S-1** 20°55'53.40"N96°44'34.25"E **S-2** 20°55'50.90"N96°44'31.75"E	▪ Twice per year ▪ Visual observation of surface soil	Environmental Contractor	1,200,000.00 MMK per monitoring session
5	Solid Waste	▪ Records of visual inspections ▪ Volume of waste ▪ Voices and complaints from the local	▪ In the tailing pond ▪ Inspection of storage areas	Within the project area	▪ Biannually ▪ Visual inspection ▪ In response to complaints	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd.	1,200,000.00 MMK per monitoring session

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
			▪ Confirmation of voices and complaints				
6	Flora and Fauna	Identification on ▪ Species & Family ▪ Conservation Status (IUCN and Myanmar, 2016) ▪ Plant Important Value Index (I.V.I)	▪ Quadrant sampling ▪ Data analysis ▪ Species occurrence	▪ Direct Impact Zone – Project Area ▪ Indirect Impact Zone – 1 km radius of project	Biannually (once during dry season and once during wet season)	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	3,000,000.00 MMK per monitoring season
7	Occupational and Community Health and Safety	▪ Number of injuries and frequency in workplace ▪ Community service program in the form of health care assistance for the significant affected people	▪ Records of Accidents ▪ Health check-up		Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	1,000,000.00 MMK
8	Rehabilitation	▪ Topsoil Management ▪ Revegetation	▪ Field observation	▪ Project site	Yearly	Environmental officer and Health & Safety Officers	2,500,000.00 MMK

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
		▪ Weed Management				of Top Ten Star Production Co., Ltd. or Environmental Contractor	

8.5 Closure Plan

The Closure Plan for Top Ten Star Production Company Limited is an integral component of its Environmental Management Plan, aligned with the company's Environmental, Health, and Safety (EHS) policy. This plan outlines the necessary activities for environmentally friendly and socially acceptable project closure, emphasizing site rehabilitation and sustainable land use. Its objectives include protecting public health, mitigating environmental damage, and ensuring long-term social and economic benefits. Key strategies involve dismantling infrastructure, stabilizing disturbed areas, revegetating with native species, and monitoring environmental quality to meet national standards. Reclamation efforts aim to restore ecological balance, minimize visual impacts, and ensure safety for future land use. A transparent approach will involve stakeholders, including local communities and regulatory authorities, to oversee and support sustainable post-closure outcomes.

9. Conclusion

An Environmental Management Plan (EMP) report has been prepared for the Lead Washing Plant project. The EMP systematically identified potential impacts through a scoping process that considered how project activities could interact with environmental and social resources or receptors.

In conclusion, the mining and refining industry has significant potential to contribute to state revenue. However, the findings indicate that the Lead Washing Plant has minimal environmental impact. To ensure sustainability, it is essential to adhere strictly to relevant laws, regulations, and environmental guidelines.

2. INTRODUCTION

2.1 Project Background and History

Top Ten Star Production Company Limited has obtained registration permits from the Ministry of Industry (MOIN). Furthermore, the worksite has been authorized under a permit issued by the Ministry of Natural Resources and Environmental Conservation, Myanmar, through the Department of Mining. The company is conducted in Lead mining and Lead refining operations. It has already obtained permission to share production benefits through Permit No. (1012/2010) dated 1.7.2010 and the Myanmar Investment Commission (MIC) has also obtained permission through Permit No. (MaNaTha-001/2011) dated 18.3.2011. In accordance with these permits, the company is refining Lead ore in Bawhseng, Kalaw Township, Southern Shan State and exporting it abroad to generate revenue for the State.

The company's proposed Lead Washing Plant Project is located near a Metal Refinery Plant (150 tons). Metal Refinery Plant (150 tons) has received permits from relevant ministries and has an approved IEE Report. The Lead Washing Plant that can be used temporarily to clean Lead using human power if the Metal Refinery Plant (150 tons) is shut down for various reasons.

2.1.1 Project area

The lead washing plant is located in Bawhseng Village, approximately 37.15 km northeast of Kalaw Township in Southern Shan State. The site lies within the Map Index 93D/9 on Myanmar's One-Inch Map. The plant covers an area of 0.013274 square kilometers (3.28 acres) and is situated on Map Index 93D/9.

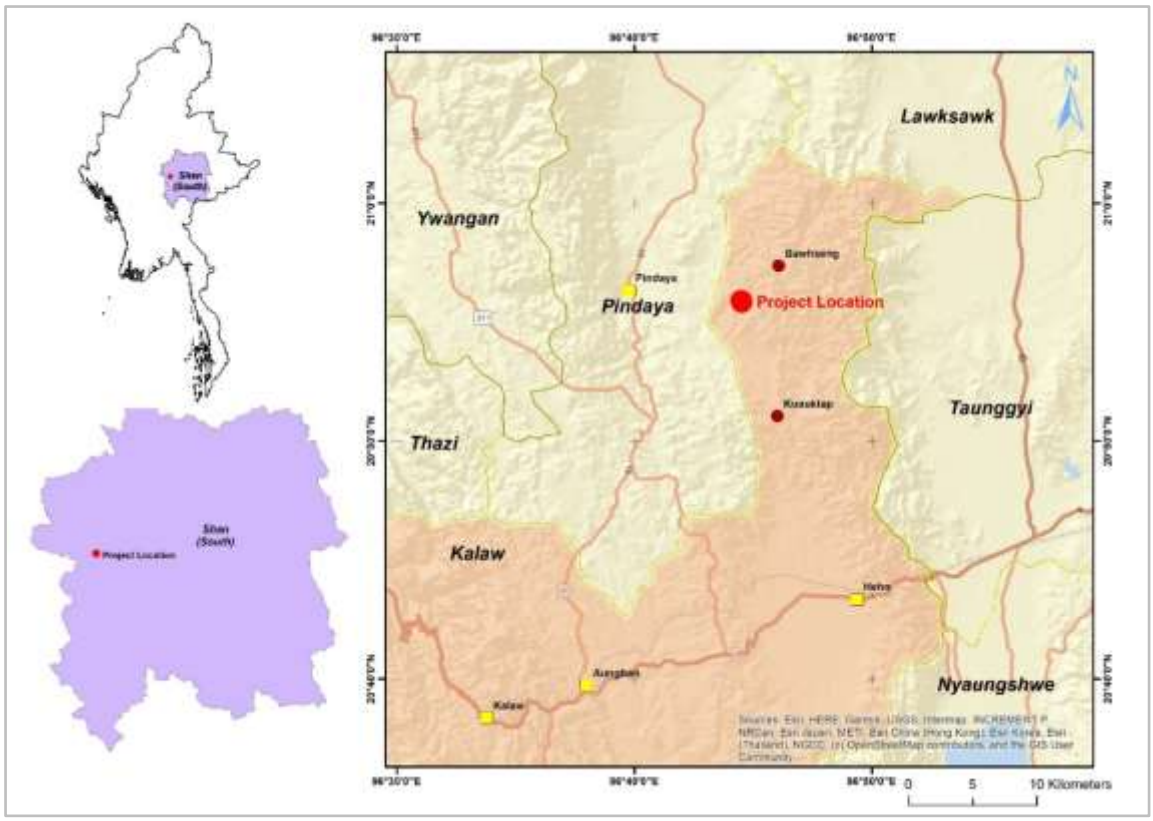


Figure 2.1 Location map of Project Area

2.1.2 Schedule for Implementation

The proposed schedule for project implementation is outlined in the table below.

Item	Details
Period for Capital Introduction	Within one year after receiving approval from the Myanmar Investment Commission (MIC)
Proposed Duration of Investment	1 year
Total Lease Period	1 year (land)
Construction/Installation Period	Completed
Current State	Operation phase

2.2 Presentation of the Project Proponent

	Top Ten Star Production Company Limited
Contact name of Proponent:	U Ko Ko Maung Managing Director
Proponent`s address for correspondence:	Olympic Hotel, U Wizara Road, National Swimming Pool Compound, Dagon Township, Yangon, Myanmar
Telephone(fixed/mobile):	+959 400465217
E-mail	kkmgygn@gmail.com, toptenstar.ygn@gmail.com

2.3 Presentation of the Environmental Experts

The field studies will be carried out by the consultant team with extensive experience in conducting Environmental Management Plan (EMP) projects in Myanmar. The team will conduct the EMP process by determining the potential impacts during both the Construction, and Operation Phases of the project. The significance and magnitude of impacts during the Construction, and Operation Phases, will be evaluated. For those impacts requiring mitigation, suitable and feasible measures will be proposed, in this EMP report to avoid or reduce impacts within acceptable limits. The environmental study was conducted by the consultant team, and the following summarizes the responsibilities of the team members during the field study period. A list of third parties approved by the Department of Environmental Conservation to develop an environmental management plan is provided in Appendix 1.

The consultant team for the proposed project are as follows:

Name of Expert	Position	Background	Years of Experience	Responsibility
U De Hlaing Zaw	Environment consultant (Team Leader) license (EIA-C 041/2023)	➢ Bachelor of Science (Hons) (Geology), Hinthada University ➢ Master of Science (Geology), University of Yangon ➢ Master of Research (Geology), University of Yangon ➢ Dip. in Environmental Studies, University of Yangon ➢ Certificate in Environmental and Social Impact Assessment (A.I.T. Vietnam)	12 years	✓ Geology ✓ Impact Assessment (Air, Noise, Vibration, Water and Soil) ✓ Environmental Management Plan and Monitoring Plan ✓ Stakeholder Engagement Plan ✓ Socio-Economic ✓ Project Overall Management ✓ Review of EMP Report
Daw Naing Naing Win	Environment consultant (Member) license (EIA-C 040/2023)	➢ Bachelor of Science (Hons) (Zoology), Dagon University ➢ Master of Science (Zoology), Dagon University ➢ Dip. in Environmental Studies, University of Yangon ➢ Certificate in Biodiversity Impact Assessment (A.I.T. Vietnam)	12 years	✓ Ecology and Biodiversity ✓ Biodiversity Baseline Survey ✓ Impact Assessment (Biodiversity) and Environmental Management Plan

Name of Expert	Position	Background	Years of Experience	Responsibility
Dr. Thiha Soe	Environment consultant (Member)	➢ Bachelor of Science (Q) (Geology), University of Yangon ➢ Master of Science (Environmental Studies), University of Yangon ➢ Master of Engineering (Geological Engineering), University of Yangon ➢ Doctor of Philosophy (Economic Geology), University of Yangon ➢ Dip. in GIS, University of Yangon	10 years	➢ Physical Baseline Survey ➢ GIS and Mapping ➢ Geology

2.4 Scope of the EMP

The primary objective of this Environmental Management Plan (EMP) is to ensure compliance with local regulatory requirements, specifically those outlined in the Environmental Impact Assessment (EIA) Procedure (2015), as they relate to the project activities. The EMP encompasses:

- A description of the project activities.
- Provisions of the relevant environmental laws.
- The baseline environmental conditions of the study area.
- Identification and discussion of potential adverse environmental impacts anticipated from the project.
- Appropriate mitigation measures.
- An outline of the Environmental Management Plan.

2.5 Purpose of the EMP

The purpose of this Environmental Management Plan (EMP) is to provide a framework for environmental and social management, including specific management measures and monitoring programs. The EMP is designed to:

- Integrate management and mitigation measures to reduce potential environmental and social impacts.
- Establish monitoring and mitigation systems to meet statutory and compliance standards.
- Demonstrate compliance with relevant Myanmar environmental legislation and align with the best practices, company policies, and management systems of Myanmar.

2.6 Proponent Commitments

ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်

Top Ten Star Production Co.,Ltd.

No.8, Lane (6), Mindama Road, Shwe Gabar Housing, Mayangone Township, Yangon, Myanmar.
Telephone : 95-1-243130, 243131, 243133, 243134, 243135, 374277

Ref :

Date :

Top Ten Star Production Co., Ltd.
No.........
Date.........

စာအမှတ်၊ ၃၉၆/ထတက-သတ္တု(ဘဆ)/ချော်ဆေးကန်/၂၀၂၄

ရက် ၆ ၊ ၂၀၂၄ ခုနှစ် ဒီဇင်ဘာလ ရက်

စီမံကိန်းအဆိုပြုသူ၏ ကတိကဝတ်

ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်မှ ရှမ်းပြည်တောင်ပိုင်း၊ကလောမြို့နယ်၊ ဘော်ဆိုင်းကျေးရွာအုပ်စုအတွင်းရှိ စီမံကိန်းမြေဧရိယာ (၃.၂၈)ဧကတွင် သတ္တုရေဆေးကန်နှင့် သတ္တုသိုလှောင်ရုံ တည်ဆောက်လည်ပတ်ရန်အတွက် တင်ပြလာသော အစီရင်ခံစာတွင်ပါဝင်သော ကတိကဝတ်များနှင့် ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၏ တည်ဆဲဥပဒေ၊ နည်းဥပဒေများ၊ စီမံကိန်းနှင့် သက်ဆိုင်သည့် လိုက်နာဆောင်ရွက်ရမည့် ဥပဒေ၊ နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများနှင့် နိုင်ငံတကာစည်းကမ်း သတ်မှတ်ချက်များအပါအဝင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊နည်းဥပဒေများ၊ လုပ်ထုံးလုပ်နည်းများ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွှတ်မှု) လမ်းညွှန်ချက်များနှင့် အမျိုးသားမြေပေါ်ရေအရည်အသွေးစံချိန်စံညွှန်းများ အခါအားလျော်စွာ ထုတ်ပြန်ကြေငြာမည့် ညွှန်ကြားချက်များကို သိရှိလိုက်နာဆောင်ရွက်မည်ဖြစ်ကြောင်းနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်တွင်ပါရှိသည့် ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ပါးစေရေး လုပ်ငန်းများအား ဆောင်ရွက်မည်ဖြစ်ကြောင်း ကတိကဝတ်ပြုအပ်ပါသည်။

Ko Ko Maung
Director
Top Ten Star Production Co.,Ltd.

3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section provides a brief summary of relevant national environmental legislations established by the Ministry of Natural Resources and Environmental Conservation (MONREC) and overview of current local and international environmental and social policies including related international or regional convention for the proposed project.

3.1 Myanmar Regulatory Framework

Myanmar has 25 ministries under the Office of the President as of February 2019. The leading ministries in-charge of environmental and social considerations is the Environmental Conservation Department (ECD) of the MONREC that was reorganized Ministry of Environmental Conservation and Forestry (MOECAF) on 30 March 2016.

3.2 Corporate Environmental and Social Policies

Top Ten Star Company has environmental policy of doing environmentally and socially responsible with minimal impact on the environment. It must follow all laws and regulations prescribed by the Republic of the Union of Myanmar over specified in environmental policy, laws, rules, regulations and other international guidelines.

The company is working with the local committees and government agencies, such as MONREC integrating the environment into its planning, operations and policy decisions. The first and foremost policy is to comply with laws, rules and regulations relating to the physical and social environment. Most of all, it will follow the rules and regulations set up by the ECD, the main agency responsible for environmental management of regional level. The company pledges to do the business that will be environmentally as practical as possible. Environmental management of the Project/Factory needs to comply with legal requirements of the Environmental Management Plan prescribed in the Environmental Conservation Rules, Notification No. 50/2014 and the EIA Procedure, Notification No. 616/2015.

An EMP is a project document to be prepared according to the requirements and guidance of the Ministry of Natural Resources (MONREC) and Environmental Conservation Department. In order to refrain from, protect against, mitigate and monitor adverse impacts caused by the design, construction, implementation, operation, maintenance, termination, or closure of a project or business or activity; or after its closure, or by any other related cause [Environmental

Conservation Rules, 50/ 2014, Chapter I, Articles (2g)]. An EMP should include programs to manage, implement activities, and monitor changes to the environmental context.

Corporate Environmental and Social Policies of Project Proponent

The main policy and commitment of Top Ten Star Company limited can be identified in the following points:

- the protection of public safety, the health and safety of the workforce and the local communities
- the protection and promotion of human rights, the economic and social development of local communities
- the protection of the environment and the conservation of biodiversity and ecosystems;
- the compliance with Myanmar laws, regulations and industrial standards regarding the environment, health, safety and hygiene at work in all of our operations
- visible and active leadership that promotes HSE excellence, which engages and motivates employees and contractors alike to succeed
- manage HSE in order to achieve our objective of incident free operations
- implementing sustainable development principles in our activities

Developer's Policies for Socio-economic Development of Local People

Top Ten Star Company should actively participate in implementation of government schemes for welfare of the society of the Baw Sai Village, Kalaw Township. If the Contribution at random places with no records, that will have some social problem due to the lack of transparency. Therefore, we should have CSR program to contribute and manage CSR fund effectively. Our policies for local socio-economic development are shown in the following table.

No.	Description	Company's Policy
1.	Local Community Development Policy	Appoint local people with relevant skills as much as possible
2.	Corporate Social Responsibility (CSR) Policy	Fund at least 2 percent of the annual net profit after taxes as CSR fund.

3.3 Myanmar Legislation Relevant to the Project

Laws relating to environmental and social issues related to the Project and hence their relevance to the EMP Study are included in Table 3.1. The project proponent commits to follow the laws and regulations stated in Table 3.1.

Table 3.1 Myanmar Legislation and Relevance to Project

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
1	Environmental Conservation Law (ECL), 2012	Provision of basic guidance to integrate environmental conservation in sustainable development, ministry's responsibility to develop relevant guideline and regulation, setting up monitoring system, waste management, conservation of natural resource and cultural heritage. Relevant section is: (Section 7o, 14, 15, 24 and 29)	**Project Proponent commits to**: • According to the section 7 (O), Provide compensation for environmental impact if there is any pollution; contribute a portion of the benefit gained from the businesses which explored, traded and used natural resources. Treat, emit, discharge and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards for causing a point source of pollution. • According to the section 14, Treat, emit, discharge, and deposit substances which cause pollution in the environment in accordance with stipulated environmental quality standards. • According to the section 15, Install or use an on-site facility or control equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. Wastes will be disposed in accordance with environmentally sound methods. • According to the section 24, allow the Ministry to 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. • According to the section 29, not violate any prohibition contained in the rules, notifications, orders, directives and procedures issued under this Law.
2	Environmental Conservation Rules (ECR), 2014	Rules 69a and 69b	**Project Proponent commits to**: • According to the rule 69a, not to emit, ask to emit, not to dispose, and ask to dispose, pile nor ask to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. • According to the 69b, not to carry out any activity that can damage the ecosystem and the natural environment, which is influenced due to such system, except for carrying out with the permission of the Ministry for the interest of the people.
3	The EIA Procedure (2015)	Relevant articles 102 – 110, 113, 115, 117	Environmental Impact Assessment Procedures have been prepared by MONREC under the Environmental Conservation Law, 2012. It requires that the Project proponent has to include in its evaluation environmental, social and health aspects of the environment, and has to identify and assess

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			all adverse impacts and risks for environment, social issues and, if relevant, health that potentially could arise from the Project. This includes information on project categorization, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues. Under the EIA Procedure, there is a requirement for the undertaking of an EIA in order to obtain an ECC for certain development projects. **Project Proponent commits to**: Commence implementation of the Project strictly in accordance with the conditions attached to the ECC and including the EMP, within such time as may be prescribed by the Ministry. Bear full legal and financial responsibility for his actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Project acting for or on behalf of the Project, in carrying out work on the Project; and Bear full legal and financial responsibility to support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all adverse Impacts until PAPs have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project. **EMP**, Implement the EMP, all Project commitments, and conditions. 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. Fully and effectively implement the requirements set forth in ECC, applicable Laws, Rules, EIA Procedure and standards. Implement project commitments and conditions when providing services to the Project and inform the Ministry with detailed information as to the proposed project's potential adverse impacts. **Monitoring and Reporting**, Notify and identify in writing to the Ministry, providing detailed information as to the proposed Project's potential adverse Impacts Engage in continuous, proactive and comprehensive self-monitoring of the Project and

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			activities related thereto, all adverse Impacts, and compliance with applicable laws, the Rules, this EIA Procedure, standards, the ECC, and the EMP during all phases of the Project (pre-construction, construction, operation, decommissioning, closure and post closure) Notify and identify in writing to the Ministry for any breaches of his obligations or other performance failures or violations of the ECC and EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, to undertake within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident 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 Submit the monitoring report within ten (10) days of completing a monitoring report and the information to be included Make a monitoring report as contemplated in Section 108 and Section 109 in accordance with the EMP schedule, (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g., libraries, community halls) and at the Project offices within ten (10) days of completing Submit a digital copy of a monitoring report within ten (10) days of receiving such request via email or as may otherwise be agreed upon with the requestor for the request of any organization or person
			Monitoring and Inspection, the event of emergency, Allow 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. Allow from time to time as and when the Ministry may reasonably require, the Ministry access to the Project's offices and to the Project site and any other location at which the Project activities or activities related to the Project are performed Allow full and immediate access to the Ministry at any time as may be required by the Ministry in the event of an emergency, or where, in the opinion of the Ministry, there is or may exist a violation or risk of violation of the compliance by the Project with all applicable environmental and social requirements Ensure that the Ministry's rights of access can extend to access by the Ministry to the Project's contractors and subcontractors.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
4	National Environmental Quality (Emission) Guidelines (2015)	MONREC formulated the National Environmental Quality (Emission) Guidelines (EQEG) in coordination with ADB in December 2015.The EQEG determines the guideline values for general emission such as air emissions, wastewater, noise levels, odor, and those for sector-specific emission such as emission from forestry, agribusiness/food production, chemicals, oil and gas, infrastructure, general manufacturing, mining, and power.	The project proponent commits to follow the Thermal Power Plant Guideline during construction and operation. The project proponent commits to comply with the provisions mentioned the National Environmental Quality (Emission) Guidelines (2015)
5	EIA procedure for Mining Sector (2018)		- The project proponent must commit to protect human health and ecological well-being - The project proponent commits to comply a basic rule for the control of noise, vibration and fume emissions and liquid discharges of various places in order to prevent pollution. - In order to comply with contribute to the long-term and sustainable socio-economic development of the national while. - The relevant government department to comply with the environmental impact assessment guidelines for the mining sector. Organizations non-governmental organizations; In order for the entire people to participate together, including civil society organizations
Mining			
6	Mining Law (2015)	Section 3, and 4	The project proponent must commit to comply the following sections,

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			- To minimize the impact on the environment while carrying out mineral production and to ensure that there is no socio-economic impact on the local people. Emphasis on keeping funds for annual environmental conservation activities. - When mineral production is completed or closed, the land of the business site is rehabilitated according to the mine closure plan; conservation and rehabilitation work and establishing a fund for green activities and operating in accordance with the specifications. - In relation to the production of minerals, the Ministry has obtained a permit for joint venture or venture business with the entrepreneur for a percentage-sharing system or profit-sharing system, including environmental impact assessment costs on production. A system or a system of mutual contribution based on profit sharing shall be employed.
Forestry/Biodiversity/Agriculture			
7	The protection of Biodiversity and Protected Area Law, 2018	Relevant sections are 35 a, 35 c, 35 d, 29 e and 39d.	**Project Proponent commits to:** According to the section 35a, avoid entering a prohibited area located in the protected area without permission. According to the section 35c, avoid digging on the land or carrying out any activity in the protected area. According to the section 35d, avoid extracting, collecting, or destroying in any manner, any kind of wild flora or cultivated plant. According to the section 29e, avoid disposing or handling chemical waste and poisoning materials in the protected area. According to the section 39e, avoid pollution on water, land and air quality in the protected area.
8	Forest Law, 2018	Relevant *section 12a*	**Project Proponent commits to:** According to the section 12a, desirous of carrying out any development work or economic scheme shall obtain the prior approval of the Ministry (of Natural Resources and Environmental Conservation). Shall abide by the provisions of Environmental Conservation Law and other relevant Laws when carrying out any development work or economic scheme under sub-section.
Public Health and Safety			

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
10	The Public Health Law (1972)	Relevant sections are 3 and 5.	THE PROJECT PROPONENT shall concern with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics. **Project Proponent commits to:** According to the section 3, abide by any instruction or stipulation for public health. According to the section 5, provide required infrastructure relating to environmental health, such as garbage disposal, use of water for drinking and other purposes, radioactivity, protection of air from pollution, sanitation works and food and drug safety for all works.
11	The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)	The relevant sections 3a, 9, 4 and 11.	THE PROJECT PROPONENT will ensure the healthy work environment and prevention the communicable diseases by the project owner, THE PROJECT PROPONENT with the relevant health department. **Project Proponent commits to:** According to the section 3a, prepare report for an outbreak of a communicable disease to the nearest Health Officer. According to section 4, comply with the measures undertaken by the Ministry of Health and the Department of Health in respect of prevention of the occurrence and spread of communicable disease and control thereof. According to section 9, undertake investigations and medical examinations to prevent and to control the spread of Principal Epidemic Disease. According to the section 11, allow the Health Officer to undertake the measures detailed to prevent and control the spread of a Principle Epidemic Disease.
Occupational Health and Safety			
12	The Fire Brigade Law (2015)	Relevant sections are: Sub-section (a) of section 25: The project proponent will institute the specific fire services. Sub-section (b) of section 25: The project proponent will provide	THE PROJECT PROPONENT will ensure to prevent the fire, to provide the precautionary material and apparatuses, if the fire caused in the project area to be defeated because the project is business in which electricity and any inflammable materials such as petroleum are used. So, the project owner has to institute the specific fire service in line with the law. **Project Proponent commits to**: According to section 25a, to Form the reserve fire brigade.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
		materials and apparatuses for fire precaution and prevention.	According to the section 25b, train fireman by systematically organized the fire brigade. Provide materials and apparatuses for fire safety; in conformity with the directive of the Fire Services Department.
13	Occupational Health and Safety Law (2019)	The relevant sections 12, 14, 16, 17, 18, 26, 27, 34 and 36.	THE PROJECT PROPONENT aims to implement occupational health and safety activities at each workplace, to reduce occupational accidents, damages and disease, to improve production by preventing workers from occupational damages and diseases and to work safety and healthily. **Project Proponent commits to:** According to section 12, appoint the occupational safety and health responsible person in order to closely inspect the health and safety of workers as per types of business defined by Ministry of Labor, Immigration and Population. According to section 14, Occupational safety and health responsible person shall make the workplace to be a safe workplace that is good for health. According to the section 16, Allow Inspection Officers to enter the Workplaces to which this Law applies and inspect Occupational Safety and Health conditions and direct Employers for their compliance and report the findings to the Chief Inspection Officer. Comply and care the right and responsibilities of the inspection officer as per section 17 and 18 According to section 26, arrange properly, manage as per requirement for accessing potential hazard, and provide the physicians, supports the personnel protective covering, material in free. According to section 27, not to dismiss or demote for complains concerning the potential health and occupational hazards, undertaking the duty for the occupational health and safety committee, not working for the unsafe in health. According to section 34, to undertake to inform the heavy accident arising, to submit the report of approved physicians and inform to the department in case of infected the occupation disease or toxic due to the materials use or operations process. According to section 36, to get the skill, Knowledge, Technology and aware of the safety, the Occupational Safety and Health Manual and guidelines issued by the relevant Ministries for the acquisition of the work. Provide feedback or make arrangements for awareness raising.
14	Tobacco and Tobacco Products	Relevant *section 9*	The project owner will arrange the specific place for smoking in the operation area and keep the caption and mark in accordance with the stipulations. **Project Proponent commits to:**

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
	Consumption Control Act, No. 5/2006		According to the section 9, keep the caption and mark referring that it is a non-smoking area, arrange the specific place where smoking is allowed and supervise and carry out measures so that no one can smoke at the non-smoking area and accept the inspection when the supervisory body comes to the place for which they are responsible.
15	Traffic Safety and Motor Vehicle Management Law, (2020)	The project proponent will follow the relevant sections are 9a, 12c, 14n, 18a and 81g.	THE PROJECT PROPONENT shall set rules to drive safety motor vehicles in public area through registration according to official rules and regulations, to provide driving license, to protect the road users from the road risks and vehicles perils, to use high technology transportation systems. **The project proponents commit to** According to section 9a, to specify the accessible and restricted places for motor vehicles for local use. According to section 12c, to shall approve and specify conditions, standards and formulate specifications relating to safety and environmental conservation for initial motor vehicle registration. According to the section 14n, to give suggestions and comments on motor vehicle safety to the relevant government departments and government organizations during construction preparation period or construction period or the use of any constructions when starting construction at a public place. According to section 18a, to regular repair and maintain the motor vehicle to meet the standards specified by the relevant Department. According to the section 81g, to load or transport dangerously goods in a motor vehicle in inconformity with the stipulations.
16	Traffic Safety and Vehicle Management Rules, No. 1/2022	Relevant rules 152, 153, 154, 256, 261, 263, 269 and 171	**The project proponents commit;** To register the vehicle in the form prescribed by the Department. To avoid excessive emissions of fumes from vehicles that pollute the surrounding air In order to always work properly, vehicles must be equipped with an emission control device to prevent the release of smoke that pollutes the surrounding air To comply with the vehicle emission standards set by the Department The project proponent is committed to complying with the provisions of rule 152, 153, 154, 256, 261, 263, 269 and 171 of the Traffic Safety and Vehicle Management Rules, No. 1/2022.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
17	Occupational Substances Explosives Act 2018	Relevant sections are 6c, 7c, 11b, 13, 14b, 15, 16, 18, 19, 20 and 21.	**The project proponent commits to** comply with the section 6c, 7c, 11b, 13, 14b, 15, 16, 18, 19, 20 and 21 as following: According to the section 6c, if explosive materials are used in the implementation of the project, to request permission from the relevant ministry for the place where they will be stored To construct the design of the explosive substances warehouse in accordance with the features specified by the Ministry The licensee shall apply to renew the license, 30 days before expiration to the Chief Inspector in accordance with the stipulations, if he wishes to continue to store industrial explosive materials. To renew license, the project proponent to be constructed the design of the explosive substances warehouse in accordance with the features specified by the Ministry. Shall systematically store without excessing the permitted amount, accept the inspection of chief Inspector and if damage to property, injury or dead of people burning or explosion of explosive material inform to nearest police station and report it to the chief Inspector timely. Shall store the explosive material only in the licensed Shall take necessary preventive measures in accordance with the specifications to avoid harm in transport, use or possession of industrial explosive material. The chief Inspector shall follow the inspecting of license and permission, law, rules, directive and procedure and taking action abide by them Recommending to the Ministry if it is in conformity with the specifications after examining the application shall not refuse inspection of the Chief Inspector or an inspector Shall not allow to transport, store and use of explosive material without license. Shall not accept to store and deliver the industrial explosive material in an unlicensed. Shall not accept to store industrial explosive material more than the limited amount, there have no license. Fail to inform the nearest police station immediately and to report the Chief Inspector timely if anything mentioned in sub-section (c) of section 15 occurs due to industrial explosive materials Continue to store industrial explosive materials without renewal after expiration of the license.
Investment			
18	Myanmar Investment	Relevant sections are 50, 51, 65, 66, 67 and 73.	**The project proponent commits;** To act in compliance with land use rights according to the section 50, To comply with the provisions on the appointment of staff and workers mentioned in section 51.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
	Law, No. 40/2016		To inform the commission if the permitted investment is transferred and rent to another one during the term of business mentioned in section 65. To respect and comply with the customs, traditions and traditional culture of the ethnic groups in the Union in section 65. To establish and register a company or branches of such entities under the Laws in order to invest in section 65. According to the section 73, take out the relevant insurance out of the following types of insurance at any insurance business holds the license in the Union based on the nature of the business: Property and Business Interpretation Insurance; Engineering Insurance; Professional Liability Insurance; Professional Accident Insurance; Marine Insurance; Workmen Compensation Insurance; Life Insurance; Fire Insurance. In relation to environmental measures, the project proponent is committed to complying with provisions of sections 66 and 67 of the Myanmar Investment Law (2016). The project proponent commits to comply with the provisions of section 50, 51, 65, 66, 67 and 73 of Myanmar Investment Law (2016).
19	Myanmar Investment Rules, No. 35/2017	The project proponent will follow the relevant Rules are 202, 203, 206 and 212.	**The project company commits to** comply with rule 202, 203, 206 and 212 as follows. To comply with rule 202, all terms and conditions in permits and other applicable laws when the investment is carried out in accordance with Myanmar Investment Rule (2017). To fully assist the negotiation processes with the relevant government departments and government organizations for the affected persons due to proposed project according to Rule 203. To submit the application attached with reference documents to the Commission and obtain the approval if the company desires to appoint expert foreigner according to Rule 206. To ensure that Bodily Injury Insurance and Workmen Compensation Insurance at any insurance business entitled to carry out insurance business within the Union by the company in accordance with Rule 212. The project proponent are committed to complying with the provisions of rule 202, 203, 206 and 212 of the Myanmar Investment Rule (2017).
20	Myanmar Companies Law 2017		The project proponent is committed to complying with the provisions of the Myanmar companies Law (2017).

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
21	Disaster Management Law (2013)	The project proponent will follow the relevant section are 14 and subsection (14a –e).	Pre-planning measures for disaster mitigation before natural disaster strikes include the following: (a) Prioritization of natural disaster mitigation activities by the national committee and various regional groups; (b) To further improve natural disaster early warning systems; (c) Knowledge to inculcate the habit of being safe and resilient at every level from the national level to the ward and village level. Applying skills and creativity; (d) Including natural disaster mitigation measures in national development projects; (e) Building strong preparedness for effective disaster response at all levels from the national level to the ward and village level. The project proponent are committed to complying with the provisions of section 14 and subsection (14a-14e) of Disaster Management Law (2013).
Working Environment			
22	The Minimum Wage Law (2013)	Relevant sections are Section 12 and 13	THE PROJECT PROPONENT will comply the Minimum Wages Law sets a minimum wage to meet the essential needs of workers, and their families, who are working in commercial, production and service, agricultural and livestock breeding businesses and for the purpose of increasing the capacity of the workers. **The project proponent** commits to comply with sections 12 and 13 as following; The employer shall not pay wage to the worker less than the minimum wage stipulated under this Law. The employer 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. 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. If the workers cannot work due to sickness, shall give them holiday for medical treatment in accord with the stipulations. 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.
23	Labor Organization Law (2011)	Relevant sections are: 18 to 22	THE PROJECT PROPONENT will protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labor organizations systematically and independently.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			The project proponent commits to comply the section 18 to 22 under the Labour Organization Law 2011. Allow the demand for the re-appointment of a worker who is dismissed by the employer and if the cause of dismissal is related to labour organization membership or activities or does not conforming to the labour laws. Allow the labour organization to send representatives to the Conciliation Body and Tribunals in disputes between the employer and the worker. Allow the labour organization to participate and discuss in discussing with the government, the employer, and the complaining workers in respect of workers' rights or interests contained in the labour laws. Allow the labour organization to participate in solving the collective bargains of the workers in accordance with the labour laws. Allow labour organizations to peacefully in carrying out holdings of meetings, going on strike and carrying out other collective activities in accord with their procedures, regulations, by laws and any directives prescribed by the relevant Labour Federation. And take collective actions in accordance with the relevant procedures, regulations, and law
24	Employment and Skills Development Law (2013)	Relevant sections are 5, 14 and 30	**The project proponent commits to**: Section 5: (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment. (2) If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1). (3) The regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law. worksite (4) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labor exchange office within the stipulated period and shall get the approval of it. Section14: The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			Section 30: The Employer shall carry out the training for each work or compounding the work individually or group-wise by opening on-job training, training systematically at worksite, sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers.
25	The Leave and Holiday Act, 1951; Amendment in (2014)	Relevant sections are: (Section 3, 4, 5, 7 (a))	**The project proponent commits to**: Section 3 The public holidays that every employee shall be granted with full payment. The rules of leaves for workers including medical leave, earned leave and maternity leave. The employer shall allow at least one day per week as a working holiday with pay or full salary for the employees For non-Buddhist workers, the relevant religious holidays may be granted as unpaid days off by mutual agreement between those workers and their employers Section 4 The employer shall pay each worker who has completed twelve consecutive months of work at the relevant average wages during the next twelve months or 10 consecutive days of seniority leave shall be allowed, regardless of the average salary. Workers also worked at least twenty-four days a month. Even if the job has been completed for twelve consecutive months. Seniority leave must be allowed. But the worker for every month that did not complete twenty days. He shall be deducted one day from his seniority day. Section 5 The relevant fee or with salary or Casual leave shall be available for a total of six days per year. Workers does not take the casual leave he is entitled to in the relevant year. Such leave shall be void Section 7a Pregnant women workers are entitled to six weeks before childbirth and eight weeks after childbirth, with or without pay. Allowed as paid maternity leave. Maternity leave may be admissible in conjunction with medical leave
26	Social Security Law (2012)/ Came into force 1 April 2014	The relevant sections are 11a, 15a, 15b, 18b, 48b and 75	The project proponent commits to Section 11a Apply with the provisions for compulsory registration for social security system and benefits contained in the law if the entity employs minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Board.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			Section 15a Ensure it meets the requirements of the social security funds. Section 15b For the Social security fund, to include the funds for health and social care, invalidity benefit, superannuation benefit and survivors' benefit, unemployment benefit, other social security fund for social security system of compulsory registration and contribution stipulated by the Ministry of labour, in co-ordination with the Social Security Board. Section 18b Deduct contributions to be paid by worker from his remuneration and pay to the social security fund together with contribution to be paid by him. The employer shall also bear the expenses for such contribution Section 48b Registering voluntarily for insurance of the workers who are not applied to provisions of compulsory registration for employment injury benefit insurance system, by paying stipulated contribution to employment injury benefit insurance fund. Section 75 Report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such. Correctly prepare and keep records and lists prescribed in subsection (a) of Section 75 to inform any changes and submit (if requested) to the relevant Social Security Board Office
27	Payment Wages Law (2016)	The relevant sections are 3, 4, 5, 14 and chapter 3.	Project Proponent commits to comply with the following stipulation: That salaries are to be paid at the end of the month or, depending on the size of the employing enterprise, between 5-10 days before the end of the month. The employer is permitted and required to withhold income tax and social security payments. Other deductions, e.g., for absence, may only be withheld in accordance with the law. For the employer (a) to pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary (b) If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. For finishing the contract, employer needs to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. For the employer to report to the Department with evidence of payment at later date agreed with the employee if the employer has difficulties to pay wages on time because of significant events (e.g., natural disaster), For the employer to deduct expense which are allowance for accommodation and ferry service arranged by the employer, meal allowance, electricity charges, water service charges and income taxes liable to be paid by workers and cash paid in excess under mistake, which are not included in the expression of wages under this Law and not to deduct from the wages of the worker except the deduction as per clause 7. For any deducting from the salary due to the employees' absence, the total cut salary not to be more than 50 % of his salary. For the Employer need to approval form the department as a penalty and cannot more than actual ravage rate when cut salary. No cut salary from the employees under 16 age. For overtime work, to allow the presiding overtime rate as set by the Law.
28	Labor Dispute Resolution Act, No.5/2012 (Amended: 2014, 2019)	The relevant sections are 38, 38a, 39, 40, 43, and 51.	**Project Proponent commits to**: Acknowledged that the Arbitration Council will form and assign duty to a Tribunal to try the case and decide in respect of the application made if both or any relevant party is not satisfied with the decision of the Arbitration Body. Not absent for the negotiation of a dispute within the stipulated date and time. To form a coordination committee. Not change the existing stipulations for employees within conducting period before Tribunal. Not close the work without negotiation, discussion on dispute in accord with this law, decision by Tribunal. Comply with an item in the agreement and not change before the Conciliation Body in respect of individual dispute or collective dispute. Pay the compensation decided by Tribunal if violates any act or any omission to damage the interest of labour by reducing of product without proper reason
29	Workmen' Compensation Act 1923		**Project Proponent commits to**: Comply fully with the Workmen's Compensation Act in respect of Employer's liability for compensation, amount of compensation, method of calculating wages, review, commutation of half-

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			monthly payments, 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, medical examination, contracting, remedies of the employer against the stranger, special provisions relating to masters and seamen, penalties. Comply with any update for revising the monetary amount as per the amendment law. Pay compensation for the injury to workmen if there is any injury by accident arising out of and in the course of his employment in accordance with the provisions of said law
Cultural Heritage			
30	The Protection and Preservation of Antique Objects Law (2015)	The relevant sections are 12, 15 and 20f.	**The project proponent commits to** Section 12, If finds any seem to be antique objects, it is needed to inform the relevant GAD department, ward or village-tract administrator. The project proponent commits to inform to the relevant ward and village administrators in accordance with section 12 of The Protection and Preservation of Antique Objects Law (2015), if any antiquities are found during the project implementing. Section 15 Shall not carries or transports an antique object to a foreign country without permission Section 20f No person shall attempt or conspire to commit any offense under this Act.
31	Cultural Heritage Areas Protection and Conservation Law, No.6/2019	The relevant section is 21b.	If the project proponent does not comply with any of the provisions of the Protection and Preservation of Cultural Heritage Region Law, 2019 (Section 21b), compliance with the regulations according to the issued order and instructions, confession and following the rules by paying fines will be carried out.
Water Resources/ Pollution			
32	The Conservation of Water	Relevant sections are: 8a, 11, 19, 21b, 24b and 30.	The project proponent commits to Section 8 (a): Not to do anything with the intention of damaging water sources and rivers or to change the flow of water.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
	Resources and Rivers Law (2006)		Section 11: To conserve and protect the water resources and rivers system for beneficial utilization of the public Section19: 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. Section 21 (b): Drill well or pond or dig earth without the permission of the Directorate. Section24 (b): Violate the conditions prescribed by the Directorate so as not to cause water pollution and change of watercourse in rivers and creeks. Section 30: If any project will be carried out near rivers and banks, to obtain the consent of the Ministry in order not to harm water sources and rivers.
33	Water Resources and Rivers Conservation (2013)		The project proponent commits to comply with the relevant provisions of rules of Water Resources and Rivers Conservation (2013) as the project may cause water pollution in rivers.
Land Acquisition			
34	Land Acquisition Act No.1/1894	Relevant sections 30	**The project proponent commits to** Section 30: When the amount of compensation has been settled under section 11, if any dispute arises as to the apportionment of the same or any part thereof, or as to the persons to whom the same or any part thereof is payable, the Collector may refer such dispute to the decision of the Court. Government has authority to acquire the land under this Act not only for public purpose but also for business reasons for the companies at that time.
35	Land Nationalization Act 1953		**The project proponent commits to** Repealed by the Farmland Law 2012, determines nationalization of farmlands and procedures for conversion of farmlands to other purposes (La Na 39).
36	Farmland Law 2012	Relevant sections 30	**The project proponent commits to** The Township Farmland Management Body shall issue the Land Certificate to the Township Land Record Department. The law introduces right to use the land to farmers through land use certificate and acquiring the farmland for other purpose.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			Section 30: Regarding the application to use the land in another way for public benefit: (a) The Central Agricultural Land Management Organization, Region or State, to use the farmland in another way. Nay Pyi Taw, It can be approved with the verification and approval of the agricultural land management team. (b) Region or state, so that the relevant regional or state government can use the agricultural land in other ways than agricultural land. Nay Pyi Taw, it can be approved with the verification and approval of the agricultural land management group.
37	Farmland Rule 2012		**The project proponent commits to** The Rules details the eligibility of farmer or organization for the process of acquiring land use certificate, the role and responsibility of farm land committee in various level and the application process of land use certificate. And regulating the requirement of indemnity and compensation to the affected person when it comes to the case of confiscating farms in the interests of nation.
38	Vacant, Fallow & Virgin Lands Management Law 2012	Section 10a, 19a and 19d	**The project proponent commits to** Section 10a: The relevant management committee is free land, agriculture of fallow and fallow land; When allowing for livestock and related businesses, it must be allowed only after verifying whether there is a person currently working in accordance with the law. Section 19a: If, the discovery of ancient cultural heritage in permitted vacant land, fallow land and waste land, the project owner shall inform to relevant government immediately. Section 19d: If, vacant land permitted to operate; Resource discovery in fallow and fallow land, the project owner shall inform to relevant government immediately.
39	Vacant, Fallow & Virgin Lands Management Rules 2012		The project proponent commits to comply with: Stipulation of claiming unused land to usable in form of agriculture, livestock, mining & government allowable other purpose.
42	Prevention of Hazard from Chemical Substances law 2013	Relevant sections are 15, 16, 16j, 17, 22 and 27. (a, b, d, J)	**The project proponent commits to** Abide the provisions of section 15, 16, 17, 22, 23 and 27 of said law, stating obligations related to chemicals and related substances: inspection, registration, training, instructions to abide by, mitigation measures, compensation for damages. Provide medical checkup and keep records for the working persons who will work in the chemical and related substances.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			Transport only the permitted amount of the chemical and related substances in accordance with the prescriptive stipulations, if they are transported in local. Classify the hazard level of chemicals and related substances in advance. Show Material Safety Data Sheet and warning signage. Provide safety equipment, personal protective equipment and training on their use. Possess, transport, store, use and discharge chemicals and related materials in accordance with stipulations. Not import or export chemicals and related materials banned by the central supervising board. Shall take the permission from the Central Supervisory Board if the chemical and related substance is altered and transferred from one place to any other place which contained in the license.
43	Chemical Substances and Related Substances Hazard Prevention Regulation (2016)		**Project Proponent commits to comply with the relevant rules of Chemical Substances and Related Substances Hazard Prevention Regulation (2016)** For organizations who store the chemical and related substances to abide by the following facts for safety: (a) Install the fire protection system in building to be stored in accordance with prescribed provisions of the Department of Fire Brigade and being the building, which is constructed to correspond for storing the chemical and related substances (b) Stick the warning sign according to hazard class and keeping the safety equipment at the stored place. (d) Store only the substances which are contained in the issued national chemical and related substances (e) Keep the chemical and related substances according to the hazard class (f) Separate the chemical and related substances which may react and be hazardous if they are closely kept (g) Make the stored place to be cool, dry and good in ventilation and not to have the direct contact of sunlight on the stored substances (h) Not storing the chemical and related substances near the place where releases the heat energy (i) Not storing and eating the food near the place where the chemical and related substances are stored (j) Use the gas cylinders with pressure gauge and not keeping them at place where may easily collapse (k) Make strong and resistant to corrosion of the boxes and bottles which are put the chemical and related substances and the shelves which are kept them

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			(l) Place and store the corrosive chemical and related substances on the nearest stage to the floor (m) Provide fire prevention equipment and fire extinguishing equipment which are required for fire safety depending on the categories of chemical and related substance sufficiently, at the nearest to entrances and exits to be able to use them easily (n) Supervise closely the storehouse or storeroom by experts or persons who have attended to the training (o) Allow only for the responsible person for entering into the storehouse or storeroom (p) Store the gas as the commercial purpose only by a person who knows and understands the using way of the gas and about dangers arisen by gas (q) Separate the gas-cylinders depending on categories of gas, and the empty and full gas-cylinders in storing of them (r) Abide by with the provisions contained in existing laws in storing of the chemical and related substances. To be safe, for the user of chemical and related substances To inform in advance the side effects which shall be obtained by using chemicals and health impact to the working persons in the occupational area.
44	Myanmar Insurance Law, 2015	The project proponent will follow the relevant section 15 and 16.	The project will compensate for all the general damages to the environment and injuries to public to ensure that needed insurances such as making insurance for the project owned vehicles and injured person. According to section 15 of the Myanmar Insurance Law 2015, the company will be insured Third-Party Liability Insurance for vehicles used in the project. Organizations operating as an enterprise which may cause damage to life and property of the public workers or may pollute the environmental to have General Liability Insurance with the Myanmar Insurance. **Project Proponent commits to:** Ensure all Motorized Vessels effect compulsory Third Party Liability Insurance with the Myanmar Insurance. Comply the stipulations for compulsory requirement for organizations operating as an enterprise which may cause damage to life and property of the workers or may pollute the environment to have General Liability Insurance with the Myanma Insurance.
45	Petroleum Rules, 1937	The relevant chapter 3 and 4	**Project Proponent commits to:** According to the chapter 3, transportation Storage of any petroleum requiring will be carried out according to the Petroleum Rules.

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
			According to the chapter 4, Provide and taken precautions all times to prevent accident by fire or explosion, and any escape of petroleum during transport especially into any drain, sewer, harbor, river or water course. Receptacles for dangerous petroleum shall have a stamped, embossed, painted or printed warning, either on the receptacle itself or, where that is impracticable, displayed near the receptacle, exhibiting in conspicuous characters the words "Petrol" or "Motor Spirit", or an equivalent warning of the dangerous nature of the petroleum.
46	Petroleum and Petroleum Product Act, No. 20/2017	Relevant sections are 9a, 10a, 10b, 10d and 11.	**The project proponent commits to following section:** shall carry out the following activities in relation to petroleum and petroleum products a vehicle carrying oil and petroleum products; Licensing of vessels and trailers shall carry out the following activities in relation to petroleum and petroleum products (a) issuance of storage license for storage tanks and warehouses (b) transportation permits for carrying oil and petroleum products; Vessels and trailers Issuance (d) environmental damage occurring while carrying out activities related to petroleum and petroleum products, conduct field inspections and take necessary action in accordance with existing laws Labeling of all packaging materials containing hazardous petroleum and petroleum products
48	The Law on the Protection of the Rights of Ethnic People, No.8/2015	Section 5	**According to the section 5, Project Proponent commits to comply** Inform, coordinate, and undertake consultation with ethnic groups if the Project falls within areas with ethnic groups. Disclose all about the project fully to the residents who are national races. Cooperate with the residents who are national races.
49	The Ethnic Rights Protection Rules-2019	Rule 20 and 21	**Project Proponent commits to:** According to the rule 20, arrange public consultation activities at the early stage to disclose the project information and to discuss with the relevant stakeholders and local people who may be affected by a project using the local language. According to the rule 21, carry out the project to support the Myanmar Sustainable Development Plan (MSDP). Report the EIA study including public consultation and disclosure plan to the relevant government authorities to obtain comments and opinions before the project commencement. Update the project plan and status to the relevant government authorities. The project proponent commits to comply with the provisions of relevant rule 20 and 21 of The Ethnic Rights Protection Rules-2019

No.	Relevant Laws, Rules and Regulations	Relevant Articles/Sections	Commitments
50	The Export and Import Law No.17/2012	The relevant section 6 and 7	The project proponent will not export or import restricted, prohibited, banned and specified goods without obtaining license and no violation of the conditions contained in the license. **Project Proponent commits to:** According to the section 7, the Project Proponent, as a license holder, commits to comply not to violate the conditions contained in the license.
51	Underground Water Act (1930)	The underground water act enacted on the date of 21st June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Burma. This act prohibits sinking of a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Township Officer or sub-divisional officer had power to close a license tube after exercising jurisdiction over the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.	The project proponent is committed to comply with the provisions of sections of 3 and 5 of Underground Water Act (1930). Section 3: No person shall sink a tube for the purpose of obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Every person owning a tube which was in existence before the extension of this Act to the local area concerned shall apply to the water officer for a license for the said tube, and such license shall be granted free of charge. Section 5 Every person obtaining or attempting to obtain underground water shall supply the water officer with such information as the Governor may by rule prescribe.

3.4 International Agreements and Conventions

In addition to the domestic laws listed above, Myanmar is also a signatory to the following international conventions, and these may have relevance to the proposed survey activities. Refer to the following table.

Table 3.2 International Agreements and Conventions Relevant to the Proposed Project

International Agreements and Conventions	Status	Purposes
Vienna Convention for the Protection of the Ozone Layer, 1985	1998	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	1993	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.
Basel Convention, 1989	2015	The Convention regulates the transboundary movements of hazardous wastes and provides obligations to its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
United Nations Framework Convention on Climate Change (UNFCCC), New York, 1992 and Kyoto Protocol 1997	1995 and 2005	Provide a framework for intergovernmental efforts to tackle climate change. Recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.
Convention on Biological Diversity, Rio de Janeiro, 1992	1994	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.
Asia Least Cost Greenhouse Gas Abatement Strategy	1998	Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement

International Agreements and Conventions	Status	Purposes
(1998 ALGAS)		options and preparation of a portfolio of abatement projects for each country.
United Nations Agenda 21	1997	Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmers and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.
Relevant ILO Conventions in force in Myanmar C14 Weekly Rest (Industry) C17 Workmen's Compensation (Accidents) C19 Equality of Treatment (Accident Compensation) C26 Minimum Wage Fixing Machinery C29 Forced Labour Convention C42 Workmen's Compensation		Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers.
Workmen's Compensation (Accidents) Convention,	1956	Entered in force 16 February 1956 the Project has risks to occupational health and safety
Workmen's Compensation (Occupational Diseases) Convention 1925 and its Revision 1934	2016	Entered in force 30 Sept 1927; Revision entered in force 17 May 2016. The Project has risks to occupational health and safety.

3.5 International and National Guidelines and Standards

International policies, guidelines and standards relevant to environmental and social impacts of projects that are referred to by most countries are those issued by the National Environmental Quality (Emission) Guideline (NEQG), World Health Organization (WHO), the U.S Environmental Protection Agency (EPA), the World Bank, and the International Finance Corporation (IFC). The policies, guidelines and standards of the World Bank and IFC are cross-referenced and complementary as the IFC is an organization of the World Bank Group. They are also adopted by most development organizations such as the Asian Development Bank, and Japan Bank for International Cooperation. It should be noted that the guidelines and standards recommended by the World Bank and IFC, especially those related to environmental pollution, also provide due consideration to the guidelines and standards of U.S. EPA and WHO. Only those international policies, guidelines and standards relevant to this Project are discussed herein.

3.5.1 IFC's Standards and Guidelines

IFC's standards and guidelines relevant to this project are described in two documents:

- Performance Standards on Environmental and Social Sustainability, January 1, 2012.
- Environmental, Health and Safety-General Guidelines, April 30, 2007.

The first document describes eight performance standards on environmental and social sustainability, which IFC requires its clients to apply throughout the project life cycle. The second document provides general guidelines for environmental, health and safety (EHS) for development projects.

IFC EHS Guidelines

The EHS Guidelines by IFC are technical reference documents with general and industry – specific examples of Good International Industry practice (GIIP), as defined in IFC's Performance Standard Resources Efficiency and Pollution Prevention. The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC and that considered achievable in new facilities at reasonable costs by existing technology.

There are two kinds of guidelines, General EHS Guidelines and Industry Sector Guidelines. The General EHS Guidelines contain information on crosscutting environmental, health, and

safety issues potentially applicable to all industry sectors in the following section: (1) Environment, (2) Occupational Health and Safety, (3) Community Health and Safety and (4) Construction and Decommissioning. Table 3.3 shows the contents of the section of Community Health and Safety.

Table 3.3 Community Health and Safety Contents

Contents	Brief Description
Water Quality and Availability	Drinking water sources should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand. The overall target should be the availability of 100 liters per person per day.
Safety of Project Infrastructure	Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily. The following issues should be considered and incorporated. As appropriate into the planning, siting, and design phases. A project of (1) inclusion of buffer strips or other methods of physical separation around project sites to protect the public from major hazards associated with hazardous materials incidents or process failure. (2) incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, tsunamis, wind, flooding, landslides and fire, and (3) application of locally regulated or internationally recognized building codes, standards and regulations, and mitigation measures.
Traffic Safety	All project personnel should promote traffic safety during displacement to and from the workplace, and during operation of project equipment on private or public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents.
Transport of Hazardous Materials	Projects should have procedures in place that ensure compliance with local laws and international requirements applicable to the transport of hazardous materials.
Disease	Recommended interventions against the communicable diseases

Source: IFC, Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Community Health and Safety (April 30.2007)

3.5.2 National Environmental Quality (Emission) Guidelines (2015 Dec, 29)

Objective of the guidelines are to provide the basis for regulation and control of noise and vibration, air emissions and effluent discharges from various sources in order to prevent pollution for purpose of protection of human health and ecosystem. Guidelines application to the project.

The project environmental management plan during operation needs to comply with Myanmar National Environmental Quality (Emission) Guidelines (NEQG) and the others as appropriate. Guidelines for parameters relevant to the Project are shown in Table 2.4 toTable2.6, as follows:

Table 3.4 Noise Level NEQG

Receptor	One Hour LAeq (dBA)a	
	Daytime 07:00-22:00 (10:00-22:00 for Public holidays)	Night time 22:00-07:00 (22:00-10:00 for Public holidays)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

a Equivalent continuous sound level in decibels

Table 3.5 Effluent Levels (Mining Sector)

Parameter	Unit	Guideline Value a
5-day Biochemical oxygen demand	mg/l	50
Active ingredients / Antibiotics	To be determined on a case specific basis	
Chemical oxygen demand	mg/l	250
Oil and grease	mg/l	10
pH	S.U.a	6-9
Temperature increase	mg/l	<3b
Total coliform bacteria	mg/l	400
Total nitrogen	mg/l	10

Parameter	Unit	Guideline Value a
Total phosphorus	mg/l	2
Total suspended solids	mg/l	50

a Standard Unit

b At the edge of scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge

This guideline applies to underground and open-pit mining, alluvial mining, solution mining, and marine dredging. Extraction of raw materials for construction products are addressed in the guideline for Construction Materials and Extraction.

Table 3.6 Effluent Levels for Ore and mineral extraction

Parameter	Unit	Guideline Value
Arsenic	mg/l	0.1
Cadmium	mg/l	0.01
COD	mg/l	150
Chromium (Hexavalent)	mg/l	0.1
Copper	mg/l	0.3
Cyanide	mg/l	1
Iron	mg/l	2
Lead	mg/l	0.3
Mercury	mg/l	0.002
Nickel	mg/l	0.5
pH	S.Ua.	6-9
Temperature	˚C	<3-degree differential
TSS	mg/l	50
Zinc	mg/l	0.5

Table 3.7 NEQG of Air Emissions (General Guidelines)

Parameters	Averaging period	Guideline Value (µg/m3)
Nitrogen dioxide	1 year 1 hour	40 200
Ozone	8-hour daily Maximum	100
Particulate matter PM 10	1 year 24 hours	20 50
Particulate matter PM2.5	1 year 24 hours	10 25
Sulphur dioxide	24 hours, 10 minutes	20 500

Source: National Environmental Quality (Emission) Guidelines, 2015

Table 3.8 Soil Quality Guideline

No.	Parameter	Unit	Standard		
			Japan	Thailand	Vietnam
1	pH	-	-	-	-
2	Mercury	ppm	15	610	-
3	Arsenic	ppm	150	27	12
4	Lead	ppm	150	750	300
5	Cadmium	ppm	150	810	10
6	Copper	ppm	125	-	100
7	Zinc	ppm	150	-	300
8	Chromium	ppm	250	640	-
9	Fluoride	ppm	4000	-	-
10	Boron	ppm	4000	-	-
11	Selenium	ppm	150	10,000	-

Source:Japan: Ministry of Environment, Government of Japan (2002), "Regulation for Implementing the Law on Soil Contamination Countermeasures"

Thailand: Notification of National Environmental Board No.25, B.E. Thailand (2004), "other purpose" class"

Vietnam: QCVN 03:2008/BTNMT, Applied "industrial land', Vietnam

Table 3.9 IFC Guideline for lighting

Location	Light Intensity
Emergency light	10lux
Outdoor non-working areas	20lux
Simple orientation and temporary visits (machine storage, garage, warehouse)	50lux
Workspace with occasional visual tasks only (corridors, stairways, lobby, elevator, auditorium, etc.)	100lux
Medium precision work (simply assembly, rough machine works, welding, packing, etc)	200lux
Precision work (reading, moderately difficult assembly. sorting, checking, medium bench and machine works, etc.), offices.	500lux
High precision work (difficult assembly, sewing, color inspection, fine sorting etc.)	1000-3000lux

Source: IFC, World Bank

Table 3.10 Guideline for Working Temperature

Work/rest periods	Light Work	Moderate Work	Heavy Work
Continuous work	30.0˚C	26.7 ˚C	25.0 ˚C
70%work:25%rest	30.6˚C	28.0 ˚C	25.9 ˚C
50%work:50%rest	31.4˚C	29.4 ˚C	27.9 ˚C
25%work:75%rest	32.2˚C	31.1 ˚C	30.0 ˚C

Source: Guideline from American Conference of Governmental Industrial Hygienists (ACGIH)

4. PROJECT DESCRIPTIONS

4.1 Project Objectives and Activities

The Lead Washing Plant is designed as a temporary solution for processing lead ore during the shutdown of the 150-ton Metal Refinery Plant, ensuring uninterrupted operations without the use of chemicals. It efficiently recovers high-purity lead ore with a minimum metal content of 15%, using a mechanical washing process to maximize output. The project emphasizes environmental sustainability by incorporating a water recycling system, significantly reducing freshwater consumption and minimizing environmental impact. Furthermore, the plant operates in full compliance with local regulations and environmental guidelines set by the Ministry of Natural Resources and Environmental Conservation. By maintaining operational continuity through an economically efficient process, the plant meets lead production demands while aligning with both environmental and economic goals.

The project is located near Bawhseng Village Tract in Kalaw Township, southern Shan State, Myanmar. In the lead washing process, water is used to treat the mud and lead mixture through pressure pumps, without the need for chemical additives. The mud and lead mixture are placed in small washing tanks, where water is injected under pressure to separate the lead from the mud and sand. Once washed, only lead remains in the small washing tanks, while the mud and sand are washed away, flowing into the First Tailing Pond. After passing through the First, Second, and Third Tailing Ponds, the water reaches the Fourth Tailing Pond. Water from the Fourth Tailing Pond is then pumped into a 30,000-gallon storage pond for recycling. When additional water is required for the washing process, it is pumped from the Rainwater Storage Pond and reused in the 30,000-gallon water storage pond. The clean lead obtained after washing is bagged and sent to the warehouse for storage.

4.2 Project Location

The proposed Lead Washing Plant is located near Bawhseng Village Tract in Kalaw Township, southern Shan State, Myanmar. The project site is situated 3.9 kilometers from Bawhseng Village and approximately 0.35 kilometers northwest of the 150-ton Metal Refinery Plant. Kalaw is situated 4297 ft above sea level. The area is located on Map Index: 93 D/9 in One Inch Map of Myanmar. The permitted area of lead washing plant is 3.28 acres and it is situated in Map No. No. 93 D/9. The Lead Washing Plant is expected to produce 12 tons of lead per

day to support the operations of the 150-ton Metal Refinery Plant. This activity has been permitted for a duration of one year, in accordance with the approval granted by the Ministry of Industry. The detailed information about the lead washing plant is described as the following Table.

Table 4.1 Coordinate Point of Project Area

Points	Latitude	Longitude
A	20°55'55.05"N	96°44'28.51"E
B	20°55'55.70"N	96°44'31.09"E
C	20°55'53.71"N	96°44'32.15"E
D	20°55'50.29"N	96°44'32.53"E
E	20°55'49.76"N	96°44'30.86"E
F	20°55'52.68"N	96°44'29.27"E

Figure 4.1 Boundary of the Project

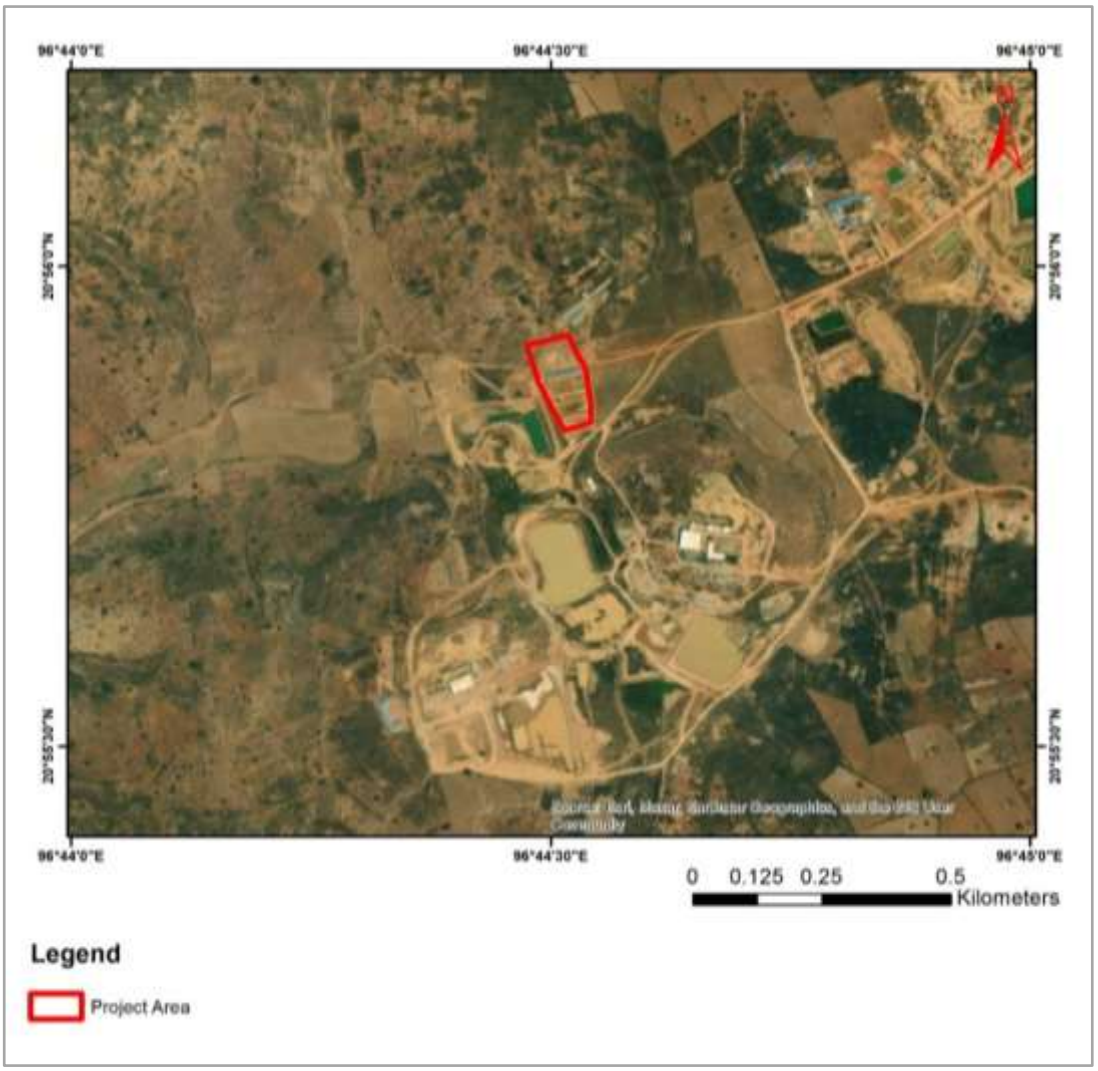


Figure 4.2 Location Map of the Project Area

4.3 Project Size

The total land area of the project is 3.28 acres (0.0132 km^2). Within this area, the project includes the construction of small washing tanks, tailing ponds, 30,000-gallon water storage pond, rainwater storage pond, and warehouse. These facilities are strategically designed and constructed to support the operational and environmental requirements of the Lead Washing Plant. The primary finished product of the plant is 35% refined lead ore, supporting the production needs of the Metal Refinery Plant. The project represents a total investment value of 128.00 million MMK. It has been authorized under a permit issued by the Ministry of Industry (MOIN). Additionally, the worksite has been authorized under a permit issued by the Ministry of Natural Resources and Environmental Conservation, Myanmar, through the Department of Mining.

4.4 Project Period

Top Ten Star Production Company Limited received a permit on November 30, 2023, to conduct lead cleaning operations utilizing manpower in the Bawhseng Area, Kalaw Township. The primary finished product is 35% refined lead ore, with a total investment value of 128.00 million. This permit was issued by the Ministry of Industry (MOIN) as detailed in Appendix 2.

Project Area	Working Permit	Issue Date	Expire Date
3.28 acres in the Bawhseng Area, Kalaw Township	1	30.11.2023	30.11.2024

4.5 Project Components and facilities

The Lead Washing Plant is constructed on a 0.0132 km^2 site and features 20 small washing tanks designed to optimize the lead cleaning process. The facility also includes an L-shaped warehouse built with durable brick walls and a tin roof, providing secure storage and operational efficiency. This infrastructure supports the plant's primary activities. Table 4.2 provides a detailed list of the buildings in the lead washing plant.

Table 4.2 List of Buildings in Lead Washing Plant

No.	Type of Building/Facility	Dimension	Number
1	Small Washing Tank	12'x10'x2.5'	20
2	Warehouse	(32'x30'x14'), (96'x32'x14'), (58'x32'x14')	1

4.6 Site Layout Map

The site layout map of the Lead Washing Plant provides a detailed representation of the key facilities and infrastructure within the project area. It highlights the Rainwater Storage Pond, strategically located to the southwest, designed for rainwater collection and storage. The map also features the Washing Tank Zone, which includes 20 small tanks essential for lead cleaning operations. Water from the tailing pond is pumped into the 30,000-gallon water storage pond

for recycling. When water is needed for the washing process, it is drawn from the Rainwater Storage Pond, pumped, and reused in the 30,000-gallon water storage pond. Additionally, the map shows an L-shaped warehouse, constructed with brick walls and a tin roof, used for secure storage. The locations of the washing tanks, tailing ponds, 30,000-gallon water storage pond, rainwater storage pond, and warehouse are shown in Figure 4.3.

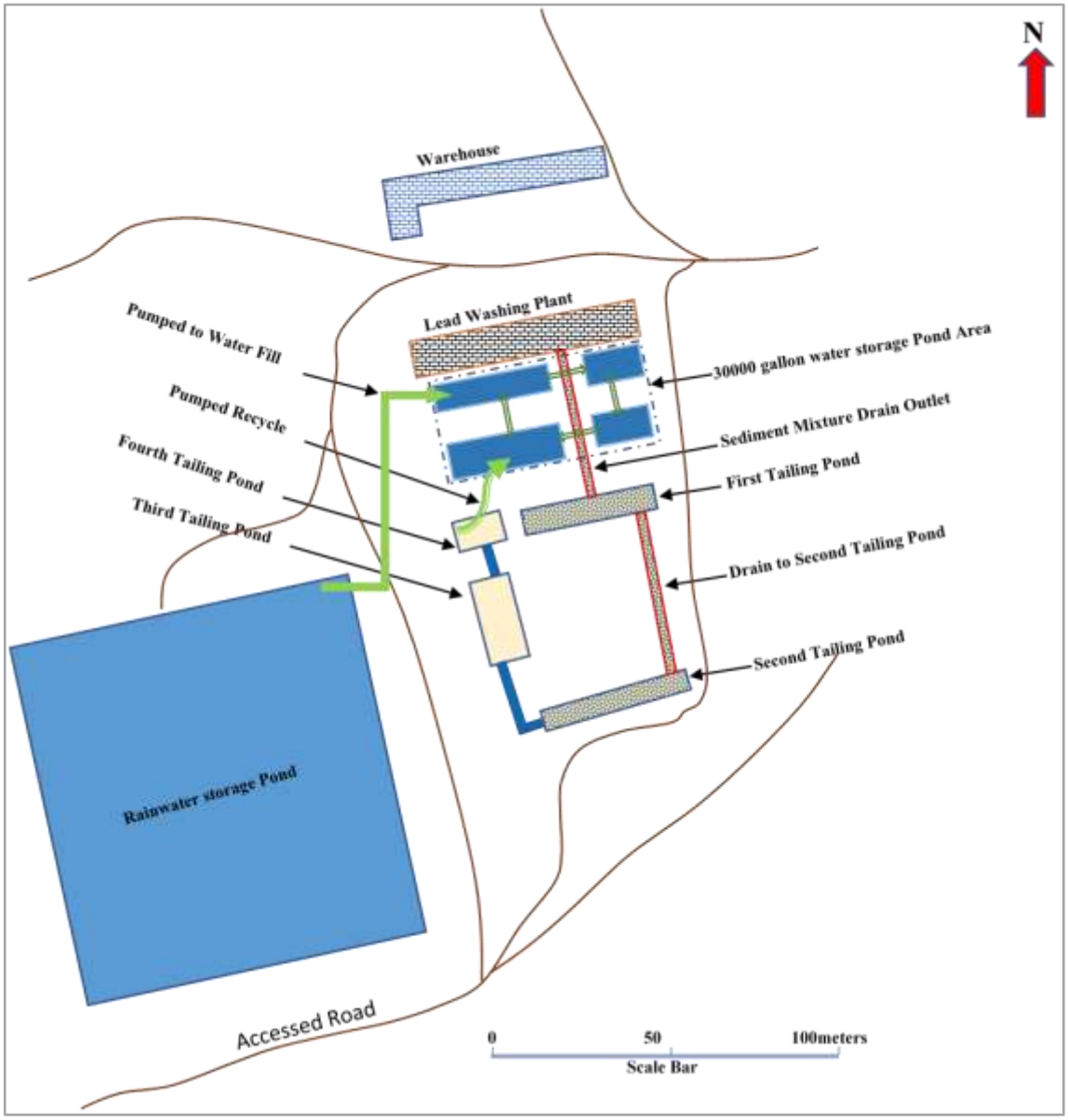


Figure 4.3 Layout Map of the Lead Washing Plant

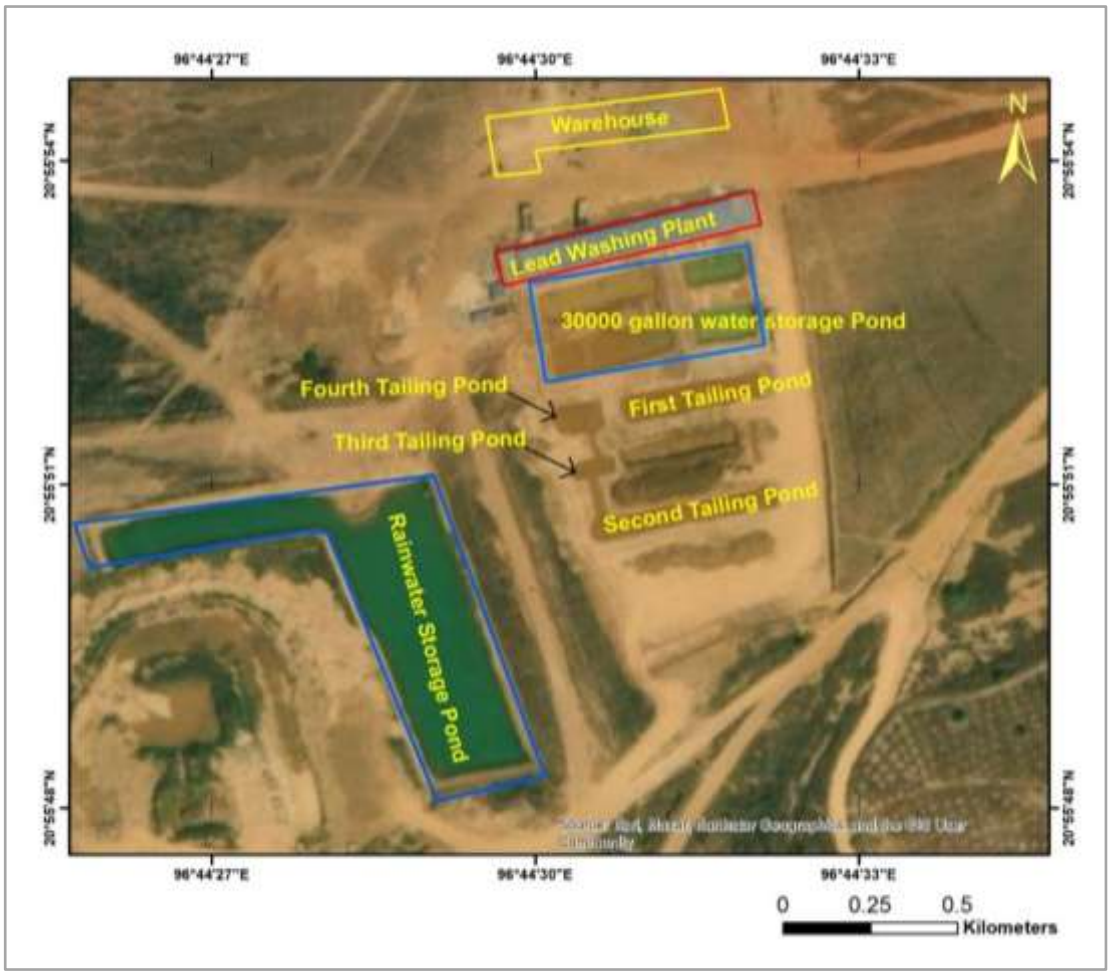


Figure 4.4 The Detailed Layout Plan of the Project

4.7 Groundwater Level

The Bawhseng region primarily relies on rainwater for its water supply. Local residents collect rainwater throughout the year from an excavation-based rainwater storage pond. The groundwater level in the area is typically found at depths of over 300 feet below the surface, indicating that shallow groundwater is not easily accessible. Due to this, the community depends on the rainwater storage pond for its water needs, particularly during the dry season.

4.8 Raw Material for the Project

The primary raw material for the Lead Washing Plant is lead ore, which will be sourced from an officially designated lead mining worksite in the Bawhseng region, Kalaw Township, Southern Shan State. The ore is extracted through mining operations in the area, after which it is initially processed to remove excess impurities. Once processed, the ore is transported to the Lead Washing Plant for further refinement.

At the plant, the lead ore undergoes a mechanical washing process using water, without the use of chemical agents, to separate the lead from mud, sand, and other impurities. The raw material for the washing process will consistently be sourced from the designated worksite to ensure a steady supply of suitable ore for efficient processing and production.

4.9 Lead Washing Process

If the Metal Refinery Plant (150 ton) cannot operate due to various reasons, the Lead Washing Plant have been built to wash the mud using sluicing method using manpower. In the operation, the water required for lead cleaning is first pumped from the rainwater storage pond into (30,000) gallon water storage pond. The mud and lead mixture are poured into small washing tanks, water is injected with a pressure pump, the mud, sand and lead particles are diluted with water, and the remaining solid Lead are obtained. The clean solid lead obtained after washing is put in bags and sent to the warehouse for storage.

The mud, sand and lead particles (sediment mixture) were washed away by the water and reached the First Tailing Pond. After flowing through the First, Second and Third Tailing Pond, the water arriving in the Fourth Tailing Pond and water is pumped into the 30000-gallon water storage pond and recycle. The sediment mixture from First and Second Tailing Pond are excavated with a backhoe. The excavated sediment mixture is loaded onto the dump trucks and transported to Metal Refinery Plant (150 ton) where the remaining lead is further refined. When the washing process is need for water, the water from the Rainwater storage Pond is pumped and used again into 30000-gallon water storage Pond.

4.9.1 Lead Washing Activities and Storage During the Operation Phase

The proposed project is located near Bawhseng Village Tract in Kalaw Township, Southern Shan State, Myanmar. The lead washing activities and operational processes during the project's operation phase include the following:

- Sluicing Method
- Mud, Sand, Lead Particles and Lead Ratio
- Water Storage and Drain System
- Mud, Sand and Lead Particles (Sediment Mixture)
- Solid Waste Sediments Management
- Storage.

Sluicing Method

The sluicing method is a process of ore dressing that utilizes water flowing along an inclined plane to separate particles based on their density. A simple sluice tank consists of a rectangular trough through which the slurry flows. As the slurry moves, the ore particles are loosened by the water current and stratified according to their density. The lighter minerals, such as mud, sand, and lead particles, are carried away quickly by the flow and drained out of the tank. Meanwhile, the heavier minerals, such as lead, settle at the bottom of the trough. These heavy deposits are either periodically discharged or move slowly along the bottom of the trough and are discharged from the lower part of the system. This method ensures efficient separation of lead from lighter impurities.

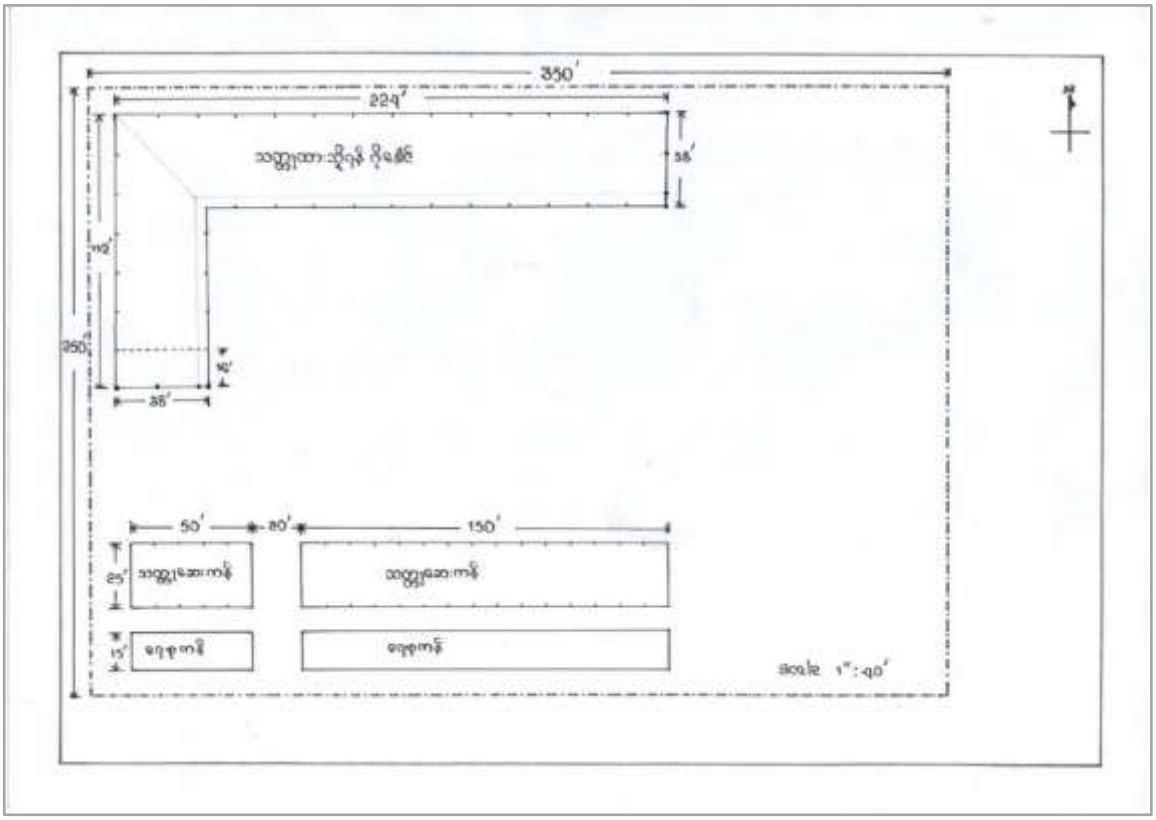


Figure 4.5 Washing Plant Design

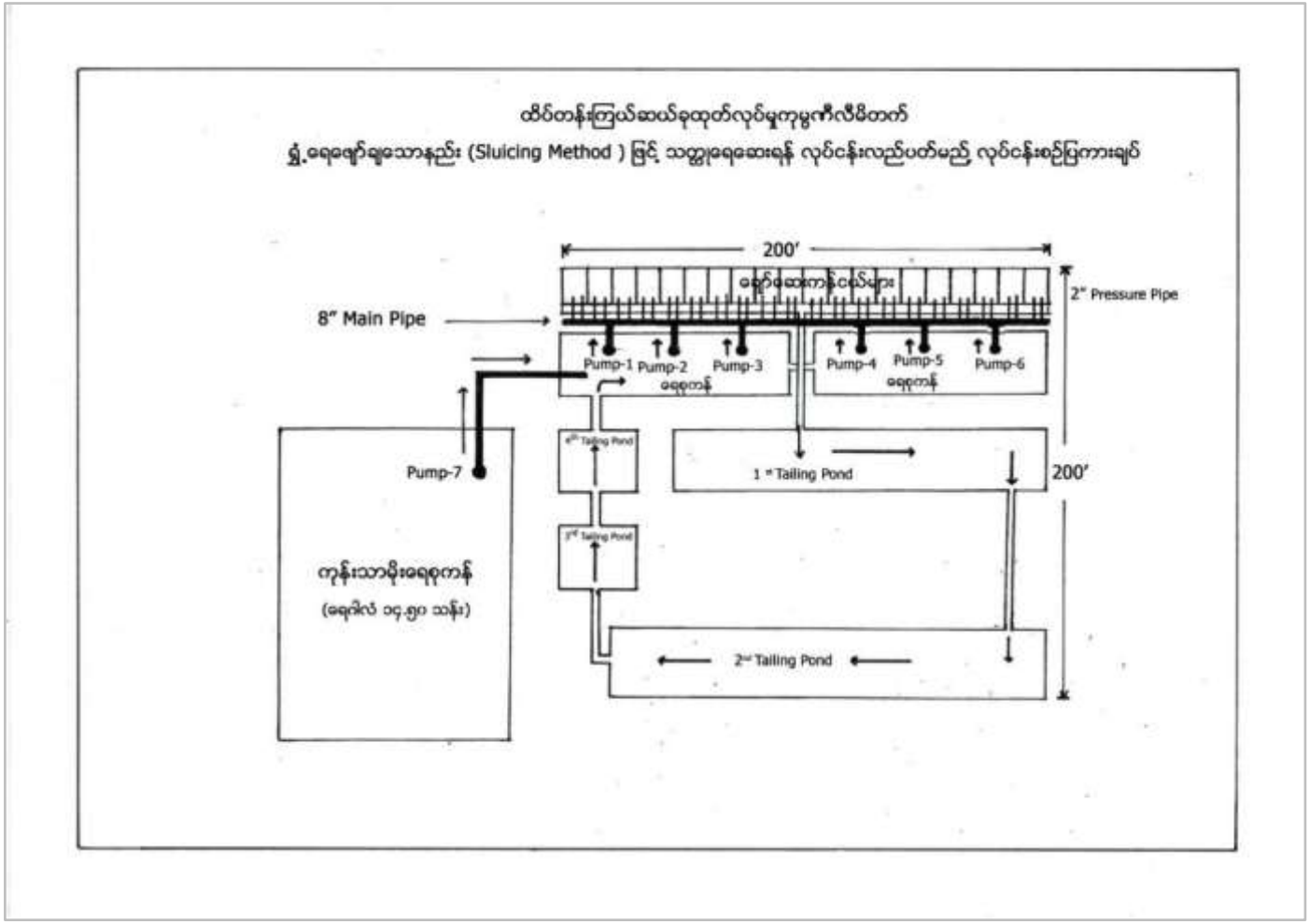


Figure 4.6 Lead Washing Plant Operation by Sluicing Method

Mud, Sand, Lead Particles and Solid Lead Ratio

The Lead Washing Plant is equipped with (20) small washing tanks. Each tank can process ore ranging from a minimum of (1) ton to a maximum of (1.5) tons per cycle. Using the sluicing method, only ore with a minimum metal content of (15%) or higher is selected for washing. If (1.5) tons of ore are washed in a single tank, an average of (0.90) tons of material consisting of mud, sand, and lead particles will be produced, while approximately (0.60) tons of pure solid lead will be recovered. This process ensures the efficient separation and recovery of lead from the ore.

Water Storage and Drain System

In the lead washing process, water is used with a pressure pump to separate lead from the mud, sand, and lead mixture, without the use of any chemical materials. The required water is first pumped from the Rainwater Storage Pond into 30,000-gallon Water Storage Pond. The mud, sand, and lead mixture are placed into small washing tanks, where it is washed with water using pressure pumps. This process leaves only lead in the washing tanks, while the mud, sand, and lead particles (sediment mixture) are washed away with the water.

The sediment mixture is carried to the First Tailing Pond, then sequentially flows through the Second, Third, and Fourth Tailing Ponds. The water from the Fourth Tailing Pond is pumped back into the 30,000-gallon Water Storage Pond for recycling. When additional water is needed during the washing process, it is pumped from the Rainwater Storage Pond into the 30,000-gallon Water Storage Pond to ensure continuous operation. This recycling system minimizes water wastage and supports sustainable water use.

(a) Small Washing Tanks

(b) Tailing Pond

(c) 30,000-gallon Water Storage Pond

(d) Rainwater Storage Pond

Figure 4.7 illustrates key components of the Lead Washing Plant, including the small washing tanks, tailing pond system, and water storage facilities essential for the washing and recycling process

Mud, Sand and Lead Particles (Sediment Mixture)

The sediment mixture from the First and Second Tailing Ponds is excavated using a backhoe. The excavated material is then loaded onto dump trucks and transported to the Metal Refinery Plant (150-ton capacity), where the remaining lead is further refined and recovered.

Solid Waste Sediments management

After the final refining processes, the remaining solid waste sediments are properly disposed of in a sedimentation pond located within the Metal Refinery Plant (150-ton capacity) area. The sedimentation pond measures 200 feet in length, 120 feet in width, and 24 feet in depth. During the rainy season, a soil retaining wall with a height of 6 feet and thickness of 3 feet is constructed around the pond to prevent flooding and mitigate pollution.

Once the sedimentation pond reaches its full capacity, it is filled with soil, leveled, and covered with natural compost to improve the land. The prepared area is then used for cultivation, where local plant species are planted to promote greenery and restore the ecosystem. This approach ensures sustainable land management and supports environmental rehabilitation.

Storage

The clean lead obtained after the washing process is carefully collected and packed into bags to ensure its quality is preserved. The lead-filled bags are then transported to the warehouse using vehicles and stored in a designated, secure area. The warehouse is designed to accommodate large volumes of lead, with clearly organized sections to facilitate easy inventory management and safe handling.


Figure 4.8 Warehouse in Lead Washing Plant

4.10 List of Machine and Equipment

Table 4.3 List of Machine and Equipment used in Lead Washing Plant

No.	Equipment Name	Quantity	Purpose/Function
1	Backhoe	1	For excavating sediment mixture
2	Dump Trucks (3-ton)	1	For transporting clean solid lead from washing plant to warehouse

4.11 Workforce

The successful operation of the Lead Washing Plant relies on a skilled and dedicated workforce. Each position within the plant is essential to ensure the effective and safe processing of lead ore. The workforce is composed of specialized roles, each responsible for different aspects of the plant's operation, from management to technical support and day-to-day plant maintenance. The table below outlines the key positions and the number of employees assigned to each role.

Table 4.4 Employee list of the Lead Washing Plant

No.	Position	Employee
1	Washing Plant Manager	1
2	Mechanic	1
3	Electrician	1
4	Lead Washer	5
5	Storekeeper	1
6	Operator and Driver	2

4.12 Working hours per day

The Lead Washing Plant will operate for a total of 8 hours per day, divided into two shifts. The first shift will run from 8:00 AM to 12:00 PM, and the second shift will run from 1:00 PM to 5:00 PM. This schedule allows for effective management of operational activities, including the washing and storage of lead, while providing necessary maintenance and operational flexibility throughout the day. The following table outlines the specific working hours for each operation activity.

Table 4.5 Working Time in Lead Washing Plant

Operation Activities	Working Shift
Lead Washing and Storage	8:00 - 12:00 (4 Hour) 13:00 - 17:00 (4 Hour)

4.13 Production Rate

If 1.5 tons of sediment mixture (mud, sand, and lead) is processed in one tank, 0.6 tons of refined lead is recovered, while 0.9 tons of residue (mud and sand) flows into the Tailing Pond. With 20 tanks in operation and fully utilized in a day, the plant can produce 12 tons of refined lead per day, resulting in an estimated annual production capacity of 2,800 tons. The Lead Washing Plant serves as a supply source to provide refined lead ore to support the 150-ton Metal Refinery Plant during periods of shutdown caused by various operational or technical reasons.

Table 4.6 Production Rate of the Lead Washing Plant

Parameter	Details
Sediment mixture per tank	1.5 tons
Refined lead recovered per tank	0.6 tons
Residue (mud and sand) per tank	0.9 tons
Number of washing tanks	20
Daily refined lead production	12 tons
Annual refined lead production	2,800 tons

4.14 Water Consumption

Water is a critical resource for the Lead Washing Plant, as it is essential for the washing and cleaning of lead ore. The plant relies on water from the Rainwater Storage Pond, which is pumped into a 30,000-gallon water storage pond to facilitate the washing process. During operations, water is pumped from the storage pond to the small washing tanks using submersible pumps. Each washing tank requires a specific volume of water for the sluicing process, where water is injected under pressure to separate the lead from the mud, sand, and other particles.

The water used in the washing process is continuously recycled. After the washing process, the water flows through the Tailing Ponds, where the mud, sand, and other particles are separated. The water is then pumped from the last Tailing Pond back into the 30,000-gallon water storage pond, ensuring minimal water loss and enabling the plant to reuse water for future washing cycles. This system helps optimize water consumption while reducing the need for additional water sources.

Table 4.7 Specification of Rainwater Storage Pond

Rainwater Storage Pond					
Latitude	**Longitude**	**Length (ft)**	**Width (ft)**	**Depth (ft)**	**Gallon**
20°55'49.69"N	96°44'27.42"E	300	317	20	12 million gallons of water

4.15 Power Requirement

For the Lead Washing Plant, the power requirements are designed to ensure efficient operation of the water pumping and washing processes. To facilitate the pumping of water into the washing tanks, it is planned to use four submersible pumps, each with a power rating of 7.5 kW, connected to an 8-inch diameter water pipe. The water will be transferred through a 2-inch diameter pipe from the main pipeline to each small washing tank. The plant will consume approximately 240 units of electricity per day, based on 8 hours of operation, to power the washing process for the 20 small washing tanks. This electricity will be sourced from the government's grid, providing a stable supply to support continuous operation. This energy consumption is essential for ensuring the efficiency of the washing plant during its daily operations.

4.16 Estimated amount Emission, Water, Solid waste

Emission Estimates

The operation of the Lead Washing Plant generates potential sources of emissions, including dust and particulate matter released during the washing process and from the transportation of raw materials via diesel-powered dump trucks. These emissions can negatively affect air quality and pose health risks to workers and nearby communities. To minimize these risks, it is crucial to implement effective dust control measures, regularly maintain vehicles, and adopt environmentally-friendly practices.

Water Consumption and Discharge

Water consumption at the Lead Washing Plant is primarily driven by the sluicing process, where water is used to wash the mud, sand, and lead mixture. The total water volume used in

the washing process depends on the scale of the operation and the number of washing tanks in use. As the plant recycles water through the Tailing Ponds, minimal water loss is expected. The water used in the washing process is collected, treated, and pumped back into the 30,000-gallon storage pond for reuse. The discharged water, which contains a mixture of mud, sand, and other particles, is directed to the Tailing Ponds for sedimentation. Provided proper sedimentation and filtration measures are followed, no significant water pollution is expected.

Solid Waste Generation

The primary solid waste generated by the Lead Washing Plant consists of the sediment mixture (mud, sand, and lead particles) from the washing process. This mixture is collected in the Tailing Ponds and later excavated from the first and second ponds using a backhoe. The excavated waste is transported to the Metal Refinery Plant for further refinement of any remaining lead. Sediments that are not further processed will be disposed of in designated areas in compliance with environmental regulations.

After final processing, solid waste sediments are disposed of in a sedimentation pond located near the Metal Refinery Plant. To prevent flooding and minimize environmental impact, soil retaining walls are constructed around the pond, particularly during the rainy season. When the sedimentation pond reaches full capacity, the sediments are covered with natural compost for land reclamation, promoting local vegetation growth and improving the surrounding ecosystem.

4.17 Lead Washing Plant Closure Plan

To ensure that the closure of the Lead Washing Plant does not cause any environmental impact, comprehensive monitoring will be conducted during the operation phase and through the closure period. During the closure, systematic measures will be taken to ensure that both buildings and movable equipment do not cause environmental harm. Recyclable materials will be repurposed for activities such as replanting local native plants to restore the environment, and broken concrete fragments will be used for road repairs.

The closure plan includes conducting laboratory tests on water and soil from the Tailing Ponds to check for any remaining lead residues. Air quality measurements will also be carried out at the project site. Soil, water, and air quality will be monitored for an additional six months following the closure of the project to ensure the site is fully rehabilitated.

The restoration plan will involve filling the Tailing Ponds and Water Storage Pond with soil, covering them with topsoil, and enriching the soil using natural compost. After completing the land reclamation, local native plants will be planted and carefully monitored for growth. Planting native tree species will help sustain the local wildlife and maintain biodiversity in the region.

All of these activities will be carried out in collaboration with the employees of the company and local residents, who will continue to benefit from the initiative by earning income through land restoration efforts. The water needed for replanting will continue to be sourced from the Rainwater Storage Pond, which was used during the operation of the Lead Washing Plant.

The closure process will be officially communicated, consulted, and coordinated with relevant ministries, local administrative officials, and local residents to ensure smooth and effective implementation.

5. DESCRIPTION OF THE NATURAL AND SOCIAL ENVIRONMENT

5.1 Introduction

This Environmental Management Plan report provides an assessment of the potential environmental impacts on the surrounding environment and the area around the project. It also includes recommended control measures to be adopted or implemented to minimize these adverse effects. In addition, the report outlines monitoring practices to ensure ongoing compliance with environmental standards and to track the effectiveness of the mitigation measures over time.

To conduct this assessment study, it is first necessary to delineate and define the existing environmental factors in and around the project site. This includes examining the current environmental conditions related to ecology, flora and fauna, socio-economic profiles, and environmental quality in terms of water, soil, air, and noise. This section provides a description of the existing environmental settings within the proposed project area, primarily based on secondary data.

Secondary data were used to describe the existing environment, including the township profile provided by the Township General Administration Department, research papers and reports from universities, and the 2014 Population and Housing Census Report.

5.2 Existing Physical Environment

5.2.1 Climate and Meteorology

Kalaw Township, located in Taunggyi District in the southern part of Shan State, Myanmar, experiences a tropical monsoon climate characterized by distinct wet and dry seasons due to the influence of the southwest monsoon. At an elevation of approximately 1,310 meters (4297 feet) above sea level, Kalaw enjoys relatively moderate temperatures throughout the year compared to lower-lying regions.

Annual temperatures in Kalaw are typically moderate, ranging from 15°C to 25°C. During the summer months from March to May, temperatures can range from 20°C to 30°C. While this period is warmer, the altitude helps maintain generally mild conditions. In the monsoon season, which spans from June to October, average temperatures drop slightly to between 18°C and

25°C. The winter months, from November to February, can see temperatures fall to 10°C or lower, with daytime averages around 15°C to 20°C.

The southwest monsoon, occurring from June to October, brings the most rain to Kalaw, with August typically being the wettest month. Annual rainfall can vary significantly, ranging between 1,500- and 2,500-mm. High humidity levels are prevalent during the rainy season, often exceeding 80% at the peak of the monsoon. In contrast, the winter season offers lower humidity levels, resulting in a drier and more comfortable climate.

Wind patterns in Kalaw are heavily influenced by the southwest monsoon, which transports moisture-laden winds from the Bay of Bengal, leading to heavy rainfall during the monsoon period. In the winter, northeast winds prevail, bringing cooler, drier air from the continental interior. This shift in wind patterns contributes to the clear skies and lower temperatures typical of the winter season.

From March to May, Kalaw experiences a buildup of humidity, often accompanied by occasional thunderstorms, which signal the impending arrival of the monsoon season. The monsoon itself is marked by intense rainfall and thunderstorms, posing potential risks of landslides and flooding in the surrounding hilly areas. Conversely, the cooler months from November to February present the clearest weather, with minimal rainfall and a comfortable climate.

In summary, the climate and meteorology of Kalaw Township are shaped by monsoon-driven rainfall patterns, altitude-influenced temperatures, and seasonal weather variability. These conditions create a unique ecological and socioeconomic environment that supports both agriculture and tourism while also presenting occasional challenges, particularly during extreme weather events associated with the monsoon season. According to the data of Government Administration Department (2023), the annual rainfall and temperature are shown below in Table 5.1.

Table 5.1 Annual Rainfall and Temperature

No.	Year	Rainfall		Temperature	
		Day	Total Rainfall (inch)	Summer (°C)	Winter (°C)
				Maximum	Minimum
1	2018	76	27.81	33.8	4.0
2	2019	78	32.44	34.9	3.8
3	2020	63	35.00	35.8	-
4	2021	79	68.71	34.4	1.00
5	2022 to 2023 (March)	92	39.72	31.8	7.6

5.2.2 Topography

Kalaw Township is located on the Shan Plateau, an elevated region that stretches across eastern Myanmar. The township itself is at an elevation of approximately 1,310 meters (4297 feet) above sea level, making it one of the higher-altitude areas in the country. The elevation influences not only the climate but also the types of vegetation and agriculture practiced in the region. The landscape of Kalaw is predominantly hilly, with a series of undulating hills that provide a scenic backdrop for the township. These hills are often covered with lush forests, agricultural fields, and tea plantations. The hilly terrain affects local weather patterns, contributing to cooler temperatures compared to surrounding lowland areas.

To the north and east of Kalaw, several mountain ranges are prominent, including the eastern foothills of the Himalayas. These ranges feature steep slopes and rugged terrain, contributing to the dramatic scenery. Notable peaks in the area include Mount Inle and other highlands, which are often shrouded in mist and cloud cover. Interspersed among the hills are fertile valleys that support agricultural activities. The valleys are typically utilized for rice cultivation, vegetable farming, and the growing of other crops that thrive in the cooler climate. These low-lying areas are crucial for the local economy, providing sustenance for the communities in the township.

Several rivers and streams flow through Kalaw Township, including the Kalaw River and its tributaries. These water bodies not only provide essential resources for irrigation but also contribute to the region's biodiversity. The topography of Kalaw is complemented by a variety of soil types, influenced by the underlying geology and vegetation. Fertile soils in the valleys support agricultural productivity, while the hilly areas often have a mix of clay, loam, and sandy soils that vary in depth and fertility.

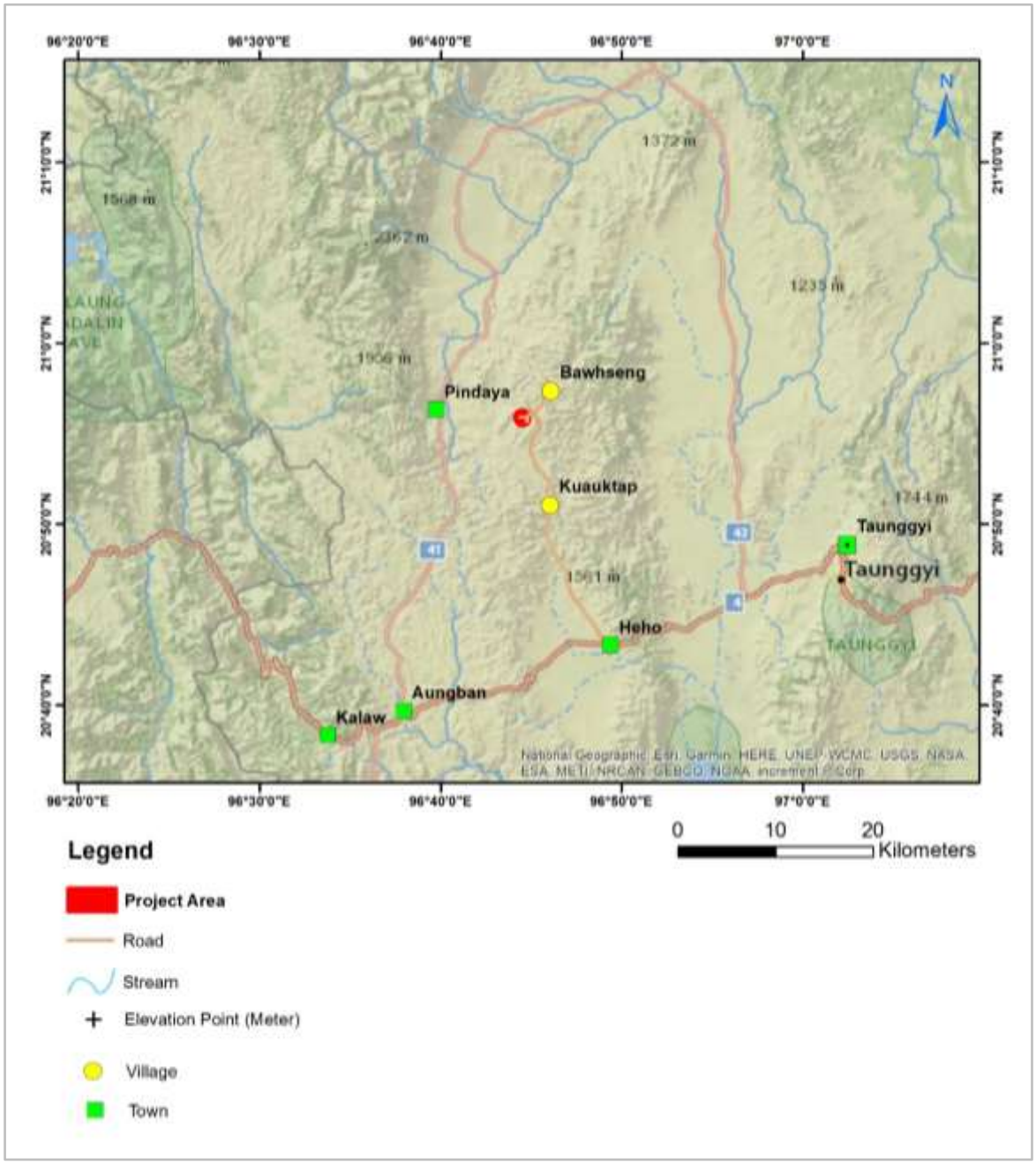


Figure 5.1 Topography Map of Project Area

5.2.3 Geology

Kalaw Township is situated on the Shan Plateau, a prominent geological feature of eastern Myanmar. The plateau is primarily composed of sedimentary rocks, which were deposited over millions of years. The area's geological formation includes various rock types, including sandstone, shale, and limestone, which provide insights into the region's geological history and tectonic processes.

The predominant rock types in Kalaw Township are sedimentary in nature. This rock is common in the region and often forms the basis of the hilly landscape. It is typically well-cemented and varies in color from light brown to reddish hues. Sandstone in Kalaw can be found in layered formations. Found alongside sandstone, shale is a fine-grained sedimentary rock that results from the compaction of mud and clay. It is prevalent in the valleys and lower elevations, contributing to the fertile soils that support agriculture. While less common than sandstone and shale, limestone deposits are also present in Kalaw. These carbonate rocks have formed through the accumulation of marine organisms in ancient seas.

The geological history of Kalaw Township has been significantly influenced by tectonic activity. The region is situated near the boundary of the Indian and Eurasian tectonic plates, which has resulted in complex geological formations and fault systems. This tectonic activity has contributed to the uplift of the Shan Plateau, creating the hilly terrain that characterizes Kalaw.

Geological Overview of the Project Area

The project area is surrounding at the Wunbye Formation of the Pindaya Group. Wunbye Formation has largest distribution and thickness among the formation of the Pindaya Group. Bawsaing Range is predominantly built up with the rocks of the Wunbye Formation. Wunbye Formation locality consists of a succession of thick-bedded limestone, siltstones and dolomites. The limestones are finely crystalline, grey to bluish grey coloured and silstone are thin, medium hard, and light greenish siliceous marlstone occur within the siltstones.

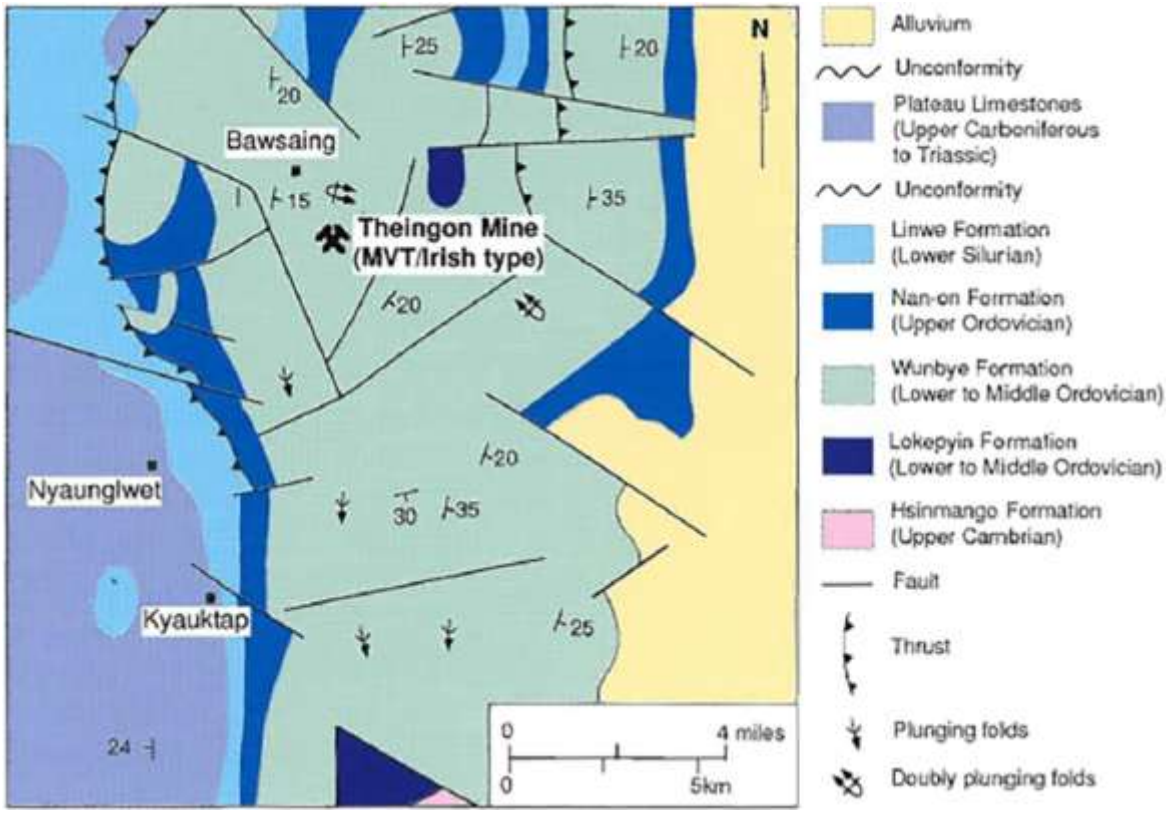


Figure 5.2 Geological Map of the Bawhseng-Heho Area (after Myint Lwin Thein 1979; Khin Zaw et al. 1984)

5.2.4 Natural Hazards

One of the most significant natural hazards in Kalaw Township is landslides. The hilly terrain, combined with steep slopes and heavy rainfall during the monsoon season (June to October), increases the risk of landslides. Intense and prolonged rainfall can saturate the soil, reducing its stability and leading to landslides. Agricultural expansion and logging activities can destabilize slopes, making them more susceptible to landslides. The presence of loose sedimentary rocks, such as shale and sandstone, can exacerbate the risk of landslides in the region.

Flooding is another natural hazard that affects Kalaw Township, particularly during the monsoon season. The combination of heavy rains and the area's topography can lead to flash floods and river flooding. Intense rainfall can quickly overwhelm local streams and rivers, causing flash floods in low-lying areas and valleys. Overflow from rivers, such as the Lanya River, can inundate nearby fields and settlements, damaging crops and infrastructure.

Kalaw Township is situated near the boundary of the Indian and Eurasian tectonic plates, making it prone to seismic activity. Although major earthquakes are relatively infrequent, smaller tremors can occur, posing risks. Earthquakes can lead to the collapse of poorly constructed buildings and infrastructure, particularly in rural areas. Earthquakes can also trigger landslides, especially in the hilly regions of Kalaw.

In summary, Kalaw Township faces various natural hazards, including landslides, flooding, earthquakes, and storms. Understanding these hazards and their contributing factors is crucial for developing effective disaster risk reduction strategies and enhancing community resilience. Local authorities, communities, and stakeholders must collaborate to implement measures that mitigate the impacts of these natural hazards, ensuring the safety and sustainability of the region's inhabitants and their livelihoods. Ongoing monitoring, education, and preparedness initiatives will be vital in addressing the challenges posed by natural hazards in Kalaw Township. According to the data of Government Administration Department (2023), the disasters of fire, cyclone, and landslide are occurred as below Table 5.2 list of natural disasters in Kalaw Township.

Table 5.2 List of Natural Disasters in Kalaw Township

No	Type of Disaster	Frequency	Loss of building
1	Fire	7	9
2	Cyclone	2	3
3	Landslide	1	-

5.2.5 Hydrology

Kalaw Township is characterized by a network of rivers, streams, and lakes that are integral to its hydrological landscape. The most significant water body in the region is the Kalaw River, which flows through the township and serves as a critical source of water for domestic, agricultural, and ecological needs. Other smaller rivers and streams also contribute to the hydrological system, particularly during the monsoon season.

The hydrology of Kalaw is heavily influenced by the region's tropical monsoon climate. The monsoon season, occurring from June to October, brings substantial rainfall, which is essential

for replenishing surface water resources. Annual rainfall in Kalaw can range from 1,500 to 2,500 mm, with the majority falling during the monsoon months. This seasonal influx of rain leads to increased surface water flow in rivers and streams. During heavy rainfall events, surface runoff increases, contributing to river flow and the risk of flooding. This runoff is critical for replenishing aquifers and maintaining the water balance in the region.

Groundwater is a vital resource in Kalaw Township, providing an essential supply for agriculture and domestic use. The hydrology of groundwater in the area is influenced by several factors. The region's sedimentary geology, comprising sandstone and shale, contributes to the formation of aquifers that store groundwater. These aquifers are often tapped for wells and other extraction methods. Groundwater recharge primarily occurs during the monsoon season when rainfall infiltrates the soil and replenishes aquifers. Proper management practices are essential to ensure sustainable groundwater use.

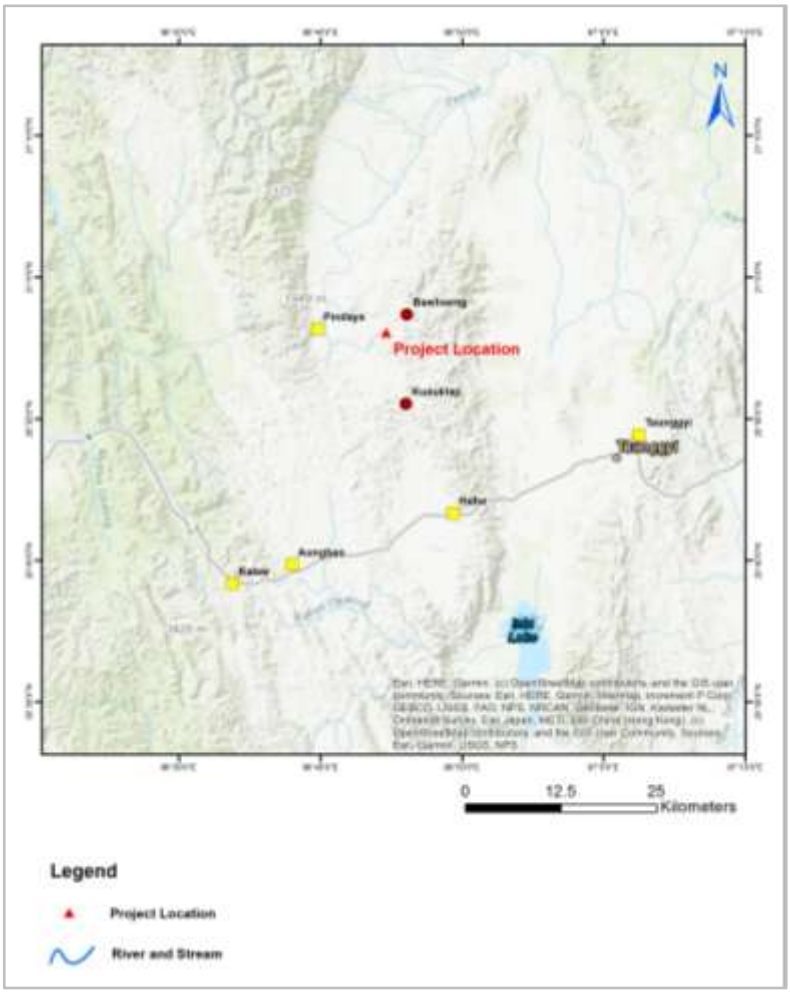


Figure 5.3 Drainage Map of Project Area

5.2.6 Air Quality

(a) Survey Item

The parameters for the air quality survey were established by referring to the environmental quality standards outlined in the National Emission Guidelines. The Myanmar National Environmental Quality (Emission) Guidelines were announced on December 29, 2015. The guideline values for air pollution levels are presented in Table 5.3.

Table 5.3 Myanmar National Environmental Quality (Emission) Guideline for air quality

No	Parameter	Averaging Period	Guideline Value	Units
1	Nitrogen dioxide	1-hour	200	µg/m3
2	Particulate matter PM_{10} a	24-hours	50	µg/m3
3	Particulate matter $PM_{2.5}$ b	24-hours	25	µg/m3
4	Sulphur dioxide	24-hours	20	µg/m3
5	Ozone (O3)	8-hour daily maximum	100	µg/m3
6	Carbon monoxide	24-hours	-	ppm

(b) Survey Location and Period

AQ-1

The air quality measurement site, AQ-1, was measured near the project area (at Metal Refinery Plant Compound) in the Bawhseng Village Tract of Kalaw Township, located in southern Shan State, Myanmar. This site was selected to evaluate ambient air quality within and around the project area, specifically assessing air quality levels near residential quarters in the project vicinity. The survey activities conducted at AQ-1 are illustrated in Figure 5.4.

AQ-2

The AQ-2 air quality measurement was conducted between the washing plant and warehouse within the project area in the Bawhseng Village Tract of Kalaw Township, located in southern Shan State, Myanmar. This assessment aimed to evaluate the ambient air quality around the

site. Positioned within a project area close to residential neighborhoods, this location was chosen to minimize disturbances to local communities and mitigate potential impacts from project activities. The survey activities conducted for AQ-2 are illustrated in Figure 5.4.

Table 5.4 Location and Period of Air Quality Survey Point

Survey Point	Period	Coordinate		Description
		Latitude	Longitude	
AQ-1	26th – 27th September 2024	20°55'57.84"N	96°44'32.68"E	Near the project area
AQ-2	27th – 28th September 2024	20°55'53.95"N	96°44'30.77"E	Between the washing plant and warehouse within the project area

Figure 5.4 Photographic Documentation of Survey Activities

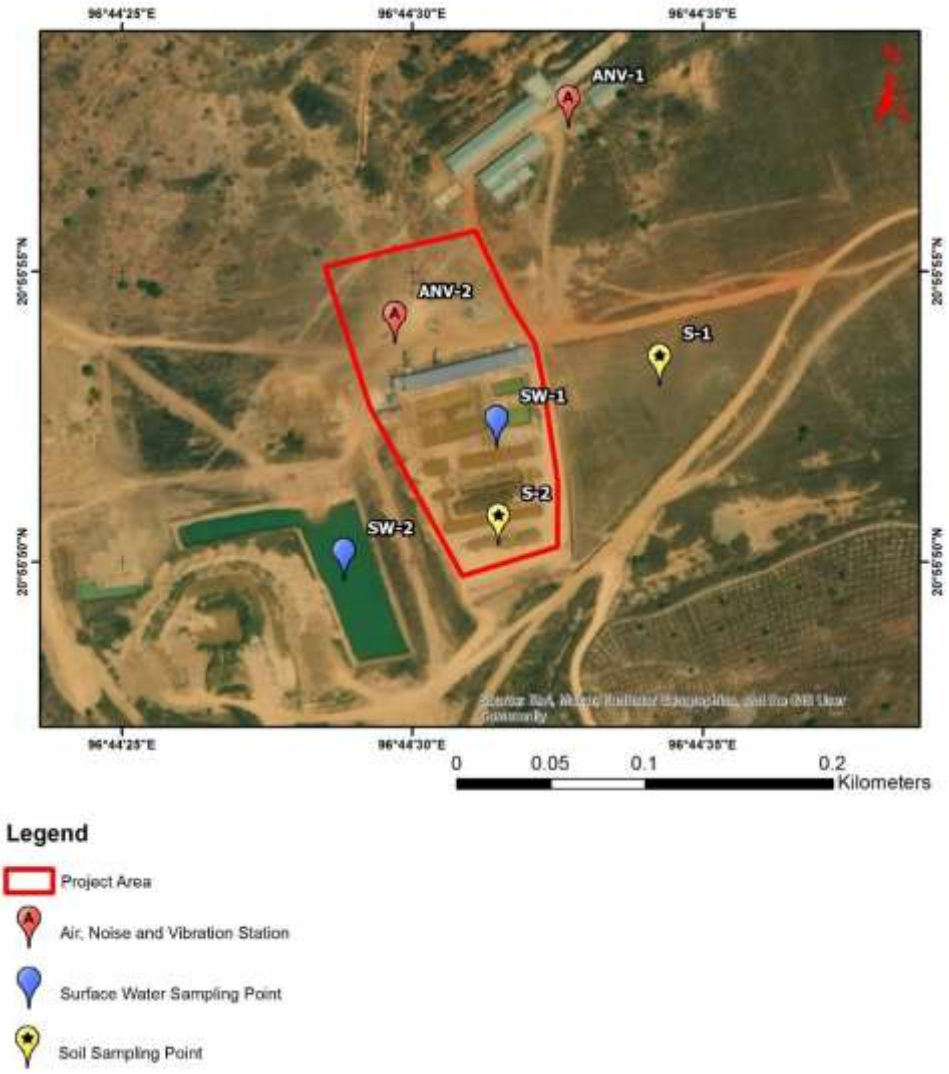


Figure 5.5 Locations of Environmental Survey Points: Air, Noise, Vibration, Soil, and Water Sampling Points

(c) Survey Method

AQM-09 air quality monitoring system used to detect the pollutant gases (SO_2, CO, NO_2, O_3, etc.). Particulate matter PM_{10}, $PM_{2.5}$ and TSP can detect at the same time, no need to change the sampling cutter and meteorological parameters such as temperature, humidity, wind speed and wind direction can detect sure data accuracy. The system is making the unique function of automatic heating and dehumidification to avoid humidity influence on measurement data. Adopts long-life anti-jamming sampling system is quiet, efficient and the sampling period is adjusted. The system is the two-channel communication to ensure the data continuity. This particulate monitor, along with gas sensors, can detect maximum, minimum, and time-

weighted average levels continuously per second up to the duration concerned (e.g., 1 day) with high sensitivity (ppb & ug/m3 level).

Table 5.5 Monitoring Equipment for Air Quality

No	Instrument	Brand & Model	Measurement/ Parameter	Instrument
1.	Environmental Perimeter Air Monitoring System	AQM-09	CO, NO_2, SO_2, PM (2.5), PM (10), Relative Humidity, Temperature, Wind Speed, Wind Direction	

(d) Survey Results

The average values of ambient gaseous levels from all 24-hour air quality monitoring are summarized in Table 5.6. According to the survey results, the average 24-hour concentrations of PM2.5 and PM10 are within the limits set by the National Environmental Quality (Emission) Guidelines (NEQG). While 24-hour concentrations of NO_2 are not expressed under the applied standard, the measured NO_2 levels were assessed by the one-hour standard outlined in the NEQG. The hourly results indicate that NO_2 concentrations are below the permissible limit. Additionally, sulfur dioxide (SO_2) concentrations comply with the 10-minute standard specified in the NEQG. Carbon monoxide (CO) concentrations are also well within the applicable standards. These findings demonstrate that the project activities are effectively managed and are not contributing to air pollution levels exceeding regulatory limits, thereby ensuring the health and safety of workers and the surrounding environment.

Table 5.6 Ambient Air Quality Results

Sampling No.	Time	NO2	PM10	PM2.5	SO2	CO	RH	Temp
	Hours	µg/m³	µg/m³	µg/m³	µg/m³ (10 min)	µg/m³	%	℃
AQ-1	24 Hours	11.2	1.51	1.62	47	0.0	78.32	24.70

AQ-2	24 Hours	10.8	2.08	1.33	51	0.0	78.58	24.72
National Environmental Quality (Emission) Guideline		200 (1hour)	50	25	500 (10 min)	-	-	-

(e) Wind Speed and Direction

Wind speed and direction were measured using the Haz-Scanner Instrument, specifically the Haz-Scanner Environmental Perimeter Air Station (EPAS). This advanced monitoring system is capable of measuring real-time meteorological parameters, ensuring accurate and reliable data collection for ambient air quality assessment. According to the survey results, the average wind speed at the air quality monitoring stations (AQ-1 and AQ-2) ranged from 1.15 to 1.74 m/s. The predominant wind direction at both AQ-1 and AQ-2 stations was observed to be from the southwest, blowing towards the northeast.

5.2.7 Noise

(a) Survey Item

As concern noise measurements, after a proper time for calibrating the measurement devices (to be used in accordance with Myanmar National Emission Guideline standards), for each location a total of 24 hours of noise monitoring was conducted.

Table 5.7 Applicable Noise Level Guideline

Receptor	**One Hour LAeq (dBA)[a]**	
	Daytime **07:00 - 22:00** **(10:00 - 22:00 for public holidays)**	**Nighttime** **22:00 - 07:00** **(22:00 - 10:00 for public holidays)**
Residential, institutional, educational	55	45
Industrial, commercial	70	70

(b) Survey Location and Period

A noise survey was conducted at two designated stations to assess ambient noise levels in the area. The selected noise survey points correspond to the same locations used for the air quality survey, ensuring a comprehensive understanding of the environmental conditions at these sites.

Figure 5.6 Photographic Documentation of Survey Activities

(c) Survey Method

Sampling and monitoring of surrounding sound were conducted by using following instrument for 24 hours/1-day measurement. Measurement of environmental sound level was conducted by referring to the recommendation of International Organization for Standardization (ISO), i.e., ISO 1996-1:2003 and ISO 1996-2:2007. The instrumentation used for noise quality survey is shown in the following Table. Noise meter was set up to record the log as ten minutes intervals during an hour for one consecutive day. Day time and night time was calculated by using the following array formula in the excel sheet. This formula is firstly used for hourly LAeq and then for the 24 hours LAeq.

10*LOG10(AVERGAE (10^((RANGE)/10)))

Table 5.8 Instrumentation for Noise Survey

Instrumentation	Description
Sound level meter	Sound level meter with SD Card (Brand - Lutron; Model - SL-4023SD)

Figure 5.7 Lutron Sound Level Meter

(d) Survey Results

The daily average noise levels (LAeq) for the survey points are presented in Table 5.9. Potential noise emission sources exist around the noise level monitoring stations. The daytime noise levels recorded at monitoring points N-1 and N-2 were 42 dB and 48 dB, respectively, which are well within the NEQG (National Environmental Quality Guidelines) standard of 55 dB. Similarly, the nighttime noise levels at N-1 and N-2 were 39 dB and 33 dB, which are significantly below the NEQG guideline of 45 dB. These results indicate that noise levels at both monitoring points are compliant with the national standards, ensuring minimal disturbance to the surrounding environment and community.

Table 5.9 A-weighted loudness Equivalent (LAeq) Level

Result	N-1		N-2	
	Day	Night	Day	Night
	42	39	48	33
NEQG Guideline (Residential, institutional, educational)	55	45	55	45

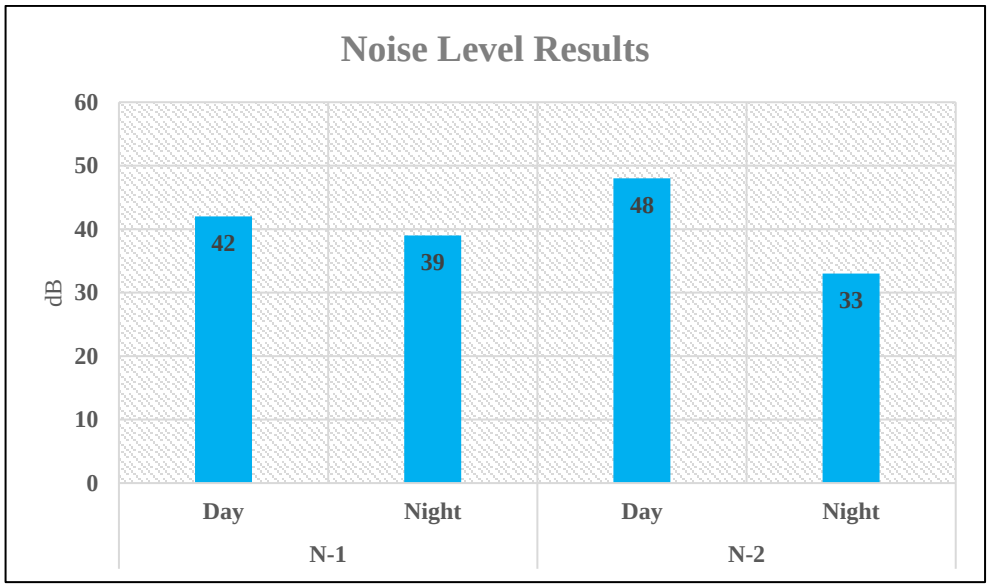


Figure 5.8 Noise Level Results for N-1 and N-2

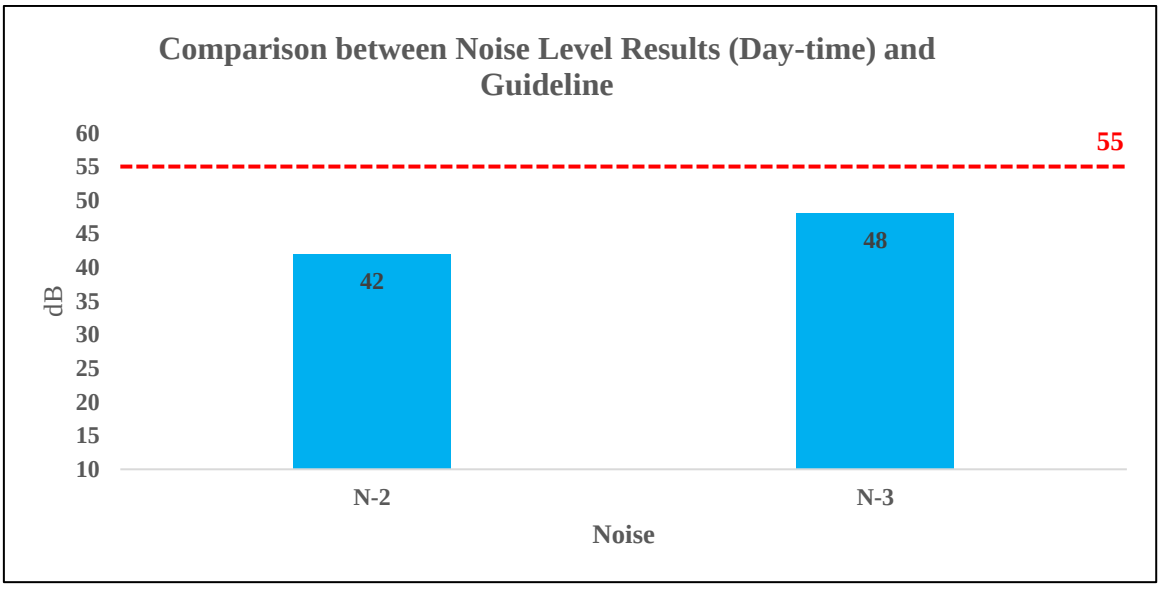


Figure 5.9 Comparison of Daytime Noise Levels with Guideline Standards

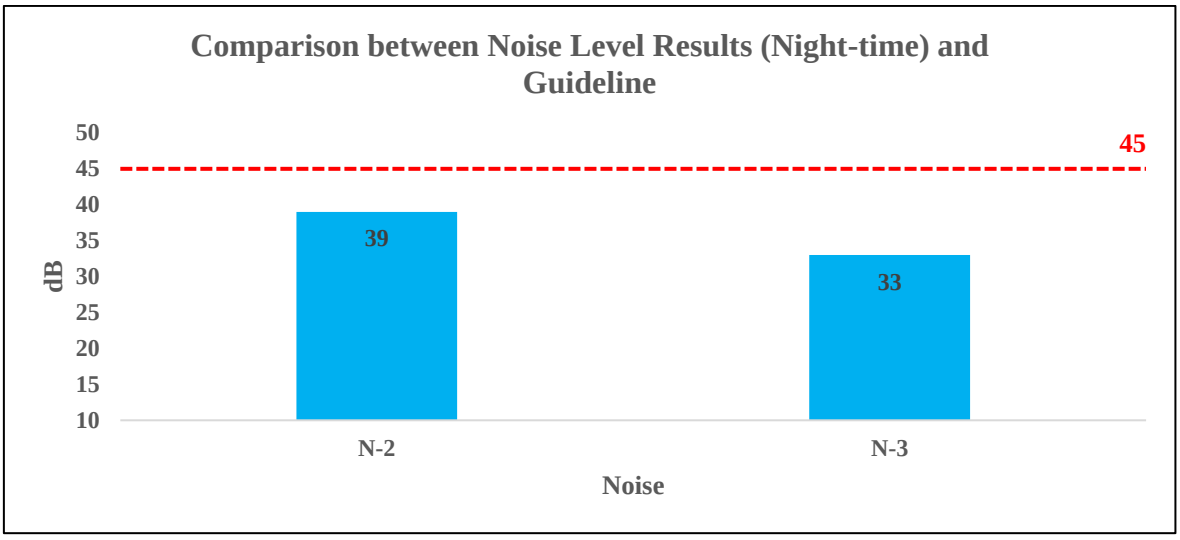


Figure 5.10 Comparison of Nighttime Noise Levels with Guideline Standards

5.2.8 Vibration

(a) Survey Item

As there is no vibration standard for receptors in Myanmar, the target vibration level at the construction phase shall be set based on the standards in some foreign countries. Accordingly, the target level of vibration is set based on the following policies.

- Monastery and residential houses where is necessary to keep quiet and sleep shall comply with the Japanese standard for residential areas,
- Office, commercial facilities, and factory areas shall comply with the Japanese standard for mixed areas including residential, commercial, and industrial areas, and
- The category of times is divided into three types in a manner consistent with the target noise level for construction.

1. Regulatory Standards for Vibration Emitted from Specified Factories (Summary)			
Time Area	**Daytime**	**Nighttime**	**Applicable Areas**
I	60 – 65 dB	55 – 60 dB	Areas where maintenance of quiet is particularly needed to preserve a good living environment and where quiet is needed as they are used for residential purposes.
II	65 – 70 dB	60 – 65 dB	Areas used for commercial and industrial as well as residential purposes where there is a need to preserve the

			living environment of local residents and areas mainly serving industrial purposes require measures to prevent the living environment of local residents from deteriorating.

Note: Vibration level shall be measured at the boundary line of the specified factory.

2. Standards for Vibration Emitted from Specified Construction Works (Summary)		
Type of Restriction	Area Classified	
Standard value	I & II	85dB
Work prohibited time	I	7 p.m. - 7 a.m.
	II	10 p.m. - 6 p.m.
Maximum Working duration	I	10 hours per day
	II	14 hours per day
Maximum consecutive working days	I & II	6 days
Work prohibited days	I & II	Sundays and holidays

Notes: 1.'Area I' stands for areas to which one of the following descriptions applies:

(a) Areas where maintenance of quiet is particularly needed to preserve the residential environment.

(b) Areas that require maintenance of quiet since they are used for residential purposes.

(c) Areas used for commercial and industrial as well as residential purposes need measures to prevent vibration pollution since a considerable number of houses are located.

(d) The neighborhood of schools, hospitals, and the like. 'Area II' stands for areas where there is a need to preserve the living environment of inhabitants and other than Area I.

Note: 2. Vibration level shall be measured at the boundary line of the specified construction work site.

3. Request Limits for Motor Vehicle Vibration (Summary)			
Time Area	**Daytime**	**Nighttime**	**Applicable Areas**
I	65 dB	60 dB	Areas where maintenance of quiet is particularly needed to preserve a good living environment and where quiet is called for as they are used for residential purposes.
II	70 dB	65 dB	Areas used for commercial and industrial as well as residential purposes where there is a need to preserve the living environment of local inhabitants and areas mainly serving industrial purposes require measures to prevent the living environment of local residents from deteriorating.

(b) Survey Location and Period

A vibration survey was conducted at two designated stations to assess ambient vibration levels in the area. The selected vibration survey points correspond to the same locations used for the air quality survey, ensuring a comprehensive understanding of the environmental conditions at these sites.

Figure 5.11 Photographic Documentation of Survey Activities

(c) Survey Method

The instrumentation for vibration level was used by the RION VM-55 vibration meter. This instrument is a 3-axis (X, Y, Z) vibration meter that can be used in a wide range of applications for measurement and analysis of different parameters. The unit is equipped to measure the instantaneous value for vibration level and vibration acceleration level, as well as the time

percentile level, time-averaged level, and maximum and minimum values in three axes simultaneously.

Table 5.10 Instrumentation for Vibration Survey

Instrumentation	Description
Vibration meter	Rion VM55 with SD Card

Figure 5.12 Instrumentation for Vibration Meter

(d) Survey Results

Table 5.11 and Figure 5.13 present the average vibration levels (Lveq) recorded at two points over a 24-hour period. Based on the calculated results, the vibration levels at all monitored points were compared with the Japanese road traffic vibration standards. Both daytime and nighttime vibration levels were found to be within the target values specified by the standard, indicating compliance and minimal impact on the surrounding environment.

Table 5.11 Vibration Level Results

Result	V-1		V-2	
	Day	Night	Day	Night
	30	23	45	26
Guideline	**65 dB**	**60 dB**	**65 dB**	**60 dB**

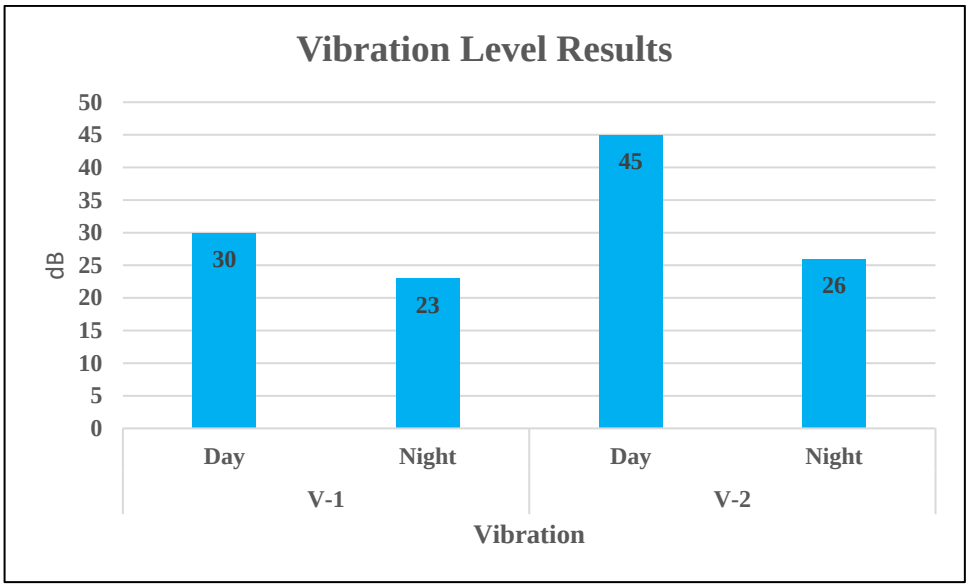


Figure 5.13 Vibration Level Results V-1 and V-2

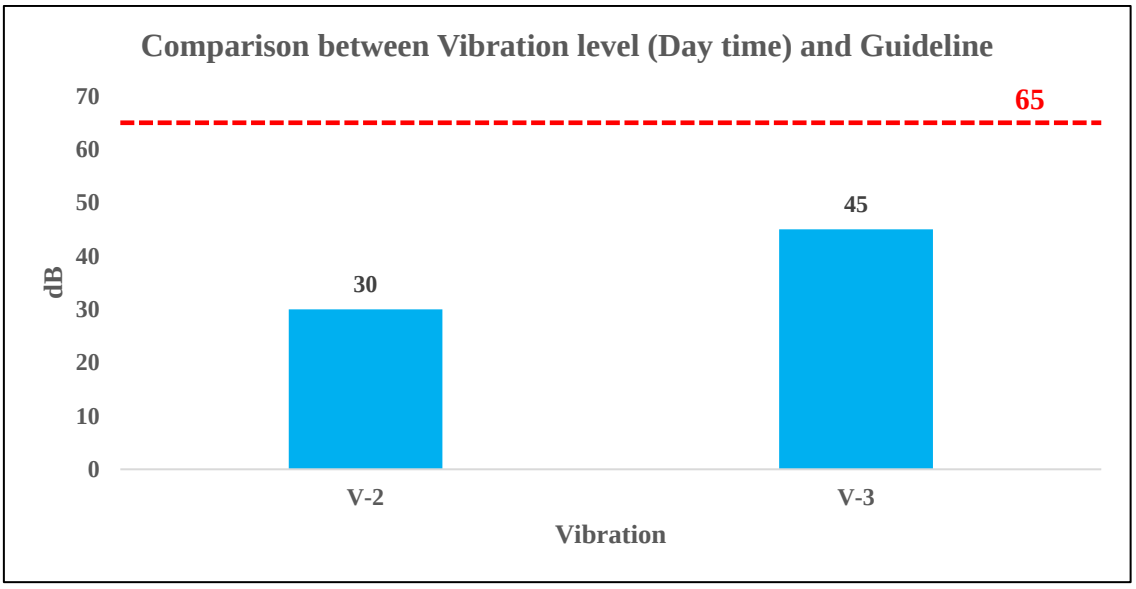


Figure 5.14 Comparison of Daytime Vibration Levels with Guideline Standards

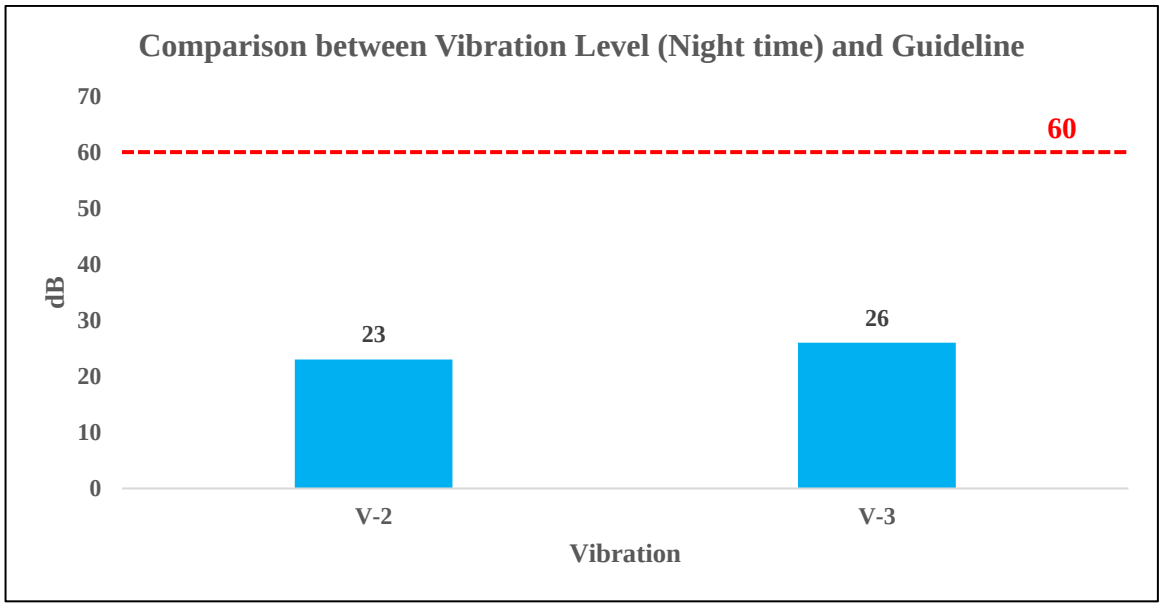


Figure 5.15 Comparison of Nighttime Vibration Levels with Guideline Standards

5.2.9 Water Quality

(a) Survey Item

Parameters for water quality survey are determined so as to cover the parameters of existing environmental standards of Myanmar. The results of water quality measurements will be compared with the drinking water quality guidelines and the National Surface Water Quality Standard (NSWQS). The other parameters will be analyzed in a certified laboratory. The water quality locations are described in the Figure 5.5.

Table 5.12 Survey Parameter for Water Quality

Surface Water Quality Measurement	
Number of samples	Two
Parameters	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel
Period	One time

(b) Survey Location and Period

SW-1

Sample SW-1 was collected from the drain outlet of the washing plant within the project area in the Bawhseng Village Tract of Kalaw Township, located in southern Shan State of Myanmar. This sample was taken and analyzed to assess the water quality of the pond and its surrounding environment, particularly around the project area. Water quality parameters such as pH, temperature, and other parameters concentrations were measured to ensure compliance with environmental standards. The survey activities for SW-1 are illustrated in Figure 5.16. This data provides a baseline for understanding the potential impact of project activities on the water quality.

SW-2

Sample SW-2 was collected from the rainwater pond (Kone Thar Pond) within the project area in the Bawhseng Village Tract of Kalaw Township, located in southern Shan State, Myanmar. This sample was taken and analyzed to assess the water quality of the pond and its surrounding environment, specifically within the project vicinity. Key water quality parameters, including pH, temperature, and various concentration levels, were measured to ensure compliance with environmental standards. The survey activities for SW-2 are illustrated in Figure 5.16. This data provides a baseline for evaluating the potential impact of project activities on local water quality.

Table 5.13 Location of Water Quality Survey Point

Survey Point	Period	Coordinate		Description
		Latitude	Longitude	
SW-1	18 Sep, 2024	20°55'52.02"N	96°44'31.47"E	From drain outlet of the washing plant within the project area
SW-2	18 Sep, 2024	20°55'49.03"N	96°44'27.47"E	The rainwater pond (Kone Thar Pond) within the project area

Figure 5.16 Photographic Documentation of Water Survey Activities

(c) Survey Method

Water samples were collected in both plastic and sterilized glass containers, following strict adherence to recognized standard procedures. Parameters such as pH, temperature, odor, and color were measured on-site at the time of collection. In accordance with laboratory standards, some samples were preserved with specific chemicals to maintain sample integrity. All samples were stored in iced boxes and transported to the laboratory to ensure reliable analysis.

(d) Survey Results

The water samples were analyzed at ALARM Ecological Laboratory and Landuse Department in Myanmar, and the results are shown in Table 5.14. The corresponding certificates can be found in Appendix 3. These results were evaluated with the established drinking water quality guidelines and the National Surface Water Quality Standard (NSWQS). Most of the water quality parameters were found to be within the applicable standards, confirming that the water is generally suitable for use and capable of supporting local communities and ecosystems without posing significant health risks.

However, total suspended solids (TSS) were observed to exceed the standard. This is attributed to the sampling source of SW-1, which was collected from the drain outlet of the washing plant within the project area, where higher suspended solids are expected due to operational processes. Additionally, SW-2, collected from the rainwater pond, likely exhibited elevated Total Suspended Solids (TSS) levels. This increase could be attributed to sediment runoff or particulate matter accumulation within the pond, a phenomenon commonly observed in rainwater collection systems, especially during or after rainfall events.

Furthermore, the total coliform bacteria levels were found to exceed the standard limits. This is primarily attributed to the sampling source of SW, which was collected from the drain outlet and the rainwater pond associated with the washing plant within the project area. The elevated coliform levels could result from organic matter accumulation, contamination by decaying vegetation, or the presence of microorganisms often found in recycled or stagnant water sources. Rainwater ponds, in particular, are prone to bacterial growth due to runoff carrying organic debris and animal waste.

Table 5.14 Laboratories Analysis Results for Water Quality

Analysis Parameter	Units	SW- 1	SW- 2	Drinking Water Quality Standard	National Surface Water Quality Standard
pH	-	7.4	7.3	6.5-8.5	6.5-8.5
TSS		428	19980	-	150
Ammonia	mg/L	0.86	0.5	1.5	0.9
Mercury	mg/L	0.001	0.001	0.001	0.001
Phenol	mg/L	<0.1	<0.1	-	0.05
Oil & Grease	mg/L	10	5	-	10
Total Coliform Count	(MPN/100ml)	>1100	>1100	3	1000
Fluoride	mg/L	0.3	Nil	1.5	1.5
Arsenic	mg/L	Nil	Nil	0.05	0.05
Nitrate-Nitrogen	mg/L	3.7	Nil	3	10
Dissolved Oxygen	mg/L	4.8	4.0	-	>3

Analysis Parameter	Units	SW- 1	SW- 2	Drinking Water Quality Standard	National Surface Water Quality Standard
COD	mg/L	96	96	-	100
BOD	mg/L	30	18	-	30
Copper	mg/L	Nil	Nil	2	0.3
Lead	mg/L	Not Detected	Not Detected	0.01	0.01
Cadmium	mg/L	Not Detected	Not Detected	0.003	0.003
Chromium	mg/L	Not Detected	Not Detected	0.05	0.01
Nickel	mg/L	Not Detected	Not Detected	0.07	0.07

5.2.10 Soil

(a) Survey Item

Parameters for soil quality survey are determined to cover the parameters of existing available environmental standards. Soil sample was taken by the manual hand auger. Parameter for soil contamination survey is determined by referring to the parameter of soil content observation of Japan.

Table 5.15 Applicable Guideline for Soil Quality

No.	Parameter	Unit	Japan Standard
1	Lead	ppm	150
2	Cadmium	ppm	150

No.	Parameter	Unit	Japan Standard
3	Chromium	ppm	250
4	Nickel	ppm	-
5	Copper	ppm	125*

Source: ***Japan: Ministry of the Environment, Government of Japan (2002), "Regulation for Implementing the Law on Soil Contamination Countermeasures"***

****Ministry of the Environment, Government of Japan, Environmental Quality Standards for Soil Pollution***

(b) Survey Location and Period

S-1

Sample S-1 was collected from a plantation within the project area, located in the Bawhseng Village Tract of Kalaw Township in southern Shan State, Myanmar. The sample was analyzed at the ALARM Ecological Laboratory to assess the ambient soil quality around the project site. Details of the survey activities for S-1 can be found in Figure 5.17.

S-2

Sample S-2 was collected in the second tailing pond within the project area, located in the Bawhseng Village Tract of Kalaw Township in southern Shan State, Myanmar. The sample was analyzed at the ALARM Ecological Laboratory to assess soil quality and identify any potential impacts related to the project activities. Details of the survey activities for S-1 can be found in Figure 5.17.

Table 5.16 Location of Soil Quality Survey Point

Survey Point	Period	Coordinate		Description
		Latitude	Longitude	
S-1	6 September, 2024	20°55'53.40"N	96°44'34.25"E	At plantation within the project area
S-2	6 September, 2024	20°55'50.90"N	96°44'31.75"E	In the second tailing pond within the project area

Figure 5.17 Photographic Documentation of Soil Survey Activities

(c) Survey Method

For soil sampling, the standard environmental sampler (soil auger) was applied. The sampler is a stainless-steel tube that is sharpened on one end and fitted with a long, T-shaped handle. This tube is approximately three inches inside diameter. In order to refrain from contamination, about 00-30 cm of top soil was removed by the sampler before sampling. Most of samples were taken and collected from 30-50 cm depth. During sample collection, wear the glove, rinse glove and soil auger with clean water. Then sample was taken and collected in cleaned plastic bag. Chemical preservation of soil not generally recommended. Samples were cooled in an ice box which temperature was under 4 °C. Samples were protected from sunlight to minimize any potential reaction. Field equipment used on site also show in the Table.

Table 5.17 Field Equipment for Soil Quality Survey

No.	Equipment	Originate Country	Model
1	Soil Auger (Hand held)	U. S. A	AMS

(d) Survey Results

The soil samples analyzed by the laboratory of the Land Use Department were found to be within the established Japanese standards for most parameters, confirming acceptable soil quality in general. The results from the laboratory analysis were systematically compared to these standards. However, the lead concentration in soil sample S-1 exceeded the Japanese standard. This elevated lead level could be attributed to historical activities, such as the use of pesticides containing lead-based compounds or contamination from runoff transporting lead particles from nearby operations. Similarly, the lead concentration in soil sample S-2 exceeded the Japanese standard, likely due to its collection from the second tailing pond within the project area. This pond may have concentrated lead particles through processes like sedimentation of residues from the washing plant, runoff containing lead contaminants, or recycling of lead-laden water.

Table 5.18 Soil Quality Analysis Results

Parameter	Unit	S-1	S-2	Japan Standard
Lead	ppm	916	2084	150
Cadmium	ppm	1.492	0.072	150
Chromium	ppm	0.032	0.036	250
Nickel	ppm	0.052	0.002	-
Copper	ppm	1.328	2.248	125

5.3 Environmental Biological Components

The biological constituents of the environment are known as its biotic components. These include all living organisms, such as plants, animals, and microorganisms like bacteria, which interact closely with the abiotic (non-living) components of the environment. This interaction between biotic and abiotic components gives rise to various ecosystems, including pond ecosystems, marine ecosystems, and others. As part of this study, a desktop review of publicly available scientific publications was conducted to investigate the ecology and biodiversity of the survey area.

Kalaw Township, located in the southern Shan State of Myanmar, is characterized by its unique ecological features and high-altitude landscape. Nestled at approximately 1,320 meters above sea level, Kalaw enjoys a temperate climate that significantly differs from the tropical conditions found in lower-lying regions of Myanmar. The township experiences moderate temperatures, ranging from 10°C to 30°C, and receives substantial rainfall during the southwest monsoon season, which lasts from June to October.

The region is predominantly covered by temperate forests, featuring mixed evergreen and deciduous tree species. These forests play a crucial role in maintaining local biodiversity, supporting various flora and fauna adapted to the cooler climate. Notable plant species include pine, oak, and various fruit trees such as avocados and plums, which thrive in the area's fertile soils. Agriculture in Kalaw is diverse, with local farmers cultivating crops such as tea, potatoes, and a variety of fruits and vegetables. The cool climate and ample rainfall contribute to the region's reputation as a significant agricultural hub in Myanmar, particularly for highland crops. Tea plantations are especially prominent, with Kalaw being renowned for its high-quality tea production.

Kalaw Township's rich biodiversity is further enhanced by its varied habitats, which include streams, wetlands, and hillside terraces. These ecosystems provide essential habitats for a range of wildlife, including birds, mammals, and insects, some of which are endemic to the region. Additionally, the cooler temperatures and lush vegetation attract numerous migratory bird species, making Kalaw a popular destination for birdwatchers.

5.3.1 Terrestrial Ecology and Wildlife

The methodologies used in biodiversity surveys are described below.

(a) Desktop Study

Publicly available sources of information were analyzed to outline the known and likely ecological values of the study area. Aerial imagery was utilized to gain a comprehensive spatial understanding of the patterns of vegetation communities and human activities on the site, as well as to map access routes and internal tracks. Additionally, consultations were conducted with ecologists experienced in the study area to gather information about species known to be present or previously recorded on the site, as well as other ecological values they deemed relevant.

(b) Field Survey

A site visit was conducted to identify and map various biodiversity features, habitats, and vegetation present at the location. This included the creation of a fine-scale vegetation map that identified and categorized different plant communities. Searches for listed and protected plant species were carried out, with the locations of all observed listed plant species recorded using GPS technology. Additionally, active searches for reptiles and amphibians were conducted within habitats likely to be significant for these species. The impact assessment phase will involve determining the nature of the potential impacts of the development and providing recommendations for mitigation measures.

(c) Interviewing and literature survey

In addition to field observations, secondary data was collected through interviews with local residents and a review of existing literature. During the interview survey, the surveyor visited residents in and around the survey area to gather information about the names of plants and animals present in the region. The interviews also explored historical conditions of flora and fauna, as well as changes in biodiversity and ecosystem dynamics in the area.

(d) Methodology of Flora and Fauna

Flora

A Global Positioning System (GPS) was utilized to navigate and mark coordinates within the survey area. Field observations were conducted in and around the project area. During the field

survey, a plotless sampling method was employed. This method involves randomly selecting points within the survey area to calculate the average area per tree by measuring the distances between these points and the trees, or between the trees themselves. Digital photographs of plants were taken whenever possible. Plant and animal species identification was conducted with the assistance of skilled local individuals. Plant specimens were identified by consulting sources such as Hundley and Chit Ko Ko (1961), Kress et al. (2003), Simon Gardner (2000), and Simon Gardner et al. (2015), and by comparing them with herbarium specimens. The identification of threatened species was verified against the IUCN Red List (version 2024).

Fauna

Mammal	A mammal survey was conducted to cover each habitat type by actively searching along transects that passed through all identified habitats in the study area. Evidence of mammal presence was collected from signs such as scats and tracks (footprints) on the ground, as many mammals leave these indicators. Other signs observed included resting sites in dense shrub and herb vegetation, near water sources, and in other potential habitats for specific mammal species. Additionally, secondary data was gathered from local villagers through interviews to supplement the findings. Questions were posed to residents knowledgeable about the local terrestrial mammal species to enhance the survey data.
Herpetofauna	Herpetofauna surveys were conducted across each habitat type through direct observation and active searching in potential hiding places, such as leaf litter, holes, and under stones and logs within the study area. This approach involved grouping habitat surveys to maximize coverage. Additionally, interviews with local residents were conducted to collect secondary data. The survey included scanning trees, examining holes in the ground, digging through leaf litter, and turning over logs and stones near streams to facilitate visual encounters with herpetofauna.
Birds	The presence of birds serves as an important indicator of biodiversity richness in the forest. During the survey, all birds seen or heard from either side of the transect were identified to the species level whenever possible, with their relative abundance noted. Signs of breeding, such as nests and recently fledged juveniles, were also recorded.

	Observations were made using binoculars, and photographic records were taken to document the findings. The population status of bird species and their habitats was assessed using the point count method.
Butterfly and Dragonfly	Butterflies and dragonflies in different habitats within the study area were surveyed using a qualitative point count method. Species of butterflies and dragonflies observed from either side of the survey transect were identified, and their relative abundance was recorded. Specimens were collected using aerial nets along the trail, with species identified and subsequently released. Some species were photographed immediately after collection to facilitate identification using reference books based on key characteristics observed at the study site.
Fish	Interviews with local fishermen from the study area were conducted during the specimen collection process. The fishermen were asked about their fishing practices, including the types of gear used, the number of fishing trips made per day, and the target species. Fish were collected with the assistance of the fishermen during the survey period. Photographs were taken of the fish immediately after collection, and measurements were recorded for key characteristics.

(e) Survey Area

The location of the survey area is shown in Figure 5.18.

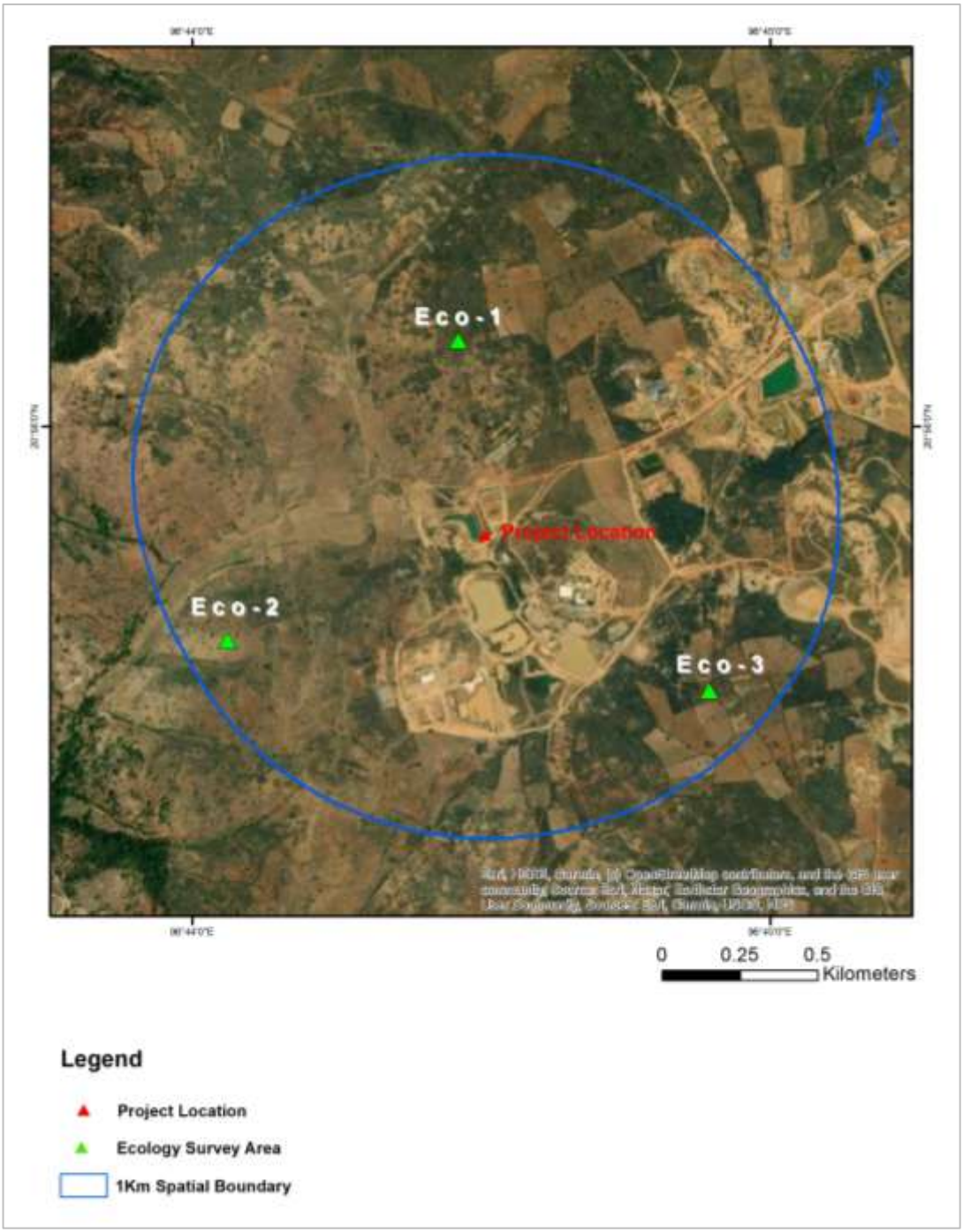


Figure 5.18 Location of the Survey Area

(f) Flora Survey Results

Flora surveys were conducted to assess the diversity of flora taxa in the area. A total of 50 species were identified during the survey. These species were classified as follows: 12 species were of 'Least Concern' according to the IUCN Red List, 37 species were 'Not Yet Assessed,' and one species was classified as 'Data Deficient.' No endemic species were found in the area.

Table 5.19 Tree Species List Recorded Survey Period

No.	Family Name	Scientific Name	Common Name	Habitat	Distribution	IUCN
1.	Asteraceae	Chromolaena odorata	Bezat	S	Wide	NE
2.	Poaceae	Dendrocalamus brandisii	Wa-bo	B	Reported from Myanmar	NE
3.	Anacardiaceae	Spondias pinnata	Gwe	T	Reported from Myanmar	NE
4.	Verbenaceae	Tectona grandis	Kyun	T	Wide	NE
5.	Annonaceae	Miliusa velutina	Thabut-gyi	T	Mandalay, Bago, Yangon	NE
6.	Euphorbiaceae	Emblica officinalis	Zi-phyu	T	Wide	LC
7.	Lythraceae	Lagerstromia speciosa	Pyinma	T	Reported from Myanmar	NE
8.	Bignoniaceae	Oroxylum indica	Kyaung-sha	T	Wide	NE
9.	Fabaceae	Mucuna pruriens	Khwele-ya	Cl	Bago, Chin, Kayin, Mandalay, Sagaing, Shan, Yangon	NE
10.	Combretaceae	Terminalia crenulata	Htauk-kyant	T	Bago, Mandalay, Rakhine, Sagaing, Yangon	NE
11	Mimosaceae	Albizia procera	Sit	T	Reported from Myanmar	LC
12	Anacardiaceae	Mangifera indica	Thayet	T	Wide	DD
13	Mimosaceae	Archidendron jiringa	Danyin	T	Reported from Myanmar	NE
14	Euphorbiaceae	Jatropha pungens	Kyetsu	S	Magway, Mandalay	NE
15	Lythraceae	Lagerstromia speciosa	Pyinma-yetthey	T	Reported from Myanmar	NE
16	Moraceae	Ficus hispida	Ka-aung	ST	Bago, Mandalay, Taninthayi, Yangon	LC
17	Poaceae	Dendrocalamus membranaceus	Wa-phyu	B	Bago, Kachin, Kayin, Mon, Shan, Taninthayi	LC
18.	Anacardiaceae	Melanorrhoea usitata	Thitsi	T	Bago, Mandalay, Sagaing, Shan	NE
19	Poaceae	Oxytenanthera albociliata	Wa-gauk	B	Reported from Myanmar	NE

No.	Family Name	Scientific Name	Common Name	Habitat	Distribution	IUCN
20	Poaceae	Imperata cylindrica	Thekke	G	Bago, Chin, Kachin, Kayah, Kayin, Mandalay, Rakhine, Sagaing, Shan	NE
21.	Bombaceae	Bombax ceiba	Letpan	T	Wide	LC
22	Moraceae	Ficus religiosa	Bawdi-nyaung	T	Cultivated	NE
23	Sapindaceae	Schleichera oleosa	Gyo	T	Wide	LC
24	Poaceae	Bambusa burmanica	Hnee-wa	B	Bago, Kachin, Magway, Mandalay, Mon, Sagaing, Shan, Taninthayi	NE
25	Euphorbiaceae	Breynia patens	Taw-meyaing	S	Bago, Chin, Kachin, Mandalay, Mon, Taninthayi, Yangon	NE
26	Tiliaceae	Corchorus olitorius	Gon-shaw	S	Reported from Myanmar	NE
27.	Euphorbiaceae	Phyllanthus albizzioides	Shit-sha	T	Wide	NE
28.	Apocynaceae	Alstonia scholaris	Taung-mayo	T	Bago, Kachin, Mandalay, Shan, Taninthayi, Yangon	LC
29.	Dipterocarpaceae	Shorea siamensis	Ingyin	T	Wide	LC
30.	Anacardiaceae	Lannea coromandelica	Nabe	T	Bago, Kayin, Mandalay, Rakhine, Shan, Taninthayi, Yangon	NE
31.	Moraceae	Ficus glomerata	Ye-thapan	T	Bago, Kachin, Mandalay, Yangon	NE
32.	Myristicaceae	Myristica amygdalina	Taung-saga	T	Bago, Mon, Taninthayi	NE
33.	Solanaceae	Solanum indicum	Khayan-kazaw	S	Bago, Mandalay, Shan, Yangon	NE
34.	Poaceae	Andropogon fastigiatus	Myauk-mya	G	Reported from Myanmar	NE
35.	Poaceae	Imperata cylindrica	Thekke	G	Bago, Chin, Kachin, Kayah,	NE

No.	Family Name	Scientific Name	Common Name	Habitat	Distribution	IUCN
					Kayin, Mandalay, Rakhine, Sagaing, Shan	
36.	Euphorbiaceae	Marcaranga denticulata	Phet-wun	ST	Bago, Ayeyarwady, Kachin, Mandalay, Mandalay, Taninthayi, Sagaing, Yangon	NE
37.	Verbenaceae	Lantana aculeata	Seinnaban	S	Reported from Myanmar	NE
38.	Rutaceae	Murraya koenigii	Pyindaw-thein	ST	Cultivated	NE
39.	Rutaceae	Zanthoxylun acanthopodium	Tabu	ST	Bago, Chin, Kachin, Magway, Sagaing, Shan, Yangon	NE
40.	Alanaceae	Alangium chenense	Taw-posa	T	Chin, Kachin, Kayin, Mandalay, Mon, Sagaing, Shan, Taninthayi	NE
41.	Dilleniaceae	Dillenia pentagyna	Zin-byun	T	Bago, Chin, Mandalay, Yangon	NE
42.	Caesalpiniaceae	Bauhinia acuminata	Palan	ST	Wide	LC
43.	Sapindaceae	Sapindus rarak	Nwapadi	T	Mandalay, Sagaing, Shan	NE
44.	Fagaceae	Lithocarpus lindleyanus	Phet-kyan	Tree	Ayeyarwady, Chin, Kachin, Mandalay, Shan	NE
45.	Cucurbitaceae	Momordica macrophylla	Tha-byet	Cl/ Cr	Wide	NE
46.	Menispermaceae	Stephania venosa	Sin-don-na-nwe	Cl	Wide	NE
47.	Moraceae	Ficus obtusifolia	Nyaung-gyat	Tree	Wide	LC
48.	Poaceae	Arundo donax	Kyu	Grass	Reported from Myanmar	LC
49.	Caesalpiniaceae	Cassia fistula	Ngu	Tree	Wide	LC
50.	Asteraceae	Sphagneticola calendulacea	Nay-kyar-gale	Herb	Reported from Myanmar	NE

(g) Fauna Results

Table 5.20 List of Fauna recorded from the Project Area

Fauna	Number of Species
Mammals	7
Bird	55
Herpets	8
Butterflies	22
Dragonflies and Damsel flies	5
Totals	97

Herpetology (Amphibian & Reptiles)

A total of 8 herpetological species were recorded during the survey, including one amphibian species and seven reptile species from 7 genera and 5 families. Among the reptile species, five were snakes, two were lizards, and one was a frog. Three species were reported by local interviews, while five species were directly observed in the survey area. According to the IUCN Red List of Threatened Species, no endangered or threatened species were found in the area.

Table 5.21 Herpetology Species List Recorded Around the Survey Area

No	Scientific Name	Common Name	Family Name	Observation Status	IUCN/ Status
1	*Trimeresurus albolabris*	Green Pit Viper	Viperidae	Observed	LC
2	*Daboia russelii*	Russell's Viper	Viperidae	Interviewed	NE
3	*Ptyas mucosa*	Indian Rat Snake	Colubridae	Observed	LC
4	*Xenochrophis piscator*	Chequered Keelback Water Snake	Colubridae	Interviewed	LC
5	*Naja kaouthia*	Monocled Cobra	Elapidae	Interviewed	LC
6	*Fejervarya limnocharis*	Asian Grass Frog	Dicroglossidae	Observed	LC
7	*Calotes mystaceus*	Blue Forest Lizard	Agamidae	Observed	LC
8	*Calotes versicolor*	Garden fence Lizard	Agamidae	Observed	NE
LC- Least concerned, NE-Not Evaluated					

Calotes mystaceus(Blue Forest Lizard)

Asian Grass Frog (Fejervarya limnocharis)

Indian Rat Snake(Ptyas mucosa)

Figure 5.19 Herpetology Species Photo Recorded Around the Survey Area

Mammals

A total of 7 mammal species from 7 genera and 7 families were recorded during the survey. Five species were observed, and three species were reported through local interviews. Based on the globally threatened status of the recorded species, all were classified as 'Least Concern' (LC). There were no threatened or endangered species found in the area.

Table 5.22 Mammal Species List Recorded Around the Survey Area

No	Scientific Name	Common Name	Family Name	Observation Status	Iucn/status
1	*Cannomys badius*	Lesser Bamboo Rat	Spalacidae	Observed	LC
2	*Viverra zibetha*	Large Indian Civet	Viverridae	Interviewed	LC

No	Scientific Name	Common Name	Family Name	Observation Status	Iucn/status
3	*Prionailurus bengalensis*	Leopard Cat	Felidae	Interviewed	LC
4	*Lepus peguensis*	Burmese Hare	Leporidae	Observed	LC
5	*Herpestes javanicus*	Small Asian Mongoose	Herpestidae	Interviewed	LC
6	*Bandicota indica*	Greater Bandicoot Rat	Muridae	Observed	LC
7	*Muntiacus muntjak*	Red Muntjac	Cervidae	Observed	LC
LC- Least concerned					

Butterfly

In the present study, a total of 22 butterfly species were recorded in the area. These included 2 species from the Papilionidae family, 4 species from the Pieridae family, 12 species from the Nymphalidae family, 3 species from the Lycaenidae family, and the fewest species from the Hesperiidae family. The most commonly observed butterfly species were from the Nymphalidae family. According to the IUCN Red List (2024-2), no endemic or threatened species were recorded during the survey period.

Table 5.23 Butterfly Species List Recorded Around the Survey Area

No.	Family Name	Species Name	Common Name	IUCN Status
1	Papilionidae	*Papilio polytes*	Common Mormon	NE
2	Papilionidae	*Papilio paris*	Paris Peacock	NE
3	Pieridae	*Catopsilia pyranthe*	Mottled Emigrant	NE
4	pieridae	*Catopsilia pomona*	Lemon Emigrant	NE
5	Pieridae	*Eurema hecabe*	Common Grass Yellow	NE
6	Pieridae	*Leptosia nina*	Psyche	NE
7	Nymphalidae	*Junonia atlites*	Grey Pansy	NE
8	Nymphalidae	*Junonia orithya*	Blue Pansy	LC
9	Nymphalidae	*Junonia lemonias*	Lemon Pansy	NE
10	Nymphalidae	*Ariadne merione*	Common Castor	NE
11	Nymphalidae	*Euthalia aconthea*	Common Baron	NE
12	Nymphalidae	*Danaus chrysippus*	Plain Tiger	LC
13	Nymphalidae	*Danaus genutia*	Common Tiger	NE
14	Nymphalidae	*Tirumala limniace*	Blue Tiger	NE
15	Nymphalidae	*Orsotriaena medus*	Nigger	NE
16	Nymphalidae	*Hypolimnas bolina*	The Great Eggfly	NE
17	Nymphalidae	*Melanitis zitenius*	Great Evening Brown	NE
18	Nymphalidae	*Ypthima baldus*	Common Five-ring	NE
19	Lycaenidae	*Castalius rosimon*	Common Pierrot	NE
20	Lycaenidae	*Caleta caleta*	Angled Pierrot	LC
21	Lycaenidae	*Prosotas dubiosa*	Tailless Lineblue	NE
22	Hesperiidae	*Oriens gola*	Common Darlet	NE
NE=Not Evaluated, LC=Least Concerned				

Hypolimnas bolina (The Great Eggfly)

Melanitis zitenius (Great Evening Brown)

Euthalia aconthea (Common Baron)

Ypthima baldus (Common Five-ring)

Figure 5.20 Photo of Butterfly Species List in Survey Area

Odonata

A total of 3 species of dragonflies and 2 species of damselflies were found and recorded in the survey area. All dragonfly species belong to the Libellulidae family, while damselfly species are from the Calopterygidae and Coenagrionidae families. According to the IUCN Red List (2024-2), no endemic species were recorded, and none were classified under major threats.

Table 5.24 List of Dragonfly Species Recorded Around the Survey Area

No.	Family Name	Species Name	Common Name	IUCN Status
1	Libellulidae	*Orthetrum sabina*	Green Marsh Hawk	NA
2	Libellulidae	*Trithemis pallidinervis*	Long-Legged Marsh Glider	LC
3	Libellulidae	*Crocothemis servilia*	Scarlet Skimmer	LC

No.	Family Name	Species Name	Common Name	IUCN Status
4	Calopterygidae	*Neurobasis chinensis*	Stream Glory	LC
5	Coenagrionidae	*Ischnura mildredae*	Dartlet	NE
NE=Not Evaluated, LC=Least Concerned, NA=Not Applicable				

Orthetrum Sabina (Green Marsh Hawk)

Trithemis pallidinervis

Crocothemis servilia (Scarlet Skimmer)

Ischnura mildredae (Dartlet)

Figure 5.21 Photo of Dragonfly and Damselfly Species List in Survey Area

Bird

A total of 55 bird species were recorded during the survey period. The Grey-headed Parakeet (Psittacula finschii) and Blossom-headed Parakeet (Psittacula roseata), both classified as Near-Threatened, were observed in the project area. The Red Junglefowl (Gallus gallus), a member of the Phasianidae family, was found near the survey site and is listed as a forest bird. Additionally, the Long-tailed Shrike (Lanius schach), from the Laniidae family, was also noted as a forest bird. From the Dicruridae family, the Ashy Drongo (Dicrurus leucophaeus) and Hair-crested Drongo (Dicrurus hottentottus) were found near the survey site and are classified as forest bird species. The White-vented Myna (Acridotheres javanicus), a species from the

Sturnidae family, is listed as Vulnerable on the IUCN Red List and was found in the project area. Other bird species in the area were classified as Least Concern on the IUCN Red List.

Table 5.25 Bird Species Photo Recorded During Survey

No	Scientific Name	Common Name(s)	Family	IUCN Status
1	*Gallus gallus*	Red Junglefowl	Phasianidae	Least concern
2	*Buteo rufinus*	Long-legged buzzard	Accipitridae	Least concern
3	*Aviceda leuphotes*	Black baza	Accipitridae	Least concern
4	*Pernis ptilorhynchus*	Oriental honey-buzzard	Accipitridae	Least concern
5	*Spillornis cheela*	Crested serpent-eagle	Accipitridae	Least concern
6	*Picus erythropygius*	Black-headed woodpecker	Picidae	Least concern
7	*Dendrocopos hyperythrus*	Rufous-bellied woodpecker	Picidae	Least concern
8	*Yungipicus canicapillus*	Grey-capped pygmy woodpecker	Picidae	Least concern
9	*Dryocopus javensis*	White-bellied woodpecker	Picidae	Least concern
10	*Dinopium javanense*	Common Flameback	Picidae	Least concern
11	*Megalaima haemacephala*	Coppersmith Barbet	Ramphastidae	Least concern
12	*Megalaima lineata*	Lineated Barbet	Ramphastidae	Least concern
13	*Coracias benghalensis*	Indian Roller	Coraciidae	Least concern
14	*Halcyon smyrnensis*	White-throated Kingfisher	Alcedinidae	Least concern
15	*Merops orientalis*	Little green bee-eater	Meropidae	Least concern
16	*Phaenicophaeus tristis*	Green-billed Malkoha	Cuculidae	Least concern
17	*Centropus sinensis*	Greater Coucal	Cuculidae	Least concern
18	*Psittacula finschii*	Grey-headed Parakeet	Psittaculidae	Near-threatened
19	*Psittacula roseata*	Blossom-headed parakeet	Psittaculidae	Near-threatened
20	*Ceropis daurica*	Red-rumped swallow	Hirundinidae	Least concern
21	*Cypsiurus balasiensis*	Asian Palm-Swift	Apodidae	Least concern
22	*Hemiprocne coronata*	Crested treeswift	Hemiprocnidae	Least concern

No	Scientific Name	Common Name(s)	Family	IUCN Status
23	*Streptopelia orientalis*	Oriental Turtle-Dove	Columbidae	Least concern
24	*Streptopelia chinensis*	Spotted Dove	Columbidae	Least concern
25	*Treron phoenicoptera*	Yellow-footed green pigeon	Columbidae	Least concern
26	*Columba livia*	Rock Pigeon	Columbidae	Least concern
27	*Vanellus indicus*	Red-wattled Lapwing	Charadriidae	Least concern
28	*Lanius schach*	Long-tailed Shrike	Laniidae	Least concern
29	*Corvus macrorhynchos*	Large-billed Crow	Corvidae	Least concern
30	*Oriolus xanthornus*	Black-hooded Oriole	Oriolidae	Least concern
31	*Aegithina tiphia*	Common Iora	Aegithininae	Least concern
32	*Sitta cinnamoventris*	Chestnut-bellied nuthatch	Sittidae	Least concern
33	*Dicrurus leucophaeus*	Ashy Drongo	Dicruridae	Least concern
34	*Dicrurus aeneus*	Bronzed Drongo	Dicruridae	Least concern
35	*Dicrurus hottentottus*	Hair-crested Drongo	Dicruridae	Least concern
36	*Copsychus saularis*	Oriental Magpie-robin	Muscicapidae	Least concern
37	*Pyconotus cafer*	Red-vented Bulbul	Pycnontidae	Least concern
38	*Pycnonotus jocosus*	Red-whiskered Bulbul	Pycnontidae	Least concern
39	*Pycnonotus melanicterus*	Black-crested Bulbul	Pycnontidae	Least concern
40	*Pycnonotus flavescens*	Flavescent Bulbul	Pycnontidae	Least concern
41	*Upupa epops*	Common Hoopoe	Upupidae	Least concern
42	*Chrysomma sinensis*	Yellow-eyed Babbler	Timaliidae	Least concern
43	*Acridotheres tristis*	Common Myna	Sturnidae	Least concern
44	*Acridotheres fuscus*	Jungle Myna	Sturnidae	Least concern
45	*Acridotheres javanicus*	White-vented Myna	Sturnidae	Vulnerable
46	*Sturnia malabarica*	Chestnut-tailed starling	Sturnidae	Least concern
47	*Saxicola caprata*	Pied Bushchat	Muscicapidae	Least concern
48	*Saxicola maurus*	Siberian stonechat	Muscicapidae	Not evaluated
49	*Prinia flaxiventris*	Plain prinia	Cisticiolidae	Least concern
50	*Prina hodgsonii*	Grey-breasted prinia	Cisticiolidae	Least concern
51	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	Dicaeidae	Least concern

No	Scientific Name	Common Name(s)	Family	IUCN Status
52	*Nectarinia asiatica*	Purple Sunbird	Nectariniidae	Least concern
53	*Anthus hodgson*	Olive-backed pipit	Motacillidae	Least concern
54	*Lonchura striata*	White-rump Munia	Estrildidae	Least concern
55	*Lonchura punctulata*	Scaly-breasted Munia	Estrildidae	Least concern

5.3.2 Forest and Vegetation Cover

The artificial lead refinery in the Bawhseng Region is located at an altitude of 4,000 to 5,000 feet above sea level. Within the block, there are no large natural forest trees, but small trees and shrubs are present, and the topography consists of small hills. The following species are found in this area: Cherry, Sein Pan, U Ka Lit, Taw Thayat, Banana, Htaw Pat, Wut Thit Sha, Thit AL, Mezali, Ma Gyi, Htin Shu, Panne, Japan Ngu, Tha Pyay, and Pin Sein.

The hills and mountains in the region generally run from northwest to southeast. Since 2012, the company has been implementing greening and food support plant cultivation activities in the Bawhseng Mine Block. In the natural environment of the Bawhseng Region, species such as Bamboo, Me Za Li, Sein Pain, Banana, Htaw Pat, Cherry, Htin Shu, Ma Gyi, U Ka Lit, Kyauk Hin Shu, Panne, and Pin Sein are found.

5.3.3 Protected and Environmentally Sensitive Areas

Protected Areas are one of the most important tools for biodiversity conservation, safeguarding ecosystem services, and preserving cultural landscapes. Myanmar has 42 Protected Areas, of which seven are ASEAN Heritage Parks (AHPs), recognized for their biodiversity value within ASEAN countries, and five are Ramsar Sites (wetlands of international importance). There are no protected areas in the immediate vicinity of the project area, as shown in Figure 5.22. However, several significant protected and reserved areas are located over 30 kilometers away from the project site. These include the Inlay Wetland Wildlife Sanctuary, Panlaung Pyadalin Cave Wildlife Sanctuary, Taunggyi Bird Sanctuary, Kubyin Reserve Forest, Kyatsakan Reserve Forest, Pyinyaung Reserve Forest, and Myitha Reserve Forest.

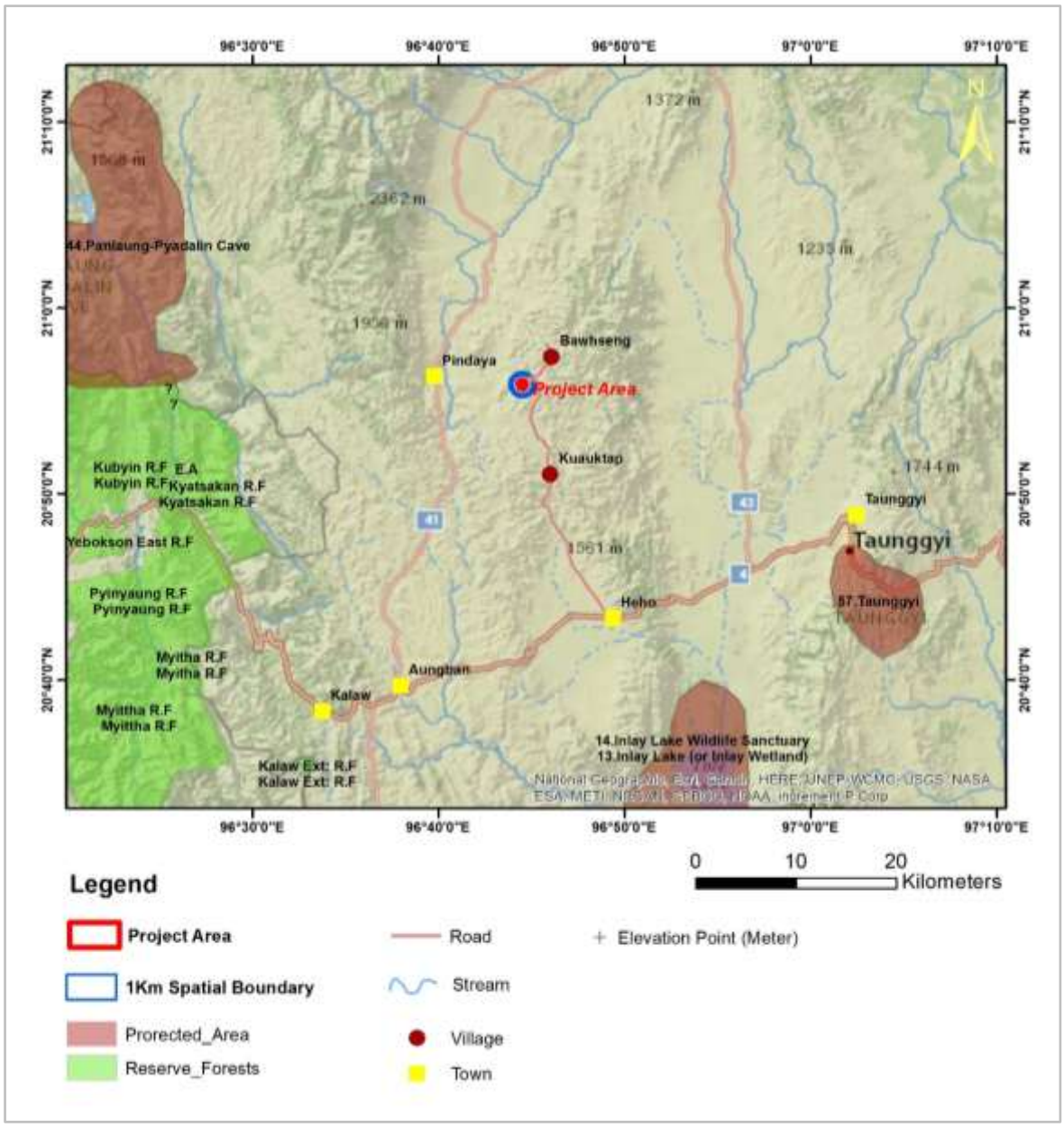


Figure 5.22 Protected Area and Sensitive Area Map

5.4 Human Environment

The proposed project is situated in the Bawhseng area, approximately 37.15 km northeast of Kalaw Township in southern Shan State, Myanmar. The socio-economic study for the area focused on aspects such as demographic structure, local economic activities, income levels, education, and other related factors impacting local communities within Kalaw Township, Shan State (South). According to the 2023 report by the General Administration Department, Kalaw Township encompasses 253 villages, 26 village tracts, 3 sub-townships, and 1 township.

5.4.1 Demographic Information

Kalaw Township has a total population of 171,161, comprising a diverse community with distinct urban and rural characteristics. Of this total, 61,892 residents live in urban areas, where they enjoy access to various amenities and services, while the remaining 109,269 people reside in rural settings, often engaged in agriculture and traditional livelihoods. This demographic distribution highlights the contrast between urban development and rural lifestyles. The following Table and Figure are examined about the urban and rural population of Kalaw Township in 2023.

Table 5.26 Urban & Rural Population

No	Population	Population		Total
		Male	Female	
1	Urban Population	29498	32394	61892
2	Rural Population	54595	54674	109269
Total Population		**84093**	**87068**	**171161**

Source; General Administration Department* Kalaw Township *(2023)

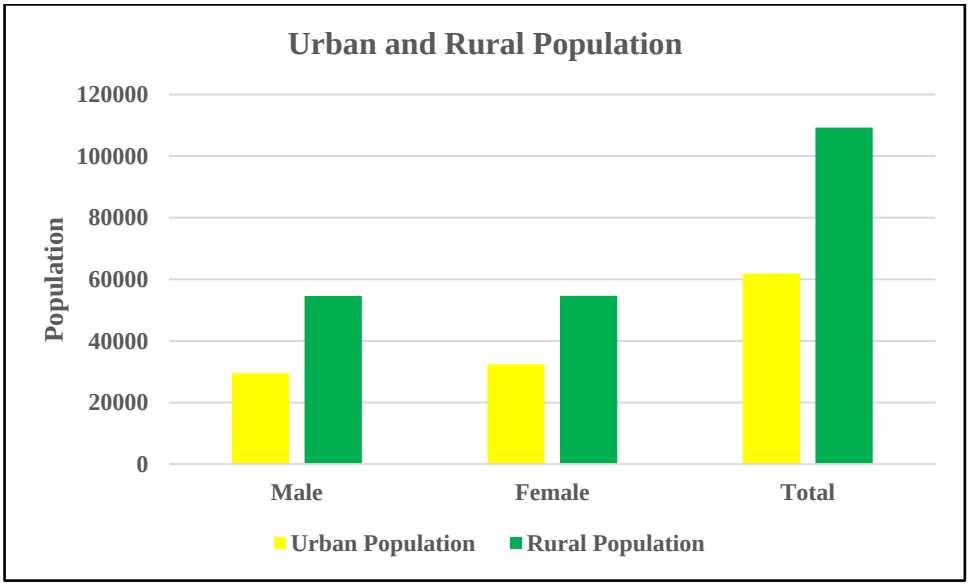


Figure 5.23 Urban & Rural Population

5.4.2 Population, Household and House Status

According to Table 5.27 in 2023, the total population, households, and houses are higher in Kalaw than in others.

Table 5.27 Population, Household and House Status

No	Towns	Population	Household	House
1	Kalaw	92051	30057	29624
2	Aungpan	25545	7249	6759
3	Heho	8276	2899	2772
Total		**125872**	**40205**	**39155**

Source; General Administration Department* Kalaw Township *(2023)

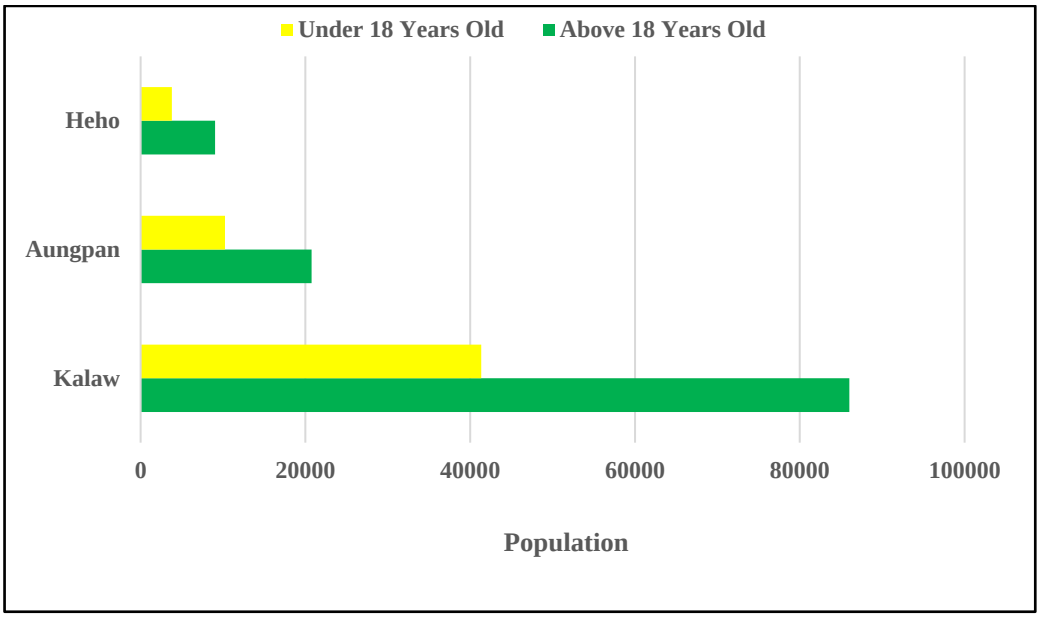
5.4.3 Above and Under 18 years old

The following Table is presented above and under 18 years old in the study area. In this case, above 18 years old are more in all the three sub-townships, especially in Kalaw which township was a large population size than others.

Table 5.28 Above and Under 18 years old in the Study Area

No	Towns	Above 18 Years Old			Under 18 Years Old			Total Population
		Male	Female	Total	Male	Female	Total	
1	Kalaw	42362	43646	86008	20801	20543	41344	127352
2	Aungpan	9690	11061	20751	5175	5056	10231	30982
3	Heho	4224	4811	9035	1841	1951	3792	12827

Source; General Administration Department* Kalaw Township *(2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.24 Above and Under 18 years Old in the Study Area

5.4.4 Economic Status

Kalaw Township is located in South of Shan State and the economy of local people in the township mainly depends on the agricultural sector.

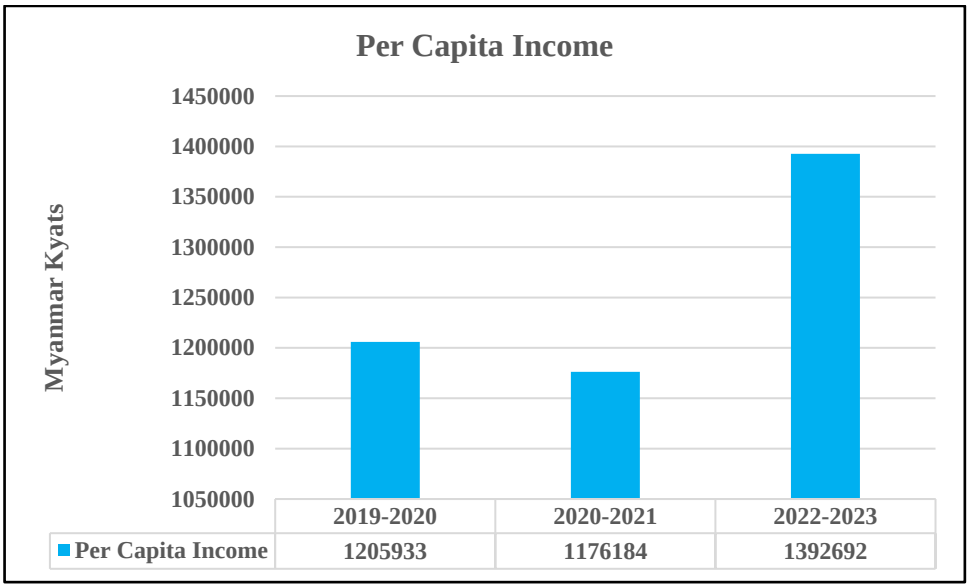
5.4.5 Per Capita Income

Based on the secondary data received from the related GAD office, the income of the person for a year from 2019 to 2023 could be identified as follows Table. The annual per capita income of Kalaw Township was gradually increasing.

Table 5.29 Per Capita Income (MMK) Status of Kalaw Township

Income Status	2019-2020	2020-2021	2022-2023
Per Capita Income	1205933	1176184	1392692

Source; General Administration Department Kalaw Township (2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.25 Per Capita Income of Kalaw Township

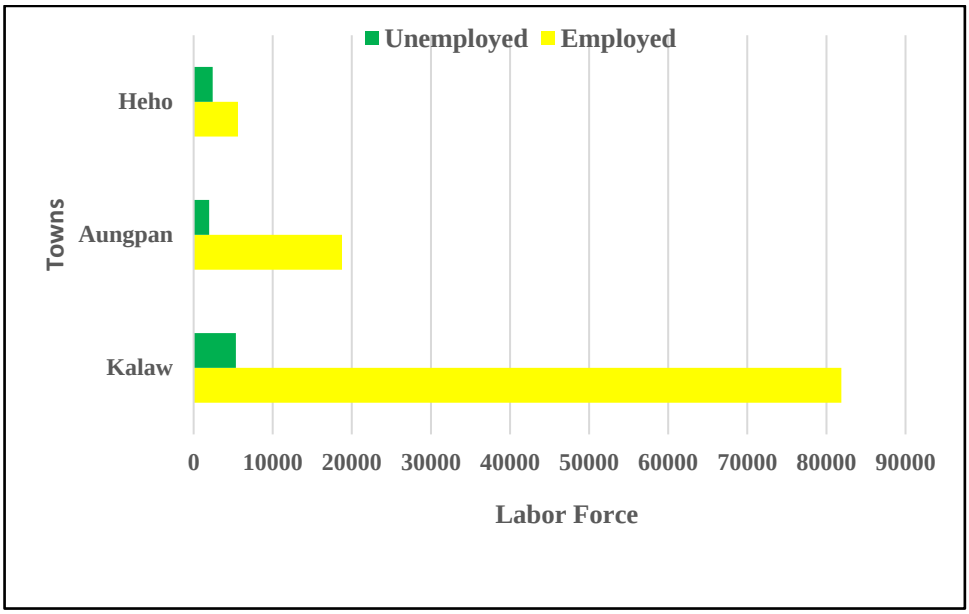
5.4.6 Employment and Unemployment

The labor force was 87221 in Kalaw, 20722 in Aungpan, and 8009 in Heho Town. The total labor force of 91.6 percent was employed and only 8.4 percent was unemployed. The following Table and Figure presents the employed and unemployed of Kalaw Township.

Table 5.30 Employment and Unemployment

No	Towns	Labor force	Employed	Unemployed
1	Kalaw	87221	81889	5332
2	Aungpan	20722	18752	1970
3	Heho	8009	5610	2399
Total		**115952**	**106251**	**9701**

Source; General Administration Department Kalaw Township (2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.26 Employment and Unemployment

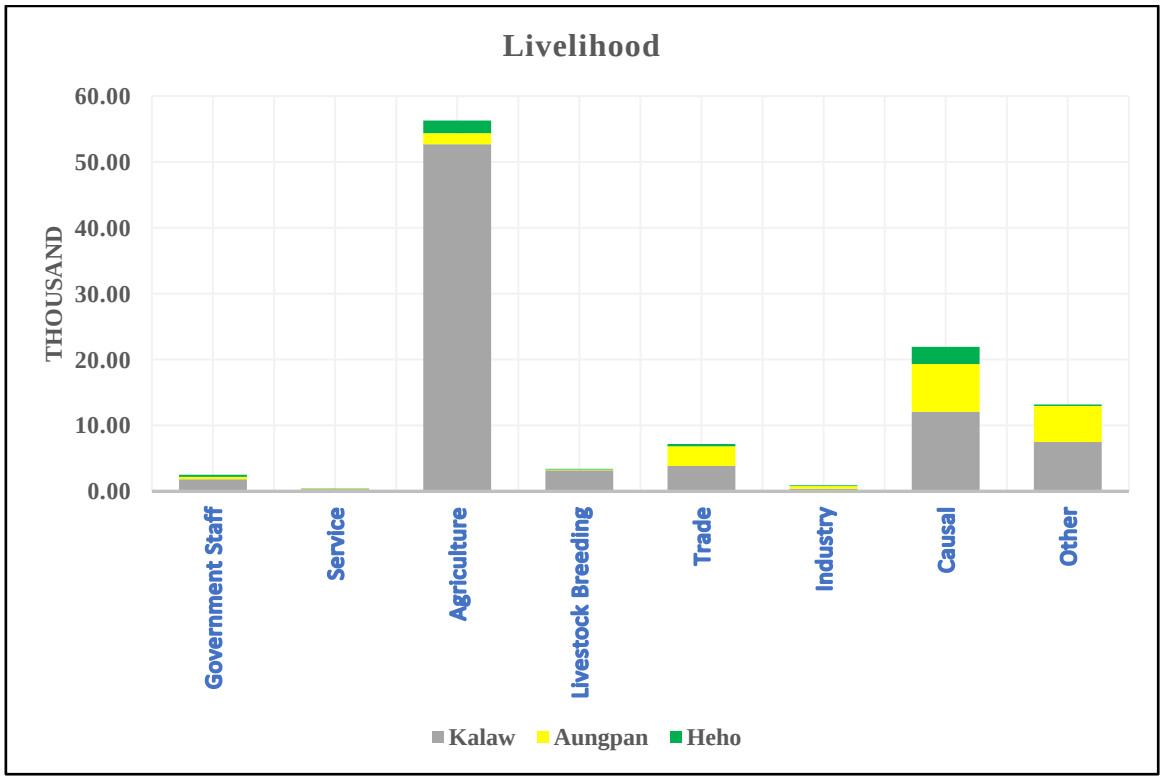
5.4.7 Livelihood

The total Employed of Kalaw Township was 106251 persons in 2023. According to the following Table and Figure shows that most of the people from the township were working in Agriculture, Casual work, Trade and other.

Table 5.31 Livelihood status of Kalaw Township

No	Towns	Government Staff	Service	Agriculture	Livestock Breeding	Trade	Industry	Fishing	Causal	Other
1	Kalaw	1846	326	52690	3184	3840	379	-	12077	7500
2	Aungpan	364	83	1681	135	3000	418	-	7250	5463
3	Heho	310	31	1913	88	343	110	-	2596	219

Source; General Administration Department Kalaw Township (2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.27 Livelihood Status

5.4.8 Social Infrastructures

The education and healthcare infrastructures are studied in this section.

(a) Education

The current basic education system in Myanmar comprises six years of primary (Grade 1 to Grade 6), three years of lower secondary (Grade 7 to Grade 9) and two years of upper secondary (Grade 10 and Grade 11) education. The following Table presents the education infrastructure development condition of Kalaw Township. The township has basic education such as high schools, middle schools, primary schools, and monastery education schools.

Table 5.32 Number of Education Infrastructures

No	Towns	High School	Middle School	Primary School	Monastery Education School
1	Kalaw	13	21	121	-

No	Towns	High School	Middle School	Primary School	Monastery Education School
2	Aungpan	6	-	11	2
3	Heho	1	1	10	-

Source; General Administration Department Kalaw Township (2023)

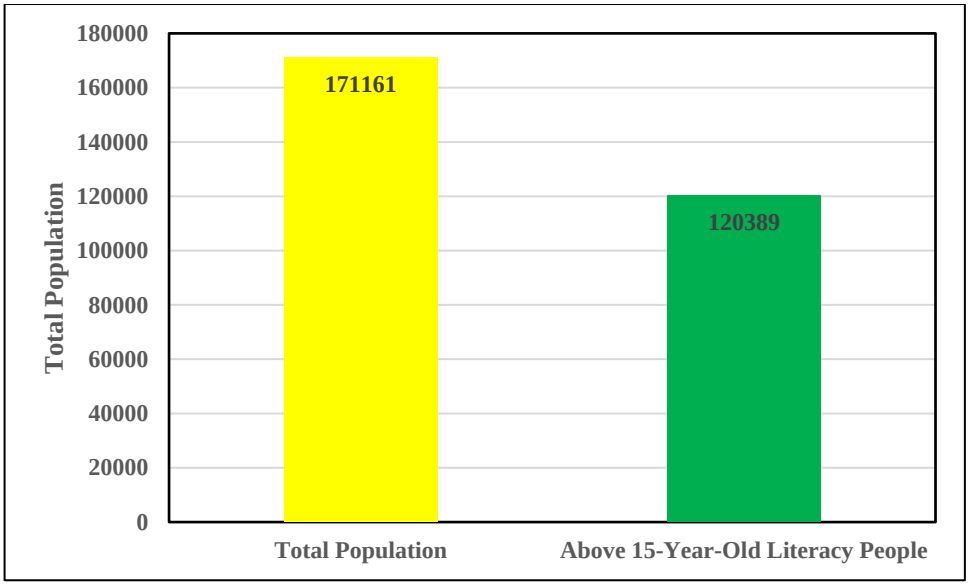
(b) Literacy Condition in Kalaw Township

The literacy of those aged 15 in Kalaw Township is presented in the following Table and Figure. According to the General Administration Department of Kalaw Township in 2023, the total population was 171161 while above 15-year-old has 120389 persons.

Table 5.33 Above 15-Year-Old Literacy People in Kalaw Township

No	Township	Total Population	Above 15-Year-Old	Above 15-Year-Old Literacy People
1	Kalaw	171161	120389	120389

Source; General Administration Department Kalaw Township (2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.28 Above 15-Year-Old Literacy People in Kalaw Township

(c) Healthcare Facilities

As shown in Table 5.34 the public health condition, the township had 6 hospitals, 37 clinics, and 28 rural health care centers. The overall condition of the health including life expectancy (male/female), and major diseases are described as follows.

Table 5.34 Number of Healthcare Facilities

No	Hospital	Clinic	Rural Health Care
1	6	37	28

Source; General Administration Department Kalaw Township (2023)

(d) Life expectancy (male/female)

The life expectancy in Kalaw Township being higher than the national average appears to be accurate based on available data, though precise figures for the region are not always easy to find. According to the most recent estimates, the national average life expectancy in Myanmar is around 64.7 years (WHO). For Kalaw Township, the reported life expectancy at birth is 66.3 years (MIMU), which is indeed slightly higher than the national average. Additionally, like the national trend, women in Kalaw have a higher life expectancy than men, with female life expectancy reported at 69.4 years compared to 63.2 years for males (WHO). This trend of women living longer than men is consistent with general patterns observed worldwide, where females tend to have a longer life expectancy than males due to various biological and socio-economic factors.

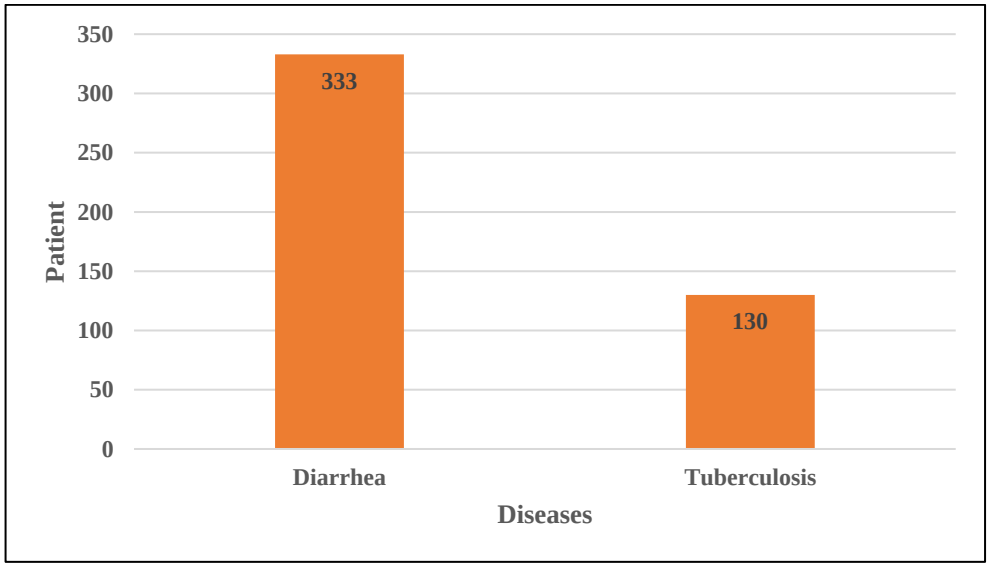
(e) Major Diseases

Five kinds of diseases were the major disease in Kalaw Township. Kind of Major diseases shown in Table 5.35. The Figure in major disease happen presented the number of patients and major diseases. According to Figure 5.29, Diarrhea was more happened in the Kalaw Township.

Table 5.35 Kind of Major Disease

No	Kind of Disease									
	Malaria		Diarrhea		Tuberculosis		Dysentery		Hepatitis	
	Happen	Death	Happen	Death	Happen	Death	Happen	Death	Happen	Death
1	-	-	333	-	130	-	-	-	-	-

Source; General Administration Department Kalaw Township (2023)



Source; General Administration Department Kalaw Township (2023)

Figure 5.29 Major Disease in Kalaw Township

5.4.9 Transportation

Kalaw Township is strategically located along the Yangon-Taunggyi Road, providing crucial connectivity to various regions within southern Shan State. Heho Airport, also situated within Kalaw Township, serves as a major regional hub for air travel, with international codes IATA: HEH and ICAO: VYHH. The combined accessibility of road and air transport significantly supports tourism, trade, and economic growth within Kalaw and its neighboring areas.

In addition to road and air links, the Yangon-Shwe Nyaung railway traverses Kalaw Township, establishing a vital transport corridor in southern Shan State. This railway line connects Kalaw to Heho, facilitating both the movement of passengers and the transport of goods across nearby

towns. Extending to Aungpan, it bolsters local trade and tourism, promoting economic integration and development opportunities for communities along the route. The railway system thus plays a fundamental role in enhancing regional connectivity and economic prospects for Kalaw Township.

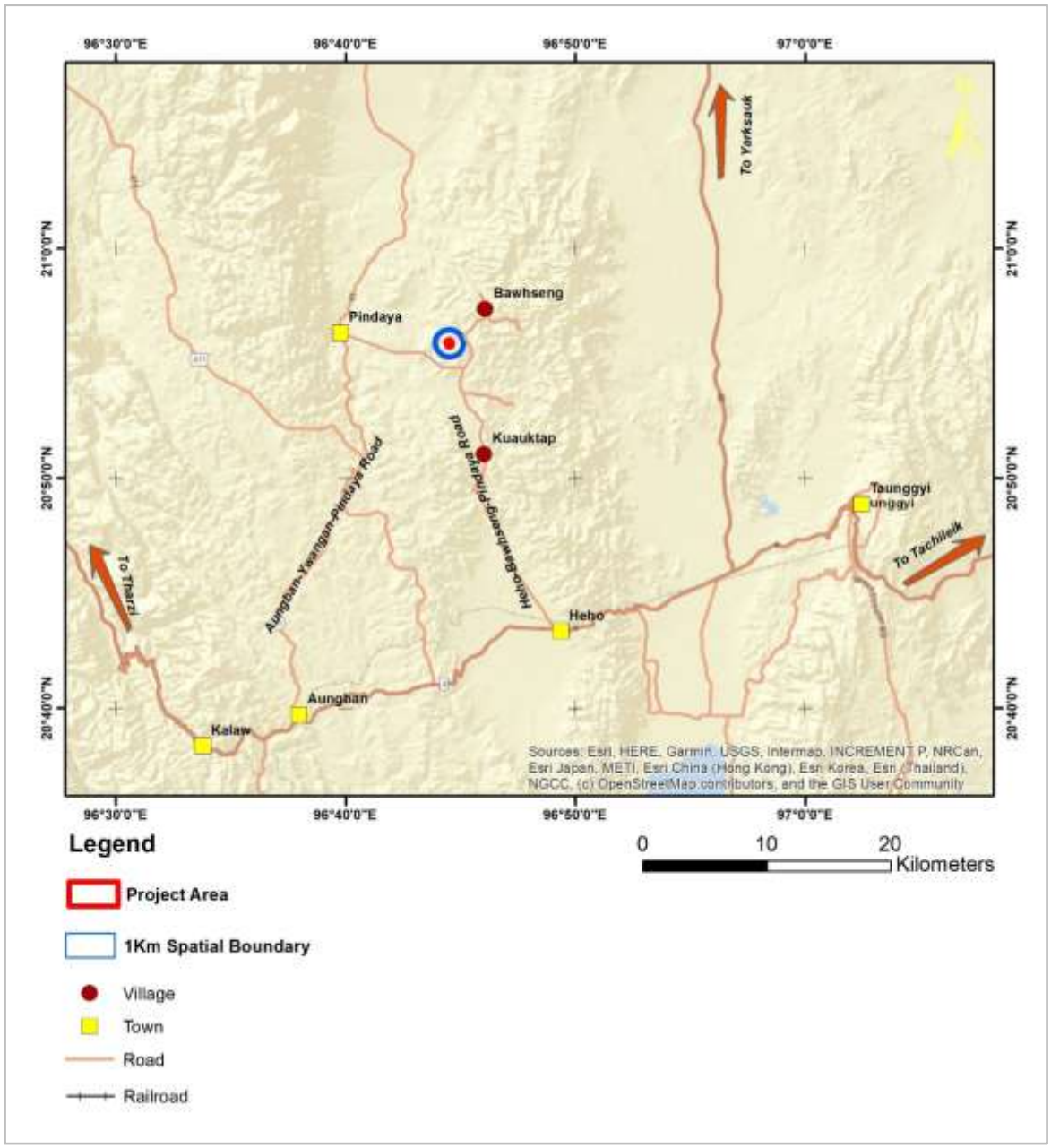


Figure 5.30 Transportation Condition in Kalaw Township

5.4.10 Cultural Components

The town of Kalaw, once a British colonial hill station, retains charming architectural elements such as colonial buildings, traditional Shan houses, and Buddhist pagodas that are prominent cultural features in the area. Many historic monasteries and temples are spread across the township, including the famous Aung Chan Tha Zedi and the Hnee Pagoda, which houses a 500-year-old bamboo Buddha statue, revered by locals and visitors alike. The following Table shows the religious buildings in this township.

Table 5.36 Number of Religious Buildings

No	Pagoda	Stupa	Monastery	Convent School	Chapels
1	495	222	186	2	99

Source; General Administration Department Kalaw Township (2023)

5.4.11 Visual Components

Kalaw Township is nestled among the Shan Hills, offering breathtaking views and a serene mountain landscape that is among the most beautiful in Myanmar. Known for its cool climate and natural charm, Kalaw is a popular destination for outdoor activities and cultural experiences. Visitors can explore the scenic trails and take in views of rolling hills, pine forests, and terraced farms, perfect for trekking and bird-watching. Not far from Kalaw, Inle Lake offers a picturesque escape with floating gardens, stilt villages, and traditional boat tours. The town itself is home to colonial-era architecture, bustling local markets, and vibrant cultural festivals that reflect the diversity of its ethnic communities. This makes Kalaw not only a hub for adventure but also a window into the rich cultural heritage of the Shan State.

6. IMPACT ASSESSMENT AND MITIGATION MEASURES

6.1 Method and Approach to Impact Assessment and Mitigation Measure

This chapter outlines the potential environmental and biodiversity impacts generated by the project throughout its construction, operational, and closure phases, based on the project description and biophysical baseline results. It also details the mitigation measures that will be implemented to prevent or minimize these impacts. Currently, the existing project is in the operational stage.

To prepare the impact assessment, assessment team has referred the information provided by the project developer and as well as all possible secondary data information, also from field through site observation, primary data collection and public consultation with the combination of professional judgments. The impact assessment was done according to the following methodology.

6.1.1 Impacts Nature and Type

Whether an impact is beneficial or adverse (impact nature), and the way in which it is related to the Project (impact type, e.g., direct, indirect) are relevant to the EIA process. In particular, the degree to which an impact may be managed or modified by the mitigation measures is dependent upon the impact nature and type.

6.1.2 Impact Magnitude

The magnitude of an impact is a measure of change from baseline conditions. This measure of change will be described in terms of its spatial extent (site, local, regional, and international), duration (temporary, short-term, long-term, and permanent), frequency (intermittent, seasonal, and constant), importance (low and high), magnitude of change (small, medium, and large) and reversibility (irreversible, short-term recovery and long-term recovery).

Table 6.1 Criteria of Evaluating the Significance of Impacts

Criteria	Definition	Attribute
Spatial extent	The geographic area of the impact	▪ Site ▪ Local ▪ Regional

Criteria	Definition	Attribute
		▪ International
Duration	The time scale for activity	▪ Temporary ▪ Short-term ▪ Long-term ▪ Permanent
Frequency	The rate at which activity occurs or is repeated over a particular period.	▪ Intermittent ▪ Seasonal ▪ Constant
Importance	The value that is attached to a specific environmental component in its current condition.	▪ Low ▪ High: - Human health - Subsistence Agriculture - Protected area or species - Global or national importance - Commercially Valuable - Culturally Important
Magnitude of change	The amount of change in environmental component	▪ Low ▪ Moderate ▪ High
Reversibility (Resilience)	The ability of the environmental components to recover their value after an impact has occurred	▪ Irreversible ▪ Short term recovery ▪ Long term recovery

6.1.3 Impact Significance

The impact significance of the project will be classified into the following categories.

Table 6.2 Assigning Significance

No Impact:	The potential impact of project activity will be assessed as No Impact if the project activity is physically removed in space or time from the environmental parameter.
Significant Impact:	An impact is said to be Significant if the activity has potential to affect an environmental or social component; and if the a) Importance of environmental or social component is - high; or b) Spatial extent of the impact is - regional, national, or international; or c) Time scale of the impact is - long term or permanent; or d) Magnitude of the change in the environmental or component is - moderate or high; or e) Impact is irreversible or the recovery of the component will take a long period of time.
Insignificant Impact:	If an impact occurs but does not meet the criteria for significance it is assigned the category Insignificant.
Unknown Impact:	The potential impact of a project activity will be assessed as being Unknown if: a) The nature and location of the project activity is uncertain. b) The occurrence of the environmental component within the study area is uncertain. c) The time scale of the effect is unknown. d) The spatial scale over which the effect may occur is unknown; or e) The magnitude of the effect cannot be predicted.

Although beneficial impacts of the Project will be identified within the EIA, beneficial impacts will not be assessed in terms of impact magnitude. The reasoning behind each evaluation will be explained in the EIA report.

6.2 Assessment of Potential Future Impact

6.2.1 Construction Phase

The construction phase of the lead washing plant has now been completed, and the plant is currently in its operational phase. As the plant is now in its operational phase, the focus of environmental monitoring and mitigation will be on assessing and managing potential impacts arising from ongoing operations rather than construction-related activities. Designed for temporary use, this project will only operate if the main metal refinery plant is shut down for maintenance or other reasons, which limits its duration and impact. The plant occupies a relatively small area of (3.28 acres) and is located in an isolated area to minimize environmental and social impacts. There are no villages within a 3-kilometre radius of the site, and no rivers or streams are present nearby, which reduces the potential for air, noise, water pollution, or disruption to community resources. Additionally, the Lead Washing Plant operates with minimal staffing, which reduces potential health and safety impacts on both workers and nearby communities. Since the plant is only intermittently operational, its overall environmental impact is expected to be low. The project will be carried out to have an insignificant impact during its temporary operation with the national environmental quality guidelines carefully followed to ensure compliance and minimize any negative impacts.

6.3 Assessment of Impact on Key Environment Component during Operation

6.3.1 Physical Component

(a) Air Quality Impact

The process of pouring mud and lead mixture into small washing tanks has an impact on air quality. As water is injected with a pressure pump, the agitation can release dust and fine particulate matter into the air, potentially containing lead particles. Particulate Matter is mostly dispersed by the wind. This dust can pose health risks to workers and nearby communities if proper dust control measures are not implemented. During the process, the mud, sand, and lead particles are mixed with water, which helps settle larger particles but may still allow smaller,

lead dust to escape. After washing, the remaining solid lead is collected, and the clean lead is then bagged for storage in a warehouse.

The transportation of raw material from the working face to the washing plant by dump trucks has an impact on air quality. As these trucks operate, they generate gas emissions primarily from the combustion of fuels used in their engines. These emissions can include nitrogen oxides, carbon monoxide, and particulate matter, all of which contribute to air pollution and can negatively affect both environmental and human health.

The impact assessment is summarized in the following Table.

Impact Nature and Type	Beneficial	Adverse	Direct	Indirect
	Air pollution from the lead washing plant is primarily caused by the emissions of particulate matter and gases. These emissions can have adverse impacts on human health.			
Spatial Extent	Site	Local	Regional	National
	Particulate matter and gases are dispersed within and around the washing plant area.			
Duration	Temporary	Short term	Long term	Permanent
	The current situation of the Lead Washing Plant is to provide a temporary washing process during the shutdown of a medium-sized (150-ton) Metal Refinery Plant for various reasons. Consequently, the duration is intended to be short-term.			
Frequency	Intermittent	Seasonal	Constant	
	According to the working time, emissions and dust will occur intermittently during operation activities.			
Importance	Low	High		
	The main environmental concern associated with air pollution is likely to be limited to occupational health risk and irritation to workers.			
	Irreversible	Short term recovery	Long term recovery	

Reversibility/ Recovery Time	The impacts are reversible with short term recovery and diminish upon cessation of operation activities.			
Magnitude (size) of the Change	Low	Moderate	High	
	The magnitude of the change in air quality due to emissions from the washing plant can be considered low. This is because the concentration of pollutants is below the levels and the air quality is relatively stable even during operation.			
Impact Significance	No Impact	Insignificant Impact	Significant Impact	Unknown Impact
	The spatial extent of the impact is site, the duration is short term, the frequency is intermittent and reversible with a short recovery time, and the magnitude of the change in the air quality is low. The overall impact on this component can be considered insignificant.			

Mitigation Measures

- Implement effective dust control measures during the pouring and washing processes.
- Ensure that all machinery, including pressure pumps and dump trucks, is well-maintained to reduce emissions and minimize dust generation.
- Schedule transportation and handling activities during times of lower wind conditions to minimize the dispersion of dust and emissions.
- Provide appropriate PPE, including respirators or dust masks, to workers who may be exposed to elevated levels of dust and lead particles during operations.
- Conduct regular air quality monitoring to assess levels of particulate matter and emissions.

(b) Noise and Vibration

The lead washing plant generates noise and vibration primarily from equipment operations, including pumps and shovel tools. Additionally, the transportation of raw materials via dump trucks contributes to the overall noise level. These sources of noise and vibration can impact both the work environment and nearby communities. Prolonged exposure to high noise levels may lead to annoyance and stress among workers. However, it is assumed that the project's surrounding area and residential are not affected because the noise and vibration measurement

results mentioned in Section 5 are within the Myanmar National Environmental Quality (Emission) Guidelines.

The impact assessment is summarized in the following Table.

Impact Nature and Type	Beneficial	Adverse	Direct	Indirect
	Noise and vibration are impacts of lead washing plant operations resulting from project activities. This noise and vibration pollution can lead to hearing loss and affect both mental and physical health.			
Spatial Extent	Site	Local	Regional	National
	These impacts from operational activities are only within the site.			
Duration	Temporary	Short term	Long term	Permanent
	The current situation of the Lead Washing Plant is to provide a temporary washing process during the shutdown of a medium-sized (150-ton) Metal Refinery Plant for various reasons. Consequently, the duration is intended to be short-term.			
Frequency	Intermittent	Seasonal	Constant	
	Project activities will occur intermittently during working hours.			
Importance	Low	High		
	The environmental concern associated with noise and vibration is potential impact of hearing loss, mental and physical health for workers.			
Reversibility/ Recovery Time	Irreversible	Short term recovery	Long term recovery	
	The impacts are reversible with short term recovery and diminish upon cessation of operation activities.			
	Low	Moderate	High	

Magnitude (size) of the Change	The measured noise and vibration results are within the NEQG guideline, so noise and vibration impact during the operation phase at the lead washing plant is considered as low.			
Impact Significance	No Impact	Insignificant Impact	Significant Impact	Unknown Impact
	The spatial extent of the impact is site, the duration is short term, the frequency is intermittent and reversible with a short recovery time, and the magnitude of the change in the noise and vibration is low. The overall impact on this component can be considered insignificant.			

Mitigation Measures

- Regular maintenance of machinery, including pumps and shovel tools, is essential to ensure they operate efficiently and quietly.
- Turn off all machinery and equipment when not in use.
- Use machinery and equipment only during specified working hours.
- Ear muffs and other personal protective equipment (PPE) will be provided to workers as needed.
- Provide training for workers on noise management practices and the importance of minimizing noise and vibration during operations.
- Regularly monitor noise and vibration levels to ensure compliance with the Myanmar National Environmental Quality (Emission) Guidelines.
- Maintain open lines of communication with nearby communities to address any concerns related to noise and vibration.

(c) Water Quality Impact

During the lead washing process, water is injected using a pressure pump to separate lead from the mud, sand, and lead mixture. This process does not involve the use of any chemical materials, which helps minimize potential chemical contamination. The mud and lead mixture are placed into small washing tanks where it is agitated by pressured water sprays. This washing action allows the lead to settle while the muddy sand is washed away. The muddy sand, along with any suspended particles, is carried away by the washing water into the First Tailing Pond. This system is designed to manage and contain the sediment and impurities removed during

the washing process. The water then flows sequentially through the First, Second, and Third Tailing Ponds. Each pond allows for sedimentation, where larger particles settle out, improving the quality of the water. After passing through the tailing ponds, the water arrives at the Fourth Tailing Pond, where it is further clarified. The water is then pumped into a 30,000-gallon water storage pond, where it is recycled for future use in the washing process.

While the lead washing process is designed to minimize chemical use and control sediment, there is still a potential risk of elevated lead levels and other contaminants in the water that flows through the tailing ponds. Effective management of the tailing pond system is crucial to ensure that water quality standards are maintained. If not managed properly, this can lead to adverse effects on local water bodies. If contaminated water is released into nearby water bodies, it could harm aquatic life and disrupt local ecosystems. However, there are no rivers and streams within 3-kilometer radius of the project site. This distance helps reduce the potential risk of direct water contamination from the lead washing process, providing an added layer of protection for local water resources.

The water used in the lead washing plant is sourced from a rainwater storage pond. This system collects and stores rainwater, which is then utilized for the washing process. By relying on rainwater, the plant minimizes its impact on local water resources and promotes sustainable water management practices. The use of collected rainwater also reduces the need for additional water extraction from other sources. Regular maintenance of the rainwater storage system ensures the quality and availability of water for the washing operations.

The impact assessment is summarized in the following Table.

Impact Nature and Type	Beneficial	Adverse	Direct	Indirect
	The washing process may result in elevated levels of lead particles in the washing water. This contamination poses a risk of lead entering the tailing ponds and potentially affecting the surrounding environment.			
Spatial Extent	Site	Local	Regional	National
	Impacts on the water quality by washing activities are present in the project area and its surroundings.			
Duration	Temporary	Short term	Long term	Permanent

	The current situation of the Lead Washing Plant is to provide a temporary washing process during the shutdown of a medium-sized (150-ton) Metal Refinery Plant for various reasons. Consequently, the duration is intended to be short-term.			
Frequency	Intermittent	Seasonal	Constant	
	Impacts on the water quality will occur intermittently during operation activities.			
Importance	Low	High		
	Washing water can contribute to water pollution during the wet season. If not managed properly, this can lead to adverse effects on water quality, including elevated levels of contaminants such as lead particles and increased sedimentation.			
Reversibility/ Recovery Time	Irreversible	Short term recovery	Long term recovery	
	The impacts are reversible with short term recovery and diminish upon cessation of operation activities.			
Magnitude (size) of the Change	Low	Moderate	High	
	In lead washing plant, water pollution will release from washing water during the wet season. The impact on the water quality is low because all washing water will flow directly into the tailing ponds.			
Impact Significance	No Impact	Insignificant Impact	Significant Impact	Unknown Impact
	The spatial extent of the impact is site, the duration is short term, the frequency is intermittent and reversible with a short recovery time, and the magnitude of the change in the water quality is low. The overall impact on this component can be considered insignificant.			

Mitigation Measures

- Conduct regular monitoring of water quality in the washing process, and tailing ponds, etc.
- To prevent contamination from the washing process, a concrete drain will be constructed to connect the washing tanks to the tailing ponds. This drainage system will effectively channel the washing water, minimizing the risk of pollutants and sediments entering the surrounding environment.
- Regular maintenance of the drain system will be essential to ensure its effectiveness and to prevent blockages that could lead to overflow or contamination.
- Install sediment control measures, such as silt fences and sediment traps, around the washing area and tailing ponds to prevent sediment from entering water bodies, especially during heavy rainfall.
- Enhance rainwater storage and management systems to collect and use rainwater effectively, reducing reliance on external water sources and minimizing runoff during wet seasons.
- Maximize the recycling of water used in the washing process. Implement systems to treat and reuse water, reducing the overall volume of wastewater generated and minimizing environmental impact.
- Develop an emergency response plan for spills or accidental releases of contaminants. This plan should include immediate actions to contain and remediate any pollution events.
- Provide training for employees on best practices for managing water quality and minimizing contamination risks.
- Regularly maintain all equipment involved in the washing process to prevent leaks and spills that could introduce contaminants into the water system.
- Regularly monitor water quality to ensure compliance with the Myanmar National Environmental Quality (Emission) Guidelines.

(d) Solid Waste

In the lead washing plant, solid waste is generated from the sediment mixture that accumulates in the tailing ponds. The sediment from the First and Second Tailing Ponds is excavated using a backhoe, resulting in a solid waste mixture composed of mud, sand, and residual lead particles. Proper management of this solid waste is essential to mitigate environmental impacts,

as improper handling can lead to soil and water contamination. The excavated sediment is loaded onto dump trucks to the Metal Refinery Plant, where it will be processed further. If not managed appropriately, the solid waste from the tailing ponds can pose risks to the environment, including soil and water contamination from residual lead.

The impact assessment is summarized in the following Table.

Impact Nature and Type	Beneficial	**Adverse**	**Direct**	Indirect
	Sediment waste generated by operation activities can be impact on surrounding environment.			
Spatial Extent	**Site**	Local	Regional	National
	Impacts due to solid waste by operation activities are localized in the project area and its surroundings.			
Duration	Temporary	**Short term**	Long term	Permanent
	The current situation of the Lead Washing Plant is to provide a temporary washing process during the shutdown of a medium-sized (150-ton) Metal Refinery Plant for various reasons. Consequently, the duration is intended to be short-term.			
Frequency	**Intermittent**	Seasonal	Constant	
	Impacts due to solid waste will occur intermittently during operation activities.			
Importance	Low	**High**		
	The operation phase may lead to impacts from solid waste, primarily sediment waste, which could pose health risks to workers. Exposure to sediment, especially if it contains hazardous materials like lead, can result in skin irritation, or other health problems.			
Reversibility/ Recovery Time	Irreversible	**Short term recovery**	Long term recovery	
	The impacts are reversible with short term recovery and diminish upon cessation of operation activities.			

Magnitude (size) of the Change	Low	Moderate	High	
	Considering the type and amount of solid waste generated during the operation phase, it can be reduced to an acceptable level by adhering to the proposed mitigation measures. The excavated sediment is transported to the Metal Refinery Plant, where the remaining lead is further refined. As a result, the impacts associated with solid waste generation during the operation phase can be considered low.			
Impact Significance	No Impact	Insignificant Impact	Significant Impact	Unknown Impact
	The spatial extent of the impact is site, the duration is short term, the frequency is intermittent and reversible with a short recovery time, and the magnitude of the change in the solid waste is low. The overall impact on this component can be considered insignificant.			

Mitigation Measures

- Avoid the indiscriminate discharge of solid waste into water body by all means.
- Schedule regular removal of solid waste from the site to prevent accumulation.
- Develop a plan for the regular excavation and transport of sediment from the tailing ponds to the Metal Refinery Plant.
- Waste management system will be developed including requirements for handling and disposal of all generated waste.
- Provide training for all employees on proper waste disposal practices and the importance of minimizing waste generation.
- Educating workers about the importance of proper waste disposal and recycling can foster a culture of environmental responsibility.

(e) Soil Quality

During operation, the lead washing plant has potential impacts on soil contamination. Soil contamination can result from spills or leaks from washing tanks, drains, and storage area, as well as from accidental discharges and runoff within the facility. Without proper containment, lead particles and other contaminants may infiltrate the surrounding soil, posing environmental and health risks.

Lead particles and other contaminants may enter the soil due to spills or leaks from washing tanks, drains, or storage area. If wastewater from washing processes is not properly contained, lead may accumulate in surrounding soil. Additionally, during washing, mud and sand are mixed with lead in small tanks. Any overflow or accidental discharge may lead to sedimentation in nearby soil, altering soil texture and potentially reducing soil fertility. Furthermore, if wastewater is not adequately managed, surface runoff from rainfall may carry dissolved lead particles and sediment into the surrounding soil. This would not only impact soil quality but could also extend contamination to surrounding vegetation. Moreover, storing and handling lead in bags may lead to small leaks or particles being deposited on the ground. Improper storage conditions or handling could result in lead contamination in soil near storage facilities.

The impact assessment is summarized in the following Table.

Impact Nature and Type	Beneficial	Adverse	Direct	Indirect
	The lead washing plant has potential impacts on soil contamination. Soil contamination can result from spills or leaks from washing tanks, drains, and storage area, as well as from accidental discharges and runoff within the facility.			
Spatial Extent	Site	Local	Regional	National
	These impacts from operational activities are confined to the site area			
Duration	Temporary	Short term	Long term	Permanent
	The current situation of the Lead Washing Plant is to provide a temporary washing process during the shutdown of a medium-sized (150-ton) Metal Refinery Plant for various reasons. Consequently, the duration is intended to be short-term.			
Frequency	Intermittent	Seasonal	Constant	
	Soil impacts will occur intermittently during operational activities.			
Importance	Low		High	

<table>
<tr><td></td><td colspan="4">The environmental concern associated with soil contamination is its potential impact on occupational safety for workers. Contaminated soil can create physical hazards, such as slips and falls, and may also lead to long-term health issues.</td></tr>
<tr><td rowspan="2">Reversibility/ Recovery Time</td><td>Irreversible</td><td colspan="2">Short term recovery</td><td>Long term recovery</td></tr>
<tr><td colspan="4">The impacts are reversible with short-term recovery measures and diminish once operation activities cease.</td></tr>
<tr><td rowspan="2">Magnitude (size) of the Change</td><td>Low</td><td colspan="2">Moderate</td><td>High</td></tr>
<tr><td colspan="4">The proposed mitigation measures will be implemented to reduce the impacts to an acceptable level. The excavated sediment, including mud, sand, and lead particles, will be transported to the Metal Refinery Plant, where the remaining lead is further refined. As a result, the impacts associated with soil contamination during the operation phase are expected to be low.</td></tr>
<tr><td rowspan="2">Impact Significance</td><td>No Impact</td><td>Insignificant Impact</td><td>Significant Impact</td><td>Unknown Impact</td></tr>
<tr><td colspan="4">The spatial extent of the impact is site, the duration is short term, the frequency is intermittent and reversible with a short recovery time, and the magnitude of the change in the soil is low. The overall impact on this component can be considered insignificant.</td></tr>
</table>

Mitigation Measures

- The excavated sediment, including mud, sand, and lead particles, must be carefully collected and transported to the Metal Refinery Plant for further processing and refinement of the remaining lead.
- All sediment and soil containing contaminants will be contained using appropriate barriers or liners during excavation and transport to prevent further dispersal of lead particles or other harmful materials.
- Ensure that all washing tanks, drains, and storage areas are equipped with containment systems such as secondary containment trays, leak-proof liners, or bund walls to prevent spills or leaks from reaching the surrounding soil.

- During excavation and washing operations, effective water management practices will be implemented to prevent runoff from carrying contaminated sediments into surrounding soil or water bodies.
- Create drainage systems to manage surface runoff, ensuring that any rainwater or washing water is directed away from the contaminated area to prevent runoff from carrying dissolved lead particles into the surrounding environment.
- Implement a robust wastewater management system that captures and treats all wastewater from the washing processes before it is released.
- Store and handle lead in sealed, durable containers or bags to prevent leakage of lead particles into the ground. Implement regular inspections and maintenance of storage facilities to ensure integrity and prevent contamination.
- Conduct periodic soil sampling and analysis around the washing plant, storage areas, and wastewater discharge points to monitor contamination levels.
- Provide training to workers on proper handling techniques for lead materials and the importance of containment measures. Workers will be trained to quickly address any spills or leaks and report incidents of contamination.
- Workers involved in sediment excavation and handling will be provided with appropriate personal protective equipment (PPE), such as gloves, masks, and boots, to prevent direct exposure to contaminated soil or materials.
- Implement regular inspections and maintenance of washing tanks, storage areas, drainage systems, and wastewater treatment equipment to ensure they function as intended and are free of damage.

6.3.2 Biological Component

The project area is mainly covered by Grass/Shrub Land, and Degraded Forest. The vegetation of the area is low- rich natural environmental vegetation and the same type of vegetation is distributed in the surrounding area of the project site. The project footprint area is located in and plantation area. The artificial lead refinery in the Bawhseng Region is at an altitude of more than 4,000 to 5,000 feet above sea level. Within the block, there are no large natural forest trees, but only small trees and shrubs grow, and the topography is small hills.

Some birds, insects, mammals, reptiles, and amphibian were only living in the area. The project is located in the existing compound in the 150-ton Metal Refinery Plant. These areas were

found endangered species and protected species in 3 km buffer area. But these species were no found proposed project site.

Positive Impacts on local fauna and flora

Based on the baseline survey results, there were found Bird species were found one vulnerable species in 3 km buffer area. But these species were no found proposed project area. Mammal, Flora, Herpetology and Butterflies species was no threatened species in this area, according to IUCN Red list (2024) ver-3.1. Base on knowledge on hazards, ecological hazards in terrestrial ecosystem can be coined to be any biological, chemical, mechanical environmental or physical agent that is likely to cause harm to other organisms and damage to habitats and ecological process in the environment in the absence of their control. Potential risks that would likely occur when project is implemented.

Ecological risk/ impact assessment focused on the sensitive issues within the project footprint. The total area of the project footprint and potential new project area. Fauna diversity and population in the area is low.

The following are the potential impacts on Flora and Fauna at proposed site.

- The impacts of direct habitat loss due to annihilation of the species habitats.
- The impacts of habitat modification due to change in land management.
- The impacts of indirect habitat loss due to the displacement of birds and other fauna as a result of construction and maintenance activities.

As a wintering / feeding ground for some of the migrants, it is also possible that the species will have to find alternative sites.

(a) Flora

- Damage to natural vegetation due to deposition of dust emitted during vehicular movements and washing plant activities, restricting photosynthesis.
- Probable cutting of trees for use as fire wood by local workers.
- Potential major damage due to accidental bush/fire caused by careless workers.

(b) Fauna

- Potential direct impact on threatened faunal species.
- Potential habitat, fragmentation, destruction, and loss.
- Potential damage on wildlife and birds, breeding grounds, nesting, foraging.

- Potential disturbance due to noise and visual intrusion due to washing plant activities which will scare away the wildlife.
- Potential limitation of movement for land fauna (wildlife and also for domestic animals).
- Potential loss of wildlife due to hunting or trapping of animals by workers, if any.

Impact Nature and Type	Beneficial	**Adverse**	Direct	**Indirect**
	The impact on the surrounding ecology during the operation of the project will mainly occur from habitat loss of the 150-ton Metal Refinery Plant and Lead Washing Plant. Based on the baseline survey results. And then Bird species were found one vulnerable species in this 3 km buffer area. Mammal, Flora, Herpeto and Butterflies species was no threatened species in this area, according to IUCN Red list (2024) ver-3.1.			
Spatial Extent	**Site**	Local	Regional	National/International
	Impacts that is limited to the boundaries of the lead washing plant.			
Duration	Temporary	**Short Term**	Long Term	Permanent
	Impacts that cause a short-term change in the affected area (e.g., removal of ecological habitat).			
Frequency	**Intermittent**	Seasonal	Constant	
	Impacts are predicted to be of intermittent during operation.			
Importance	Low		**High**	
	Project site area was no found threatened species and endangered species. Within 3km buffer were found threatened species of flora and fauna. But there is no important ecosystem/habitat around the proposed project site based on IUCN red list.			
Reversibility/Recovery Time	Irreversible	Short term recovery	**Long term recovery**	
	Impacts can be reversed through the implementation of proper restoration and rehabilitation plan.			
	Small	**Medium**	Large	

Magnitude of the Change	The change is expected to be Medium where the affected environment is altered but natural functions and processes continue, albeit in a modified way.			
Impact Significance	No Impact	Insignificant Impact	Significant Impact	Unknown
	Insignificant Impact. Impacts are expected to be small limited to the site, Short Term, intermittent, and reversible with a long recovery time.			

Mitigation Measure

(a) Flora

- Plan and manage for the protection and conservation of the biological component of the environment.
- Comply with law, rule and regulation (the protection of wildlife and protected Area Law, 1994; Conservation of Environmental Law 2012 and Regulation 2014).
- Do not clear vegetation than necessary in the project area; restrict the removal of vegetation avoid as far as possible the cutting of big trees.
- Restrict the collection of fire wood, do not cut trees for fuel wood but collect fuel wood from fallen tree dried logs of branches or use charcoal for cooking.
- Fire for cooking should only be made in dedicated spot cleared from vegetation.
- Avoid open burning of debris.
- Provide basic firefighting training for a few workers.
- Identify sensitive species and habitats and try to avoid such spots as far as possible.
- Promote environment awareness to workers.
- Try to stop illegal logging inform the authority if there is any.
- Implement rehabilitation to promote natural vegetation establishment after completion of washing plant at a site.

(b) Fauna

- Plan and implement the protection and conservation of wildlife as far as possible, ensure the work have minimal disturbance or wildlife.
- Prohibit the hunting and / or trapping of wild animals, big and small including rodent, bird, reptiles, and amphibians by workers.

- Prevent the potential injury or death of wildlife due to vehicular movements especially awareness workers.
- Identify sensitive species which need to avoid seeds avoid the disturbance of animal habitat such as nest and breeding ground as far as possible.

6.3.3 Social Component

During the operational phase, activities at the lead washing plant are more extensive than in the development phase. The current role of the Lead Washing Plant is to provide a temporary washing process while a medium-sized (150-ton) Metal Refinery Plant is shut down for various reasons. The lead washing plant is situated in an area with no villages or residential zones within a 3 km radius, which significantly reduces the risk of lead exposure for nearby communities and lowers potential health impacts. However, within a 5 km radius lies Bawhseng Village, approximately 80 households where Pa Laung is the primary language. Given this proximity, the lead washing plant has the potential for both positive and negative socio-economic impacts.

On the positive side, the lead washing plant creates local employment opportunities and contributes to economic growth, benefitting nearby communities. The project also includes a Corporate Social Responsibility (CSR) program aimed at village development, with plans for infrastructure or social improvements. In a public consultation, village leaders and residents discussed their needs and identified development priorities with the project proponent, fostering collaboration. Additionally, the project provides a source of revenue for the government through taxes and royalties.

Nevertheless, potential negative impacts need careful consideration. Despite the absence of nearby residential areas within a 3 km radius, lead washing activities could still affect the surrounding environment. Plantation lands and natural water sources used by residents fall within the social area of influence, and contamination from lead particles could harm soil quality and water resources essential for agriculture. Although there are no rivers or streams within 3 km, there are plantation areas that could be impacted, necessitating careful monitoring and management to mitigate environmental impacts and protect these resources for the community.

Social concerns and conflicts: The residents may have concerns on the project activities and the conflicts can be occurred between the residents and project proponent and in the labor workforce.

Mitigation and Enhancement Measures

To avoid concerns on the project activities, the project proponent should conduct the followings:

- To conduct the project activities in accordance with instructions suggested by the respective government departments and guidelines mentioned in the EMP report
- To have liaison officer to consult the concerns between the ones who complaint and the project proponent
- To have proper grievance mechanisms to solve concerns

To minimize the conflicts,

- The project proponent has to solve the complaints in timely manner.
- The liaison officer has to receive the complaints and make sure what the problem is and negotiate between project proponent and the ones who complaints.
- For the labor workforce, the site responsible persons ensure the labors to follow the instructions mentioned in occupational health and safety policies. Besides, the project proponent should have stipulations of rules and regulations for the labors to avoid conflicts within the project site.

6.3.4 Economic Component

Within the study area, local economic activities primarily include agriculture, casual labor, trade, and other small-scale businesses. Agriculture is the main livelihood for villages in the region, with local residents engaged in plantation work, growing cash crops, and selling and trading agricultural products. The lead washing plant produces solid waste, primarily from sediment that accumulates in the tailing ponds. This waste consists of a mixture of mud, sand, and residual lead particles, excavated using a backhoe and managed carefully to prevent environmental contamination. The sediment is transported by dump trucks to the Metal Refinery Plant for further processing, which helps mitigate potential soil and water contamination.

While the lead washing plant does generate some job opportunities, the workforce requirements are minimal due to the plant's temporary role in supporting operations while a 150-ton Metal Refinery Plant is shut down. Consequently, the number of local employment opportunities is limited, which may restrict economic benefits to the broader community. Labor recruitment needs may vary depending on the specific operational requirements, potentially leading to conflicts if the local workforce expectations are not fully met.

During the social survey, some respondents expressed interest in job opportunities associated with the lead washing activities. However, due to the limited scope of operations, only a small workforce is required, resulting in minimal direct employment opportunities for the local community within the social area of influence. Nonetheless, the project will employ local labor for the available positions, allowing households with members working on-site to earn a monthly income from the project. Although limited, this employment provides a financial benefit to those households and contributes positively to the local community's economy.

Mitigation and Enhancement Measures

- To avoid the disputes through employment and to enhance the project benefits, the project will implement the following mitigation measures:
- To prioritize local hiring for any available positions to support the local economy and provide economic benefits to the community, even if the workforce is limited.
- To provide clear communication to the community regarding the limited scope of employment opportunities to manage expectations, especially due to the temporary nature of the lead washing plant's operations.
- Establish a fair and transparent recruitment process to prevent potential conflicts. Provide clear criteria for selection to ensure transparency and community trust, reducing any feelings of exclusion or bias.
- To implement a grievance mechanism to address concerns or conflicts related to employment or environmental impacts.
- Regularly engage with community leaders and representatives from the nearby villages to discuss project updates, employment opportunities, and environmental monitoring results, ensuring community awareness and involvement.
- To regularly monitor the tailing ponds to check for any potential seepage or overflow to minimize impacts on surrounding agricultural lands.

- To conduct periodic soil and water testing around the plant to detect any trace of contamination.

6.3.5 Health and Safety

At the operational level, occupational health and safety is the most important fact to pay attention to by the project. With the good guidance of project management, the workers need to follow the instructions and cooperate with the actions mentioned in the policy.

Workers involved in washing process are at risk of lead exposure, which can cause serious health issues if not properly managed. Lead exposure can occur through inhalation of lead dust, direct contact with contaminated surfaces. Chronic lead exposure can result in respiratory issues, neurological damage, kidney dysfunction, and other long-term health problems. Accidental spills or leaks can lead to environmental contamination, which can have indirect health impacts on nearby communities if lead particles enter the soil or water sources, potentially affecting agricultural products or water quality over time.

The handling of heavy machinery and equipment, such as backhoes and dump trucks, increases the risk of physical injuries. Without proper training, workers may face hazards from machinery operation, such as crushing injuries, slips, or falls. The use of pressurized water in washing tanks poses an additional risk. High-pressure equipment can lead to accidents, causing injuries. Wastewater generated from the washing process may contain dissolved lead particles and other contaminants. If improperly managed, wastewater can lead to contamination, posing direct health hazards to workers who handle or are exposed to untreated water.

Mitigation and Enhancement Measures

- Provide workers with appropriate PPE, including gloves, masks, goggles, and coveralls, to prevent direct contact with lead and other contaminants.
- Conduct regular training sessions on safe handling procedures, the use of machinery.
- Emphasize the importance of hygiene practices, such as washing hands before eating and showering before leaving the worksite, to minimize lead exposure.
- Monitor air quality in and around the plant for lead dust levels and test wastewater before disposal.
- Implement a medical surveillance program for workers exposed to lead.
- Recruit the workers with medical recommendation letters including medical history record.

- First aid facilities, medicines and ambulance are available to meet any emergency situation.
- Develop and implement an emergency response plan that includes procedures for dealing with accidental spills or leaks of lead-contaminated materials.
- Ensure that the workers at the project site follow each instruction mentioned in health and safety guidelines
- Have security guards in the site to ensure the protection and safety of the lead washing plant.
- Make rules and restrictions to avoid criminal cases in the local area committed by the project workers.

6.3.6 Cultural Components

Kalaw is home to several famous pagodas and attractive cultural sites, with a notable concentration of these in and around the urban area. The population density of Kalaw town is significantly higher, but it is located more than 37.15 km southwest of the project site. Additionally, the Bar Doo Pagoda is located over 3 km to the northeast of the project area, and Inle is situated approximately 40.35 km to the southeast. Moreover, Graveland lies about 3.91 km northeast of the project area. As a result, the impacts of the project activities on cultural components are considered negligible. In the event that any cultural or archaeological objects are encountered during operations, the project will immediately inform and cooperate with the Department of Archaeology and National Museum (Kalaw) to ensure proper handling and preservation.

6.3.7 Visual Components

The lead washing process, which separates lead mineral resources, may cause changes to the topographical features of the site. Additionally, the land cover and natural vegetation could be affected, leading to potential degradation of the landscape. However, the project includes a replantation plan as part of its rehabilitation efforts. According to the Rehabilitation and Environmental Management Plan, the project is expected to have minimal impact on visual components. These mitigation measures, such as replanting and land restoration, aim to reduce any long-term visual disturbance and promote the recovery of the natural landscape.

6.4 Assessment of Impact on Key Environment Component during Closure

During the closure phase of the Lead Washing Plant, it is essential to carefully assess the environmental impacts to ensure that all activities align with the rehabilitation goals and environmental management standards. At this stage, however, a detailed assessment of the environmental impacts associated with decommissioning cannot be fully carried out due to the plant's expected lifespan of one year. In addition, the life of the washing plant will be further extended. As a result, only general principles for closure can be established at this time.

In broad terms, the closure phase is expected to generate impacts similar to those encountered during the construction phase, including soil disturbance, waste management, and potential impacts on local water and air quality. The decommissioning methods and techniques will be selected in accordance with national and international standards that are in effect at the time of closure, ensuring that environmental impacts are minimized and proper mitigation measures are implemented. Proper planning and adherence to environmental guidelines will be crucial in reducing any negative effects during the closure phase and facilitating a successful rehabilitation of the site.

7. PUBLIC CONSULTATION AND DEVELOPMENT PROGRAM

7.1 Methodology and Purpose

The Project Proponent (TTS) developed a preliminary Stakeholder Engagement Plan (SEP) which contained an overview of the relevant stakeholder groups to be consulted and the estimate schedule for engagement activities. During the scoping, information was disclosed to various stakeholders, which included:

- Brief details about the Project;
- EIA process, study and measures;
- Purpose of the consultations;
- Expectations from the local stakeholders in regards to the consultation etc.; and
- The likely adverse impacts to the public and/or environment.

The meeting was conducted at the regional level and was structured as follows:

- Presentation of Project and Project Proponent (in Myanmar language);
- Presentation of the proposed EMP study and measures; and
- Question and Answer Session.

7.2 Stakeholder Engagement Plan

The preliminary stakeholder identification and analysis will need to be further consolidated and based around a detailed stakeholder consultation programme during the EMP Study. The importance of such an analysis lies in the role played by such an understanding in the assessment of the socio-political environment surrounding the Project. It allows for:

- Identification of key stakeholders, their primary groupings and sub-groupings;
- Identification of the interests, concerns and potential risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of key groups/ individuals who need to be informed about the Project;
- Identification of the impact and influence of the Project on the stakeholders and of the stakeholders on the Project;
- Generation of information essential to the planning, implementation and monitoring of the Project; and

- Development of a framework for participatory planning and implementation of various Project activities.

The process of stakeholder identification and analysis should allow for the formulation of a robust engagement strategy, which will then provide opportunity for the concerned stakeholders to be involved in the process of identification of areas of concerns as well as formulation of mitigation strategies for the same. This in turn should allow for the stakeholders to develop an understanding of the Project as well as the maintenance of positive relations between stakeholders and the Project Proponent.

Potentially relevant stakeholders and potentially affected communities are identified through a preliminary site visit, discussions with Irrigation and Water Utilization Management Department and a review of Google Earth imagery. A top-down approach is followed; firstly, the national level stakeholder will be consulted and contacted such as Regional, District and Township GADs. These discussions will allow the survey team to gain permission to enter the villages and also helped to map out which villages are closest to the Project Site and could be potentially affected. The stakeholder engagement plan is provided in Table.

Table 7.1 Stakeholder Engagement Plan

Level	Stakeholder Group	Purpose of Engagement	Method of Engagement
Regional	Environmental Conservation Department (ECD); Taunggyi ECD	▪ Seek clarity on the expectations on stakeholder engagement and disclosure; Get necessary permission and contacts to engage with government departments at different levels as well as to hold consultations in the Study Area; and Get access to useful data from national as well as regional offices.	Invite with Letter
Regional	Township General Administration department (GAD), Department of Public Health (Kalaw Township), (No.1) Mining Department, Forest Department, Fire Bridge Department	▪ Seek expectations on stakeholder engagement and disclosure; Seek introductory letters to meet various government departments and agencies; ▪ Seek clarity on the range of permission and approvals required at different levels of regional government; Obtain data and information.	Meeting

Table 7.2 Stakeholder Engagement Plan

Level	Stakeholder Group	Purpose of Engagement	Method of Engagement
National Level	Government Authorities concerning on Project License and relevant	▪ Seek an understanding of the requirements and plan for government	Meeting/Official Letter
District/ Township	▪ District/ Township Administration Department ▪ District/Township Farmland Management Committee; ▪ District Environmental Conservation ▪ Department (ECD); ▪ Related Governmental	▪ Seek instructions for obtaining telephone numbers from GAD departments ▪ Obtain necessary local permissions for telephone interviews at local level; ▪ Provide an understanding of the specific issues and stakeholder concerns at the local level; ▪ Obtain district and township level ▪ social and environmental data; and	Meeting/ Telephone
Village Tract / Village	▪ Village/ward Leaders, ▪ Community Opinion Leaders; ▪ Local community; and ▪ Village Tract/ ward	▪ Obtain information on local potential ▪ Impacts from the Project; and ▪ Obtain village tract and village level social and environmental data.	Meeting/ Telephone

For the public consultation meetings, one session of PCM is planned at a venue on one day in Meeting Room of Top Ten Star Production Co., Ltd, which is located at Bawhseng Village, Kalaw Township, and Southern Shan State. The venue was selected in terms of easy accessibility from villages in and around project area and the meeting room capacity of the building.

The project proponent prepared the invitation letter in Myanmar language and announced to the invitees, who are villagers, and relevant governmental organizations, and anyone who are interested.

Table 7.3 Stakeholder Engagement Selection

No.	Region	District/Township
1	Southern Shan State	Bawhseng Village, Kalaw Township

Basically, information on the meeting was announced to the invitees one week in advance before the meeting by sending invitation letters to the respective invitees. Afterward, the information on the meeting under the village level was requested to be disseminated by village tract heads of the respective villages in accordance with local practice.

7.2.1 Tools Supported and Document Preparation for the PCM

Table 7.4 Tools used for Stakeholder Consultations

Checklists/Tools	Purpose
Presentation	Approximately 30 slides which include information on the Project Proponent, information on the Project activities and timeline, potential impacts and mitigation, management and monitoring plan and CSR plan
Maps and other visual tools	A large map that shows the Study Area used during meetings to discuss potential impacts and locations of key documents.

7.3 Public Consultation

Public consultation is one part of the Environmental Management Plan to familiar the local people or stakeholder with the project. The consultation helped the Project to gather information on potentially affected people and on potential data gaps and informed the project activities.

The consultative meeting was organized with the representation from stakeholders and local people. Social team interviewed the people who are representative from Bawhseng Village, Kalaw Township and Shan State. As the result of the interview, most of their opinion on proposed project are not included the negative view and they are agreeing to implement the

proposed project. But they want to create the more job opportunities and appreciate the village development programme.

Focus Group Discussion: refers to a discussion carried out amongst a group of people (3-5) from a similar background/profile on a specific topic while being guided by a moderator. The primary purpose of such discussions is to gather an insight into the thought process of the group in regards to a particular issue working in factory. Structured in-depth interviews were held with key employees in the affected village and mine workers.

7.3.1 Stakeholders Participation and Details of Consultation Meeting

Public meeting was held on (18.11.2024) at office hall of Top Ten Stars Company Ltd, Bawhseng Village, Kalaw Township. There were about 35 people from relevant government and local people who are directly or indirectly affected by the proposed project are attended in this meeting. Attendance list, suggestion letters of public meeting and key discussions during the meeting are shown in Figure 7.1.

The Public meeting was held in following agenda;

- Opening Ceremony
- Opening Remark and Presentation about Project Planning by U Soe Tun Aung, Manager of Top Ten Star Co., Ltd.
- Presentation of Environmental Management Plan (EMP) by U De Hlaing Zaw, EIA/ESIA (Freelance Consultant)
- Recommendation and Suggestion by Attendees.
- Closing Ceremony

(1) The opening ceremony was announced at 10:00 am.

(2) U Soe Tun Aung (Manager of Top Ten Star Co., Ltd) Mingalarbar to all, the hads of relevant government departments and organizations, local elders and attendees. First of all, I would like to explain a little bit about the history of the company regarding our company limited. Our company is a Local investment company and will be investing in this project for 10 years. Our company will implement the lead washing plant and storage building (warehouse) construction project. Our company must not harm the environment. I would like to say that we will do our best to ensure safety. I would like all the dignitaries to come and give suggestions.

(3) U De Hlaing Zaw, (EIA/ESIA Freelance Consultant) Mingalarbar to all. U De Hlaing Zaw Thank you all for giving your time and attending this meeting. Our organization is neither on

the side of the company nor the side of the government, but a Third Party. We are coming to assess the advantages and disadvantages associated with the project. The main purpose of our organization is to assist as a third party in assessing and evaluating the development activities with the aim of minimizing the impact on the environment in developing the economy of the project developers and also in developing the socio-economic life of the local people. U De Hlaing Zaw was explained about the purposed of EMP work with power points. U De Hlaing Zaw was described the process of process and environmental baseline survey. The result of environmental baseline survey such as air quality, noise and vibration, water quality and soil. Environmental consultant examines the principles of environmental impact in project operation; environmental management programs; Monitoring programs and regional development programs were explained step by step. After that, the environmental consultant asked from government departments and affected villagers who attended the meeting to give suggestions.

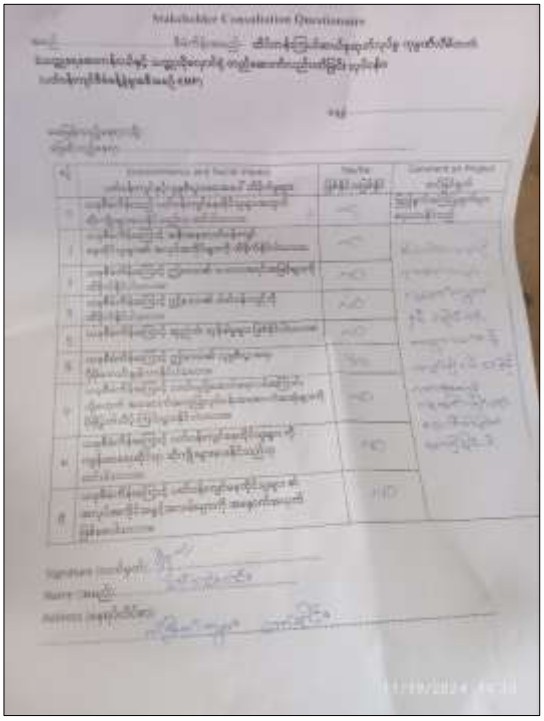


Figure 7.1 Suggestion form of Public Meeting and Key Discussions

7.4. Comments and suggestion from PCMs

The following topics and concerns have been discussed and collected during the meetings. The detailed of minutes of meeting and power point presentation used in public consultation meeting are presented in below.

U Hlyuan Moe Htet (Assistance Director, Environmental Conservation Department, Taunggyi District)	He suggested that want to know the phase of project at that time. It is necessary to show the comparison with the baseline results of other projects within the environment of the project. It is necessary to have and monitoring plans related to natural disasters. There is a need to place suggestion boxes in front of the office in order to know the residents' opinions about the project and submit suggestions.
U Sein Maung Htay (District Commissioner Environmental Conservation Department, Taunggyi District)	He was suggested that I would like to collect and test the water samples from four tailing ponds. Because it is an area where water is scarce, it is not possible to always spray with water to reduce dust and particles, so it will be practical to reduce the frequency of spraying with water. Dispose of waste materials according to disposal standards. It is necessary to implement the CSR plan. It is recommended that the summary of the report be posted on the billboard and the commitment to be followed.
U Thein Nyunt (assistance general manager, Mining Department)	In Bawhseng area, the mining block area of more than 2,000 acres has been granted to companies, and Top Ten Star Production Company is a company that operates over 7,000 acres, which is about 1/3 of all the blocks in the Bawhseng region. Top Ten Star is working partnership with the Department of Mines. Therefore, to continue to provide disaster relief and to cooperate with the guidance of experts from relevant ministries.
Daw Aye Aye Myint (Department of Health, Public Hospital of Bawhseng Village)	It was found that the health of the current company's employees has been fully implemented. It is recommended to connect with the public hospital of Bawhseng Village to provide timely care for emergency injuries and to

	continue to implement first aid training and emergency plans.
U Khun Kyar Myat Sitt (Assistance Officer, Fire Bridge Department, Bawhseng Village)	He was suggested that in case of a fire hazard due to storage of fuel oil, keep a full supply of fire-extinguishing oil, such as soap oil, which is easy to extinguish fuel oil. In order to prevent fire hazards, it is necessary to form groups and have natural disaster prevention measures in place.
Daw Thin Thin (Chairman, Greening Organization of Bawsai, NGO)	She said that As a Top Ten Star Production Company, it has been working on mining operations in Bawhseng region for more than 10 years. It was found that the company is planting trees every year not only in the mining area but also in the ponds dug for public use by schools and monasteries. In addition, free distribution of seedlings for tree planting and provision of electricity for Bawhseng region. It is recommended to continue providing other necessary assistance, making donations, etc.
U Sein Hlaing Toe (Village Elders of Innpalet Village)	He said that as a Top Ten Star Production Company, we would like to express our gratitude for creating job opportunities for the locals and for helping the livelihood of the locals a lot.
U Hla Oo Maung (Village Elders of Bawhseng Village)	He said that as a Top Ten Star Production Company, planting plants in their area; Construction was done for regional development activities. Regarding factories, all the residents of the village already know that there is no smell and no noise in the surrounding air.
U Win Naing (Village Elders of Bawhseng Village)	He said that as a Top Ten Star Production Company, we request you to continue to support

	the needs of the residents and continue to implement environmental protection activities.
U Sein Aung Htay (Village Elders of Kan Oo Village)	He said that as a Top Ten Star Production Co., Ltd, we would like to thank you for providing community benefits, greening the environment and minimizing the impact. We believe that this project will also be a project that will protect from environment impacts.

Table 7.5 Meeting with Projects Stakeholders

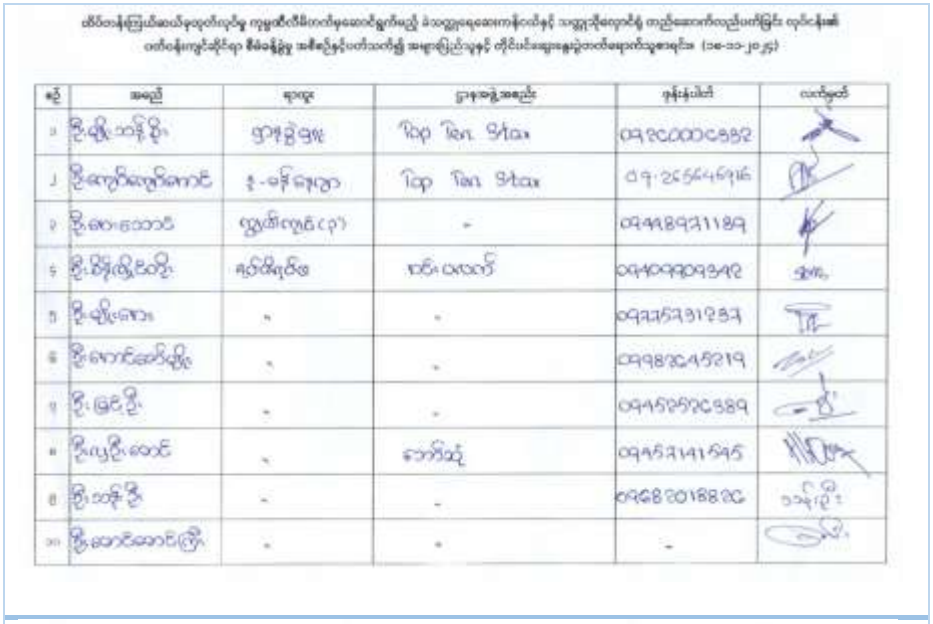
Meeting Dates	Stakeholders	Number of Participants
19th November 2024	Kawlaw Township and affected of Bawhseng Village	
	1.Government officials	8
	2.Project Proponent's representatives	3
	3.EIA Consultant (TEAM)	2
	4. Local people	18
	5. NGO	1
	Total	32

Figure 7.2 Some Record Photos During Public Meeting

Table 7.6 Attendance list of public consultation meeting of Lead washing plant and storage building construction project

Sr. no	Name	Position	Department/ Village	Contact
1	U Hlyuan Moe Htet	Assistance Director	Environmental Conservation Department, Taunggyi District	09- 43013979
2	U Sein Maung Htay	Officer	Environmental Conservation Department, Taunggyi District	09- 256216450
3	U Khun Kyar Myat Min Sitt	Assistance Officer	Fire Bridge Department, Taunggyi	09- 980990709
4	U Aye Tun Naing	corporal	Fire Bridge Department, Taunggyi	09- 263591441
5	U Phyo Phyo Kyaw	corporal	Fire Bridge Department, Taunggyi	09- 694570946
6	U Thein Nyunt	Assistance General Manager	No.1, mining Department	09- 5214407
7	Daw Aye Aye Myint	Women Health	Health Department	09- 428222329
8	Daw Aye Myat Myat Soe	Midwife	Health Department	09- 404776367
9	U De Hlaing Zaw	Environmental Consultant EIA C-041	Freelance Consultant	09- 759090018
10	Dr. Thiha Soe	Mining Consultant	Freelance Consultant	09- 250299265
11	U Myo Thant Soe	Head of Division	Top Ten Star Production Co., Ltd	09- 260006332
12	U Kyaw Kyaw Aung	Assistance Manager	Top Ten Star Production Co., Ltd	09- 265646916
13	U Aye Thaung	Skill Worker	Top Ten Star Production Co., Ltd	09- 448971189
14	U Sein Hlaing Toe	Village Elders	Innpalet Village	09- 409909342

Sr. no	Name	Position	Department/ Village	Contact
15	U Myo Aye	Village Elders	Innpalet Village	09- 775731237
16	U Aung Zaw Myo	Village Elders	Innpalet Village	09- 982645219
17	U Myint Oo	Village Elders	Innpalet Village	09- 452526389
18	U Hla Oo Maung	Village Elders	Bawhseng Village	09- 457141545
19	U Than Oo	Village Elders	Bawhseng Village	09- 682018826
20	U Maung Maung Gyi	Village Elders	Bawhseng Village	-
21	Daw Thin Thin	Chairman	Bawhseng Greening Organization (NGO)	09- 254338967
22	U Win Tun	Village Elders	Kon Myint Tharyar Ward, Bawhseng	09- 250625872
23	U Moe Kyaw Thu	Village Elders	Bawhseng Village	09- 697934496
24	U Maung Eain	Village Elders	Bawhseng Village	09- 652712049
25	U Maung Pu	Village Elders	Kon Myint Tharyar Ward, Bawhseng	-
26	U Pyae Sone Thu	Village Elders	Kon Myint Tharyar Ward, Bawhseng	09- 457697271
27	U Zaw Lin Tun	Village Elders	Kon Myint Tharyar Ward, Bawhseng	09- 675582977
28	U Zaw Lin	Village Elders	Kon Myint Tharyar Ward, Bawhseng	09- 785224597
29	U Sein Aung Htay	Village Elders	Kan Oo Village	09- 262906675
30	U Myo Aung	Village Elders	Kan Oo Village	09- 404023190
31	U Myint Oo	Village Elders	Kan Oo Village	09- 896977673
32	U Tun Lin	Village Elders	Kan Oo Village	09- 684390722



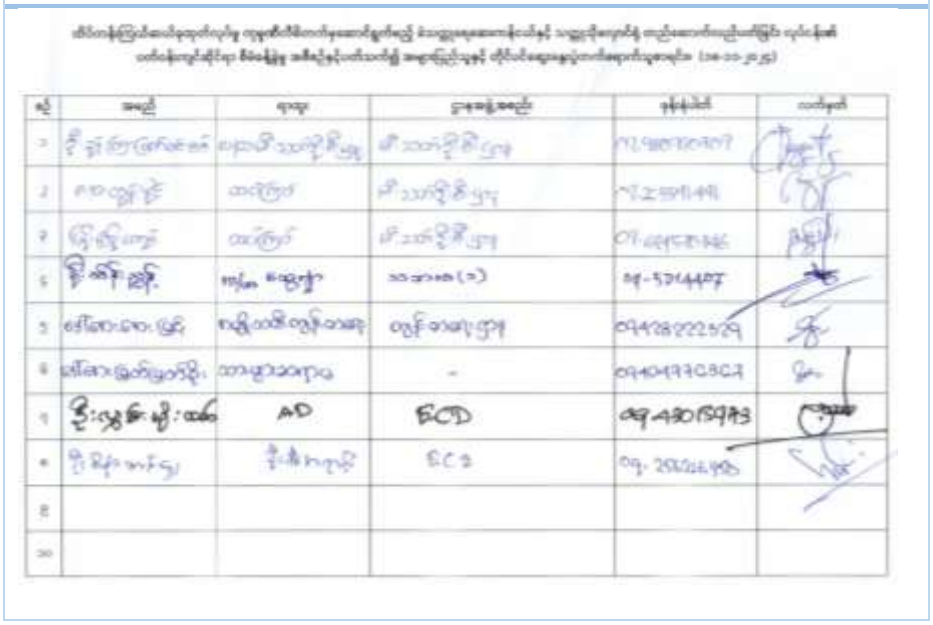


Figure 7.3 Photos of Attendances List of Public Consultation Meeting

7.5 Result of public consultation meeting

Basically, PCM for EMP was conducted successfully, because most of the invitees attended the PCM and their opinions and concerns were efficiently grasped by not only question and answer session but also during through the meeting.

At the PCM of EMP, the environmental consultant explained how the public concerns were considered and reflected to the Project plan, assessing impacts, designing mitigation measures, and in the development of management and monitoring plans.

Government and local peoples were discussed about water quality discharge from tailing ponds, waste management system, worker's health, natural disaster, job opportunities and relation between local peoples and company and they also suggested to provide more village development activities and replantation plan. According to PCM results, opinion from local peoples is in a positive sense on the project implementation. However, as the project owner, it is necessary to carefully fulfill the consent of the local peoples mentioned above during the whole of project operation.

7.6 Future Plan for Stakeholders and Public Consultation Meetings

- Public consultation activities should be conducted throughout all the stages of the project.
- The establishment and operation of GRM (Grievance Redress Mechanism) is highly recommended as a vital consultation activity.
- Monitoring by the project proponent and external agents/specialists should include both regular and ad-hoc consultations and discussions with diverse stakeholders of the project, especially project-affected people, in order to supervise environmental and social performances and to manage unexpected impacts, if any.
- Installation of comment boxes at GAD offices of each village could be a good means of collecting opinions, concerns, and feedback from local communities, with timely delivery to the project proponent the local government, and the Contractor for construction.
- Last but not least, public consultation during the project is to be carried out and improved in accordance.

Table 7.7 Stakeholder Communication and Notification

Timing	Purpose	Stakeholder/Group	Method of communication/ notification
Following lodgement of EMP for assessment	Disclosure EMP Report	Relevant regional officials/ authorities Relevant Government organisations; Other relevant stakeholders and General pubic	Hardcopy EMP executive summary (Myanmar) made available Publish Project information on signboards at the site.

Timing	Purpose	Stakeholder/Group	Method of communication/ notification
During the Project activities	Address any community concerns that may arise during Project activities	Implement the Grievance Mechanism	Grievance Mechanism disclosed to local community and government

Before operations begin, concerned stakeholders should be informed for the project implementation. The engagement activities thus far, were undertaken as part of the EMP process. However, stakeholder engagement is understood to be a continuous process and undertaken throughout the life of the Project, in this case during the duration of the Project. Top Ten Star Co., Ltd will implement and manage this ongoing consultation, address concerns if new stakeholders emerge, and monitor stakeholder feedback.

A Grievance Mechanism has been established in the form of Complaint Process. A Stakeholder Consultation Log will be kept documenting all consultation carried out throughout the entire life cycle of the project. A Community Liaison Officers (CLO) should assign the local ethnic people and they will be appointed to facilitate the grievance process and to provide information/ clarification to the local community."

Contact details for Top Ten Star Co., Ltd. are provided below:

Contact Person:	**U Ko Ko Maung, Director**
Address**:**	Olympic Hotel, U Wizara Road, National Swimming Pool Compound, Dagon Township, Yangon
Telephone**:**	+959 400465217
Email**:**	kkmgygn@gmail.com, toptenstar.ygn@gmail.com

- Monitoring by the project proponent and external agents/specialists should include both regular and ad-hoc consultations and discussions with diverse stakeholders of the project, especially project-affected people, in order to supervise environmental and social performances and to manage unexpected impacts, if any.

- Installation of comment boxes at GAD offices of each village could be a good means of collecting opinions, concerns, and feedback from local communities, with timely delivery to the project proponent the local government, and the Contractor for construction.
- Last but not least, public consultation during the project is to be carried out and improved in accordance.

7.6.1 Grievance Redress Mechanism (GRM)

Grievance redress mechanism (GRMs) is an integrated system consisting of institutions, instruments, methods, and processes to settle down grievances from diverse stakeholders with regard to the project. Grievances and dissatisfactions about the actual and perceived impacts of development projects are normally raised by project affected people or communities who are adversely influenced by such projects. These grievances usually stem from physical, situational, and social losses and can be imposed on the project developer at different stages of the project cycle.

GRM for the present project will also be implemented with establishment Grievance Redress Committees (GRCs). GRM provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting. The specific procedures receiving complaints shall be prepared in advance, and all details of purpose, investigation, analysis and response of complaints shall be recorded in the Grievance Redress System (GRS).

7.6.2 Guidelines for GRM Establishment

GRM needs to be mutually beneficial in ways that grievances and dissatisfactions could be easily raised and enough hearing should be provided and that satisfactory solutions should be identified (ADB, 2010).

Since there is no legal procedure related with grievance redress mechanism in Myanmar EIA procedure (2015), the project proponent shall follow the best international practices to cope with grievances and facilitate the resolution process.

I. **Purpose**

Top Ten Star Co., Ltd. will be responsible for establishing the Grievance Redress Mechanism and setting the contact point at the place where the project will be located; and ensuring the stakeholders get informed about the GRM. The main purpose of GRM is to create a platform

where grievances and complaints from PAPs due to the project could be collected and the finest resolutions for such grievances and complaints could be identified and conducted.

I. **Objectives**

The objectives are:

- To prevent any potential disputes among diverse stakeholders, especially PAPs
- To register and resolve the grievances and complaints of the project affected people
- To promote transparency and accountability during the project implementation
- To deter fraud and corruption
- To mitigate adverse impacts and potential risks from the project

During the impact assessment and mitigation phase, stakeholder participation has the following roles and contributions:

- To identify specific impacts relevant for the stakeholders' groups;
- To explore cumulative impacts on stakeholders' groups that are caused in conjunction with already ongoing other developments and projects in the area;
- To review, modify, add and remove mitigation measures that are not relevant or effective to address the impacts of the development based on the stakeholders' views;
- To review together with stakeholders, the environmental management plans and other relevant plans;
- Agree on the follow-up in terms of regular review, sharing outcomes of monitoring and other means as agreed with the stakeholders; and
- Finally, to document the outcomes of the conclusions and place them in the EMP.

7.7 Implementation Program

7.7.1 Trainings and Capacity Buildings

Training and development programs are essential to capacity building within organizations. To promote products and services, the organization must develop the training and development programs for their employees. Competent employees are valuable and the factory is probably depending on them. Providing training can help to improve the efficiency and productivity of

employees. Employees remain up to date with new technology and thus use existing ones in a better way. Employee training includes awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities.
- Roles and responsibilities to achieve that conformity, including with regarded as emergency response.

Manager (HR) and Occupational Health and Safety Officer (OHS Officer) should take responsible for the coordinating training maintaining employee-training records, and ensuring that monitored and reviewed on a regular basis. Some training requirements are also listed in the following table.

Table 7.8 Description of the Required Trainings

No.	Description	Frequency	Responsible
1	Basic Fire Fighting Training	One time/ year	Manager (HR)
2	Emergency Response Training	One time/ year	Manager (HR) & OHS Officer
3	Machines Safety & PPE Training	Two time/year	OHS Officer
4	First Aid Training	Two time/year	OHS Officer

7.8 Corporate Social Responsibility

The CSR is defined as applying core values consistently and effectively, responding to the expectations of community and continually improving our social, economic and environmental performance.

The vision of sustainable development is to engage with local community ethically to have lasting achievements which benefit to them in sectors of social, environmental, economic aspects. The environmental fund should be allocated in accordance with the monitoring plan. Knowledge and information of environmental conservation should be disseminated to employees and local people. Training programs should be done for factory workers and staff to meet the environmental performance.

Through the CSR activities, Company should be considered any socio-economic challenges facing to community and stand firmly as a constructive partner for local populace. The project proponent will implement CSR plan by using 2% of net profit of the project after tax with the policy of capacity building for factory employees to enhance industrial development. A CSR

plan formulated by the Top Ten Star Production Co., Ltd Limited for the proposed project can be seen in following Table.

Table 7.9 Corporate Social Responsible Plan

No.	CSR Activity	Responsibility Party	% of Contribution
1	For local community development	Top Ten Star Production Co., Ltd	30% of CSR
2	For health care sector development	Top Ten Star Production Co., Ltd	20% of CSR
3	For natural disaster prevention	Top Ten Star Production Co., Ltd	10% of CSR
4	For social welfare development	Top Ten Star Production Co., Ltd	20% of CSR
5	For education sector development	Top Ten Star Production Co., Ltd	20% of CSR

8. ENVIRONMENTAL MANAGEMENT PLAN

8.1 Institutional Arrangements for Implementation of the EMP

8.1.1 Environmental and Social Management System

Top Ten Star Production Company Limited has committed to fully protecting the environment in the proposed project area by developing and implementing an Environmental Management Plan (EMP). This plan will serve as an effective tool to mitigate potential adverse impacts and enhance the beneficial impacts associated with the project during the construction, operation, and closure phases.

The Environmental Management Plan will be considered a dynamic and living document. It will be regularly reviewed, revised, and updated as necessary to reflect any changes in the proposed activities. This ensures that the plan remains relevant and appropriate throughout the various stages of the project.

8.1.2 Responsibilities

Responsibilities for the implementation of environmental and social considerations lie with Top Ten Star Production Company Limited, which shall be accountable for fulfilling the commitments outlined in this document. The implementation of the Environmental Management Plan (EMP) will primarily be overseen by the Project Manager, with support from the Environmental Officer and the Occupational Health & Safety Officer.

However, specific management interventions will be the responsibility of each respective Head of Department and the individuals designated in the EMP for each specific intervention. These individuals will ensure that all staff under their supervision work toward achieving the objectives set out in the management plan.

To facilitate the implementation of the EMP, an Environmental Protection Management Section will be established within the Project Company.

Position	Responsibilities
Project Manager	The environmental responsibilities of the Project Manager are given below; Establish Environmental policy, objectives, targets, and Environment Management Plans available for the project. Ensure that all activities are carried out in compliance with relevant laws and regulations. Identify potential risks from the environment section and establish and implement preventive actions in a bid to curb environmental impacts. Control the training, recognition, and competency.
Site Supervisor/s	Environmental responsibilities of the Site Supervisor/s are given below; Implement and follow the Environmental policy, objectives, targets, and Environment Management Plans available for the project. Ensure that all activities are carried out in compliance with relevant laws and regulations. Identify potential risks from the environment section and establish and implement the preventive actions in a bid to curb environmental impacts. Control the training, recognition, and competency.
Environmental Officer	The responsibilities of an Environmental Officer are listed below: Assist Top Ten Star Production Company Limited assigned Environmental Staff in managing stipulated environmental requirements. Prepare and impact training (including toolbox talks) to contract personnel on various environment-related topics like Environmental awareness, Solid waste management, etc. Prepare and assist in the implementation of the project environmental documents. Arrange & conduct environmental campaigns on environmental topics.

Site HSE officer/ Representative	The Site HSE officer/ Representative will identify significant environmental aspects of the project. He will prepare environmental resources to provide information to the top management of the project. The responsibilities of the Site HSE officer are listed below: Identify all possible risks and their environmental consequences to prevent them and act in case of an accident. Provide environmental training to all employees. Compliance with requirements, including legal requirements relevant to the environment.

8.1.3 Organization Structure

The Occupational Health and Safety Committee, established by Top Ten Star Production Company Limited, is responsible for overseeing and managing the implementation of the Environmental Management Plan (EMP). The Committee will consist of the Board of Directors and high-level management of the company. It will also include the Project Manager and the operation section management of the corporation.

The Occupational Health and Safety Committee will appoint the Environmental Manager, Environmental Officer, and Health & Safety Officers to ensure the effective implementation of the EMP. The organizational structure for the implementation of the Environmental Management Plan (EMP) during the operation phase is illustrated in Figure 8.1.

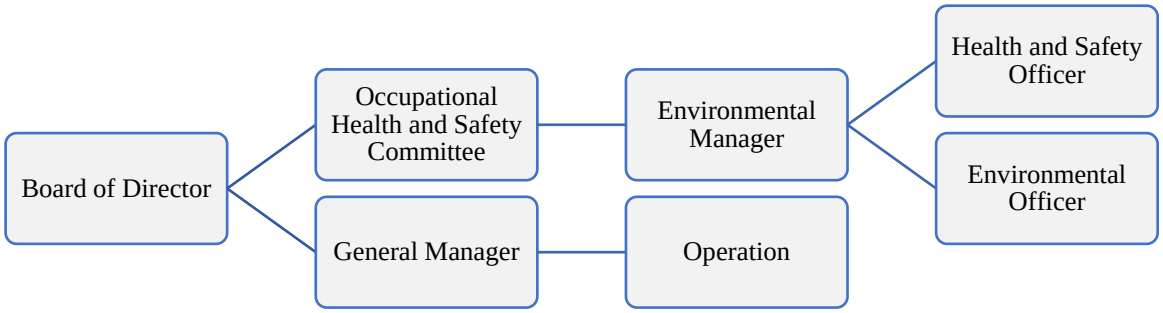


Figure 8.1 Occupational Health and Safety Committee

8.2 Environmental Training

Top Ten Star Production Company Limited shall:

- Ensure that all personnel, particularly new employees or those transferred to new assignments, receive appropriate environmental training relevant to their duties.
- Provide training in environmental management systems for all managers and supervisory personnel.
- Be responsible for identifying any environmental training needs that may arise for work performance and ensure that the required training is provided to the relevant personnel to mitigate adverse environmental impacts.

Environmental training will include the following:

- Project HSE policy and objectives
- Overview of the provisions of the site-specific EMP
- Identification of significant environmental aspects
- Emergency preparedness and response plan
- Waste control plan
- Current applicable environmental laws and regulations
- Importance of good housekeeping practices
- Best practices in handling potential pollutants
- Personal responsibilities and liabilities
- Proper use of Personal Protective Equipment (PPE)

All training information, records, and certificates will be properly documented, maintained, and made available for verification.

8.3 Environmental and Social Management Sub-plans

8.3.1 Air Quality Management Plan

Objectives	To reduce the sources of pollution that contribute to the loss of ambient air quality, improve the quality of life for workers, and protect their health from air pollution-related risks
Implementation Schedule	During operation, and closure phase
Management Action	▪ Install dust suppression systems, such as water sprays, during the pouring and washing processes to reduce dust.

	▪ Ensure regular maintenance of all machinery, including pressure pumps, dump trucks, and other equipment, to ensure they are in good working condition and do not contribute to excessive emissions or dust generation. ▪ Implement a schedule for routine inspections and servicing of machinery to detect and correct any issues that may result in increased pollution. ▪ Coordinate transportation and handling activities during times when wind conditions are low to minimize the dispersion of dust and emissions. ▪ Provide workers who may be exposed to elevated dust levels and lead particles with appropriate personal protective equipment (PPE), including respirators, dust masks, gloves, and protective clothing. ▪ Ensure regular checks on the condition of PPE and provide training on their proper use to minimize health risks. ▪ Implement a comprehensive air quality monitoring program to assess levels of particulate matter (PM), including lead dust, and other emissions within the work site and surrounding areas. ▪ Review monitoring data regularly and take corrective actions.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.2 Noise and Vibration Management Plan

Objectives	To control and limit noise emissions and vibration levels at the workplace and other sensitive receptors near the project site
Implementation Schedule	During operation, and closure phase
Management Action	▪ Perform regular maintenance on all machinery, including pumps and shovel tools, to ensure they are functioning efficiently and with minimal noise emissions. ▪ Turn off machinery and equipment when not in use to reduce unnecessary noise. ▪ Restrict machinery and equipment use to designated working hours to limit noise disturbances during non-working hours.

	▪ Provide ear muffs and other noise-protective equipment to workers as needed, especially for those working in high-noise areas. ▪ Train workers on noise management practices, emphasizing the importance of reducing noise and vibration during operations. ▪ Conduct regular noise and vibration monitoring to ensure adherence to the Myanmar National Environmental Quality (Emission) Guidelines.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.3 Water Quality Management Plan

Objectives	To minimize water contamination from the project area and protect water quality, regular monitoring and assessments will be conducted to determine if additional management practices are necessary to maintain or improve water quality standards
Implementation Schedule	During operation, and closure phase
Management Action	▪ Conduct regular water quality monitoring in critical areas, such as the washing process and tailing ponds, to detect and address any contamination early. ▪ Construct a concrete drainage system to direct washing water from the washing tanks to the tailing ponds.  ▪ Schedule regular maintenance for the drain system to ensure it remains clear of blockages, preventing potential overflow or contamination issues.

	▪ Install silt fences, sediment traps, and other sediment control barriers around the washing area and tailing ponds, especially in preparation for heavy rainfall events. ▪ Enhance systems for collecting and storing rainwater to reduce reliance on external sources and minimize excess runoff during wet seasons.  ▪ Maximize water recycling within the washing process by reusing water, thus lowering the total wastewater generated and its environmental impact. ▪ Develop and implement an emergency response plan for accidental spills or contaminant releases, outlining steps to contain and remediate pollution quickly. ▪ Provide comprehensive training for employees on water quality management best practices, focusing on contamination risk minimization. ▪ Regularly monitor water quality to ensure adherence to the Myanmar National Environmental Quality (Emission) Guidelines.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.4 Solid Waste Management Plan

Objectives	To implement integrated solid waste management in ways that is protective to human health and the environment
Implementation Schedule	During construction, operation, and closure phase
Management Action	▪ Schedule periodic removal of sediment from the site to prevent buildup and maintain a clean working environment.

	▪ Develop a systematic plan for regularly excavating and transporting sediment from tailing ponds to the Metal Refinery Plant to manage waste buildup effectively. ▪ Provide ongoing training for employees on proper waste disposal practices. ▪ Educate employees on the significance of proper waste disposal and recycling to foster a culture of environmental responsibility throughout the workforce.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.5 Soil Management Plan

Objectives	To prevent soil contamination, a comprehensive plan must be developed and implemented to ensure effective protection measures.
Implementation Schedule	During operation, and closure phase
Management Action	▪ The excavated sediment, including mud, sand, and lead particles, must be carefully collected and transported to the Metal Refinery Plant for further processing and refinement of the remaining lead. ▪ All sediment will be contained using appropriate barriers during excavation and transport to prevent the dispersal of lead particles or other harmful materials. ▪ Ensure that all washing tanks, drains, and storage areas must be constructed with concrete to prevent spills or leaks from reaching the surrounding soil. ▪ During excavation and washing operations, implement effective water management practices to prevent runoff from carrying contaminated sediments into surrounding soil or water bodies. ▪ Create drainage systems to manage surface runoff, ensuring that any rainwater or washing water is directed away from the contaminated area to prevent runoff from carrying dissolved lead particles into the surrounding environment. ▪ Store and handle lead in sealed, durable containers or bags to prevent leakage of lead particles into the ground. Regular

	inspections and maintenance of storage facilities will be conducted to ensure their integrity and prevent contamination. ▪ Conduct periodic soil sampling and analysis around the washing plant, storage areas, and wastewater discharge points to monitor contamination levels. ▪ Provide training to workers on proper handling techniques for lead materials and the importance of containment measures. ▪ Workers involved in sediment excavation and handling will be provided with appropriate PPE, such as gloves, masks, and boots, to prevent direct exposure to contaminated soil or materials. ▪ Implement regular inspections and maintenance of washing tanks, storage areas, and drainage systems to ensure they function safely and effectively.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.6 Flora and Fauna Management Plan

Objectives	To avoid and minimize impacts to flora and fauna habitat feature within the vicinity of project area
Implementation Schedule	During operation phase
Management Action	▪ All waste will be appropriately stored and disposed of to prevent attracting both native and alien species to the project area. ▪ Hunting or disturbing wild animals will be strictly prohibited for all personnel working on the site. ▪ Vegetation clearance and habitat disturbance will be minimized by clearly demarcating the boundaries for site clearing. Efforts will be made to preserve as much of the natural environment as possible. ▪ Areas temporarily disturbed during construction will be reinstated with trees, shrubs, and grass upon completion of the works to restore the local ecosystem. ▪ Environmental awareness training will be provided to all workers to promote the preservation of local species and enhance understanding of environmental responsibilities.
Responsibilities	Monitoring by HSE section of Top Ten Star Production Company Limited and/or third party

8.3.7 Community Engagement and Development Plan

Throughout the project implementation, close liaison with the local community and government institutions will be maintained. It is essential that the local community and local government are made aware of all project activities and any potential environmental and socio-economic impacts. A dedicated Community Liaison Officer or Health and Safety Manager will be responsible for ensuring effective communication with community groups, local government institutions, and relevant government departments.

The project will prioritize employment opportunities for local residents, starting with those living closest to the project site. In addition to creating job opportunities, the company will contribute to local development by supporting infrastructure projects that benefit the community. Both male and female residents will be given equal opportunities to increase their income and improve their livelihoods. Outsiders will only be considered for employment if the required skills and experience are not available locally.

A Grievance Mechanism is a system that allows a person, workers, indigenous groups, villagers, or other community members to provide feedback to the project implementers and receive responses. The project proponent will ensure that this procedure is communicated to all external stakeholders, raising awareness and offering transparency on how stakeholders can express their grievances and concerns. Various channels for external stakeholders to vocalize their grievances formally include:

Telephone:	Stakeholders can call Top Ten Star Production Company Limited and request to speak to a stakeholder contact officer.
Face to Face:	Stakeholders can voice their grievance to any Top Ten Star Production Company Limited employee who will then escalate using the correct process.
Complaint Box:	The grievance box shall be kept at the entrance of the project site or office as the stakeholders can complain about their grievance at this box.

8.3.8 Occupational Health and Safety Management Plan

The Lead Washing Plant will implement a comprehensive Occupational Health and Safety Management Plan to safeguard the well-being of workers and minimize health and safety risks

associated with plant operations. This plan will address both immediate and long-term risks, ensuring compliance with national regulations and international best practices.

Risk Assessment and Hazard Identification

- A thorough risk assessment will be conducted to identify potential hazards related to the operation of the Lead Washing Plant. Key hazards include exposure to lead dust, noise, equipment-related injuries, and slip, trip, and fall hazards.
- Regular site inspections will be carried out to identify any emerging risks and take corrective actions promptly.

Health and Safety Training

Pre-Employment Medical Examination: All employees will undergo a pre-employment medical assessment to ensure they are physically fit for their roles.

Ongoing Health Surveillance: Regular health checks and surveillance will be carried out, particularly focusing on lead exposure, respiratory health, and hearing.

Safety Training: All workers will receive comprehensive safety training before starting work, focusing on:

- Safe handling of lead-containing materials.
- Proper use of Personal Protective Equipment (PPE).
- Safe machine operation and lockout/tagout procedures.
- Emergency response, including first aid and evacuation procedures.

Personal Protective Equipment (PPE)

- Workers will be provided with appropriate PPE.
- Respirators/Dust Masks: To protect against dust and particulate matter.
- Ear Protection: To mitigate noise exposure from machinery.
- Protective Clothing: To avoid direct contact with lead and other hazardous materials.
- Gloves, Boots, and Goggles: To prevent skin and eye exposure to dust.
- PPE will be inspected regularly, maintained in good condition, and replaced as necessary.

Emergency Preparedness and Response

An emergency response plan will be in place to address potential accidents or incidents such as fires, or injuries. The plan will include:

- First Aid: First aid kits will be readily available throughout the plant. First responders will be trained in basic medical care.
- Evacuation Procedures: A clear evacuation route and assembly points will be established for all employees.
- Fire Safety: Fire extinguishers and fire suppression systems will be installed and regularly tested.

8.3.9 Emergency Response Plans

The purpose of Emergency Response is to ensure that all potential emergencies that might arise during the Project are properly identified, reported, and dealt with safely and effectively.

Emergency Response Plan covers but not limited to:

1. Nomination of persons responsible for managing an emergency situation;
2. Definition of roles/responsibilities in Emergency Response Team; (ERT)
3. The identification of events that could give rise to major events involving fire, explosion, other loss of containment; and other events that may require the evacuation or escape of personnel.
4. Procedures for reporting, communicating, and response action in an emergency;
5. Provision of necessary emergency equipment in adequate quantities to handle all foreseeable emergency scenarios. Includes monitoring, testing, and maintenance of alarm systems and early warning devices;
6. Periodic testing of response procedures
7. Provision of qualified Rescue and medical response personnel
8. Training requirements

Emergency Cases

Emergencies that might develop during construction, operation, and closure include:

1. Fire (involving fuels, and other materials);
2. Personnel injuries

Means of Communication

The primary means of communication shall be:

1. Telephone;
2. Mobile (only in authorized areas);

Emergency Response Action

In the event of an emergency and upon hearing the alarm:

1. Do not panic;
2. Stop work, and leave the area immediately to the designated assembly points;
3. Shut off power or machines if safe to do so;
4. Ensure you are counted at the assembly point;
5. Return to work only if instructed by the emergency response team.

8.3.10 Community Health and Safety

The operation of the Lead Washing Plant is unlikely to lead to rapid encroachment or an influx of migrant populations due to the relatively low number of workers involved in the project. However, there is a potential risk that the workforce employed during the operational phase could have an indirect impact on the health status of local communities, particularly in terms of infectious diseases or environmental factors. Efforts will be made to mitigate these risks through proper health management practices, hygiene practices, and environmental safeguards.

Given the isolation of the Lead Washing Plant, the risk of disease transmission to surrounding communities is relatively low. However, the washing plant will implement measures to prevent the spread of infectious diseases, particularly by ensuring a clean and safe working environment for all staff. Proper sanitation, waste management, and hygiene practices will be maintained to minimize the risk of disease outbreaks within the workplace. In the event that an occupational disease is identified among workers or if there are outbreaks of infectious diseases, the local public health department will be notified immediately, and the project will fully cooperate in line with their guidance.

8.4 Environmental Monitoring

8.4.1 Notifications for Environmental Monitoring

a) Monitoring Frequency

If monitoring results show constantly (3 consecutive years) and significantly (e.g., less than 75 percent) better than the required levels, frequency of monitoring can be reduced. (IFC, World Bank, 2007)

b) Monitoring Guidelines and Standards

As specified in the EIA Procedure, projects shall be responsible for the monitoring of their compliance with the following standard parameters from Myanmar National Environmental Quality (Emission) Guidelines, December 2015. Detail parameters values are showed in the previous section 3.5. Projects shall engage in continuous, proactive and comprehensive self - monitoring of the project and comply with applicable guidelines and standards.

8.4.2 Environmental Monitoring Plan

Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken.

The parameters to be monitored, location of the monitoring sites, frequency and duration of monitoring and responsibilities for each of the monitoring parameters are presented in the following Tables. The monitoring results will be submitted to MONREC. The period for submission of monitoring report is biannually during operation and Decommissioning phase.

Successful implementation of Environmental Monitoring Plan (EMP) depends on regular monitoring, documenting and reporting. Top Ten Star Production Company should have provision of Health, Safety and Environmental department for monitoring the EMP implementation during operation phase of the project.

If survey findings are compared with applicable guidelines, the explanation will be provided together with supporting documentation in the monitoring report, which will be submitted to the Environmental Conservation Department. Analysis on the survey results will be presented in the monitoring report that will be submitted to the Environmental Conservation Department by comparing the baseline or previous survey data. In the monitoring report that will be submitted to the Environmental Conservation Department, photos of each monitoring point,

photos of sample collection, and photos of surveying will be described. Resident's opinion from the factory noise emission should be surveyed at least once a year and measures taken to reduce traffic issues will be included in the monitoring report.

The environmental monitoring officer should monitor the EMP implementation and submit a quarterly report to the concerned department. Additionally, another yearly monitoring report with quarterly monitoring data should be submitted to the Environmental Conservation Department for renewing the Environmental Clearance Certificate.

8.4.3 Reporting Monitoring Results

Results of recorded in files to monitor and audit monitoring will be carried out strictly as required by the related national regulations. According to the environmental impact assessment procedure, 2015, Article 108, the monitoring results of required parameters will be reported to Environmental Conservation Department (ECD) every six months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.

8.4.4 Implementation Budget and Schedule

The project must implement the proposed management programme and monitoring plan for the proposed project. The estimated annual cost for mitigation measures is as follow.

Table 8.1 Implementation Budget for EMP

Item	Estimate annual Cost (USD)
Management and Mitigation Measures	10000 USD
Environmental Monitoring	12000 USD
Emergency Disaster Prevention	4000 USD
Total Estimated Cost	**26000 USD**

The total estimated annual cost is 26,000 USD. If these budgets are not sufficient for the implementation of the EMP, Top Ten Star Production Company Limited will supplement it.

8.4.5 Compliance Monitoring

Compliance monitoring is the prudent element of Environmental Monitoring Plan that ensure effective implementation of the Environmental Management Plan, compliance of all project related activities with relevant environmental rules and regulations and safety procedure.

Monitoring of the compliance may be carried out by the Environmental Personnel of the Project Management Unit but should be audited yearly by the external auditor. The monitoring activities and results should be well documented and followed by the standard monitoring checklist. The principal approach of the step-by-step monitoring involves:

- Walkthrough inspection: quick survey of the activities, operations, equipment, and facilities.
- Through inspection: visual observation activities, operation, equipment and facilities and review of related documents, previous records, reports, etc.
- Interview of relevant personnel: interviewing of related employees, key personnel, etc.
- Consultation with local people: consultation with local people to understand community perception on the project related activities and to identify social issues related with the project.

The inspection, observation, consultation and reporting should be followed by an organized checklist. The checklist of the monitoring should be developed during preparation of Environmental and Social Action Plan at the stage of detail design of the project. The target areas of monitoring are:

- Compliance of project related activities with national and international (if required) environmental rules and regulation as described in chapter 2 during preconstruction, construction and operation phases
- Compliance of the project related activities with the Suggested EMP during pre-construction, construction and operation phases
- Compliance of the Plant operation (noise, emission, waste disposal, waste water discharge, etc.) with relevant national and international (if required) standards
- Compliance of the Environmental Monitoring Activities with suggested Environmental Monitoring Plan
- Record each of incidents

The compliance monitoring report along with the checklist should be indexed and annexed with the monthly and annual monitoring report. A format of compliance monitoring checklist shall be prepared during detail design stage. It may be required to submit the annual monitoring report to Department of Environmental Conservation for renewing of the Environmental Clearance Certificate each year.

8.4.6 EMP and Monitoring Cost

Estimated Environmental Management Plan and Monitoring Cost (Operation Phase)

The Project cost is inclusive of cost for implementing Environmental Management Plan and installation of pollution abatement and mitigation measures described in the study report. If estimated cost is not sufficient in the implementation of Environmental Management and Monitoring Plans, budget will be set up again.

Table 8.2 Environmental Monitoring Plan in Operation Phase

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
Operation Phase							
1	Water quality (Surface water)	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel	▪ From Drain outlet of washing plant ▪ At rainwater pond	**SW-1** 20°55'52.02"N96°44'31.47"E **SW-2** 20°55'49.03"N96°44'27.47"E	Twice per year	Environmental Contractor	2,000,000.00 MMK per monitoring session
2	Air Quality	Nitrogen dioxide, Particulate matter PM10, Particulate matter PM2.5, Sulphur dioxide, Ozone (O3), Carbon monoxide	▪ Near the project area ▪ Between the washing plant and warehouse within the project area	**AQ-1** 20°55'57.84"N96°44'32.68"E **AQ-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	2,000,000 MMK per monitoring session
3	Noise and Vibration	LAeq (A-weighted loudness equivalent), Lveq (Equivalent Continuous Level)	▪ Near the project area ▪ Between the washing plant	**NV-1** 20°55'57.84"N96°44'32.68"E	Twice per year	Environmental Contractor	1,200,000.00 MMK per monitoring session

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
			and warehouse within the project area	**NV-2** 20°55'53.95"N96°44'30.77"E			
4	Soil Quality	Lead, Cadmium, Chromium, Nickel, Copper	▪ At plantation within the project area ▪ In the second tailing pond within the project area	**S-1** 20°55'53.40"N96°44'34.25"E **S-2** 20°55'50.90"N96°44'31.75"E	▪ Twice per year ▪ Visual observation of surface soil	Environmental Contractor	1,200,000.00 MMK per monitoring session
5	Solid Waste	▪ Records of visual inspections ▪ Volume of waste ▪ Voices and complaints from the local	▪ In the tailing pond ▪ Inspection of storage areas ▪ Confirmation of voices and complaints	Within the project area	▪ Biannually ▪ Visual inspection ▪ In response to complaints	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd.	1,200,000.00 MMK per monitoring session
6	Flora and Fauna	Identification on ▪ Species & Family ▪ Conservation Status (IUCN and Myanmar, 2016)	▪ Quadrant sampling ▪ Data analysis ▪ Species occurrence	▪ Direct Impact Zone – Project Area ▪ Indirect Impact Zone – 1 km radius of project	Biannually (once during dry season and once during wet season)	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or	3,000,000.00 MMK per monitoring season

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
		▪ Plant Important Value Index (I.V.I)				Environmental Contractor	
7	Occupational and Community Health and Safety	▪ Number of injuries and frequency in workplace ▪ Community service program in the form of health care assistance for the significant affected people	▪ Records of Accidents ▪ Health check-up	Project Site	Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	1,000,000.00 MMK
8	Social economic	▪ Complain logs from community ▪ Employment record	▪ Hearing the opinion on project from community ▪ Provide the suggestion box for local community and announcement	▪ Within the project AOI	Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	1,000,000.00 MMK

Table 8.3 Environmental Monitoring Plan in Decommission Phase

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
Decommission Phase							
1	Water quality (Surface water)	pH, TSS, Ammonia, Mercury, Phenol, Oil & Grease, Total Coliform Count, Fluoride, Arsenic, Nitrate-Nitrogen, DO, COD, BOD, Copper, lead, Cadmium, Chromium, Nickel	▪ From Drain outlet of washing plant ▪ At rainwater pond	**SW-1** 20°55'52.02"N96°44'31.47"E **SW-2** 20°55'49.03"N96°44'27.47"E	Twice per year	Environmental Contractor	2,000,000.00 MMK per monitoring session
2	Air Quality	Nitrogen dioxide, Particulate matter PM10, Particulate matter PM2.5, Sulphur dioxide, Ozone (O3), Carbon monoxide	▪ Near the project area ▪ Between the washing plant and warehouse within the project area	**AQ-1** 20°55'57.84"N96°44'32.68"E **AQ-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	2,000,000 MMK per monitoring session
3	Noise and Vibration	LAeq (A-weighted loudness equivalent), Lveq (Equivalent Continuous Level)	▪ Near the project area ▪ Between the washing plant	**NV-1** 20°55'57.84"N96°44'32.68"E **NV-2** 20°55'53.95"N96°44'30.77"E	Twice per year	Environmental Contractor	1,200,000.00 MMK per monitoring session

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
			and warehouse within the project area				
4	Soil Quality	Lead, Cadmium, Chromium, Nickel, Copper	▪ At plantation within the project area ▪ In the second tailing pond within the project area	**S-1** 20°55'53.40"N96°44'34.25"E **S-2** 20°55'50.90"N96°44'31.75"E	▪ Twice per year ▪ Visual observation of surface soil	Environmental Contractor	1,200,000.00 MMK per monitoring session
5	Solid Waste	▪ Records of visual inspections ▪ Volume of waste ▪ Voices and complaints from the local	▪ In the tailing pond ▪ Inspection of storage areas ▪ Confirmation of voices and complaints	Within the project area	▪ Biannually ▪ Visual inspection ▪ In response to complaints	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd.	1,200,000.00 MMK per monitoring session
6	Flora and Fauna	Identification on ▪ Species & Family ▪ Conservation Status (IUCN and Myanmar, 2016)	▪ Quadrant sampling ▪ Data analysis ▪ Species occurrence	▪ Direct Impact Zone – Project Area ▪ Indirect Impact Zone – 1 km radius of project	Biannually (once during dry season and once during wet season)	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or	3,000,000.00 MMK per monitoring season

No.	Aspect	Parameter Monitored	Monitoring Measure/Task Description	Monitoring Location	Frequency	Implementing/ Management Organization	Cost/Year MMK
		▪ Plant Important Value Index (I.V.I)				Environmental Contractor	
7	Occupational and Community Health and Safety	▪ Number of injuries and frequency in workplace ▪ Community service program in the form of health care assistance for the significant affected people	▪ Records of Accidents ▪ Health check-up		Monthly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	1,000,000.00 MMK
8	Rehabilitation	▪ Topsoil Management ▪ Revegetation ▪ Weed Management	▪ Field observation	▪ Project site	Yearly	Environmental officer and Health & Safety Officers of Top Ten Star Production Co., Ltd. or Environmental Contractor	2,500,000.00 MMK

Figure 8.2 Monitoring Survey Points

8.5 Closure Plan

This Closure Plan has been developed as part of the overall Environmental Management Plan for Top Ten Star Production Company Limited in line with the company's Environmental, Health and Safety (EHS) Policy. The Plan covers a description of all activities that need to be carried out in order to affect closure in an environmentally friendly and socially acceptable manner. To this effect work standards have been stipulated in order to achieve the decommissioning and closure objectives in line with the overall EHS policy.

Key considerations in the development of the Plan have been the envisioned state of environmental setting within the project license area particularly the project area at the time of closure. It is this vision that characterize the rehabilitation works and standards to which the said works will have been done together with monitoring requirements. It should however be noted that preparation of this plan is based on the information available as of now.

Over this period operational and environmental conditions may differs requiring adjustment to the proposed plan. In view of the above this plan is hereby presented to serve the purpose of initial planning subject to perfection at the time of actual decommissioning and closure.

8.5.1 Objectives

Closure is an integral part of the project cycle. It is to be investigated and planned for before the project begins to operate. The project area is rehabilitated and stabilized so they are suitable for a sustainable land use that is compatible with the surroundings. Rehabilitation activities at the project include: decommissioning the project, providing surface drainage and contaminate protection across the entire site, establishing self-sustaining vegetative cover, meeting water quality standards, and minimizing post-closure maintenance requirements.

In planning for closure, there are four key objectives that must be considered:

- Protect public health and safety
- Alleviate or eliminate environmental damage
- Achieve a productive use of the land, or a return to its original condition or an acceptable alternative
- To the extent achievable, provide for sustainability of social and economic benefits resulting from construction and operations.

8.5.2 Remediation Strategy

- Safely dismantle washing tanks for recycling or disposal at approved facilities.
- Remove movable equipment, including motorized items such as vehicles and dump trucks, and non-motorized items such as furniture, computers, and other office equipment.
- Carefully handle and transport hazardous materials to prevent environmental pollution and ensure fire safety.
- If equipment is no longer in use, dismantle and recycle or dispose of parts responsibly.
- Stabilize slopes, including water pond embankments, to prevent erosion and maintain structural integrity.
- If closing permanently, cover the tailing ponds with a thick layer of clean soil and revegetate with native plants to prevent erosion.
- Ensure the rainwater pond is properly graded and stabilized to avoid future erosion or waterlogging.
- Replace excavated areas with clean soil and replant with native vegetation to restore ecological balance.
- Cover rehabilitated areas with clean soil and revegetate using native species to restore biodiversity.
- Safely dismantle any unused structures such as drainage systems, fences, or storage areas.
- Recycle materials where possible and dispose of debris at licensed facilities.
- Conduct soil, water, and air quality tests periodically to assess the effectiveness of remediation measures.
- Establish benchmarks for contamination levels and ensure compliance with Myanmar National Environmental Quality Guidelines.
- Carry out environmental monitoring, including air quality, noise and vibration, and water quality evaluation, for at least five consecutive years after project closure.
- Perform regular monitoring and closure monitoring of air quality, water quality and quantity, noise, vibration, and soil for protection.
- Submit the final closure plan to the relevant ministry or department no later than one year before the completion of the lead washing plant.

- Inform nearby communities about remediation efforts, even if no villages are within a 3 km radius, to maintain trust and transparency.
- Organize a monitoring committee including local authorities, civil society organizations, and the local administrative authority. This committee will be monitor, maintenance, supervision and monitor the completion of land rehabilitation and rehabilitation work after the closure of the project.

8.5.3 Reclamation

The reclamation plan aims to ensure that areas cleared or impacted during construction and operational activities are rehabilitated to restore plant ecosystem functions. Revegetation will also visually screen disturbed areas and re-establish habitats for native fauna. The objectives of site rehabilitation can be summarized as follows:

Achieve Long-Term Stabilization

- Stabilize all disturbed areas to minimize erosion potential and prevent soil degradation.

Revegetation

- Re-vegetate all disturbed areas using suitable local plant species to ensure compatibility with the native ecosystem and promote biodiversity.

Minimize Visual Impact

- Reduce the visual impact of disturbed areas by reintroducing vegetation and integrating the reclaimed areas with the surrounding landscape.

Ensure Safety for Future Use

- Ensure that disturbed areas are safe and stable, enabling them to support future uses, whether for ecological, agricultural, or community purposes.

Sustainability and Stakeholder Considerations

- Rehabilitate areas disturbed by project activities to a condition that is safe, stable, and sustainable, considering the expectations and concerns of stakeholders, including local communities and regulatory authorities.

8.5.4 Closure and Reclamation Schedule

A conceptual closure timeline for the project is shown in Table.

Table 8.4 Schedule for Rehabilitation of Each Domain

Domain	*Year*				
	1	**2**	**3**	**4**	**5**
Site Infrastructure					
Washing Tanks					
Tailing Ponds					
Machine					
Movable Equipment					
Roads					
Access Road					
Storage					
Lead Storage					
Monitoring					
Lead washing plant area					
Re-vegetated Area					

9. CONCLUSION

Top Ten Star Production Co., Ltd. is legally operating in Lead mining and Lead Refinery Plant at the near Bawhseng village, Kalaw Township in Southern Shan State. The company is working according to the guidelines of the Ministry of Natural Resource and Environmental Conversation and the legal framework to be followed and to minimize socio-environmental impacts that may occur until closure. The company have also obtained environmental report (EIA, IEE, etc.) approvals related to the capacity of factories and Lead mining operations.

The proposed Lead Washing Plant is also a part of the Metal Refinery Plant (150 ton), it was built to partially support the process during downtime of the Refinery Plant due to various reasons. Therefore, it is only necessary to work using manpower. When the Lead and mud mixture is washed the mud, sand and Lead particles (Sediment mixture) flow into the Tailing Pond with the water and the solid Lead are residue. The washing process is only washed using natural water without any other chemicals. The Sediment mixture in the Tailing Pond is systematically transported by car to the Metal Refinery Plant (150 ton) for further refining. If the impact assessment, mitigation measures plan and monitoring plan must be followed, the environmental impact can be minimized in operation. In order to mitigate environmental impact after Plant closure, Land filling, Land restoration and replanting of trees will need to be implemented.

In conclusion, mining and refining is an industry that can generate revenue for the State. As observed, the Lead Washing Plant has the least impact on the environment and in order to achieve the sustainable environment, must follow the laws, regulations and environmental guidelines.

9.1 List of Commitments

A consolidated summary of the environmental and social impacts, along with the corresponding mitigation measures, that Top Ten Star Production Co., Ltd. is committed to adopting in order to manage and mitigate potential impacts associated with the project development is presented below in Table 9.1.

Table 9.1 Project Key Commitments

Components	Commitments
EMP Report, Chapter 3, Section 3.3 - Myanmar Legislation Relevant to the Project	Top Ten Star Production Company will follow Myanmar Legislation Relevant to the Project.
EMP Report, Chapter 3, Section 3.5 - International and National Guidelines and Standards	Top Ten Star Production Company will follow International and National Guidelines and Standards for the air emission, noise levels, soil, and effluent levels., etc.
EMP Report, Chapter 3, Section 3.5.1 - IFC's Standards and Guidelines	Top Ten Star Production Company will follow IFC's Standards and Guidelines.
EMP Report, Chapter 4, Section 4.16 Estimated amount Emission, Water, Solid waste	Top Ten Star Production Company will develop Estimated amount Emission, Water, Solid waste.
EMP Report, Chapter 6, Section 6.3.1 (a) Air Quality Impact	Top Ten Star Production Company will implement control measures for air quality.
EMP Report, Chapter 6, Section 6.3.1 (b) Noise and Vibration	Top Ten Star Production Company will implement protection, mitigation and monitoring measures for noise and vibration impacts.
EMP Report, Chapter 6, Section 6.3.1 (c) Water Quality Impact	Top Ten Star Production Company will implement pollution control measures for washing water generated from lead washing activities.
EMP Report, Chapter 6, Section 6.3.1 (d) Solid Waste	Top Ten Star Production Company will implement mitigation measures for solid waste.

Components	Commitments
EMP Report, Chapter 6, Section 6.3.1 (e) Soil Quality Impact	Top Ten Star Production Company will implement mitigation measures for soil.
EMP Report, Chapter 6, Section 6.3.2 Biological Component	Top Ten Star Production Company will implement mitigation measures to minimize further potential impacts on biodiversity.
EMP Report, Chapter 6, Section 6.3.3 Social Component	Top Ten Star Production Company will implement mitigation measures to minimize further potential impacts on social component.
EMP Report, Chapter 6, Section 6.3.4 Economic Component	Top Ten Star Production Company will implement Mitigation and Enhancement Measures for economic component.
EMP Report, Chapter 6, Section 6.3.5 Health and Safety	Top Ten Star Production Company will implement Mitigation and Enhancement Measures for Health and Safety.
EMP Report, Chapter 6, Section 6.3.6 Cultural Components	Relevant authorities such as the Ministry of Culture, Archeological Department and the local authority shall be informed whenever findings of heritage significance are found.
EMP Report, Chapter 8, Environmental Management Plan	Top Ten Star Production Company will develop Management Plan and Monitoring Plan for Lead Washing Plant.
Overall Commitment	Top Ten Star Production Company will ▪ Strictly carry out the relevant local standards and guidelines in areas of environmental protection, labor safety, and industrial hygiene etc., ▪ The project team has blend in the local society and carry out its social responsibility, expand and maintain its relations with social organizations and neighboring villagers.

Appendix 1

A list of third parties approved by the Department of Environmental Conservation

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
ညွှန်ကြားရေးမှူးချုပ်ရုံး

စာအမှတ်၊ EIA-၁/၅/EMP(TP-N)(၄၂၁၀ /၂၀၂၄)
ရက်စွဲ ၊ ၂၀၂၄ ခုနှစ်၊ စက်တင်ဘာလ ၂၅ ရက်

သို့

ညွှန်ကြားရေးမှူး
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
ရှမ်းပြည်နယ်

အကြောင်းအရာ။ ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်၏ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်အား ရေးဆွဲဆောင်ရွက်မည့် တတိယပုဂ္ဂိုလ်များနှင့်စပ်လျဉ်း၍ သဘောထား ပြန်ကြားခြင်း

ရည် ညွှန်း ချက်။ (၁) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ညွှန်ကြားရေးမှူးချုပ်ရုံး၏ ၁၉-၁၀-၂၀၂၃ ရက်စွဲပါ စာအမှတ်၊ EIA-၁/ဖ/သဘောထား(PP-N)(၄၉၅၆/၂၀၂၃)

(၂) ထိပ်တန်းကြယ်ဆယ်ခု ထုတ်လုပ်မှု ကုမ္ပဏီလီမိတက်၏ ၁၉-၈-၂၀၂၄ ရက်စွဲပါ စာအမှတ်၊ Mining-TTS/ Env-009/2024

၁။ အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်မှ ရှမ်းပြည်နယ် (တောင်ပိုင်း) ၊ ကလောခရိုင်၊ ကလောမြို့နယ်၊ ဘော်ဆိုင်းကျေးရွာအုပ်စု၊ ကွင်းအမှတ် (၇၇) (ချော်ဆေးကန်မြောက်ကွင်း)၊ ဦးပိုင်အမှတ် (၁၉၃)၊ မြေရီယာ (၃.၂၈) ပေါ်တွင် အကောင်အထည်ဖော် ဆောင်ရွက်လျက်ရှိသည့် ခဲသတ္တုရေဆေးကန်ငယ်များနှင့် သတ္တုသိုလှောင်ရုံ တည်ဆောက်လည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ရေးဆွဲတင်ပြရမည် ဖြစ်ကြောင်း ရည်ညွှန်း (၁) ပါစာဖြင့် သတ္တုတွင်းဦးစီးဌာနမှတစ်ဆင့် လုပ်ငန်းရှင်သို့ အကြောင်းကြားခဲ့ပါသည်။

၂။ အဆိုပါ စီမံကိန်းလုပ်ငန်းအတွက် ရေးဆွဲတင်ပြမည့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို လုပ်ငန်းလိုင်စင်ရယူထားသည့် အကြံပေးပုဂ္ဂိုလ်များဖြစ်သော ဦးဒီလှိုင်းဇော် (EIA-C 041/2023)၊ ဒေါ်နိုင်နိုင်ဝင်း (EIA-C 040/ 2023) နှင့် ဒေါက်တာသီဟစိုး၊ အထောက်အကူပြု ကျွမ်းကျင်ပညာရှင် (၁) ဦးတို့ဖြင့် ရေးဆွဲခွင့်ပြုပါရန် ကုမ္ပဏီမှ ရည်ညွှန်း (၂) ပါစာဖြင့် တင်ပြလာပါသည်။

၃။ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းပြုလုပ်သည့် တတိယပုဂ္ဂိုလ် သို့မဟုတ် အဖွဲ့အစည်းများ လုပ်ငန်းလိုင်စင်ဆိုင်ရာ လုပ်ထုံးလုပ်နည်းအပိုဒ် ၅၀ အရ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ရေးဆွဲရန် ဆောင်ရွက်မည့် လေ့လာဆန်းစစ်ရေးအဖွဲ့တွင် အကြံပေး

ပုဂ္ဂိုလ် သို့မဟုတ် တွဲဖက်အကြံပေးပုဂ္ဂိုလ် အနည်းဆုံး (၂) ဦး ပါဝင်ရမည်ဟု သတ်မှတ်ပြဋ္ဌာန်းထားပါသည်။

၄။ သို့ဖြစ်ပါ၍ ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလိမိတက်၏ ခဲသတ္တုရေဆေးကန်ငယ်များနှင့် သတ္တုသိုလှောင်ရုံ တည်ဆောက်လည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အား ပူးတွဲပါ လေ့လာဆန်းစစ်ရေးအဖွဲ့ဝင်များဖြင့် ရေးဆွဲခွင့်ပြုကြောင်းနှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အား ၂၄-၁၂-၂၀၂၄ ရက်နေ့မတိုင်မီ တင်ပြရမည် ဖြစ်ကြောင်း လုပ်ငန်းရှင်သို့ ဆက်လက်ပြန်ကြားနိုင်ရန် အကြောင်းကြားပါသည်။

ပူးတွဲ - ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလိမိတက်၏ ခဲသတ္တုရေဆေးကန်ငယ်များနှင့် သတ္တုသိုလှောင်ရုံ တည်ဆောက်လည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) အား ဆောင်ရွက်မည့် လေ့လာဆန်းစစ်ရေးအဖွဲ့ဝင်များ (၁) ရွက်

၂၁/၁၂/၂၀၂၄

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(ဒေါက်တာဆန်းဦး၊ ဒုတိယညွှန်ကြားရေးမှူးချုပ်)

မိတ္တူကို
ညွှန်ကြားရေးမှူးချုပ်ရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
ရုံးလက်ခံ၊ မျှောစာတွဲ

ပူးတွဲ

ထိပ်တန်းကြယ်ဆယ်ခုထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်၏ ခဲသတ္တုရေဆေးကန်ငယ်များနှင့်
သတ္တုသိုလှောင်ရုံ တည်ဆောက်လည်ပတ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်
(EMP) အား ဆောင်ရွက်မည့် လေ့လာဆန်းစစ်ရေးအဖွဲ့ဝင်များ

စဉ်	ပညာရှင်အမည်	လုပ်ငန်း လိုင်စင်အမှတ်	အဆိုပြုအစီရင်ခံစာအတွက် တာဝန်ယူ ဆောင်ရွက်ခွင့်ပြုသည့် နယ်ပယ်များ
၁	ဦးဒီလှိုင်းဇော်	(EIA-C 041/2023)	(၁) ဘူမိဆိုင်ရာ ဆန်းစစ်လေ့လာခြင်း
၂	ဒေါ်နုိင်နုိင်ဝင်း	(EIA-C 040/2023)	(၁) ဂေဟစနစ်နှင့် ဇီဝမျိုးစုံမျိုးကွဲ
အထောက်အကူပြုကျွမ်းကျင်ပညာရှင်			
၁	ဒေါက်တာသီဟစိုး		

Appendix 2

Permit Issuance by the Ministry of Industry (MOIN)

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ

စက်မှုဝန်ကြီးဌာန

စက်မှုကြီးကြပ်ရေးနှင့်စစ်ဆေးရေးဦးစီးဌာန

ပုဂ္ဂလိကစက်မှုလုပ်ငန်းမှတ်ပုံတင်လက်မှတ်

စက်မှုမှတ်ပုံတင်အမှတ် ရ/ကြီး/၅၈၆ ရက်စွဲ ၃၀ . ၁၁. ၂၀၂၃

လုပ်ငန်းအရွယ်အစား အကြီးစား ပြည်ထောင်စုနယ်မြေ/တိုင်းဒေသကြီး/ပြည်နယ် ရှမ်း

အောက်ပါလုပ်ငန်းသည် ပုဂ္ဂလိကစက်မှုလုပ်ငန်း ဥပဒေ ပုဒ်မ ၇ ပုဒ်မခွဲ (ဂ)အရ မှတ်ပုံတင်ပြီး ဖြစ်ပါသည်။

၁။ လုပ်ငန်းအမည် ထိပ်တန်းကြယ် ဆယ်ခုခဲသတ္တုမြေစာရေဆေးသန့်စင်ခြင်းလုပ်ငန်း

၂။ လုပ်ငန်းအမျိုးအမည် အခြေခံသတ္တုပစ္စည်းများထုတ်လုပ်မှု

၃။ အဓိကကုန်ချောပစ္စည်းအမျိုးအမည် သန့်စင်ပြီးခဲသတ္တု(၃၅ %)

၄။ တည်နေရာလိပ်စာ ကွင်းအမှတ်(၇၇)၊ ချောဆေးကန်မြောက်ကွင်း၊ ဘော်ဆိုင်းကျေးရွာ၊ကလောမြို့နယ်၊ ကလောခရိုင်

၅။ ပိုင်ဆိုင်မှုအမျိုးအစား ကုမ္ပဏီပိုင်

၆။ လုပ်ငန်းရှင်အမည် ဦးကိုကိုမောင်

၇။ ကိုင်ဆောင်သည့်မှတ်ပုံတင်အမှတ် ၁၂/မရက (နိုင်) ၁၈၁၂၁၈

၈။ ရင်းနှီးမြှုပ်နှံမှုတန်ဖိုး(ကျပ်) ၁၂၈. ၀၀ သန်း တည်ထောင်သည့်ခုနှစ် ၂၀၂၃

၉။ အသုံးပြုသည့်အားအမျိုးအစား ထရန်စဖော်မာ မြင်းတောင်ရေ ၅၃၆၂ HP

၁၀။ အလုပ်သမားဦးရေ ၆ ဦး

၁၁။ မှတ်ပုံတင်သက်တမ်းကုန်ဆုံးသည့်နေ့ရက် ၃၀. ၁၁. ၂၀၂၄

ဒေါက်တာသိန်းဆွေ
ညွှန်ကြားရေးမှူးချုပ်

Appendix 3

Laboratory Results Certificate

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအဓိမြေဖွံ့.ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

No.121, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.Tel: - 09-407496078

စာအမှတ်/Reference Number: EL (M)-R / 1518

နေ့စွဲ/Date: 4th October, 2024

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Waste Water (Outlet)	နမူနာအမှတ် / Sample ID	1518	
နေရာ (မြို့နယ်) Location (Township)	Industrial Waste ဘော်ဆိုင်း/ ခဲထုတ်စက်ရုံ	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	ရှမ်းပြည်နယ်	လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	18.9.2024	11:00 AM
အဖွဲ့အစည်း /Organisation	Top Ten Star Co .,Ltd.			
ဆက်သွယ်ရန် /Contact	09250299265	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	23.9.2024	9:25 AM

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	**ရလဒ် အဖြေ** **Results**	နည်းစဉ် Method	Wastewater Discharges Guideline Value*	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	-	
2	Total coliform count (MPN/100 ml) (Presumption test)	**>1100**	Most Probable Number method	400	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	-	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	-	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Plate count method	-	
7	Total *E.coli* count (CFU/ml)		3M Plate count method	-	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein Research Assistant ALARM	May Zaw Research Assistant ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory ALARM

ပတ်ဝန်းကျင်ရေးရာဓာတ်ခွဲခန်း
Ecological Laboratory

စိမ်းလန်းအဓိမြေဖွံ့ဖြိုးတိုးတက်ရေးအသင်း (Advancing Life and Regenerating Motherland, ALARM)

No.121, Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township, Yangon.Tel: - 09-407496078

စာအမှတ်/Reference Number: EL (M)-R / 1519

နေ့စွဲ/Date: 4th October, 2024

ဓာတ်ခွဲစစ်ဆေးမှုအစီအရင်ခံစာ/Laboratory Analysis Report

နမူနာရာဇဝင် /Sample Profile

နမူနာအမည် /Sample Name	Water Supply	နမူနာအမှတ် / Sample ID	1519	
နေရာ (မြို့နယ်) Location (Township)	industrial used water ဘော်ဆိုင်း/ ခဲထုတ်စက်ရုံ	လတ္တီတွဒ် Latitude		
နေရာ (တိုင်း/ပြည်နယ်) Location (Region/State)	ရှမ်းပြည်နယ်	လောင်ဂျီတွဒ် Longitude		
ပေးပို့သူအမည် /Sender Name		နမူနာကောက်ယူချိန် (နေ့၊ နာရီ) Sampling Time (Date, Time)	18.9.2024	11:15 AM
အဖွဲ့အစည်း /Organisation	Top Ten Star Co ., Ltd.			
ဆက်သွယ်ရန် /Contact	09250299265	နမူနာရောက်ရှိချိန် (နေ့၊ နာရီ) Arriving Time (Date, Time)	23.9.2024	9:25 AM

(This laboratory analysis report is based solely on the sample submitted by the customer)

(ဤဓာတ်ခွဲစစ်ဆေးမှုအစီရင်ခံစာသည် ပေးပို့သူမှပို့ဆောင်ခဲ့သည့်နမူနာကိုသာအခြေခံထားပါသည်။)

Analysis Results/စမ်းသပ်ချက်အဖြေ

စဉ် Sr.	အရည်အသွေးညွှန်းကိန်း Quality Parameter	**ရလဒ် အဖြေ** **Results**	နည်းစဉ် Method	Wastewater Discharges Guideline Value*	မှတ်ချက် Remarks
1	Total plate count (CFU/ml)		Total plate count method	-	
2	Total coliform count (MPN/100 ml) (Presumption test)	**>1100**	Most Probable Number method	400	
3	Total faecal coliform count (MPN/100ml) (Presumption test)		Most Probable Number method	-	
4	Total coliform count (CFU/ml) (Confirm test)		Eosin Methyl blue agar plate test	-	
5	Complete test for coliform bacteria		Gram staining test	-	
6	Total coliform count (CFU/ml)		3M Plate count method	-	
7	Total *E.coli* count (CFU/ml)		3M Plate count method	-	

Note: The target sample needs to test some additional tests to confirm total coliform and total faecal coliform.

စမ်းသပ်ပြီး Tested by	စစ်ဆေးပြီး Checked by	တာဝန်ခံ Approved by
May Myat Nyein Research Assistant ALARM	May Zaw Research Assistant ALARM	Dr. Aye Aye Win Laboratory In-Charge Ecological Laboratory, ALARM

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-24-03719 **Date: October 7, 2024**

Client Information

Client Name	:	Top Ten Star Co., Ltd
Organization	:	-
Client ID	:	-
Registration Date & Time	:	23.9.2024 9 :25 AM
Contact	:	09-250299265
Email	:	thiha.soe.u@gmail.com
Testing Purpose	:	-

Sample Information

Sample ID	:	11760
Sample Name	:	Waste Water
Sample Type / Source	:	Waste Water (Outlet)
Sampling Date & Time	:	18.9.2024 11:00 AM
Sample Location	:	ဘော်ဆိုင်း၊ ခဲထုတ်စက်ရုံ၊ ရှမ်းပြည်နယ်
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Ammonia[3]	0.86	mg/L	≤ 10 [d]	Normal
2	Mercury	0.001	mg/L	≤ 0.01 [d]	Normal
3	Phenol[3]	<0.1	mg/L	≤ 0.5 [d]	Normal
4	Oil & Grease [9]	10	mg/L	≤ 10 [d]	Normal

"ND" = Not Detected "LOD" = Lower limit of detection " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	

No.237,Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township,Yangon.
Tel: 09-407496078, Email: aelab.2022@gmail.com

ALARM Ecological Laboratory

Water Testing Result Report

Report Number: EL-WR-24-03720 **Date: October 7, 2024**

Client Information

Client Name	:	Top Ten Star Co., Ltd
Organization	:	-
Client ID	:	-
Registration Date & Time	:	23.9.2024 9 :25 AM
Contact	:	09-250299265
Email	:	thiha.soe.u@gmail.com
Testing Purpose	:	-

Sample Information

Sample ID	:	11761
Sample Name	:	Water Supply
Sample Type / Source	:	စက်ရုံသုံးရန် လှောင်ထားသည့်ရေ
Sampling Date & Time	:	18.9.2024 11:15 AM
Sample Location	:	ဘော်ဆိုင်း၊ ခဲထုတ်စက်ရုံ၊ ရှမ်းပြည်နယ်
Latitude	:	-
Longitude	:	-

Testing Results

This laboratory analysis report is based solely on the sample submitted by the client unless client took our sampling service.

This report shall not be reproduced except in full, without written approval of the laboratory

Sr.	Quality Parameters	Results	Units	Emission Standards	Remarks
1	Ammonia[3]	0.5	mg/L	≤ 10 [d]	Normal
2	Mercury	0.001	mg/L	≤ 0.01 [d]	Normal
3	Phenol[3]	<0.1	mg/L	≤ 0.5 [d]	Normal
4	Oil & Grease [9]	5	mg/L	≤ 10 [d]	Normal

"ND" = Not Detected "LOD" = Lower limit of detection " - " = No Reference Standard

Tested by	Checked by	Approved by
Daw May Myat Khine Lab. Technician II Ecological Laboratory ALARM	Daw Lin Myat Myat Aung Lab. Technician I Ecological Laboratory ALARM	

No.237,Corner of Shu Khin Thar Street & 7 Street, (3) Block, South Oakkalapa Township,Yangon.
Tel: 09-407496078, Email: aelab.2022@gmail.com

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
စိုက်ပျိုးရေး၊ မွေးမြူရေးနှင့် ဆည်မြောင်းဝန်ကြီးဌာန
စိုက်ပျိုးရေးဦးစီးဌာန
(မြေအသုံးချရေးဌာနခွဲ)
ရန်ကုန်မြို့

စာအမှတ်- ဓခ- ၂(၁)/၂၀၂၄-၂၀၂၅ (၁၈၀)
နေ့စွဲ၊ ၂၀၂၄ ခုနှစ်၊အောက်တိုဘာလ(၃၅) ရက်

အကြောင်းအရာ။ **မြေနှင့် ရေနမူနာ ဓာတ်ခွဲအဖြေများပေးပို့ခြင်း**

ရည်ညွှန်းချက် ။ **Top Ten Star Co., Ltd မှ (23.9.2024) နေ့တွင် ပေးပို့သော နမူနာ။**

အထက်အကြောင်းအရာပါ ကိစ္စနှင့်ပတ်သက်၍ ရည်ညွှန်းစာဖြင့် ပေးပို့လာသော မြေနမူနာ (၂ - မျိုး) နှင့် ရေနမူနာ (၂ - မျိုး) အား ဓာတ်ခွဲစစ်ဆေးပြီးဖြစ်၍ ဓာတ်ခွဲတွေ့ရှိချက် အဖြေများကို ဤစာနှင့်အတူ ပူးတွဲပေးပို့ပါသည်။

(ဒေါက်တာသန္တာညီ)
ဒုတိယညွှန်ကြားရေးမှူး
ဓာတ်ခွဲခန်းတာဝန်ခံ
မြေအသုံးချရေးဌာနခွဲ

မိတ္တူကို-
ရုံးလက်ခံ

DEPARTMENT OF AGRICULTURE (LAND USE)

SOIL ANALYTICAL DATA SHEET

Top Ten Star Co., Ltd (23.9.2024)

Region /State - ရှမ်းပြည်နယ်။ Sheet No. 1

Township - ဟဲဟိုးမြို့နယ်၊ ဘော်ဆိုင်းကျေးရွာ။ Sr No. S 1 - 2 /2024

Sr No.	Sample	Lead (Pb) (ppm)	Cadmium (Cd) (ppm)	Chromium (Cr) (ppm)	Nickle (Ni) (ppm)	Copper (Cu) (ppm)
1	S - 1	916	1.492	0.032	0.052	1.328
2	S - 2	2084	0.072	0.036	0.002	2.248

မှတ်ချက်။ ။မြေနမူနာစောင်ခွဲအဖြေများအရ Lead (Pb) ပါဝင်မှုသည် စိုက်ပျိုးမြေတွင် ပါဝင်သင့်သည့် MPL(Maximum permissible Limit) 70 ppm ထက် ကျော်လွန်နေပါသည်။ (Ref : FAO, U. Ewers (1991))

(ဒေါက်တာသန္တာညီ)

ဒုတိယညွှန်ကြားရေးမှူး

စောင်ခွဲခန်းတာဝန်ခံ

မြေအသုံးချရေးဌာနခွဲ

DEPARTMENT OF AGRICULTURE (LAND USE)

W ATER ANALYTICAL DATA SHEET

Top Ten Star Co., Ltd (23.9.2024)

Region /State - ရှမ်းပြည်နယ်။ Sheet No. 2

Township - ဟဲဟိုးမြို့နယ်၊ ဘော်ဆိုင်းကျေးရွာ။ Sr No. W 1 - 2 /2024

Sr No.	Sample	Lead (Pb) (ppm)	Cadmium (Cd) (ppm)	Chromium (Cr) (ppm)	Nickle (Ni) (ppm)
1	SW - 1	Not Detected	Not Detected	Not Detected	Not Detected
2	SW - 2	Not Detected	Not Detected	Not Detected	Not Detected

(ဒေါက်တာသန္တာညီ)

ဒုတိယညွှန်ကြားရေးမှူး

ဓာတ်ခွဲခန်းတာဝန်ခံ

မြေအသုံးချရေးဌာနခွဲ

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2015 Cert. No.688283

W0924 421

WATER QUALITY TEST RESULTS FORM

Client: Top Ten Star Co.,Ltd.
Nature of Water: မိုးရေ
Location: ဘော်ဆိုင်း၊ ဟဲဟိုးမြို့နယ်။
Date and Time of collection: 18.9.2024
Date and Time of arrival at Laboratory: 23.9.2024
Date and Time of commencing examination: 24.9.2024
Date and Time of completing: 29.9.2024

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Fluoride (F)	Nil	mg/l	1.5 mg/l
Lead (as Pb)		mg/l	0.01 mg/l
Arsenic (As)	Nil	mg/l	0.01 mg/l
Nitrate ($N.NO_3$)	Nil	mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH_3)		mg/l	
Ammonium Nitrogen (NH_4)		mg/l	
Dissolved Oxygen (DO)	4.0	mg/l	
Chemical Oxygen Demand (COD)	96	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	18	mg/l	
Cyanide (CN)		mg/l	0.07 mg/l
Zinc (Zn)		mg/l	3 mg/l
Copper (Cu)	Nil	mg/l	2 mg/l
Silica (SiO_2)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Officer
ISO Tech Laboratory

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
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ISO 9001:2015 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 2

W0924 421

WATER QUALITY TEST RESULTS FORM

Client: Top Ten Star Co.,Ltd.
Nature of Water: မိုးရေ
Location: ဘော်ဆိုင်း၊ ဟဲဟိုးမြို့နယ်။
Date and Time of collection: 18.9.2024
Date and Time of arrival at Laboratory: 23.9.2024
Date and Time of commencing examination: 24.9.2024
Date and Time of completing: 29.9.2024

Results of Water Analysis

			WHO Drinking Water Guideline (Geneva - 1993)
pH	7.3		6.5 - 8.5
Colour (True)		TCU	15 TCU
Turbidity		NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	0.3 mg/l
Chloride (as CL)		mg/l	250 mg/l
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	500 mg/l
Total Solids		mg/l	1500 mg/l
Total Suspended Solids	19980	mg/l	
Total Dissolved Solids		mg/l	1000 mg/l
Manganese		mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Officer
ISO Tech Laboratory

(a division of WEG Co., Ltd.)
No.18. Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-880100172, 09-880100173, 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ISO TECH LABORATORY

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B.Sc Engg: (Civil), Dip S.E(Delft) Lecturer of YIT (Retd). Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

ISO 9001:2015 Cert. No.688283

WW0924 152

WATER QUALITY TEST RESULTS FORM

Client	Top Ten Star Co.,Ltd.
Nature of Water	Wastewater (Inlet)
Location	ဘော်ဆိုင်း၊ ဟဲဟိုးမြို့နယ်။
Date and Time of collection	18.9.2024
Date and Time of arrival at Laboratory	23.9.2024
Date and Time of commencing examination	24.9.2024
Date and Time of completing	29.9.2024

Results of Water Analysis

Temperature (°C)		°C	
Fluoride (F)	0.3	mg/l	
Lead (as Pb)		mg/l	
Arsenic (As)	Nil	mg/l	
Nitrate ($N.NO_3$)	3.7	mg/l	
Chlorine (Residual)		mg/l	
Ammonia Nitrogen (NH_3)		mg/l	
Ammonium Nitrogen (NH_4)		mg/l	
Dissolved Oxygen (DO)	4.8	mg/l	
Chemical Oxygen Demand (COD)	96	mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)	30	mg/l	
Cyanide (CN)		mg/l	
Zinc (Zn)		mg/l	
Copper (Cu)	Nil	mg/l	
Silica (SiO_2)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Officer
ISO Tech Laboratory

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
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ISO 9001:2015 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 2

WW0924 152

WATER QUALITY TEST RESULTS FORM

Client: Top Ten Star Co.,Ltd.
Nature of Water: Wastewater (Inlet)
Location: ဘော်ဆိုင်း၊ ဟဲဟိုးမြို့နယ်။
Date and Time of collection: 18.9.2024
Date and Time of arrival at Laboratory: 23.9.2024
Date and Time of commencing examination: 24.9.2024
Date and Time of completing: 29.9.2024

Results of Water Analysis

pH	7.4		
Colour (True)		TCU	
Turbidity		NTU	
Conductivity		micro S/cm	
Total Hardness		mg/l as $CaCO_3$	
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron		mg/l	
Chloride (as CL)		mg/l	
Sodium Chloride (as NaCL)		mg/l	
Sulphate (as SO_4)		mg/l	
Total Solids		mg/l	
Total Suspended Solids	428	mg/l	
Total Dissolved Solids		mg/l	
Manganese		mg/l	
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature:
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr.Chemist
ISO Tech Laboratory

Approved by
Signature:
Name: Thinzar Theint Theint
B.E (Civil)
Assistant Technical Officer
ISO Tech Laboratory

Appendix 4

CSR Budget Status