

# Draft ESIA Report for Nyaung Hnitpin Industrial Complex Project, Hlegu Towbship, Yangon



Submitted to

Myanmar Korea  
Nyaung Hnitpin Development  
Consortium

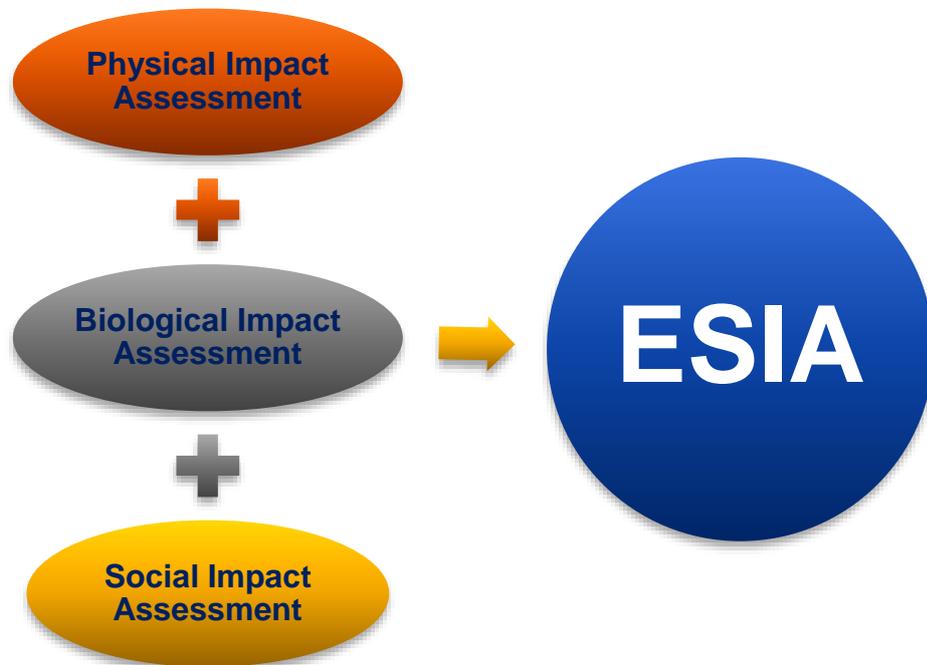
By

  
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April 30, 2019

# ESIA

This assessment comprises three components



## TERMS AND ACRONYMS

### TERMS

U	“U” is an honorific placed before the name of a male adult. It is an equivalent of “Mr.” It does not say whether the person addressed is single or married.
Daw	“Daw” is an honorific placed before the name of a female adult. It does not say whether the person addressed is single or married.
Ma	“Ma” is used to address a female child or a young lady. Women of same age— young or old—also address each other using this honorific. Especially older persons use this address for younger persons.
Ko	“Ko” is used to address a young man. Men of same age—young or old—also address each other using this honorific. Older persons also use this address for younger persons.
pyi	Myanmar <b>volume</b> measuring unit. There are 16 pyi’s in a basket. There are 8 tinfuls in a pyi. (tin = condensed milk tin)
viss	Myanmar <b>weight</b> measuring unit: One viss is equal to 3.6 pounds or 1.65 kilograms.

### Basic Education System in Myanmar

Primary School	= Elementary School	1 <sup>st</sup> Grade (Kindergarten)
		2 <sup>nd</sup> Grade
		3 <sup>rd</sup> Grade
		4 <sup>th</sup> Grade
		5 <sup>th</sup> Grade
Middle School	= Lower Secondary School	6 <sup>th</sup> Grade
		7 <sup>th</sup> Grade
		8 <sup>th</sup> Grade
		9 <sup>th</sup> Grade
High School	= Upper Secondary School	10 <sup>th</sup> Grade
		11 <sup>th</sup> Grade (Matriculation)

After completing 11 years of Basic Education, a student can join an institution of higher learning.

Post-Primary School	A primary school teaching some more Middle School grades in addition to the Primary School grades.
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### ACRONYMS

AC	Alternating Current
ASL	Above Sea Level
CSR	Corporate Social Responsibility
ECD	Environmental Conservation Department
ECF	(Ministry of) Environmental Conservation and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Socio-economic Impact Assessment
KMIC	Korea Myanmar Industrial Complex
KW	Kilowatt
KWh	Kilowatt hour
GWh	Gigawatt hour
TWh	Terawatt hour
MEPE	Myanmar Electric Power Enterprise
MMK	Myanmar kyat
MoU	Memorandum of Understanding
MSR	Myanmar Survey Research

MW	Megawatt
NLD	National League for Democracy
NPED	National Planning and Economic Development
NPT	Nay Pyi Taw (the capital city)
PPE	Personal Protective Equipment
SIA	Socio-economic Impact Assessment
SMP	Socioeconomic Management Plan
SPDC	State Peace and Development Council (Title of the former military government)
USDP	Union Solidarity and Development Party

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# **SECTION 1**

## **EXECUTIVE SUMMARY**



## 1. EXECUTIVE SUMMARY

(မြန်မာအစီရင်ခံစာအကျဉ်းချုပ်)

## 2. Executive Summary (English)

### 2.1 Introduction

The objective of this report is to present the systematic identification and assessment of potential adverse impacts including cumulative impacts of the Industrial Complex project, systematic assessment of feasible project alternatives and determination of appropriate measures to mitigate potential adverse impacts. The report also includes the Environmental Management Plan (EMP).

### 2.2 Project Description and Location

The Government of Myanmar and L H Consortium of Korea have worked together on September 2015 to develop an industrial complex. Both parties have agreed to develop it at Nyaung Hnitpin area about 40km away to the north of Yangon. This site is 555.81 acre (2,249,288 square meter) wide flat land, located near Nyaung Hnitpin Livestock and Agricultural Zone No.3 in Hlegu Township. In this site, the industrial park would occupy the land area of 1,593,119 m<sup>2</sup>. The rest will be occupied by other inside infrastructure including roads. The industrial park will be made up of three scale (large, medium and small) industrial plots where factories and warehouses for Garment Products, Food Manufacturing, Jewelry Processing, Vehicle Spare Parts, Electronic Parts installation etc. will be constructed. Besides, it will contain inside infrastructure such as residential, commercial, vocational training school, main roads, intersection roads, drainage, overhead electricity installation, plantation of green spaces, substation, wastewater treatment plant, water purification plant and public facilities.

The project site area also is known as Nyaung Hnitpin National Convention Compound, currently remained as unused land where the buildings (Hall, Hostel, Theatre, Hospital, etc...) and roads have been remained in ruin among the Phone-zo area of a fallow land, dry in summer, swampy in rainy season covered with wild grasses, wild plants and weak herbs and shrubs of many species.

### 2.3 Access Road

The developer has planned to upgrade existing road way which accesses Yangon – Mandalay express to proposed project site. The existing 9.4 km long tar road which was constructed in 2002 has already been damaged by heavy loaded transportation. Along the traffic way culverts and bridges will be constructed. The center line of road way will pass through existing villages.

### 2.4 Water Resource and usage

The developer has already planned to install the water from Kalihtaw Dam which was constructed since 2001 for supplying water for livestock and Agricultural Zone of Nyaung Hnitpin area.

### 2.5 Electricity

The project will use electricity supplied by government and installed from 230 kV Kamarnat-Myaungtakar national grid. The looping point is 48 km from Kamarnat and 16 km from Myaungtakar. The proper process of transformers will be installed at substation-yard. Internal supply will be installed overhead lines at road sides. Demand of consumption of electricity at the proposed project's completion stage will be 50 MW.

### 2.6 Livestock and agricultural zone

Three agricultural zones have been established at the Nyaung Hnitpin area of about 10,000 acres of land. Around the project site there exists 5-acre unit of land which is offered to any individual who could pay the designated price to use the land for agriculture. There are orchards of 5-acre land owned by different persons surrounding the project site. Long-term

crops, such as mango, jack fruit, dragon fruit, and rambutan are grown in most of the unit of land. Many fish farming ponds and poultry keeping farms have also been already established just next to these orchards. Former vegetation of natural forest of the area have already been replaced by paddy growing fields and cash crop plantation including rubber and acacia plantation across the landscape between Hlegu and Hmawbi townships.

## **2.7 Project Alternative**

In terms of an alternative project, such area which does not need to solve the resettlement problem, worry on electricity and availability of water is rare in Yangon Region. Transport system could be built with shortest route to reach the main highways and expressways. No actionable option of keeping the area by maintaining the status quo of abandoning in wilderness is negative to the country goal of economic growth.

## **2.8 Policy, Legal and Regulatory Framework and Guidelines**

This session specifies the legislative framework relating to the project like Nyaungnhitpin Industrial Complex. This session mainly focuses on the enacted laws, regulations and guidelines which are compulsory for the project proponent to comply with in developing the project as environmentally friendly and socially responsible business investment in Myanmar.

The ESIA process will include: a review of the National Policy and Legal Framework, a review of relevant Government Guidelines and legal policies in force, and a review of most of the relevant laws regulating such a kind of project in Myanmar. A full assessment of policy and regulatory context is detailed in this report.

### **Baseline Data Collection**

#### **2.8.1 Study Limit**

MSR study team sets the study limit within the premises of 2,464,282 m<sup>2</sup> (600 Acres) wide land which is previous proposal limit for soil samples, water samples collection. Air quality measurement is done within 5 km radius range which covers the existing proposed land area of project site and area of influence of the project.

For the social environment, the study covers Kya Khat Su, Nyaung Hnitpin, Takuton, Sone Kone Kyar Inn (West) and Kyar Inn (East) villages which are located within 5 km from the project site.

Focus area for the biological environment is at project site and area within 3 km range for ecological perspective. However, overall social, physical and biological impact assessments are not limited to the surrounding area of the project site. The study looks at the wider scope for an understanding of regional and national level effect of the project.

## **2.9 Physical Data Collection**

#### **2.9.1 Air Quality Analysis**

Air quality was measured by using Auto Sensors of the EPAS haz-scanner which was installed at the project site to identify the current condition of air quality to analyze and match with the air quality of later time in case of occurrence of air pollution. Sampling period was based on 24-hour measurement level of PM<sub>2.5</sub> and PM<sub>10</sub> using EPAS air sampler and other gases. Results were certified by National Health Laboratory, Occupational Health Department, and Ministry of Health.

#### **2.10 Noise and Vibration Analysis**

The sound level monitoring was performed in accordance with standard procedures adopted by American Conference of Governmental Industrial Hygienist (ACGIH) which is

authoritatively and currently used in Myanmar; measuring was conducted 24 hours (1-hour average noise level (Leq in dBA) and (Lmax in dBA).

### **2.10 Soil Nutrient Analysis**

Soil survey was made by using Russian soil scientist soil analysis method and F.A.O/UNESCO method. Physical properties of soil such as soil color, texture, structure, moisture, hardness, drainage, inclusion and new formation were recorded, and soil names were given by using Russian soil classification, F.A.O soil classification method.

When classified the soil types, soil horizontally characteristics were based and identified the soil types. Results were certified by laboratory of Department of Agriculture, Ministry of Agriculture, Livestock and Irrigation.

### **2.11 Water Analysis**

The method and parameters of testing results are:

Standard method of water analysis with atomic absorption spectrophotometer (graphite furnace method), Spectrophotometer and Incubation method by POTATEST will be used to measure the values of following parameters of collected water samples. These parameters include Color, pH, BOD, COD, Total Dissolved Solid, Nitrate, Arsenic, Bacterial Growth etc.

### **2.12 Biological Environment**

Current proposed industrial complex site is a restricted and abandoned place that becomes a wild fallow land, covered with wild grasses and wild plants which provides variety of habitats for wild animals to survive with some connectivity with surrounding of orchards and commercial fruit and vegetable growing fields.

Site visits were made to conduct baseline data collection. The secondary information of terrestrial and aquatic fauna, flora and land-use were also recorded, and interviews with residents were made for getting information of the history of the area and presence and absence of flora and fauna in the past and present time.

Both terrestrial and aquatic ecosystems were examined. Most habitats on sites were differentiated. The biological impact assessment field team carried out observations, transect line survey in the industrial lot. The tree, plant, and shrub and species composition of plant and their distribution near the project site were studied and identified taxonomically.

During the scoping study visit, significant disturbance from ongoing deforestation for fire wood extraction was noted. Therefore, subsistence living of hunting, fishing, plant gathering, wood extracting etc. was examined in the area as far as 1Km to 3 Km radius of the project site.

### **2.13 Potential Impacts**

The potential ecological impacts identified for the project are: Air pollution, Water pollution, Noise pollution, Solid wastes, Ecosystem disruption, Loss of wildlife and wildlife habitat, Destruction of vegetation, Health and safety, Groundwater, Contaminated Land, and Socio-economic impact.

### **2.14 Scope of Impact Assessment**

The occurrence of impacts that may be both beneficial and adverse will be evaluated.

The impact assessment will cover: Evaluation of identified important features of biophysical and socioeconomic situation; Description and evaluation of the magnitude and significance of the potential effects;

Detail specific impact assessment;

Mitigation and enhancement measures to address the identified effects and identification of any residual effects following mitigation; cumulative assessment; and a description and evaluation of residual effects of the Proposed Development.

### **2.15 Environmental Management Plan (EMP)**

An EMP was developed to ensure that the management actions arising from ESIA processes are clearly defined and implemented through all phases of the project life-cycle. It is to be implemented during the pre-construction/construction phase and, thereafter, throughout the project life-cycle. This is to ensure that environmental management objectives are integrated into the project planning and design. However, only after completing the EIA, can it be possible to prepare an EMP framework that provide overarching requirements for environmental management.

### **2.16 Environmental monitoring**

A monitoring program was provided along with environmental management plan, for the major aim of a monitoring program is to detect trends and changes so that remedial measures can be taken to achieve good environmental performance.

### **2.17 Socio-economic Impact Assessment and Public consultation**

The survey process is comprised of three parts:

i. Public Consultation and Disclosure; ii. Preliminary Social Baseline and iii. Social Impact Assessment

The approach will focus on:

- Key stakeholder interviews in 6 villages located in 5 km radius from the project site. Village heads, village administrative officials, Buddhist monks, local business community, school teachers, health workers, commodity-sellers with small vender in villages were interviewed.
- Village profiles of 6-villages with the influence of project were established.
- Directly and indirectly affected PAPs in communities, households, and individuals who live near the proposed project site as well as officials from three agricultural and animal breeding zones and village administrations of the Naung Hnitpin area were invited to participate in the Public Consultation meeting which was held at Zone no. 2. in January 2019.

#### **Public Consultation and Suggestions**

1. As there is only one primary school in Nyaunghnitpin Agriculture and Livestock Zone (3), it is found that Middle School is needed.
2. It is observed that the workers experience difficulties to work in Hmawbi, Hlegu and Htauk Kyant township. When the industrial zone is developed, they should be hired to employ in the zone.
3. It is found that a dispensary / hospital is needed because it is difficult for the people to go to Ngar Su Daung village for medical treatment.
4. The cultivators at Zone (3) cannot get the water supply from Kalihtaw dam, it is found that water from this dam should be provided.
5. It is necessary to provide a cemetery land for the people who are living in Nyaunghnitpin Agriculture and Livestock Zone (3) because they don't have land for burial.

6. It is necessary to upgrade the roads for the people because the roads outside of Nyaungnnapin Convention Center are bad.
7. People worry for their health because there will be factories that produce bad odor in the Industrial zone. So that they don't want to build such factories in the zone.
8. People want agricultural and livestock processing export companies in the industrial zone because the zone itself is used for agriculture and livestock breeding.
9. It is necessary for people to access to clean drinking water because they have to use water from the well and tube well.
10. Tenant worry for losing lands when the landlords sell their lands with high price when the industrial zone is developed.
11. People worry for degradation of cultivated land because of chemical and industrial wastes from the Industrial Zone.
12. People and Buddhist monks worry that there will be slaughter houses in the Industrial Zone.
13. Thought the agricultural zone has been established, it is found that there is not enough reservoir water so that people have to rely on the well.

## **2.18 Report Structure**

The EIA report is structured according to “Environmental Impact Assessment Procedure” by Ministry of Natural Resources and Environmental Conservation (notification no. 616/2015).

- 1) Executive Summary
- 2) Introduction
- 3) Policy, Legal and Institutional Framework
- 4) Project Description and Alternative Selection
- 5) Description of the Surrounding Environment
- 6) Impact and Risk Assessment and Mitigation Measures
- 7) Cumulative Impact Assessment
- 8) Environmental Management Plan
- 9) Public Consultation and Disclosure
- 10) Conclusion and Recommendations

## **2.19 Conclusion and recommendation**

The Industrial Complex project proposed by the Korea L H Consortium Myanmar has strategic value on many fronts. As Myanmar believes that the establishment of industrial zones throughout the country will contribute to the development of the national economy, it could also be said that the Project is strategic in the economic sense. The Project will contribute to the economic development of the commercial city, Yangon of Myanmar and, thence, to the economic development of the country. The economic cooperation between the two countries will also be strengthened.

The Project will seek to develop the socio-economic conditions of the people living in the region. There is no denying that, once the Project is implemented, it will substantially enhance mutually beneficial Myanmar-Korea trade. It also has the huge potential of attracting investors from inside and outside the country by establishing a favourable investment environment. At the micro-economic level, the Project will promote entrepreneurship and create job opportunities.

In terms of the living environment, most of the impacts could be controlled and limited in and around the project area. Major negative impacts such as but not limited to air pollution, surface water/ground water contamination, solid waste generation, traffic flow are expected for construction, operation and decommissioning phases but their significance levels are medium. However, implementation of appropriate mitigation and management plan will minimize these impacts.

In terms of the natural environment, the major negative impact is the clearance of existing vegetation during construction phase, though no sensitive ecological protection area is involved. However, implementation of appropriate mitigation measures, such as creating green areas and sodding of public spaces as soon as possible and keeping the existing environmental conditions as much as possible will minimize the impact on the ecosystem.

In terms of the social environment, the existing social infrastructures and services, risks for infectious diseases, occupational health and safety and community health and safety are expected. However, implementation of appropriate mitigation and management plan, such as to manage working conditions during the construction work and to provide security and maintain safety prevention measures during construction/operation phase will minimize these impacts.

On the other hand, some positive impacts of the Project such as increase in job opportunities and improvement of social infrastructure are also expected. There are no land issues for the project and the community living nearby villages are pleased to see the project implementation as early as possible. They would like to get employment in the project.

The residual impacts, effects on watercourses, groundwater contamination, air pollution, dust emission, community health and safety, are expected but their magnitude is low and are reversible. The duration of these impacts are intermittent and short term and level of significance is minimal.

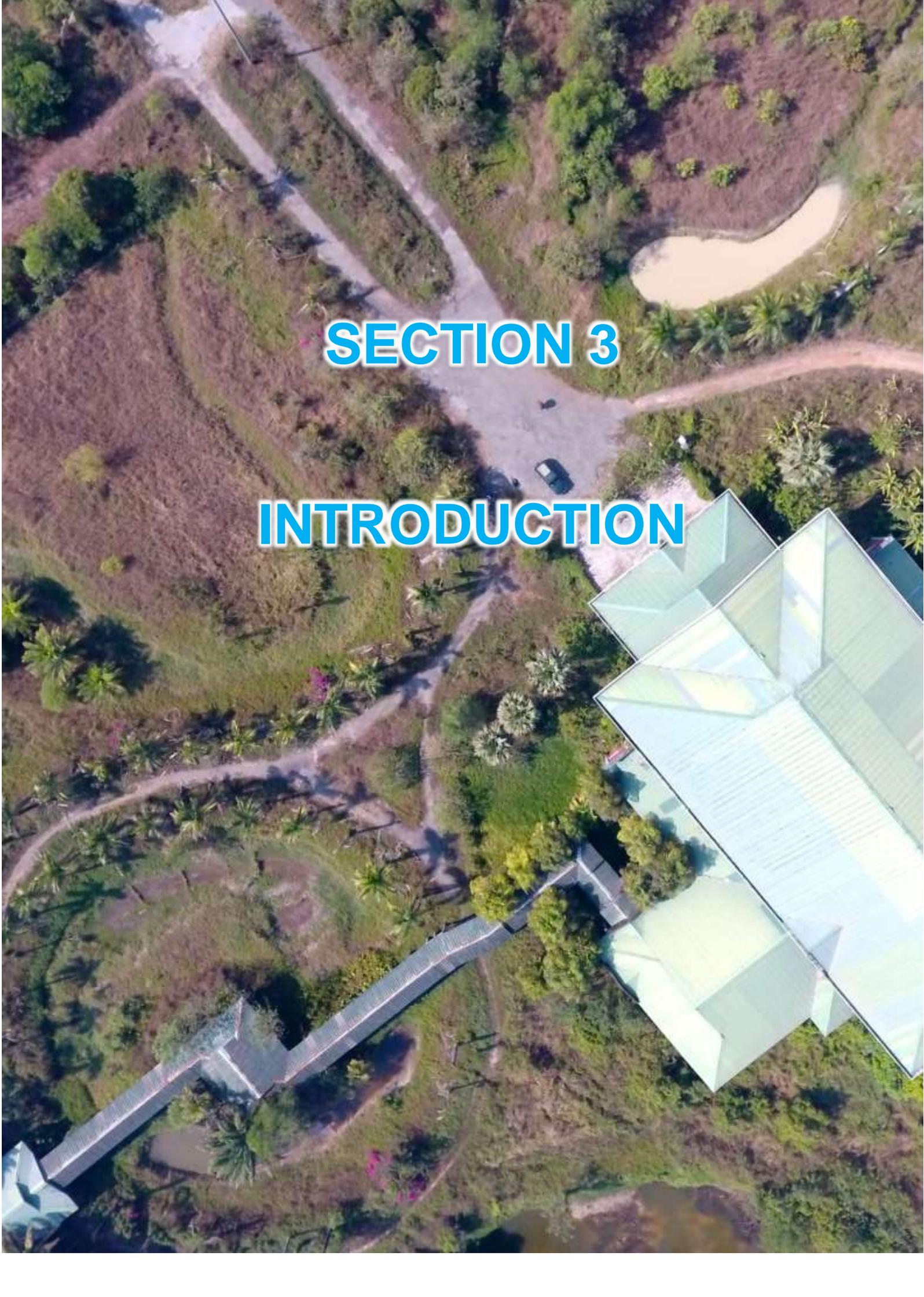
The cumulative impacts could be expected on air quality, water quality, traffic, community health and safety, greenhouse gas emissions and solid waste generation due to different activities of livestock farms, fish farms, and agricultural production businesses in the surrounding area of the proposed project. The cumulative impacts typically result from the actions of multiple stakeholders, it is necessary to engage with these stakeholders for effective collaboration and coordination. Therefore, the project developer plans to initiate collaborative engagement in impact management with others including project proponents, government agencies, affected communities, Environmental NGOs, conservation groups, and expert groups for the programs but not limited to collaborative protection and enhancement of regional areas to preserve biodiversity, collaborative engagement in other regional cumulative impact management strategies, and participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts, wherever applicable.

In consideration of the result of the EIA study for the Project, the Environmental Management Plans (EMPs) including adequate mitigation measures to reduce the negative impacts and Environmental Monitoring Plan (EMP) including budget allocation are proposed for each phase of the Project: construction, operation and decommissioning phases. For the pre-construction phase, no negative impacts are judged for physical, biological and social environment.

It is confirmed that the environmental, social and health impacts of the Project were assessed, and the Environmental Management Plan formulated properly. In the process of EIA, opportunity of public involvement was ensured and comments from the public and MONREC were reflected into the final EIA Report. Thus, the EIA was completed in accordance with the requirements of the EIA Procedure properly for the project proponent to follow the EMP accordingly.

It is also needed to develop an explicit CSR (Corporate Social Responsibility) program while local people expectation is high on the upgrading of the roads linking to the project site and getting assistance for education and health care and the removal of vegetation of 600-acre land is the known factor.



An aerial photograph showing a large building with a prominent green, multi-gabled roof. The building is situated in a lush, green landscape with numerous palm trees and other tropical vegetation. A paved road or driveway leads towards the building, and a small car is visible on it. The overall scene is bright and clear, suggesting a sunny day.

## SECTION 3

# INTRODUCTION

## 3. INTRODUCTION

### 3.1 Introduction

This Environmental Impact Assessment (EIA) report has been prepared by Myanmar Survey Research (MSR) on behalf of Korea Land and Housing Corporation (LH). The proposed project is the development of an industrial complex to be built on the land of approximately 600 acres in a public open space, access and landscaping. LH is currently preparing an outline planning application for the site, including an Environmental and Social Impact Assessment (ESIA).

The intention is to submit an ESIA Report to the Environmental Conservation Department for the Environmental Compliance Certificate for the Industrial Complex in the area of Nyaung Hnitpin public land area of 600 acres along with infrastructure development for roads, electricity and water pipeline.

### 3.2 Project Proponent

<b>Company Name:</b>	<b>Myanmar Korea Nyaung Hnitpin Development Consortium</b>
<b>Contact person</b>	<b>Mr. Kim Gunwoo</b>
<b>Company Address:</b>	<b>LH Myanmar Representative Office</b> Pyay Garden Office Tower, 346-354, Pyay Road, Sanchaung Township, Yangon
<b>Country:</b>	Myanmar
<b>Tel:</b>	+95-99757 99222
<b>E-mail</b>	<a href="mailto:gonwoo2@gmail.com">gonwoo2@gmail.com</a>
<b>Websites:</b>	Under Development

### 3.3 The Environmental and Social Impact Assessment Expert Team

It is obligatory for the project proponent, LH Consortium (Korea), to submit an Environmental and Socio-economic Impact Assessment (ESIA) with regard to the project to the government authorities concerned. Hence, it has contracted Myanmar Survey Research – an independent and private research firm in Myanmar – to conduct this assessment to ensure that the project will be environmentally sound and acceptable to local communities and in full compliance with guidelines and regulations of ECD and the Myanmar Environmental Conservation Law.

Myanmar Survey Research is a leading research company in Myanmar with more than 20 years of research experiences in social, marketing, industry and environmental and social impact assessment.

### 3.4 General Information and address of MSR ESIA Team

<b>Company Name:</b>	<b>Myanmar Survey Research Co. Ltd.</b>
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<b>Company Address:</b>	<b>MSR Head Office</b> Yangon-Central-Railway Station Building, Mingalartaungnyunt Township, Yangon
<b>Country:</b>	Myanmar
<b>Websites:</b>	<a href="http://www.myanmarsurveyresearch.com">http://www.myanmarsurveyresearch.com</a>
<b>Tel:</b>	+95-1-370464
<b>Fax:</b>	+95-1-254263
<b>E-mail</b>	<a href="mailto:msr@myanmarsurveyresearch.com">msr@myanmarsurveyresearch.com</a>
<b>Qualifications and Experience of MSR</b>	Established in 1995, Myanmar Survey Research company has been providing research and consultancy services for more than twenty years to local and international firms including international organizations like UN agencies, World Bank and INGOs in Myanmar. MSR is certified by Department of Environmental Conservation of the Ministry of Natural Resources and Environmental Conservation. Besides ESIA assessment services for different types of projects in Myanmar, MSR also offers market, social and industry research services.

### Assessment team members



Figure 3-1 MSR: EIA team members

The MSR's EIA assessment team has been formed for conducting the ESIA study and assessment for this Nyaung Hnitpin Industrial Complex Project with the following environmental and social experts:

The MSR's EIA assessment team has been formed for conducting the ESIA study and assessment for this Nyaung Hnitpin Industrial Complex Project with the following environmental and social experts:

Name and designation	Position in team	Responsibility
U Kyaw Hlaing President	Leader	Overseeing the EIA/ESIA assessment process and the project
Dr. San Tun Aung Senior Adviser	Dy Leader	Advising on socio-economic impact assessment and editing the report
U Tin Than Biological Specialist	Member	Biological Impact Assessment, Preparation of written documentation and report writing
Engr. U Myint Swe Consultant Engineer	Member	Specialist gathering data of physical environment and devising the Environmental Management and Monitoring Plan

U Aung Lin Librarian-cum-Databank Manager	Member	Co-writer of ESIA report and gathering data (Social impacts)
U Ko Ko Soe Lwin Thaw (a) Ko Soe GIS & IT Specialist	Member	Cartography, photography and designing
U Oo Kyaw Maung (Policy Specialist)	Member	Policy specialist Specialize on laws, by-laws and regulations of Myanmar related to EIA/ESIA
U Kyan Dyne Aung, Environmental Management Specialist	Member	Conducting research and designing the environmental management plan of different project.
U Phone Myint Tun (Consultant, Physical Environment)	Member	Air Quality & Noise Level Assessment Hydrology, Geology & Soil Studies
U William Han Lwin Senior Analyst, MSR	Member	Senior Analyst and Report Writer
U Nyana Soe, Project Coordinator	Member	Coordinating and project implementation Do in-depth study of secondary research / literature review and, from time to time, liaise between company staff and officials from the developer side, whenever required
Daw Tin Tin Htwe Staff	Member	Supporting Staff Assist in typing and desktop publishing
<b>Government agencies that provide lab results</b>		
<b>Relevant Agencies</b>		<b>Lab tests performed</b>
Land Use Division of Department of Agriculture		Soil interpretation and soil analysis; soil water extraction interpretation and soil water extraction analysis
Plant Protection Division of Department of Agriculture		Heavy metal analysis of soil sample

### U Kyaw Hlaing (President-cum-Research Director)



U KYAW HLAING (PRESIDENT-CUM-RESEARCH DIRECTOR) is a founding member of Myanmar Survey Research (MSR), which was officially established in 1995.

He has had experience in conducting more than 300 research projects on various industries, macroeconomics, international relations and socio-economics and health. He is also a co-founder of AV Media Ltd, Yangon, Myanmar Monitor, Yangon and Myanmar Think Tank, which is attached to MSR. He has had experience in conducting five ESIA surveys.

He worked for Daikan Service Co Ltd in Tokyo, Japan, as a managerial assistant from 1992 to 1994. In 1995, he was an Administrative Associate at California Institute of Biological Research, San Diego, USA. In MSR, he was the Vice-President of MSR from 1995 to 1998.

U Kyaw Hlaing obtained a B Sc degree from Yangon University in 1985 and MA degree, specializing in International Management, from the International University of Japan in Niigata, in 1992.

### U San Tun Aung, Ph.D (Sociology, University of Hawaii)

U SAN TUN AUNG has been Technical Advisor to Myanmar Survey Research since 2009. Before joining MSR, he served with IFRC (International Federation of Red Cross and Red Crescent Societies), Myanmar Delegation Yangon, at various positions—Regional Information Officer and Senior Field Officer—from August 2004 to August 2008. From September 2002 to July 2004, he worked for Myanmar Red Cross Society, Yangon, in the position of Head of Communications. He was also Editor of The Myanmar Times, a weekly news journal published in two versions—Myanmar and English. He taught English to undergraduate students as a lecturer at English Language Institute, Thammasat University, Bangkok, for one year from June 1993 to June 1994. The first organization he joined after university graduation was The Working People's Daily (Now renamed: The New Light of Myanmar), a State-owned English language newspaper. He was an editor there from July 1983 to July 1992. He studied mathematics at University of Rangoon for BS and MS degrees which were conferred on him in 1977 and 1983 respectively. He obtained MA (International Development Program) from International University of Japan in 1998. Now he holds a Ph D, specializing in sociology, conferred by University of Hawaii, USA.



### U Tin Than, M. Sc. (Ygn.), M. Sc. (AIT)



U TIN THAN is the head of EIA/ESIA Department and by profession he is a biologist. He started his career as a demonstrator and later was promoted to lecturer at Zoology Department of Rangoon University from 1972 to 1990. From 1990 to 1993 he worked as a private biology and English teacher at British American English Language School, Bangkok, Thailand. He earned a master's degree in Natural Resource Management and Planning from Asian Institute of technology (AIT) in 1994. He was a consultant in Natural Resources Management and Development for Fifty-fifty Export-Import Co in Sangyaung, Yangon, from September to November in 1994. He

worked as Program Associate at Environment and Natural Resources Program and Business Development Unit, Continuing Education Centre, Asian Institute of Technology, Bangkok, from 1995 to 1997. He joined World Wide Fund for Nature (WWF) at Thailand Project Office as a Programme Officer from 1997 to 1999. He was promoted to the position of Senior Programme Officer up to 2005. From 2005 to 2013, he served as the Myanmar Program Coordinator/Myanmar Conservation Liaison Officer for Regional/Sub-regional Conservation Unit at WWF Thailand, WWF International Greater Mekong Program. He has joined MSR since October 2013.

### U Aung Lin (Librarian-cum-Databank Manager)



U AUNG LIN (LIBRARIAN-CUM-DATABANK MANAGER) joined MSR 19 years ago in 1998 as an Assistant Librarian who was responsible for gathering data and information.

He occasionally takes charge of MSR's data collection teams playing a key role in public consultations and conducting in-depth interviews with key stakeholders. He was promoted to Librarian and Databank Manager in 2003. He monitors political and economic news stories carried by State-owned newspapers

and private weekly news journals, and also carries out radio and television monitoring. He has had experience in conducting five ESIA surveys.

He is knowledgeable in almost all sectors and fields—the environment, deforestation, water and sanitation, mangroves, fishery industry, special economic zones (SEZs) and industrial zones, national infrastructure projects, hydropower and other sources of electricity, rice industry and agri-products, mining, etc.

Before joining MSR, he was a teacher from 1981 to 1998. With pen-names “Ko Lin Nwe (Main Ma Hla Island)” and “Ko Lynn Man Aung,” he has written a total of 200 articles on the natural environment and reduction of natural disasters among other topics.

He was conferred a B Sc with specialization in physics by Yangon University in 1979

### U Myint Swe (Engineer)

U MYINT SWE is currently the Civil Engineer of MSS Engineering Co Ltd, which is an affiliate of MSR. He is mainly responsible for analyzing physical impact of the proposed project and developing environmental management plan (EMP) and monitoring plan.

He is experienced in civil engineering field more than 42 years of surveying, construction of buildings, Roads, Bridges, Revetments, Ports and calculating of structure designs.

U Myint Swe is the civil engineer of MSSE engineering Co Ltd which is an affiliate of MSR. He obtained degree of A.G.T.I (Civil) from Government Technical Institute of Myanmar. He has conducted over 52 construction projects at Building department, Yangon City Development Committee (YCDC) from 1975 to 1992. He has also conducted as a senior licensed engineer and consultant, serviced to over 65 construction projects from 1993 to current. He was recognised Registered Senior Engineer (R.S.E) by Myanmar Engineering Council and awarded (Engr.) title.

He has reorganized as a Membership of the Society of Environmental Engineering, MSEE (UK) and also a Member of Myanmar Engineer Society.



### U Ko Ko Soe Lwin Thaw (GIS & IT Specialist)

U KO KO SOE LWIN THAW (GIS SPECIALIST), or better known as KoSoe, has officially been appointed a GIS and IT specialist since 2012. His other tasks on the EIA/ESIA team include doing cartography, designing and audio-video production.

He was an Assistant Manager and also a Creative Director for Lao Fo Ye Co Ltd in Singapore from 2008 to 2012. He also worked as a producer/editor for MRTV 3 and MRTV 4, government television channels in English version, from 1996 to 2008. He is also engaged in live show production and post-production. From 1992 to 1995, he worked as a freelance videographer and video editor in Singapore.

Bangkok Bureau of NHK Japan appointed him Assistant Cameraman (TV) from 1991 to 1992. Earlier from 1989 to 1991, he worked for AV Media Co Ltd (Yangon) as a cameraman.

He pursued his academic education, computer applications and advanced English in Singapore.



### U Kyan Dyne Aung (Environmental Engineering Management Specialist and Environmental Researcher)

**U Kyan Dyne Aung** obtained his bachelor's degree in civil engineering from Yangon Technological University in 2012. He worked as a construction site engineer in TACCO construction company from 2012 to 2014. After working a few years in the private construction business, he did his master's in environmental engineering management in Sydney, Australia in the years of 2015 and 2016. He was then appointed as Consultant – Civil Engineer for the project, namely, Community Development for Remote Townships – CDRT in Mon Kayin area from September 2006 to July 2007. Then he joined Asian Institute of Technology (AIT) in May 2008 to work for School of Environment, Resources and Development (SERD) as research associate. He worked on preparation and reviewing of several Environmental reports including but not limited to Environmental Impact Assessment, Healthcare Waste Status for Developing Countries, NGOs Implementing 3R Practice in Developing Countries, Eco-Industrial Cluster, and Integrated Management of Municipal Solid Waste in Asia. Afterwards, he was also a Project Officer in External Relations and Communications Office, AIT for organizing the 50<sup>th</sup> Anniversary Celebration of AIT until February 2010. In March 2010, he joined one of the leading Myanmar local Environmental NGOs, ECODEV. Being a Program Officer there for almost four years, he was responsible for managing several climate change and Environment related programs, projects and activities. From October 2013 to April 2018, he was a Senior Program Officer at Yangon Heritage Trust, a prominent local NGO, and had a good experience of overseeing and managing different and very challenging heritage and urban planning issues. He recently worked with Myanmar Survey Research as Environmental Engineering Management Specialist and Environmental Researcher for Environmental Impact Assessment on diverse projects and development.



**U Oo Kyaw Maung (Policy Specialist)**



U Oo Kyaw Maung (Policy Specialist) joined MSR in 2016 as a senior researcher. He is responsible for conducting research on different of social, economic policy issues for MSR. He will be advising on laws, by-laws and regulations related to the proposed project.

U Oo Kyaw Maung has extensive working experiences as independent consultant in different national and international organizations. In addition to such experiences, he also worked for UN agency in Myanmar for over four years.

U Oo Kyaw Maung hold B.A (Economics). Also, he holds Postgraduate Diploma in Public Administration and Master of Public Policy (Economic Policy) from the Australian National University.



An aerial photograph of a park area. In the center, there is a baseball field with a dirt infield and a grassy outfield. To the left of the baseball field is a tennis court. A paved path winds through the park, and there are several palm trees and other greenery. The text "SECTION 4" is overlaid in the center of the image.

**SECTION 4**

**POLICY, LEGAL AND  
INSTITUTIONAL  
FRAMEWORK**

## 4. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

### 4.1 Introduction

This section states the legislative framework concerning an industrial complex like Nyaung Hnitpin Industrial Complex. This section mainly focuses on essential policies, laws, regulations in force and guidelines that are compulsory by the project developer to comply with in developing the project. A full assessment of all relevant policies, legal, institutional and guidelines concerning the proposed project will be detailed in the ESIA Report of this project.

### 4.2 National Administrative Framework

Since National League for Democracy Party's government has taken the executive power, there are 25 ministries under the Office of the President as of November 2017. Regarding environmental, natural resources and social issues related to investment businesses, one of the focal agencies is the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation (MONREC), which the Ministry of Environmental Conservation and Forestry (MOECA) were merged in April 2016.

While ECD is the focal institute for environmental conservations, the following institutional consideration, regulatory setting and policies are equally essential for the project developer to comply with in doing investment business in Myanmar.

### 4.3 The Constitution of Republic of Union of Myanmar

The existing constitution of Myanmar came into effect in 2008. According to the constitution, the Union government has put special consideration and obligation to the critical role of natural environment for sustainable development and economic growth. Meanwhile, the constitution also states the commitment of the Union and its government in:

- Preservation and safeguarding of cultural heritage;
- Environmental conservation;
- Striving for development of human resources; and
- Protection and preservation of public property.

### 4.4 National Sustainable Development Strategy

The National Sustainable Development Strategy (NSDS) is part of a broader program of the UN Sustainable Development Commission set up after the World Summit on Sustainable Development in 2002. Every country, including Myanmar, that signed Agenda 21 at the Earth Summit in Rio de Janeiro in 1992, agreed to develop an NSDS by 2010 in line with the Millennium Development Goals (MDGs). UNEP provided funding for Myanmar to develop an NSDS. The main aim of the process was to develop an NSDS in line with international standards by meeting the MDGs and ensure that environmental and social impacts are mitigated when implementing development projects. Myanmar's NSDS was published in August 2009.

The major three goals that are designated in Myanmar's NSDS are (1) sustainable management of natural resources, (2) integrated economic development and (3) sustainable social development. In addition to these goals, specific strategies are outlined under each goal. For example, the goal for Sustainable Management of Natural Resources suggests strategies for forest resource management, sustainable energy production and consumption, biodiversity conservation, sustainable freshwater resources management, sustainable management of land resources, sustainable management for mineral resources utilization, and so on.

## 4.5 Myanmar National Environment Policy (1994)

With purposes to establish sound environmental policies, utilization of water, land, forests, mineral, marine and other mineral resources to conserve the environment and prevent environmental degradation, the National Commission for Environmental Affairs (NCEA) draft the National Environmental Policy in 1994. To meet with emerging challenges a new multifaceted national environmental policy, based on this National Environmental Policy, has finalized the final stage of drafting national environment policy by the Ministry of Natural Resources and Environmental Conservation (MNREC). This new national environmental policy is intended to “complement the national economic policy.”<sup>1</sup> The policy objectives also include “achieving harmony and balance between its people, their cultural heritage, the environment and its national resource”<sup>2</sup>. Principally, this policy states that it is the obligation of the government to take “environmental considerations into account when developing anything that may enhance the quality of the life of all its citizens” and environmental protection should always be “primary objectives in seeking development”<sup>3</sup>. In addition, the policy also emphasizes “not to exceed its jurisdiction or infringe upon the interests of the other nation”<sup>4</sup> while it has the sovereignty right to utilize its natural resource.

## 4.6 National Land Use Policy

The national Land use policy was drafted under the guideline of the former president U Thein Sein’s administration in 2014. This National Land Use Policy is the guide for the emergence of a new land law, including “harmonization of existing laws relating to land and their implementation” in Myanmar.

Some of the core objectives of this policy include:

- To promote sustainable land use management and protection of cultural heritage areas, environment, and natural resources for the interest of all people in the country
- To recognize and protect customary land tenure rights and procedure of the ethnic nationalities
- To develop transparent, fair, affordable and independent dispute resolution mechanisms in accordance with rule of law

In addition to these objectives, one of the basic principles of the National Land Use Policy is (a) *“to legally recognize and protect legitimate land tenure rights of people, as recognized by the local community, with particular attention to vulnerable groups such as smallholder farmers, the poor, ethnic nationalities and women”*<sup>5</sup>.

## 4.7 Myanmar Forest Policy

The policy document formalizes the commitment and intent of the government in “ensuring sustainable development of the forest resource both for environmental and economic purposes”<sup>6</sup>. This policy was drawn in 1995 to facilitate in implementation of the Forest Law promulgated in 1992. The policy mainly focuses on sustainable production, satisfying basic needs, institutional strengthening and improvements in efficiency. In addition, the policy focus pertains (a) forest and biodiversity protection and participatory forestry. This policy also

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<sup>1</sup> “A new and comprehensive national environmental policy for Myanmar”, UNDP (2016), <http://www.mm.undp.org/content/myanmar/en/home/presscenter/pressreleases/2016/12/a-new-and-comprehensive-national-environmental-policy-for-myanmar.html>

<sup>2</sup> Myanmar Laws & Regulations” Forest Legality Initiative, <http://www.forestlegality.org/risk-tool/country/myanmar>

<sup>3</sup> Myanmar Laws & Regulations” Forest Legality Initiative, <http://www.forestlegality.org/risk-tool/country/myanmar>

<sup>4</sup> Myanmar Laws & Regulations” Forest Legality Initiative, <http://www.forestlegality.org/risk-tool/country/myanmar>

<sup>5</sup> Chapter (3) (a), Basic principles, the National Land Use Policy

<sup>6</sup> Myanmar Forest Policy (2015)

reinforces the commitment of Myanmar government to “ensure sustainable development of forest resources while conserving wildlife, plants and ecosystem”<sup>7</sup>.

Specifically, the Myanmar Forest Policy have identified six imperatives which are essential to achieve broader national goals and objectives. These imperatives are as follow.

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

#### **4.8 National Biodiversity Strategy and Action Plan (NBSAP)**

The United Nations Convention on Biological Diversity (CBD) is a framework for national action for the conservation of biodiversity, the sustainable use of its components, and the equitable sharing of benefits arising from the utilization of genetic resources<sup>i</sup>. To fulfill this commitment to the Conservation, the government meeting No.17/2006 of the Republic of the Union of Myanmar, held on 25<sup>th</sup> May 2006, approved to formulate National Biodiversity Strategy and Action Plan (NBSAP), for which the funding is provided by the United Nations Environment Program (UNEP) and Global Environment Facility (GEF)<sup>ii</sup>. On the third of May 2012, the Government of the Republic of the Union of Myanmar adopted the Myanmar National Biodiversity Strategy and Action Plan by the Government Meeting No. 16/2012.

The fundamental objectives of the NBSAP is to provide “a strategic planning framework for the effective and efficient conservation and management of biodiversity and natural resources with greater transparency, accountability and equity”<sup>8</sup>. In addition to this objective, the National Biodiversity Strategy and Action Plan is designed based on the five grounded guided principles. Two of these five principles recognize that it is the indispensable right of indigenous and ethnic people in conserving biodiversity and for their coexistence with ecosystem. Also, the highest consideration is put to secure the access to common resources by economically disadvantaged groups<sup>9</sup>.

#### **4.9 Myanmar Industrial Policy**

In February 27, 2016, Industrial Policy was laid down by the Ministry of Industry, the Government of the Republic of the Union of Myanmar. In order to accomplishing the vision of the State “to establish the peaceful and modern developed new democratic nation”, the industrial policy implicitly states to accomplish the specific missions in 2020, which includes “to restore eternal peace and all-round improvement through country”.

Likewise, Myanmar industrial policy has stipulated the essential factors to be assessed from different point of views to successfully establish the industries in the industrial zones and special economic zones across the country. These includes

- a. National Development Strategy that the investors needed to be “acquainted widely the National Comprehensive Development Plan (NCDP), regional

<sup>7</sup> “Myanmar Law & Regulations”, Forest Legality Initiative, <http://www.forestlegality.org/risk-tool/country/myanmar>

<sup>8</sup> National Biodiversity Strategy and Acton Plan (2011)

<sup>9</sup> National Biodiversity Strategy and Action Plan (2011)

development plans, the Investment Law, Industrial Zone Law and the Special Economic Zone Law are as a guide <sup>10</sup>

- b. Location and situation for which the following criteria are essential to be fulfilled for the long-term development
  - a. A place for regional development
  - b. A place of good water resource
  - c. A place of good electricity supply
  - d. A place of good information and communication
  - e. A place where there is enough labor
  - f. A place where environmental conservation can be arranged
  - g. A place where land, water and air transportation are good

#### **4.10 The Myanmar Special Economic Zone Law and Rule (2014)**

This law was enacted in 2013 and revised in January 2014. This law provides the foundation for the establishment of Special Economic Zone to encourage economic growth and foreign investments in Myanmar. This law specifies a number of incentives for the investors, such as tax exemption for five years and 50% income tax relief on items exported overseas for five years. In addition to these incentives for investors, the article (35) of this law stipulates that investors shall abide by the environmental standards described in the Myanmar Environmental Conservation Law and International standards.

#### **4.11 The Land Acquisition Act (1894)**

This law serves as the fundamental law for land acquisition in Myanmar. It sets out the procedures of land acquisition and compensation. Further, the law has outlined relevant procedures such as notice periods, procedures for objections to acquisition, the method of valuation of land, process for taking possession of land, court process and appeals, procedure for the temporary occupation of land, and the acquisition of land for companies. The act requires that compensation at market value is provided to those from whom the land is acquired.

#### **4.12 The Farmland Law and Rules (2012)**

This law determines the land use rights of farmland and the granting of land use right to eligible farmers. Also, this law allows the rights to sell, mortgage, lease, exchange, and give either whole or part of the right to use the farmland. In addition, the law also determines the formations as well as the roles and responsibility of farmland administrative bodies at various levels. The Farmland law and rules determine procedures such as the application for farmland registration and obtaining land use certificates, application of transfer of farmlands for other purposes, and indemnities and compensation.

#### **4.13 The Environmental Conservation Law and Rules**

The Pyidaungsu Hluttaw enacted this law by law No. 9 of 2012 on the date of 30th March 2012. The key objectives of this law are:

- To enable to implement the Myanmar National Environmental Policy;
- To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process;
- To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations;

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<sup>10</sup> Chapter 5, "Establishment of Industries in Industrial Zones and Special Economic Zones" Myanmar Industrial Policy (2016), Ministry of Industry, the Government of the Republic of the Union of Myanmar

- To reclaim ecosystems as may be possible which are starting to degenerate and disappear;
- To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially;
- To enable to implement for promoting public awareness and cooperation in educational program for dissemination of environmental perception;
- To enable to promote international, regional and bilateral cooperation in the matters of environmental conservation;
- To enable to cooperate with Government Departments, Government Organizations, International organizations, non-government organizations and individuals in matters of environmental conservation.

Subsequently, the Environmental Conservation Rules (ECRs) were enacted in June 2014 as the detailed enforcement regulations for the Environmental Conservation Law. ECL stipulates MONREC's responsibility for environmental policy and administration, formulation of environmental management plan, implementation of environmental monitoring, setting of environmental standards, management of hazardous waste, and formulation and implementation of EIA, among others. The Environmental Conservation Law (ECL 2012) and Rules (ECL Rules 2014) both have implications for domestic and foreign investors in Myanmar. Article 7 of the ECL states the duties and powers of the Ministry of Environmental Conservation and Forestry (MOECAAF), which include:

- Prescribing environmental quality standards on emissions, effluents, solid waste, production procedures, processes and products
- Facilitating the settlement of environmental disputes
- Specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances used in industry, agriculture, mineral production, sanitation and other activities;
- Prescribing categories of hazardous substances that may significantly affect the environment;
- Prescribing the terms and conditions for effluent treatment in industrial estates, buildings, and other sites and emissions of machines, vehicles and mechanisms;
- Developing and implementing a system of environmental impact assessment (EIA) and social impact assessment (SIA);
- Enforcing compensation by polluters for environmental impacts; collecting funds from organizations which benefit from natural ecosystems and revenues from businesses which explore, trade and use natural resources, in order to support environmental conservation works.

#### **4.14 The Protection of Wildlife, Wild Plants and Conservation of Natural Areas Law (1994)**

The major objectives of this law are to implement the Government policy for wildlife protection and natural areas conservation, to carry out in accordance with the relevant International Conventions, to protect endangered species of wildlife and their natural habitats, to contribute for the development of research on natural science, and to protect wildlife by the establishment of zoological/botanical gardens. It prescribes the formation of the committee for protection of wildlife and natural areas with its function and duties and the determination of natural areas and endangered species of wild animal which are to be protected.

#### **4.15 The Forest Law**

The State Law and Order Restoration Council promulgated the Forest Law in 1992. This law was formulated by focusing on the balanced approach towards conservation and development issues implicit in the concept of sustainable forestry. It decentralizes the management and

opens opportunities for increased private sector involvement in timber trade. Highlighting environmental and biodiversity conservation, the law encourages community forestry and people's participation in forest management to meet the basic needs of the rural people but prescribes severe punishments for offences. In addition, the MOF has promulgated the Forest Rules in 1995.

#### **4.16 Myanmar Investment Law**

The Myanmar investment law (Law No. 40/2016) is enacted by the Pyidaungsu Hlutaw in 2016. The foreign investment law (the Pyidaungsu Hluttaw Law No.221/2012) and the Myanmar Citizens Investment Law (the Pyidaungsu Hluttaw Law No.18/2013) are repealed with this Law. However, the Myanmar Investment Commission which was formed by that Law is still given the power to perform its duties. Any decisions made by the commission under this power conferred by this law is the final and conclusive. The Ministry of Planning and Finance undertakes the office-work of the commission and bear the expenditures of the Commission.

The following objectives of this law are essential to comply with for this proposed investment project.

- To develop responsible investment business which do not cause harm to the natural environment and thee social environment for the interest of the Union and its citizens
- To protect the investors and their investment businesses in accordance with the law
- To enable the citizens to be able to work alongside with the international community
- To develop business and investment businesses that meet international standards

#### **4.17 The Public Health Law**

The public health law is enacted in January 1972. The objectives of the law include aspect of environment, food, sanitary, cosmetic items, diseases and medicine.

The guidance of the law is as follow for environment:

1. Residential area has to be trash free and wastage has to be properly disposed.
2. Area of drinking water source has to be cleaned and monitor according to the international standards.
3. Residential area has to be free of odor, smoke, carbon dioxide, dust, noise and radioactive materials.
4. Public and government buildings for the municipal and health care are advised to be developed.

Also, food manufacturing buildings has to follow:

1. Processed Food deliver to the public has to be clean and healthy.
2. Food production buildings are meant to be clean from fraud product, disease, dust and pest.

#### **4.18 The Conservation of Water Resources and Rivers Law**

The State Peace and Development Council Law enacted this law by Law No.8/2006 on the date of 2<sup>nd</sup> October 2006. However, this law is under the jurisdiction of the Ministry of Transport. This law focuses on transportation safety and its development. However, it lacks actual numerical criterion for natural environment. The main objectives of this law include:

1. To conserve and protect water resources and rivers system for beneficial utilization by the public.
2. To ensure smooth and safety waterways navigation along rivers and creeks;
3. To contribute to the development of State economy through improving water resources and river system and

4. To prevent environmental impact

#### **4.19 The Protection and Preservation of Cultural Heritage Regions Law**

The State Peace and Development Council Law enacted this law by law No.9/98 on the date 10<sup>th</sup> September 1998 with the objectives:

1. To implement the protection and preservation policy with respect to perpetuation of cultural heritage that has existed for many years;
2. To protect and preserve the cultural heritage regions and the cultural heritage therein so as not to deteriorate due to natural disaster or man-made destruction;
3. To uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving the cultural heritage regions;
4. To promote public awareness and will as to the high value of the protection and preservation of the cultural heritage regions;
5. To protect cultural heritage regions from destruction;
6. To carry out protection and preservation of the cultural heritage regions in conformity with the International Convention approved by the State.

#### **4.20 The Prevention and Control of Communicable Diseases Law (1995, revised in 2011)**

This law describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics and penalties for those failing to comply. The law also authorizes the Ministry of Health and Sport to issue rules and procedures when necessary with approval of the government.

#### **4.21 The Explosive Act (1884)**

The explosive act stipulates the prohibitions on production, possession and use of explosives without permission.

#### **4.22 The Explosive Substances Act (1908)**

The Explosive Substance Act stipulates the prohibitions on production, possession and use of explosives without permission

#### **4.23 The Prevention of Hazard from Chemical and Related Substances Law (2013)**

The Prevention of Hazard from Chemical and Related Substances Law, the central law of chemicals management in Myanmar enacted in 2013, stipulates that when chemical and related substances is to be transferred, stored, used, or disposed, operating approval certificate should be obtained in accordance with the regulations based on the international treaties.

#### **4.24 The Worker's Compensation Act (1923)**

This law stipulates that employer is required to make payments to employees who become injured or who die in any accidents arising during and in consequence of their employment. Such compensation also must be made for diseases which arise as a direct consequence of employment, such as carpal tunnel syndrome.

#### **4.25 The Payment of Wages Act (1936)**

The Payment of Wage Act defines the payment obligation to the workers employed in the factories or railway administration. It stipulates the method of payment stating that the payment

should be made in cash on a regular payday and allows legal action against delayed payment or un-agreeable deduction.

#### **4.26 The Factory Act (1951)**

This act stipulates the work condition of the workers in the factory such as working hours, worksite safety and health measures. According to the act, worker at age of 18 or over shall not work exceed eight working hours per day or forty-four hours per week, and the working days shall not exceed six days per week. As for worksite safety, the factory shall be kept clean with proper ventilation, light and heat and the workspace shall be situated away from drains, latrines or other things which create a bad or unhealthy smell.

#### **4.27 The Shops and Establishment Act (1951)**

This act stipulates the payment of wage, working hours, holidays at shops and commercial establishment.

#### **4.28 The Leave and Holidays Act (1951, revised in 2014)**

This act has been used as the basic framework for leaves and holidays for workers with minor amendment in 2006 and 2014. This defines the public holidays that every employee shall be granted with full payment. It also defines the rules of leaves for workers including medical leave, earned leave and maternity leave.

#### **4.29 The Labor Organization Law (2011)**

The Labor organization law replaced the Trade Union Act enacted in 1927 for protecting the rights of the workers, having good relations among the workers of between the employer and the work, and for forming and carrying out the labor organization systematically and independently. Under this law, the labor organization has the right to carry out freely in drawing up their constitution and rules. It has the right to negotiate and settle with the employer if the workers are unable to obtain the right of the workers contained in the labor laws. On the one hand, the employer shall recognize the labor organizations and assist as much as possible if the labor organizations request for help for the interest of his workers.

#### **4.30 The Social Security Law (2012)**

The Social Security Law, enacted in 2012, was amended the Social Security Act in 1954. It stipulates the formation and implementation of social security systems.

#### **4.31 The Labor Dispute Settlement Law (2012)**

This law was enacted for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly. It stipulates that employer in which more than 30 workers are employed shall form the workplace coordinating committee consisting of the representatives of workers and the representatives of employer.

#### **4.32 The Minimum Wage Law (2013)**

The minimum wage law, passed in March 2013, was replaced the 1949 Minimum Wage Act. The law provides a framework for minimum wage determination: the presidential office establishing a tripartite minimum wage committee shall decide minimum wage with industrial variation based on a survey on living costs of workers possibly every two years. This also stipulates equal payment.

#### **4.33 The Export and Import Law (2012)**

In 2012, the Export and Import Law was enacted and the Control of Imports and Exports Act (1947) was abolished. It aims to implement the economic principles of the State successfully,

to lay down the policies to export and import that support the development of the State; and that are to be in conformity with the international trade standards.

#### **4.34 The Electricity Law (2014)**

In 2014, the Electricity Law of 1984 was replaced by the new Electricity Law, a comprehensive piece of legislation covering licensing, a new regulatory commission, standards, inspection, tariff, and restrictions. The Electricity Law divides projects into “small” (up to 10 MW), “medium” (between 10 MW to 30 MW) and large (upwards of 30 MW); the states and regions can issue permits for small and medium power plants. In case these plants are not connected to the national grid, the Union Government Ministry is not the primary authority involved. The authorities have a legal right to use land for power plants under the Electricity Law and have the right to expand and maintain their facilities. The law also provides that the authorities can build transmission lines in accordance with existing laws.

#### **4.35 The Boiler Law (2015)**

The Boiler Law was enacted for protection of the accidents related to the boiler, building up skill resources, and mitigation of the long-term environmental and health impacts generated from boilers. It is described that the boiler that is to be used should meet international requirements.

#### **4.36 International Conventions, Treaties and Agreements**

The government of the Republic of the Union of Myanmar has also ratified international agreements and treaties which are related to environmental and social issues. It is also essential for the project proponent to take into consideration these treaties and agreements in commencing the project. The Major International Agreements and Treaties are:

1. Plant Protection Agreement for the Asia and Pacific Region; Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer;
2. London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer;
3. United Nations Framework Convention on Climate Change (UNFCCC); United Nations Convention to Combat Desertification;
4. International Civil Aviation Organization: ANNEX 16 Annex to the Convention on International Civil Aviation Environmental Protection Vol. I, II, Aircraft Noise;
5. Vienna Convention for the Protection of Ozone Layer;
6. Montreal Protocol on Substances that Deplete the Ozone Layer;
7. Convention Concerning the Protection of the World Cultural and Natural Heritage;
8. Convention on Biological Diversity (CBD); International Tropical Timber Agreement (ITTA);
9. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
10. ASEAN Agreement on the Conservation of Nature and Natural Resources: Catagena Protocol on Bio-safety
11. Kyoto Protocol to the United Nations Framework Convention on Climate Change;
12. Ramsar Convention on Wetlands; and
13. Copenhagen Amendment to Montreal Protocol on Substances that deplete the Ozone Layer.
14. United Nations Declaration on the Rights of Indigenous Peoples.

#### **4.37 Environmental Policy of the Project Proponent**

The Korea Land and Housing Corporation (LH) is committed to providing a quality services in a manner that ensures a safe and healthy workplace for the employees and minimizes the

potential impact on the environment. The Corporation sets out the policies to make sure that the environment is protected by conserving energy and natural resources and proper management of the wastes generated. The Policy addresses the following aspects:

- 1) Taking significant environmental aspects and impacts into account throughout the project construction and operations;
- 2) Ensuring that the environmental issues are properly assessed and considered when key decisions are taken for the project activities;
- 3) Establishing and measuring the significant environmental impacts of construction and operations, setting targets for performance improvements and monitoring progress against those targets in areas including but not limited to energy, greenhouse gas emissions, water usage/quality and waste;
- 4) Using energy and natural resources wisely and efficiently, reusing and recycling whenever possible and practical;
- 5) Developing and improving operations and technologies to minimize waste, and other pollution, minimize health and safety risks, and dispose of waste safely and responsibly;
- 6) Ensuring that employees have a level of knowledge and understanding appropriate to their environmental responsibilities and are aware of actions they can take to reduce their impacts; and
- 7) Updating the policy as needed according to the new laws, rules and regulations.

A unit with members will be established with specific responsibilities for the Project's environmental policy and performance. The findings and results of the Project's environmental performance would be available at the Project website.

#### 4.38 Social Policy of the Project Proponent

The Korea Land and Housing Corporation (LH) set the social policy covering the following factors:

- 1) Employment opportunities;
- 2) On – job skills training;
- 3) Workplace safety and health;
- 4) Mandatory social security schemes for certain workers and voluntary insurance under the social security schemes for all workers entitling them to benefits according to law; and
- 5) Provision of health care and monetary benefits that are provided for in the Social Security Law in an accurate and speedy manner, supporting insured workers and their families in times of need and suffering.

The healthcare and monetary benefits include:

- i) medical treatment and cash benefit for sickness;
- ii) medical treatment and cash benefits for maternity;
- iii) temporary and permanent disability (regarding employment injury) benefit;
- iv) funeral benefit for decease due to occupation
- v) survivors' benefit for occupational decease

The policy will also cover:

**Fair Employment System:** The talented individuals who can work together would be hired to achieve the mission and vision in a transparent manner. The diversity and human rights of the employees are respected and there will be no discrimination based on their gender, ethnicity,

age, religion, educational background and physical disability while ensuring full compliance with Myanmar Labor Law and International Labor Organization (ILO) on the prohibition of force labor.

**Ethical Management System:** Based on the high level of ethical standards, a transparent and fair company culture is created to build an ethical management system so that all employees can conduct themselves and make decisions rightly. We fully comply with all applicable laws and regulations and treat every individual fairly with respect according to our ethical practice guidelines.

**Improving Employees:** It is important to have an accurate understanding of the mindset and values that each and every employee has toward the company and their work, and to improve employee satisfaction as well as reflecting these findings into the management of the company, in order to bring out the full potential of each and every employee and to create a lively

workplace environment.

**Creating Healthy and Enjoyable Workplace:** The healthy and enjoyable workplace will be created by developing public places such as recreation place, day care center and playground for children, canteen and lounge for workers.

### 4.39 Occupational Health and Safety Guidelines and Standards of Project Proponent

**The Korea L H Consortium Myanmar** as an employer considers its employees to be its most valuable assets and undertakes to safeguard them through providing and maintaining, as far as reasonably practical, a working environment that is safe and without risk to the health of its employees.

The consortium also believes that health and safety orientation is a vital component of the health and safety management system. It is the process of introducing new, inexperienced, transferred and returning employees to a safe and healthy workplace.

Orientation provides employees with necessary safety information about their job and tasks, informs them of specific details about workplace hazards and provides an opportunity to learn about the company and their colleagues, ask questions and to clarify new or confusing information.

The orientation will be conducted for all employees, and workers for the construction phase and the length of time required for orientation will depend on the workplace, and the specific job and tasks. Orientation will not consist of a whirlwind of checklists and safety manuals handed to the new employee, but rather needs to be practical and hands-on, and will focus on the skills the employee must develop to be successful at their job.

#### ORIENTATION TOPICS

The following topics are the minimum requirement for the company to review with new employees before they begin work:

##### 1. Contact Information:

Names, phone numbers of employee's supervisor and company personnel, including emergency contact information.

##### 2. Rights and Responsibilities:

Explain both the employee and employer responsibilities as outlined in Occupational Safety and Health Law (Draft) by Pyidaungsu Hluttaw.

##### 3. Procedures and Codes of Practice:

Explain the company's procedures and codes of practice as it pertains to the employee's job and department. Outline the expectations for the employee and the employee's supervisor to adhere to all standards.

#### **4. First Aid:**

Introduce first aid providers, indicate areas for first aid kits or room, explain to employees how to summon first aid for themselves or for a co-worker.

#### **5. Accident/Injury Reporting Procedures:**

Explain the established company procedure and contact people for reporting any injuries sustained by the employee.

#### **6. Emergency Procedures and Preparedness:**

Review the company's emergency personnel contact info; evacuation plan, including exit routes; evacuation signals and sirens; location of eyewash stations and showers, fire extinguishers, and alarm pull boxes; identify fire marshal(s); and identify exposures. Other procedures may include:

- ✓ Bomb threats/suspicious packages
- ✓ Threatening, violent or disruptive behaviours
- ✓ Chemical spills, gas leaks
- ✓ Debriefing assistance for critical incidents

#### **7. Personal Protective Equipment (PPE):**

Review the required PPE (legal) standards for specific jobs or job tasks, including the appropriate use, fitting, storage, and maintenance for assigned jobs.

#### **8. Code of Practice for Working Alone:**

Outline the process for any employee who works alone so they can remain safe on the job or to be able to summon emergency assistance, if required.

#### **9. Workplace Hazardous Material Information System (WHMIS):**

Explain where hazardous material and substances are located and review the labeling system, hazardous symbols and location and contents of the Material Safety Data Sheets (MSDS). Train employees on site-specific products and accompanying MSDS material.

## **4.40 GUIDELINES, STANDARDS AND ACTIVITIES FOR OCCUPATIONAL HEALTH AND SAFETY**

### **4.40.1 ORGANISING THE SITE**

#### ***1.1 Planning the work***

A good planning will be made by gathering as much information about the project and the project site before works begin to ensure safety during construction phase.

Information that could be sought would be:

- (a) Underground services
- (b) Presence of live bare electrical conductors, underground/overhead insulated cables. Advice from the authority concerned would also be sought prior to start of work.
- (c) Ground conditions
- (d) Contract documents

- (e) Nearby schools, footpaths and roads
- (f) Other activities going on the site

### **1.2 Organising the work**

Responsibilities regarding safety and health between different stakeholders would be clearly allocated:

- (a) Between client/main contractor/subcontractor
- (b) By appointment of competent supervisors/safety and health officers
- (c) By proper coordination on site between parties

### **1.3 Common facilities to be provided**

The provision of basic facilities to ensure safety, health and welfare of employees would be ascertained.

#### **1.3.1 Site access**

Adequate, safe and separate pedestrian and vehicular traffic routes would be provided on and around the site.

#### **1.3.2 Site boundaries**

The construction site will be fenced to prevent the entry of unauthorised persons on construction sites, which are located in built-up areas and alongside vehicular and pedestrian traffic routes.

#### **1.3.3 Public safety**

The public safety would be ensured through appropriate fencing of site or by other means.

#### **1.3.4 Lighting**

The adequate lighting of all worksite would be ensured through natural and/or artificial lighting.

#### **1.3.5 Site tidiness**

- (a) The site would be kept tidy.
- (b) Walkways and stairs would be kept free of slipping and tripping hazards.
- (c) There will be no protruding nails on loose or fixed materials.

#### **1.3.6 Storage areas**

- (a) The storage areas would be set up for plants, materials, flammable substances (e.g. flammable liquids and gases) and hazardous substances (e.g. chemicals).
- (b) The flammable materials would be stored away from other materials and protected from accidental ignition.
- (c) The obstruction of access routes/emergency escapes by proper storage of materials would be prevented.
- (d) Materials to be properly stacked to prevent falls.

#### **1.3.7 Fire Safety**

Details can be reviewed in Fire Safety Management and Fire Emergency Plan.

## **2.0 EXCAVATIONS**

- (a) All utility services, such as electrical, water and sewer in the area would be located and identified before beginning to excavate.
- (b) The pointed tools will not be used to probe for underground electrical cables.

- (c) Trees, utility poles, rocks or similar objects near the edge of an excavation would be removed or secured to prevent workers from being injured.
- (d) The sides of excavations would be supported by sheet piling, shoring and bracing to guard against danger to workers from fall or dislodgement of earth, rock or other material.
- (e) The excavation slopes and/or supporting systems would be inspected daily for erosion or deterioration.
- (f) The excavated materials will be kept back at least 600 mm (2 ft.) from the edge of any trench excavation and 1.2 m (4 ft.) from any other excavation.
- (g) The substantial guardrails or barriers would be erected around excavations to prevent workers or other persons from falling into them.
- (h) A ladder will be provided when workers are required to enter excavations over 1.5 m (5 ft) in depth.
- (i) The load, plant or equipment would not be placed or moved near the edge of any excavation where it is likely to cause its collapse and thereby endanger any person unless precautions such as the provision of shoring or piling are taken to prevent the sides from collapsing.
- (j) The anchored stop blocks, and barriers would be provided to prevent vehicles being driven into the excavation.
- (k) The heavy vehicles will not be allowed near the excavation unless the support work has been specially designed to permit it.
- (l) If an excavation is likely to affect the security of a structure on which persons are working, precautions would be taken to protect the structure from collapse by providing shoring.

### **3.0 WORKING AT HEIGHT**

#### **3.1 General provisions**

- (a) Ensure that working platform is secure and check that it:
  - (i) will support the weight of workers using it and any materials and equipment they are likely to use or store on it.
  - (ii) is stable and will not overturn.
  - (iii) is footed on stable ground or on a stable support or structure.
- (b) Provide guard rails, barriers, etc. at open edges, including edges of floors, floor openings, edges of roofs and edges of working platforms.

#### **3.2 Guard rails**

##### **Guard rails would:**

- (a) be made from any material, provided they are strong and rigid enough to prevent people from falling and be able to withstand other loads likely to be placed on them.
- (b) be fixed to a structure, or part of a structure capable of supporting them.
- (c) Include:
  - (i) a main guard rail at least 900 mm above any edge from which people are liable to fall.
  - (ii) a toe board at least 150 mm high.
  - (iii) a sufficient number of intermediate guard rails or suitable alternatives.
- (d) Risks of falls through openings or fragile material (e.g. rooflights), to be reduced by providing appropriate and adequate guard rails or barriers to cover the opening or material.

#### **3.3 Safe working platforms**

All working platforms would be:

- (a) Fully boarded and securely fixed to prevent displacement.
- (b) Strong enough to support the load usually placed on it (workers and materials).
- (c) Provided with toe-boards so as to prevent materials and tools from falling over the edges.

### **3.4 General access scaffolds**

All scaffolds would be:

- (a) Properly designed, constructed, erected and maintained so as to prevent collapse or accidental displacement.
- (b) Based on a firm and level foundation.
- (c) Erected on a firm ground capable of supporting the weight of the scaffold and any load likely to be placed on it.
- (d) Braced and tied into a permanent structure or otherwise stabilized.
- (e) Provided with platforms that are fully boarded and wide enough for the work and for access.
- (f) Provided with scaffold boards that are properly supported and rest on at least three supports.
- (g) Have a safe ladder or other access onto the work platforms.

### **3.5 Safe use of access ladders**

- (a) Any ladder would be properly fixed to prevent slipping.
- (b) A good handhold would be provided to the ladder.
- (c) The ladder would be leaned at the proper angle to minimize the risk of slipping outwards, that is, about 1 m out at the base for every 4 m in height.
- (d) The top of the ladder would rest against a solid surface and not on fragile or other insecure materials such as cement or plastic guttering.
- (e) Both feet of the ladder would rest on a firm footing and cannot slip.
- (f) If the ladder is more than 3 m long or used as a way to and from a workplace, it would be secured from falling by fixing it at the top or sometimes at base.
- (g) If the ladder cannot be fixed a second person would secure the ladder at the base while it is being used.
- (h) The ladder would extend a sufficient height (about 1 m) above any landing place where workers will get on and off it unless some other adequate handhold is available.

### **3.6 Stepladders**

- (a) Stepladders would be fully opened, and both spreader bars would be locked.
- (b) Stepladders would not be used on top of scaffolds, platforms, or other surfaces above the ground.
- (c) Unattended tools, such as hammers, would not be left on top of stepladder.
- (d) Stepladder would be dismantled before being moved.
- (e) Top most rung of a stepladder would not be used.

### **3.7 Care of ladders**

- (a) Ladders would be inspected regularly by a competent person and damaged ladders should be removed from service.
- (b) Ladders would be properly stored on racks under cover and above ground.
- (c) Ladders would not be hung from its rungs.

### **3.8 Roof works**

- (a) All roof-work operations would be pre-planned and properly supervised.
- (b) Roof work would only be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work.
- (c) Work on roofs should not be carried on in weather conditions that threaten the safety of workers.

#### **3.8.1 Flat roofs**

- (a) All the edges and openings on a roof from or through which there is a risk of fall would be protected with suitable guardrails and toe boards.
- (b) All covers for openings in roofs would be of substantial construction and be secured in position.

#### **3.8.2 Sloping roofs**

- (a) When work is being carried out on sloping roofs, sufficient and suitable crawling boards or roof ladders would be provided and firmly secured in position as soon as practicable.
- (b) During extensive work on sloping roofs, edge protection in the form of barriers or guardrails high enough and strong enough would be provided to stop worker from falling off the roof.

#### **3.8.3 Fragile Roofs**

Where workers are required to work on or near roofs or other places covered with fragile material, through which they are liable to fall, they would be provided with sufficient suitable roof ladders or crawling boards strong enough, when spanning across the supports for the roof covering, to support those workers.

## **4.0 MOVING, LIFTING AND HANDLING LOADS**

### **4.1 Manual handling**

- (a) Work site and storage of materials would be planned so that manual handling is reduced to a minimum.
- (b) Manual handling would be done by the kinetic lifting technique and the person involved should be properly trained.

### **4.2 Hoists**

- (a) Selection of a hoist, which is suitable for the site and capable of lifting the loads required will be made.
- (b) To prevent people being struck by the platform or other moving parts:
  - (i) Enclose the hoistway at places where people might be struck, e.g., working platforms or window/door openings.
  - (ii) Provide gates at all landings and at ground level
- (c) Prevent falling down the hoistway by making sure:
  - (i) the hoistway is fenced where people could fall down it.
  - (ii) the gates at landings are kept closed except during loading and unloading.
  - (iii) the edge of the hoist platform is close to the edge of the landing so that there is no gap to fall through.
- (d) Prevent being hit by falling materials by:
  - (i) stopping loads falling from the platform, e.g., make sure wheelbarrows are not overfilled.
  - (ii) not carrying loose loads. Put loose loads in proper container or use a hoist with an enclosed platform.

- (iii) not overloading the platform.
- (iv) enclosing the hoistway.
- (v) hoist should be used to carry materials only.

#### **4.3 Lifts**

Lifts for the carriage of persons need to be especially constructed and installed for the purpose, with such features as mechanical and electrical interlocking devices on the cage and landing gates.

#### **4.4 Mobile cranes**

- (a) The crane would be able to lift the load on a site.
- (b) It should be of such a size so that it can be used safely on a site.
- (c) Crane's inspection certificates would be up-to-date.
- (d) The crane would be fitted with an automatic Safe Load Indicator, which should be in good working order.
- (e) The employer would ensure that the driver is trained and experienced in the operation of the type of crane being used.
- (f) The crane should be sited in a safe place, so that;
  - The driver has a clear view of the site.
  - It is well away from excavations and overhead powerlines.
  - It is on level ground which can take its full weight and together with its maximum load.

#### **5.0 Site Vehicles and Mobile Plant**

- (a) Provide safe site entry and exit points with adequate turning room and good visibility for vehicle drivers.
- (b) Keep pedestrians separate from vehicles, e.g., by providing separate site entry and exit points.
- (c) Consider a one - way system and avoid needs for vehicles to reverse wherever possible.
- (d) Consider fitting reversing alarms to vehicles.
- (e) Make use of signalers to control high-risk situations, e.g., where visibility is restricted.
- (f) Prepare the running surface of temporary roads. Where the site is muddy, use hardcore or other fill to overcome the problem of skidding and repair potholes
- (g) Protect any temporary structures, such as scaffolds or falseworks, which might be damaged and made unsafe if struck by a vehicle.
- (h) Protect any excavations and alongside any areas of water if vehicles must pass close by.
- (i) Take precautions, such as stop blocks, where vehicles tip materials into excavations.
- (j) Make sure that vehicles are not overloaded as they may become unstable, difficult to steer or have their braking efficiency impaired.
- (k) Make sure loads are securely attached to vehicles and that loose materials cannot fall from lorries or site dumpers and strike workers.
- (l) Take special precautions with blind corners.

#### **6.0 CHEMICALS**

- (a) Follow the instructions provided on the labels when working with glues, paints, and solvents.

(b) Work with glue, paint, or solvents in well-ventilated areas so as to prevent build-up of hazardous environment to chemical vapours.

(c) Use appropriate personal protective equipment and clothing to employees working with chemicals based on labels and Material Safety Data Sheet (MSDS).

## **7.0 PROTECTIVE EQUIPMENT**

Employees on construction sites need specific Personal Protective Equipment (PPE) to ensure their safety and health. e.g.:

### **7.1 Safety helmet**

(a) Employees would be provided with safety helmets to protect the head from injury due to falling or flying objects or due to striking against objects or structures.

(b) Employers should ensure that the safety helmets are worn.

(c) When working at height, a strap would additionally be used to prevent the safety helmets from falling.

### **7.2 Footwear**

(a) Protective footwear would be provided to workers who are exposed to the risk of injury of materials being dropped on their feet or nail or other sharp objects penetrating their sole.

(b) Where it is likely that employees will be working in water or wet concrete, appropriate boots would be provided.

### **7.3 Goggles and safety spectacles**

The employer would provide goggles or other suitable protective device when likely to be exposed to eye or face injury from airborne dust or flying particles, dangerous substances, harmful heat, light or other radiation, and in particular during welding, flame cutting, rock drilling, concrete mixing or other hazardous work;

### **7.4 Gloves and protective clothing**

Protective gloves and suitable protective clothing to protect hands or the whole body as required when exposed to heat radiation or while handling hot, hazardous or other substances which might cause injury to the skin would be provided by the employer.

### **7.5 Other protective equipments**

Where necessary, workers would be provided with and required to wear the following personal protective equipment:

(a) Ear protection when exposed to noise.

(b) Dust masks when exposed to excessive dust.

(c) Waterproof clothing and head coverings when working in adverse weather conditions.

(d) Safety harnesses with independently secured lifelines where protection against falls cannot be provided by other appropriate means.

(e) Life vests and life preservers where there is a danger of falling into water.

(f) Distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure to danger from moving vehicles.

Note: All protective equipments should be properly maintained and stored after use.

## **8.0 EMERGENCY PROCEDURES**

### **8.1 Transport**

(a) Where an employee has suffered injury or illness at work necessitating his removal to his home or to a hospital or other similar institution, the employer shall promptly and at his own expense provide an appropriate means of conveyance for the employee.

(b) The appointed person or first-aider shall accompany the injured or ill employee to a hospital or other similar institution whenever the circumstances so justify.



An aerial photograph of a rural landscape. In the center, there is a cluster of several rectangular buildings with light-colored roofs, possibly a school or a small industrial site. A dirt road or path runs through the area, and there are patches of green vegetation and brown soil. The background shows a vast, flat landscape under a clear blue sky with a few wispy clouds.

# **SECTION 5**

# **PROJECT DESCRIPTION AND ALTERNATIVE**

## 5. PROJECT DESCRIPTION AND ALTERNATIVE

### 5.1 Project Background



Figure 5-1: Overview image of project

This Environmental Impact Assessment (EIA) report has been prepared by Myanmar Survey Research (MSR) on behalf of Korea Land and Housing Corporation (LH).

The proposed project is the development of an industrial complex to be built on the land of approximately 555.81 acres in a public open space, access and landscaping. LH is currently preparing an outline planning application for the site, including an Environmental and Social Impact Assessment (ESIA).

At this stage, the intention is to submit an ESIA Report to the Environmental Conservation Department to obtain the Environmental Compliance Certificate for construction of the Industrial Complex in Nyaung Hnitpin public land area of 555.81 acres along with infrastructure development for roads, electricity and water pipeline.

## 5.2 Project Description and Location

### 5.2.1 Project Location, Overview Map

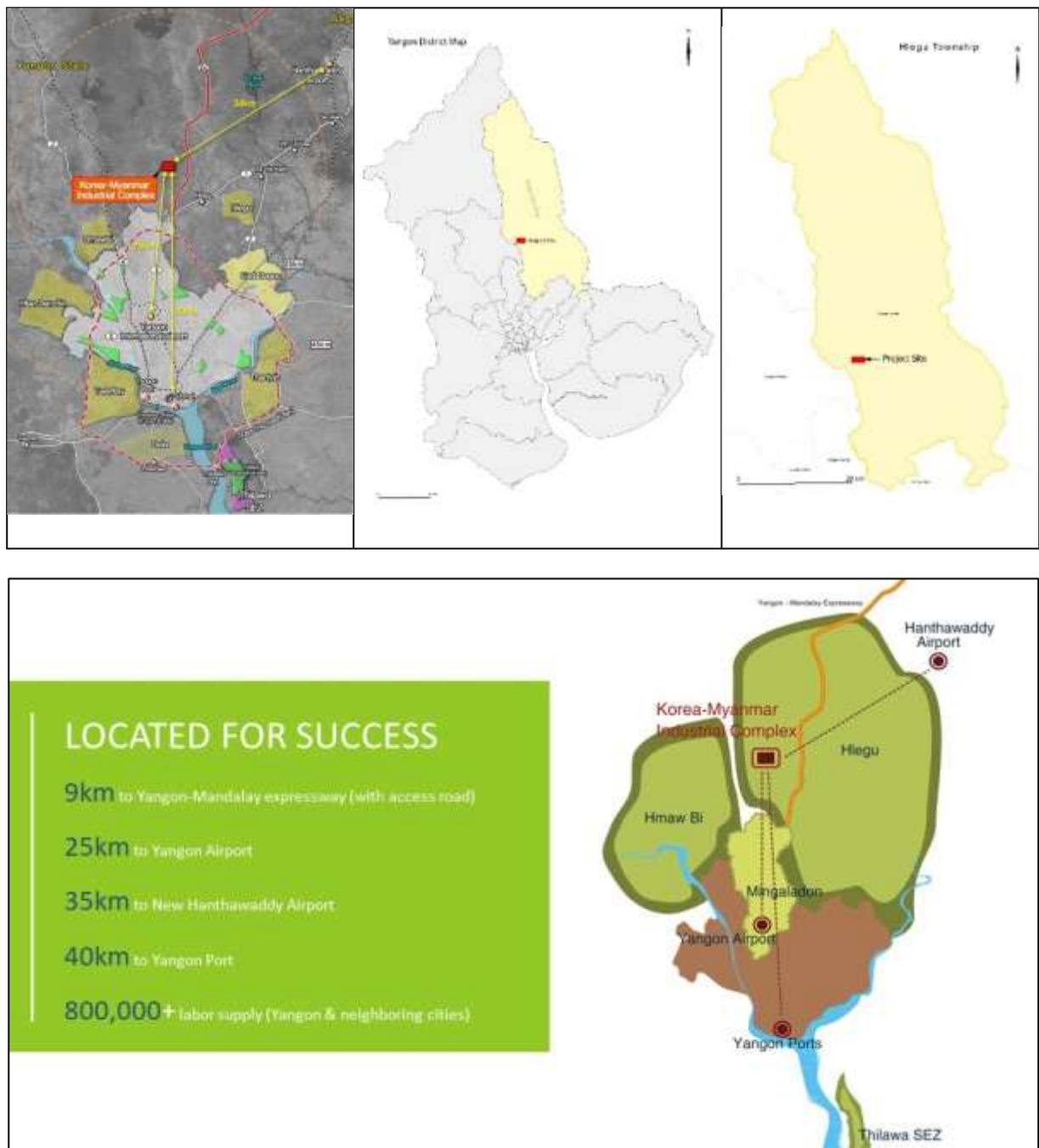


Figure 5-2 Location Map

The Government of Myanmar, Ministry of Construction and L H Consortium (Korea) agreed to develop an Industrial complex around Yangon Region. Myanmar Korea Nyaung Hnitpin Development Consortium is formed, and it initiates Nyaung Hnitpin Industrial Complex Project which is located in Nyaung Hnitpin Livestock and Agricultural Zone No.3, Hlegu Township, and which is 40 km north from Yangon Port, 25 km from Yangon International Airport and 35 km from Hantharwaddy Airport (Bago), 9 km from Yangon – Mandalay Expressway. The land is 555.81 acre (2,249,288 square meter) in area and is flat and swampy area previously known as Nyaung Hnitpin Research and Training Institute.

The location is between:

	Latitude	Longitude
Point A	17.136131°	96.155709°
Point B	17.141934°	96.157951°
Point C	17.142103°	96.162789°
Point D	17.144476°	96.162692°
Point E	17.144329°	96.158867°
Point F	17.145730°	96.159415°
Point G	17.146511°	96.179249°
Point H	17.137174°	96.178757°



Figure 5-3: Figure 0 2: Aerial Photo of Existing Project Site (Taken by MSR Drone Team)

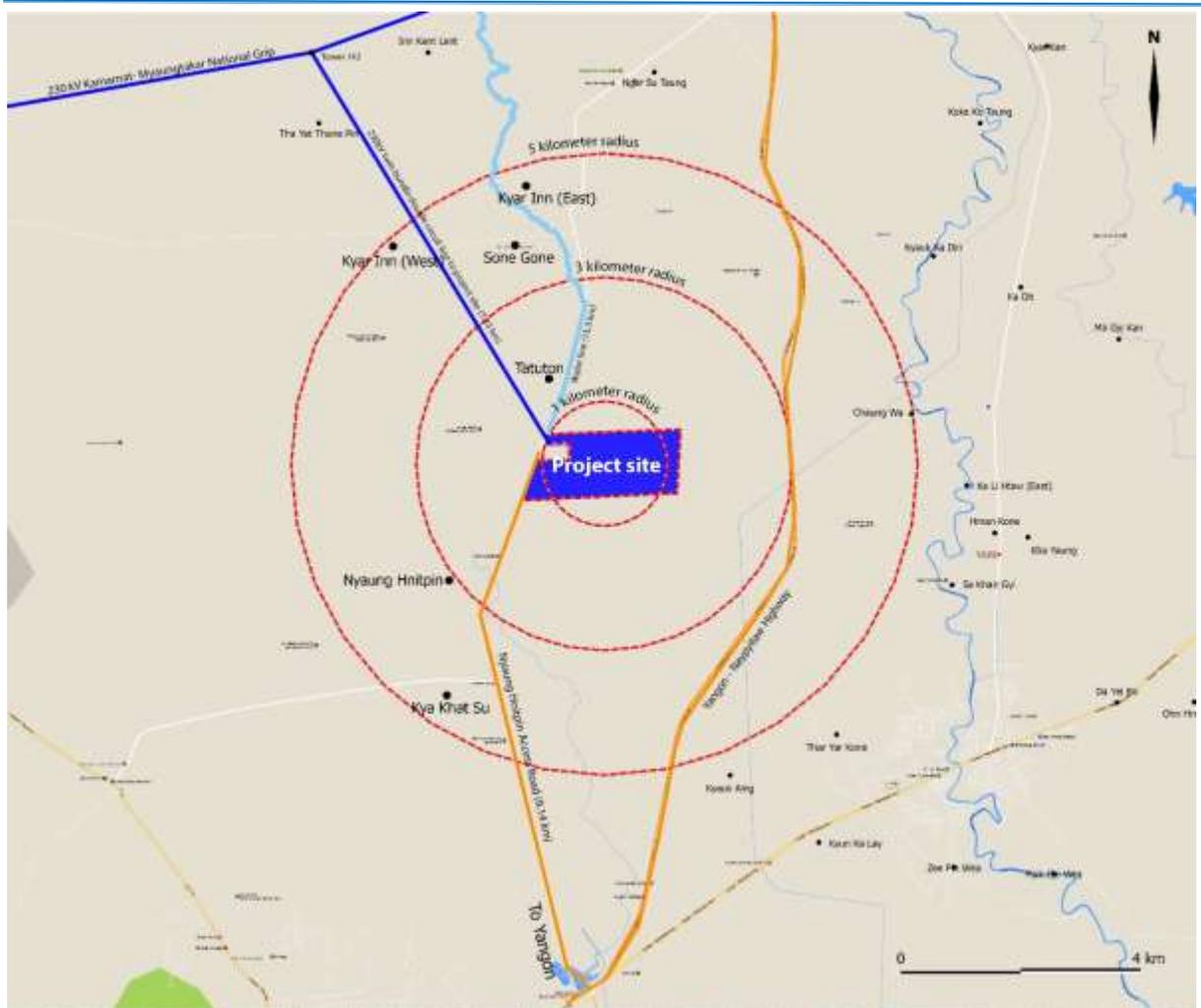


Figure 5-4: Aerial Photo of Existing Project Site (Taken by MSR Drone Team)

## 5.3 Project Development and Implementation Time Schedules

### 5.3.1 Development Concept

Korea LH Consortium Myanmar (hereinafter referred to as Project Proponent or the Developer) plans to implement the Industrial Complex in Nyaung Hnitpin, Hlegu township, Yangon region, Myanmar. The main objectives of the development are mentioned below:

- 1) To become a competitive industrial complex by attracting international companies providing with excellent infrastructure, incentives such as tax breaks, and low cost of rent;
- 2) To become a national center for R & D and industrial effectiveness as a foundation of multi-industrial complex;
- 3) To contribute the national economic growth through job creation and revenue generation; and
- 4) To become a project of economic exchange and mutual cooperation between two countries.



This industrial complex development not only benefits the region but also the whole.

### 5.3.2 Implementation Time Schedules



2019.09: Phase 1 construction started

2020.06: Start of Phase 1

2021.06: Completed Phase 1 construction

Industrial, Commercial, Water Treatment Plant, Power Transformer (Substation) and Wastewater Treatment Plant

2022.09: Phase 2 construction started

2023.06: Two-phase initiation

2024.06: Completed Phase 2 construction

Residential, Villas, Park, Management office and Technopark

## 5.4 Description of Project



Figure 5-5: Artist impression

The project is designed for large scale, middle scale and small scale industrial compounds including internal infrastructure such as 8 high rise residential, 30 villa blocks, 2 management centers, 1 public support facility, 4 commercial buildings, Techno park (IT Park), Industrial area, gas station, recreation park, main roads, intersection roads, drainage, overhead electricity installation, plantation of green spaces, electricity sub-station, wastewater treatment plant, and water purification plant. There will be approximately 203 buildings, including large scale, middle scale and small-scale industrial plots be situated and constructed. These buildings include factories and warehouses for Garment Products, Food Manufacturing, Jewelry Processing, Vehicle Spare Parts and Electronic Parts installation. Residential areas will be used for dormitory and apartments for managers and owners. Total 800,000 job opportunities will be created.

The existing two-lanes access road way to the project site is 9 km in length and 6 m in width and connecting from Yangon - Mandalay main road junction to the proposed site. Ministry of Construction will improve the existing road way as 4 lanes carriage ways mid island and sidewalks. The requirement of water will be supplied from Kalihtaw Dam which is situated in the north. The direct buried supply pipes will be used, and the water will be purified at site. The 230 KV transmission line will be installed from Kamarnat- Myaungtakar national grid.

### 5.4.1 Project Summary

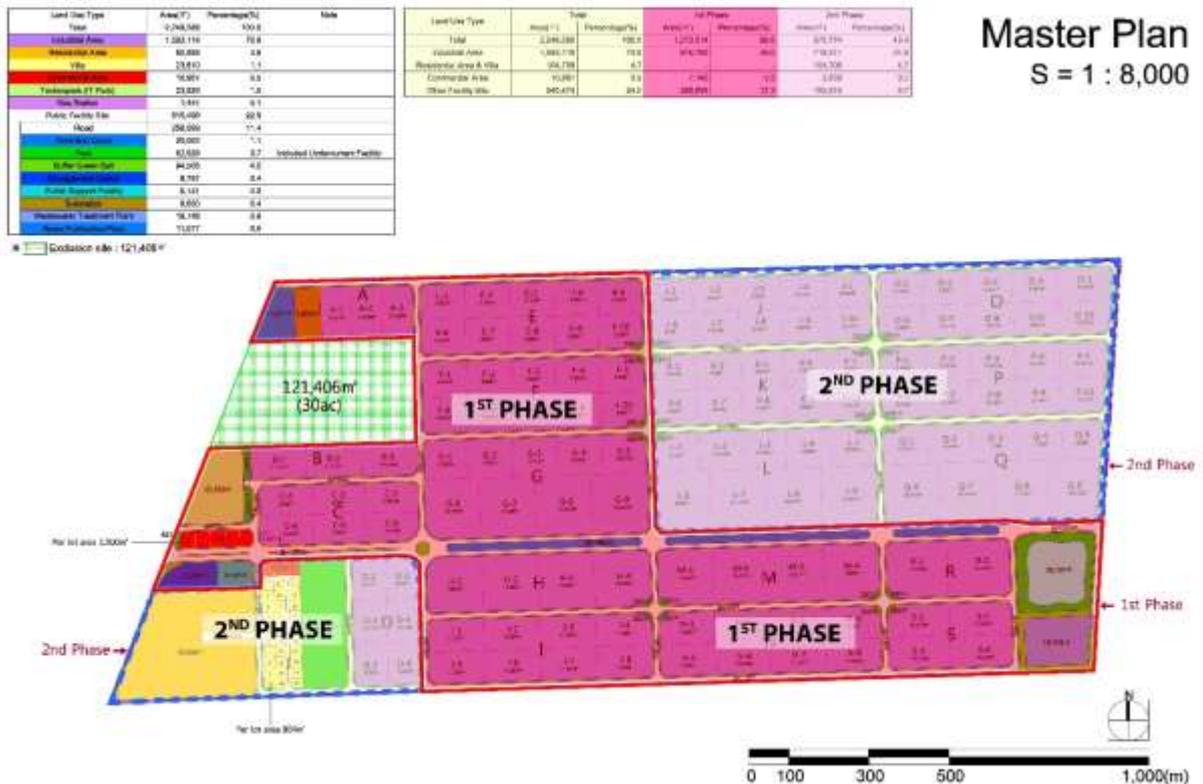


Figure 5-6: Project Layout Plan (See large map A3 size in Appendix)

### Project Summary

PROJECT SUMMARY			
<b>Project Name</b>	Nyaung Hnitpin Industrial Complex		
<b>Location:</b>	Nyaung Hnitpin Livestock and Agricultural Zone No.3, Hlegu Township, Yangon Region.		
	<b>Coordinates:</b>		
	Point A	Latitude 17.136131°	Longitude 96.155709°
	Point B	Latitude 17.141934°	Longitude 96.157951°
	Point C	Latitude 17.142103°	Longitude 96.162789°
	Point D	Latitude 17.144476°	Longitude 96.162692°
	Point E	Latitude 17.144329°	Longitude 96.158867°
	Point F	Latitude 17.145730°	Longitude 96.159415°
	Point G	Latitude 17.146511°	Longitude 96.179249°
Point H	Latitude 17.137174°	Longitude 96.178757°	
<b>Site area:</b>	555.81 acre (2,249,288 square meter)		
<b>Land Use</b>	<b>Classification</b>	<b>Area (sqm)</b>	<b>Composition Rate (%)</b>
	Industrial	1,640,245	71.9
	Residential	83,010	3.6
	Villa	23,810	1.1
	Commercial	9,852	0.5

	Gas Station	1,447	0.1
	Public Facilities Site (including greening area)	490,924	21.8
	<b>Total</b>	<b>2,249,288</b>	<b>100.0</b>
	<b>Public Facilities Site</b>		
	• Road	233,745	10.4
	• Retention Canal (Water way)	25,062	1.1
	• Park	82,928	3.7
	• Buffer Green Belt	94,775	4.2
	• Management Center	8,797	0.4
	• Public Support Facility	6,141	0.3
	• Substation	8,650	0.4
	• Water Treatment Plant	19,749	0.9
	• Water Purification Plant	11,077	0.5
	<b>Total</b>	<b>490,924</b>	<b>21.8</b>
<b>Building</b>	203 buildings		
<b>Land Owner</b>	Myanmar Government Land, Ministry of Construction (MOC)		
<b>Land Lease</b>	50 years + 10 years + 10 years (Land is contributed by DUHD as a shareholder of JV)		
<b>Construction /Preparation Period</b>	<ol style="list-style-type: none"> <li>1. a period of three (3) years from the date of commencement of Zone A</li> <li>2. a period of three (3) years from the date of commencement of Zone B</li> </ol>		
<b>Project Period</b>	Phase 1: 2019 – 2069 Phase 2: 2023 – 2073 (Expected)		
<b>Investment Capital</b>	75,475,596 USD		
<b>Business Structure</b>	<p>Joint Venture between Myanmar Government, Ministry of Construction (40%) and L H Consortium (Korea) (60%)</p> <p><b>Myanmar (DUHD, under MOC)</b></p> <ul style="list-style-type: none"> <li>• Land Contribution,</li> <li>• Construction of External Infrastructure,</li> <li>• Government Liaison etc...</li> </ul> <p>Land contribution for 50 years Terms of investment which is equivalent to 40% of share, construction of external infrastructure facilities (power, driveway, water) and regulatory support</p> <p><b>LH Consortium (Korea Land &amp; Housing Corporation and Global Sae-A Co., Ltd)</b></p> <ul style="list-style-type: none"> <li>• Cash Contribution,</li> <li>• Project Management,</li> <li>• Marketing etc...</li> </ul> <p>L H Consortium is responsible for 3 main aspects, namely, making a capital contribution to fund the joint venture by holding 60% of the shares, Marketing and planning, design, construction and quantity management as the main developer.</p>		

<p><b>Developer</b></p>	<p><b>Myanmar Korea Nyaung Hnitpin Development Consortium</b></p> <p><b>Address:</b> LH Myanmar Representative Office Pyay Garden Office Tower, 346-354, Pyay Road, Sanchaung Township, Yangon</p> <p><b>Contact person:</b> Mr. Kim Gunwoo,</p> <p><b>Tel:</b> 09 9757 99222</p> <p><b>Email:</b> <a href="mailto:gonwoo2@gmail.com">gonwoo2@gmail.com</a></p>
<p><b>Electricity Source</b></p>	<p>230kV twin bundle double circuit Line from Tower No.142 Myaungtagar – Kamarnat National Grid. Total estimated consumption 100 MW</p>
<p><b>Water usage</b></p>	<p>10,000 cubic meters (2.6 million gallons) per day (Kalihtaw Dam)</p>
<p><b>Access Road</b></p>	<p>9 km length, expanding 4 lanes from Highway Road No.1 and No.2 Junction to Nyaung Hnitpin Research and Training Institute</p>

## 5.5 Site Layout Map

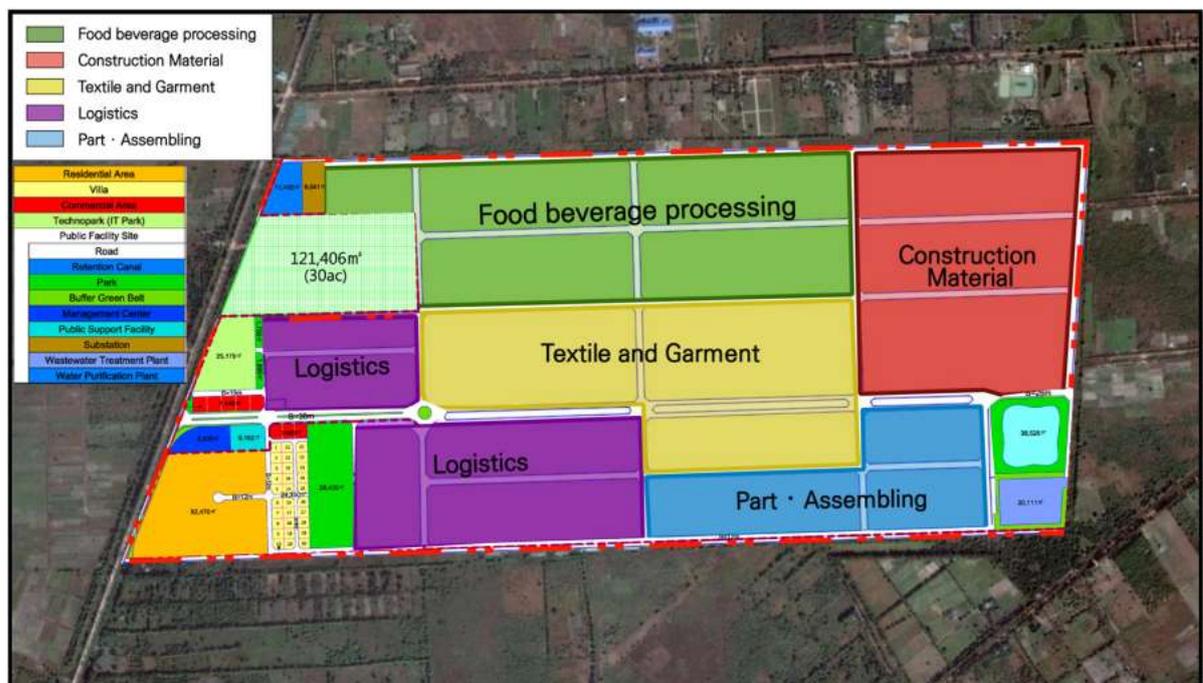


Figure 5-7: Site Layout Plan ( See large image A3 size in Appendix 7-1)

The project is designed for large scale, middle scale and small scale industrial compounds including inside infrastructure such as residential, commercial ,vocational training school, main roads, intersection roads, drainage, overhead electricity installation, plantation of green

spaces, public support, electricity sub-station, wastewater treatment plant, water purification plant and public facilities.

The large scale, middle scale and small scale industrial plots will be situated and construction will include factories and warehouses for Garment Products, Food Manufacturing, Jewelry Processing, Vehicle Spare Parts and Electronic Parts installation. Residential areas will use for dormitory purpose and apartments for managers and owners.

### 5.6 Proposed Land Use Pattern

From the total demarcated land area of 2,249,288 square meters, the Nyaung Hnitpin Industrial Complex will occupy 100 percent of the land area. The Industrial area will occupy 70.8% (1,593,119 square meter), Residential area is 3.6% (80,898 square meter), Villa is 1.1% (23,810 square meter), Commercial, IT park and Gas station will take 1.6% (35,963 square meter), and Public Facility Site such as road, retention canal, park, buffer green belt, management center, public support facility, substation, wastewater treatment plant and water purification plant would occupy 22.9% (515,498 square meter).

The developer planned to complete the proposed project within two phases. The detail arrangement is as follow:

Land Use Type	Total		1 <sup>st</sup> Phase		2 <sup>nd</sup> Phase	
	Area (m <sup>2</sup> )	%	Area (m <sup>2</sup> )	%	Area (m <sup>2</sup> )	%
<b>Total</b>	2,249,288	100	1,273,514	56.6	975,774	43.4
<b>Industrial Area</b>	1,640,245	72.9	905,011	40.2	735,234	32.7
<b>Residential &amp; Villa Area</b>	106,820	4.7	-	-	106,820	4.7
<b>Commercial Area</b>	11,299	0.6	7,440	0.3	3,859	0.2
<b>Other</b>	490,924	21.8	361,063	16.1	129,861	5.8

The proposed project will be completed after phase1 and phase 2 construction work.

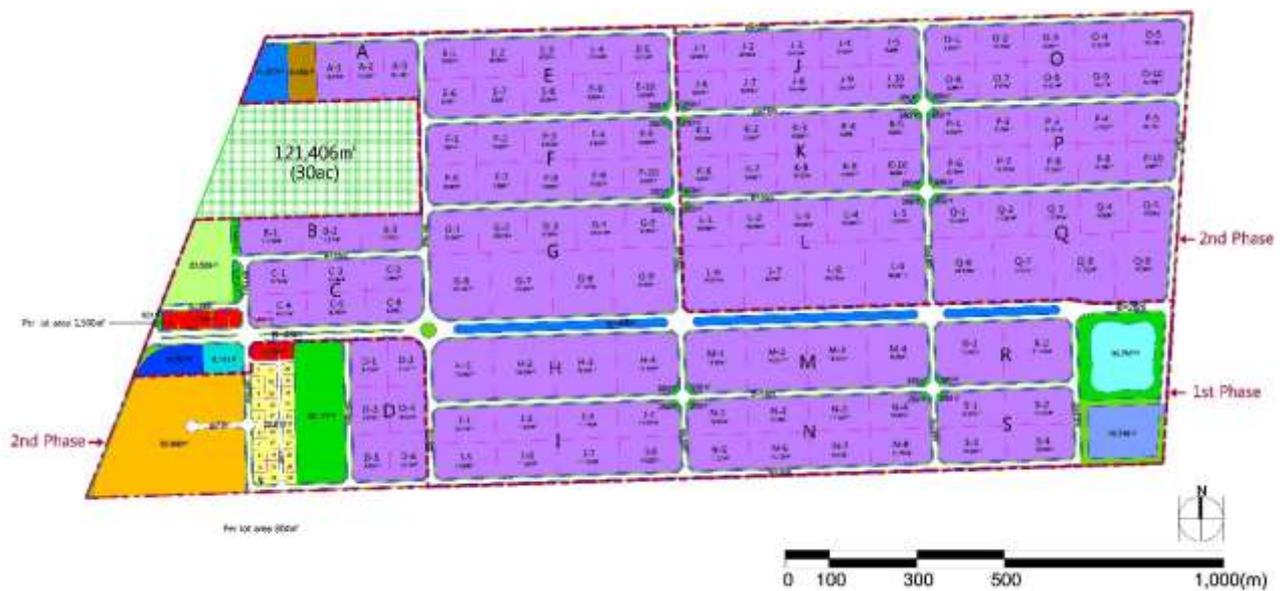


Figure 5-8: Lot Layout and Land Use Plan Drawing (See large image A3 size in Appendix 7)

## 5.7 Proposed Internal Infrastructure

The two-meter high reinforced brick wall fencing will be constructed around parameter of proposed land and entrance gates will be constructed at main road. Main entry roads and intersection roads will be paved by concrete and road side drainage will be constructed by concrete which will collect storm water to detention ponds. Over flows from detention pond will be disposed at front and back drains. Sewage from every habitant area will be collected to waste water treatment plant and treated water will be disposed along the back drainage which will lead to Kalitaw creek. Residential, commercial and public buildings will be constructed at beside entrance gates. The power substation facilities will be dropped from 230 KV high tension line which will be looped from Kamarnat - Myaungtakar national grid. Purification plant and buildings will be constructed beside access road near the entrance. The plant will purify the water supplied from Kalihtaw Dam.

### 5.7.1 Road Ways in KMIC's Compound

There are six types of road ways which would be constructed in the internal infrastructure. They are 38 m wide, 46 m wide, 26 m wide, 18m wide, 12 m wide and 8 m wide road ways. Details of cross section of roads are as follow:

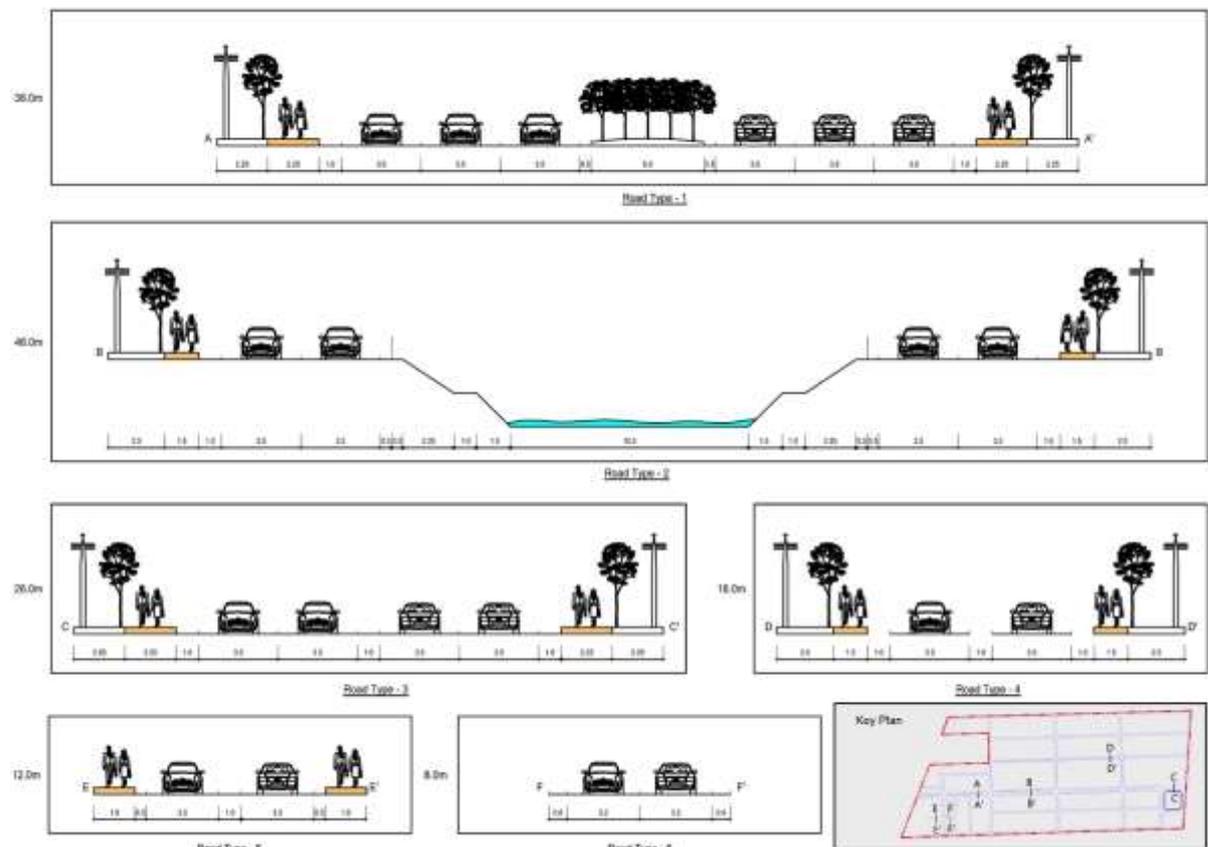


Figure 5-9: Internal Road Infrastructure Section Drawing

### 5.7.2 Water Supply System Plan

The schematic diagram of water supply system is shown in the figure below.

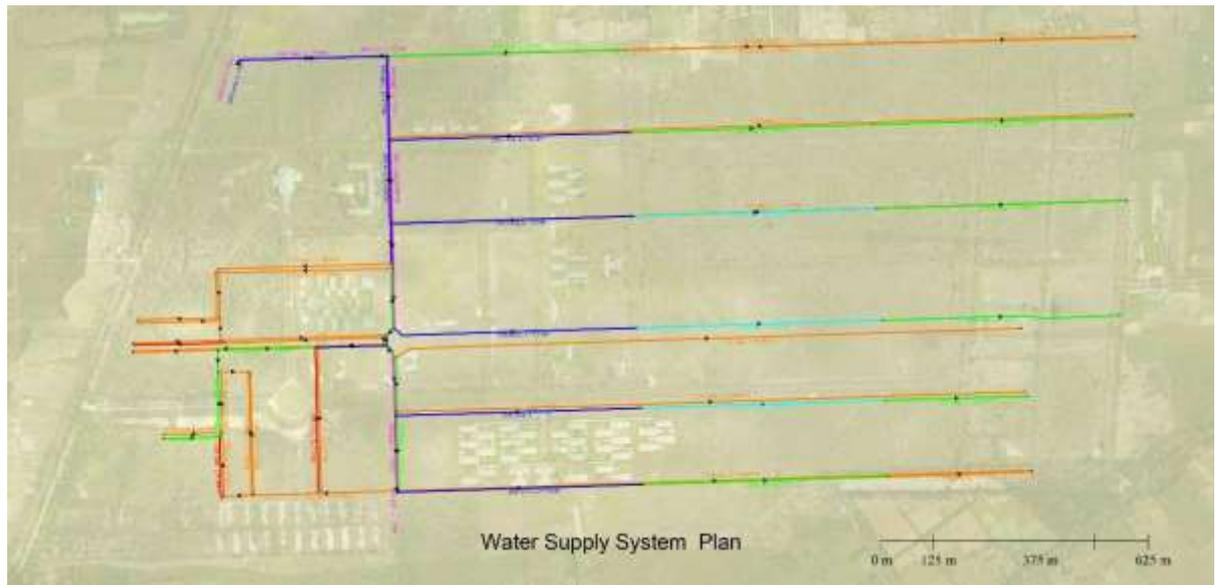


Figure 5-10: Diagram of water supply system

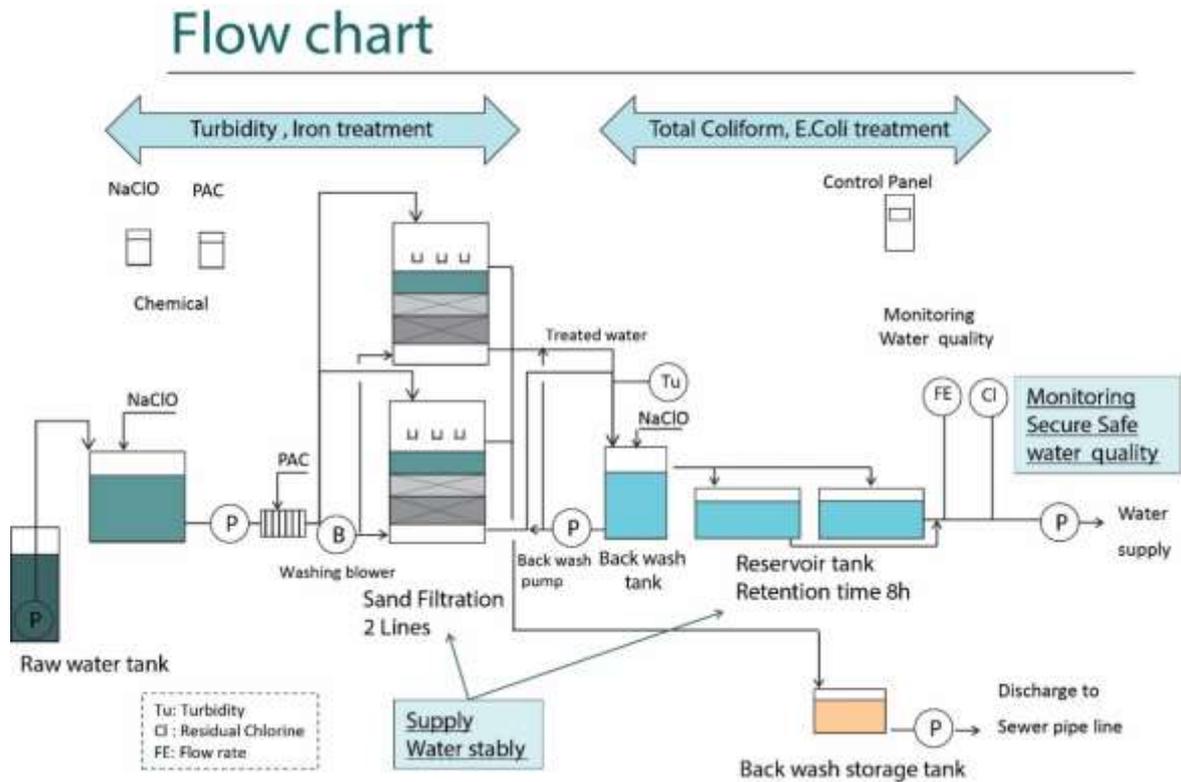
A - LINE					B - LINE				
Particulars	Standard	Unit	Quantity	Explanatory	Particulars	Standard	Unit	Quantity	Explanatory
PIPE	D100	M	-		PIPE	D100	M	697	
	D150	M	13,018			D150	M	3,174	
	D200	M	566			D200	M	3,781	
	D250	M	-			D250	M	2,284	
	D300	M	843			D300	M	3,022	
	D400	M	-			D400	M	1,396	

### 5.7.3 Water Treatment Plant



Figure 5-11: Location map of Water Treatment Plant

The location of water treatment plant for KMIC industrial complex will be constructed at the corner of north west area shown as figure 7 and 8. The appropriate land occupancy will be 11,770 square meters. The following facilities will be included in the water treatment plant installation. The following figures show the WTP layout plan, the process of WTP and size of each facility of the plant.



### Water Treatment Plant Layout plan

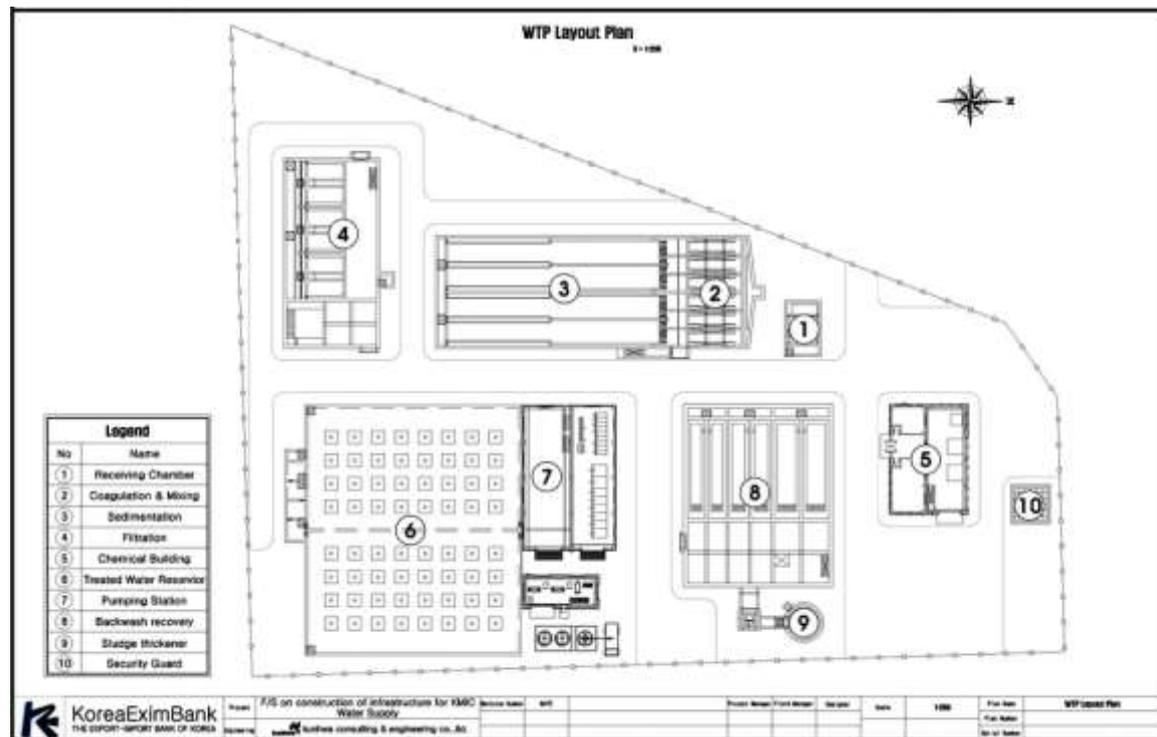


Figure 5-12: Water Treatment Plant Layout Plan

No.	Facility	Dimension
1	Receiving Chamber	W2.5m×L2.4m×H3.0m (2module)
2	Mixing Flocculation	W8.4m×L8.4m×H2.6m (2module)
3	Sedimentation	W8.4m×L39.5m×H3.6m (2module)
4	Rapid Filter	B3.1m×L6.1m×2cell (3module)
5	Chemical Building	10,000m <sup>3</sup> /day
6	Treater Water Reservoir	W20.8m×L36.0m×H4.5m (2module)
7	Pumping Station	10,000m <sup>3</sup> /day
8	Backwash	W3.4m×L17.0m×H3.0m (2module)
	Sludge	W3.0m×L17.0m×H3.0m (2module)
	Recovery	W4.4m×L17.0m×H3.0m (2module)
9	Sludge Thickener	D7.0m(1 module)
10	Security Guard	-

### Hydraulic Flow Diagram

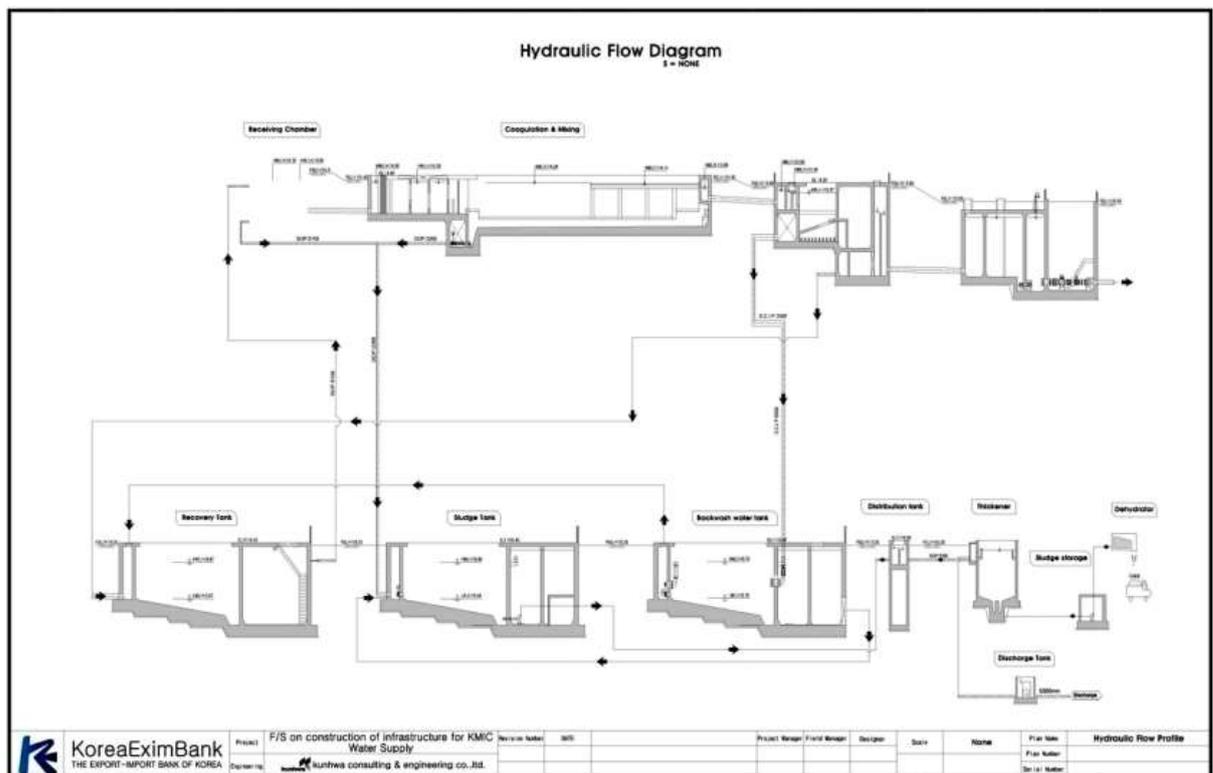


Figure 5-13: Hydraulic Flow Diagram

### Electricity Supply (Substation Construction)

230kv substation 1 EA, 100 MVA Transformer 2EA

1<sup>st</sup> 230 kV Gas Circuit Breaker (GCB), 2<sup>nd</sup> Circuit Breaker 33kV, Gas Insulated Switch (GIS)

The raw water pumping station is scheduled to be provided from the three phase lines. The water treatment plant is planned to be supplied the necessary power according to the entire power plan of the complex.

**Transmission line construction 230kV cable spec. 605 MCM 2 line 7.5 km**

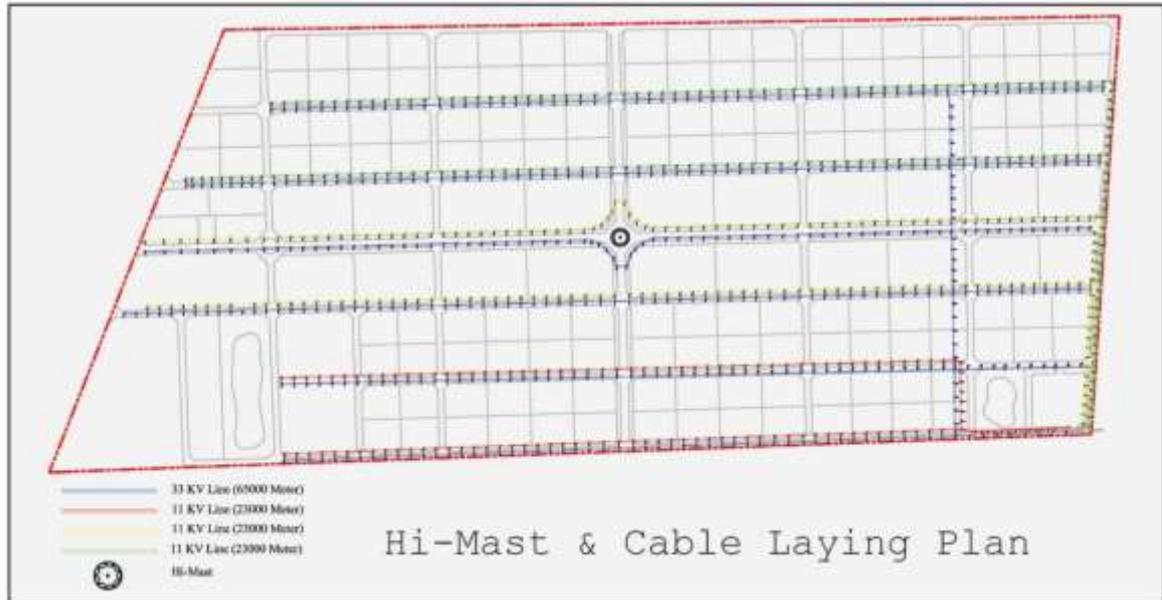


Figure 5-14: Transmission line construction 230kV cable spec. 605 MCM 2-line 7.5 km

**5.8 Wastewater and Sewage Collection and Disposal**

Domestic wastewater, industrial wastewater and other disposed water included in storm water will be collected via road side drainage to wastewater treatment plant. The estimated capacity of wastewater will be 8,000 cubic meters per day. Sewage will be collected to sewage treatment plant by central system. Sewage from Industrial plots, residential plots and other infrastructure buildings will be collected through buried sewage pipe lines at the road side. The developer will use ejectors, pumps and compressors along sewage pipeline. The plant will purify both Waste water and Sewage which will be constructed at south east corner of proposed project land. Both treated water will be disposed of at the back drainage which leads to Kalihtaw creek.



Figure 5-15: Proposed Drainage



Figure 5-16: Wastewater Treatment Plant Location Map

The treatment process of wastewater and sewage can be seen in the flow diagram below.

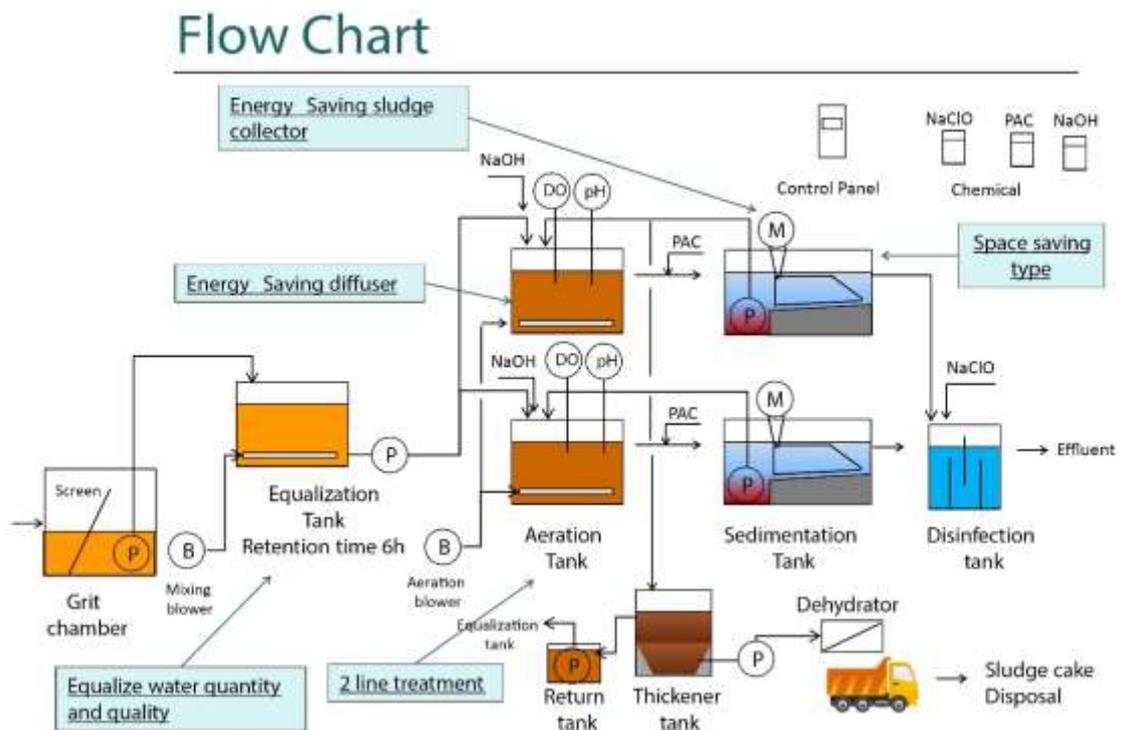


Figure 5-17: Sewage treatment plant flow diagram

### Wastewater System Plan

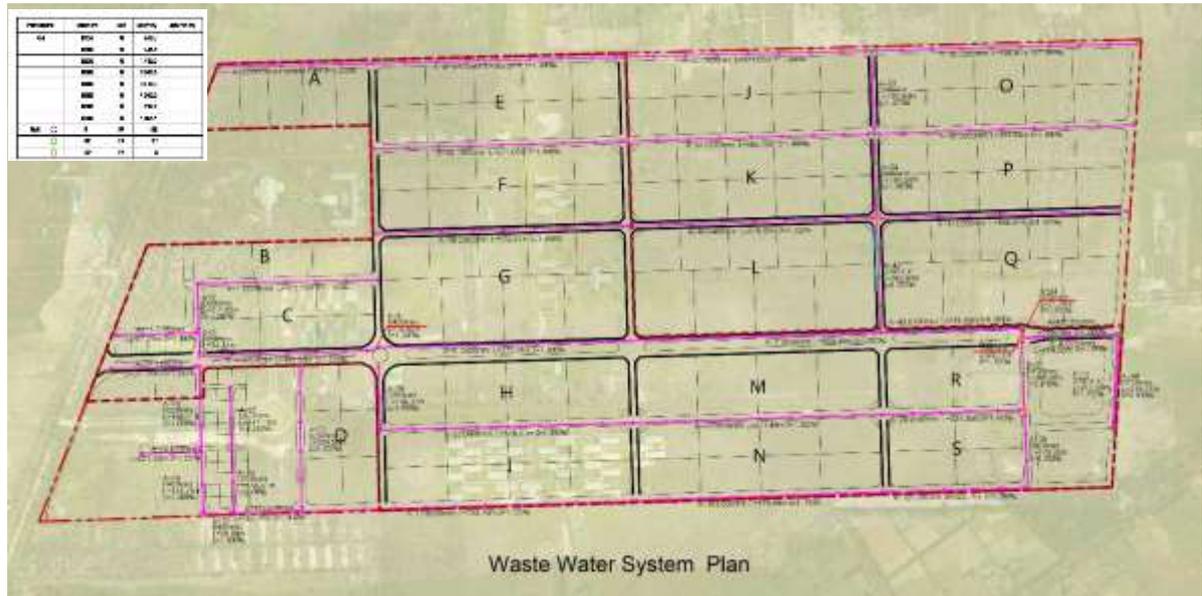


Figure 5-18: Wastewater System Plan

### Drainage Layout Plan

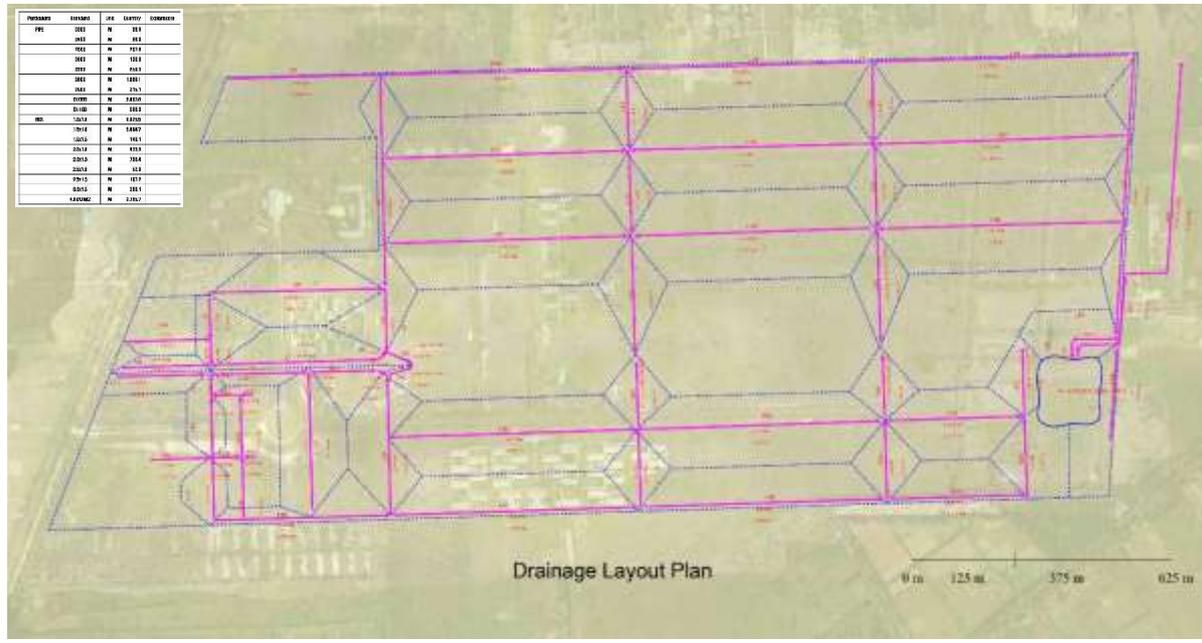


Figure 5-19: Drainage Layout Plan

### 5.9 Solid Waste Disposal

During pre-construction phase, demolition of old buildings and site cleaning will be resulted in large quantities of solid waste that come out of the excavation and grading earth level at the site. At the construction phase solid waste will consist of rejected parts of pre-casted concrete,

solid components, surplus materials, rejected materials, papers, containers, broken bricks, solvent containers, empty paint drums, surplus oil and waste from workers. Such solid waste will be injurious to the environment through blockage of drainage system, choking of water bodies, and negative impact on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as paints, solvent, cement, adhesives, and chemicals. Some of waste materials including plastic containers and plastic bags are not biodegradable and can have long term and cumulative effects on the environment. The developer will sort out the solid waste to be refined, reused and recycled.

At the operation phase solid waste management plan will be arranged by developer and frequency of collection will be included at inside the project complex. Disposal of solid waste at dumping ground will be collected at site and arranged by Hlegu township development committee.

### **5.10 Solid Waste Management System**

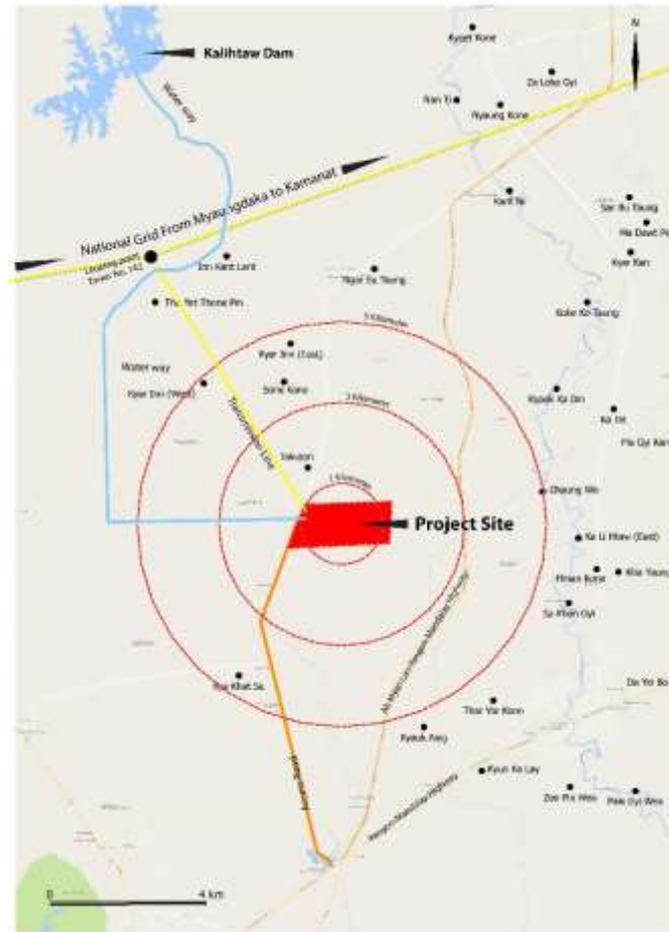
The waste management plan will be designed and implemented for the construction and operation phases. This plan will:

- 1) Record quantities and composition of waste streams, sources of waste streams, length of storage on site, and destination. This would constitute the basis for a continuous improvement program in waste minimization.
- 2) Incorporate the following waste control hierarchy to mitigate the environmental impacts:
  - a) Minimize the generation of waste
  - b) Reuse the waste during construction
  - c) Reuse or recycle waste streams to other users at other locations
  - d) Dispose unusable waste streams at permitted waste disposal facilities

The system for waste collection, sorting, disposal and recycling will be applied as follows:

- a) A separate waste disposal area will be designated on the construction site, which contains clearly demarcated skips and bins to allow different types of waste to be segregated at source: domestic, metal scrap, used oil, paper, hazardous etc. In addition, separation along the lines of potential reuse and recycling opportunities will be undertaken. In operation phase, the different bins would be provided in buildings and premises for recyclable and non – recyclable wastes.
- b) The sufficient bins with lids would be provided to store the solid waste produced on a daily basis. The waste will be temporarily stored on site in a central waste area (pit) that is weatherproof and scavenge proof.
- c) The excavated earth and the associated debris could potentially be reused on site as reclamation fill or construction of landscape and thereby reducing the amount of waste requiring disposal to the municipal dump site.
- d) The waste sorting and temporary storage area will be managed by the cleansing workers (cleaners) of the project and they will be provided with a training on waste management.

## 5.11 Proposed External Infrastructure



The existing access road way to the project site is 9.14 km length and 6 meter wide: two lanes lies from Yangon - Mandalay main road T junction to the proposed site. The developer (MOC) will improve the existing road way to 4 lanes carriage ways mid island and sidewalks. Requirement of consumption of water will be supplied from Kalihtaw Dam which is situated in the north. Direct buried supply pipes (D=600mm) will be used and the water will be purified at KMIC site. 230 KV electricity will be installed from Kamarnat- Myaungtakar national grid.

## 5.12 Water Resource and usage

The developer has already planned to access water from Kalihtaw Dam which was constructed in 2001 for the purpose of supplying water for livestock and Agricultural Zone in Nyaung Hnitpin. The dam is supplying water to 9,000 acres of agricultural land. Maximum storage of high flood level of the dam is 26,000-acre feet. The developer will install supply pipe line along the old creek to avoid public area and cultivated lands. In the completion stage of the proposed project, daily requirement of purified water will be 10,000 cubic meters (2.6 million gallons) per day. The purification plant will be constructed at the north-west corner of the proposed land and water supply pipes will be buried at main and intersection road sides. Raw water from Kalihtaw dam will reach in front of proposed project land via collection drain. The water will be collected in raw water tank. Chemical treatment and mechanical treatment will be done at the plant and secure safe water will be supplied.

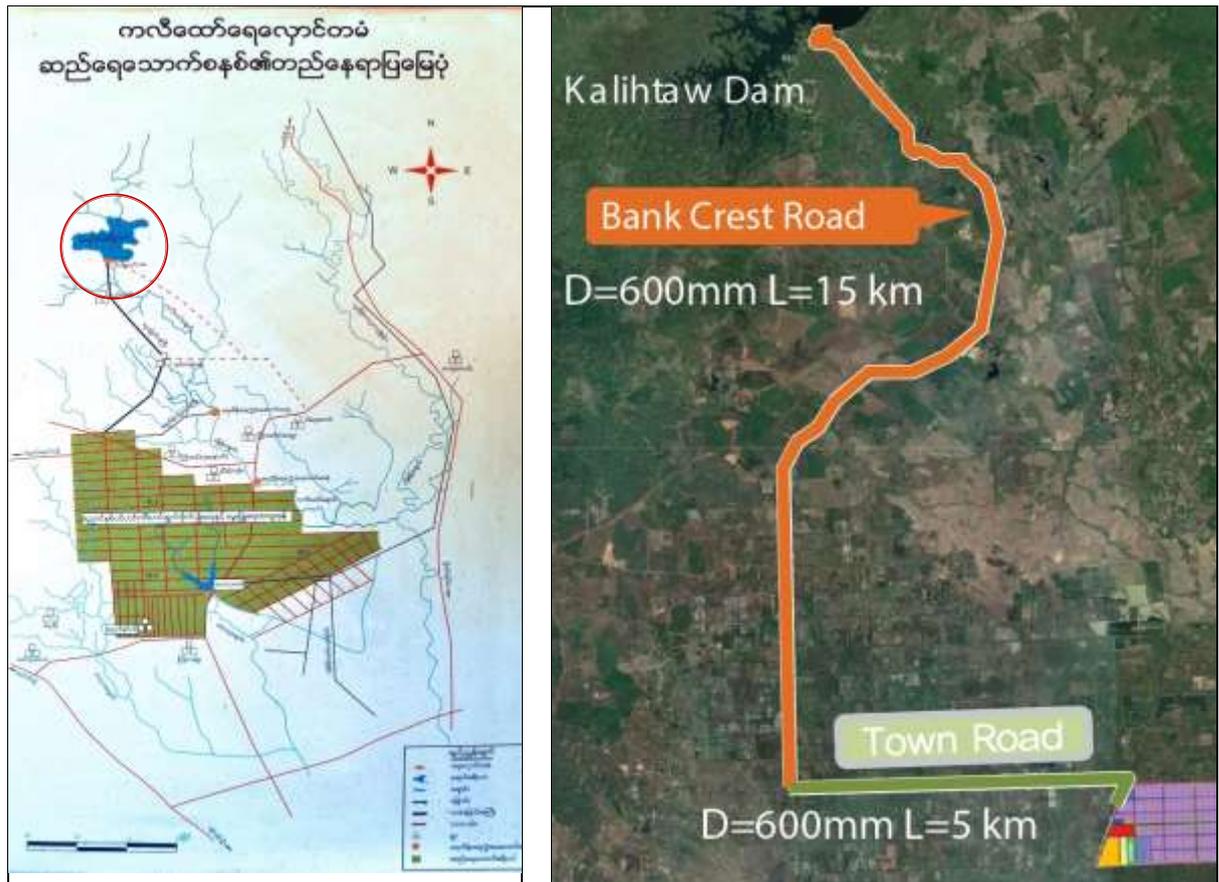


Figure 5-20: Figure 0 20: Kalihtaw Dam location and water supply pipes line ROW

The developer has planned 600 mm diameter pipe line will be installed from Kalihtaw Dam to KMIC, along the 15 kilometer-stretch bank crest road belonging to irrigation department and 5 kilometer long Town road. Total pipe line distance is 20 kilometers.

The dam is 65 feet height and 3500 feet in length. It store 26000 acre feet at a maximum and 760 acre feet at a maximum. Kalihtaw Dam was constructed in 2001.

The original aim of building the dam was to supply water to Nyaung Hnitpin agricultural and livestock zones. It now supplies water also to residents and farms in the area. At the completion stage of the proposed project, daily requirement of purified water will be 15,000 cubic meters (3.2 million gallons) per a day. The purification plant will be constructed at the northern edge of the proposed land and water supply pipes will be buried at main and intersection road sides.

Raw water from Kalihtaw dam will reach in-front of proposed project land via collection drain. The water will collect at raw water tank. Chemical treatment and mechanical treatment will be done at the plant and secure safe water will be supplied.

### Kalihtaw Dam Photos



Kalihtaw Dam



Kalihtaw Dam



Water Channel to Agricultural Zone



Water Channel to Agricultural Zone

### 5.13 Access Road



The Ministry of Construction (MOC), counterpart of the developer, has planned to upgrade existing road which has access to Yangon –Mandalay express way to the proposed project site. The existing tar road was constructed since 2002 and 9 km length but already damaged by heavy loaded transportation. The 6-meter-wide the existing road way will be improved to 21-meter crest width road way. Two lane -7-meter carriage way will be constructed at both side of 3-meter mid island. Both 3-meter-wide sidewalk will be situated at edges. Necessary drainage at road side will be constructed. Along the traffic way, culverts and bridges will be constructed. Regulatory signs such as control, command and prohibitions, Guidance signs such as direction and guide signs, Caution and Warning signs such as advanced warning signs and hazard marker signs, safety barriers will be installed for road safety. The center line of road way will pass through existing villages. The expanded and improved road shall also accommodate heavy trucks.

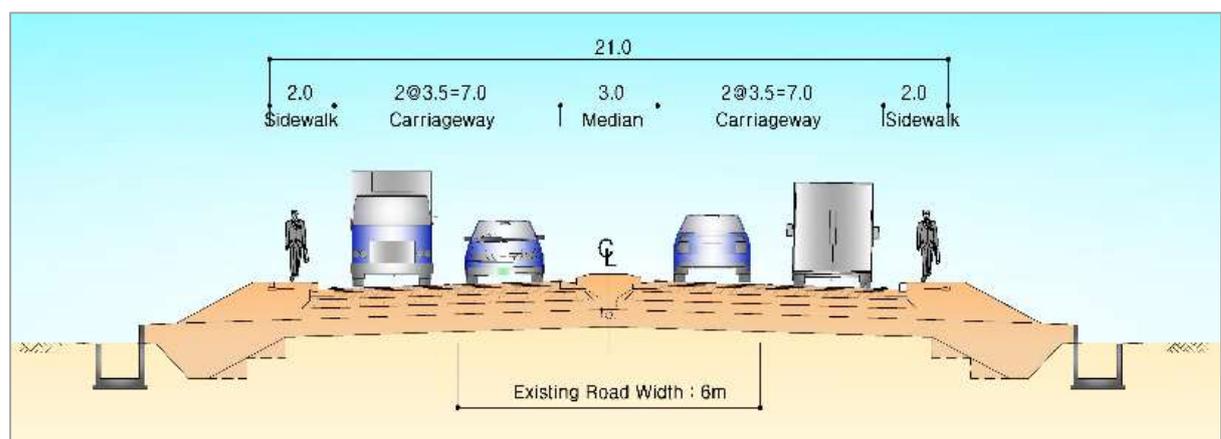


Figure 5-21: Proposed design to upgrade existing road

#### Existing road condition



point to proposed project site will have a 9 km stretch. 230 KV high tension line is already constructed as national grid. Demand of consumption of electricity at the proposed project's completion stage will be 50 MW.

230 KV high tension voltage will be dropped off to the stage of industrial use, the developer will construct a substation-yard at the northern site of proposed land. The proper process of transformers will be installed at substation yard. Internal supply will be installed overhead lines at road sides.

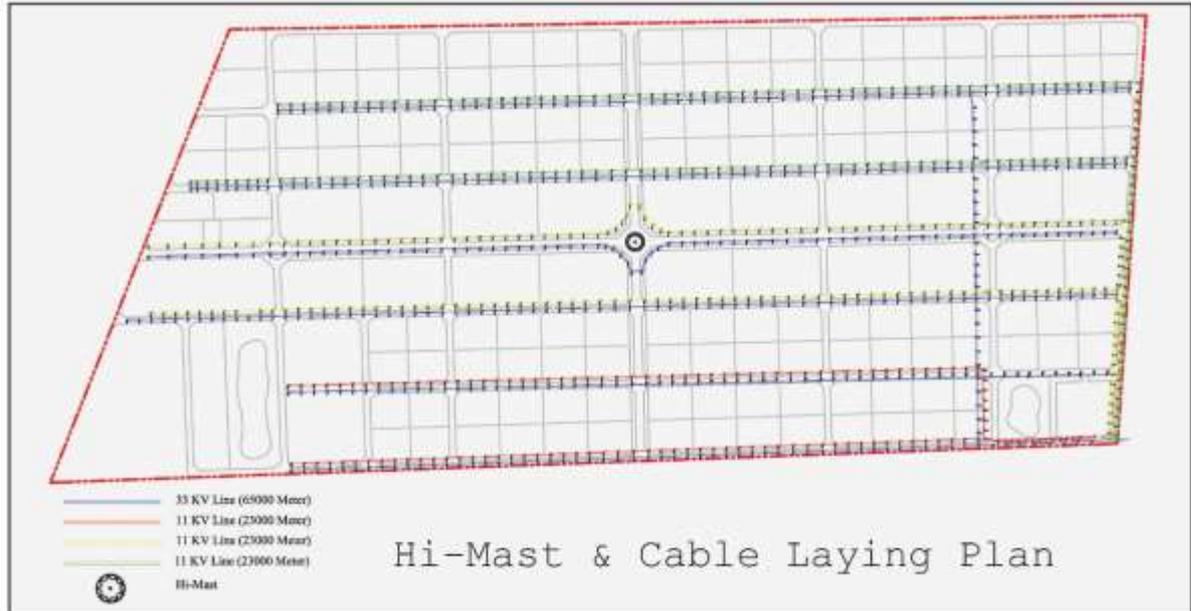


Figure 5-23: Hi-Mast & Cable Laying Plan

#### Existing National Grid Myaungdakar to Kamanut station



### 5.15 Alternatives

In terms of alternative, such area which does not need to take into account the resettlement issue, and no concerns about electricity and availability of water. Transport system could be built with shortest route to reach the main highways and expressways.

The project location is located in the Nyaung Hnitpin Livestock and Agricultural Zone No.3, Hlegu Township, and specifically situated at former research and training institute by Union Solidarity and Development Party. Currently, the land is not in use and the buildings on which are in poor condition. There are Zone No. 1 and 2 around the project area and no villages are situated near the project site. Therefore, generally the impact on public will be not much significant and hence that location was selected for the proposed project.

The buildings (residential, industrial and commercial) in the complex would adopt the features of the green buildings (sustainable buildings) mentioned below as much as possible in order to be environmentally responsible and resource efficient.

- a) Energy efficient through the natural lighting, ventilation and solar passive designs;
- b) Efficient use of water through recycling and water harvesting;
- c) Use of renewable energy through photo voltaic systems and solar systems etc.;
- d) Non-toxic material in-door environment;
- e) Using green cooling commodities (Ozone – depleting substances, CFCs, HCFCs and HFCs, free air conditioners and refrigerators)
- f) Use of recycle/recyclable materials; and
- g) Efficient waste utilization and disposal.

The project will also include wastewater treatment system, hazardous and non-hazardous waste management plan and emergency response plan.

The public consultation will also be carried out and the concerns, opinions and suggestions of the public would be taken into consideration for scoping, CSR programs, and developing the Environmental Management Plan.

Therefore, the project would be environmentally as well as socially accountable and this area is the best option for the proposed project.

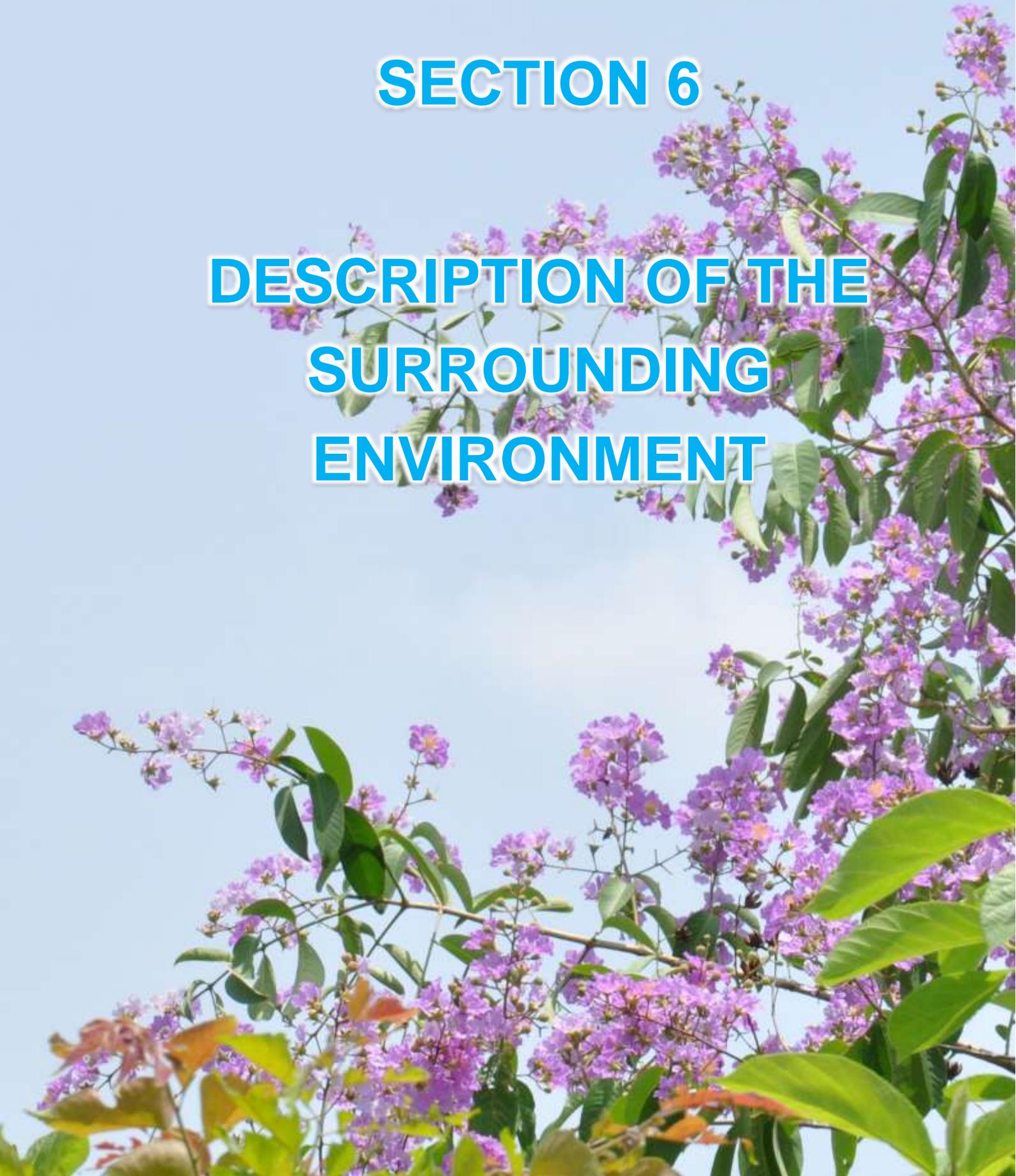
### **No Project Option**

If the proposed project is not implemented, economic benefits generated by the project would not be gained. Benefits loss would include:

- Employment generation and project expenditures during the development and operation of the project;
- Potential loss/slowdown of trade and cooperation between two countries;
- Loss of revenue for the Union and region governments;
- Potential loss of infrastructure upgrading in Hlegu region;
- Potential slowdown in the economic development of Hlegu region;

## **SECTION 6**

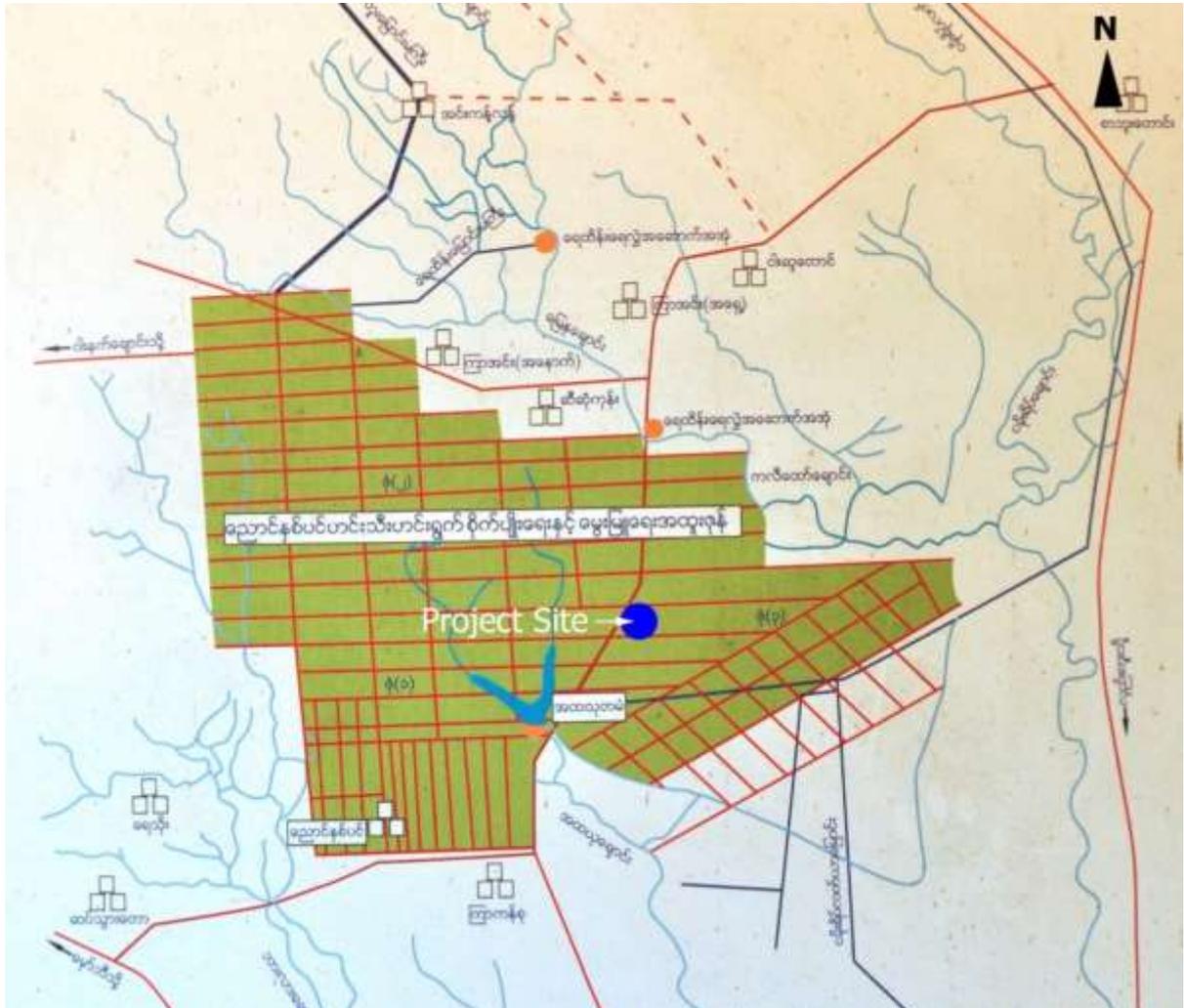
# **DESCRIPTION OF THE SURROUNDING ENVIRONMENT**



## 6. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

### 6.1 Description the Surrounding Environment

#### 6.1.1 Location Map of Surrounding Environment and Nyaung Hnitpin Livestock and Agricultural Zone

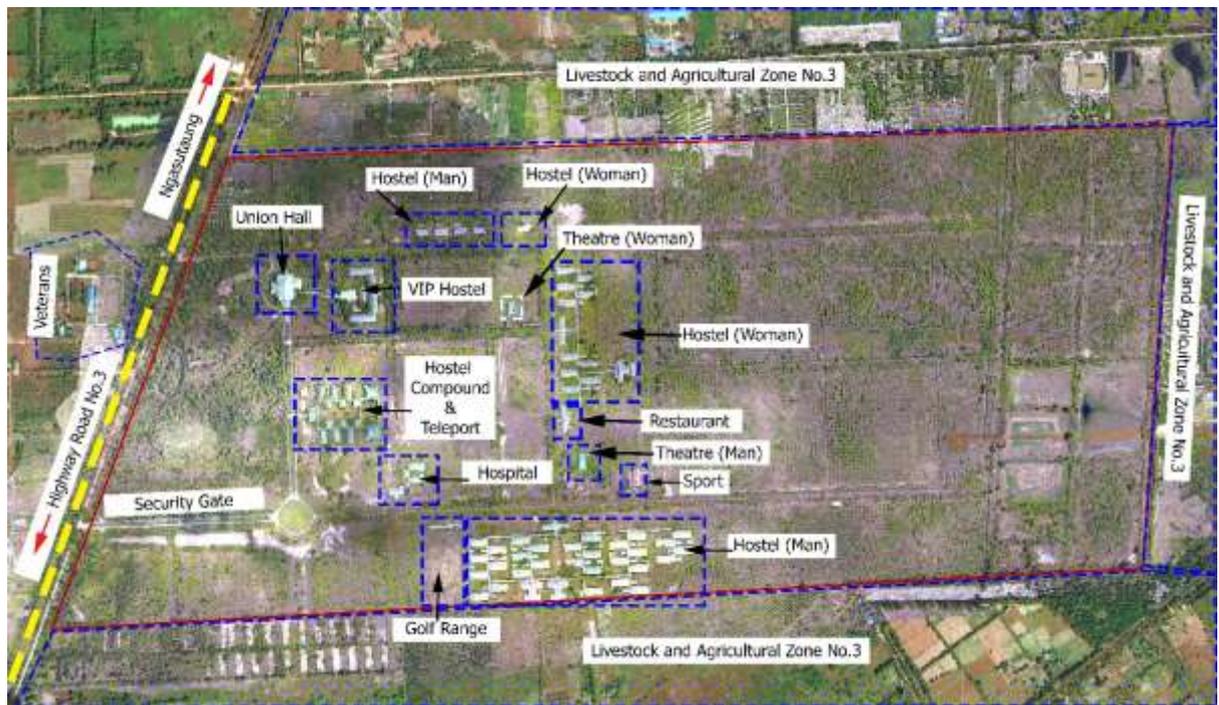


Basically, the project site is an abandoned place which has been left in nature without caring the land and buildings that had been used for convening meetings in late 1990s, an effort of accomplishment for developing the current constitution of the country. Now it becomes a Phone-zo area of a fallow land, dry in summer, swampy in rainy season. As the Nyaung Hnitpin project site is a restricted area, the total lot has been thickly covered with wild plants of abundantly growing coarse grasses of Thetke (*Imperata cylindrical*), Kaing (*Saccharum spontaneum*); weak herbs of many species such as Ye-salat (*Pistia stratiotes*) and Naya-myet (*Setaria verticillata*), Mahuya-Pein (*Colocasia esculenta*), Burma linseed (*Hygrophila phlomoides*) and Sin-hna-maung pin (*Heliotropium indicum*) as well. And it is also found proliferately thriving wild small trees of Phon-ma-thein (*Blumea balsamifera*), Malaysia Padauk (*Acacia auriculiformis*) and Ka-aung pin (*Ficus hispida*).

Some of the roads and buildings are in a state of ruin now. In and around this area, an agricultural zone has been established. Each individual owner was offered 5 acres of land per unit so as to grow vegetables and seasonal plants. Perennial trees, such as mango, jack fruit, and rambutan are grown in some yards. Whole lots of surrounding areas including villages have been designated as agricultural and livestock breeding zones. Many fish farming ponds

and poultry keeping farms have been already established just next to the project site area. Former vegetation of natural forest have already been replaced by paddy growing and cash crop plantation including rubber and acacia plantation.

### 6.1.2 Aerial Photo and Location of Existing Buildings



## 6.2 Existing Building

### 6.2.1 Photography of Existing Building





### 6.3 Geology

The Yangon area is underlain by alluvial deposits, the non-marine fluvial sediments of Irrawaddy formation, and hard, massive sandstone of Pegu series. The alluvial deposits are composed of gravel, clay, silts, sand and laterite which lie upon the eroded surface of the Irrawaddy formation at 4.6 m above mean sea level (MSL). The rock type in Yangon is mainly soft rocks, which consist of sandstone, shale, limestones and conglomerate.

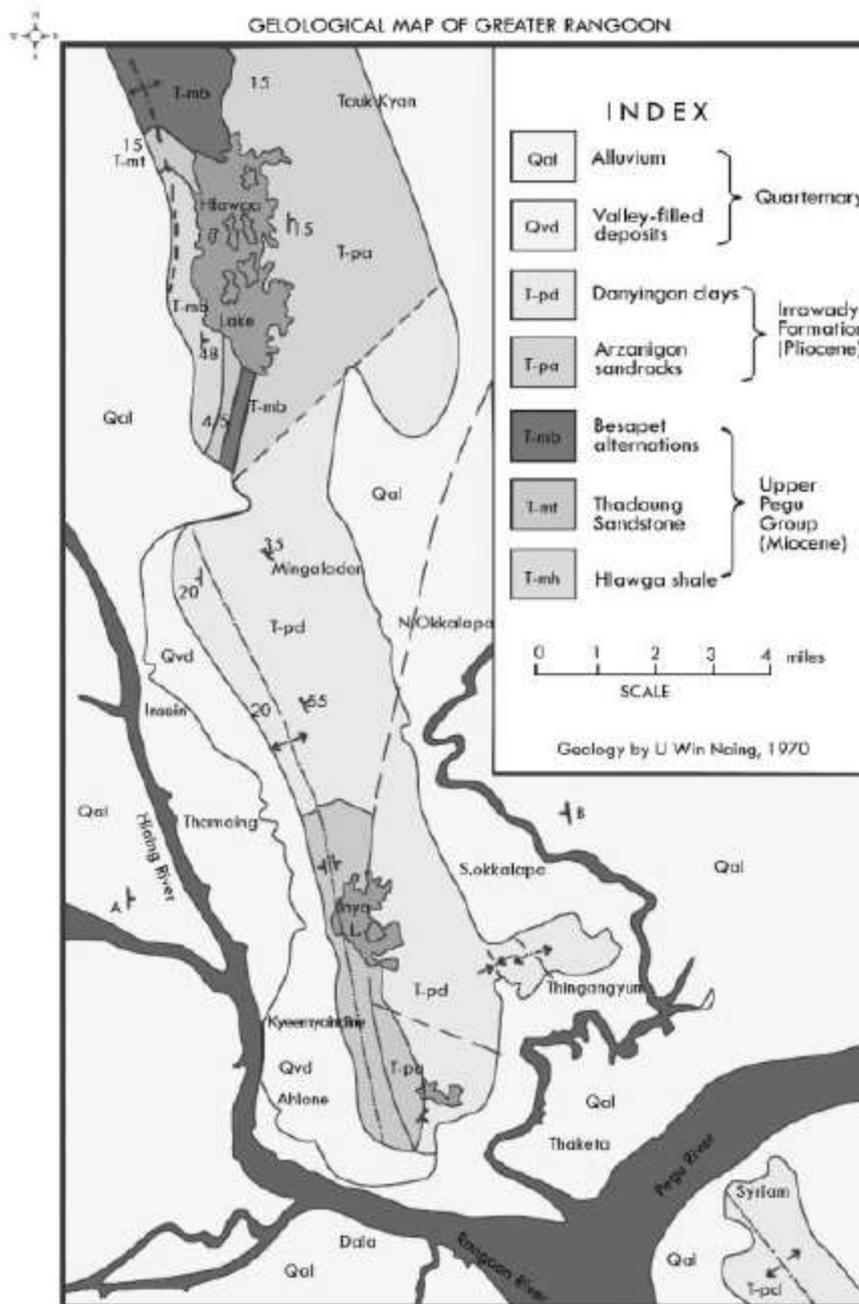


Figure 6-1: Geological Map of Yangon

### 6.4 Tectonics

Yangon is situated in the southern part of the Central lowland which is one of the three major tectonic provinces of Myanmar. The Taungnio Range of the Gyophyu catchment area of Taikkyi District, north of Yangon, through the Thanlyin Ridge, south of Yangon forming a series of isolated hills probably resulted from the progressive deformation of the Upper Miocene rocks as the eastern continuation of the subduction or stretching and compression along the southern part of the Central basin and regional uplifting of the Pegu Yoma (Aung Lwin 2012).

## 6.5 Hydrogeology

Yangon is rich in groundwater resources conserved by unconsolidated Tertiary-Quaternary deposits. In Yangon, groundwater is mostly extracted from Valley filled deposits and Ayeyarwady sandstones.

Groundwater: Groundwater availability is generally based on the distribution of permeable and relatively impermeable rocks. The nature of openings in the rocks determines permeability of rocks. Based on local geological considerations, potential groundwater source of Yangon can be roughly divided into two sub regions, namely the low potential area and high potential area. Low potential areas are areas with those rock units of Hlawga Shale, Thadugan Sandstones and Basepet Alternation of upper Pegu Group (Miocene epoch) and Danyingon Clays of Irrawaddy rocks. These rocks and formations are a dense, massive and consolidated nature and have impervious characteristic. High potential areas are underlain by Pliocene Series and recent Formations.

## 6.6 Soil

The soil type of the project area is Meadow and Meadow Alluvial soil. The meadow soils which occur near the river plains with occasional tidal floods are non-carbonate. They usually contain large amount of salts. Meadow Alluvial soils (fluvic Gleysols) can be found in the flood plains. They have the texture of silty clay loam and they have the neutral soil reaction and are rich in available plant nutrients.

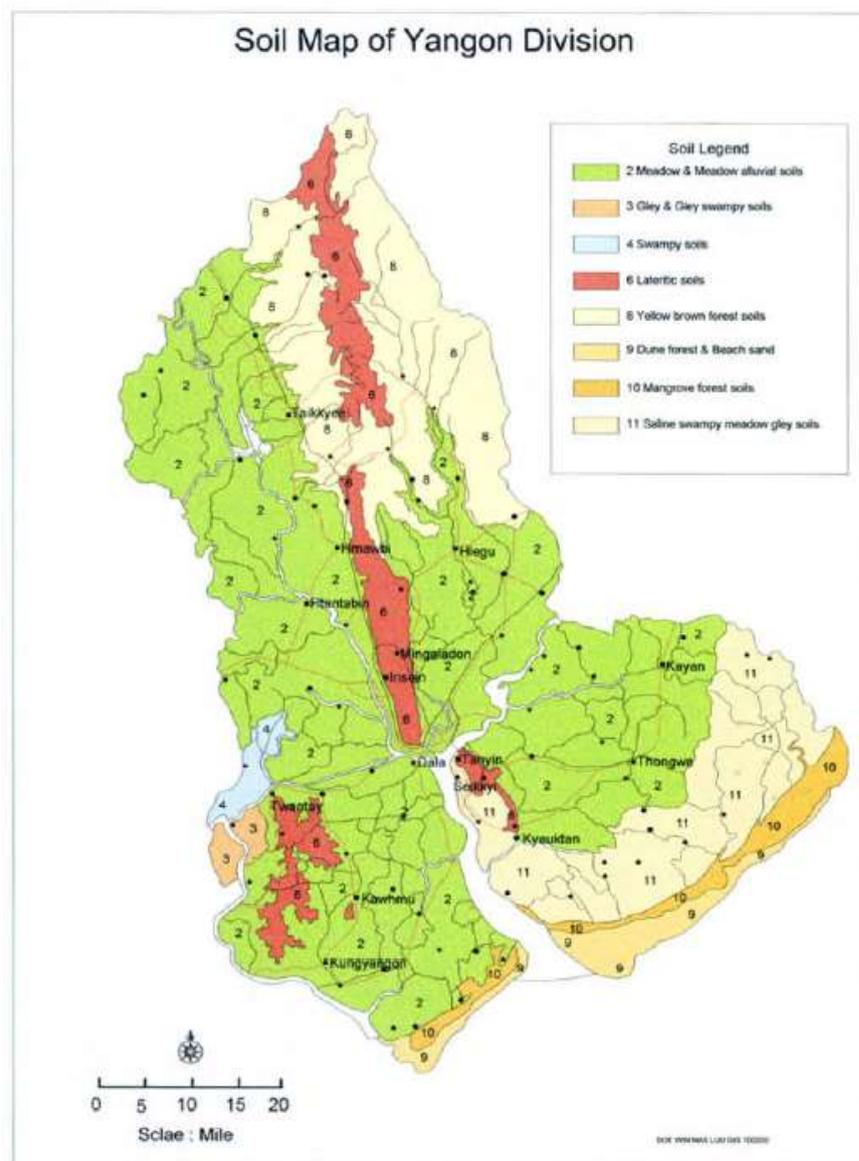


Figure 6-2: Soil map of Yangon area (copyright of Land use division, Myanmar Agriculture Service (Feb 11, 2002

## 6.7 Climate

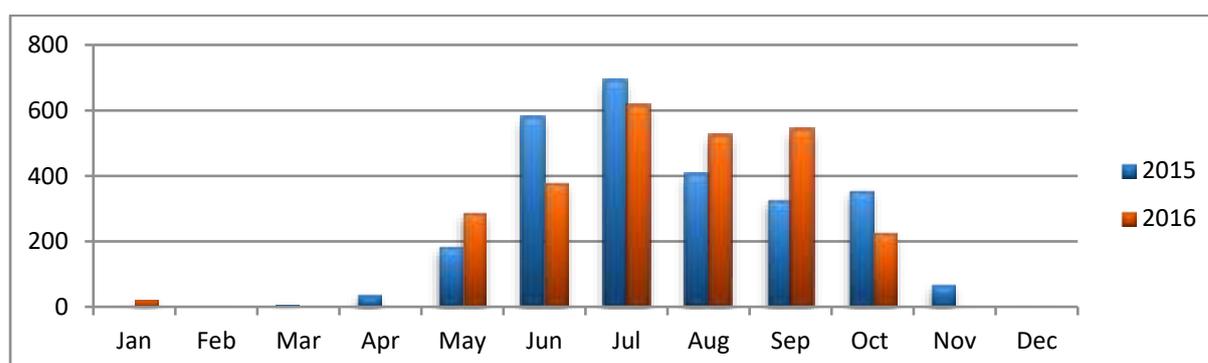
Yangon Region is located in the tropical monsoon climate region, and it has three seasons, summer (March to May), rainy season (June to October), and cool season (November to February). In Yangon Region, there are three meteorological stations, namely, KabaAye, Mingalardon, Hmawbi, which are managed by Department of Meteorology and Hydrology, Ministry of Transport. Long-term monthly averages for the climatic parameters, which is representative of the climate of Yangon Region, are obtained by analyzing the observed data from these three stations.

### 6.7.1 Rainfall Status

Long-term average for monthly rainfall data, which are observed in different meteorological stations in Yangon Region such as KabaAye, Mingalardon, and Hmawbi. The rainfall data of KabaAye station is a little bit higher than the other two stations, Mingalardon and Hmawbi, but rainfall data of the latter two stations are nearly the same. KabaAye station is located in the city and the other two stations are located near the water supply reservoirs of Yangon City.

Table 1: Monthly Rainfall (mm) 2015 and 2016

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	0	0	9	40	185	580	692	408	329	355	69	0
2016	23	0	0	0	288	379	618	526	543	227	1	0



Rain fall patterns range from 2015 to 2016, average months of rainfall per year is 222.25mm in 2015 and 217.08mm in 2016 are reported by Meteorology and Hydrology Department, KabaAye station, Yangon

### 6.7.2 Highest and Lowest Temperatures

In long-term analysis, the maximum mean daily temperature of Yangon Region is 38.1°C (in April, 2015), 38.5 °C (in April, 2016) and the minimum is 18.8°C (in February, 2015), 15.7°C (in January, 2016).

The difference between monthly maximum and minimum temperatures is large (more than 9) mostly in the period from January to April.

The long-term monthly average of mean daily maximum and minimum temperatures of Yangon Region is shown in below table.

Table 2: Mean Maximum Temperature (°C) in 2015 - 2016

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	32.7	35	37.8	38.1	35.9	32.3	31.7	31.2	32.2	32.4	34.1	33.3
2016	31.6	34.4	36.7	38.5	37.1	31.7	31.8	31.3	31.9	24	22.8	21.4

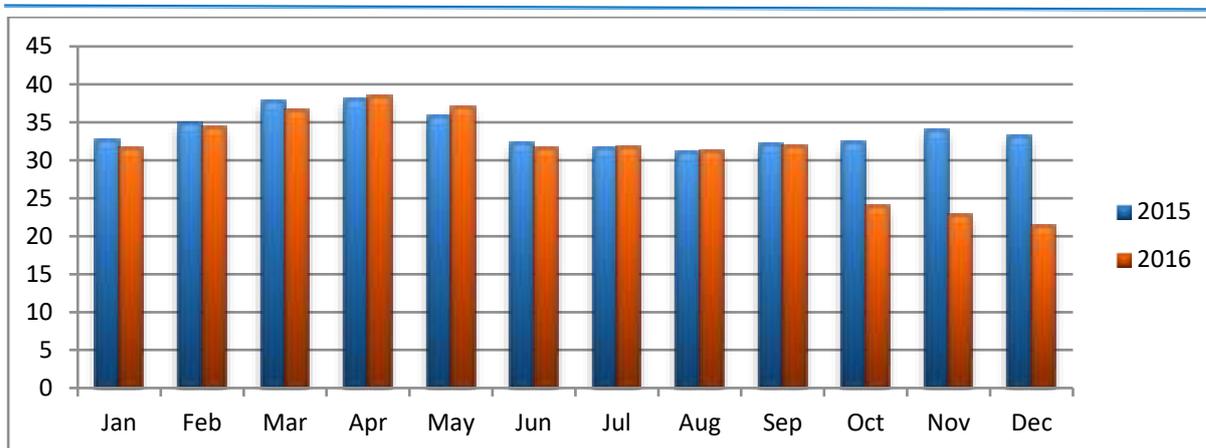
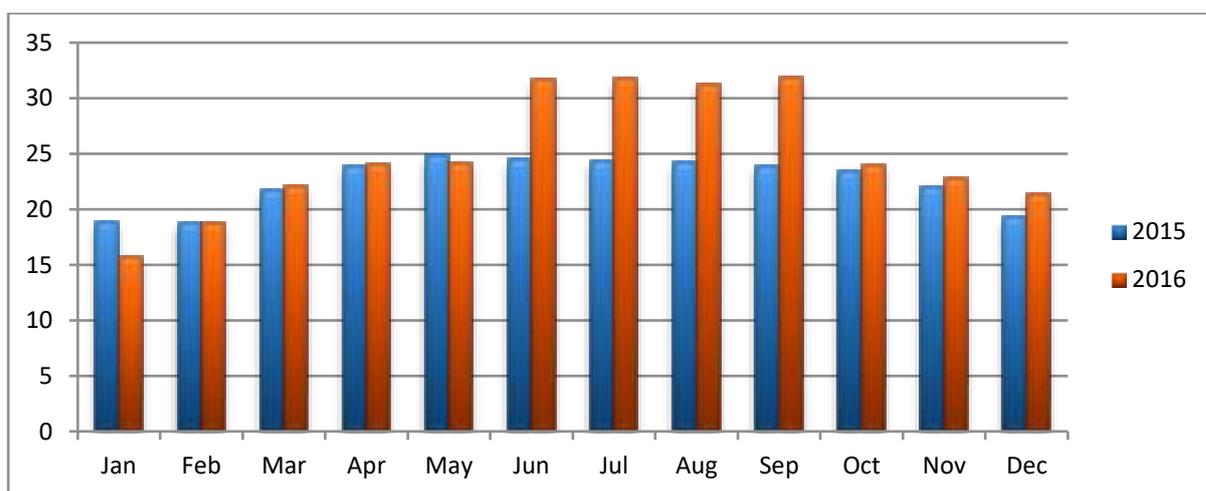


Table 3: Monthly mean Minimum Temperature (°C) in 2015 – 2016

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	18.9	18.8	21.8	23.9	24.9	24.5	24.4	24.3	23.9	23.5	22	19.3
2016	15.7	18.8	22.1	24.1	24.2	31.7	31.8	31.3	31.9	24	22.8	21.4



### 6.7.3 Wind Direction and Wind Speed

Data of wind direction and wind speed reported by Metrology and Hydrology Department, Ka bar Aye Station are collected and shown as below:

#### Wind Direction

Table 4: Monthly Mean Wind Direction 2015

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2015</b>												
6:30 AM	SE	N	E	SW	NE	E	SE	SE	SW	NE	SE	S
9:30 AM	SE	NE	SE	SW	NW	N	SW	SE	SE	NE	SW	NE
12:30 PM	SE	NE	NW	SE	NW	SW	SW	SW	SE	NE	SE	SE
18:30 PM	NW	NW	SE	SW	NW	S	SW	SW	SW	W	SW	NW

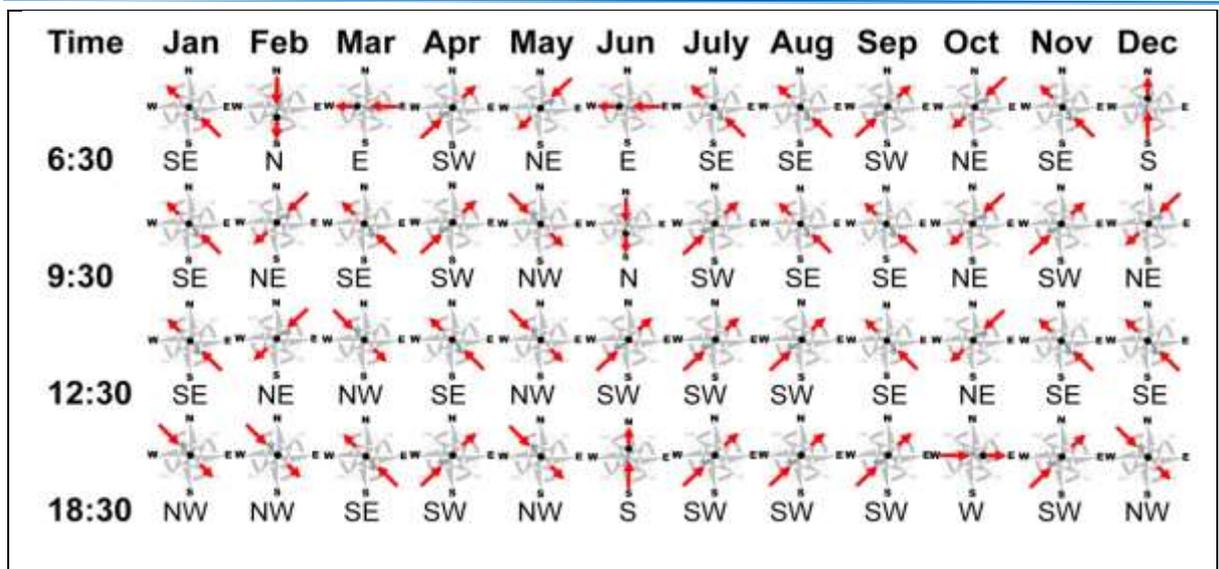
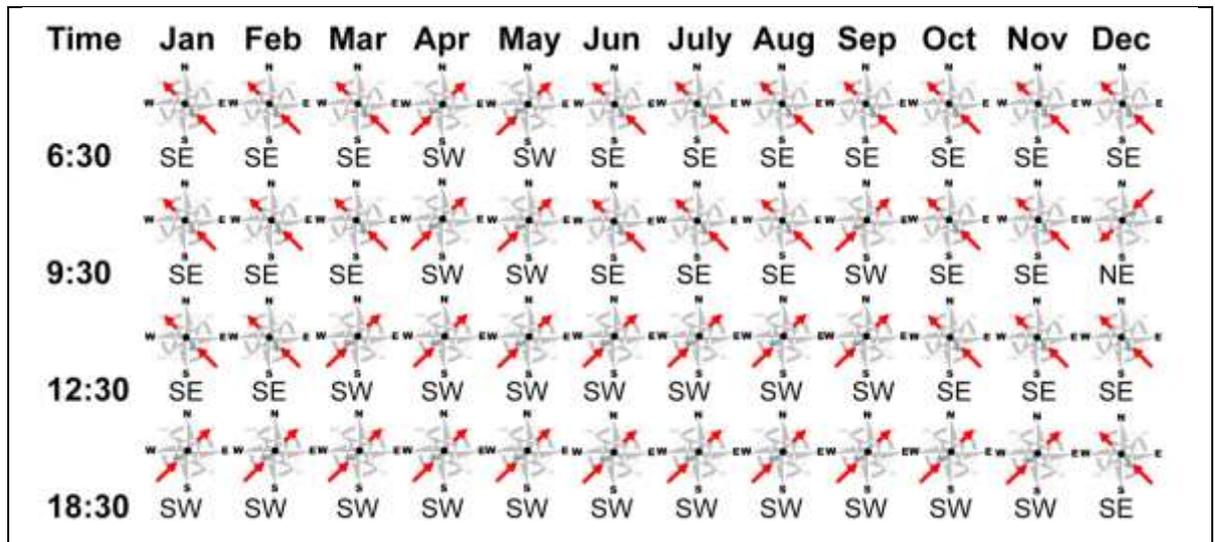


Table 5: Monthly Mean Wind Direction 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2016</b>												
<b>6:30 AM</b>	SE	SE	SE	SW	SW	SE	SE	SW	SE	SE	SE	SE
<b>9:30 AM</b>	SE	SE	SE	SW	SW	SE	SE	SW	SW	SE	SE	NE
<b>12:30 PM</b>	SE	SE	SW	SE	SE	SE						
<b>18:30 PM</b>	SW	SE										



### Wind Speed

Table 6: Monthly Mean Wind Speed (mph) 2015

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2015</b>												
<b>6:30 AM</b>	3.6	2.4	4.8	3.6	2.4	3.6	6	2.4	3.6	6	4.6	2.3
<b>9:30 AM</b>	4.8	4.8	6	3.6	3.6	3.6	3.6	3.6	4.8	6	4.6	4.6
<b>12:30 PM</b>	6	4.8	8.4	7.2	4.8	6	6	4.8	9.6	7.2	5.8	4.6
<b>18:30 PM</b>	2.4	4.8	6	10.8	4.8	4.8	4.8	3.6	4.8	3.6	5.8	5.8

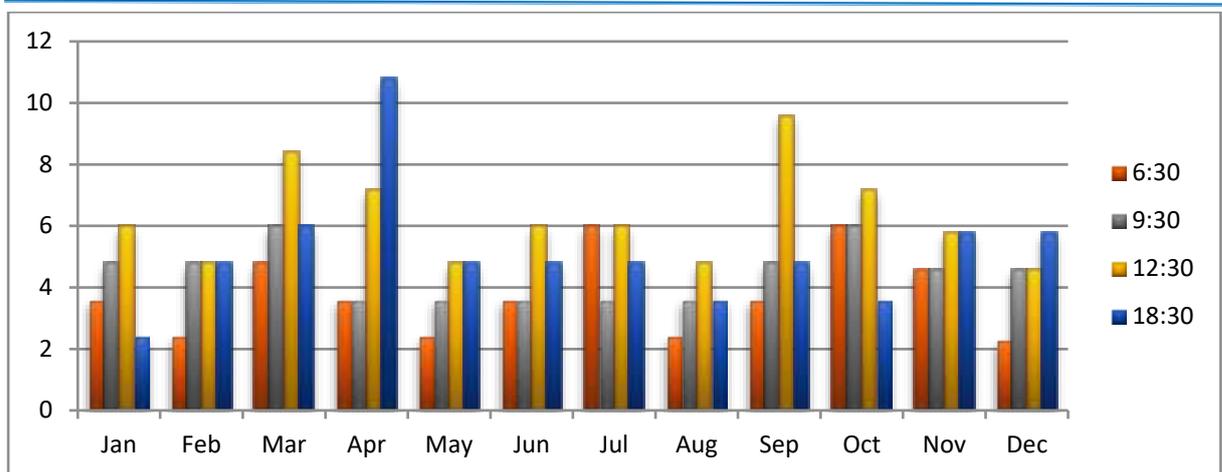
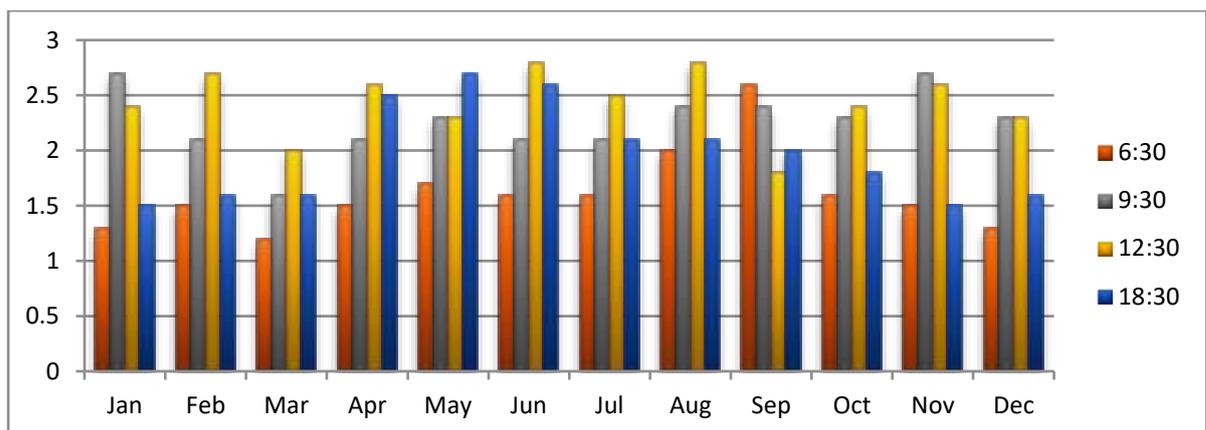


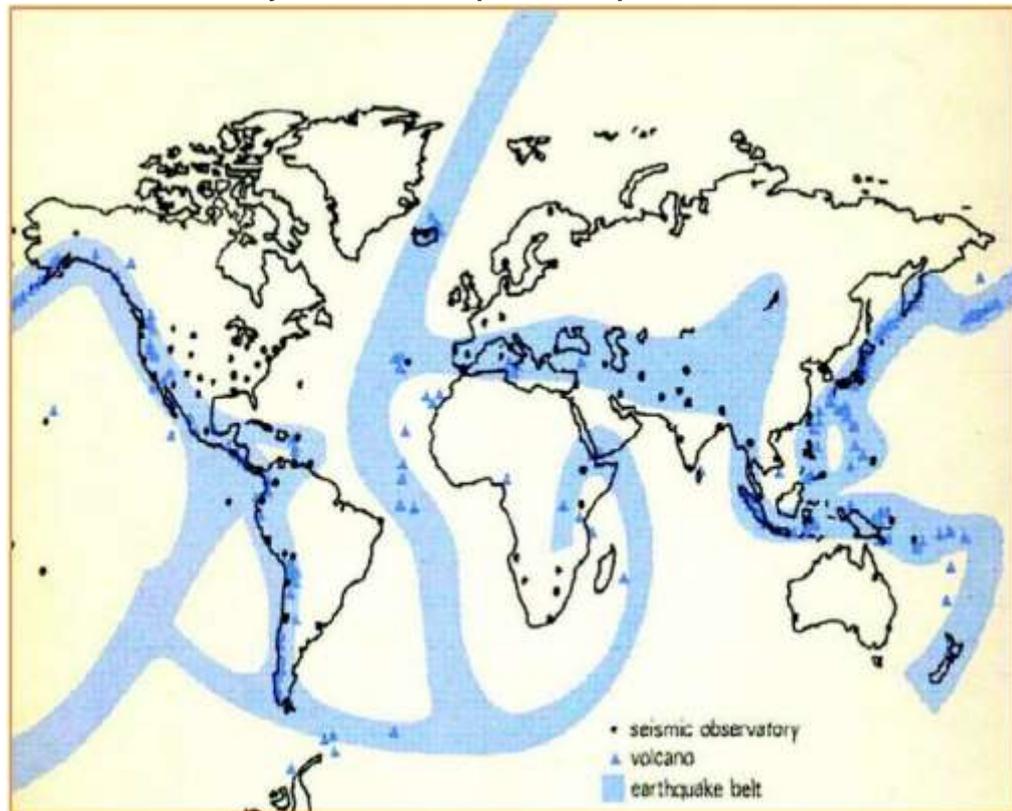
Table 7: Monthly Mean Wind Speed (mph) 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2016</b>												
6:30 AM	1.3	1.5	1.2	1.5	1.7	1.6	1.6	2	2.6	1.6	1.5	1.3
9:30 AM	2.7	2.1	1.6	2.1	2.3	2.1	2.1	2.4	2.4	2.3	2.7	2.3
12:30 PM	2.4	2.7	2	2.6	2.3	2.8	2.5	2.8	1.8	2.4	2.6	2.3
18:30 PM	1.5	1.6	1.6	2.5	2.7	2.6	2.1	2.1	2	1.8	1.5	1.6



#### 6.7.4 Earthquake Risk

Myanmar in the Alpide Earthquake Belt



SOURCE: MANUAL ON EARTHQUAKE, UN-HABITAT

It could be seen in the above Figure that Myanmar falls in the Alpide Belt.

The Alpide Belt or Alpine-Himalayan orogenic belt is a seismic belt and orogenic belt that includes an array of mountain ranges extending along the southern margin of Eurasia, stretching from Java to Sumatra through the Himalayas, the Mediterranean, and out into the Atlantic. It includes the Alps, the Carpathians, the Pyrenees, the mountains of Anatolia and Iran, the Hindu Kush, and the mountains of Southeast Asia. It is the second most seismically active region in the world, after the circum-Pacific Belt (The Ring of Fire), with 17% of the world's largest earthquakes.

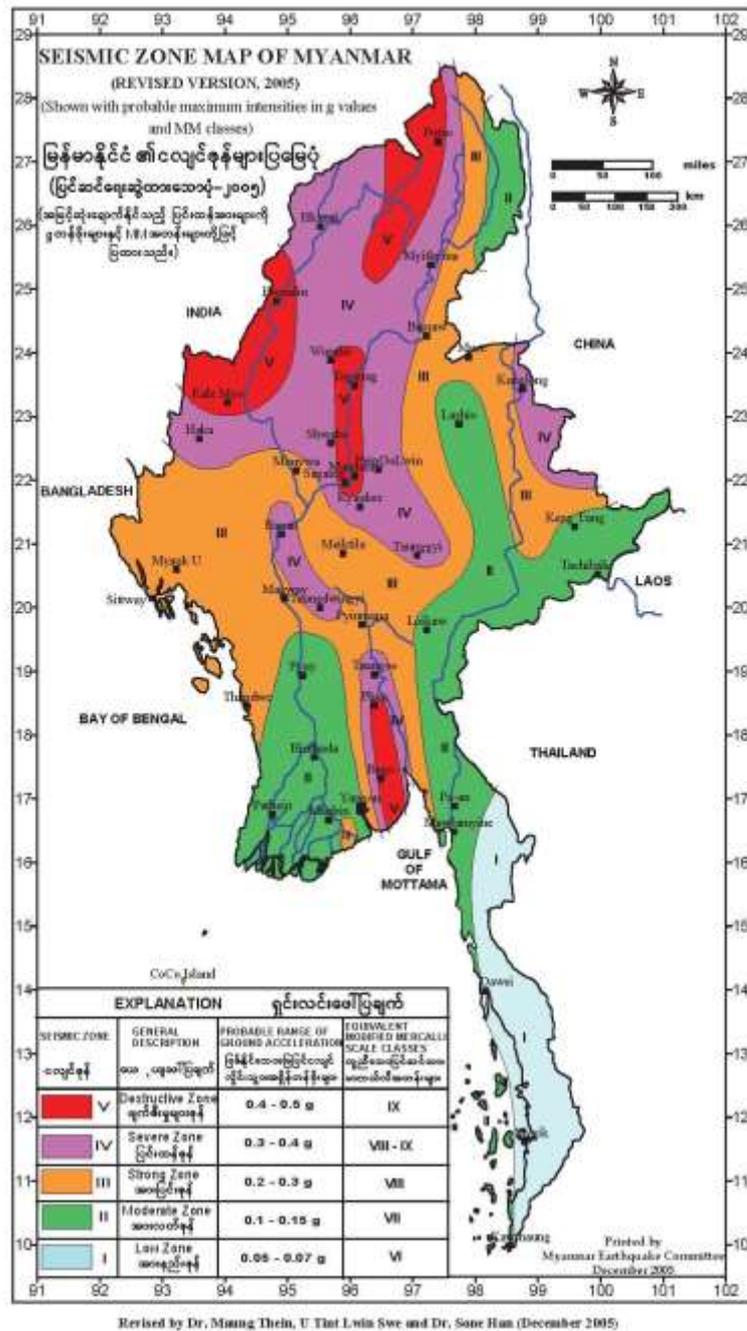


Figure4. : Seismic Map of Myanmar

According to the above Seismic Map of Myanmar, Yangon/Hlegu Township is located in the zones where only strong and moderate earthquakes will likely strike, avoiding the zones where destructive and severe earthquakes could strike.

Myanmar's Earthquake Zone and the Sagaing Fault

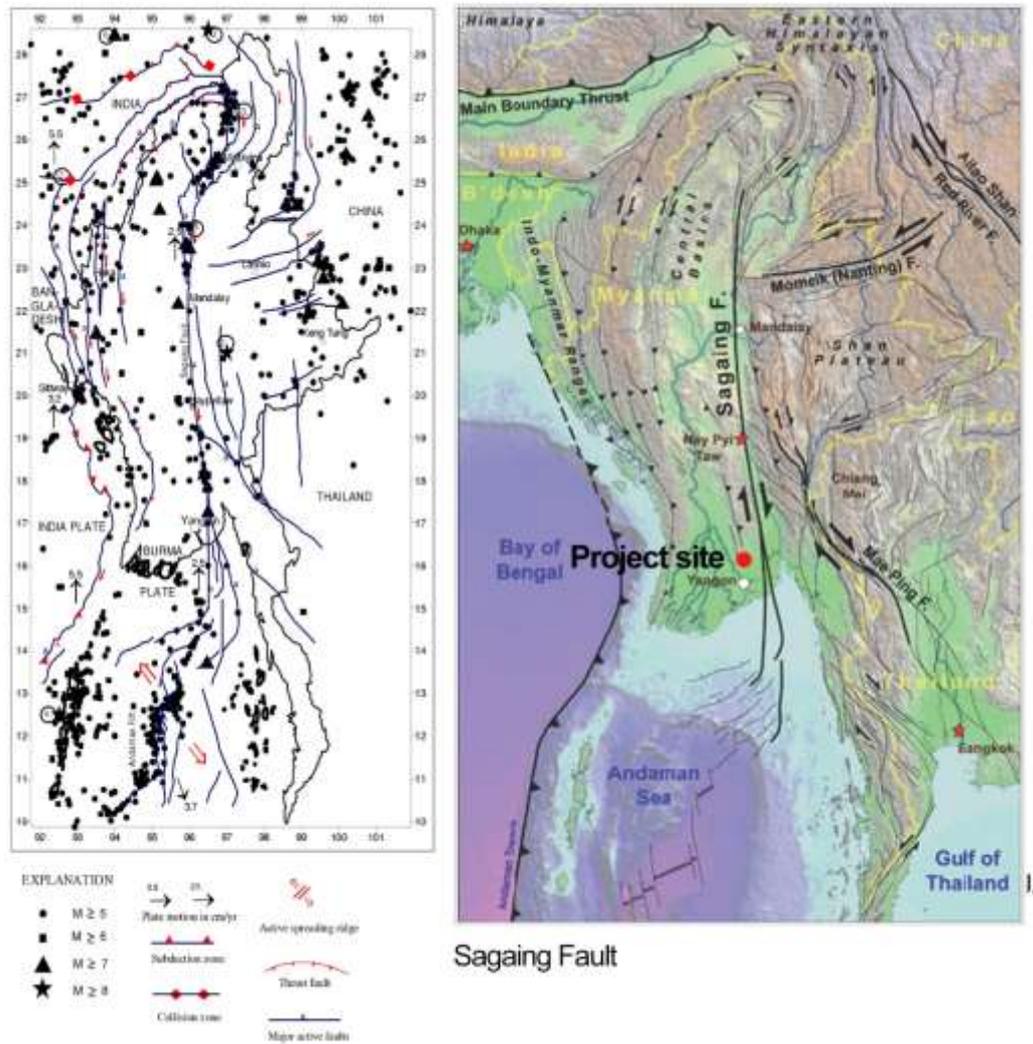


Figure 4. : Myanmar's Earthquake Zone and the Sagaing Fault  
 Source: Department of Geological Engineering, Gadjah Mada University and [www.sagaingfault.info/index.html#info](http://www.sagaingfault.info/index.html#info)

The proposed Project Site is located at approximately 37 kilometers to the west of the 1,200-kilometre long Sagaing Fault which stretches from the northernmost part of the country to the Gulf of Mottama. A 7.0 Richter Scale quake killed 500 people in Bago and 50 people in Yangon in 1930, at which time Yangon's population was only about 400,000.

Summary record of earthquakes which struck Myanmar is listed in Table below.

Table : List of earthquakes which struck Myanmar

Date	Location	Magnitude and/or brief description
868	Bago	Shwemawdaw Pagoda a fell
875	Bago	Shwemawdaw Pagoda a fell
1429	Innwa	Fire-stopping enclosure walls fell
1467	Innwa	Pagodas, solid and hollow, and brick monasteries destroy-ed
24 July 1485	Sagaing	3 well-known pagodas fell
1501	Innwa	Pagodas, etc. fell
13 Sep 1534	Bago	Pagodas including Shwemawdaw and Mahazedi fell
1567	Bago	Kyaikko Pagoda fell
1582	Bago	Umbrella of Mahazedi Pagoda fell
9 Feb 1588	Bago	Pagodas, and other structures fell
30 Mar 1591	Bago	The Great Incumbent Buddha destroyed

<b>23 June 1620</b>	Innwa	Ground surface broken, river fishes were killed after quake
<b>18 Aug 1637</b>	Innwa	River water flush
<b>10 Sep 1616</b>	Innwa	-
<b>11 June 1648</b>	Innwa	-
<b>1 Sep 1660</b>	Innwa	-
<b>3 April 1690</b>	Innwa	-
<b>15 Sep 1696</b>	Innwa	4 well-known pagodas destroyed
<b>8 Aug 1714</b>	Innwa	Pagodas etc. fell; the water from the river gushed into the city
<b>4 June 1757</b>	Bago	Shwemawdaw Pagoda damaged
<b>2 April 1762</b>	Sittwe	M=7 RS: very destructive violent earthquake felt over Bengal, Rakhine up to Calcutta
<b>27 Dec 1768</b>	Bago	Ponnya Yadana Pagoda fell
<b>9 June 1776</b>	Innwa	A well-known pagoda fell
<b>26 April 1850</b>	Innwa	-
<b>21 Mar 1839</b>	Innwa	Oil place and many buildings demolished;
<b>23 Mar 1839</b>	Innwa	Pagodas and city walls fell; ground surface broken; the river's flow reversed for sometime; Mingun Pagoda shattered; about 300 to 400 persons killed
<b>6 Feb 1843</b>	Kyaukphyu	Eruption of mud volcanoes at the Ram bye (Ramree) Island
<b>3 Jan 1848</b>	Kyaukphyu	The civil line and other buildings were damaged
<b>24 Aug 1858</b>	Pyay	Collapsed houses and tops of pagodas at Pyay, Henzada, and Thayet Myo and felt with some damages in Innwa, Sittwe, Kyaukphyu and Yangon
<b>8 Oct 1888</b>	Bago	Mahazedi Pagoda collapsed
<b>6 Mar 1913</b>	Bago	Shwemawdaw Pagoda lost its final
<b>5 July 1917</b>	Bago	Shwemawdaw Pagoda fell
<b>10 Sep 1927</b>	Yangon	-
<b>17 Dec 1927</b>	Yangon	M-7 RS: extended to Dedaye
<b>8 Aug 1929</b>	Near Taungoo	Bent railroad tracks, bridges and culver is collapsed , and loaded trucks overturned (Swa Earthquake)
<b>5 May 1930</b>	Near Khayan	M-7.3 RS. 1 mix-IX; in a zone tending north-south for 37km south of Bago (on the Sagaing Fault line) about 500 persons in Bago and about 50 persons in Yangon killed
<b>3 Dec 1930</b>	Nyaunglebin	M-7.3 RS: railroad tracks twisted (Pyu Earthquake): about 30 persons killed
<b>27 Jan 1931</b>	East of Indawgyi	M-7.6 RS: 1 mix-IX: numerous fissures and cracks (Myitkyina Earthquake)
<b>10 Aug 1931</b>	Pyinmana	-
<b>27 Mar 1931</b>	Yangon	-
<b>16 May 1931</b>	Yangon	-
<b>21 May 1931</b>	Yangon	-
<b>12 Sep 1946</b>	Tagaung	M-7.5 RS
<b>12 Sep 1946</b>	Tagaung	M-7.75 RS
<b>16 July 1956</b>	Sagaing	M-7.0 RS: Several pagodas severely damaged (40to50 persons killed)
<b>8 July 1976</b>	Bagan	M-6.8 RS: Several pagodas in Bagan Ancient City were severely damaged (only 1 person killed)
<b>22 Sep 2003</b>	Taundwingyi	M-6.8 RS: Severe damaged to rural houses and religious buildings (7 persons killed)
<b>24 Mar 2011</b>	Tarlay	Mw 6.8, Myanmar, Thailand, Laos, China and Vietnam border areas were affected and about 150 person were killed when 130 houses collapsed.
<b>24 Aug 2016</b>	Chauk	Mw 6.8, several temples in the nearby ancient city of Bagan were damaged and four people were reported dead

Source: Myanmar Geosciences Society

## 6.8 Study Limit

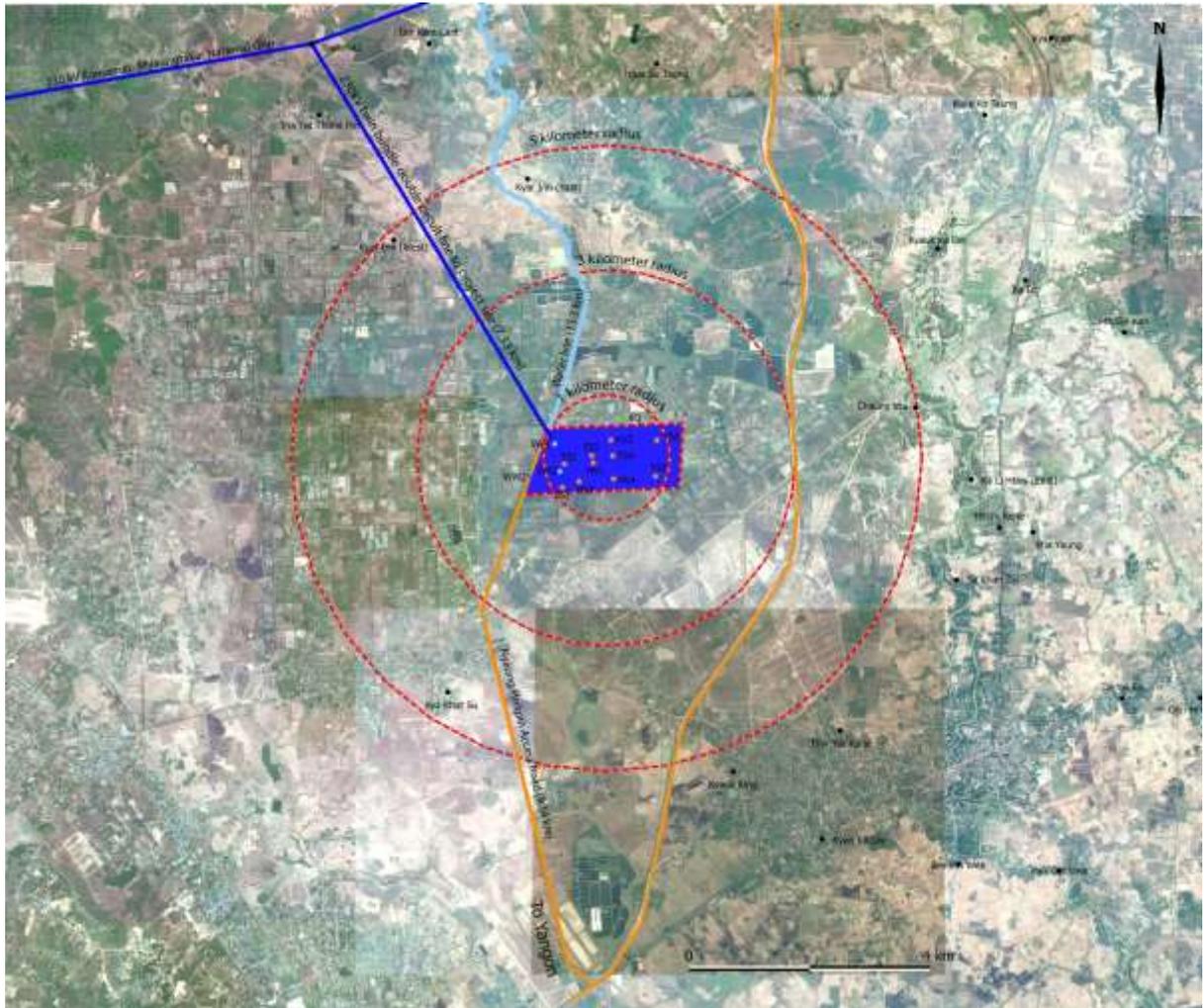


Figure 6-3: Map of setting the study limit

MSR study team set the study limit within the proposed premises such as 2,464,282 square meters (600 Acres) wide land and the study area is 3 to 5 kilometers radius of the project area (surrounding environment) for physical data collection and impact assessment. The study area will cover not only the project site but also include the spatial and temporal limits of individual environmental components outside the Project Area boundaries where an effect can be reasonably expected. The geographic boundaries for the assessment included the area that will be directly affected by the project operations.

For the social environment, the study covers Kya Khat Su, Nyaung Hnitpin, Takuton, Sone Kone Kyar Inn (West) and Kyar Inn (East) villages which are located within 5 km from the project site or more. These 5 villages are the areas which will likely be directly affected by the project. According to the experts' observation, the impact of the project and its influence area are expected within 3 – kilometer radius of the project. The detailed information of socioeconomic conditions of households in these villages will be provided in the ESIA report of this project.

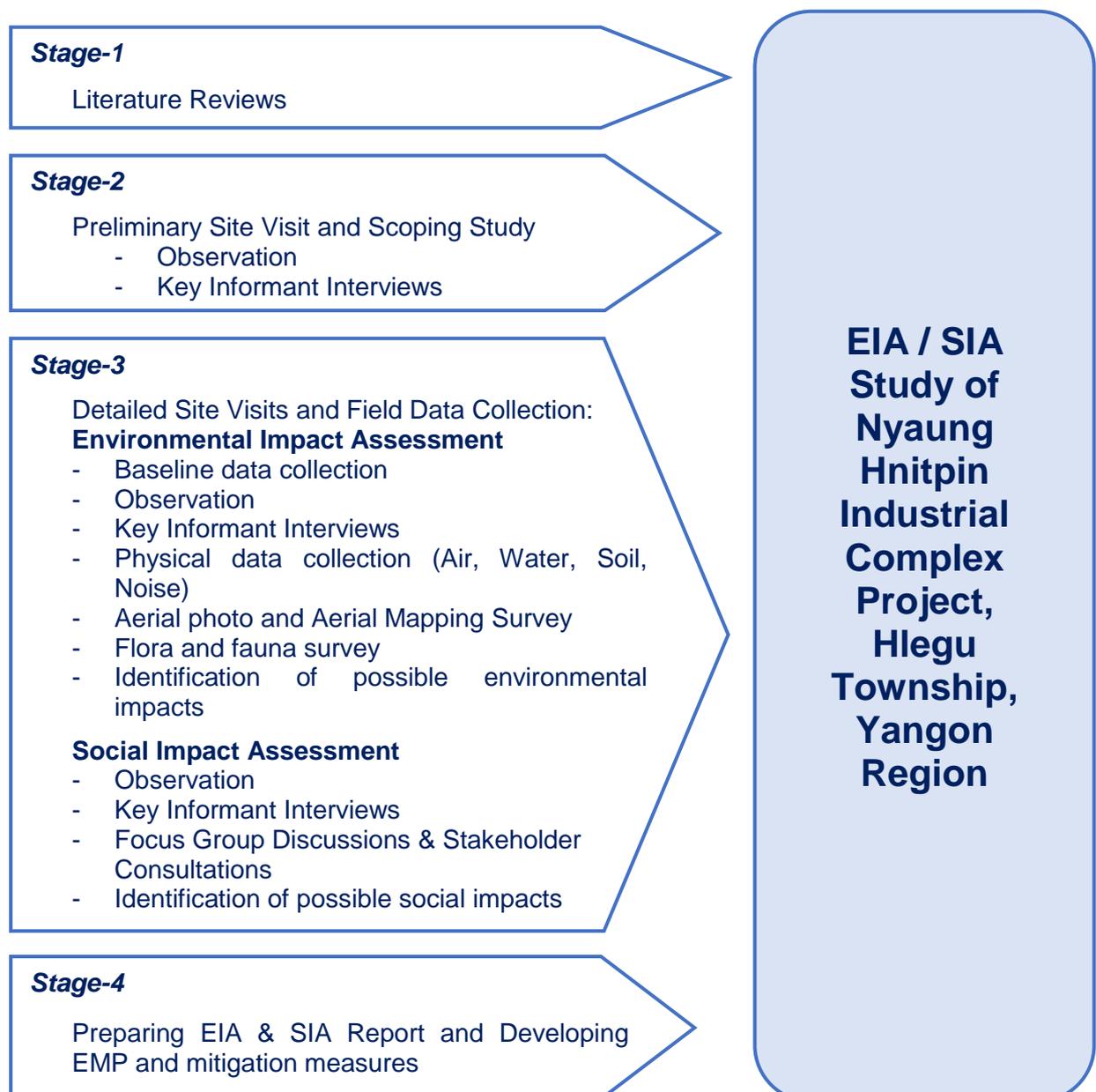
The main focus area for the biological impact assessment is the project site and ecological aspect is observed inside and outside of range and is within 3 km from the project site.

However, the overall social and biological impacts are not limited to the surrounding areas of the project site. Therefore, the study looks at wider scope and contribution to regional level.

In addition, the study will cover topography of landscape and presence of large natural lakes and fish-farming ponds surrounding the project site in such distance. Thus, drainage system of the areas (freshwater aquatic environment) especially in rainy season expands within the area of 3 km radius from the center of the project site where aquatic organisms will have the effect of the industrial zone development. Therefore, residual and cumulative effects in aquatic food chain has a risk factor. Agricultural and natural vegetation with its original soil may have the effect of acid rain (as a result of emissions from factories) that suggests extending the field observation for biological environment setting.

## 6.9 Research methodology

Research methodology involves literature reviews, preliminary site visit for scoping study, and detailed field data collection at sites. By reviewing and analyzing the data collected, EIA and SIA reports will be prepared, and Environmental Management Plan and mitigation measures will be developed.



# **SECTION 7**

# **BASELINE DATA COLLECTION**



## 7. BASELINE DATA COLLECTION

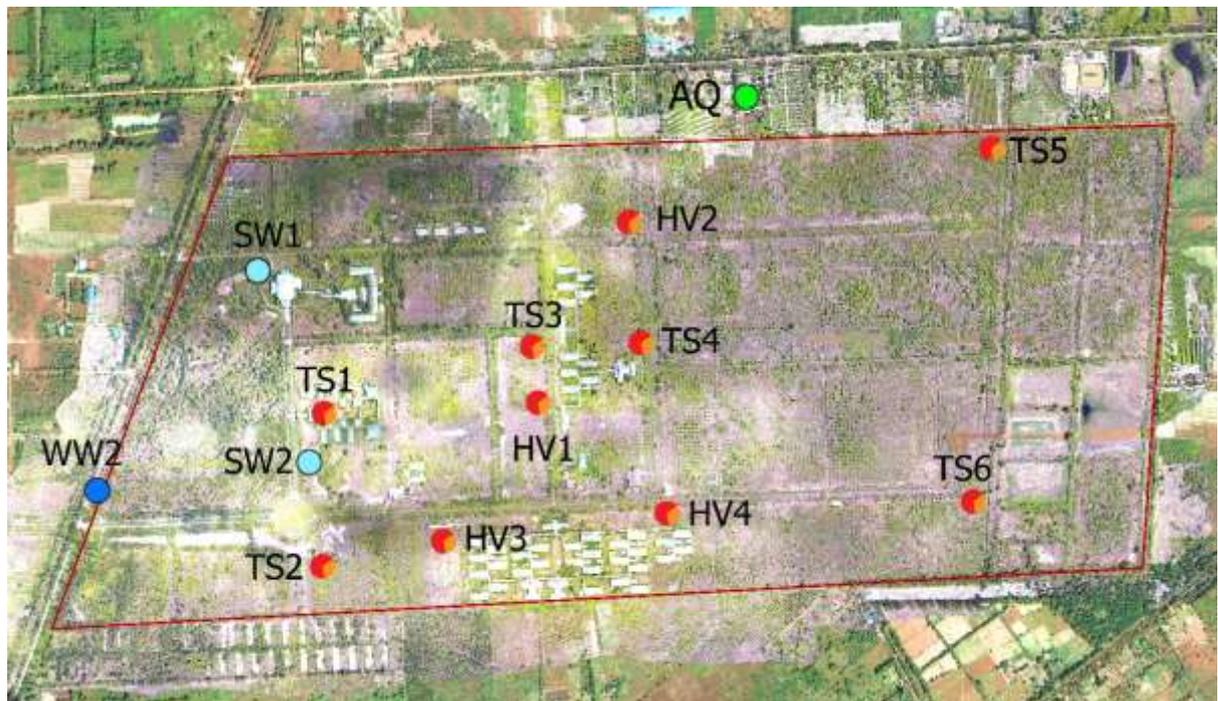
### 7.1 Physical Environment and Baseline Data Collection

Physical environmental study team of MSR studied topographic map, site layout plan, water drains and associated structures. The team visited the site and observable locations of the proposed project and decided to collect samples as base line data for this environmental impact assessment report.

1. Soil may be impacted negatively at site by preparation, construction, operation and decommissioning phases. MSR study team decided to collect 6 samples of soil to analyze soil nutrient and 4 samples of soil to analyze soil heavy metal such as harmful substances. These analytical reports are baseline data of soil.

2. Air may be polluted by dust emission, operating of machineries which use diesel fuel at construction, operation and decommission phases that 24 hours ambient air quality test should analyze near the proposed project. These analytical reports are baseline data of air.

3. Waste water and groundwater pollution may be impacted by oil spills, dumping of materials, dumping of solid waste, factory waste and sewage. The main discharge points of 1 waste water samples and 2 samples of surface/ groundwater were collected to analyze water quality. These analytical reports are baseline data of wastewater and ground water.



- TS** ● Top soil nutrients
- HV** ● Heavy metal toxic
- AQ** ● Air Quality
- SW** ● Surface/ groundwater
- WW** ● Wastewater

## 7.2 Topography



Figure 7-1: The map of topography

The proposed project land is situated between latitude N-1896800 to N-1898000 and longitude E-197300 to E-199900. Approach road way to project site is 9.14 km length from junction of Yangon - Mandalay Highway No.3

The project location is between:

	Latitude	Longitude
Point A	17.136131°	96.155709°
Point B	17.141934°	96.157951°
Point C	17.142103°	96.162789°
Point D	17.144476°	96.162692°
Point E	17.144329°	96.158867°
Point F	17.145730°	96.159415°
Point G	17.146511°	96.179249°
Point H	17.137174°	96.178757°

The highest point is 15.5 meters above sea level (ASL) in the north east and the lowest point is 11.5 meters above sea level (ASL) in the south-west of the project site. The land was previously used as research and training institute by Union Solidarity and Development Party (USDP). Currently, it remains as an unused land where the buildings (Hall, Hostel, Theatre, Hospital, etc...) have been ruined.

### 7.3 Air Quality, Sound Level, Wind speed and direction



#### Air sample Location

Sample point	Latitude	Longitude
AQ -1	N 17° 8' 48.93"	E 96° 10' 12.93"

#### Air quality survey method

Ambient air sampling was conducted at above mentioned site. Sampling period was based on 24-hour measurement level of PM<sub>2.5</sub> and PM<sub>10</sub> using EPAS air sampler and other gases are also measured by auto sensors of the EPAS haze-scanner. Particulate Matter (PM<sub>10</sub>), Particulate Matter (PM<sub>2.5</sub>), Sulphur dioxide (SO<sub>2</sub>), Nitrogen dioxide (NO<sub>2</sub>), Carbon Monoxide (CO), Total Volatile Organic Compound (TVOCs), Hydrocarbon (HC), and Methane (CH<sub>4</sub>) are measured 1 hour average and Ozone (O<sub>3</sub>) is measured 8 hours average. The report covers the observations for the baseline data obtained in one cross-sectional survey.

#### Sound level survey method

Maximum Sound Pressure Level (L<sub>max</sub>) and the Equivalent Continuous Sound Level (L<sub>eq</sub>) were measured at available site of the Project area.

Acoustic environment monitoring was performed in accordance with standard procedures adopted by American Conference of Governmental Industrial Hygienist (ACGIH) which is authoritatively and currently used in Myanmar.

## Measuring of Air Quality



Figure 7-2: Air Quality Measurement Device

Five pollutants are measured in the monitoring networks in the province. these criteria pollutants are sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), particulate matter (PM) and ozone (O<sub>3</sub>). volatile organic compounds, (VOCS) are also measured periodically at the station, but are not included in the report.

### Common air pollutants

The nature of the common air pollutants and their effects are briefly presented as follows:

#### 7.4 Particulate matter (PM)

Particulate matter is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets, and can be large and dark enough to be seen with the naked eye or so small that they can only be detected with an electron microscope. Many manmade and natural sources emit particulate matter directly while others emit gaseous pollutants that react in the atmosphere to form particulate matter.

The size of the particulate has important health considerations. Particulate matter less than 10 microns in diameter (PM<sub>10</sub>) poses a health concern because it can be inhaled into and accumulate in the respiratory system. coarse particles (PM<sub>10</sub>) have an aerodynamic diameter between 2.5µm and 10µm. They are formed by mechanical disruption (e.g. crushing, grinding, and abrasion of surfaces) evaporation of sprays, and suspension of dust. PM<sub>10</sub> is composed of alumina silicate and other oxides of crustal elements, and major sources including fugitive dust from roads, industry, agriculture, construction and demolition, and fly ash from fossil fuel combustion.

Fine particles have an aerodynamic diameter less than 2.5µm (pm<sub>2.5</sub>). They differ from PM<sub>10</sub> in origin and chemistry. These particles are formed from gas and condensation of high temperature vapors during combustion, and they are composed of various combinations of sulfate compounds, nitrate compounds, carbon compounds, ammonium, hydrogen ion, organic compounds, metals (Pb, Cd, V, Ni, Cu, Zn, Mn and Fe), and particle bound water.

The major sources of  $PM_{2.5}$  are fossil fuel combustion, vegetation burning, and the smelting and processing of metals. particulate matter less than 2.5 microns in diameter ( $PM_{2.5}$ ) is believed to pose the greatest health risks as it can lodge deeply into the lungs; a  $PM_{2.5}$  particles is approximately  $1/30^{th}$  the average width of a human hair.

### 7.5 Sulfur dioxide ( $SO_2$ )

Sulfur dioxide gas is an inorganic gaseous pollutant. Sulfur dioxide emissions are expected to be emitted wherever combustion of any fuel containing sulfur takes place. The sulfur in the fuel will combine with oxygen to form sulfur dioxide.

Literature information has indicated that the presence of sulfur dioxide in the photochemical smog reaction enhances the formation of visibility enhancing aerosols.

Sulfur dioxide in atmosphere is significant because of its toxicity. Sulfur dioxide is capable of producing illness and lung injury. Further, it can combine with water in the air to form toxic acid aerosols that can corrode metal surfaces, fabrics and the leaves of plants. Sulfur dioxide is irritating to the eyes and is harmful to the respiratory system. Excessive exposure to sulfur dioxide causes bronchial asthma and other breathing related diseases as it affects the lungs.

The major sources of sulfur dioxide are emissions from diesel generators used by industries and local residents and forest and bush fires and burning of crop residues.

### 7.6 Nitrogen oxide ( $NO_2$ )

$NO_2$  is the primary component of concern in  $no_x$  emissions. Generally, between 5% and 10% of the  $no_x$  emitted from the combustion of fuel is emitted as  $no_2$ . The remainder is emitted as  $NO$ , which is subsequently converted to  $NO_2$  in reactions with various oxidants and oxygen as the plume is transported downwind from the source. The rate of  $NO_2$  formation varies with time of day, season, temperature, wind speed, solar radiation and the availability of oxidants to help drive the chemical reactions.

$NO_2$  is a reddish brown gas with a pungent odor, which upon reaction with other atmospheric compounds, becomes a major contributor to smog, acid rain, inhalable particulates and reduced visibility. At significant levels and exposure, inhalation may result in irritation and burning to the skin and eyes, nose and throat. prolonged exposure may result in permanent lung damage.

### 7.7 Carbon monoxide (CO)

Carbon monoxide is a colorless / odorless gas which reduces the delivery of oxygen to the body's organs. For those with heart disease, exposure to low doses can result in chest pain. For healthier people, exposure to higher levels affects the central nervous system.

Carbon monoxide is present in small amounts in the atmosphere, chiefly as a product of volcanic activity but also from natural and man-made fires (such as forest and bush fires, burning of crop residues and sugarcane fire-cleaning).

Carbon monoxide is a temporary atmospheric pollutant in some urban areas, mainly from the exhaust of internal combustion engines (including motorized vehicles, portable and back- up generators, lawn mowers, power washers, etc.), but also from incomplete combustion of various other fuels (including wood, coal, charcoal, oil, paraffin, propane, natural gas and trash).

Incomplete oxidation of fuel results in the formation of CO. In simplified terms, the generic stoichiometric combustion equation is:



However, if sufficient oxygen ( $\text{O}_2$ ) is not present to complete the combustion of the hydrocarbon fuel (HC), then the oxidation to carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) is not completed and hence CO is emitted.

## 7.8 Ozone ( $\text{O}_3$ )

Ground-level ozone is not directly emitted into the air, but rather is formed by chemical reactions between  $\text{NO}_x$  and volatile organic compounds (VOCs) in the presence of ultraviolet (UV) radiation. Ozone is a primary component of smog.

Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can also worsen bronchitis, emphysema, and asthma as well as reduce lung function and inflame the linings of the lungs, permanently scarring lung tissue under repeated exposure.

## 7.9 Ambient Air Standards

The maximum concentrations of air pollutants considered to be protective of the environment are defined in the *National Environmental Quality (Emission) Guidelines, 2015*. For the pollutants discussed in the report, the ambient air standards are detailed in Table below.

Parameter	Averaging Period	Guideline Value $\mu\text{g}/\text{m}^3$
Nitrogen dioxide	1-year	40
	1-hour	200
Ozone	8-hour daily maximum	100
Particulate matter $\text{PM}_{10}^{\text{a}}$	1-year	20
	24-hour	50
Particulate matter $\text{PM}_{2.5}^{\text{b}}$	1-year	10
	24-hour	25
Sulfur dioxide	24-hour 10-minute	20
		500

<sup>a</sup> Particulate matter 10 micrometers or less in diameter

<sup>b</sup> Particulate matter 2.5 micrometers or less in diameter

### Air Quality Survey Results

Air Quality was tested by the Occupational and Environmental Health Laboratory, Ministry of Health on 25 April 2017. The test results are presented below.

Summary of air quality results (Collected date 25 – 26 April 2017)

Name	AQ-1	Reference Unit	Unit
<b>PM<sub>10</sub> (24 hr)</b>	70.6	50	$\mu\text{g}/\text{m}^3$
<b>PM<sub>2.5</sub> (24 hr)</b>	32.1	25	$\mu\text{g}/\text{m}^3$
<b>SO<sub>2</sub> (24 hr)</b>	50.7	20	$\mu\text{g}/\text{m}^3$
<b>NO<sub>2</sub> (1 hr)</b>	78.3	200	$\mu\text{g}/\text{m}^3$
<b>CO (1 hr)</b>	301	30000	$\mu\text{g}/\text{m}^3$
<b>O<sub>3</sub> (8 hr)</b>	17.8	100	$\mu\text{g}/\text{m}^3$
<b>VOCs (1 hr)</b>	17.9	400	$\mu\text{g}/\text{m}^3$
<b>HC</b>	401.1	-	ppm
<b>CH<sub>4</sub></b>	6362	-	ppm

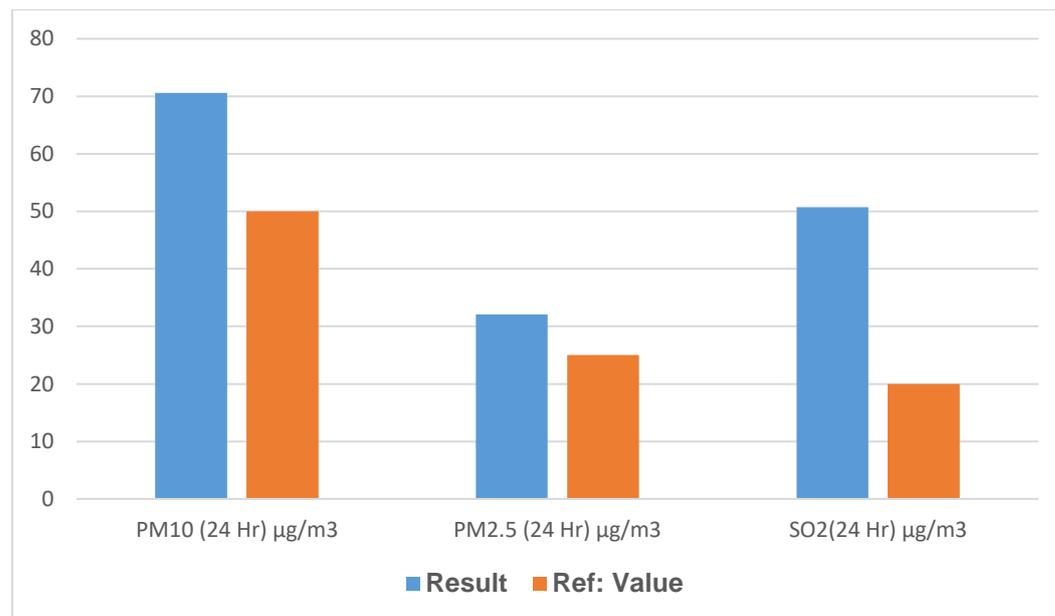
24 hours mean results of Hydro-carbon (HC) is (401.1) ppm and Methane (CH<sub>4</sub>) is (6362) ppm respectively.

NO<sub>2</sub> is (78.3) micro gram per cubic meter, CO is (301) micro gram per cubic meter, O<sub>3</sub> is (17.8) micro gram per cubic meter, VOCS is (17.9) micro gram per cubic meter are lower than reference value.

PM<sub>10</sub> is (70.6) micro grams per cubic meter, PM<sub>2.5</sub> is (32.1) micro grams per cubic meter and SO<sub>2</sub> is (50.7) micro grams per cubic meter are higher than reference value.

### Air Quality Parameters

#### Particulate matter (PM<sub>10</sub>), Particulate matter (PM<sub>2.5</sub>) and Sulphur dioxide (SO<sub>2</sub>)



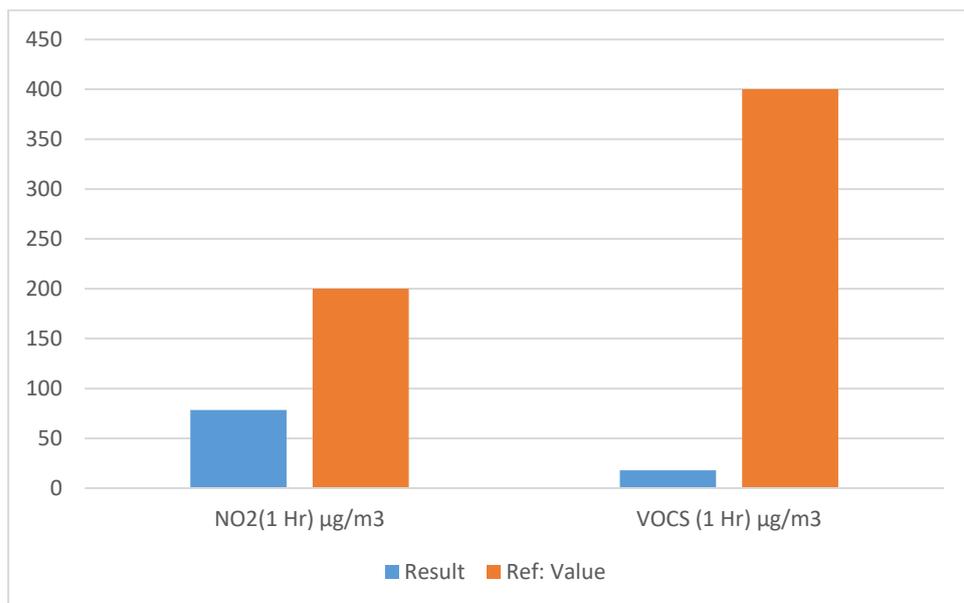
#### Particulate matter (PM<sub>10</sub>), Particulate matter (PM<sub>2.5</sub>) and Sulphur dioxide (SO<sub>2</sub>) concentrations

The result of Particulate Matter (PM<sub>10</sub>) from sample site is revealed 70.6 µg/m<sup>3</sup> and higher than WHO guide line values (50µg/m<sup>3</sup>).

The result of Particulate Matter (PM<sub>2.5</sub>) from sample site is revealed 32.1 µg/m<sup>3</sup> and higher than WHO guide line values (25µg/m<sup>3</sup>).

The result of Sulphur Dioxide (SO<sub>2</sub>) concentrations obtained from sample site was 50.7 µg/m<sup>3</sup> and higher than WHO guide line values (20µg/m<sup>3</sup>).

### Nitrogen Dioxide (NO<sub>2</sub>) and Total Volatile Organic Compounds (TVOCs)

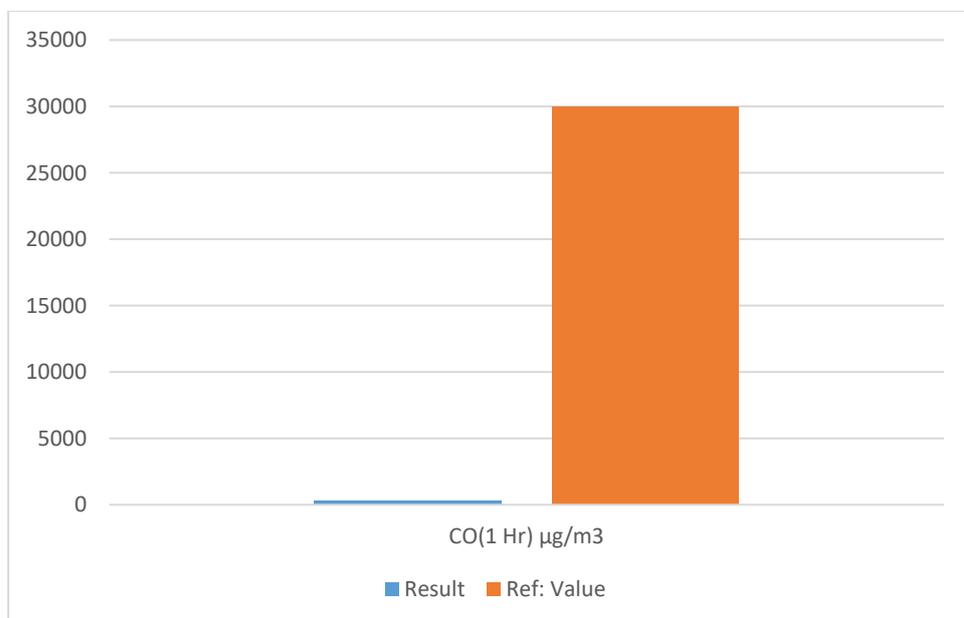


#### Nitrogen Dioxide (NO<sub>2</sub>) and Total Volatile Organic Compounds (TVOCs) concentrations for 1 hr mean

The result of Nitrogen Dioxide (NO<sub>2</sub>) concentrations obtained from sample sites was 78.3 µg/m<sup>3</sup> for 1 hr mean and lower than WHO guide line values (200µg/m<sup>3</sup>).

The result of Total Volatile Organic Compounds (TVOCs) concentrations obtained from sample sites was 17.9 µg/m<sup>3</sup> for 1 hr mean and much lower than WHO guide line values (200µg/m<sup>3</sup>).

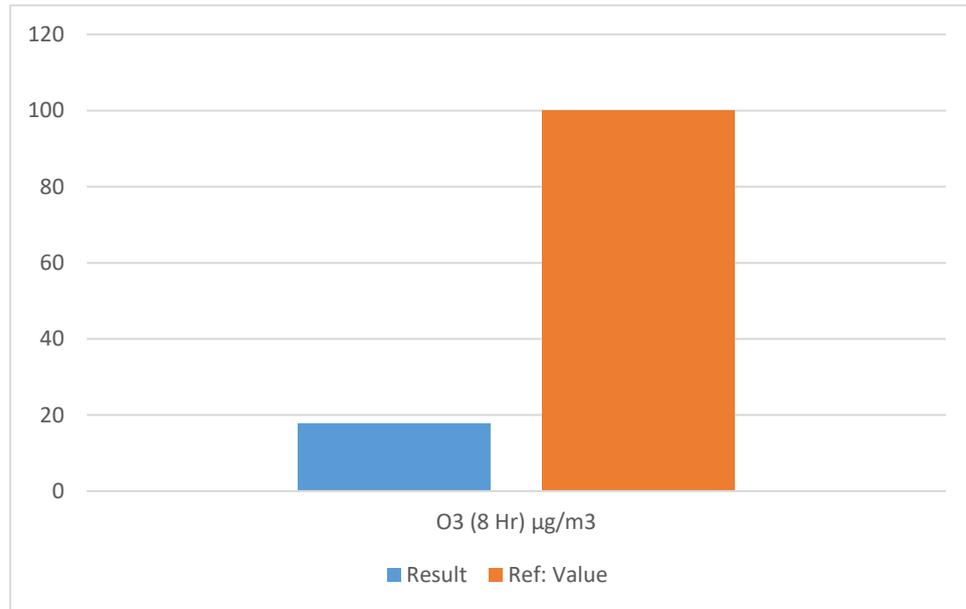
### Carbon Monoxide (CO)



#### Carbon monoxide (CO) concentrations

The result of Carbon Monoxide (CO) concentrations for 1 hr obtained from sample site was 301 µg/m<sup>3</sup> and much lower than WHO guide line values (30,000µg/m<sup>3</sup>).

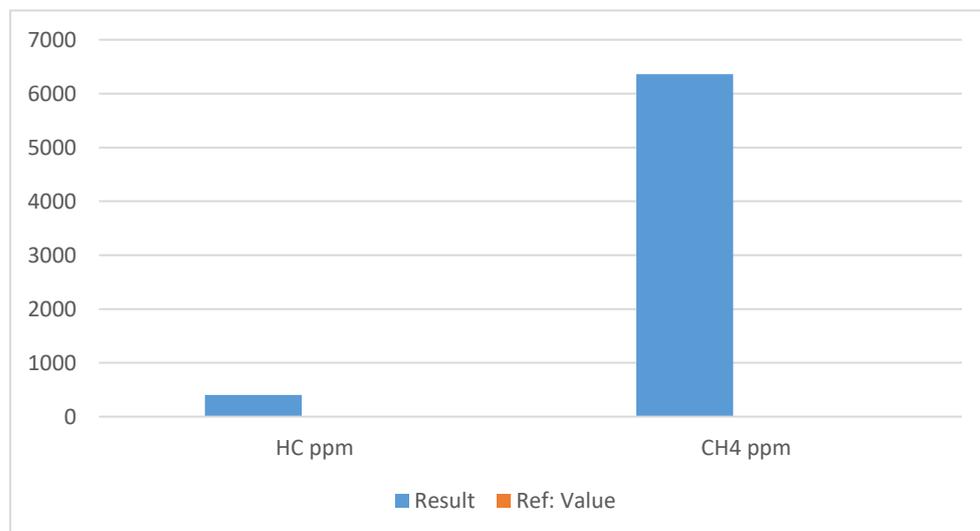
### Ozone (O3)



#### Ozone (O3) concentrations

The result of Ozone (O3) concentration obtained from sample site was 17.8 µg/m3 for 8hr mean and much lower than WHO guide line values (100µg/m3).

### Hydro carbon (HC) and Methane (CH4)



#### Hydro carbon (HC) and methane (CH4) concentrations

The result of Hydrocarbon (HC) concentrations obtained from sample site was 3,825 ppm.

The result of Methane (CH4) concentrations obtained from sample site was 22,889 ppm.

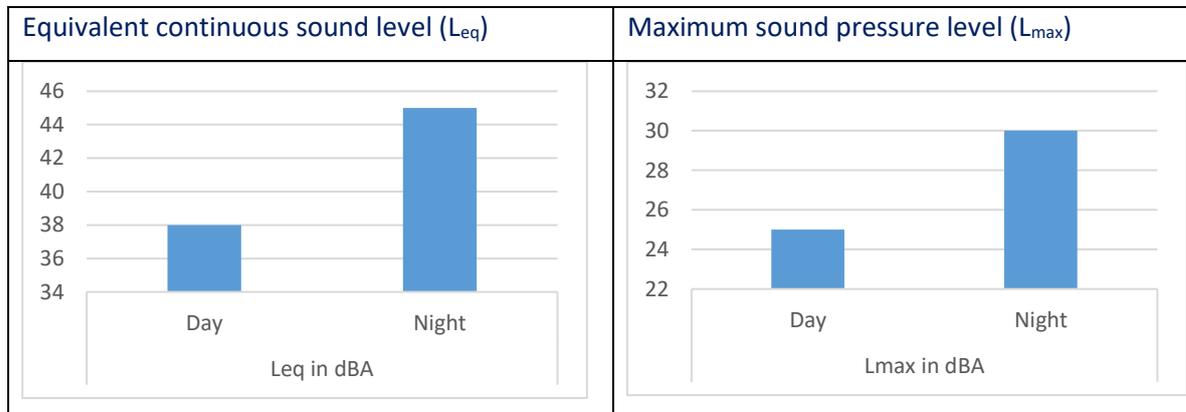
### Sound level parameters

The sound level monitoring was performed in accordance with standard procedures adopted by American Conference of Governmental Industrial Hygienist (ACGIH) which is authoritatively and currently used in Myanmar.

Maximum Sound Pressure Level ( $L_{max}$ ) and the Equivalent Continuous Sound Level ( $L_{eq}$ ) are measured at available site of the Project area.

#### Sound Pressure Level

Sample Sites	Leq in dBA			Lmax in dBA		
	Day	Night	Total	Day	Night	Total
Project site	38	45	42	25	30	27



**Equivalent continuous sound level (Leq) in sample site**

Equivalent continuous sound level (Leq), the constant noise level that would result in the same total sound intensity being produced over a given period, in day is 38 dBA and that in night is 45 dBA. All values are not increased that the position of observation should be taken into account.

**Maximum sound pressure level (Lmax) in sample site**

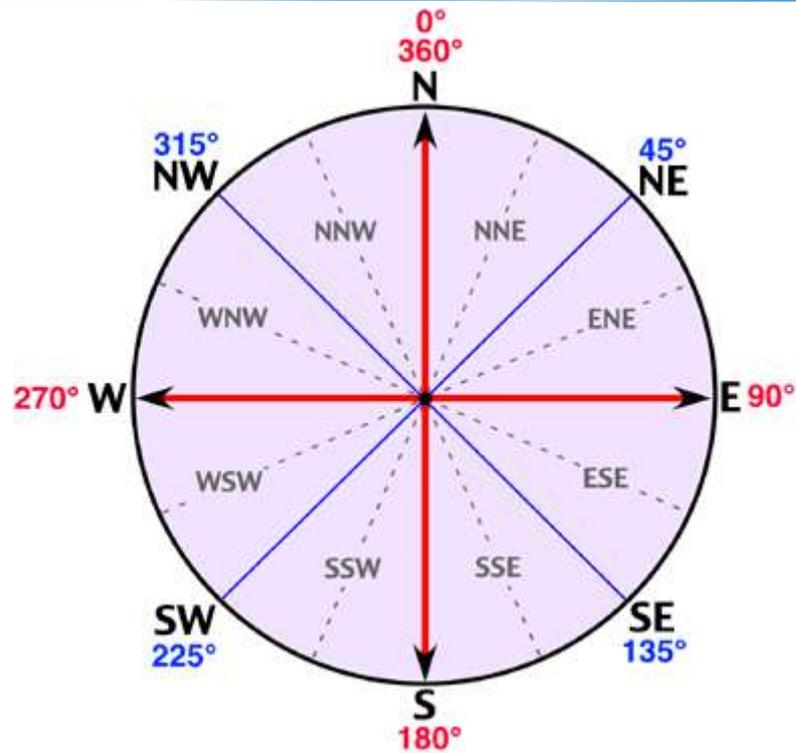
Maximum sound pressure level (Lmax), square root of mean of the square of the measurement values (RMS) in day is 25 dBA and at night is 30 dBA. All values are not increased at the position of observation should be taken into account.

**24 hours (1 hour average noise level (Leq in dBA) and (Lmax in dBA)**



**Wind direction and wind speed (24 hours)**

Time and Date to Start	WDir Derg.	WSpM kph
25.4.2017 (9:00 am) to 26.4.2017 (8:00am)	288	0.3



### 7.10 Water Quality Data Collection



Location of water quality samples collecting points

#### Water Sample Locations

Sample point	Latitude	Longitude
SW 1	N 17° 8' 36.27"	E 96° 9' 36.46"
SW 2	N 17° 8' 22.00"	E 96° 9' 39.28"
WW 2	N 17° 8' 19.28"	E 96° 9' 23.36"

**Water Quality Survey method**

Physical data collection team collected one waste water/ drain water sample from the existing front drain of proposed project site, and two surface water were collected from the ponds of inside Nyaung Hnitpin compound. The samples were collected with specially treated bottles by sampling officer of Occupational and Environmental Health Department.

Water samples were analyzed at the Occupational and Environment Health Department Laboratory by using spectrophotometer, atomic absorption spectrophotometer (Graphite furnace method), pH meter with waste-water analysis standard method and POTATEST incubation method.

**WATER SAMPLE COLLECTING**

**Water samples collecting**

	
<p>Water sample collected from drain at the front of Nyaung Hnitpin Compound.</p>	<p>Water sample collected from drain at the front of Nyaung Hnitpin Compound.</p>
	
<p>Water sample collected from pond at project site</p>	<p>Water sample collected from pond at project site</p>
	
<p>Water sample collected from pond at project site</p>	<p>Water sample collected from pond at project site</p>

## Summary of Waste Water &amp; Surface Water Laboratory Results

Analyte	Ref: Value	Unit	Results		
			Waste Water I	Surface Water I	Surface Water II
Turbidity	5-15	NTU	1	1	0.1
Nitrate	10	ppm	0	0	0
Chloride	1000	ppm	1.5	1.6	1.1
pH	5.5 – 9		7.1	7.3	6.5
Sulphate	1000	ppm	12	12	7
Total Dissolved Solid	2000	ppm	20	10	20
Chlorine	1.5	ppm	0.08	0.12	0.05
Electro conductivity	1500	µmhos/cm	70	10	10
Fluoride	1.5	ppm	0	0	0
Hardness	500	ppm as CaCO <sub>3</sub>	20	25	22
Color	15	TCU	10	10	5
COD	200	ppm	30	42	18.0
BOD	20 – 60	mg O <sub>2</sub> /L	40.5	40.0	22.4
Oil and Grease	10	ppm	13.20	3.20	5.2
Arsenic	50	ppb	0.000	0.000	0.000
Beryllium	0.012	ppm	0.018	0.088	0.018
Calcium	200	ppm	3.406	2.003	2.901
Cadmium	0.003	ppm	0.003	0.005	0.008
Cobalt	0.001 – 0.002	ppm	0.000	0.000	0.000
Chromium	0.05	ppm	0.000	0.000	0.000
Copper	2	ppm	0.000	0.000	0.000
Iron	1	ppm	0.000	0.000	0.000
Lithium	0	ppm	0.005	0.005	0.004
Magnesium	150	ppm	1.840	1.857	2.436
Manganese	0.4	ppm	0.000	0.000	0.000
Molybdenum	0.07	ppm	0.000	0.000	0.000
Nickel	3	ppm	0.000	0.000	0.000
Lead	10	ppb	0.000	0.000	0.000
Antimony	0.02	ppm	0.000	0.014	0.022
Selenium	0.04	ppm	0.084	0.084	0.029
Strontium	0.5 – 1.5	ppm	1.640	1.453	0.55
Titanium	0	ppm	0.024	0.044	0.025
Vanadium	0.0012 – 0.001	ppm	0.000	0.000	0.000
Thallium	0.001	ppm	0.000	0.000	0.000
Zinc	3	ppm	0.000	0.000	0.000
Mercury	0.001	ppm	0.00	0.00	0.00

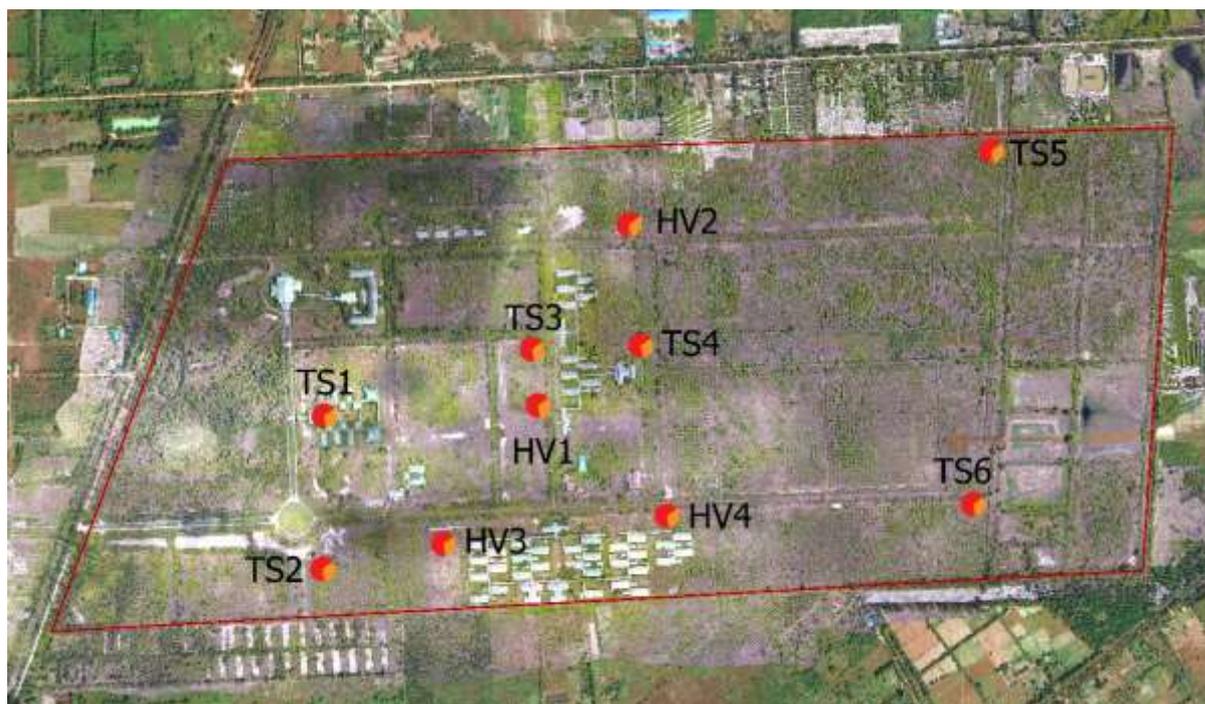
## 7.11 Soil Samples Collection

### Soil survey methods

The soil survey was conducted by using the Russian soil scientist soil analysis method and FAO/UNESCO method.

When soil survey was conducted physical properties of soil such as soil colour, texture, structure, moisture, hardness, drainage, inclusion and new formation were recorded and the soil name was given by using Hussian soil classification, FAO soil classification method.

When classified the soil types, soil horizontal characteristics were based and identified the soil type. Soil properties are formed according to the soil forming process and it is not possible to give nomenclature on the base of site seeing different norms of the soil characteristics. It needs thousands of million years to form one inch cubic of soil but soil can be easily deteriorated in a few years due to improper use of the land and soil.



### Top soil sample locations (Nutrient)

Sample point	Soil Depth	Layer	Location	
			Latitude	Longitude
TS -1	0 "-8"	A/P	17° 8'25.70"N	96° 9'40.70"E
	8" -20"	A/B		
TS -2	0 "-8"	A/P	17° 8'14.90"N	96° 9'39.80"E
	8" -22"	A/B		
TS -3	0 "-10"	A/P	17° 8'31.10"N	96° 9'56.90"E
	10" -18"	A/B		
TS-4	0 "-10"	A/P	17° 8'30.20"N	96°10'5.50"E
	10" -25"	A/B		
TS-5	0 "-10"	A/P	17° 8'45.60"N	96°10'32.70"E
	10" -20"	A/B		
TS-6	0 "-10"	A/P	17° 8'19.60"N	96°10'30.20"E
	10" -20"	A/B		

**Heavy Metal soil sample location**

Sample point	Soil Depth	Layer	Location	
			Latitude	Longitude
HV -1	0 " - 10"	A/P	17° 8'25.97"N	96° 9'57.38"E
	10" -22"	A/B		
HV -2	0 "-10"	A/P	17° 8'38.10"N	96°10'4.20"E
	10" -23"	A/B		
HV -3	0 "-10"	A/P	17° 8'17.60"N	96° 9'50.70"E
	18" -20"	A/B		
	30 " -35"	B		
HV-4	0 "-10"	A/P	17° 8'18.87"N	96°10'7.73"E
	10" -25"	A/B		

**Soil survey results**

Soil samples were taken six places of top soil (nutrient) and four places of deep soil (heavy metal) on the project site and, according to the soil survey results, the surveyed soils are light yellow Brown Forest Lateritic at base soils and called as Xanthic Ferralsols according to F.A.O soil classification. The top soils are sandy loam texture. The sub soils about 15 inches depth are 1:1 Kaolinite clay. The third layer soils, about 25" inches depth are clayey and soft lateritic soils and some are red in colour. These soils have rapid water infiltration rate and rain water will be disappeared as soon as after raining. It contains well drainage infiltration rate. It has low soil pH and low cation exchangeable capacity and low in  $Ca^{+2}$ ,  $Mg^{+2}$  and  $K^{+}$ . It has low humus content and reduces in micro nutrient content.

The soils are suitable for orchard and vegetable cultivation and it needs to use compost, organic manure and chemical fertilizers as a balanced fertilization. Split application and foliar fertilizer application are suitable. Broken building and other waste materials should be removed when these soils are used for agriculture because it is a Naung Hnitpin Zone (3) departmental compound.

The soil survey results are expressed as Profile Description, External Features, chemical analysis and water-soluble salts.

<b>Soil Analysis Results</b>	
Soil texture	Silt Loam, Silty Clay Loam
Soil Structure	Crumbly & sub angular blocky
Soil pH	Moderately acid, Near Neutral, Extremely acid, Strongly acid
Nitrogen content ( $N_2$ )	Low, Very Low
Phosphorus content (P)	Low
Potassium content ( $K_2O$ )	Low
Humus	Medium
Organic carbon	Medium
Calcium ( $Ca^{++}$ )	Low
Magnesium ( $Mg^{++}$ )	Low
Potassium ( $K^{+}$ )	Low

Aluminium (Al <sup>+3</sup> )	Not detected
Hydrogen (H <sup>+</sup> )	Low
Sodium (Na <sup>+</sup> )	Low
Cation Exchange capacity (C.E.C)	Low
Electrical conductivity (Ec)	Very Low

Soil Soluble Salts Analysis Results	
Total dissolved solids TDS	Low
Electrical conductivity (Ec)	Very Low
Sodium Adsorption Ratio SAR	Low (Not detected)
Residual Sodium Carbonate RSC	Not detected
pH	Moderately acid, Near Neutral Extremely acid
Dorminate salts	CaCl <sub>2</sub> , Ca (SO <sub>3</sub> ) <sub>2</sub> , NaCl, CaSO <sub>4</sub>

### Heavy Metal Analysis Results

No	Heavy Metal Contaminants	Profile No.1 HV A/P Layer 0-10"		Profile No.2 HV A/P Layer 0-10"		Profile No.3 Layer (B) Layer 30-35"		Profile No.4 HV Layer 0-10"	
		Result (ppm)	Maximum Level (ppm)	Result (ppm)	Maximum Level (ppm)	Result (ppm)	Maximum Level (ppm)	Result (ppm)	Maximum Level (ppm)
1	Nickel (Ni)	ND	35	ND	35	ND	35	ND	35
2	Chromium (Cr)	ND	100	ND	100	ND	100	ND	100
3	Cadmium (Cd)	ND	0.8	ND	0.8	ND	0.8	ND	0.8
4	Lead (Pb)	ND	85	ND	85	ND	85	ND	85
5	Iron (Fe)	894.5	250	950.5	250	939	250	801	250

Soil analytical data of heavy metal analyzed at Pesticide Analytical Laboratory, Plant Protection Division, Department on Agriculture, Ministry of Agriculture, Livestock and Irrigation resulted. Heavy metal of lead, Arsenic and Cadmium are lower than reference value.

Iron (Fe) is 894.5 ppm at Profile No.1 HV A/P Layer 0-10", 950.5 ppm at Profile No.2 HV A/P Layer 0-10", 939 ppm at Profile No.2 HV A/P Layer 30-35" and 801 ppm at Profile No.4 HV A/P Layer 0-10" are higher than maximum permitted level is 250 ppm.

### Analytical data evaluation and recommendation

There is no plant nutrient problem in soil analysis of Naung Hnitpin Zone (3) compound in Hlegu Township Yangon Region. Also soil problems such as saline soil, sodic soil, sodium toxicity, high in calcium and aluminum content etc.

There is no distinct problem in total dissolved salt content in water soluble salts analysis. SAR sodium Absorption Ratio also did not show as a soil problem.

There is no problem in Electrical conductivity and residual sodium carbonate.

Therefore, there is no nutrients problem and soil soluble salts problem in these soils.

### Soil samples collecting



Collecting soil samples



Collecting soil samples



Collecting soil samples



Testing soil Electrical conductivity (Ec)



Testing soil pH level



Comparing soil color

## 7.12 Biological Environment

The biological assessment portion consider the likely ecological issues relating to the Proposed Development. It can be expected that significant effects on habitats and species can arise directly during construction (including demolition) and following the completion of the proposed development.

The project site itself has been the used land for some years in since 1995. However, after 2008, the area was abandoned; so that buildings are left with natural ecological succession of plants and animals in a wilderness terrestrial ecosystem of 600-acre compound, though some connectivity exist with surrounding environment which is basically striving with agricultural

activities of flowers and commercial fruit and vegetable growing practice for almost a decade. Baseline information will be included as part of the assessment.

The secondary information of terrestrial and aquatic fauna, flora and land use would also be recorded, and interviews with local residents are to be made for getting information of the history of the area and presence and absence of flora and fauna in the past and present time.



Figure 7-3: The area of the project where tall trees are scattering, and grasses take place the larger area.



Figure 7-4: Northwestern part of the project is covered by to some extent thick tall trees



Figure 7-5: Tree-lacking area of project site and somewhat larger water bodies existing in the vicinity

A site visits would be made to conduct and observe the currently existing situation of flora, fauna and habitats of project site and its surroundings. Baseline data would be collected with field survey works.

Both terrestrial and aquatic ecosystems would be examined. The majority of habitats on sites are generally considered to be of limited ecological value, comprising of hard standing trees and shrubs. Scrubs, herbs and grasses occurring along with succession through more than a decade of time offer some wildlife value at the site.

Terrestrial flora, fauna and natural habitats will be recorded based on secondary information and direct observation and through examination. The tree, plant, and shrub and species composition of plant and their distribution near the project site will be studied and identified taxonomically.



Figure 7-6: Depression of the land at the nearby area of project site keeps water until summer

Presence of other animals such as snakes, frogs, birds and mammals would be examined. Bird watching would be undertaken to be done in the habitats of the study area to build up a true picture of species-habitat relationship. Distribution and presence of some mammals will be examined by conducting track and sign surveys. Sighting of prey species, tracks, scats, droppings as data gathering in the field. Collection of butterflies will be made along the transect lines to be set up at various habitats in the proposed project area. The specimens are to be photographed.

Although trees, plants, shrubs, and grasses are dominating on the land surface of the project site, some patches of peddles, bogs and drainage channels maintain water providing shelter for aquatic organisms. Some lakes and bogs also provide refuge for fish and some aquatic animals to let them continue year-round living in nearby area including commercial fish farming ponds and natural lakes which can keep water during summer times.

Therefore bogs, paddles, creeks and drainage channels would be observed in and around the project sites as far as 1 km to 3 km radius of the project surrounding whether fishes can live in naturally existing aquatic environment. Fishes would be collected from the small creek and bogs. The presence and absence of other aquatic organisms would be examined from the local inhabitants at the time of baseline study.

Land use pattern would be sort out based on interviews with local residents and drone photographs.

Areas used for livelihood activities (hunting, fishing, grazing, wood gathering, farmland, orchard etc. which may be affected by the project would be identified.

### **Scope of Impact Assessment**

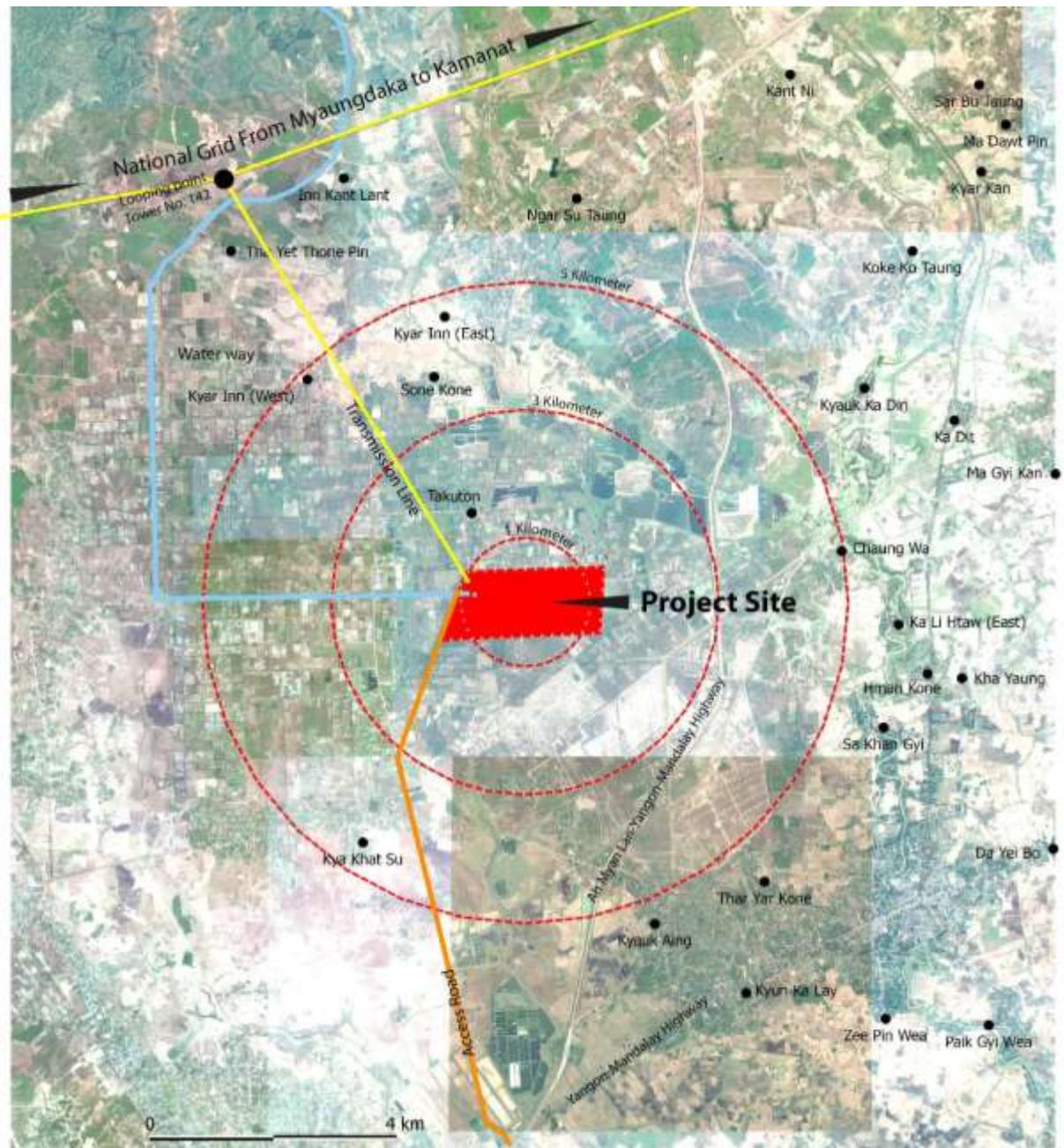
The occurrence of impacts due to the effect of proposed action that may be both beneficial and adverse will be evaluated.

The impact assessment will cover:

- Evaluation of identified important features: faunal species, habitats and vegetation;
- Description and evaluation of the magnitude and significance of the potential effects of the proposed development on species, habitats and vegetation;
- Detail species-specific assessment;
- Mitigation and enhancement measures to address the identified effects and identification of any residual effects following mitigation;
- Cumulative assessment; and
- A description and evaluation of residual effects of the proposed development

## 7.13 Social Environment

### 7.13.1 Setting the Study Limit



The SIA study survey process comprised three parts:

1. Public consultation and disclosure;
2. Preliminary social baseline and
3. Social Impact Assessment

Early consultation with all interested parties is an essential part of study.

The approach was to focus on:

- Key stakeholder interviews in 6 villages located in 5 km radius from the project site. Village heads, village administrative officials, religious leaders, local business community, school teachers, health workers, local stores and others in villages were interviewed.
- Village profiles of 6 villages have been established.

- Directly and indirectly affected PAPs in communities, households, and individuals who live in close proximity to the proposed project site as well as officials from three agricultural and animal breeding zones and village administrations of the Naung Hnitpin area were invited to participate in the Public Consultation meeting which is planned be held at Zone no. 2.

### 7.13.2 Summary of Tagukone Village Profile

Sr	Title	Description
1	Village Name	Tatutone
2	Number of Households	120
3	Population	570
4	Education	1 middle school
5	Health	Midwife 1
6	Economy/Business	Small shop 8 Light Truck 2 Motorcycle (motorcycle taxi) 20 Agriculture: Livestock: Fish, Chicken, Pig
7	Transport	Light Truck 2 Three wheeler 1 Motorcycle 40
8	Communication	Mobile Phone MPT, MEC, Ooredoo 250, TV 60, Radio 5
9	Social	Monastery 1
10	Other	Electricity <ul style="list-style-type: none"> <li>• 84 households with electricity from EPC with</li> <li>• 36 households without electricity from EPC</li> </ul> Water <ul style="list-style-type: none"> <li>• Tube well 10,</li> <li>• Hand-dug well 70</li> </ul>
11	Religion	Buddhists



Figure 7-7: Village profile data were collected and reached out to poultry keeping site in Nyaung Hnitpin Village

### **7.13.3 Key Points raised by local communities living around the project site**

1. An agricultural zone has been established around the project site. Each individual owner was offered 5 acres of land per unit so as to grow vegetables and seasonal plants.
2. Perennial trees are, however, grown in some yards. The farm-yard owners are worried that the forest fire may spread to their farm-yards if it breaks out in the Nyaung Hnitpin project complex area.
3. Some of the fields cultivated with crops have the water supply through irrigational channels while most of the cultivators rely on artesian/tube wells.
4. People from 6 villages in the immediate vicinity of the project area warmly welcome current investors. They hope there will be more employment opportunities and road transport and socio-economic conditions will be significantly improved only if the factories emerge.
5. Health, economic and educational situations have a lot of difficulties due to the extremely ruined roads that link the area with the nearby villages.
6. As there is a rural dispensary in only one village, the locals are facing with difficulties in seeking health services. As the roads are getting worse in monsoon, the nurses find it difficult to go from one place to another.
7. The Agricultural and Livestock Breeding Zone No 2 is the flood-prone area because it is close to the Takutone Inn (fishery) and lies on the low-land. In this area, business people buy land, dig fish-breeding ponds and breed fish. Digging ponds causes diversion of the natural flow of water and slowdown of water flow, leading to flooding.
8. Another flood-prone area is Takutone Village, adjacent to Nyaung Hnitpin and the Agricultural and Livestock Breeding Zone No 2 and it is also located in the low-lying part of the land. Takutone Inn (fishery) is next to Takutone Village. If the Agricultural and Livestock Breeding Zone 2 is flooded, so is Takutone Village. The floods never reached this village in the past. Flooding began to occur in this village after formation of zones in 2000

### 7.13.4 Location of respondent (Villager)

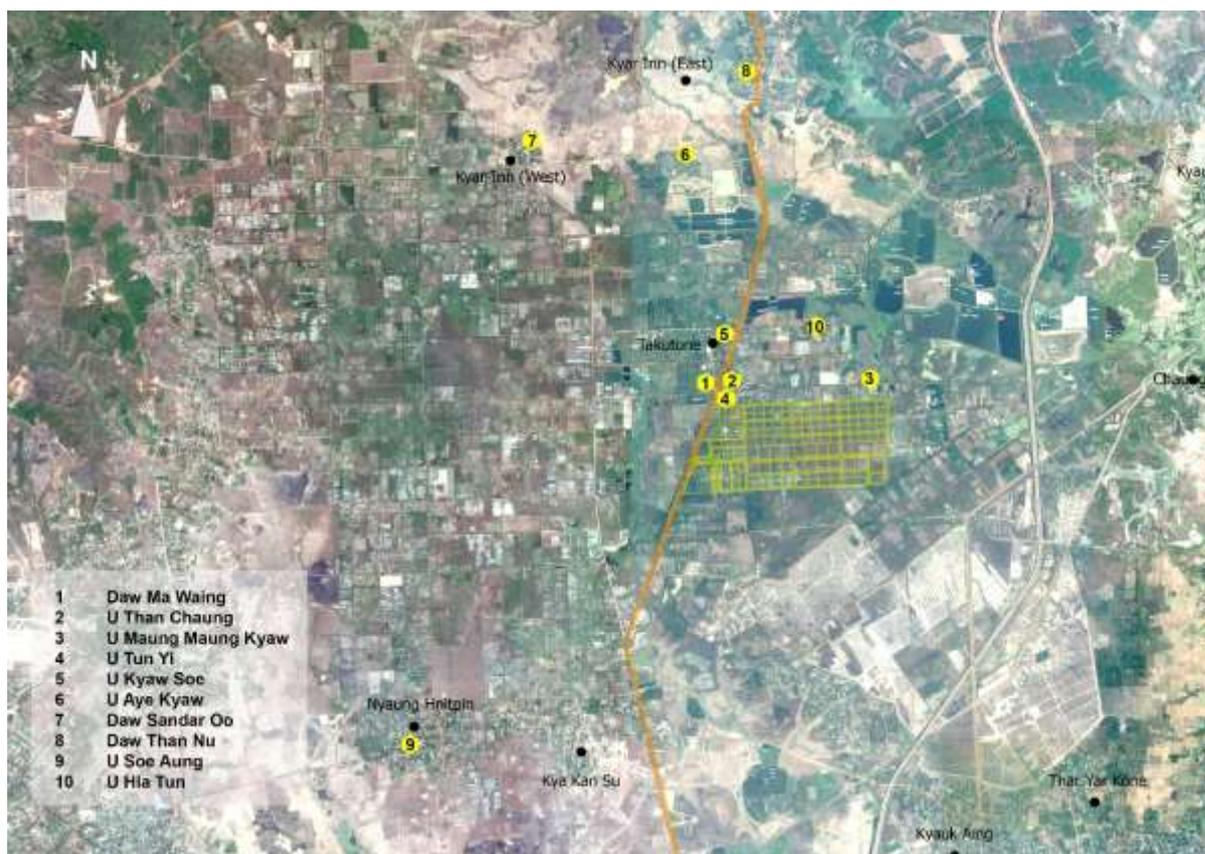


Figure 7-8: Location map of respondents

### 7.13.5 Interviews with Villagers

<b>1</b>	<b>Name:</b>	<b>Daw Ma Waing</b>	
	Age:	35	
	Address:	Livestock Breeding Zone. (2), Agriculture and Livestock Breeding Zone, Nyaung Hnitpin, Hlegu Township	
	Occupation:	Grocer	
	Rank:	Shopkeeper	
	Tel:	09 976 308000	
	<p>I haven't known that an industrial zone is to be established in the immediate vicinity. This is Nyaung Hnitpin Agriculture and Livestock Breeding Zone 2. People from here have to go to work at Hmawbi Industrial Zone (Sanchaungpauk). I have been living here for over 10 years. There is a steel factory in the neighbourhood. Some of the people have to go to work at Shwepyitha Industrial Zone. We have only a primary school. The middle school students from here have to attend the middle school in Nyaung Hnitpin Village. We have to go to the Rural Healthcare Centre in Ngazutaung Village. Our village products are vegetables and fruits. We are happy if an industrial zone emerges near our village. We agree with it. We also hope that we will have better roads and bridges with the emergence of the industrial zone. It will also be a job creation for the people in this area. The nearest villages to the Nyaung Hnitpin Zone are Takontone, Photanagone, Kyau Inn, Hsawgone, Thayekyun, and Nyaung Hnitpin Villages. I feel joyous because my grocery will sell better if the industrial zone comes into existence.</p>		

<b>2</b>	<b>Name:</b>	<b>U Than Chaung</b>	
	Age:	65	
	Address:	No 3, Agriculture and Livestock Breeding Zone, Nyaung Hnitpin , Hlegu Township	
	Occupation:	Security for the zone	
	Rank:	Gate-keeper	
	Tel:	09 9729 70250	
<p>I haven't known that an industrial zone will be built in Nyaung Hnitpin . The zonal chairman U Maung Maung Kyaw has once told me about that project. He is the chairman of the Agriculture and Livestock Breeding Zone 3. He is doing agricultural business. I have to collect tax from the cars passing the gate and check them for security. This road is built by the entrepreneurs living on this road after raising funds. Some of my children are in Hlegu. Some are in the armed forces. There is one teacher. Both my wife and myself—only two of us—are here. I hope the locals will have job opportunities if an industrial zone is built here. We are hoping that certain roads will be improved thens. For these reasons, I agree with the construction of the industrial zone.</p>			

<b>3</b>	<b>Name:</b>	<b>U Maung Maung Kyaw</b>	
	Age:	53	
	Address:	No 3 Industrial Zone Road, Agriculture and Livestock Breeding Zone 3, Nyaung Hnitpin , Hlegu Township	
	Occupation:	Agriculture and Livestock Breeding	
	Rank:	Chairman, Zone 3, Agriculture and Livestock Breeding Zone	
	Tel:	09 4500 29805	
<p>I have already known that an industrial zone is to be established in Nyaung Hnitpin . I have been informed that a team from Korea will come and meet me. They will come and discuss the construction of an industrial zone. If MSR Team conducts EIA/SIA assessment, it is very suitable to do that. We are ready to give you necessary help regarding the EIA/SIA assessment. What I specifically desire is the development of this area. It is not for individual purpose but for the purpose of supporting the socio-economic development of our region and our people. If you want to hold a public consultation meeting, I will invite people, provide a venue and help your discussion to be successful.</p>			

<b>4</b>	<b>Name:</b>	<b>U Tun Yi</b>	
	Age:	56	
	Address:	Farm No. 1, 2, Agriculture and Livestock Land (3), Nyaung Hnitpin , Hlegu Township	
	Occupation:	Rubber Seedlings and Fruit Plants Agricultural Farm	
	Rank:	Farm-worker	

Tel:	09 7674 33487
<p>I have lived on this farm as a farm-worker for 4 years. There are one manager and 4 farm-workers working on this farm. My birth-place is Labutta. I stay here alone. There are two other men living with their families. The children from here go to the Primary School in Tagukone by bicycle. The children of the manager go to attend school in Hlegu in their car. My salary is 120,000 kyats. The proceeds from the sales of farm-crops and rubber seedlings have to be given to the owner through the manager. Drinking water, water for domestic use and agriculture are obtained from the hand scooped well by pumping up. If the family members are not well, they have to go to the clinic in Ngasutaung Village by hired motorcycle. The motorcycle fee is 3,000 kyats for round trip. We find it difficult to travel during the monsoon because of the ruined roads. If this new industrial zone emerges, it is good to have job-opportunities. I think the socio-economic status will be higher as the locals and their children will get jobs. I don't think the establishment of industrial zone will not have bad impacts on us. If there are favourable job creations, locals will come and join it. As the wells dry up in summer, the water is pumped up from the drains to be used during the months between April and June, the hot months. The water fetched from the wells is used for drinking and for domestic use.</p>	

<b>5</b>	<b>Name:</b>	<b>U Kyaw Naing</b>	
	Age:	39	
	Address:	Farm No. 1, 2, Agriculture and Livestock Zone (3), Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Rubber Seedlings and Fruits & Crops Agricultural Farm	
	Rank:	Manager	
	Tel:	09 7746 00086, 09 4546 00086	
<p>I have worked on this farm for 5 years. I'm a staff-member of the Inter-Myanmar Pacific Co., Ltd. (IMP). The farm block numbers 1, 2, 6, and 8 belong to this company. The owner of this farmyard is Retired Major General Khin Maung Than. My salary is Ks. 300,000. I was once a staff member of the Agriculture Department. Water is available from tube wells that can be dug here. If a 4-inch-diameter well is dug, the water is found at a depth of 100 feet. But the water at this depth can be used only for agriculture. We cannot drink it because it contains too much iron. The water fit for drinking is found at a depth of 300 feet. The hand-dug well we are now using is dug up to 8 to 10 feet deep. It is dug at a location 50 feet deep from the ditch of the Irrigation Department. When the irrigational canal has no water, the water in the wells dries up. U Maung Maung Kyaw, No 3 Zone Chairman and Yangon Region Chief Minister U Phyo Min Thein have once said an industrial zone will be constructed in the compound of the past Nyaung Hnitpin National Convention venue. If an industrial zone comes into existence, we will have employment opportunities and road links. I don't anticipate any negative impact. As the roads are bad, students and those who have to go to the health care centre are faced with difficulties. The roads become worse during monsoon. If the CSO (corporate social responsibilities) is to be provided, we expect that certain portion is spent on improving roads. We also need a clinic. It will be appropriate if the company making investment does it. I tried to enroll my children at the Nyaung Hnitpin High School. But as there are not enough rooms for incoming students there, I sent my children to a Hlegu private High School. There is Ngasutaung High School, but it is very far and the roads have been ruined. We have to go to the Tagukone monastery for religious activities. We have no graveyard for the funeral rites such as cremation and burial. We go to the Tagukone village for such affairs. There are 120 households, with a population of 600, in No. 3 of Agriculture and Livestock</p>			

	Zone. On our farm, a male worker earns Ks. 3,500 and a female worker Ks. 3,000 as daily wages. The general prevailing daily wage for a worker Ks. 6,000.
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<b>6</b>	<b>Name:</b>	<b>U Aung Myint Thein</b>	
	Age:	52	
	Address:	Farmyard No 16, Land No 3 of Agriculture and Livestock, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Agriculturist	
	Tel:	09 7672 93779	
	<p>Vegetables are grown on this farm. I have worked on a leased land for about 2 years. My birthplace is Letpadan Township. I have four family members including a son and a daughter. If there emerges an industrial zone, the locals including my children will have jobs. I've already heard of building an industrial zone that will bring benefits for us. Currently, people find it difficult to go to school or clinic. If one goes to Main Road No 3 or Highway Road by motorcycle, we have to pay a round-trip fee of Ks. 3,000. The road is good there. It is not convenient to use the road to Tagukone, Ngasutaung and Nyaung Hnitpin villages because it is not in good condition. I have to pay Ks. 50,000 per acre per year to lease this 5-acre farm. If I hire a worker from outside, a worker (male) is to be paid Ks. 5,000 a day and a worker (female) is paid Ks. 4,000 a day respectively. I have no idea whether what would be the impact of the industrial zone.</p>		

<b>7</b>	<b>Name:</b>	<b>U Kyaw Swa</b>	
	Age:	36	
	Address:	Farmyard No. 5, Land No. 3 of Agriculture and Livestock, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Agriculturist (Private)	
	Tel:	09 4202 01041	
	<p>I came to this farmyard before 2008. I've known that it is owned by Major General San Sint (Retd.). I haven't known that an industrial zone will be constructed in the complex of Nyaung Hnitpin National Convention. I grow mint and other varieties of flower plants which are sold at Htaukkyant Market. Regarding education, people from this area go to attend the Nyaung Hnitpin High School. We go to the government clinics and private health care centres for medical treatment. It is inconvenient for us to use those ruined roads leading to those places. The situation becomes worse in monsoon. They can be used in summer, though. We hope we will have employment opportunities if there emerges an industrial zone in the vicinity. It will be better if the factories and companies that can export the products from Agriculture and Livestock zone will be included in that zone. The agriculture and livestock zone has no cemetery. We have to use the Tagukone graveyard for our funeral rites. We have many difficulties because we have to wade through the water about 2 feet deep during monsoon. The locals here need good roads that can be used in all seasons. Good roads will give us convenient access to deal with the affairs of education, health, society and religion. There are no longer wild animals such as barking deer, samburs, boars, etc. which used to be there. But there are still many species of snakes and birds. The construction of an industrial may have either good or bad impacts on us. We are worried to evacuate from our land as a bad impact.</p>		

8		<b>Name:</b>	<b>U Toe Hlaing</b>
		Age:	39
		Address:	Farmyard No. 3 and 4, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Agriculture
		Rank:	Farmyard Watchman
		Tel:	—
<p>I have 5 family members, including 3 children. I have been working in this farmyard for about 6 years. I grow vegetables and seasonal fruit trees and earn my living by selling them. I use a hand scooped well for the water required for agriculture. That well was 8 feet in depth. It provides us with enough water for agriculture as well as for domestic use. I haven't known that an industrial zone will be built in the complex of Nyaung Hnitpin National Convention. I believe it will bring benefits to our locals and our own children—getting jobs at the industrial zone. My children go to attend the primary school in Tagukone village. The high school students have to go to Nyaung Hnitpin High school. If we are sick, we go to a traditional medical practitioner in Tagukone Village. There are government clinics in Nyaung Hnitpin and Kyar Inn Villages. We need a school and a clinic for our agriculture and livestock zone. The plants grown in this farmyard are known as 'Aurisha' which are now about 5 years old each and the circumference of each is about 12 inches. The stem of the plant can be used as posts in building houses. I have no idea whether there will be good or bad impacts. But I hope there will not be bad impacts. We have no serious diseases here such as malaria, cholera, etc. We only have minor illnesses.</p>			

9	<b>Name:</b>	<b>U Naing Win</b>	
	Age:	45	
	Address:	Farmyard No. 9, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman	
	Tel:	09 3131 0234, 09 7999 21540	
<p>I'm a watchman and grow flower plants and trees. I have been doing agriculture for 7 years. I have 6 family members. My children go to Tagukone primary school and Ngasutaung High School. When we are ill, we go to Ngasutaung public health care centre and private clinics. I haven't known that an industrial zone is to be established in the complex of past Nyaung Hnitpin National Convention. Now it has been confirmed as you have just told me about it. The factories that exude odour in the environment should not be included in this new industrial zone. I will not object to this project if there is no factories that release bad smell. We hope we will have good roads if an industrial zone is established. We have to dig tube wells to get water for domestic use and for drinking purposes. Formerly Irrigation Department supplied water and we had to use that water in the drains near our farmyard. Now we get no water from the Irrigation Department and we can only grow Eugenia. We have dug three tube wells in our farmyard. When we went to the Irrigation Department and requested it to supply water, they complied with our request. I haven't got water from there for about 3 years.</p>			

	The most crucial requirement for this locality is water for agriculture and good roads for better transport.
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<b>10</b>	<b>Name:</b>	<b>U Thein Win</b>	
	Age:	57	
	Address:	Farmyard No. 10, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman	
	Tel:	09 4578 32794	
<p>I have worked in this farmyard for 6 years. My birthplace is Kyaiklat. I have five family members including three children. I grow perennial fruit trees such as mango, jackfruit and Eugenia. The owner of this farmyard is Lt. Col San Matu. He gives me Ks 50,000 per month as a watchman. I also grow seasonal plants in some parts here. I have ever heard of establishing a new industrial zone in the complex of Nyaung Hnitpin National Convention. I feel happy to hear that an industrial zone will be constructed because the locals will have jobs. I think the construction of factories will not have bad impacts on us. We find it difficult to deal with health and educational matters because the roads in this area are in bad condition. I want the companies constructing factories to help improve road transport. Currently we get water for drinking as well as for domestic use from the tube well. As the water for agriculture is not available from the irrigated water, it is fetched from the tube well. For this reason, water for agriculture should be provided in all seasons. For the time being, the irrigated water cannot reach the nearby drains starting from January until the end of May and June every year. This has been going on for about 2 or 3 years. I hope the lives of the locals will be much better than the current situation if there emerges an industrial zone.</p>			

<b>11</b>	<b>Name:</b>	<b>U Chit Ko</b>	
	Age:	36	
	Address:	Farmyard No. 11, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman-cum-worker	
	Tel:	09 7984 34654	
<p>I have been working in this farmyard for 4 years. I have 8 family members including 6 children. The owner of the farmyard is U Soe Myint living in Yangon. We grow ram button plants in this farmyard. They have been grown for about 4 years and they are bearing fruits. If they are in 5 year-term, they will bear more fruits. The money earned from selling rambutan fruits is paid to the owner.</p> <p>The owner himself also comes and picks fruits. The farmyard owner gives me Ks 20,000 per month as a watchman's salary. When I work in the farmyard, I get daily wage. A daily-wage earner (male) is given Ks 3,000 a day and a female worker Ks 2,500 a day. My family members work as daily-wage earners. If workers from outside areas are to be hired, a male worker is given Ks 5,000 a day and a female worker, Ks 3000 a day. My children go to attend the post-primary school in Zone 5. If we are sick, we have to go to the midwife in Tagukone Village for medical treatment. If we suffer from serious diseases, we have to go to the Ngasutaung health care centre.</p>			

Sometimes we also need to go to the Hlegu hospital. We find it very difficult to go to Tagukone, Ngasutaung and Nyaung Hnitpin villages for health matters in monsoon because the roads to those villages are bad. For those reasons, the roads leading to those villages should be improved to be able to use conveniently in all seasons. As the irrigated water does not reach our farmyard, we dug a hand scooped well to get water for agriculture, for drinking and for domestic use. The well is about 15 feet deep. If the irrigated water is available all the year round, it will be more convenient. We want the irrigated water to be supplied to reach our farmyard. I am happy to hear that an industrial zone will be built in the complex of Nyaung Hnitpin National Convention. I feel happier because people from nearby places will get jobs at the factories. I don't think that construction of factories will have bad impacts on the locality. I hope it will be a good impact on us.

<b>12</b>	<b>Name:</b>	<b>U Htay Win</b>	
	Age:	43	
	Address:	Farmyard No. 15, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman-cum-worker	
	Tel:	09 7736 87948	
	<p>I have worked in this farmyard for 5 years. The owner is Daw Hteik Hteik living in Yangon. The main plants grown in the farmyard are Eugenia trees. They are ordinary. We did not grow ASEAN Eugenia. As the plenty of water is not available, we grow only ordinary Eugenia. We use water the tube well we dug. The irrigated water is available only in monsoon. It hasn't reached here in summer for 3 years. My wife and I myself live here. So there are 2 family members. If we are ill. We go to the Ngasutaung Health Care Centre for medical treatment. I think it is better if an industrial zone emerges in the vicinity. I feel happy because I hope that the locals will get jobs in that zone. I want to object to building factories that exude stink smells. We feel very inconvenient in the Agriculture and Livestock Zone 3 as the smells from the poultry farm and the cowsheds are awful. It is worse in monsoon. We are worried about those awful smells that will cause ill-health. We are worried about those bad smells that will cause ill-health. For those reasons, only the factories that do not pour out bad smell should be built.</p>		

<b>13</b>	<b>Name:</b>	<b>U Kyaw Thu</b>	
	Age:	33	
	Address:	Farmyard No. 18, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman-cum-worker	
	Tel:	09 7882 41569	
	<p>I have worked in this farmyard for 2 years. Formerly I lived in my father's farmyard. There are 6 family members including children. My children are in 6<sup>th</sup> grade, attending the post-primary school in Agriculture and Livestock Zone 3. Next year, they will be in the 7<sup>th</sup> grade and will have to attend the Nyaung Hnitpin High School. When we are ill, we go to Ngasutaung for medical treatment. In the rainy season, the muddy tracks make it difficult to go there. In summer, the ground tracks are so dusty that we are</p>		

worried about the dust that may cause harm to our health. We need good roads to Ngasutaung and Nyaung Hnitpin villages and they must be useful in all seasons. We grow perennial trees in our farmyard such as eaglewood, mango and jackfruit. The owner himself comes and picks the fruits. The owner is Police Colonel U Aung Naing (Retired). We grow vegetables in monsoon and in winter. We do it in accordance with the permission of the owner. We grow vegetables and sell them without the need to pay the owner. If there emerges a new industrial zone in the complex of Nyaung Hnitpin National Convention, the locals and the people from the nearby area will get jobs. So I am happy about it. I am worried about the roads that may become worse if there is the traffic of heavy trucks in and out of the construction sites. I have no idea whether there will be other bad impacts. I have heard that an industrial zone will be constructed in the complex of Nyaung Hnitpin National Convention since last year. I haven't got any information this year.

<b>14</b>		<b>Name:</b>	<b>U Saw Le Pin</b>
		Age:	46
		Address:	Farmyard No. 18, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Agriculture
		Rank:	Farmyard Watchman-cum-worker
		Tel:	09 4517 42451

I have been working in this farmyard for 4 years. My birthplace is Labutta. There are 5 family members including 3 children. Two of them, still single are working in this farmyard. The youngest child is attending the post-primary school in the Agriculture and Livestock Zone. I am given Ks 100,000 per month as a salary for a watchman. My two sons earn Ks 70,000 per month each. We grow jackfruit and mango. We fetch water from the pond which is in our farmyard. Water is available from there until the monsoon. The pond is one acre wide. We haven't got irrigated water for a long time. If we are ill, we go to the private clinic and the State Health Care Centre in Ngasutaung Village for medical treatment. We have no serious diseases in this area such as malaria, cholera, TB, etc. We only suffer from minor ailments. Our area will be more developed if an industrial zone is established. The area has forests and farms overgrown with bushes in close proximity to our farmyard. I am worried that the fire may break out. If the industrial zone is constructed, the bushes will be cleared and the area will be safe from fire.

<b>15</b>	<b>Name:</b>	<b>U Kyaw Htwe</b>	
	Age:	53	
	Address:	Farmyard No. 14, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Farmyard Watchman-cum-worker	
	Tel:	09 7829 91739	

I have lived in this farmyard for over 1 year. We grow perennial trees in this farmyard such as mango, jackfruit and Eugenia. We have a hand-dug well so as to get water for agriculture, for domestic use and for drinking. It has been dug to a depth of 20 feet. I have 4 family members including myself. If we are ill, we have to go far for medical treatment. A motorcycle that takes us to No 3 Highway Road asks Ks 3000 for a round trip. I hope there will be a good impact on the locals as they will get jobs if an industrial

	zone emerges in the complex of Nyaung Hnitpin National Convention. I don't think there will be bad impacts. If the water and electric power are available, the living standards of the locals will surely be improved.
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<b>16</b>		<b>Name:</b>	<b>Daw Su Su Naing</b>
		<b>Age:</b>	37
		<b>Address:</b>	Farmyard No. 13, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		<b>Occupation:</b>	Agriculture
		<b>Rank:</b>	Wife of Watchman-cum-worker
		<b>Tel:</b>	09 3169 5568
	<p>I have lived in this farmyard for over 2 years. There are 3 members in my family including a parent-in-law. We grow jackfruit, Ngamauk, pine-apple and mango. We use both a hand-dug well and a tube well for water. The hand-dug well gets dry in summer. The owner gives me a salary for watching his farmyard. The money obtained from selling crops and fruits has to pay to the owner. If we are ill, we go to Tagukone Village for medical treatment. We go there by bicycle. It is inconvenient to go there in monsoon because of the damaged roads. I feel happy to hear that an industrial zone is to be constructed in the complex where the National Convention was held and people may get jobs. This place and its environs will be developed as a whole I have no idea whether there will be bad impacts.</p>		

<b>17</b>		<b>Name:</b>	<b>U Min Lwin</b>
		<b>Age:</b>	44
		<b>Address:</b>	Farmyard No. 12, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		<b>Occupation:</b>	Agriculture
		<b>Rank:</b>	Watchman-cum-worker
		<b>Tel:</b>	09 9655 33752
	<p>I have been working in this farmyard for about 7 years. My birthplace is Yangon. The owner of this farmyard is U Tin Maung Win. We have dug a tube well to get water for agriculture. As the irrigated water is not available, we had to dig it. If we are not well, we go to Ngasutaung Health Care Centre for medical treatment. We are faced with difficulties to use the damaged roads to go there especially at night and in monsoon. If the roads are good, we will be convenient. If an industrial zone springs up in the complex of Nyaung Hnitpin Conference, the locals here and people in the vicinity of this place will be sure to get jobs. It can be said that there will be a good impact. I have no idea about any bad impacts.</p>		

<b>18</b>		<b>Name:</b>	<b>Ko Ye Paing</b>
		Age:	20
		Address:	Farmyard No. 7, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Agriculture
		Rank:	Watchman-cum-worker
		Tel:	09 7916 20343
<p>I have been working in this farmyard for about 7 years. I live with my parents. There are other members in my family. I grow perennial trees and seasonal vegetables. Perennial trees we grow are mango and jackfruit and seasonal vegetables are aubergine and some flower beds. The crops and flowers are sent to Htaukkyant and Danyingone market. We get water for agriculture from a tube well. The irrigated water is not available. I haven't known that an industrial zone is to be established in the complex of Nyaung Hnitpin National Convention. I know it now. We hope to get jobs thanks to the emergence of factories. if we are given jobs, we want to work there. I have no idea that the construction of factories may have bad impacts. Our area will be sure to get developed compared to the present situation.</p>			

<b>19</b>	<b>Name:</b>	<b>Daw Kay Zin Khaing</b>	
	Age:	25	
	Address:	Farmyard No. 171, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural farm	
	Rank:	Wife of watchman	
	Tel:	09 7954 71598	
<p>I have lived in this place for 17 years. Formerly we grew lychee for Ve Ve factory. We no longer grow it. We grow Eugenia, flower plants and aubergine like kitchen garden plants, as irrigated water is not available for the plantations, we have dug tube wells to get water. Once the plantations failed due to the lack of water. Now the tube well we dug is 60 feet in depth. The cost of drilling is over Ks 100,000. It will be more convenient if the irrigated water is available all year round. I have heard that an industrial zone will be established in the complex of Nyaung Hnitpin Conference. I feel happy as I hope the unemployed will get jobs. We need a health care centre in this place. It costs us a lot as we have to go to Hlegu and Yangon for medical treatment. As the agricultural business is not doing well, we need to pay off our debts. To pay off the debts, we have to cut trees into pieces of firewood. I do not anticipate the construction of an industrial zone will have bad impacts on the locals. I have no idea of what sort of bad impacts will have on us.</p>			

<b>20</b>	<b>Name:</b>	<b>Daw Myint Myint Si</b>	
	Age:	50	
	Address:	Farmyard No. 171, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural farm	
	Rank:	Dependent	
	Tel:	09 7829 51288	
<p>There are 6 members in our family. We have leased 5 acres of land for agriculture from the owner of the farmyard. We grow flowers, gourd, Eugenia, jackfruit and guava. For leasing the land, we have to pay Ks 100,000 annually. Our children at the school going age attend the post-primary school on Zone 3. If we feel ill, we have to go to Yangon for medical treatment. We dug a tube well that gives us the chance of growing plants. We get water for drinking and for domestic use. If there emerge factories in the complex of Nyaung Hnitpin National Convention, we are happy as we will get jobs, although we are relatively old, we need jobs. We do not object to the construction of an industrial zone as it will bring us benefits, we welcome it. But if the owners and workers are from abroad, we do not welcome it. I have no idea how it will have bad impacts on us. We hope our lives will improve compared to the current situation.</p>			

<b>21</b>	<b>Name:</b>	<b>Ko Myint Naing</b>	
	Age:	31	
	Address:	Farmyard No. 171, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural farm	
	Rank:	Agriculturist	
	Tel:	09 7964 37830	
<p>I have already leased 10 acres of land for agriculture. I grow sugarcane, cucumber, gourd and flowers. Land lease costs me Ks 200,000 per year. I have 5 family members. My children attend Agriculture and Livestock Zone 3 School. We go to Hlegu for medical treatment. We need a health care centre in this locality. My birthplace is Kyonepyaw Township, Ayeyarwady Region. Some children who have no birth certificates cannot attend school. We feel happy to hear that an industrial zone will be established in the complex of Nyaung Hnitpin National Convention. We want to get jobs at factories when they are established. So I do not object to it. I hope the locals and their whole environment will be changed and developed. It will be better than the current situation. I hope there will not be bad impacts on men and their environment.</p>			

<b>22</b>	<b>Name:</b>	<b>U Htay Kyaing</b>	
	Age:	45	
	Address:	Farmyard No. 171, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural farm	
	Rank:	Agriculture worker	
	Tel:	09 2545 85780	

I have lived here for 2 years. There are six members in my family. One of my children attends Agricultural and Livestock School and another goes to Tagukone School. If we are ill, we go to the Hlegu hospital for medical treatment. I leased 3 acres of land and have been growing Eugenia and other varieties of flowers. We dug a tube well to get water for drinking, agriculture and domestic use. We are happy to hear the emergence of an industrial zone. We want the factories that export our products to be included. It will bring us another chance of getting jobs. So we can have benefits. We hope there will not be bad impacts. We don't want the factories that exude bad smell. We are worried about that.

<b>23</b>	<b>Name:</b>	<b>Daw Khin Myo Myint</b>	
	Age:	47	
	Address:	Farmyard No. 174, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural farm	
	Rank:	Dependent	
	Tel:	09 7906 87819	
<p>We have been doing agricultural business for 5 years. There are 7 family members in our family. We have leased 5 acres of land. We have to pay Ks 25,000 per acre for leasing land every year. We grew flowers, gourd, lettuce and cucumber. We sell them at Danyingone market. Sometimes people who resell them come and buy them here. Our children attend the post-primary school in Agriculture and Livestock Zone 3. If we are ill, we go to the Hlegu hospital for medical treatment. We find it very difficult to use the road to Hlegu as it is not usable in monsoon. I am happy to know that an industrial zone will spring up in the complex of Nyaung Hnitpin National Convention. I hope this area will develop more than before and our lives will improve. We are worried that the factories that pour out awful smell will be included. We are also worried about losing our shelter if the owners sell their land that we have leased currently. We want the employers who will give us jobs at the factories in the industrial zone and provide shelters for us.</p>			

<b>24</b>	<b>Name:</b>	<b>U Jain</b>	
	Age:	47	
	Address:	Agriculture and Livestock Zone 3 to the south of the complex of National Conference, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Watchman	
	Tel:	09 9761 47765	
<p>I have lived in this farmyard for 4 years. The owner of the farmyard is Daw Hlaing Myo Htet, whom I am familiar with. So I became a watchman. She gives me Ks 70,000 per month for watching the farmyard. We grow cashew, mango, cucumber, lady's fingers, etc. I have the right to sell those fruits and earn the money. There are 4 members in my family. One of my children is attending the Agriculture and Livestock Zone 3 School. If we are ill, we go to Hlegu for medical treatment. I have previously known that an industrial zone is to be established in the complex of Nyaung Hnitpin National Convention. As for me, I'm happy. I think people may get jobs at the factories. The socio-economic lives of the locals may also be improved. We may have a lot to gain</p>			

from the emergence of an industrial zone. I have no idea of what bad impacts there will be. We have dug 3 tube wells to get water for drinking, domestic use and agriculture. Each of them is 75 feet in depth.

<b>25</b>	<b>Name:</b>	<b>Daw Than Sint</b>	
	Age:	62	
	Address:	Agriculture and Livestock Zone 3 to the south of the complex of National Conference, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Dependent	
	Tel:	—	
<p>My birthplace is Hinthada. I have lived in this farmyard for about 14 years. I am a watchman and grow trees and plants to earn my living. There are 3 members in my family. I grow gourd, cucumber, beans and flowers. I cut trees into firewood and sell them. The owner of this farmyard is Colonel Khin Myint. The money earned from growing vegetables is not enough for us to make a living. We have to be frugal. We sometimes suffer from a total loss due to low prices of our agricultural products. Traders from Htaukkyant market come and buy vegetables here. We dug a tube well to get water for drinking, domestic and agricultural use. If there arises an industrial zone, the land prices may go up and the owner may sell his land. The locals are sure to get jobs because of the emergence of an industrial zone. We are deeply worried that we may lose our shelter and our livelihood. As an old person, I have a rare chance to be given a job.</p>			

<b>26</b>	<b>Name:</b>	<b>U Soe Naing</b>	
	Age:	44	
	Address:	Agriculture and Livestock Zone 3 to the south of the complex of National Conference, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Agriculture	
	Rank:	Watchman	
	Tel:	09 4581 15518	
<p>I have worked and lived in this farmyard for over 10 years. My birthplace is Hinthada Township. There are 4 members in my family. We grow such vegetables as cucumber, marrow, gourd and lettuce and flowers. We sell them at Htaukkyant market. If we are ill, we go to the Hlegu hospital for medical treatment. I have already heard that an industrial zone is to be established in the complex of Nyaung Hnitpin National Convention. I welcome it because people will get jobs if there arises an industrial zone. My life has not changed although I have been growing vegetables and flowers. I am worried that we will lose our livelihood and shelter once the industrial complex is established. The prices of the land may go up due to the emergence of an industrial zone. As a consequence, the owner may feel like selling out his land. By then, we are likely to lose our place to live and work to earn a living.</p>			

27		<b>Name:</b>	<b>U Saw Thu Aung</b>
		Age:	54
		Address:	Farmyard to the south of the complex of Conference, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Agriculture, Tetlan Sein Lae Oo Company
		Rank:	Farmyard manager
		Tel:	09 4202 13197
		<p>I have worked in this farmyard for over 10 years. We grow fruit trees such as honey orange, pomelo and Nagamauk in the farmyard. The farmyard is 30 acres in total. I feel happy to know that an industrial zone is to be established in the complex of Nyaung Hnitpin Conference. On the other hand, the area forested and overgrown with weeds in this complex will be cleared and we don't have to be worried about fire anymore. There are 3 members in my family. My child attends the No 3 Agriculture and Livestock Zone School. When we are ill, we go to Ngasutaung Village health care center and Hlegu hospital for medical treatment. I'm sure many locals will get jobs if there arises an industrial zone that will have a good impact on them. Their lives will be improved. We are afraid of the bad smell spread in the air that may have bad impacts on the health of the locals. I am also concerned about polluted water from the industrial zone that may have disastrous impacts on the environment. We also need a good system of discarding the rubbish in dustbins and of sewage disposal. But as this industrial zone project is to be implemented through the G to G agreement, I hope everything will be put in order. There are 2 permanent staff members and 18 daily wage-earners in this farmyard. A man earning a daily wage of Ks 3,000 and a woman Ks 2,500.</p>	

28		<b>Name:</b>	<b>Daw Tin Tin San</b>
		Age:	52
		Address:	The Western part of the complex of Conference, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Agriculture
		Rank:	Dependent
		Tel:	09 4202 13197
<p>I have lived here for 18 years. My husband was a staff member of Telecommunication Department in the complex of Conference. He got retired in 2017. The owner of our farmyard is Colonel Aung San. We live here watching farmyard. There are 6 members in our family. One of our children is now working at Hmawbi Industrial Zone. He goes there by commuter bus. Two students attend Nyaung Hnitpin High School. People face difficulties in going to school or work as the roads are damaged in monsoon. I now come to know that an industrial zone is to be established in the complex of Nyaung Hnitpin National Convention. We are sure the locals will get jobs thanks to the emergence of an industrial zone. I'm hoping that our children will be able to shift their jobs from Hmawbi to this area. I think educational and health sector will be much more improved. We welcome the emergence of an industrial zone. I have no idea of whether the emergence of an industrial zone has the bad impact on us or not.</p>			

<b>29</b>	<b>Name:</b>	<b>Ko Myat Moe Naing</b>	
	Age:	27	
	Address:	Farmyard No. 979, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Video Production Yard	
	Rank:	Watchman and Worker	
	Tel:	09 2520 78027	
<p>I have been a watchman in this farmyard for 5 years. There are 3 members in my family. One of my children will attend the Nyaung Hnitpin High School this year starting from the kindergarten. I worked as a watchman and my wife opens a shop at the corner of the road selling goods. I myself have a motorcycle repair shop. The roads here are so muddy and damaged in the rainy season that we find it very difficult to use them. I hope roads will become much better if there emerges an industrial zone. People in the vicinity will also get jobs. There will be a better road link; health and educational sectors will consequently be improved a lot. I fear that the factories that exude bad smell will harm the health of the locals. The current crucial issues are bad roads and having difficult of access to health facilities. I want the roads to be become all-weather ones. Another requirement is a clinic. I have no objection to the construction of an industrial zone.</p>			

<b>30</b>		<b>Name:</b>	<b>U Kumara</b>
		Age:	31
		Address:	Promotion of Sasana (The Teaching of the Buddha) Ayemyayeithar Pakokku Monastery
		Occupation:	Religion
		Rank:	Assistant Presiding Monk
		Tel:	09 4025 44652
<p>This monastery has been built for 10 years. I have been presiding at this monastery for 4 years. My objective is to launch a school of Buddhist scriptures. But I haven't achieved my objective because Buddhism is not flourishing in this area at the moment. If an industrial zone is established in the complex of Nyaung Hnitpin Conference, the area will be developed and the population will increase. And then the number of monks and novices will increase. There are only 2 novices at the monastery. I'm also worried that the factories which are unbearably noisy and those which exude awful smell may be included in the establishment of the industrial zone. In monsoon, the roads are so damaged that we find it difficult to go on an alms-round. I want those roads to be repaired when the industrial zone is constructed. We also need a health care centre. A tube well has been dug to get water for drinking and domestic use at the monastery. The monastic complex is 20 acres in its area. We applied for changing the land type of 5 acres to a religious land and have been given permission. For these reasons I do not object to the establishment of an industrial zone. I welcome it as it will have good impacts on us. Systematic implementation shall not have had impacts.</p>			

31		<b>Name:</b>	<b>U Kyaw Win</b>
		Age:	59
		Address:	The Western part of the complex of Conference, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township
		Occupation:	Cow-Breeding Yard
		Rank:	Manager
		Tel:	09 2502 29043
		<p>I have worked in this cow breeding farm for about 7 years. It is 25 acres in its area. There are 20 workers on this farm. We have about 100 dairy and beef cattle. I have already known about the forthcoming construction of an industrial zone in the complex of Nyaung Hnitpin National Convention. The roads will be better if there emerges an industrial zone. People in close proximity will get jobs. The agricultural farmers in this locality are not doing well. They sometimes suffer from financial losses. Their living conditions haven't been changed for the better. But there should be a systematic management of getting rid of awful smell, disposal of polluted water, rubbish and sewage. I am worried about the environment impacts.</p>	

32	<b>Name:</b>	<b>Ma Thein Htay Oo</b>	
	Age:	32	
	Address:	Universe Farmyard, The western part of the complex of Conference, Agriculture and Livestock Zone 3, Nyaung-Hnitpin Area, Hlegu Township	
	Occupation:	Agricultural Farmyard	
	Rank:	Watchman and Worker	
	Tel:	09 9709 94148	
<p>I have lived in this farmyard for about 4 years. I work here as a watchman and worker. I get a monthly salary of Ks 120,000 as a watchman and worker. We cultivate a nursery of Malaysian padauk. Other trees such as mango, cashew, and guava are grown in the farmyard in Tagukone Village where the manager lives. Our farmyard is 50 acres in total. The owner of the farmyard is Daw Than Than Htay. If we are ill, we go to Ngasutaung rural clinic or Hlegu hospital. I haven't known that factories will be established in the complex of Nyaung Hnitpin Conference. Now I come to know about that and I'm happy. I'm also happy that people will get jobs if the factories are constructed. I also want to work there. There are 4 members in our family. My children are too young to attend schools. I welcome the construction of factories because my family will have more income than the present time of we get jobs at the industrial zone. I have no idea of what bad impacts there will be.</p>			

33	<b>Name:</b>	<b>U Myo Thant</b>	
	Age:	69	
	Address:	Farmyard No. 131, Agriculture and Livestock Zone 3, Nyaung Hnitpin Area, Hlegu Township	
	Occupation:	Survey and Land Records Department	
	Rank:	Head of Township Department (Retired)	
	Tel:	09 9739 93031	
<p>I have lived in this farmyard since 2008. I bought 2.5 acres of land and have been growing seasonal fruit trees. There are 5 members in my family. My children are now</p>			

	<p>government employees. I was formerly the township head of the Land Records Department and I have retired from it. I haven't known that an industrial zone will be established in the complex of Nyaung Hnitpin Conference. I welcome this construction because many people will get jobs if the industrial zone springs up. But the factories to be established should be the ones which do not have negative impacts on the environment. Currently, a chicken farm of Agriculture and Livestock Zone 3 close to our yard has dumped dead chicken and rotten eggs. We are very displeased about it and we don't want factories that will have bad impacts on the environment and that emit bad smell. If there will no negative environmental impact, we don't object to the project. Water supply, electric power and improved roads are required for the present situation to be significantly improved. We only grow seasonal plants and vegetables as much as we can. In the past, we hired many workers but we suffered losses. Since then we haven't hired any worker. We cannot walk along the roads around this area in monsoon as they all are damaged due to the traffic of heavy trucks loaded with tons of goods. In constructing the industrial zone we are worried that roads will be more damaged if they don't follow relevant rules and regulations. The builders of the industrial zone should systematically implement the project. And once the industrial complex is established, it should properly be maintained.</p>
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5	Name:	U Kyaw Soe	
	Age:	40	
	Address:	Takutone Village, Hlegu Township	
	Occupation:	Head of Hundred Households	
	Tel:	09 2500 41552	

I was born in this village. We had some first-hand experience of flooded fields in our childhood. The water flowed from Takutone Inn (lake) into the Ngamoeyeik Creek. Even though it was flooded, water did not flow into the village. The fields were full of flood waters but it subsided after 2 or 3 days. But later in the present period, when it is flooded, the water reaches the village. It has happened like that for about 4 years. There are floods on village roads and inside the house compounds, rising up to over one feet. Hand-dug wells are deluged. Only after about one week, it subsides. There have been floods due to the entrepreneurs of agricultural and livestock breeding zones who divert the flow of water, blocking or unblocking the drains as they like. The drains they dug are also too narrow.

6	Name:	U Aye Kyaw	
	Age:	40	
	Address:	Hsonkone Village, Hlegu Township	
	Occupation:	Head of Hundred Households	
	Tel:	09 7954 53349	

There were floods when we were young. The fields were full of flood waters and it flowed into the village. I had some experiences of witnessing the water rising right up to about one feet. It subsided after about one week. And then the water ran down into the Zone No. 2 and Zone No.3.

For the time being, there are floods every year. But the water does not flow into the villages as it happened in my childhood. The water does not flow into the village after making embankments on the main roads at the entrance of the village. There have been floods only in the fields. The water normally subsides after about one week.

7	Name:	Daw Sandar Oo	
	Age:	38	
	Address:	Kyarinn Anauk (West) Village, Hlegu Township	
	Occupation:	Head of Hundred Households	
	Tel:	09 7836 19636	

I was born in this village. We experienced flooding in monsoon when we were young, studying in the primary school level. There were floods in the fields and the water reached only up to the fringe of the village. The flood waters in the field subsided after about one week. These days, the flooding becomes normal, damaging the plantations. After the water subsides, plants are grown again. There have been flooding more or less and it happens every year.

8	Name:	Daw Than Nu	
	Age:	52	
	Address:	Kyarinn Ashe (East) Village, Hlegu Township	
	Occupation:	Headmistress, Middle School	
	Tel:	09 4201 59596	

I was born in this village. I have never seen floods and inflow of water into the village as far as I remember. But there have been floods since 2015. The water does not flow into the village. I have seen the flood waters running high above the lower parts of the main causeway. It subsided after 7 days. The flood waters flow into the Innkapaw Inn (Fishery) that is situated to the east of Kyarinn Ashe (East) Village. We experience floods about once a year.

9	Name:	U Soe Aung	
	Age:	55	
	Address:	Nyaung Hnitpin Village, Hlegu Township	
	Occupation:	Village-tract Administrator	
	Tel:	09 4304 0242	

I was born in this village. There have never been floods so far since we were very young. Even today there are absolutely no floods. Sometimes some water flows into the field outside our village when it rains heavily. But it rarely happens. Although it is flooded, it subsides immediately. There have been no harm to the economy and no buildings damaged of due to flooding.

10	Name:	U Hla Tun	
	Age:	60	
	Address:	Agricultural and Livestock Breeding Zone No 3. Nyaung Hnitpin Village, Hlegu Township	

I have been living at No 45-46 in the Agricultural and Livestock Breeding Zone No 3 for 23 years. Now, I live in another place. I have been here before the holding of Nyaung Hnitpin Convention and since 1990s. By then there was no agricultural and breeding zone. The Zone emerged later in 2000. There have been no flooding. Even though it is flooded because of heavy rains, it flows out within a few hours. Zone No 3 does not suffer flooding. Zone No 2 usually experience floods. Zone No. 2 is located to the west of the main motor road, at the back of the Convention Complex. I think flooding takes place due to the ponds dug up by businessmen, reinforcing embankments, and blocking the drains.



## 7.14 Overview Village profile

### 7.14.1 Profile of Kyarkansu Village, Nyaunghnapin Village-tract, Hmawbi Township, Yangon Region

Population:		1600
Number of households:		320 households
Number of houses:		300 houses
Nationality:		Myanmar
Religion		Buddhism
<b>Education</b>		
1	High School (Branch):	Nil
2	Number of teachers	Nil
3	Number of students:	Nil
	a	5 <sup>th</sup> grade
	b	4 <sup>th</sup> grade
	c	3 <sup>rd</sup> grade
	d	2 <sup>nd</sup> grade
	e	1 <sup>st</sup> grade
	f	Kindergarten
<b>Health</b>		
1	25-bed hospital:	Nil
2	Village dispensary:	Nil
3	Doctor:	Nil
4	Nurse:	Nil
5	Midwife:	Nil
6	Auxiliary midwife:	Nil
7	Midwife (not scientifically trained)	2
<b>Business</b>		
1	Grocery:	7
2	Car rental service:	4
3	Trishaw:	Nil
4	Agriculture:	Gourd, groundnut, paddy, cucumber, acacia, water cress
5	Fishery (motorboat/schooner):	Nil
6	Livestock breeding:	Pig, chicken
7	Hotel:	Nil
8	Lodge:	Nil
<b>Social activities</b>		
1	Fire-fighting station:	Nil
2	Bank:	Nil
3	Library:	1
4	Recreation centre:	Nil
5	Village market:	Nil
6	Football ground:	Nil
7	Monastery:	3
8	Pagoda:	3
9	Spirit shrine:	1
10	Preschool	1
<b>Security</b>		
1	Police station:	Nil
2	Military unit/post:	Nil
<b>Transportation</b>		
1	Car (private-owned)	Nil

2	Bus	Nil
3	Rental car	3
4	Motorcycle (Passenger transport)	15
5	Motorcycle (private-owned)	150
6	3-wheel motorcycle	Nil
7	Trailer Jeep	5
8	Trishaw	Nil
<b>Telecommunication</b>		
1	Landline phone	Nil
2	Mobile phone	300
3	Television set	150
4	Radio	Nil
<b>General</b>		
1	Households using electricity	180
2	Households not using electricity	120
3	Availability (hand-scooped well)	Nil
4	Tubewell	250

### Overview

	
Village pagoda, Kyarkansu Village	Kyarkansu Village monastery <b>annexe</b>
	
Kyarkansu Village monastery	Kyarkansu Village monastery
	
Spirit Shrine	Library in Kyarkansu Village

<b>1</b>		<b>Name:</b>	<b>U Vicitta</b>
		Age:	56
		Address:	Kyarkansu Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region
		Occupation:	Buddhist Monk
		Rank:	Presiding Monk
		Hand phone:	09 4203 07708
<p>I have been presiding at this village monastery and disseminating the Sasana (the Teachings of the Buddha) for a long time. I have not formerly known about the establishment of an industrial zone in the complex of Nyaung Hnitpin Convention. Although the locals will get jobs due to the emergence of the industrial zone, I am worried that the polluted water and pungent smell the factories produce will have a damaging impact on the natural environment and the men's health. Currently there is an animal feed factory near this village. The pungent smell that this factory produces is giving trouble to the locals. It will cause damage to people later. The workers at the factories should be provided with compensation payment if they are injured. Slaughterhouses should not be included in the plan of factories. The government and those setting up factories must be accountable for the bad impacts on social and natural environment and for the compensation to the workers. If the above-mentioned requirements can be fulfilled, I will not object to the establishment of the industrial zone.</p>			

<b>2</b>	<b>Name:</b>	<b>U Tun Wai</b>	
	Age:	47	
	Address:	Kyarkansu Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region	
	Occupation:	Agricultural Business, member of village administration	
	Rank:	Head of Hundred Households	
	Hand phone:	09 4500 56073	
<p>I was born in this village. There are 6 family members. I run my own agricultural business. I grow paddy, cucumbers, and gourds. I have not known about the establishment of Nyaung Hnitpin industrial zone. I feel happy to know it now. If an industrial zone appears, people in the vicinity will get jobs. The village will be developed and the roads will be greatly improved. I am worried about the pungent smell and the polluted water from the industrial zone. They will do harm to people in nearby areas. I do not have to object to it if it does not do any harm to the people in the environment. It needs to be managed and implemented without any harm to men. I request the project developers and those who will establish the industrial zone to offer us a rural dispensary and a primary school. They should also help improve roads in the village.</p>			

<b>3</b>	<b>Name:</b>	<b>U Kyaw Htwe</b>
	Age:	30
	Address:	Kyarkansu Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region
	Occupation:	Agricultural Business

	Rank:	Head of Ten Households
	Hand phone:	09 4202 72004
<p>I was born in this village. There are 4 family members. I run my own agricultural business. I grow paddy and Kinponchin (species: Concinna). I have not known about the establishment of an industrial zone in the complex of Nyaung Hnitpin Convention. When the industrial zone is completed, people from our village will get jobs. The roads and the living conditions of the people will be greatly improved. But I am anxious that the polluted water and the pungent smell produced by the factories will do harm to the health of the people in the nearby areas. I do not have to object to it if the industrial zone is set up without causing such harm. I welcome it. Those who are establishing the industrial zone should contribute to the development of our village.</p>		

<b>4</b>		<b>Name:</b>	<b>Daw Kyi Than</b>
		Age:	50
		Address:	Kyarkansu Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region
		Occupation:	Agricultural Business, Department of Health
		Rank:	Auxiliary midwife
		Hand phone:	09 4202 52420
<p>I was born in this village. There are 6 family members. My main business is agriculture. I am an auxiliary midwife. I heard about the establishment of an industrial zone in the complex of Nyaung Hnitpin Convention last year. I am not sure which country will come and set it up. If the industrial zone is really established, the locals will get jobs and their social status will be improved. I am anxious that the waste dumped by the factory will have bad impacts on the water and air in our environment. It may also harm the health of people in the nearby area. For these reasons, those who are constructing factories should follow set guidelines to cause minimum negative impacts on the environment and the people. There has been no serious disease in this village. They suffer from normal illnesses. I don't have a record of a child that dies at birth.</p>			

#### 7.14.2 Profile of Nyaung Hnitpin Village, Nyaung Hnitpin Village-tract, Hmawbi Township, Yangon Region

Population:		3126	
Number of households:		655 households	
Number of houses:		640 houses	
Nationality:		Myanmar	
Religion		Buddhism	
<b>Education</b>			
1	High school (Branch):	1	
2	Number of teachers	35	
3	Number of students:	1318	
	a	10 <sup>th</sup> grade	49
	b	9 <sup>th</sup> grade	91

	c	8 <sup>th</sup> grade	137
	d	7 <sup>th</sup> grade	124
	e	6 <sup>th</sup> grade	119
	F	5 <sup>th</sup> grade	171
	G	4 <sup>th</sup> grade	114
	H	3 <sup>rd</sup> grade	130
	I	2 <sup>nd</sup> grade	116
	j	1 <sup>st</sup> grade	130
	k	Kindergarten	137
<b>Health</b>			
1	25-bed hospital:		Nil
2	Village dispensary:		1
3	Doctor:		Nil
4	Nurse:		Nil
5	Midwife:		1
6	Auxiliary midwife:		1
<b>Business</b>			
1	Grocery:		15
2	Car rental service:		33
3	Trishaw:		Nil
4	Agriculture:		Acacia, gway-tauk (bitter leaves), cucumber, gourd, eggplant, mustard, paddy
5	Fishery (motorboat/schooner):		Nil
6	Livestock breeding:		Pig, chicken, quail
7	Hotel:		Nil
8	Lodge:		Nil
<b>Social activities</b>			
1	Fire-fighting station:		Nil
2	Bank:		Nil
3	Library:		1
4	Recreation centre:		Nil
5	Village market:		Nil
6	Football ground:		1
7	Monastery:		1
8	Pagoda:		2
9	Spirit shrine:		1
<b>Security</b>			
1	Police station:		Nil
2	Military unit/post:		Nil
<b>Transportation</b>			
1	Car (private-owned)		1
2	Bus		Nil
3	Rental car(Light Truck)		16
4	Motorcycle (Passenger transport)		50
5	Motorcycle (private-owned)		250
6	3-wheel motorcycle		7
7	Trailer Jeep		10
8	Trishaw		Nil
<b>Telecommunication</b>			
1	Landline phone		Nil
2	Mobile phone		1200
3	Television set		300
4	Radio		5
<b>General</b>			

1	Households using electricity	400
2	Households not using electricity	60
3	Availability (hand-scooped well)	Nil
4	Tubewell	200

**Overview**



Pagoda



Monastery



Buddhist Ordination Hall

	
Community Hall	Shrines for guardian spirits
	
Library	Village dispensary
	
Basic Education High School (Branch), Nyaungnapiin Village	Football Ground
	
Acacia Plantation	Gwaytout Plantation ( <i>Dregea volubilis</i> )

<b>1</b>	<b>Name:</b>	<b>U Than Oo</b>	
	Age:	57	
	Address:	Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region	
	Occupation:	Agriculture	
	Rank:	Grower of Kinponchin (Concinna), sour leaf vegetable	
Hand phone:	09 4250 18226		
<p>I have lived in this village since I was young. There are 4 family members. I grow Kinponchin (Concinna) on this farm. I sell the sprigs of Kinponchin at the Htaukkyant and Danyingone Railway Station markets. I have heard about an industrial zone to be built. I do not know where it would be built. I feel happy now to hear the exact information of the industrial zone to be set up in the complex of Nyaung Hnitpin National Convention. When the industrial zone emerges, people from nearby villages will get jobs. I am sure the road transport as well as the living conditions of the people will be greatly improved. When the factories actually run, there may be harmful products from them. The polluted air and water may have bad impacts on the environment. For these reasons, the wastes must be systematically treated so as not to harm the environment. They have to be in conformity with prescribed rules and regulations. I do not object to the establishment of the industrial zone if it is done in conformity with set rules and regulations. I want to suggest that the company that is to set up the industrial zone should help meet the needs of the development of this village.</p>			

<b>2</b>		<b>Name:</b>	<b>U Myo Naing Oo</b>
		Age:	58
		Address:	Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region
		Occupation:	Department of Education
		Rank:	Headmaster
		Hand phone:	09 7788 53745
<p>I was born in Pyinmana. I have taken this responsibility for over 2 months. There are 4 family members. I am living with my nephews now. I have not known about the establishment of an industrial zone in the complex of Nyaung Hnitpin Convention. The locals will get jobs thanks to its establishment. The roads as well as the social status of the people will be greatly improved. As for bad impacts, the polluted water, pungent smell and industrial wastes are systematically managed I do not have to object to the setting up of the industrial zone. I have no objection to it. What I want to ask the companies establishing the industrial zone is to provide our school with enough school benches as we don't have enough of them. As the subsidy of the government is not enough, the company that is to set up the industrial zone is requested to help us in this respect.</p>			

<b>3</b>	<b>Name:</b>	<b>Daw Lwin May Than</b>	
	<b>Age:</b>	<b>38</b>	
	<b>Address:</b>	<b>Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region</b>	
	<b>Occupation:</b>	<b>Department of Health</b>	
	<b>Rank:</b>	<b>Midwife</b>	
	<b>Hand phone:</b>	<b>09 4480 22106</b>	
<p>I am from Minhla Township, Bago Region. There are 9 family members. I have been serving as a health staff for 19 years. I feel happy to know that an industrial zone is to be set up in the complex of Nyaung Hnitpin National Convention. The locals will get jobs. As many people will be employed, their social conditions will be improved. The road transport will be much better. The polluted air and contaminated water will have bad impacts on the environment if harmful industrial wastes are disposed of from the industrial zone. Providing health care services will be a challenging task as there will more and more people working and living in the area. I want to suggest that the establishment of the industrial zone should be systematically managed so as not to pollute the water and the air. Moreover, the dumping of polluted water should also be properly managed not to harm the natural environment. Wastes should also be disposed in accordance with set rules and regulations.</p>			

<b>4</b>		<b>Name:</b>	<b>U Kan Myint</b>
		<b>Age:</b>	<b>58</b>
		<b>Address:</b>	<b>Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region</b>
		<b>Occupation:</b>	<b>Agricultural Business, member of Village Administration</b>
		<b>Rank:</b>	<b>Head of Hundred Households</b>
		<b>Hand phone:</b>	<b>09 7968 04634</b>
<p>I was born in this village. There are 6 family members. I run my own agricultural business. I grow eggplants, cucumbers, mustards and gourds. I have heard about the establishment of an industrial zone in the immediate vicinity. But I do not exactly know its exact location. I feel happy to hear that an industrial zone is to be set up in the present complex of Nyaung Hnitpin National Convention. People here barely meet their basic needs. I hope that both skilled and non-skilled workers will be given jobs. I am concerned that the zone may cause air pollution and dump polluted water having bad impacts on the health of the locals. I am also concerned that foreigners from the zone may fall in love with local women. What I am worried is that they may leave the women behind without marrying them legally. Another thing I have concerns are that there may clashes between people who profess different faiths. In addition, I want to suggest the company to build a station hospital as the factory workers may need medical treatment. The company should also help us repair our roads that they will become much better than the present situation. I do not object to the setting up of an industrial zone.</p>			

<b>5</b>	<b>Name:</b>	<b>Daw Hla Thein</b>	
	Age:	55	
	Address:	Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region	
	Occupation:	Agriculture	
	Rank:	Agricultural worker, Leader of Women's Affairs Association	
	Hand phone:	09 7814 31788	
<p>I was born in this village. There are 4 family members. I have not heard of establishing an industrial zone in the complex of Nyaung Hnitpin Convention. There are high school and university graduates and casual labourers in this village. They have still been unemployed. I hope they will get jobs if the industrial zone emerges. I am happy because they will have to work under shelter as those manual labourers had to work under the sun in the past. The educated will have the kind of jobs that suit their status. That is why I am happy to have an industrial zone. I am not sure what bad impacts there will be. I do not want the factories that produce pungent smell to be included. I do not object to it if it does no harm to the people and natural environment. The task of paving the village main road with concrete has not been finished yet. We request the company establishing the industrial zone to help complete it. The jobless, landless and homeless should be provided with jobs as well as shelter for them.</p>			

<b>6</b>		<b>Name:</b>	<b>U Soe Aung</b>
		Age:	55
		Address:	Nyaung Hnitpin Village, Nyaung Hnitpin Village Tract, Hmawbi Township, Yangon Region
		Occupation:	Agriculture, Administration
		Rank:	Village Administrator
		Hand phone:	09 4304 0243
<p>I was born in this village. There are 10 members in my family. I grow paddy. I have heard about creating an industrial zone in the complex of Nyaung Hnitpin National Convention. One of the companies said to me that a factory is to be built in this complex. So I showed them around the area. The unemployed will be sure to have jobs if there arises an industrial zone. The roads will be sure to be improved if an industrial zone arises. We won't be experiencing power cutoffs. Men will be of high social status. For these reasons, I welcome the establishment of the industrial zone. Building factories should also have least impacts on the natural and social environment. The factory that produces polluted water and pungent smell should not be included. There are landless and homeless people in our village and they should be offered jobs when the factories are completed. Shelter should also be provided for them. I have no objection to it if the wastes dumped by the factories will not do serious harm to the environment. If so, I support it.</p>			

**7.14.3 Profile of Takutone Village, Kyarinn Village-tract, Hlegu Township**

Population:		570	
Number of households:		120 households	
Number of houses:		120 houses	
Nationality:		Myanmar	
<b>Education</b>			
1	Middle School (Branch):	1	
2	Number of teachers	11	
3	Number of students:	255	
	a	8 <sup>th</sup> grade	23
	b	7 <sup>th</sup> grade	26
	c	6 <sup>th</sup> grade	33
	d	5 <sup>th</sup> grade	27
	e	4 <sup>th</sup> grade	25
	f	3 <sup>rd</sup> grade	33
	g	2 <sup>nd</sup> grade	50
	h	1 <sup>st</sup> grade (Kindergarten)	38
<b>Health</b>			
1	25-bed hospital:	Nil	
2	Village dispensary:	Nil	
3	Doctor:	Nil	
4	Nurse:	Nil	
5	Midwife:	Nil	
6	Auxiliary midwife:	1	
<b>Business</b>			
1	Grocery, food shop, cafeteria	8	
2	Rental car	1	
3	Trishaw:	Nil	
4	Agriculture:	Gourd, eggplant, cucumber, peas, roselle, flowers, eugenia sprigs	
5	Fishery (motorboat/schooner):	Nil	
6	Livestock breeding:	Pig, chicken, fish	
7	Hotel:	Nil	
8	Lodge:	Nil	
<b>Social activities</b>			
1	Fire-fighting station:	Nil	
2	Bank:	Nil	
3	Library:	Nil	
4	Recreation centre:	Nil	
5	Village market:	Nil	
6	Football ground:	Nil	
7	Monastery:	1	
8	Pagoda:	1	
<b>Security</b>			
1	Police station:	Nil	
2	Military unit/post:	Nil	
<b>Transportation</b>			
1	Car (private-owned)	Nil	
2	Bus	Nil	
3	Rental car	1	
4	Motorcycle (Passenger transport)	20	
5	Motorcycle (private-owned)	40	
6	Trishaw	Nil	
<b>Telecommunication</b>			

1	Landline phone	Nil
2	Mobile phone	250
3	Television set	60
4	Radio	5
<b>General</b>		
1	Households using electricity	84
2	Households not using electricity	36
3	Availability (hand-scooped well)	70
4	Tubewell (pedal-driven)	10

## Overview



Monastery and pagoda



Basic Education Middle School (Branch),  
Takutone Village,



Basic Education Middle School (Branch),  
Takutone Village,



Grocery

## Overview

1		<b>Name:</b>	<b>U Obasa</b>
		Age:	26
		Address:	Takutone Village Monastery, Hlegu Township
		Occupation:	—
		Designation:	Assistant Presiding Monk
		Hand phone:	09 2649 23980
<p>My birthplace is Kyaiklat Township, Ayeyarwaddy Region. I have been residing at this monastery for about a year. I have already heard about the construction of an industrial zone in the Nyaung Hnitpin National Convention complex. The religious lands or buildings are not involved in the area in which the industrial zone is to be built. There are one monastery, 2 stupas and a rest house in this village. All the villagers are Buddhists. There is no one who professes other religions. We have hand-dug wells as well as tube wells. We have electricity from the national grid. I am happy that people from this village will get jobs when there arises an industrial zone. As a consequence, the economy of the villagers will improve a lot. If the socio-economic condition of the villagers has become much better, people will also engage in more meritorious deeds. Most of the villagers earn their living through agriculture. They grow seasonal vegetables, flower plants and Eugenia trees. There are some others working for factories and workshops. What we need in our village are a rest house at the cemetery, and good roads. We have to wade through the water during the rainy season. I want to request the project developers to help us repair the existing roads.</p>			

2	<b>Name:</b>	<b>U Kyaw Thu</b>	
	Age:	42	
	Address:	Agriculture & Livestock Breeding Zone 2, Takutone Village, Hlegu	
	Occupation:	Agriculture and Livestock Breeding	
	Designation:	Businessman (who owns his business), Vice Chairman of Village Funeral Rites Association	
	Hand phone:	09 9763 08000	
<p>I have lived in this village for over 17 years. My birthplace is Khayan Township, Ayeyarwady Region. The place where there are agricultural and livestock breeding zones and that are close to the Nyaung Hnitpin National Convention complex are vacant lands. In 2003, the lands were confiscated by the Union Solidarity and Development Association and the buildings for the national convention were constructed within two years—2004 and 2005. In 2006 and 2007, national conventions were held in these USDP-owned buildings. The Constitution was approved in 2008. This village is the closest to the Nyaung Hnitpin Convention complex. It is about 3,600 feet away from the complex. The village has over 100 houses. Formerly, there was no primary school. We had a primary school in 2008. Now, it has become an affiliated middle school. There are classes up to eighth grade. If there is an industrial zone in Nyaung Hnitpin, the locals will get jobs. So I welcome it. Most of the people from this village earn their living through agriculture. There are a few livestock breeders. They breed chickens. I have fifty acres of Eugenia trees. There are high school as well as university graduates in this village. Some people have to work in the industrial zones in Hmawbi, Hlegu, etc. When the industrial zone is completed, the standard of living of people from this village will change. I wish the</p>			

	developers of the industrial zone would contribute to the development of our village and to the increase of knowledge and technology.
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<b>3</b>		<b>Name:</b>	<b>Daw Hnin Wai Aung</b>
		Age:	49
		Address:	Takutone Village, Hlegu Township, Kyarinn Village Tract
		Occupation:	Health Department (and a shop-keeper)
		Designation:	Auxiliary midwife
		Hand phone:	09 7671 48201
<p>This village is my birthplace. There is no Rural Health Centre (RHC) in this village. There is an RHC in Kyarin Village. I am a midwife under the Kyarinn Health Department. Klihtaw Village also has an RHC. There has been no serious disease breakout in this village. People suffer from minor ailments due to changes in weather. The mortality rate of newly born babies was fairly high in 2015. It has declined since 2016 and it is only about 10% in 2017. The rate of malnutrition in children was about 30% in 2015. It dropped to about 10% in 2017. The Health Department is helping to nourish the children with the support of the World Health Organization (WHO). Malnourished children are being offered financial assistance, medications, milk powder and clothes. But what they have received is still not enough for them. Vaccination against infections is enough. As we have no rural dispensary in our village, we find it very difficult, when someone is ill at night and in monsoon, to look for a place where there is a dispensary. We need a dispensary in this village. In this village, every house uses a fly-proof flush toilet. If an industrial zone is established in the complex of Nyaung Hnitpin National Convention, I feel happy because the locals will get more jobs. Some have to go far from this village to earn their living. If the industrial complex is constructed, they will be able to work in this area. I hope our health, education and economy will be significantly improved. I will not object to the establishment of this industrial zone. We welcome and recommend it.</p>			

<b>4</b>	<b>Name:</b>	<b>U Tun Yee</b>	
	Age:	60	
	Address:	Takutone Village, Hlegu Township	
	Occupation:	Agriculture	
	Designation:	Villager elder	
	Hand phone:	09 3131 7675	
<p>I have lived in this village since my childhood. This village had existed since before we regained independence. This village was destroyed due to the conflict between Kayin and Myanmar after the independence was regained. When U Ne Win government assumed power in 1962, the village was reestablished with about 10 houses. There are now over a hundred houses, I'm happy to hear that an industrial zone is going to be established in the complex of Nyaung Hnitpin National Convention. As this village is close to the complex, I hope that people from the village will get jobs at the factories. The villagers had their own pieces of farmland in the past and worked on their farms for their livelihoods. Nowadays, most of them become employees working for others. There are only a few people who own farmlands. Only one or two villagers own their farmland. Most of them work as daily-wage earners doing casual work in agriculture and livestock</p>			

	breeding zones 1, 2 and 3. They earn about Ks 5,000 or 6,000 a day. Masons and construction workers earn more. On completion of the factories, we expect that our villagers will be offered jobs. If there arises an industrial zone, the zone will have good impact on the whole area and I am not sure whether if there will be bad impacts.
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**5 Name: U Kyaw Soe**

Age:	40
Address:	Takutone Village, Kyarinn Village Tract, Hlegu Township
Occupation:	Shop Keeper, Village Administration
Designation:	Head of a Hundred Households
Hand phone:	09 2500 41552



I was born in this village. I have lived in this village since my childhood. There are five members in my family. There are about 150 houses in this village. I am working towards the development of our village in cooperation with village elders and villagers. Having an affiliated middle school in our village, there are high school and university graduates. We have no rural dispensary but a auxiliary midwife. Villagers have lost their land and farm which were confiscated at the beginning of the agriculture and livestock breeding zone. Now those who confiscated the lands are leasing them to the agriculture and livestock breeders at Ks 30,000 per acre per year. Most of the people in this village rely on agriculture for their livelihoods as they are now working as hired labourers in the agriculture and livestock breeding zone. There are those who go and work at the factories and workshops in other places by commuter bus. They mostly believe in Buddhism. So there are religious buildings, monasteries, zedis and pagodas. There is no other religion. It will be more convenient for the villagers to get jobs if there arises an industrial zone in the complex of Nyaung Hnitpin National Convention. As a result, they no longer need to go for and work in other places for these reasons; we welcome the construction of the industrial zone. We feel happy on behalf of the villagers as there have been requirements to improve the education and health sectors in this village, we wish the companies building factories would help fulfill those requirements.

**6 Name: Daw Khin Khin Myaing**

Age:	49
Address:	Takutone Village, Hlegu Township
Occupation:	Department of Education
Designation:	Headmistress of the Middle School (Branch), Takutone Village
Hand phone:	09 7954 77330



My birthplace is South Okkalapa, Yangon. I am now taking responsibility as the headmistress of the Middle School (Branch) in Tagutone Village. There are 4 family members. My husband belongs to the Hmawbi telecommunication military unit. When the school closes, I go to live in that military quarter. I have not previously known about the industrial zone to be established in the complex of the Nyaung Hnitpin Convention. People from this village will get jobs if the industrial zone is constructed. So I am happy. I am sure the whole area including this village will be totally changed. I hope that the main changes will be good roads and the social life will simultaneously be improved. I think the bad impacts may be due to the dumping of polluted water from the factories and air pollution. Confiscating land will not happen, I think. So it needs to avoid any harm. The constructions of two school rooms remain unfinished in any school. As Ninth Grade classes are going to be first opened in this academic year, we need some more school

rooms and school benches. The company that will invest in the industrial zone and the government should help meet the needs of our village in cooperation with village elders and authorities concerned. I will not object to the construction of this industrial one if there is no harm to the locals and their socio-economic life. I welcome it if it has good impacts.

#### 7.14.4 Profile of Hsonkone Village, Kyarinn Village-tract, Hlegu Township

Population:		392	
Number of households:		110 households	
Number of houses:		116 houses	
Nationality:		Myanmar	
<b>Education</b>			
1	Primary school:	1	
2	Number of teachers	5	
3	Number of students:	39	
	a	5 <sup>th</sup> grade	8
	b	4 <sup>th</sup> grade	6
	c	3 <sup>rd</sup> grade	9
	d	2 <sup>nd</sup> grade	6
	e	1 <sup>st</sup> grade (Kindergarten)	10
<b>Health</b>			
1	25-bed hospital:	Nil	
2	Village dispensary:	Nil	
3	Doctor:	Nil	
4	Nurse:	Nil	
5	Midwife:	Nil	
6	Auxiliary midwife:	Nil	
<b>Business</b>			
1	Grocery:	Nil	
2	Car rental service:	Nil	
3	Trishaw:	Nil	
4	Agriculture:	Gourd, groundnut, paddy	
5	Fishery (motorboat/schooner):	Nil	
6	Livestock breeding:	Pig, chicken	
7	Hotel:	Nil	
8	Lodge:	Nil	
<b>Social activities</b>			
1	Fire-fighting station:	Nil	
2	Bank:	Nil	
3	Library:	Nil	
4	Recreation centre:	Nil	
5	Village market:	Nil	
6	Football ground:	Nil	
7	Monastery:	1	
8	Pagoda:	1	
9	Spirit shrine:	1	
<b>Security</b>			
1	Police station:	Nil	
2	Military unit/post:	Nil	
<b>Transportation</b>			
1	Car (private-owned)	Nil	
2	Bus	Nil	
3	Rental car	Nil	

4	Motorcycle (Passenger transport)	14
5	Motorcycle (private-owned)	30
6	3-wheel motorcycle	3
7	Trailer Jeep	1
8	Trishaw	Nil
9	Bullock-cart	5
<b>Telecommunication</b>		
1	Landline phone	Nil
2	Mobile phone	150
3	Television set	70
4	Radio	Nil
5	Sky Net	3
<b>General</b>		
1	Households using electricity	110
2	Households not using electricity	6
3	Availability (hand-scooped well)	1
4	Tubewell	50

### Overview



Monastery and pagoda



Guardian spirit shrine



Water tank and school in the background



Residence of Head of 100 HHs



XX

1



**Name:** U Aye Kyaw

Age:	40
Address:	Hsonkone Village, Kyarin Village Tract, Hlegu Township
Occupation:	Agriculture and Livestock Breeding, Village administration
Designation:	Head of Hundred Households
Hand phone:	09 7954 53349

This village is my birthplace, and I have lived here since my childhood. There are 5 members in my family. I run an agriculture and livestock breeding business. I grow seasonal vegetables and breed chickens and swines. We have a primary school but no rural dispensary and female nurse. I have a leading role to play in festive occasions, funerals, electricity supply and road communication of my village in cooperation with village elders and villagers, I have not formerly heard of establishing an industrial zone in the complex of Nyaung Hnitpin Convention. I have come to know it now, I hope most of the villagers will get jobs if it is an industrial zone, the villagers will no longer be casual labourers outside the area of the village as there are a number of people taking manual jobs. For them, I feel happy to have an industrial zone. It is to be positively said that the establishment of an industrial zone will have good impact on our community. I have no idea of what seems to be negative about it.

2

**Name:** U Tin Shein

Age:	65
Address:	Hsonkone Village, Kyarinn Village Tract, Hlegu Township
Occupation:	Agriculture
Designation:	Village Elder
Hand phone:	09 2505 23125



I have lived in this village since my childhood. It is my birthplace. There used to be teak forests in the immediate vicinity. In addition, there also were other wood trees—in (dipterocarpus tuberculosis) and *kanyin* (dipterocarpus alatus). In the past, those nearby forests were inhabited by wild animals such as elephants, tigers, muntjac, samburs, wild cats and mongoose. Those flora and fauna have become extinct now. I have 5 family members. I work on a paddy farm land and also grow groundnut. I haven't known that an

industrial zone is to be built in the complex of Nyaung Hnitpin National Convention. I am sure our villagers will get jobs if the industrial zone appears. Many of our villagers have limited formal education and they work as manual labourers. There are a few high school and university graduates. The project developer and factories in the industrial complex should offer jobs to them. We have a primary school. But we do not have a rural dispensary. If possible, the companies establishing the industrial zone should provide a dispensary and better roads for our village. I do not object to the construction of an industrial zone as it will have good impacts on our village and its environment. We welcome it. I do not know if there will be any bad impact. I have no idea as to what bad impacts will come out.

**3 Name: Daw Khine Nwe Yi**

Age:	46
Address:	Hsonkone Village, Kyarinn Village Tract, Hlegu Township
Occupation:	Department of Education
Designation:	Headmistress of Primary School
Hand phone:	09 7954 53354



My birthplace is in Maubin Township. I have been taking responsibility as the headmistress of the primary school for 10 years. I live in this village. There are 4 teachers including myself and one worker in this school. There are altogether 39 students at our school. The government had this school constructed in fiscal 2004-2005 as we can now see. The Partner Myanmar NGO offered the water storage tank in front of the school to collect rain water. I have not previously known that a new industrial zone will be established in the complex of Nyaung Hnitpin National Convention. The construction of a new industrial zone is sure to have good and bad impacts. The good impacts are that many of the locals will get jobs and the roads will be greatly improved. Now, people from the village have to go far and work in Hlegu and Hmawbi townships and Yangon, Htaukkyant and Mingaladon industrial zones. They will no longer need to go far to work if an industrial zone exists. I hope that skilled persons as well as the manual labourers will be offered jobs in their appropriate positions; it is rather difficult to say that it will have only bad impacts. What I really want to say is that the management needs to do no harm to men and their environment.

#### 7.14.5 Profile Of Kyarinn Ashe Village, Kyarinn Village-tract, Hlegu Township

Population:		2137	
Number of households:		480 households	
Number of houses:		470 houses	
Nationality:		Myanmar	
Religion		Buddhism	
<b>Education</b>			
1	Middle School (Branch)	1	
2	Number of teachers	12	
3	Number of students:	408	
	a	7 <sup>th</sup> grade	36
	b	6 <sup>th</sup> grade	54
	c	5 <sup>th</sup> grade	46
	d	4 <sup>th</sup> grade	39
	e	3 <sup>rd</sup> grade	48

	f	2 <sup>nd</sup> grade	54
	g	1 <sup>st</sup> grade	56
	h	KG	75
<b>Health</b>			
1		25-bed hospital:	Nil
2		Village dispensary:	1
3		Doctor:	Nil
4		Nurse:	Nil
5		Midwife:	1
6		Auxiliary midwife:	Nil
<b>Business</b>			
1		Grocery:	12
2		Car rental service:	Nil
3		Trishaw:	Nil
4		Agriculture:	Paddy, cucumber, nut, mustard, rubber
5		Fishery (motorboat/schooner):	Nil
6		Livestock breeding:	Swine, chicken and fish
7		Hotel:	Nil
8		Lodge:	Nil
<b>Social activities</b>			
1		Fire-fighting station:	Nil
2		Bank:	Nil
3		Library:	1
4		Recreation centre:	Nil
5		Village market:	Nil
6		Football ground:	Nil
7		Monastery:	2
8		Pagoda:	2
<b>Security</b>			
1		Police station:	Nil
2		Military unit/post:	Nil
<b>Transportation</b>			
1		Car (private-owned)	Nil
2		Bus	Nil
3		Rental car	Nil
4		Motorcycle (Passenger transport)	25
5		Motorcycle (private-owned)	480
6		3-wheel motorcycle	2
7		Trailer Jeep	Nil
8		Trishaw	Nil
<b>Telecommunication</b>			
1		Landline phone	Nil
2		Moblile phone	1200
3		Television set	280
4		Radio	40
<b>General</b>			
1		Households using electricity	400
2		Households not using electricity	70
3		Availability (hand-scooped well)	70
4		Tubewell	400

**Overview**



Two monasteries and pagodas



Basic Education Middle School (Branch), Kyarinn Ashe Village



Renovation of the Primary School in Kyarinn Ashe Village carried out the development funds of the Pyidaungsu Hluttaw  
 The value of funds: MMK 5 million  
 Renovation started: January 24, 2014  
 Renovation completed: February 25, 2014



The Primary school building, Kyarinn Ashe Village



Village Administrator Office, Kyarinn Village-tract

	
<p>Village Health Department, Kyarinn</p>	<p>Rubber purchase centre</p>
	
<p>Furniture, wood-carving industry</p>	<p>Brick baking</p>

**1 Name: U Myint Kyaw**

Age:	49
Address:	Kyarinn A-she Village, Kyarinn Village Tract, Hlegu Township
Occupation:	Administration
Designation:	Village Tract Administrator
Hand phone:	09 540 0908



My birthplace is Kyar-inn A-she Village. There are 5 members in my family. I run my own grocery store to earn my living. Currently I am taking responsibility as the Village Tract Administrator. I have heard that an industrial zone is to be established in the complex of Nyaung Hnitpin Convention. I do not know which country is implementing it. If the industrial zone emerges, the whole area will be changed and the roads will be improved compared to the present situation. If the roads becomes much better, it will consequently improve our social status. I feel happy as the locals will get jobs. If the businesses flourish, the rule of law will improve. The establishment of the industrial zone may have good impacts as well as bad impacts. The construction of the industrial zone should be systematically implemented under the supervision of the developers in order that bad impacts will not cause any harm to the natural environment as well as the social life. If there is no harm to natural and social environment, we welcome the industrial zone construction. I feel joy as I hope many locals will get jobs.

**2 Name: Daw Than Nu**

Age:	52
Address:	Kyarinn A-she Village, Kyarinn Village Tract, Hlegu Township
Occupation:	Department of Education
Designation:	Headmistress of the Middle School (Branch)
Hand phone:	09 4201 59596



I was born in this village. There are 5 members in my family. Currently, I am taking responsibility as the headmistress of the Middle School (Branch) in Kyarinn A-she Village. I have heard about building an industrial zone in the complex of Nyaung Hnitpin Convention. I feel happy because I hope the high school and university graduates as well as unskilled labourers will get jobs if an industrial zone is established. There are jobless people although they have passed 11<sup>th</sup> Grade (matriculation) examination. Some of them are now working with the village monastic school. As there is no nursery school, the company implementing the project should provide a daycare centre for the village. If there is a nursery, people in this village will be more convenient to work outside their houses. When the industrial zone is finished, some young people will get jobs and will be able to spend more money. I'm concerned that they will be using narcotic drugs if they have no jobs. The construction of the industrial zone will have good impacts on our village. It is difficult to say if there will be bad impacts. I want to suggest that the project developers need to manage it in order not to harm natural and social environments.

**3 Name: Daw Tin Moe Thwe**

Age:	27
Address:	Kyarinn A-she Health Department (Branch), Kyarinn A-she Village, Hlegu Township
Occupation:	Health Department
Designation:	Supervisor Level 2
Hand phone:	09 7983 23928



My birthplace is Darbein, Hlegu Township. Our family is an extended one. There are seven members including father, mother, brothers and sisters in my family. I have been taking responsibility (as a health staff member) in this village for over 4 months. I am now living in the rural health department (Branch) quarter with my younger brother. There has been no serious disease in this village. In the past, some of them suffered from malaria. However, they no longer have it. I haven't known before that an industrial zone is to be set up in the complex of Nyaung Hnitpin Convention. I feel happy that the locals, young and old alike, will get jobs if an industrial zone is established. The social status of the locals will be improved and the roads will become much better. The industrial zone may probably cause harm to the natural environment. The builders of the factories need to be responsible for not harming the earth, air and water in the natural environment. There is no doctor to take care of health in this village. We have only a midwife. If someone suffers from a disease, we have to go to the hospitals and health care centres in Yangon or Hlegu. Patients in an emergency situation find it difficult to go to town because the roads are bad. The builders of the factories should help improve roads.

<b>4</b>	<b>Name:</b>	<b>Daw Than Than Win</b>	
	Age:	48	
	Address:	Kyarinn A-she Village, Kyarinn Village Tract, Hlegu Township	
	Occupation:	Own shop	
	Designation:	Shopkeeper	
	Hand phone:	09 2634 67583	
	<p>I was born in this village. There are only 2 members in my family. I haven't heard about the establishment of an industrial zone in the complex of Nyaung Hnitpin National Convention. I feel happy because people from our village and nearby villages will get jobs if an industrial zone is set up. I am not sure if the industrial zone will have bad impacts. I think our shop will also sell much better than the present. It is needed to improve roads for the local development. The present roads are so damaged that they cannot be properly used. Those are worse in monsoon. When the industrial zone is completed, this place will be more populated. We will be able to enjoy a growing business as we sell better. We do not have to be worried about emissions from the industrial zone as it is rather far from our village. But I am worried that the harmful by-products may cause harm to the natural and social environments of the villages close to the zone. Those who set up factories should take proper measures so that there will be no bad impacts.</p>		

**5 Name: Daw Tin Than**

Age:	60
Address:	Kyarinn A-she Village, Kyarinn Village Tract, Hlegu Township, Yangon Region
Occupation:	Fishery
Rank:	Worker
Hand phone:	09 7737 11814



We have lived in this village for a long time. There are 4 members in my family. I haven't known that an industrial zone is to be set up in the complex of Nyaung Hnitpin National Convention. When the industrial zone is completed, the social status of the people, young and old alike, from the villages in the vicinity will be improved. I have a daughter working in the business of packaging plum jam. Now, she earns Ks 3,000 a day. If the industrial zone emerges, I want her to work at the zone. I think it will be more convenient for her to work at a factory than to take any job that comes by. So I support the establishment of the industrial zone. My son has already passed the matriculation exam. He aims to work at the industrial zone. I have no idea of whether the establishment of the industrial zone will have bad impacts on the environment. It will depend on what kind of factories are to be built and how they will be built.

**7.14.6 Profile Of Kyarinn Anauk Village, Kyarinn Village-tract, Hlegu Township**

Population:		1850
Number of households:		370 households
Number of houses:		350 houses
Nationality:		Myanmar
Religion		Buddhism
<b>Education</b>		
1	Middle School (Branch)	1
2	Number of teachers	12
3	Number of students:	204
	a 7 <sup>th</sup> grade	23
	b 6 <sup>th</sup> grade	23
	c 5 <sup>th</sup> grade	37
	d 4 <sup>th</sup> grade	28
	e 3 <sup>rd</sup> grade	19
	f 2 <sup>nd</sup> grade	24
	g 1 <sup>st</sup> grade	25
	h KG	25
<b>Health</b>		
1	25-bed hospital:	Nil
2	Village dispensary:	Nil
3	Doctor:	Nil
4	Nurse:	Nil
5	Midwife:	Nil
6	Auxiliary midwife:	1
<b>Business</b>		
1	Grocery:	20
2	Car rental service:	5

3	Trishaw:	Nil
4	Agriculture:	Paddy, eggplant, cucumber ,nut, mustard, roselle, chilly
5	Fishery (motorboat/schooner):	Nil
6	Livestock breeding:(small scale)	30
7	Hotel:	Nil
8	Lodge:	Nil
<b>Social activities</b>		
1	Fire-fighting station:	Nil
2	Bank:	Nil
3	Library:	Nil
4	Recreation centre:	Nil
5	Village market:	Nil
6	Football ground:	1
7	Monastery:	1
8	Pagoda:	4
9	Spirit shrine:	1
<b>Security</b>		
1	Police station:	Nil
2	Military unit/post:	Nil
<b>Transportation</b>		
1	Car (private-owned)	Nil
2	Bus	Nil
3	Rental car	2
4	Motorcycle (Passenger transport)	100
5	Motorcycle (private-owned)	300
6	3-wheel motorcycle	Nil
7	Trailer Jeep	3
8	Trishaw	Nil
<b>Telecommunication</b>		
1	Landline phone	Nil
2	Moblile phone	700
3	Television set	300
4	Radio	50
<b>General</b>		
1	Households using electricity	200
2	Households not using electricity	150
3	Availability (hand-scooped well)	200
4	Tubewell	2

### Overview



Pagodas



Monastery

	
<p>Community Hall for religious purposes</p>	<p>Wayside public resthouse</p>
	
<p>The gateway to the monastery</p>	<p>Shrines for guardian spirits</p>
	
<p>Basic Education Middle School (Branch), Kyarinn Anauk Village</p>	<p>A tubewell and a Lake</p>
	
<p>A Grocery and store</p>	<p>A street inside the village</p>

**1 Name: Daw Moe Moe Myint**

Age:	31
Address:	Kyarinn Anauk Village, Kyarinn Village Tract, Hlegu Township, Yangon Region
Occupation:	Health Department
Rank:	Auxiliary midwife
Hand phone:	09 4202 01191



This village is my birthplace. There are 3 family members. I am involved in the health care of this village. When the Health Assistant sends for me for help, I have to go to Kalihtaw Health Department. If an industrial zone is to be set up in the complex of Nyaung Hnitpin National Convention, people from the nearby villages will get jobs. I do not object to the establishment of the industrial zone as it will benefit this area and the country. If there are factories that will harm the natural as well as the social environments, I would like to suggest that the developers of the factories need to implement it in such a way that it will have minimum impacts on the natural and social environment.

**2 Name: Daw Khine Zar Mon**

Age:	30
Address:	Kyarinn Anauk Village, Kyarinn Village Tract, Hlegu Township, Yangon Region
Occupation:	Department of Education
Rank:	Teacher, middle school teacher
Hand phone:	09 7818 20731



This village is my birthplace. There are 3 family members. I have been working as a teacher for 12 years. I have never heard about the establishment of the industrial zone in the complex of Nyaung Hnitpin National Convention. If the industrial zone is set up, the roads in this area will be greatly improved and the communication links will be much better. People will get jobs. As there will be more job opportunities, students will learn more to have better jobs. However, I am a bit worried that that they will become less interested in their education and become eager to work in a factory. As more and more people will be moving into the area, I am worried about the clashes that would occur between people of different religious faiths. The factories that produce dangerous industrial waste should not be built as they will have bad impacts on men and their environment. I do not accept the idea of having an industrial zone in which such bad factories are to be built.

**3****Name: U Sein Lwin**

Age:	53
Address:	Kyarinn Anauk Village, Kyarinn Village Tract, Hlegu Township, Yangon Region
Occupation:	Agricultural and Livestock Breeding
Rank:	Village Elder, Chairman of Parent-Teacher Association
Hand phone:	09 7820 02082

My birthplace is Phoyingale village, Hlegu Township. I have lived in this village for 33 years. I got married here. There are 4 family members. I haven't heard before that an industrial zone is to be created in the complex of Nyaung Hnitpin Convention. I feel happy and unhappy at the same time. I am happy because locals, young and old alike, will get jobs. My worries are that it will have bad impacts on the health of people in our vicinity due to the polluted air and water that might be disposed of from the factories. It is required to manage and implement the establishment of the industrial zone so that there will not be any harm to the men and natural environment due to the harmful wastes from the

factories to be built. We need a day nursery and a rural dispensary in our village. I want to request the company that is to set up the industrial zone to help provide a tube well for drinking water and a reservoir. I welcome it and do not object to the establishment of the industrial zone if it causes no harm to man and his environment.

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## 8. POTENTIAL ENVIRONMENTAL IMPACTS AND RISK ASSESSMENT

### 8.1 Overview

This chapter presents assessments of potential environmental impacts of (pre-construction, construction phase, operation phase and decommissioning phase) proposed Korea Myanmar Industrial Complex in Hlegu Township, Yangon Region. These environmental impacts are related to physical, biological, and social aspects and including but not limited to pollution (air quality, surface and ground water quality, waste, soil contamination, sedimentation, hydrology, soil erosion, noise and vibration) social environment (living and livelihood, local conflict, misdistribution benefit and damage, existing infrastructures and services, water usage), natural environment (flora, fauna and biodiversity, ecosystem), health and safety (risks for infectious diseases such as AIDS/HIV, occupational health and safety, community health and safety), emergency (flood risk, risk of fire, earth quake, storms) and climate change and greenhouse gases effects. The risk assessment and mitigation measures for the potential environmental impacts are also described.

### 8.2 Impact Assessment

Assessment refers to the interpretation of the significance of anticipated changes relating to the proposed project. Impact interpretation is based upon the systematic application of definition of “significance”: E.g., waste-discharge standards (effluent limitation) from particular facilities. The application of professional judgment in the context of assessing impacts is a pivotal role in our work.

Another basis for impact assessment is public input; this input could be received through the conduct of public meetings and interviews with residents in surrounding area of the project site. As the general public can often delineate important environmental resources and values for the particular areas, and these are also considered essential in impact assessment. The assessment of short- and long-term potential impacts is made on the basis of information collected from existing sources supplemented by the field data. Impacts are also differentiated as direct or indirect – those that arise directly from the proposed project, and those that arise because of secondary activities induced by the project. Impacts are also categorized in relations with different implementation phases: Pre-construction phase, Construction phase, Operation phase and Decommissioning phases.

### 8.3 Impact Assessment Methodology

#### 8.3.1 Identification of the Potential Impacts

There are several methods applied to assist in the identification. These include checklists, map overlays, public consultation and professional judgement based on information collected from existing sources supplemented by the field data.

The interaction-matrix method developed by Leopold et al (1971) is used as an example. The Leopold Matrix contains the list of actions and environmental items. Each action and its potential for creating an impact on each environmental item are considered.

The project activities and related potential negative environmental impacts are generally mentioned in the sample matrix table below. The specific details of project activities and the potential impacts caused by these activities for different project phases are described in the following respective sections.

## Sample matrix for project activities and the related negative environmental impacts

Project Activities	Environmental Parameters														
	Topography	Air Quality	Noise and vibration	Surface Water Quality	Ground Water Quality	Soil Quality / Contamination	Soil Erosion	Generation of solid waste	GHG emissions	Flora, fauna and ecosystem	Living and livelihood	Landscape and scenery	Occupational health and safety	Emergency Risk	Community Health and Safety
Site clearing and levelling	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Transportation and storage of construction materials/ equipment		x	x	x		x		x	x	x	x		x	x	x
Construction Activities (including equipment and machine use)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Influx of labor and construction of temporary houses				x				x			x		x	x	x
Transportation and disposal of construction waste and debris		x	x	x	x	x		x	x				x		x
Operation of project activities		x	x	x	x	x		x	x		x		x	x	x
Wastewater disposed from different industries and project facilities				x	x	x							x		x
Solid waste generation from operation of project activities				x	x	x		x					x		x
Emissions from different industries		x							x				x	x	x

Demolition work		x	x	x		x		x	x		x		x	x	x
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Comprehensive literature reviews and published information helps for impact identification as well. Impact prediction is also accomplished by the use of look-alike (analogous) information on actual impacts from similar types of projects and based on professional judgment.

### 8.3.2 Nature and Characteristics of Impacts

There can be different nature of impacts with different characteristics which include:

- Positive and negative: Negative impacts harm, degrade or impair the ecosystem health and the health and quality of life of people who live and work in the affected ecosystems. Some impacts can be perceived to be neutral, whilst others are positive.
- Direct and Indirect: Direct impacts are created directly by a project action. Indirect impacts result from subsequent impacts caused by the direct impacts. Direct impacts are more easily identifiable and quantifiable than indirect impacts.
- Long term and short term: Some impacts occur only during the construction phase of the project (short term), others persist to the operational phase (medium term) and others linger on long after the project has been decommissioned (long term).
- Recurring and Non-Recurring: Some impacts occur repeatedly in space and time, while others occur only once.
- Regional and Local: Some impacts cover large areas whilst others are restricted to a small area.
- Cumulative and Non-cumulative: Cumulative impacts result when impacts from one activity combine with those from another activity to produce a greater impact or a different impact. Non-cumulative impacts do not accumulate in space and in time.
- Reversible and Irreversible: This refers to the permanence of an impact. Impacts maybe reversible by natural means at natural rates (e.g. sand deposition) or through human intervention (e.g. reforestation). However, some impacts are irreversible such as the elimination of particular wildlife habitats through urban development.

### 8.3.3 Assessment of Impact Significance

This section describes the impact assessment process undertaken to evaluate the level of risk to environmental, socio-economic and health receptors from activities associated with the proposed project. This description provides an account of the identification of potential impacts and benefits and the evaluation of their significance.

The assessment of the level of impact significance requires consideration of the impact level in relation to the receptor sensitivity. The impact assessment is based on four categories of impact significance level as described in the following table. These address the level of mitigation that is considered appropriate to be applied for a given impact.

The degree of significance depends upon the level (i.e. magnitude, extent and duration) of impacts and the sensitivity of the resource value that they may impact. The criteria used to define the significance ranking of impacts on a qualitative basis are mentioned in the table below.

**Table: Criteria used to determine Impact Significance**

Criteria	Score	Detail
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Extent	3	High – Area of impact is beyond 5 km and impact extends to regional and national level
	2	Medium – Area of impact is beyond the project area but is in a limited area of 1-5 km
	1	Low – Area of impacts is in the project area within a radius of 1 km
Duration	3	Long Term – Permanent impact and impact will remain after decommissioning of the project. Impact occurs in long term duration (> 5 years)
	2	Medium Term – Impact can be reversible over time (1-5 years), period of impact occurrence is within the project period, impact occurs over mid-term duration (1-5 years)
	1	Short Term – Impact can be quickly reversible (< 1 year), period of impact occurrence is less than the project period, impact occurs in short-term duration (< 1 year)
Magnitude	3	High – Exceeds regulatory standards, changes the original structure of the environmental or social system or ecosystem
	2	Medium – Within regulatory standards, but changes some factors in the environmental or social system or ecosystem but does not change the structure
	1	Low – within regulatory standards, with small changes in some factors for the environmental or social system or ecosystem but does not change the structure
		Negligible – no detectable impact on the environment or socio-economic conditions
Receptor Sensitivity	3	High – High value/sensitivity receptor or resource, rare or endangered species or habitat impacted on a national or international level, exceeding standards, large permanent change in human use and quality of life values at a regional level, long-term or no reversible.
	2	Medium - Medium value/sensitivity receptor or resource, impact disturbs an area that has a value for conservation or causes change in species diversity. Impact important on a local or regional level, within standards, moderate change in human use and quality of life values at moderate level over a long-term duration, reversible over medium-term.
	1	Low - Low value/sensitivity receptor or resource, impact disturbs degraded area or slightly disturbs area with value for conservation, causes small changes in species and diversity, within standards, small local change in human use and quality of life values over a short- term duration, reversible over short-term.
		Negligible – no detectable sensitivity

Source: Adapted from Nigel Rossouw (2003); Sippe (1999); and United Nations University (2007)

Impact Level = Magnitude + Extent + Duration

Total Score for Impact Level	Impact Level	Score
7-9	High	3
4-6	Medium	2
1-3	Low	1

The above matrix method is used to consider the Impact Level and Receptor Sensitivity as follows:

**SIGNIFICANCE = IMPACT LEVEL SCORE X RECEPTOR SENSITIVITY**

#### Impact Significance Evaluation

Significance Level of Environmental Impact			Impact Level		
			Low	Medium	High
			1	2	3
Receptor Sensitivity	Low	1	Negligible (1)	Low (2)	Low (3)
	Medium	2	Low (2)	Medium (4)	Medium (6)
	High	3	Low (3)	Medium (6)	High (9)

**Table: Categories of Impact Significance**

Significance Level	Definition
<b>High (7-9)</b>	Impact is classified as high and can cause numerous effects. Major impacts affect an entire population or species in sufficient magnitude to cause a decline in abundance and/or change in distribution. Large permanent change in human use and quality of life values at a regional and national level. Fatality from an accident or occupational illness. Impacts cannot be managed or resolved by any mitigation measures.
<b>Medium (4-6)</b>	Impact may result in changes that affect the value of resources and environment. Moderate impacts affect a portion of a population and may bring about a change in abundance and/or distribution but does not threaten integrity of population. Impact may affect moderate change in human use and quality of life values at a local and regional level over a long-term duration. Major injury or health effects (including Permanent Partial Disability). Mitigation measures are required to manage or reduce the potential impacts and monitoring measures are required to determine effectiveness of mitigation measures.
<b>Low (2-3)</b>	Impact may result in changes in resources and environment, but this change does not decrease value of these resources and environment. Minor impacts affect individuals within a population over a short period of time. Local change in human use and quality of life values over a short-term duration. Minor injury or health effects (Lost Time Injury). Impact can be managed and resolved by implementation of general mitigation measures.
<b>Negligible (1)</b>	Impact has no effect.

## **8.4 Identification and Assessment of Potential Environmental Impacts**

The industrial complex will consist of industrial area (including food and beverages processing, textile and garment, logistics, and assembly plant), residential area, villa, commercial, IT park, Gas station, public facility (road, park, buffer green belt, management center, public support facility), substation, wastewater treatment plant and water purification plant.

Currently, the detailed information of the buildings and facilities proposed to be included in the project is not yet available and hence the potential environmental impacts for each and every project activity cannot be identified in this stage. However, based on the past experience of the EIA consultancy team, base line data collection, discussion with public and professional judgement, the potential environmental impacts of the proposed project were identified and these would cover the significant and larger extent of the possible impacts. Each project in the industrial zone will also carry-out individual EIA or IEE according to the decision made by ECD.

Generally, the identification and assessment of potential environmental impacts will encompass the pre-construction, construction, operation and decommissioning phases of proposed projects.

There are no negative impacts on physical, biological and social environment for the pre-construction (planning) phase of the project. According to the assessment made by EIA/SIA team and discussion with the community (public engagement events) in that area, the following social issues but not limited to: land acquisition, involuntary resettlement, conflict of interest, loss of income, and degrading of living and livelihood were not raised by the public. The community made no objection on the project and they welcomed the project and hoped to get job in the project.

## 8.4.1 Potential Environmental Impacts during Construction Phase

Type of impact, impacted Environment and Environmental parameters	Score				Significance level of Impact = Impact Level Score x Receptor Sensitivity
	Extent	Duration	Magnitude	Receptor Sensitivity	
<b>- PE</b>					
Soil Degradation	1	1	1	2	2 (Low)
Soil Erosion	1	1	1	1	1 (Negligible)
Topography	1	1	1	1	1 (Negligible)
Air Pollution (including dust emission)	2	2	2	2	4 (Medium)
Greenhouse gas emissions	1	1	1	2	2 (Low)
Surface water/ Ground water contamination	2	2	2	2	4 (Medium)
Noise and vibration	2	2	2	1	2 (Low)
Solid waste generation	2	2	2	2	4 (Medium)
Changes to Natural Resources	2	3	2	2	6 (Medium)
Traffic flow	2	2	2	2	4 (Medium)
<b>- BE</b>					
Protected Area	-	-	-	-	N/A
Loss of wildlife (Endangered species – IUCN Red List)	-	-	-	-	N/A
Destruction of vegetation and expelling of wildlife to other places	1	2	1	1	2 (Low)
Disturbance to aquatic organisms and aquatic habitats	1	2	2	2	4 (Medium)
<b>- SE</b>					
Existing social infrastructures and services	2	2	2	2	4 (Medium)
Landscape and scenery	1	1	1	1	1 (Negligible)
Risks for infectious diseases such as AIDS/HIV	2	3	2	2	6 (Medium)
Occupational health and safety (Risk of injuries and accidents to workers)	2	2	2	2	4 (Medium)
Emergency risk (earthquake, risk of fire)	1	1	1	1	1 (Negligible)
Community Health and Safety	2	2	2	2	4 (Medium)

Type of impact

- (Negative Impact)

Impacted Environment

SE (Social Environment), PE (Physical Environment), BE (Biological Environment)

Impact Level Score is the combination of the ratings credited to magnitude, extent and duration.

These meanings are the same for all tables.

## Negative Impacts

### Physical Environment

#### Soil Degradation

The proposed development project is to be constructed on 555.81 acre of flat and swampy area which is located in Nyaung Hnitpin Livestock and Agricultural Zone 3. The project civil engineering works need to excavate, fill and cut a large quantity of volume of soil to get a correct slope and gradient at borrowed area and levelling at filling areas as per design. The top soil nutrient layers will be cut and removed and in some places soil from different places will be mixed. This will lead to the degradation of soil. The stacking of solid wastes, piling of construction materials, improper handling and stacking of soil, oil and lubricant spills from changing, repairing and removing parts of motor-powered construction machines, vehicles and instruments can cause contamination and degradation of soil. The significance level of impact is low.

#### Soil Erosion

The rainfall and the surface runoff can cause the soil erosion and especially it can happen when the excavated or borrowed soil are stacked on bare land. The significance level of impact is negligible.

#### Topography

The topography of some parts of project area may be changed because of the project buildings and structures. The significance level of impact is negligible.

#### Air Pollution (including dust emission)

The construction of proposed KMIC project will generate substantial quantities of dust at the construction site and its surroundings. The sources of dust emission will include site preparation, leveling, earthwork in excavation, landscaping, concrete mixing and vehicles which transport building materials and workers. Transportation of building materials from various sites to proposed work site will be used dusty branch road which turned to right from main road way of situated zone area. Emission of dust may lead to impact on workers and surrounding area during construction phase. The dust emission will be accentuated during winter and summer times.

Diesel combustion of construction machineries such as loaders, excavators, trucks, dumpers, bulldozers, backhoes, compactors, road rollers, graders, management vehicles, diesel generators and heavy-duty machineries will emit air pollutants such as carbon monoxide (CO), sulfur oxide (SO<sub>x</sub>), particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>), and nitrogen oxide (NO<sub>x</sub>). Such emissions and air pollution will affect human health such as respiratory problems. The significance level of impact is medium.

MSR survey team observed and collected samples at proposed site on (25 April 2017). Air quality Haz-scanner machine is installed at the proposed site (Coordinate 17° 8' 48.93"N, 96°

10' 12.93"E). Analytical data of air quality is analyzed and operated by Occupational and Environmental Health Laboratory experts, Ministry of Health.

### **Greenhouse gas emissions**

The greenhouse gases such as carbon dioxide (CO<sub>2</sub>), and nitrous oxide would be generated from the construction machineries and vehicles traffic during the construction phase. It can lead to the global warming and contribute to climate change. The significance level of impact is low.

### **Surface water/Ground water contamination**

The construction process of concrete foundations at the proposed project and other infrastructures will need to excavate surface earth. The deeply excavated foundation will pass through water layers and underground waterbody. The building process of these foundation needs to use cement and hardener chemicals and these materials will reach to ground water. Consequently, temporary contamination of ground water will occur during concrete construction. The negative impacts during construction phase, especially in rainy season are surface water and ground water contamination by stacking of solid waste, oil spill, improper storage of fuel oil, chemical and hazardous materials, piling of construction materials, transporting of materials and improper sewage disposal. The designated earthwork will change and contaminate the water layers and water ways.

The motor- powered construction machines on site will need to be regularly serviced. This requires continuous oiling to minimize the usual corrosion or wear and tear. Changing spare parts, repairing and removing parts need to be cleaned and washed by oil and lubricants. The oil and lubricant spills during these works can contaminate the surface water.

Existing groundwater range is about 1 meter depth at a surface water collected lake which is at the west north of the proposed land near main road. The significance level of impact is medium.

### **Noise and vibration**

Delivering of building materials by trucks, and operating earth moving machines, excavators, loaders, bulldozers, backhoes, metal cutters, compressors and concrete mixers will contribute a certain level of noise and vibration within the construction site and surrounding area. Higher noise level within the site can impose adverse impact on health of workers, and those are in vicinity of the project site. As crawling type earth moving machineries vibrate earth surface heavily, it can impose negative impact on natural habitat and native animals. The significance level of impact is low.

### **Solid waste generation**

During construction phase, large quantities of solid waste from site clearing, tree leaves, roots, cut logs, and other disposed materials will be generated as a result of the excavation and grading earth level at the site. Construction phase solid waste will consist of rejected parts of pre-casted concrete, solid components, surplus materials, rejected materials, papers, containers, broken bricks, solvent containers, empty paint drums, surplus oil and waste from workers. Such solid waste will be detrimental to the environment through blockage of drainage system, choking of water bodies, and also have negative impact on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as paints, solvent, cement, adhesives, and chemicals. Some of waste materials including plastic containers and plastic bags are not biodegradable and can have long term effects on the environment. The significance level of impact is medium.

### **Changes to Natural Resources**

During construction phase, a large volume of water will be required for different construction activities of different buildings and sanitary and washing purposes as well. The excessive and unsystematic utilization of water will impose negative impacts on the water resources and their sustainability.

A large amount of fuel will be used for the project to transport construction materials, run the construction vehicles and machineries and other associated activities. These fuels are fossil fuels and generally considered as non-renewable resources and the excessive use of these fossil fuels may have serious environmental implications.

At the same time, the project will use high consumption of electricity. The electricity will be supplied by government and installed from 230kV twin bundle double circuit Line from Tower No.142 Myaungtagar – Kamarnat National Grid. Total estimated consumption is 50 MW in operation phase. Hydropower and natural gas are natural resources of the country. In this regard, high consumption of electricity is negatively impacted to natural resources and their sustainability.

Some of the building materials such as hardcore, ballast, aggregates, rough stones, and sand will be obtained from quarries, sand yards, and mines and also the raw materials for making building materials such as mild steel, roofing sheet, brick, cement, glazed tile and shuttering wood will also be extracted from natural resource banks, namely, sea shore, rivers, hills, land and forest. Since substantial quantities of these materials will be required for construction work, the availability and sustainability of such resources will be affected in several ways. The significance level of impact on changes to natural resources is medium.

### **Traffic Flow**

During construction phase heavy machineries will be working at proposed site and only vehicles of office staffs and visitors will use access road way which is 9.14-kilometer distance from Yangon-Mandalay express high-way. During construction phase of proposed project, a few traffic congestions may occur by vehicles of construction site and vehicles of entry and exit to industrial zone. The significance level of impact is medium.

## **Biological Environment**

### **Protected areas**

There is no protected area in the proposed project area and surroundings.

### **Loss of wildlife**

There is no IUCN Red listed threatened species in the proposed project area and surroundings.

### **Destruction of vegetation and expelling of wildlife to other places**

Conversion of vegetation-covered land into industrial compound of the KMIC will involve land leveling and removal of trees and plants over the whole project site. This action will cause negative impact on wildlife and ecosystem of the current landscape and the area's vegetation which is largely composed of scrub, herbs, and grasses. No timber tree is present.

This means a negative impact on the current function of the fragile ecosystem of shrub-herb and semi-aquatic environment where terrestrial and aquatic organisms depend the formed food chain, as vegetation provides habitat and cover for organisms, as well as providing the stability of soil. The situation will force other wildlife migrate to other habitable places. The animals currently living in the project area will disappear. Animals such as long distance flying birds, some rodents, butterflies, bat and some mammals are enable to overcome the impact of habitat destruction, but some animal such as earth-dwelling arthropods, small insects and unmovable plants will face termination of life. The significance level of impact is low.

## **Disturbance to aquatic organisms and aquatic habitats**

Aquatic ecosystem of Hpaya Stream and project-site's surrounding waterways will be changed both in terms of drainage capacity and pollution level by faster run off from the project site and its waste water discharge.

Potential toxic effects to plants and animals as a result of air or water pollutant discharges or waste-disposal activities of industries will also have negative impact on surrounding ecological function. Therefore, number and species of current level existence of fishes and invertebrates including aquatic insects will decline along with the reduction of microorganisms. The significance level of impact is medium.

## **Social Environment**

### **Existing social infrastructures and services**

The existing social infrastructures and services such as health care center, clinic, school, market, shop, and emergency services for public safety will be accessed by additional construction workers during the construction phase and the availability of the services provided by these infrastructures and facilities for additional people is considerable and it can be a negative impact. The significance level of impact is medium.

### **Landscape and scenery**

The existing landscape and scenery (general appearance of the nature) will be totally changed. This significance level of impact is negligible.

### **Risks for infectious diseases**

The influx of construction workers from different areas of the country could bring different infectious diseases like Hepatitis, Malaria, Tuberculosis, and HIV/AIDS. These infectious diseases could spread between the workers and the local community and there is a possibility to increase the risks. The significance level of impact is medium.

### **Occupational Health and Safety (Risks of accidents and injuries to workers)**

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries and hazards due to human and workplace interactions. Because of the intensive engineering and construction activities, metal grinding and cutting, concrete work, scaffolding, steel erection and fastening, piling and welding and electricity using, traffic accidents, handling of heavy-duty machines and other works, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from using hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others. The significance level of impact is low. It's recommended an appropriate approach to ergonomics be sought Personal Protective Equipment (PPE) should be issued to all workers on site. Trainings on Fire Management, First Aid, occupational Health and Safety also be conducted occasionally. The significance level of impact is medium.

### **Emergency Risk**

During construction phase the improper storage and handling of fuels (loading, unloading), vehicle transporting petroleum products involving in accidents (collision, overturning), defective oil tightness integrity or incomplete closing of valves and connections, and not following no-naked flames warning signs will pose a risk of fire and explosion. There is also a possibility that if earthquake occurs the construction work structures would be collapsed. The significance level of impact is negligible.

### **Community Health and Safety**

It is anticipated that there will be an impact on community health and safety because of influx of construction workers (who might bring the infectious diseases) and increase of vehicle traffic (vehicular exhaust emissions can cause the pollution – related diseases including respiratory

problems, heart diseases, stroke, lung cancer, and chronic obstructive pulmonary disease). The increase of traffic and operation of construction machineries can also cause accidents to the local community and the injuries and even death is possible and hence the safety of the community is threatened. The significance level of impact is medium.

### **Positive Impact**

There are several potential positive impacts in social environment. These are mentioned below.

#### **Creation of employment opportunities**

Several employment opportunities will be created by different construction activities of the project. This will be a significant positive impact to the community nearby.

#### **Provision of market for supply of building materials**

The project will require supply of large quantities of building materials which will be sourced locally. This provides a market for building materials suppliers such as sand, gravel, stones, woods and hardware stores and individual with such materials.

#### **Increased business opportunities**

Requirement of a large number of project staff members and workers will create a market for various goods and services, leading to several business opportunities for small-scale traders such as food stalls near the construction site.

#### **Living and livelihood**

The increase of job opportunities as construction workers, technicians or increased business opportunities or provision of market for supply of building materials can positively change the living standards and livelihood of the community to some extent.

#### **Existing social infrastructures and services**

The social infrastructures will be improved due to the project (for instance. a new school will be built for the project as part of CSR program).

#### **Improved security in the neighboring area**

During construction phase, security persons will check and go around the perimeter of the project. They will serve 24 hours duty at site, and this will lead to improvement of security at surrounding area.

## 8.4.2 Potential Environmental Impacts during Operation Phase

Type of impact, impacted Environment and Environmental parameters	Score				Significance level of Impact = Impact Level Score x Receptor Sensitivity
	Extent	Duration	Magnitude	Receptor Sensitivity	
<b>- PE</b>					
Soil Degradation	2	2	2	2	4 (Medium)
Air Pollution (including dust emission)	2	1	2	2	4 (Medium)
Greenhouse gas emissions	2	2	2	2	4 (Medium)
Surface water/Ground water contamination	2	2	2	2	4 (Medium)
Increased water demand	2	3	2	2	6 (Medium)
Noise and vibration	2	2	2	2	4 (Medium)
Increased Solid waste generation	2	2	2	2	4 (Medium)
Increased wastewater generation	2	2	2	2	4 (Medium)
Hazardous waste generation	1	2	2	2	4 (Medium)
Changes to Natural Resources	2	2	2	2	4 (Medium)
Increased Traffic flow	2	2	2	2	4 (Medium)
Foul Odor and Vectors	1	2	2	2	4 (Medium)
<b>- BE</b>					
Changes to terrestrial flora and fauna	1	1	1	1	1 (Negligible)
Changes to aquatic flora and fauna	2	2	2	2	4 (Medium)
<b>- SE</b>					
Inconveniency with socio-economic change	1	1	1	2	2 (Low)
Community Health and Safety	2	2	2	2	4 (Medium)
Risk of injuries and accidents to workers	2	2	2	2	4 (Medium)
Light intrusion	1	2	2	2	4 (Medium)
Increased Emergency risk (risk of fire)	2	2	2	2	4 (Medium)

## **Negative Impact**

### **Physical Environment**

#### **Soil Degradation**

During operation phase, top soil layer can be degraded by domestic wastewater, oil leaks and spills from generators, transformer failure of electricity sub-station, process of usage, producing, storing, disposing and handling of oil, chemical, hazardous materials of different industries and factories (garment and textile, food and beverages processing, and assembling factories), pollution from stormwater runoff, leachate from improper dumping of solid waste, improper maintenance of water supply and wastewater system, drainage system, vehicles and equipment. The car parking, offices, wastewater treatment plant and other proposed project developments can also degrade the soil condition because of oil leaks and spills from the generators and other machinery and some activities of the developments. The significance level of impact is medium.

#### **Air Pollution (including Dust Emission)**

The fugitive dust emission can occur mainly because of the vehicular movement within the project area. The air quality can be chiefly impacted by the emissions of the factories and industries. The significance level of impact is medium.

#### **Greenhouse gas emissions**

The activities and sectors associated with the project: transportation, industry, commercial and residential will emit the greenhouse gases to the atmosphere and these gases are carbon dioxide, nitrous oxide, and fluorinated gases respectively. The significance level of impact is medium.

#### **Surface water/Ground water contamination**

During monsoon season, ground water level is higher than winter and summer times. Ground water and surface water will be contaminated because of handling of oil and solid waste. Without proper care, dumping solid waste may cause ground water and surface water sources contaminated and also form breeding area of mosquitoes and flies that will impose adverse effect on the health of people in these areas.

The water quality can be degraded by domestic wastewater, oil leaks and spills from generators, transformer failure of electricity sub-station, process of usage, producing, storing, disposing and handling of oil, chemical, hazardous materials of different industries and factories, pollution from stormwater runoff, leachate from dumping of solid waste, improper maintenance of water supply and wastewater system, drainage system, vehicles and equipment. The car parking, offices, water purification plant, wastewater treatment plant and other proposed project developments can also degrade the water quality because of oil leaks and spills from the generators and other machinery and some activities of the developments. The significance level of impact is medium.

#### **Increased water demand**

The amount of water consumption will be increased for the operation phase of the project due to different project structures and facilities.

The developer estimated total water usage demand is 12,400m<sup>3</sup> (3,275,733 gallons) per day, in which industrial plots will be using 7,800 m<sup>3</sup> (2,060,542 gallons) per day and living plots will be using 4,600 m<sup>3</sup> (1,215,191 gallons) per day. The developer planned to get water from Kalihtaw dam which is 20 kilometer away from KMIC site.

Excessive use of water and unnecessary use of water may negatively impact the water resource. Kalihtaw Dam is currently supplying to Nyaung Hnitpin Livestock and Agricultural Zone. The significance level of impact is medium.

### **Noise and vibration**

The impacts of noise and vibration by residents, traveling vehicles and industrial processes are expected during the operation stage. Delivering raw materials and products by cargo trucks and such as factories operating machinery, will contribute high level of noise and vibration within the site and surrounding area. Elevated noise level within the site can affect the workers. The significance level of impact is medium.

### **Increased Solid waste generation**

The project is expected to generate enormous volume of solid waste during its operation phase. The bulk of solid waste generated during the operation of the project will consist of papers, plastic bags, glass, metal, textiles, used containers, organic waste and disposed by workers, kitchen, room services, landscaping, cutting grass, trimming trees, annual painting, decoration and maintenance works. Such waste can be detrimental to the environment through blockage of drainage system, pipes, choking of water body and negative impacts on animal health. Some of these waste materials especially the plastic/ polythene are not biodegradable, can cause long- term injurious effects to the environment. The significance level of impact is medium.

### **Increased wastewater generation**

The wastewater disposed from different project buildings, facilities and developments will be increasing during the operation phase. Among them, the industrial wastewater will have more negative impact on the surrounding environment. The significance level of impact is medium.

### **Hazardous waste generation**

The hazardous waste can be largely generated from different processes of industries. The significance level of impact is medium.

### **Changes to Natural Resources**

During operation phase, more energy, and water will be utilized for different project activities and it will have impacts on natural resources to a certain extent. The developer is planned to use government electrical supply which will be installed from 230kV twin bundle double circuit line from Tower No.142 Myaungtagar – Kamarnat National Grid. For back-up source, the developer will use diesel generators. Since electricity generation involves utilization of natural resources such as hydropower, natural gas and diesel fuels, excessive electricity consumption will strain the resources and have negative impact on their sustainability. The significance level of impact is medium.

### **Increased Traffic Flow**

During operation phase of the proposed project, many raw materials will be distributed to the respective ware house of the compound. Cargo trucks will enter and exit along the road way carrying raw materials and delivering finished products. Office vehicles and buses also will be using the access road. Existing road is not wide enough for industrial zone. The developer planned to upgrade 2 lane road to 4 land road. The significance level of impact is medium.

### **Foul Odor and Vectors**

Especially, the sludge and bio-solid handling in the wastewater treatment plant and waste dumping ground are the sources of foul odor and they can attract the vectors. The significance level of impact is medium.

## **Biological Environment**

### **Changes to terrestrial flora and fauna**

Due to operation works terrestrial flora and fauna will be impacted. The significance level of impact is negligible.

### **Changes to aquatic flora and fauna**

Due to operation works aquatic flora and fauna will be impacted. The significance level of impact is medium.

## **Social Environment**

### **Inconveniency with socio-economic change**

This impact will be resulted from increased activities with growing economy spilled from the development of the industrial zone. Residents may need to give up their current means of livelihood and adapt themselves to new ways of making a living that come along with the development. They will also have to interact with migrant population, who will be visiting or residing in their areas. The significance level of impact is low.

### **Community Health and Safety**

There will be food and beverages processing, textile and garment factories and vehicle spare parts and electronic parts installation factories, operating in the industrial complex. The emissions and waste disposed from these factories may have impact on the health of communities. The increased traffic flow due to the project operation will possibly threaten the safety of surrounding communities on account of traffic accidents. The significance level of impact is medium.

### **Risk of injuries and accidents to workers**

During operation of the proposed project, it is expected that operation workers are likely to have accidental injuries and hazards due to human and workplace interactions. The workers will be exposed to risks of accidents and injuries at maintenance and operation. Such injuries can result from accidental falls from high elevations, injuries from hand tools and operation equipment cuts from sharp edges of metal sheets and collapse of building sections among others. It's recommended an appropriate approach to ergonomics be sought Personal Protective Equipment (PPE) should be issued to all workers on site. Trainings on Fire Management, First Aid, occupational Health and Safety also be conducted occasionally. The significance level of impact is medium.

### **Light Intrusion**

The light pollution resulting from the substation's security lighting at night is also considered as impact on the neighboring properties. The significance level of impact is medium.

### **Increased Emergency Risk**

The fire risk can be most expected from operation of different project activities. The fire occurrences are associated with the activities of gas station such as fuels receipt, fuels storage and vehicles supply. For the electricity sub-station, a failure of one or more transformers could cause fire and spillage of the purified mineral oil used for insulation and coolant. In the case of a fire, the products of combustion would be released to the surrounding environment and these products are mainly carbon soot, carbon monoxide and carbon dioxide. The significance level of impact is medium.

### **Positive Impact**

There will be some positive impacts in the social environment and these impacts can be seen below.

### **Optimal Land Use**

The land will be used as the industrial complex to full potential for the benefit of the local and regional people. It will also be beneficial for the nation.

### **Creation of employment opportunities**

Total 800,000 job opportunities will be created. Local workers, local graduates will have a chance to get employment at operational phase of this project. This will help reduce the unemployment problem of people including graduates residing nearby. The skills development training programs will be provided to those who need them and improved living conditions with the development of local economy.

### **Increased business opportunities**

The requirement of a large number of project staff members and workers for the project operation will create a market for various goods and services, leading to several business opportunities for small-scale traders such as food stalls near the project area.

### **Increase in Revenue to Region and Union governments**

Through payment of relevant taxes such as properties tax, income tax and other fees to local authorities, revenue department and other related offices, the Region and Union government will earn revenue. Implementation of the Korea Myanmar Industrial complex will contribute to national industrial growth and GDP will also be increased.

### **Improvement of social infrastructure and services**

After completion of construction phase and starting operation phase, the company will contribute surrounding area by developing and providing assistance to schools, clinics, roads, bridges and other infrastructure works and services as CSR program. This will lead to improvement of surrounding villages by developing the proposed project.

### **Provision of quality fuel (gas) at a reasonable price**

The quality fuel (gas) could be purchased in the local area at a reasonable price and consequently the transportation costs for goods and persons will be lowered.

### **Improving aesthetic by planting flowers and landscaping**

The project will include green areas (parks and gardens) for the public and the aesthetical value of the area would be increased.

### 8.4.3 Potential Environmental Impacts during Decommissioning/Closure Phase

Type of impact, impacted Environment and Environmental parameters	Score				Significance level of Impact = Impact Level (Extent + Duration + Magnitude) x Receptor Sensitivity
	Extent	Duration	Magnitude	Receptor Sensitivity	
<b>- PE</b>					
Air Pollution (including Dust Emission)	2	2	2	2	4 (Medium)
Greenhouse gas emissions	1	1	1	2	2 (Low)
Surface water/Ground water contamination	2	2	2	2	4 (Medium)
Noise and vibration	2	2	2	1	2 (Low)
Waste generation (Solid, Wastewater, Hazardous)	2	2	2	2	4 (Medium)
<b>- SE</b>					
Living and Livelihood	2	3	2	2	6 (Medium)
Risks for Infectious disease such as AIDS/HIV	2	3	2	2	6 (Medium)
Occupational Health and Safety	2	2	2	2	4 (Medium)
Community Health and Safety	2	2	2	2	4 (Medium)

#### Negative Impacts

##### Physical Environment

##### Air Pollution (including Dust Emission)

The demolishing of buildings and structures will cause dust emission and the emission gases from construction vehicles travelling around the area during the decommissioning and closing phase will cause air pollution. The significance level of impact is medium.

##### Greenhouse gas emissions

The exhaust emission of construction vehicles (including trucks for collecting demolition waste) can emit greenhouse gases and it will lead to the global warming. The significance level of impact is low.

##### Surface water contamination

The surface water can be contaminated due to wastewater quality caused by demolition work. The significance level of impact is medium.

#### **Noise and vibration**

The noise and vibration can occur from manual work or machinery and vehicles during the demolition work. The significance level of impact is low.

#### **Waste generation (Solid, wastewater and Hazardous)**

The hazardous and non-hazardous solid waste will be generated from demolition work. The significance level of impact is medium.

#### **Social Environment**

##### **Living and Livelihood**

Due to the termination of the operation of the project, some people would lose their job and income as well. Therefore, their living and livelihood will be impacted and changed. The significance level of impact is medium.

##### **Risks for Infectious disease such as AIDS/HIV**

There will be a flux of workers from local or other regions for the demolition work and the risk for communicable and vector-borne diseases are expected among the workers and the surrounding local people. The significance level of impact is medium.

##### **Occupational Health and Safety**

The occupational health and safety are expected because of the demolished work. The significance level of impact is medium.

##### **Community Health and Safety**

The community health and safety can be impacted due to the influx of labors for demolishing buildings and structures. The significance level of impact is medium.

#### **Positive Impacts**

As the positive impact, the natural habitat, land cover or vegetation could be regenerated. After the demolition and closure of the project, the damaged land could be reclaimed and revegetated, and it will regenerate the natural habitat, land cover and vegetation. Consequently, the decline of aquatic and terrestrial fauna and flora can be reversed.

## 8.5 7.5 Risk Assessment

Risk is analyzed by estimating the likelihood of the event occurring and the consequences or impact of the event if it does occur as well as the amount of control one has over the event.

Probability of occurrence		Seriousness of Impact		Degree of Control	
Almost certain	8	Major	8	High	2.5
Likely	6	High	6	Moderate	2
Moderate	4	Moderate	4	Low	1.5
Unlikely	2	Low	2	None	1

$$\text{Risk Index} = \frac{\text{Probability} \times \text{Impact}}{\text{Control}}$$

Risk Index	
Low Risk	2-12
Moderate Risk	13-18
Significant Risk	19-36
High Risk	37-64

Risk Index	Definition
Low	A risk at this level – if it occurs – will have a minor impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below goals but well above minimum acceptable levels.
Moderate	A risk at this level – if it occurs – will have a moderate impact on achieving desired results, to the extent that one or more stated outcome objectives will fall well below goals but above minimum acceptable levels.
Significant	A risk at this level – if it occurs – will have a significant impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below acceptable levels.
High	A risk at this level – if it occurs – will have a severe impact on achieving desired results, to the extent that one or more of its critical outcome objectives will not be achieved.

**8.5.1 7.5.1 Construction Phase**

Impact	Probability of occurrence	Seriousness of Impact	Degree of Control	Risk Index	RISK LEVEL
<b>Physical Environment</b>					
Soil Degradation	8	4	2	16	Moderate Risk
Soil Erosion	6	4	2	12	Low Risk
Topography	4	2	2.5	3.2	Low Risk
Air Pollution (including Dust Emission)	8	6	2	24	Significant Risk
Greenhouse gas emissions	6	6	2	18	Moderate Risk
Surface water/Ground water contamination	8	6	2.5	19.2	Significant Risk
Noise & Vibration	8	6	2	24	Significant Risk
Solid waste generation	8	6	2	24	Significant Risk
Changes to Natural Resources	6	4	2	12	Low Risk
Traffic Flow	8	4	2	16	Moderate Risk
<b>Biological Environment</b>					
Destruction of vegetation and expelling of wildlife to other places	6	4	2	12	Low Risk
Disturbance to aquatic organisms and aquatic habitats	6	4	2	12	Low Risk
<b>Social Environment</b>					
Existing social infrastructures and services	6	4	2	12	Low Risk
Landscape and scenery	6	4	2	12	Low Risk
Risks for infectious diseases such as AIDS/HIV	8	4	2	16	Moderate Risk
Occupational health and safety	8	4	2	16	Moderate Risk
Emergency risk (earthquake, risk of fire)	6	4	2	12	Low Risk

Community Health and Safety	6	4	2	12	Low Risk
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### 8.5.2 Operation Phase

Impact	Probability of occurrence	Seriousness of Impact	Degree of Control	Risk Index	RISK LEVEL
Soil Degradation	6	4	2	12	Low Risk
Air Pollution (including dust emission)	8	4	2	16	Moderate Risk
Greenhouse gas emissions	6	4	2.5	9.6	Low Risk
Surface water/Ground water contamination	6	4	2	12	Low Risk
Increased water demand	8	4	2	16	Moderate Risk
Noise and vibration	8	4	2	16	Moderate Risk
Increased Solid waste generation	8	4	2	16	Moderate Risk
Increased wastewater generation	8	4	2	16	Moderate Risk
Hazardous waste generation	8	4	2	16	Moderate Risk
Changes to Natural Resources	8	4	2	16	Moderate Risk
Increased Traffic flow	8	6	2.5	19.2	Moderate Risk
Foul Odor and Vectors	6	4	2	12	Low Risk
<b>Biological Environment</b>					
Changes to terrestrial flora and fauna	6	4	2	12	Low Risk

Changes to aquatic flora and fauna	4	4	2	8	Low Risk
<b>Social Environment</b>					
Inconveniency with socio-economic change	6	4	1.5	16	Moderate Risk
Community Health and Safety	6	4	2.5	9.6	Low Risk
Risk of injuries and accidents to workers	6	4	2.5	9.6	Low Risk
Light intrusion	6	4	2	12	Low Risk
Increased Emergency risk (risk of fire)	6	4	2	12	Low Risk

### 8.5.3 Decommissioning Phase

Impact	Probability of occurrence	Seriousness of Impact	Degree of Control	Risk Index	RISK LEVEL
<b>Physical Environment</b>					
Air Pollution (including Dust Emission)	8	6	2	24	Significant Risk
Greenhouse gas emissions	6	4	2	12	Low Risk
Surface water/Ground water contamination	6	4	2	12	Low Risk
Noise and vibration	8	4	2	16	Moderate Risk
Waste generation (Solid, Wastewater, Hazardous)	8	6	2	24	Significant Risk
<b>Social Environment</b>					
Living and Livelihood	8	4	2	16	Moderate Risk

Risks for Infectious disease such as AIDS/HIV	6	4	2	12	Low Risk
Occupational Health and Safety	6	4	2	12	Low Risk
Community Health and Safety	6	4	2	12	Low Risk

## 9. MITIGATION MEASURES AND MONITORING

This chapter outlines the necessary mitigation measures that will be adopted to prevent or minimize significant negative environmental impacts associated with the activities of the project during Construction Phase, Operation Phase and Decommissioning Phase.

### 9.1 Construction Phase

#### 9.1.1 Physical Environmental Impact Mitigation Measures

##### Soil Degradation

The soil degradation during construction phase will be mitigated by the following measures: avoidance of unnecessary cutting and removing of trees and vegetation, controlling earthwork and compacting loose soil, installation and construction of drainage structure properly, landscaping, ensuring supervision of excavation activities (especially during rainy season), providing soil erosion control and conservation structure where necessary, restriction of access only to construction site yard and monitoring and maintenance of drainage system.

Topsoil should only be exposed for minimal periods of time and adequately stockpiled to prevent the topsoil loss and runoff. It must be ensured that the stockpiles generated on site must be used as natural material for landscaping of the work site and to develop in-situ stormwater attenuation or abutments, rather than stockpile for disposal as a waste material. The stripped top soil prior to any construction activities will be reused to rehabilitate disturbed areas. Topsoil will be kept separate from overburden and will not be used for building purposes or maintenance or road maintenance/works.

##### Soil Erosion

In the rainy season of during construction phase, soil erosion will be occurred due to the construction activities, surface and stormwater runoff. During rainy season, to control soil erosion and land slide at site, it is needed to control the velocity of rain water and it will be made to ensure that levelling the drains can be minimized at construction phase. Construction of concrete drains at steep levels and proper gradient at temporary drain can control the velocity of rain water and unnecessary erosion. The clearance of vegetation will be minimized to avoid exposure of soil, only alien vegetation which constitutes the majority of vegetation on site, must be removed – where there is work/construction. The areas susceptible to erosion will be protected with mulch or a suitable alternative.

##### Topography

The shape and features of land surfaces will be maintained as much as possible by designing and constructing buildings and structures of the project.

##### Air Pollution (including Dust Emission)

Dust emission during construction phase will be minimized through restricted speed control of earth moving machines, transport buses and traffic within the project site. Pouring water on road ways at site and excavated area, cutting area, filling area and compacting area will reduce rising of dust in dry season. The contractor will install a wash deck at the exit way of the site to remove mud from vehicles which may become dust around the site and along the main road. Trucks need to be installed with proper covers when carrying sand, river shingles and cement to avoid falling down along the main road and emission of particulates. Notice and caution signs of “Dusty Area” will be erected around the project areas for the awareness of the people. The workers will be provided with facial masks to wear in the project site.

The air pollution mitigation measures which will be adopted by the project are regular maintenance of construction plants and equipment, prohibiting unnecessary driving and moving at site and idling of vehicles, strictly prohibition of open fire burning of materials or wastes, permanent monitoring to minimize emissions of pollutant, ensuring using no materials

and substances emitting toxic and carcinogenic substances, and proper storage of chemical and emitted construction materials. There will be a notice to the workers and surrounding environment that it is the “Expected Air Pollution Area”. Caution signs to wear masks will be posted and the workers will be provided with masks to wear. The visitors to the site have also to wear the masks.

### **Greenhouse gas emissions**

The mitigation measures for reducing greenhouse gas emissions are conducting training to raise the awareness of drivers, operators and concerned staff on greenhouse emissions and mitigation measures, prohibiting unnecessary driving and moving at site and idling of vehicles and construction machineries as well, the regular maintenance of vehicles and machineries will be done, the efficient use of vehicles (car-pooling and if possible a truck will be used for two purposes at the same time – unloading of building materials and loading of construction wastes) and machineries will be applied. The construction engineers and project managers will formulate the construction management procedures including the efficient use of construction vehicles and machineries and it will ensure the reduction of greenhouse gas emissions during the construction phase.

The site offices will be designed and constructed as much as possible to get the natural light and ventilation. These offices will also be using solar power for lighting and other domestic purposes like showering. The climate – friendly refrigeration and air conditioning will be used to avoid the fluorinated greenhouse gas (Hydrofluorocarbons (HCFs)) emissions.

### **Surface water/Ground water contamination**

In order to reduce or avoid the surface and ground water contamination, the sedimentation basin will be built on a construction site to capture the disturbed soil which is washed off during rainfall and lead to protection of the water quality of surface and ground water. The sand traps will also be constructed to settle the sand at the bottom and store the deposited sand. The systematic stacking and piling of materials on site, the regular solid waste disposal at the dumping site designated by the local municipality, avoidance of hazardous wastes disposal in drinking-water sources, adopting the proper waste management system, regular maintenance and check of the machineries, vehicles and sources which can cause oil spill and hazardous chemical spills (if found, the immediate repair and cleansing will be conducted), systematic storage of fuels and filling station at construction site yard compound, handling and disposal of new oil and used oil waste, provision of impervious basement at operation area to prevent oil spill when heavy machineries are working, daily checking to earth moving machines by motor transport officer before start engines, and providing a good pavement at machine workshop and garage are the mitigation measures for the project to avoid the surface/ground water contamination.

The proper sanitation system for the construction workers and project staff will also be applied and that system covering the following aspects: considering and calculation of the set-back distances for sanitation facilities in relation to travel time to aquifer, locating sewers outside drinking-water sources, ensuring sufficient distance (at least 2 m) between base of latrine pit, soakaway or infiltration trench and highest water table, constructing and maintaining vault latrine pits impermeable, fitting sewers with linings to reduce breakage, fitting waste stabilization ponds with linings, maintaining on-site sanitation facilities in good condition and encouraging to use, preventing sewer leakage and implementation of adequate final disposal of sludge as permitted by the local municipality.

### **Noise and vibration**

The drivers and operators of construction vehicles and machineries will be trained how to reduce the noise from their operations, and the construction activities will be restricted in night times. The regular maintenance of vehicles and machineries and wearing the ear muffs (hearing protection devices) can also protect the noise and vibration. The noise will be strictly

maintained within the noise level (National Environmental Quality Emission Guidelines) set by Ministry of Natural Resources and Environmental Conservation.

The following measures will also be adopted: using sound absorb, sound proof engines at construction site and proper maintenance, enclosing noisy outdoor engines and generators in sound proof wall or buildings, regular checking and maintenance to silencers of engines and conserving trees around the site as some buffers against noise.

### **Solid waste generation**

The following practices will be exercised as mitigation measures: unnecessary cutting and removing of vegetation plants, developing drawing and land survey map to follow as drawing of landscaping procedure, producing a precise construction drawing to avoid unnecessary cutting and filling of earth work and excavation work, ensuring calculation and estimation of materials requirement to avoid excessive purchase, ensuring purchase of materials and stacking at collection yard and ware houses, providing dust bins and skips at appropriate places painting different colors for hazardous substances and biodegradable substances, providing facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure, periodically disposal of solid waste at permitted dumping sites and proper loading and unloading at garbage truck and educating workers to dispose waste properly. If possible, the recycling and refurbishment of solid waste will be done to reduce the amount and volume of construction debris.

### **Changes to Natural Resources**

In order to reduce the natural resources depletion, calculation and estimation of material requirement will be ensured to avoid excessive purchase, and the accurate quantities of materials will be ordered and collected. The efficient use of fuel, electricity, water and office stationery will be applied. During rainy season of construction phase, rain water will be collected and used for concrete curing works, pouring water on roadways and washing purpose. The reusable materials will be reused by the project. The recyclables will be sent to the local recyclers.

### **Traffic flow**

The mitigation measures such as proper planning of transportation of construction materials (will reduce unnecessary traffic congestion), provision of traffic management staff at site and junctions, installation of road signs and traffic signals at along the way of work site, main road, cross roads, approach roads, to notify stakeholders of the development, enforcing speed limit to all vehicles which are transporting materials and accessing the site. The project will also follow the general EHS guidelines set by International Finance Corporation (IFC), World Bank Group mentioned below.

- Emphasizing safety aspects among drivers;
- Improving driving skills and requiring licensing of drivers;
- Adopting limits for trip duration and arranging driver rosters to avoid overtiredness; and
- Avoiding dangerous routes and times of day to reduce the risk of accidents.

Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

### **9.1.2 Biological Environmental Mitigation Measures**

#### **Destruction of vegetation and expelling of wildlife**

The plants in this site and surrounding and the potential impact on animals may not be necessarily significant either as the animals around the site would have run away with fear by the activities of construction and move further away into nearby forests. Therefore, the developer will make the proper demarcation of the project area that would be affected by construction works. This is aimed at ensuring that any disturbance to flora and fauna is restricted to the actual project area and avoid spillover effects on the neighboring areas. There will also be strict control of construction vehicles to ensure the avoidance of unnecessary disturbance of vegetation. The mitigation measures (for e.g. replantation with native species, leaving native trees/plants and supporting Environmental Education and Public Participation and Environmental Protection activities through CSR programs) would be adopted.

#### **Disturbance to aquatic organisms and aquatic habitats**

The decline of biodiversity (loss of species in aquatic environment) will be mitigated by banning fishing in fish spawning season and electric shock catching.

The following mitigation measures to minimize the negative impact to the biological environment will also be adopted by the developer:

- All the marginal and common lands available in the nearby area would be brought into a plantation program giving priority to native species for good green cover.
- Biological mitigation measures which were suggested for impacts to vegetation is providing the implementation of revalidation programs elsewhere outside of the project site which store top soil for reapplication. Replacing or restoring the vegetation is the most critical of all mitigation activities if the environmental impacts to the biological environment are to be minimized.
- Community Forestry (people's committee at village level) would be placed in the center of redevelopment efforts so as to provide protection of common property resources, local employment, and local people's participation (including women).
- Raising public awareness upon presence of healthy ecosystems where trees and wildlife including micro-organisms and invertebrates should be present to maintain food-chains, food-webs, and biogeochemical cycles balanced would be strengthened assisting with an environmental education program.

### **9.1.3 Social Environmental Mitigation Measures**

#### **Existing social infrastructures and services**

The existing social infrastructures and services will be upgraded and expanded as CSR program of the project to meet the needs of the local people and the additional construction workers.

#### **Landscape and scenery**

The architectural design, height and color of the buildings and structures will be developed by taking the visual impacts of these structures into account. The factors related to the design of the building structures, distance between the viewer and these buildings, setting of the tower including the space between these buildings and the viewer, the degree to which these buildings are visible, and the disposition and visual preferences of those who observe these buildings and structures will also be assessed before designing and construction stages.

The visual impacts of the electricity substation will be mitigated by the control measures:

- ✓ Placing the structures in such a manner as to maximize the buffer zone between the structures and the roads
- ✓ The retention of as much existing vegetation as possible, specifically the existing mature trees in the area

- ✓ The use of stepping in the building platform to minimize cut-and-fill areas and the lowering of the structures into the site as much as possible
- ✓ The establishment of climbing plants on sections of the perimeter fencing for safety and security considerations. Such planting will be done with specific viewpoints in mind and be used to break the monolithic nature or soften the visual impact of the development from those specific viewpoints.
- ✓ All lighting, especially perimeter security lighting will be shielded to minimize light spillage and pollution. No direct light sources will be seen from outside the site.
- ✓ Signage will be simple and unobtrusive

### **Risks for infectious diseases such as AIDS/HIV**

The project will follow the general EHS guidelines set by International Finance Corporation, World Bank Group. The interventions for communicable diseases will be as follows: providing surveillance and active screening and treatment of workers, preventing illness among workers in local communities (undertaking health awareness and education initiatives, training health workers in disease treatment, conducting immunization programs for workers in local community to improve health and guard against infection, providing health services), providing treatment through standard case management in on-site or community health care facilities, promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization. For the vector-borne diseases, the mitigation measures are prevention of larval and adult propagation through sanitary improvements and elimination of breeding grounds close to human settlements, elimination of unusable impounded water, increase in water velocity in natural and artificial channels, implementation of integrated vector control programs, promoting use of repellents, clothing, netting and other barriers to prevent insect bites, use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs, monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread, collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects, educating project personnel and local residents on risks, prevention and available treatment, monitoring communities during high-risk seasons to detect and treat cases, distributing appropriate education materials and following safety guidelines for the storage, transport and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure.

### **Occupational health and safety (Risk of injuries and accidents to workers)**

The company has guidelines and procedures for occupational health and safety. (Please see in the Annex section).

### **Emergency risk (risk of fire, earthquake)**

The company has guidelines and procedures for emergency risk responses. (Please see in the Annex section).

### **Community Health and Safety**

The project will follow the general EHS guidelines set by International Finance Corporation (IFC), World Bank Group.

<b>Parameter</b>	<b>Control Measures</b>
Water Quality	Drinking water sources – at all times be protected.
	Delivery of water to the community or to users of facility infrastructure – water quality needs to comply with National Acceptability Standards (or in their absence the current edition of with WHO Drinking Water Guidelines)

Water Availability	Potential effect of groundwater or surface water abstraction for project activities would be properly assessed accounting for seasonal variability and projected changes in demand in the project area.
Structural Safety of Project Infrastructure	<p>Buffer strips or other methods of physical separation around project sites will be included to protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odor or other emissions.</p> <p>The siting and safety engineering criteria will be incorporated to prevent failures due to natural disasters.</p> <p>Myanmar National Building Code (2016) will be applied to ensure structures are designed and constructed in accordance with sound architectural and engineering practice, including aspects of fire prevention and response.</p> <p>Hazardous materials storage, handling and use will be managed to reduce or eliminate consequences of the potential off-site release.</p>
Life and Fire Safety	The new buildings and facilities which can be assessed by the public will be designed, constructed and operated in full compliance with Myanmar National Building Code (2016), Myanmar Fire Services Department regulations and other local legal/insurance requirements.
Traffic Safety	<p>Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</p> <ul style="list-style-type: none"> <li>• Emphasizing safety aspects among drivers</li> <li>• Improving driving skills and requiring licensing of drivers</li> <li>• Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>• Avoiding dangerous routes and times of day to reduce the risk of accidents</li> </ul> <p>Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</p> <p>Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, the following measures will be applied:</p> <ul style="list-style-type: none"> <li>• Minimizing pedestrian interaction with construction vehicles</li> <li>• Collaboration with local authorities (traffic police unit) and local communities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations (hospital). Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaign)</li> <li>• Coordination with emergency responders (Government hospital or local social and health associations) to ensure that appropriate first aid is provided in the event of accidents</li> </ul>

	<ul style="list-style-type: none"> <li>Using locally sourced materials, whenever possible, to minimize transport distances. Locating worker camps close to project sites and arranging worker transport system to minimizing external traffic</li> <li>Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions</li> </ul>
Transport of Hazardous Materials	<p>Project will have procedures ensuring the compliance with local laws and requirements applicable to the transport of hazardous materials. The procedures will be:</p> <ul style="list-style-type: none"> <li>Proper labeling of containers, including the identity and quantity of the contents, hazards, and shipper contact information</li> <li>Providing a shipping document (e.g. shipping manifest) describing the contents of the load and its associated hazards in addition to the labeling of the containers.</li> <li>Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved</li> <li>Ensuring adequate transport vehicle specifications</li> <li>Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures</li> <li>Using labeling and placarding (external signs on transport vehicles) as required</li> <li>Providing the necessary means for emergency response</li> </ul>
Disease Prevention	Communicable Diseases and Vector-Borne Diseases – Please see in the “Risks for infectious diseases such as AIDS/HIV” section above.
Emergency Preparedness and Response	If there is a risk to the local community from a potential emergency arising at the project site, the company will inform the community through the communication measures, namely, informing the local authorities, communicating details of the nature of emergency, communicating protection options (evacuation, quarantine), providing advices on selecting an appropriate option and vehicle mounted speakers.

## 9.2 Operation Phase

### 9.2.1 Physical Environmental Mitigation Measures

#### Soil Degradation

To mitigate soil degradation due to the oil (purified mineral oil used for insulation and coolant) leaks of the transformer, the substation complex will have bunded detention ponds to contain an oil spill. To avoid soil degradation by wastewater, the wastewater treatment plant will be constructed in the project area and that plant will treat the domestic and industrial wastewater before discharging to the waterway nearby.

The project will construct a structure (building) to receive the solid waste generated from different activities and facilities. The building will have a hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. The storage area will be secured by locks with restricted access and designed for access and regular cleaning by

authorized cleaning staff and vehicles. It will also be protected from sun, and inaccessible to animals/rodents. The solid waste will be temporarily stored in skips before collection of the local municipality is done.

Each development will have the following procedures adopted for oil spills mitigation.

- All development/activity - related machinery will be thoroughly checked not to leak oils on the ground and regular maintenance of the machinery will be done.
- All maintenance works will be carried out in a designated area and where oil spills are totally restrained from reaching the ground. Such areas will be cemented and enclosed to avoid storm water from carrying away oil into the soil.
- Car wash areas and other places handling oil activities within the site will be well managed and the drains from these areas controlled.

### **Air Pollution (including Dust Emission)**

Dust emission during operation phase will be minimized through restricted speed control of transport buses and traffic within the project site.

The emissions of the factories and industries will be controlled by different technologies and technical measures not to exceed General Guidelines for Air Emissions described in National Environmental Quality Emission Guidelines. For the parameters not included in the National Environmental Quality Emission Guidelines, "Air Quality Guidelines for Europe, 1997. WHO Regional Publications, European Series No. 23. World Health Organization" will be followed.

All fuel will be sourced from trusted sources that have employed the necessary steps to eliminate lead and reduce Sulphur content.

### **Greenhouse gas emissions**

The greenhouse gas emissions can be controlled by energy use efficiency, process modification, selection of fuels or other materials, the processing of which may result in less emission, application of emission control techniques, if possible. For the time being, the exact information of type of industries to be allocated in the project is not available and hence the specific control measures for every single factory and manufacturing cannot be mentioned at this point. There will be an EIA process for individual industrial development and project activities. Residents and staff/employee of residential areas and offices and other development/facilities will do the following practice:

- Using natural light as much as possible (and using energy efficient electrical appliances like energy - saving light bulbs)
- Keeping windows shut when HVAC is in use, but employing natural ventilation whenever possible
- Unplugging TVs, AV equipment, and phone chargers when not in use
- Turning off the lights and computer when leaving the office
- Recycling and/or reusing as many waste materials as possible
- Biking or walking to work if possible (OR) arranging bus for the workers
- Using the environmentally friendly airconditioners and refrigerators to avoid or reduce the emission of fluorinated gases

### **Surface water/Ground water contamination**

The wastewater treatment plant will be constructed in the project area and that plant will treat the domestic and industrial wastewater before discharging to the waterway nearby. The project will construct a structure (building) to receive the solid waste generated from different activities and facilities. The building will have a hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. The storage area will be secured by locks with restricted access and designed for access and regular cleaning by

authorized cleaning staff and vehicles. It will also be protected from sun, and inaccessible to animals/rodents. The solid waste will be temporarily stored in skips before collection of the local municipality is done.

Each development will have the following procedures adopted for oil spills mitigation.

- All development/activity - related machinery will be thoroughly checked not to leak oils on the ground and regular maintenance of the machinery will be done.
- All maintenance works will be carried out in a designated area and where oil spills are totally restrained from reaching the ground. Such areas will be cemented and enclosed to avoid storm water from carrying away oil into the soil.
- Car wash areas and other places handling oil activities within the site will be well managed and the drains from these areas controlled.

### **Increased water demand**

Residents and responsible persons of each development/facility will be encouraged to use rainwater harvesting tanks to collect rainwater. The water connections, pipes and taps will be checked regularly to avoid any leaks and wastages.

### **Noise and vibration**

In the operation stage, the potential main sources of noise and vibration are processing factories and assembling factories, wastewater treatment plant, and residential area and commercial area. If necessary, the sound barrier, and sound absorbing materials will be prepared and installed at the facilities. The vibration control devices for equipment and design of the structure to disconnect between the sources and ground will be considered and applied as needed. The outside standard working hours such as weekend, evening or night-time works will be controlled and limited. If there is no negative impact on the community, these works will be allowed. However, the noise level of operation of all facilities and structures will be within the acceptable limit stipulated in National Environmental Quality Emission Guidelines.

### **Increased Solid waste generation**

During operation phase, a large quantity of solid wastes will be generated, and solid waste will be collected separately for industrial waste and domestic waste. Some types of organic waste from industrial solid waste and domestic solid waste will be sorted for reusing and recycling if possible. The project will accept and implement the basic concept of 3Rs (Reduce, Reuse and Recycle) for reducing solid waste generation and it has developed the Non-hazardous solid waste management plan to be followed by every tenant, worker and staff of the project. The non-hazardous solid waste management plan contains the following procedures and processes.

#### ***Non-Hazardous Solid Waste Management Plan***

Waste minimization (Reduction at source)

Source reduction includes technological efficiency, material substitute and good management practice.

Waste segregation and disposal

The domestic waste (general waste), and recyclable wastes would be segregated and disposed in the relevant dust bins by the users. Three types of dust bins would be provided at every building and different spot (garden, along the walking path, corridor, etc.) of the of the compound. The signs and materials to be disposed will be stuck on each trash bin.

Waste collection

The waste generated by residents, staff, and employees would be collected on a daily basis by the cleaners and stored in the waste dumping facility (waste transfer station). The system

requires use of a special container, truck container pick-up equipment, and replacement of the container.

#### Waste Transfer station

The waste transfer station is used to collect the refuse at a central location and to reload the wastes into a garbage truck of township municipality. The transfer station may include stationary compactors, recycling bins, material recovery facility, transfer containers and trailers, transfer packer trailers, or mobile equipment. It is designed with drainage of paved areas and adequate water hydrants for maintenance of cleanliness and fire control and other concerns like land scaling, weight scales, traffic, odor, dust, litter and noise control. Some wastes would be used for composting.

The project will construct a structure (building) to receive the solid waste generated from different activities and facilities. The building will have a hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. The storage area will be secured by locks with restricted access and designed for access and regular cleaning by authorized cleaning staff and vehicles. It will also be protected from sun, and inaccessible to animals/rodents. The solid waste will be temporarily stored in skips before collection of the local municipality is done.

#### Final collection of Waste

The frequency of solid waste collection will be at least twice-a-week by the township municipality.

Note: The 3Rs (Reduce, reuse and recycle) practice would be applied in the whole compound and especially in offices, industries, and commercial areas where office stationeries and different reusable and recyclable materials are being used. Trainings related to the non-hazardous solid waste management will be conducted for all concerned persons.

#### Increased wastewater generation

The design of sewage collection and treatment for the proposed project is a central control system and all sewage and wastewater will be collected at the treatment plant. The effluent levels of final treated water to be disposed to waterway will be following the National Environmental Quality Emission Guidelines.

The observation and checking to sewage treatment plant and its disposal will be done regularly. The backup generator or alternate source of power will be used in case of power failure.

#### Maintenance and Operation planning of Wastewater treatment

The plan of wastewater treatment will cover the following: outline of maintenance and operation planning, purpose and a range of application, basic features, operation and management of facilities, operation and management of wastewater treatment facility and emergency plans.

##### Outline of maintenance and operation planning

Division	Maintenance and operation planning
Main points	<ul style="list-style-type: none"> <li>○ Economic operation that can consider stability and efficiency</li> <li>○ Safety and cleanliness</li> <li>○ Maintaining and improving of facility performance</li> <li>○ Economic management of facility operation</li> <li>○ Establishing duty system</li> <li>○ Energy-saving management</li> </ul>

Maintenance points	<ul style="list-style-type: none"> <li>○ Daily Maintenance (Short-term maintenance and long-term maintenance)</li> <li>○ Preventing overload operating</li> <li>○ Establishing emergency plan</li> <li>○ Managing and securing fair return reserve stocks</li> <li>○ Writing and analyzing operation log</li> <li>○ Writing and analyzing record of machinery performance</li> <li>○ Establishing plan of fair operation through regular wastewater analysis</li> </ul>
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#### Purpose and a range of application

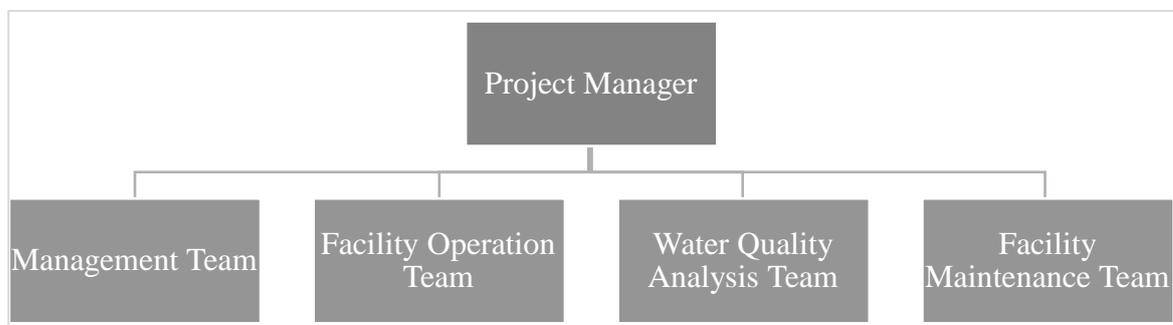
The purpose of operation and planning of maintenance is prompt work process and effective maintenance work. A range of application of planning is wastewater pipes, mediation pumping station and wastewater treatment.

#### Basic features

The basic features are:

- Organizing integrated management system to monitor and control wastewater treatment facility.
- Setting emergency plan for emergency situation

Organization chart of maintenance and operation management



#### Operation and management of facilities

Writing maintenance guideline within a month from construction date. The guideline includes maintenance features and problem that occurred during the trial operation.

##### **1. Primary treatment facility (Mechanical biological treatment included)**

Facility that removes grit in inflow wastewater in order to prevent pipe closing.

Operation and management of primary treatment facility

Grit Chamber Facility	<ul style="list-style-type: none"> <li>○ Plan for preventing sedimentation Inflow sewage flow</li> <li>○ Operation of screen facility</li> <li>○ Operation of sand removal machine</li> <li>○ Coating regularly as a precaution of corrosive gas exposure or inundation</li> </ul>
Inflow pump station Facility	<ul style="list-style-type: none"> <li>○ Water level surveillance of pump sump</li> <li>○ Maintenance of pump structure</li> <li>○ Change of Operation by changing inflow time and season</li> <li>○ Operation control of pump</li> <li>○ Standard inspection of inflow pump operation (starting duty should be within the range of 6 times per hour)</li> <li>○ Frequent inspection of abnormal noise and vibration</li> </ul>
Primary sedimentation Tank	<ul style="list-style-type: none"> <li>○ Scheme to maintain optimum C/N, C/P of biological reactor</li> <li>○ Inspection of noise and vibration of sludge collector</li> </ul>

## 2. Secondary treatment facility

Treatment facility that processes nutritive salts and organic in sewage, by biological way with microorganism.

Operation and management of secondary treatment facility

Biological Reactor Facility	<ul style="list-style-type: none"> <li>○ Measure for bulking of activated sludge</li> <li>○ Measure for floatation of activated sludge</li> <li>○ Regular calibration inspection of DO, MLSS measuring instrument</li> <li>○ Inspection of start-up time of reduced-voltage starter</li> </ul>
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## 3. Tertiary treatment facility

Operation and management of tertiary treatment facility

Filter Facility and Recycling Facility	<ul style="list-style-type: none"> <li>○ Inspection of backwashing period of filter facility</li> <li>○ Inspection of speed and filter resistance of backwashing</li> <li>○ Inspection of delivery pressure and functioning condition of water supply facility</li> </ul>
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## 4. Odor treatment facility

Management of deodorization facility

Deodorization Facility	<ul style="list-style-type: none"> <li>○ Inspection standard of normal operability of deodorization fan</li> <li>○ Problem of operation, measure, inspection method and replacement period of filler</li> </ul>
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## 5. Sludge conditioning process

Operation and management of sludge conditioning process

Dewatering Facility	<ul style="list-style-type: none"> <li>○ Operating condition inspection of mechanical filtration</li> <li>○ Inspection of VVVF automated operation</li> </ul>
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Chemical Dissolving Facility	<ul style="list-style-type: none"> <li>○ Storage, inspection and handling key point of chemical</li> <li>○ Setting dissolving and dosing period by automatic control of chemical dissolving facility</li> </ul>
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## 6. Other management and operation facilities

### Operation and management of other facilities

Automatic operation and maintenance facilities	<ul style="list-style-type: none"> <li>○ Instrumentation facility precision reliability</li> <li>○ Securing measuring instrument and spares to replace in case of situation of failure and deterioration</li> </ul>
Water quality management	<ul style="list-style-type: none"> <li>○ Outline and purpose of water quality, equipment specification of laboratory and handling key points</li> <li>○ Standard and items for water quality (Test list, number of times, management index)</li> <li>○ Sampling (way to sample, location, quantity and precaution) and water quality management method</li> </ul>

## 7. Electricity and instrumentation facility

### Operation and management of electricity and instrumentation facility

Electric facility	<ul style="list-style-type: none"> <li>✓ Outline: Design outline and system explanation of electrical facility, power distribution facility and power plant facility</li> <li>✓ General handling: ordinary requirements, safety regulations and provisions for service interruption</li> <li>✓ Receiving power facility and service interruption: corrective measure for situations (before starting receiving power facility, in operation, service interruption)</li> <li>✓ Receiving power facility and power distribution facility: operation requirements, working characteristic of circuit breaker, transformer, receiving power facility and power distribution facility</li> <li>✓ Load Facility: system explanation of electric heat, lighting, telephone program, fire alarm apparatus and load facility</li> <li>✓ Maintenance and inspection standard: requirements for daily inspection, regular inspection and special inspection</li> </ul>
Instrumentation Facility	<ul style="list-style-type: none"> <li>➤ Outline: outline explanation of instrumentation facility detect converter, monitoring and control equipment, centralized control system and Automation system equipment</li> <li>➤ General handling: ordinary requirements, safety regulations and provisions for service interruption</li> <li>➤ Maintenance and inspection standard: inspection standard of each instrumentation facilities</li> <li>➤ Maintenance and inspection of facilities</li> <li>➤ Instrumentation measuring instrument: maintenance and inspection method of detection converter, flowmeter, densitometer and water gauge</li> <li>➤ Control equipment: maintenance and inspection method of</li> </ul>

	computer control section (control section and transmission section)
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## 8. Sewage pipes

Operation and management of sewage pipe and pump station facilities

Sewage Pipes	<ul style="list-style-type: none"> <li>✓ Establishing plan for effective leakage management</li> <li>✓ Preventing sedimentation of soil in pipes</li> </ul>
Relay pump station Facility	<ul style="list-style-type: none"> <li>✓ Water level surveillance of pump sump</li> <li>✓ Maintenance of pump structure</li> <li>✓ Change of operation by changing inflow time and season</li> <li>✓ Operation control of pump</li> <li>✓ Standard inspection of inflow pump operation (starting duty should be within the range of 6 times per hour)</li> <li>✓ Frequent inspection of abnormal noise and vibration</li> </ul>

Operation and Management of Wastewater treatment facility

### 1. Management method of wastewater treatment facility

- Regular inspection for maintenance of facility.
- Management by designating staffs for each facility.
- Setting management plan for flexible response by inflow sewage change.
- Planning facility safety management plan annually

### 2. Water quality analysis of wastewater treatment facility

- ✓ Discharge water and inlet raw water sampling (Sampling should consider time of sewage inflow)
- ✓ Water quality analysis of discharge water
- ✓ Water quality analysis of inlet raw water
- ✓ Water quality inspection (If autonomous water quality inspection is not available, consigned inspection can be conducted.)
- ✓ Corrective measure of water quality inspection result (If result exceeds inlet raw water quality standard, cause analysis is needed for improvement measure). Analysis should be repeated until it meets inlet raw water quality standard.

### 3. Management of linked treatment water (outflow, sewage and landfill leachate)

- ❖ Water quality control plan of individual discharger (Discharge standard of Myanmar environmental conservation law should be applied)
- ❖ Water quality control plan of linked treatment water (sewage and landfill leachate)

If sewage and landfill leachate are treated as linked, flowmeter that can measure inflow water automatically should be installed.

4. Treatment of wastewater sludge

Myanmar environmental conservation law should be applied to treat sludge occurred by wastewater treatment facility.

5. Details of stopping operation of wastewater treatment facility

Individual wastewater discharger that is informed to stop operation of wastewater treatment facility should control wastewater by stopping operation of facility until normal operation of facility.

**Emergency Plans**

Emergency plans for wastewater treatment facility

Emergency Plans	Contents
Emergency plans for normal operation	<p>Proper control (alarm system, facility changeover) is automatically initiated when minor error occurs in major section of facility.</p> <p>After initiating proper action, facility should be controlled by operator primarily when emergency shutdown is needed caused by critical malfunction of facility.</p> <p>In preparation of decreased response capabilities of operator, automatic emergency shutdown control method is needed after a period of time.</p>
Emergency plans for service interruption of receiving power line	<p>Common-emergency two-circuit receiving power system will be used. By automatic load transfer switches (ALTS), it is able to operate normally with instantaneous changeover.</p>
Emergency plans for service interruption by transformer accident	<p>In the case of service interruption by transformer accident, system automatically switches into emergency transformer to operate overall facilities normally.</p>

**Hazardous waste generation**

The hazardous waste generated will be managed by the Hazardous Solid Waste Management plan as mentioned below.

***Hazardous Solid Waste Management Plan***

The hazardous waste management plan contains the following procedures and processes.

Waste minimization (Reduction at source)

Source reduction includes technological efficiency, material substitute and good management practice. The employees and staff of all factories, industries and offices in the compound will be encouraged to utilize chemical waste minimization (waste reduction) techniques to reduce the volume and toxicity of chemical wastes produced in the project compound.

Minimizing quantities of ordering chemicals – This can also reduce potential chemical exposure to personnel, thus minimizing the risks and severity of accidents.

Recycling – Many materials treated as chemical waste are actually surplus chemicals that are reusable. The unopened or unwanted chemicals would be transferred to laboratories and related industries where they may be used.

Substitution – Substitution of a non-hazardous or less hazardous chemical in place of a hazardous chemical is a commonly used method of reducing waste. For e.g. Changing a cleaning agent from a toxic, flammable solvent to an appropriate soap or detergent solution, and the use of water-based paints and cements over solvent based.

#### Waste Collection

All waste stored together must be compatible. Guidelines for segregation of chemicals as found in the Laboratory Safety Manual must be adhered to. Incompatible waste (oxidizers and organic solvents, for example) generated by a single laboratory should be separated by storing these materials in separate cabinets or shelves. Generally, classes, i.e. ignitable, corrosives, toxics, and reactive, should be segregated. This information will be listed on the label of each chemical or on the MSDS. Mixing of wastes that represent different hazard classes must be avoided.

#### Transportation and Disposal of Hazardous Waste

The transportation of hazardous waste can pose a threat to the public and to promote safety and protect the public's health, four basic control measures will be followed for the movement of hazardous waste from a source to disposal site: hazardous waste manifest, labelling, haulers, and incident and accident reporting.

The hazardous waste will be separately kept in the waste transfer station until the local municipality makes the collection.

The waste storage areas will be located within the facility and sized to the quantities of waste generated, and have a hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. The storage area will be secured by locks with restricted access and designed for access and regular cleaning by authorized cleaning staff and vehicles. It will also be protected from sun, and inaccessible to animals/rodents.

#### Changes to Natural Resources

Each activity of the project operation will efficiently use the energy, fuel, water, raw materials for production, and office stationeries etc. The mitigation and control measures mentioned in this whole chapter for every implementation which can potentially impact the Environment will also help reduce the depletion of natural resources.

#### Increased Traffic flow

The mitigation measures such as provision of traffic management staff at project area and surroundings, installation of road signs and traffic signals at along main road, cross roads, approach roads, enforcing speed limit to all vehicles which are transporting materials and accessing the site will be applied. The transportation for the factory workers will be considered and they will also be encouraged to use bicycles.

#### Foul Odor and Vectors

The main source to release foul odor and attract vectors is the wastewater treatment plant. The sludge and bio-solid handling is usually the most significant source of odor release and good sludge management is required. All raw sludge and bio solids will release odor largely dependent upon age.

One of the options is to thermal dry the primary sludge with the use of the biogas generated in the anaerobic digestion process. If this is done, then this impact is negated entirely. The process of dewatering also reduces odor.

At the preliminary treatment (Degritting), flies will be attracted and as mitigation measures, skips would be covered to minimize vector attraction. Contents of skips to be stabilized with lime.

### 9.2.2 Biological Environmental Mitigation Measures

#### Changes to terrestrial flora and fauna

Replantation of native species and leaving native trees/plants as much as possible will be adopted to reduce the negative changes to terrestrial flora and fauna. The restored natural habitat will be conserved and protected from any activities of operation phase. The project will continue this activity through the operation phase as much as possible.

#### Changes to aquatic flora and fauna

The decline of biodiversity (loss of species in aquatic environment) will be mitigated by banning fishing in fish spawning season and electric shock catching. The wastewater disposed to the waterways will be treated to the acceptable limit.

### 9.2.3 Social Environmental Mitigation Measures

#### Inconveniency with socio-economic change

Some people will meet with difficulty, especially at the initial stage and vocational trainings would be provided to the local people to be fit with skills requirement with project activities and needs.

#### Community Health and Safety

The project will follow the general EHS guidelines set by International Finance Corporation (IFC), World Bank Group.

Parameter	Control Measures
Water Quality	Drinking water sources – at all times be protected.
	Delivery of water to the community or to users of facility infrastructure – water quality needs to comply with National Acceptability Standards (or in their absence the current edition of with WHO Drinking Water Guidelines)
Water Availability	Potential effect of groundwater or surface water abstraction for project activities would be properly assessed accounting for seasonal variability and projected changes in demand in the project area.
Hazardous materials Management	<p>Buffer strips or other methods of physical separation around project sites will be included to protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odor or other emissions.</p> <p>Hazardous materials storage, handling and use will be managed to reduce or eliminate consequences of the potential off-site release.</p>
Traffic Safety	<p>Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</p> <ul style="list-style-type: none"> <li>• Emphasizing safety aspects among drivers</li> <li>• Improving driving skills and requiring licensing of drivers</li> </ul>

	<ul style="list-style-type: none"> <li>• Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>• Avoiding dangerous routes and times of day to reduce the risk of accidents</li> </ul> <p>Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</p> <p>Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, the following measures will be applied:</p> <ul style="list-style-type: none"> <li>• Minimizing pedestrian interaction with vehicles</li> <li>• Collaboration with local authorities (traffic police unit) and local communities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations (hospital). Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaign)</li> <li>• Coordination with emergency responders (Government hospital or local social and health associations) to ensure that appropriate first aid is provided in the event of accidents</li> <li>• Using locally sourced materials, whenever possible, to minimize transport distances. Locating worker camps close to project sites and arranging worker transport system to minimizing external traffic</li> <li>• Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions</li> </ul>
Transport of Hazardous Materials	<p>Project will have procedures ensuring the compliance with local laws and requirements applicable to the transport of hazardous materials. The procedures will be:</p> <ul style="list-style-type: none"> <li>• Proper labeling of containers, including the identity and quantity of the contents, hazards, and shipper contact information</li> <li>• Providing a shipping document (e.g. shipping manifest) describing the contents of the load and its associated hazards in addition to the labeling of the containers.</li> <li>• Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved</li> <li>• Ensuring adequate transport vehicle specifications</li> <li>• Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures</li> <li>• Using labeling and placarding (external signs on transport vehicles) as required</li> <li>• Providing the necessary means for emergency response</li> </ul>
Disease Prevention	<p>Communicable Diseases and Vector-Borne Diseases – Please see in the “Risks for infectious diseases such as AIDS/HIV” section above.</p>

<p>Emergency Preparedness and Response</p>	<p>If there is a risk to the local community from a potential emergency arising at the project site, the company will inform the community through the communication measures, namely, informing the local authorities, communicating details of the nature of emergency, communicating protection options (evacuation, quarantine), providing advices on selecting an appropriate option and vehicle mounted speakers.</p>
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**Risk of injuries and accidents to workers**

The project will follow its general procedures and guidelines for Occupational Safety and Health. (Please see in the Annex section).

**Light intrusion**

The fence of the electricity substation will be high enough to mitigate the light intrusion to the neighboring areas and community. There will also be a buffer area between the substation and the residential area and other sensitive areas.

**Increased Emergency risk**

The emergency response plans will be strictly applied to all stakeholders of the project.

**9.3 Decommissioning and Closure Phase**

**9.3.1 Physical Environmental Mitigation Measures**

**Air Pollution (including Dust Emission)**

The control techniques the project will implement for the reduction and control of air pollution and dust emission from decommissioning site include: minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone), minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content, applying water or non-toxic chemicals to minimize dust from vehicle movements, selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition, speed reduction for traffic, and avoiding open burning of solid waste.

**Greenhouse gas emissions**

The mitigation measures for reducing greenhouse gas emissions are conducting training to raise the awareness of drivers, operators and concerned staff on greenhouse emissions and mitigation measures, prohibiting unnecessary driving and moving at site and idling of vehicles and construction machineries as well, the regular maintenance of vehicles and machineries will be done, the efficient use of vehicles (car-pooling) and machineries will be applied. The construction engineers and project managers will formulate the construction management procedures including the efficient use of construction vehicles and machineries and it will ensure the reduction of greenhouse gas emissions during the demolition phase.

**Surface water contamination**

The wastewater from demolition site will be treated by the treatment plant before discharging to the creek nearby.

**Noise and vibration**

The control measures for noise and vibration are: planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance, using noise control devices, such as

temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines, and avoiding or minimizing project transportation through community areas.

**Waste generation (Hazardous and Non-Hazardous Solid Waste)**

The procedures and practices described in Hazardous and Non-Hazardous Solid Waste Management Plans by the Project will be followed for the waste generated from demolition work.

**9.3.2 Social Environmental Impact Mitigation Measures**

**Living and Livelihood**

The Employment Contract between workers and the concerned company (employer) will be prepared according to the existing Myanmar Labor Law. In this way, the worker’s labor right will be protected by confirming termination service. In case the termination service will be preceded unfairly, workers can request authorities from labor office to settle and resolve the situation.

**Risks for Infectious disease such as AIDS/HIV**

The project will follow the general EHS guidelines set by International Finance Corporation, World Bank Group. The interventions for communicable diseases will be as follows: providing surveillance and active screening and treatment of workers, preventing illness among workers in local communities (undertaking health awareness and education initiatives, training health workers in disease treatment, conducting immunization programs for workers in local community to improve health and guard against infection, providing health services), providing treatment through standard case management in on-site or community health care facilities, promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization. For the vector-borne diseases, the mitigation measures are prevention of larval and adult propagation through sanitary improvements and elimination of breeding grounds close to human settlements, elimination of unusable impounded water, increase in water velocity in natural and artificial channels, implementation of integrated vector control programs, promoting use of repellents, clothing, netting and other barriers to prevent insect bites, use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs, monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread, collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects, educating project personnel and local residents on risks, prevention and available treatment, monitoring communities during high-risk seasons to detect and treat cases, distributing appropriate education materials and following safety guidelines for the storage, transport and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure.

**Occupational Health and Safety**

The company will follow its Occupational Health and Safety Plan and Procedures.

**Community Health and Safety**

The project will follow the general EHS guidelines for Community Health and Safety set by International Finance Corporation, World Bank Group.

Parameter	Control Measures
Water Quality	Drinking water sources – at all times be protected.
	Delivery of water to the community or to users of facility infrastructure – water quality needs to comply with National

	Acceptability Standards (or in their absence the current edition of with WHO Drinking Water Guidelines)
Water Availability	Potential effect of groundwater or surface water abstraction for project activities would be properly assessed accounting for seasonal variability and projected changes in demand in the project area.
Traffic Safety	<p>Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</p> <ul style="list-style-type: none"> <li>• Emphasizing safety aspects among drivers</li> <li>• Improving driving skills and requiring licensing of drivers</li> <li>• Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>• Avoiding dangerous routes and times of day to reduce the risk of accidents</li> </ul> <p>Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</p> <p>Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, the following measures will be applied:</p> <ul style="list-style-type: none"> <li>• Minimizing pedestrian interaction with construction vehicles</li> <li>• Collaboration with local authorities (traffic police unit) and local communities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations (hospital). Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaign)</li> <li>• Coordination with emergency responders (Government hospital or local social and health associations) to ensure that appropriate first aid is provided in the event of accidents</li> <li>• Using locally sourced materials, whenever possible, to minimize transport distances. Locating worker camps close to project sites and arranging worker transport system to minimizing external traffic</li> <li>• Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions</li> </ul>
Transport of Hazardous Materials	<p>Project will have procedures ensuring the compliance with local laws and requirements applicable to the transport of hazardous materials. The procedures will be:</p> <ul style="list-style-type: none"> <li>• Proper labeling of containers, including the identity and quantity of the contents, hazards, and shipper contact information</li> <li>• Providing a shipping document (e.g. shipping manifest) describing the contents of the load and its associated hazards in addition to the labeling of the containers.</li> <li>• Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved</li> </ul>

	<ul style="list-style-type: none"> <li>• Ensuring adequate transport vehicle specifications</li> <li>• Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures</li> <li>• Using labeling and placarding (external signs on transport vehicles) as required</li> <li>• Providing the necessary means for emergency response</li> </ul>
Disease Prevention	Communicable Diseases and Vector-Borne Diseases – Please see in the “Risks for infectious diseases such as AIDS/HIV” section above.
Emergency Preparedness and Response	If there is a risk to the local community from a potential emergency arising at the project site, the company will inform the community through the communication measures, namely, informing the local authorities, communicating details of the nature of emergency, communicating protection options (evacuation, quarantine), providing advices on selecting an appropriate option and vehicle mounted speakers.

#### 9.4 Characterization and Assessment of Residual Impacts

The project will apply careful design and planning in combination with the mitigation measures and hence there are no significant adverse impacts to the physical, biological and socio-economic environments. For several valued Environmental and Social Components, no adverse environmental effects were identified that could result from routine activities during any of the project phases. However, there will be some residual impacts predicted.

The residual impacts are the impacts which remain after the implementation of the mitigation measures described. The predicted residual adverse impacts are considered for each project phase (Construction, Operation and Decommissioning/Closure). The residual impacts and their significance are determined by the professional judgement and expertise based on the nature of impacts, namely, magnitude, duration, and reversibility.

Level of Magnitude	Description
High	Impact is high enough to cause numerous effects.
Medium	Impact may result in changes that affect the value of resources, social-cultural, economic and environment.
Low	Impact may result in changes in resources and environment, but this change does not decrease value of these resources, social-cultural, economic and environment.
Nil	Impact has no effect.

Duration	Description
Long term	Beyond the construction phase for years or the operational life of project or permanent
Medium term	1-2 years

<b>Short term</b>	(0-12 months) and intermittent
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<b>Reversibility</b>	<b>Description</b>
<b>Reversible</b>	Capable of re-establishing the original condition after a change or being impacted
<b>Irreversible</b>	Incapable of re-establishing the original condition after a change or being impacted

<b>Level of Significance</b>	<b>Description</b>
<b>Major</b>	Potential impact could threaten the long-term sustainability of the resource. Additional research, monitoring, and/or recovery initiatives should be considered.
<b>Medium</b>	Potential impact could result in a decline of a resource in terms of quality/quantity, such that the impact is considered moderate in its combination of magnitude, aerial extent, duration, and frequency, but does not affect the long-term sustainability. Additional research, monitoring, and/or recovery initiatives may be considered.
<b>Minor</b>	Potential impact may result in a localized or short-term decline in a resource during the life of the Project. Typically, no additional research, monitoring, and/or recovery initiatives are considered.
<b>Minimal</b>	Potential impact may result in a small, localized decline in a resource during the construction phase of the Project and should be negligible to the overall baseline status of the resource.

#### 9.4.1 Residual Impact Assessment for Construction Phase

<b>No.</b>	<b>Impact</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Reversibility</b>	<b>Level of Significance</b>
<b>Physical Environment</b>					
1	Effects on watercourses (erosion, sediment loading, stormwater discharges, oil and fuel spills and leaks)	Low	Intermittent and Short term	Reversible	Minor

2	Groundwater Contamination (due to uncontrolled site and road runoff, accidental release of fuel chemicals and hazardous materials)	Low	Intermittent and Short term	Reversible	Minimal
3	Air Pollution (Emissions of gaseous pollutants from diesel powered construction equipment, vehicles and machineries)	Low	Intermittent and Short term	Reversible	Minimal
4	Dust Emission (from excavating and moving earth, construction equipment and machinery, vehicles)	Low	Intermittent and Short term	Reversible	Minimal
<b>Social Environment</b>					
1	Community Health and Safety	Low	Long term	Reversible	Minimal

#### 9.4.2 Residual Impact Assessment for Operation Phase

No.	Impact	Magnitude	Duration	Reversibility	Level of Significance
<b>Physical Environment</b>					
1	Degradation of groundwater quality due to accidental and chronic spills and release of chemical and hazardous materials	Low	Intermittent and Short term	Reversible	Minimal

<b>Social Environment</b>					
1	Community Health and Safety	Low	Intermittent and Short term	Reversible	Minimal
2	Risk of injuries and accidents to workers	Low	Intermittent and Short term	Reversible	Minimal
3	Light intrusion	Low	Intermittent and Short term	Reversible	Minor

#### 9.4.3 Residual Impact Assessment for Decommissioning/Closure Phase

No.	Impact	Magnitude	Duration	Reversibility	Level of Significance
<b>Physical Environment</b>					
1	Effects on watercourses (erosion, sediment loading, storm water discharges, oil and fuel spills and leaks)	Low	Intermittent and Short term	Reversible	Minimal
2	Air Pollution (Emissions of gaseous pollutants from diesel powered construction equipment, vehicles and machineries)	Low	Intermittent and Short term	Reversible	Minimal
3	Dust Emission (from excavating and moving earth, construction equipment and machinery, vehicles)	Low	Intermittent and Short term	Reversible	Minimal
<b>Social Environment</b>					
1	Community Health and Safety	Low	Intermittent and Short term	Reversible	Minimal

## 10. CUMULATIVE IMPACT ASSESSMENT

Cumulative impacts from different projects (in combination with the project being assessed) whereby the impact may arise from the combined action of a number of different projects, in combination with the project being assessed, on a single environmental parameter (receptor/resource). This can include multiple impacts of the same or similar type from a number of projects upon the same environmental receptor/resources.

### 10.1 Methodology

In order to carry out the Cumulative Impact Assessment (CIA), the following steps were followed:

1. Identification of other existing and future private and public projects and developments;
2. Determining Valued Environmental and Social Components (VECs) for which cumulative impacts will be assessed and managed;
3. Establishing the Baseline Information of VECs
4. Assessment of Cumulative Impacts and their significance on VECs; and
5. Management of Cumulative Impacts.

#### Identification of Other Projects and Activities

The other planned or reasonably foreseeable development activities and projects that might interact in a cumulative way with potential activities from the Industrial Complex development are livestock farms, fish farms, and agricultural production businesses.

#### Determining Valued Environmental and Social Components

The following Valued Environmental and Social Components (VECs) were identified for cumulative impacts of the above-mentioned projects in combination with the project being assessed. The affected community were also consulted to define the VECs to be assessed.

1. Air Quality
2. Greenhouse Gas (GHG) Emissions
3. Water Quality
4. Solid Waste Generation (Hazardous and Non-hazardous)
5. Traffic
6. Community Health and Safety

#### Establishing Baseline Information of VECs

The relevant baseline information of VECs was described in sections, namely, Project Description and Alternative Selection and Description of the Surrounding Environment.

#### Assessment of Cumulative Impacts and their significance on VECs

In order to determine the significance of cumulative impacts, some limits of acceptable change in VEC condition are needed to which incremental effects can be compared. There is not always an objective technique for determining thresholds and professional judgement was relied upon. The assessment of significance of cumulative impacts is done by the professional judgement of the experts.

Due to different activities of livestock farms, fish farms and agricultural production businesses, the identified valued Environmental and Social components will be experiencing cumulative impacts and it was judged that the impacts are within the ability of the resource to absorb such changes.

### **Management of Cumulative Impacts**

The significance of cumulative impacts is minor and however, based on the review of potential impacts and mitigation measures mentioned in different phases, it is unlikely that the construction and operation of the Industrial Development project and associated infrastructure will result in significant adverse environmental or socio-economic impacts, including cumulative impacts. The Environmental Monitoring and Management plan for different phases of the project will also help minimize or avoid the cumulative impacts.

The cumulative impacts typically result from the actions of multiple stakeholders, it is necessary to engage with these stakeholders for effective collaboration and coordination. Therefore, the project developer plans to initiate collaborative engagement in impact management with others including project proponents, government agencies, affected communities, Environmental NGOs, conservation groups, and expert groups for the following programs where they exist:

- Collaborative protection and enhancement of regional areas to preserve biodiversity;
- Collaborative engagement in other regional cumulative impact management strategies;
- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.

## 11. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

### 11.1 Environmental Management and Monitoring Plan (Construction and Operation Phases)

Environmental impact	Proposed mitigation and aspects for monitoring	Responsibility for		Mitigation and Monitoring Phase	Recommended frequency of monitoring
		Mitigation monitoring and maintenance during construction	Mitigation monitoring and maintenance during operation	Construction / Operation	
<b>Soil Degradation</b>	<ul style="list-style-type: none"> <li>Avoidance of unnecessary cutting and removing of trees and vegetation</li> <li>Controlling earthwork and compacting loose soil</li> <li>Installation and construction of drainage structure properly</li> <li>Ensuring supervision of excavation activities</li> <li>Keeping the removed topsoil and reusing to rehabilitate disturbed areas</li> </ul>	Contractor	-	Construction	Daily
	<ul style="list-style-type: none"> <li>Installation of bunded detention ponds to contain oil spills</li> <li>Treatment of wastewater before discharging to waterways</li> <li>Following the procedures of using, storing and handling the chemicals, oil, grease and hazardous materials (if any) – including training of safety usage</li> </ul>	-	Developer	Operation	Monthly
<b>Soil Erosion</b>	<ul style="list-style-type: none"> <li>Construction of concrete drains at steep levels and proper gradient at temporary drain</li> <li>Minimizing clearance of vegetation</li> <li>Protecting areas susceptible to erosion with mulch or a suitable alternative</li> </ul>	Contractor	-	Construction	Daily
<b>Topography</b>	<ul style="list-style-type: none"> <li>Designing and constructing buildings and structures as much as possible to maintain shape and features of land surfaces</li> </ul>	Architect, Civil Engineer, Contractor	-	Construction	Once (Design Stage)
<b>Dust Emission</b>	<ul style="list-style-type: none"> <li>Control speed and operation of construction vehicles</li> <li>Proper cover of trucks carrying construction materials</li> <li>Prohibition of idling of vehicles</li> <li>Water should be sprayed earth moving work place and main roads</li> </ul>	Contractor	-	Construction	Daily
	<ul style="list-style-type: none"> <li>Restriction of speed control of transport buses and traffic within the project site</li> </ul>	-	Developer	Operation	Daily

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<b>Air pollution</b>	<ul style="list-style-type: none"> <li>Regular maintenance of construction plants and equipment</li> </ul>	Contractor	-	Construction	Daily
		Developer		Operation	Monthly
	<ul style="list-style-type: none"> <li>Engage sensitive workers</li> <li>Provide masks and PPE</li> <li>Worker to understand about hazardous gas emission</li> <li>Inspection and observation of air quality</li> </ul>	Contractor	-	Construction	Daily
	<ul style="list-style-type: none"> <li>Measuring air quality</li> </ul>	Contractor	-	Construction	Every six months
	<ul style="list-style-type: none"> <li>Using quality fuel which contains reduced or no lead and Sulphur content</li> <li>Following National Environmental Quality Emission Guidelines (For the parameters not included in the guidelines, "Air Quality Guidelines for Europe, 1997. WHO Regional Publications, European Series No. 23. World Health Organization" will be followed) and the rules, regulations and guidelines set by the respective Ministry by individual project</li> </ul>	-	Developer	Operation	Daily
	<ul style="list-style-type: none"> <li>Measuring air quality</li> </ul>	-	Developer	Operation	Every six months
<b>Greenhouse gas emission</b>	<ul style="list-style-type: none"> <li>Conducting training to raise the awareness of drivers, operators and concerned staff on greenhouse emissions and mitigation measures</li> <li>Prohibiting unnecessary driving and moving at site and idling of vehicles and construction machineries as well</li> <li>Regular maintenance of vehicles and machineries</li> <li>Efficient use of vehicles (car-pooling and if possible a truck will be used for two purposes at the same time – unloading of building materials and loading of construction wastes) and machineries</li> <li>Formulating the construction management procedures including the efficient use of construction vehicles and machineries</li> <li>Designing and construction of site offices as much as possible to get the natural light and ventilation (These offices will also be using solar power for lighting and other domestic purposes like showering. The climate – friendly refrigeration and air conditioning will be used to avoid the fluorinated greenhouse gas (Hydrofluorocarbons (HCFs)) emissions.</li> </ul>	Contractor	-	Construction	Weekly
	<ul style="list-style-type: none"> <li>Using natural light as much as possible (and using energy efficient electrical appliances like energy - saving light bulbs)</li> <li>Keeping windows shut when HVAC is in use, but employing natural ventilation whenever possible</li> <li>Unplugging TVs, AV equipment, and phone chargers when not in use</li> <li>Turning off the lights and computer when leaving the office</li> <li>Recycling and/or reusing as many waste materials as possible</li> </ul>	-	Developer	Operation	Daily

	<ul style="list-style-type: none"> <li>Biking or walking to work if possible (OR) arranging bus for the workers</li> <li>Using the environmentally friendly airconditioners and refrigerators to avoid or reduce the emission of fluorinated gases</li> </ul>				
<b>Surface water/Ground water contamination</b>	<ul style="list-style-type: none"> <li>Building sedimentation basin on a construction site to capture the disturbed soil which is washed off during rainfall</li> <li>Construction of sand traps to settle the sand at the bottom and store the deposited sand</li> <li>Systematic stacking and piling of materials on site, the regular solid waste disposal at the dumping site designated by the local municipality</li> <li>Avoidance of hazardous wastes disposal in drinking-water sources</li> <li>Adopting the proper waste management system</li> <li>Regular maintenance and check of the machineries, vehicles and sources which can cause oil spill and hazardous chemical spills (if found, the immediate repair and cleansing will be conducted)</li> <li>Systematic storage of fuels and filling station at construction site yard compound, handling and disposal of new oil and used oil waste</li> <li>Provision of impervious basement at operation area to prevent oil spill when heavy machineries are working</li> <li>Daily checking to earth moving machines by motor transport officer before start engines</li> <li>Providing a good pavement at machine workshop and garage</li> <li>Applying the proper sanitation system for the construction workers and project staff</li> </ul>	Contractor	-	Construction	Monthly
	<ul style="list-style-type: none"> <li>Measuring water quality</li> </ul>	Contractor	-	Construction	Every six months
	<ul style="list-style-type: none"> <li>Treating wastewater to the acceptable limit according to the National Environmental Quality Emission Guidelines</li> <li>Storing solid waste in a temporary storage building having a hard, impermeable floor with drainage and designed for cleaning/ disinfection with available water supply</li> <li>Adopting oil spills mitigation procedures</li> </ul>	-	Developer	Operation	Monthly
	<ul style="list-style-type: none"> <li>Measuring water quality</li> </ul>	-	Developer	Operation	Every six months
<b>Increased water demand</b>	<ul style="list-style-type: none"> <li>Building rainwater harvesting tanks to collect rainwater</li> <li>Checking water connections, pipes and taps regularly to avoid any leaks and wastages</li> </ul>	-	Developer	Operation	Monthly
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>Training drivers and operators of construction vehicles and machineries to reduce the noise from their operations, and the construction activities will be restricted in night times</li> </ul>	Contractor	-	Construction	Once (24 hours)/month

	<ul style="list-style-type: none"> <li>Regular maintenance of vehicles and machineries and wearing the ear muffers (hearing protection devices)</li> <li>The construction noise will be strictly maintained within the noise level (National Environmental Quality Emission Guidelines) set by Ministry of Natural Resources and Environmental Conservation</li> <li>Using sound absorb, sound proof engines at construction site and proper maintenance, enclosing noisy outdoor engines and generators in sound proof wall or buildings, regular checking and maintenance to silencers of engines and conserving trees around the site as some buffers against noise.</li> </ul>				
	<ul style="list-style-type: none"> <li>Installing sound barrier and sound absorbing materials at the factories as needed</li> <li>Applying vibration control devices for equipment and design of the structure as needed</li> <li>Limiting outside standard working hours (weekend, evening or night-time works)</li> <li>Ensuring that noise level of operation of all facilities and structures within the acceptable limit stipulated in National Environmental Quality Emission Guidelines</li> </ul>	-	Developer	Operation	Monthly
	<ul style="list-style-type: none"> <li>Measuring noise quality</li> </ul>	-	Developer	Operation	Every six months
<b>Solid waste generation</b>	<ul style="list-style-type: none"> <li>Unnecessary cutting and removing of vegetation plants</li> <li>Developing drawing and land survey map to follow as drawing of landscaping procedure, producing a precise construction drawing to avoid unnecessary cutting and filling of earth work and excavation work</li> <li>Ensuring calculation and estimation of materials requirement to avoid excessive purchase</li> <li>Ensuring purchase of materials and stacking at collection yard and ware houses</li> <li>Providing conservancy structures, dust bins and skips at appropriate places painting different colors for hazardous substances and biodegradable substances</li> <li>Providing facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure</li> <li>Periodically disposal of solid waste at permitted land fill area or dumping sites and proper loading and unloading at garbage truck and educating workers to dispose waste properly</li> </ul>	Contractor	-	Construction	Monthly

	<ul style="list-style-type: none"> <li>If possible, the recycling and refurbishment of solid waste will be done to reduce the amount and volume of construction debris.</li> </ul>				
<b>Increased solid waste generation</b>	<ul style="list-style-type: none"> <li>Adopting 3R (Reduce, Reuse and Recycle) practice</li> <li>Practicing Non-Hazardous Solid Waste Management Plan</li> </ul>	-	Developer	Operation	Monthly
<b>Increased wastewater generation</b>	<ul style="list-style-type: none"> <li>Installation of wastewater treatment facility to treat wastewater before disposal</li> <li>All other development, industries and activities would have to follow the guidelines and standards set by Ministry of Natural Resources and Environmental Conservation and other respective Ministries.</li> </ul>	-	Developer	Operation	Monthly
<b>Hazardous waste generation</b>	<ul style="list-style-type: none"> <li>Practicing Hazardous Solid Waste Management Plan</li> </ul>	-	Developer	Operation	Monthly
<b>Changes to Natural Resources</b>	<ul style="list-style-type: none"> <li>Ensuring calculation and estimation of material requirement to avoid excessive purchase</li> <li>Ordering and collection of the accurate quantities of materials</li> <li>Efficient use of fuel, electricity, water and office stationery</li> <li>The reusable materials will be reused by the project. The recyclables will be sent to the local recyclers. (Adopting 3 R Practice)</li> </ul>	Contractor	-	Construction	Monthly
	<ul style="list-style-type: none"> <li>Efficient use of energy, fuel, water, raw materials and office stationeries etc.</li> </ul>	-	Developer	Operation	Monthly
<b>Traffic Flow</b>	<ul style="list-style-type: none"> <li>Proper planning of transportation of construction materials</li> <li>Provision of traffic management staff at site and junctions</li> <li>Installation of road signs and traffic signals at along the way of work site, main road, cross roads, approach roads, to notify stakeholders of the development</li> <li>Enforcing speed limit to all vehicles which are transporting materials and accessing the site</li> <li>Discussion with the traffic police unit there to make necessary arrangements not to worsen the existing traffic condition in the town</li> <li>The IFC guidelines will also be practiced.</li> <li><b>Traffic Safety</b></li> <li>Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</li> <li>Emphasizing safety aspects among drivers</li> <li>Improving driving skills and requiring licensing of drivers</li> </ul>	Contractor	-	Construction	Daily

	<ul style="list-style-type: none"> <li>Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>Avoiding dangerous routes and times of day to reduce the risk of accidents</li> <li>Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</li> </ul>				
<b>Increased Traffic Flow</b>	<ul style="list-style-type: none"> <li>Provision of traffic management staff at project area and surroundings</li> <li>Installation of road signs and traffic signals at along main road, cross roads, approach roads</li> <li>Enforcing speed limit to all vehicles which are transporting materials and accessing the site</li> <li>Arranging transportation for factory workers (or) Encouraging them to use bicycles</li> </ul>	-	Developer	Operation	Monthly
<b>Foul Odor and Vectors</b>	<ul style="list-style-type: none"> <li>Thermal drying the primary sludge with the use of biogas generated in the anaerobic digestion process</li> <li>Process of dewatering</li> <li>Covering the skips</li> <li>Stabilizing the contents of skips with lime</li> </ul>	-	Developer	Operation	Monthly
<b>Destruction of vegetation and expelling of wildlife</b>	<ul style="list-style-type: none"> <li>Making the proper demarcation of project area that would be affected by construction works</li> <li>Controlling construction vehicles to ensure the avoidance of unnecessary disturbance of vegetation</li> <li>Replantation with native species, leaving native trees/plants</li> <li>Supporting Environmental Education and Public Participation and Environmental Protection activities through CSR programs</li> </ul>	Contractor	-	Construction	Monthly
<b>Changes to terrestrial flora and fauna</b>	<ul style="list-style-type: none"> <li>Replantation of native species and leaving native trees/plants</li> <li>Conservation of the restored natural habitat</li> </ul>	-	Developer	Operation	Monthly
<b>Disturbance to aquatic organisms and aquatic habitats</b>	<ul style="list-style-type: none"> <li>Banning fishing in fish spawning season and electric shock catching</li> </ul>	Contractor	-	Construction	Monthly

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<b>Changes to aquatic flora and fauna</b>	<ul style="list-style-type: none"> <li>Banning fishing in fish spawning season and electric shock catching</li> <li>Treating wastewater before disposing to waterways</li> </ul>	-	Developer	Operation	Monthly
<b>Existing social infrastructure and services</b>	<ul style="list-style-type: none"> <li>Upgrading the existing social infrastructures, services and facilities and/or building new social infrastructures and services</li> </ul>	Contractor (under CSR program of developer)	-	Construction	Monthly
<b>Inconveniency with socio-economic change</b>	<ul style="list-style-type: none"> <li>Providing vocational trainings to the local people to be fit with skills requirement with project activities and needs</li> </ul>	-	Developer	Operation	Monthly
<b>Landscape and scenery</b>	<ul style="list-style-type: none"> <li>Developing the architectural design, height and color of the buildings and structures by taking the visual impacts of these structures into account</li> </ul> <p>For visual impacts of electricity substation</p> <ul style="list-style-type: none"> <li>Placing the structures in such a manner as to maximize the buffer zone between the structures and the roads</li> <li>The retention of as much existing vegetation as possible, specifically the existing mature trees in the area</li> <li>The use of stepping in the building platform to minimize cut-and-fill areas and the lowering of the structures into the site as much as possible</li> <li>The re-establishment of some agricultural activity around the substation depending on the proposed land use</li> <li>The establishment of climbing plants on sections of the perimeter fencing for safety and security considerations. Such planting will be done with specific viewpoints in mind and be used to break the monolithic nature or soften the visual impact of the development from those specific viewpoints.</li> <li>All lighting, especially perimeter security lighting will be shielded to minimize light spillage and pollution. No direct light sources will be seen from outside the site.</li> <li>Signage will be simple and unobtrusive</li> </ul>	Contractor/Architect/Designer/Engineer	-	Construction	Once
<b>Risks for infectious</b>	Following the general EHS guidelines set by IFC, World Bank Group. Interventions for communicable diseases	Contractor	-	Construction	Monthly

<p><b>diseases such as AIDS/HIV</b></p>	<ul style="list-style-type: none"> <li>• Providing surveillance and active screening and treatment of workers</li> <li>• Preventing illness among workers in local communities (undertaking health awareness and education initiatives, training health workers in disease treatment, conducting immunization programs for workers in local community to improve health and guard against infection, providing health services)</li> <li>• Providing treatment through standard case management in on-site or community health care facilities</li> <li>• Promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization</li> </ul> <p>Interventions for vector-borne diseases</p> <ul style="list-style-type: none"> <li>• Prevention of larval and adult propagation through sanitary improvements and elimination of breeding grounds close to human settlements</li> <li>• Elimination of unusable impounded water, increase in water velocity in natural and artificial channels</li> <li>• Implementation of integrated vector control programs</li> <li>• Promoting use of repellents, clothing, netting and other barriers to prevent insect bites</li> <li>• Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs</li> <li>• Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread</li> <li>• Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects</li> <li>• Educating project personnel and local residents on risks</li> <li>• Prevention and available treatment, monitoring communities during high-risk seasons to detect and treat cases</li> <li>• Distributing appropriate education materials and following safety guidelines for the storage, transport and distribution of pesticides to</li> </ul>				
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	minimize the potential for misuse, spills, and accidental human exposure				
<b>Occupational safety and health</b>	<ul style="list-style-type: none"> <li>• Company has guidelines and procedures (Please see in the Annex section) and generally the following aspects are covered:</li> <li>• Guidelines and procedures for organizing the site (planning the work, organizing the work, common facilities to be provided, site access, public safety, lighting, site tidiness, storage areas, fire safety)</li> <li>• Preventive measures for accidents or injuries from excavations, working at height, moving, lifting and handling loads, site vehicles and mobile plants operation, chemicals use, handling and storage</li> <li>• Protective Equipment (Safety helmet, footwear, goggles and safety spectacles, gloves and protective clothing, other protective equipment)</li> <li>• Emergency procedures and preparedness (company's emergency personnel contact information, evacuation plan including exit routes, evacuation signals and sirens, location of eyewash stations and showers, fire extinguishers)</li> <li>• Providing First Aid kits and training on how to use them</li> <li>• Accident/Injury Reporting procedures</li> <li>• Training (Orientation) for all employees and workers</li> </ul>	Contractor	Developer	Construction Operation	Monthly
<b>Emergency risk</b>	<p>Company has guidelines and procedures (Please see in the Annex section) and generally the following aspects are covered:</p> <p>Fire Safety Management</p> <ul style="list-style-type: none"> <li>• Practical Fire Safety Arrangements, Planning, Organization and Control, Monitoring and Review</li> </ul> <p>Fire Emergency Plan</p> <ul style="list-style-type: none"> <li>• Training and Training Provision, Information Distribution, Procedures to follow when discovering a fire and hearing the fire alarm, Contacting Emergency Services, Identify processes, machines or power which must be shut down, Emergency Services Liaison Procedures, Specific Information for the Emergency Services, Escape Routes, Assembly Points, Identify Persons especially at risk, , Evacuation Arrangements for disabled people, staff with specific responsibilities, firefighting, fire control panel, contingency plans and Re-entering the building. (also including Fire Safety Maintenance Checklist, Fire Safety Training Program)</li> </ul>	Contractor	-	Construction	Every three months

	<p>Emergency Response Plan for</p> <ul style="list-style-type: none"> <li>• Utility Failures (electrical outages, plumbing failure, gas leaks, steam line breaks, ventilation problems, elevator failures)</li> <li>• Earthquakes</li> <li>• Floods</li> <li>• Storms and Tornadoes</li> <li>• Medical Emergency</li> <li>• Shelter in place/Safe shelter</li> </ul>				
<b>Increased Emergency Risk</b>	<ul style="list-style-type: none"> <li>• Applying emergency response plans to all stakeholders of project</li> </ul>	-	Developer	Operation	Monthly
<b>Community Health and Safety</b>	<p>Following the general EHS guidelines set by IFC, World Bank Group.</p> <p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>• Drinking water sources – at all times be protected.</li> <li>• Delivery of water to the community or to users of facility infrastructure – water quality needs to comply with National Acceptability Standards (or in their absence the current edition of with WHO Drinking Water Guidelines)</li> </ul> <p><b>Water Availability</b></p> <ul style="list-style-type: none"> <li>• Potential effect of groundwater or surface water abstraction for project activities would be properly assessed accounting for seasonal variability and projected changes in demand in the project area. The higher demand of water use by health care facilities will be taken into account.</li> </ul> <p><b>Structural Safety of Project Infrastructure</b></p> <ul style="list-style-type: none"> <li>• Buffer strips or other methods of physical separation around project sites will be included to protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odor or other emissions.</li> <li>• The siting and safety engineering criteria will be incorporated to prevent failures due to natural disasters.</li> <li>• Myanmar National Building Code (2016) will be applied to ensure structures are designed and constructed in accordance with sound architectural and engineering practice, including aspects of fire prevention and response.</li> <li>• Hazardous materials storage, handling and use will be managed to reduce or eliminate consequences of the potential off-site release.</li> </ul> <p><b>Life and Fire Safety</b></p>	Contractor	Developer	Construction Operation	Monthly

	<ul style="list-style-type: none"> <li>• The new buildings and facilities which can be assessed by the public will be designed, constructed and operated in full compliance with Myanmar National Building Code (2016), Myanmar Fire Services Department regulations and other local legal/insurance requirements.</li> </ul> <p><b>Traffic Safety</b></p> <ul style="list-style-type: none"> <li>• Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</li> <li>• Emphasizing safety aspects among drivers</li> <li>• Improving driving skills and requiring licensing of drivers</li> <li>• Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>• Avoiding dangerous routes and times of day to reduce the risk of accidents</li> <li>• Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</li> </ul> <p><b>Transport of Hazardous Materials</b></p> <p>Project will have procedures ensuring the compliance with local laws and requirements applicable to the transport of hazardous materials. The procedures will be:</p> <ul style="list-style-type: none"> <li>- Proper labeling of containers, including the identity and quantity of the contents, hazards, and shipper contact information</li> <li>- Providing a shipping document (e.g. shipping manifest) describing the contents of the load and its associated hazards in addition to the labeling of the containers.</li> <li>- Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved</li> <li>- Ensuring adequate transport vehicle specifications</li> <li>- Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures</li> </ul>				
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	<ul style="list-style-type: none"> <li>- Using labeling and placarding (external signs on transport vehicles) as required</li> <li>- Providing the necessary means for emergency response</li> </ul> <p><b>Disease Prevention</b> Communicable Diseases and Vector-Borne Diseases – Please see in the “Risks for infectious diseases such as AIDS/HIV” section above.</p> <p><b>Emergency Preparedness and Response</b> If there is a risk to the local community from a potential emergency arising at the project site, the company will inform the community through the communication measures, namely, informing the local authorities, communicating details of the nature of emergency, communicating protection options (evacuation, quarantine), providing advices on selecting an appropriate option and vehicle mounted speakers.</p>				
<b>Light Intrusion</b>	<ul style="list-style-type: none"> <li>• Fencing electricity substation high enough</li> <li>• Having buffer area between substation and residential area and other sensitive areas</li> </ul>	-	Developer	Operation	Monthly

## 11.2 Environmental Management and Monitoring Plan (Decommissioning/Closure Phase)

Environmental impact	Proposed mitigation and aspects for monitoring	Responsibility for	Mitigation and Monitoring Phase	Recommended frequency of monitoring
		Mitigation monitoring and maintenance during decommissioning	Decommissioning	
<b>Air Pollution (including Dust Emission)</b>	<ul style="list-style-type: none"> <li>Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone)</li> <li>Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content</li> <li>Applying water or non-toxic chemicals to minimize dust from vehicle movements, selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition, speed reduction for traffic</li> <li>Avoiding open burning of solid waste</li> </ul>	Contractor	Decommissioning	Monthly
<b>Greenhouse gas emissions</b>	<ul style="list-style-type: none"> <li>Conducting training to raise the awareness of drivers, operators and concerned staff on greenhouse emissions and mitigation measures</li> <li>Prohibiting unnecessary driving and moving at site and idling of vehicles and construction machineries as well</li> <li>Regular maintenance of vehicles and machineries</li> <li>Formulating the construction management procedures including the efficient use of construction vehicles and machineries</li> </ul>	Contractor	Decommissioning	Monthly
<b>Surface water contamination</b>	<ul style="list-style-type: none"> <li>Treating the wastewater from demolition site before discharging to the waterway</li> </ul>	Contractor	Decommissioning	Monthly
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance</li> <li>Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines</li> <li>Avoiding or minimizing project transportation through community areas</li> </ul>	Contractor	Decommissioning	Monthly
<b>Waste generation (Hazardous and Non-</b>	<ul style="list-style-type: none"> <li>Adopting the mitigation measures used for the construction phase</li> </ul>	Contractor	Decommissioning	Monthly

<b>hazardous Solid waste)</b>				
<b>Living and livelihood</b>	<ul style="list-style-type: none"> <li>• Preparing the employment contract between workers and the concerned company according to the Myanmar Labor Law (workers' labor right will be protected by confirming termination service)</li> <li>• Workers request government authorities (labor office) to settle and resolve the situation provided that the termination service is not fair</li> </ul>	Contractor	Decommissioning	As needed
<b>Risks for infectious diseases</b>	<p>Following the general EHS guidelines set by IFC, World Bank Group.</p> <p>Interventions for communicable diseases</p> <ul style="list-style-type: none"> <li>• Providing surveillance and active screening and treatment of workers</li> <li>• Preventing illness among workers in local communities (undertaking health awareness and education initiatives, training health workers in disease treatment, conducting immunization programs for workers in local community to improve health and guard against infection, providing health services)</li> <li>• Providing treatment through standard case management in on-site or community health care facilities</li> <li>• Promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization</li> </ul> <p>Interventions for vector-borne diseases</p> <ul style="list-style-type: none"> <li>• Prevention of larval and adult propagation through sanitary improvements and elimination of breeding grounds close to human settlements</li> <li>• Elimination of unusable impounded water, increase in water velocity in natural and artificial channels</li> <li>• Implementation of integrated vector control programs</li> <li>• Promoting use of repellents, clothing, netting and other barriers to prevent insect bites</li> <li>• Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs</li> <li>• Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread</li> <li>• Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects</li> <li>• Educating project personnel and local residents on risks</li> <li>• Prevention and available treatment, monitoring communities during high-risk seasons to detect and treat cases</li> </ul>	Contractor	Decommissioning	Monthly

	<ul style="list-style-type: none"> <li>Distributing appropriate education materials and following safety guidelines for the storage, transport and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure</li> </ul>			
<b>Occupational Health and Safety</b>	<p>Company has guidelines and procedures (Please see in the Annex section) and generally the following aspects are covered:</p> <ul style="list-style-type: none"> <li>Guidelines and procedures for organizing the site (planning the work, organizing the work, common facilities to be provided, site access, public safety, lighting, site tidiness, storage areas, fire safety)</li> <li>Preventive measures for accidents or injuries from excavations, working at height, moving, lifting and handling loads, site vehicles and mobile plants operation, chemicals use, handling and storage</li> <li>Protective Equipment (Safety helmet, footwear, goggles and safety spectacles, gloves and protective clothing, other protective equipment)</li> <li>Emergency procedures and preparedness (company's emergency personnel contact information, evacuation plan including exit routes, evacuation signals and sirens, location of eyewash stations and showers, fire extinguishers)</li> <li>Providing First Aid kits and training on how to use them</li> <li>Accident/Injury Reporting procedures</li> <li>Training (Orientation) for all employees and workers</li> </ul>	Contractor	Decommissioning	Monthly
<b>Community Health and Safety</b>	<p>Following the general EHS guidelines set by IFC, World Bank Group.</p> <p>Water Quality</p> <ul style="list-style-type: none"> <li>Drinking water sources – at all times be protected.</li> <li>Delivery of water to the community or to users of facility infrastructure – water quality needs to comply with National Acceptability Standards (or in their absence the current edition of with WHO Drinking Water Guidelines)</li> </ul> <p>Water Availability</p> <ul style="list-style-type: none"> <li>Potential effect of groundwater or surface water abstraction for project activities would be properly assessed accounting for seasonal variability and projected changes in demand in the project area. The higher demand of water use by health care facilities will be considered.</li> </ul> <p>Hazardous materials Management</p> <ul style="list-style-type: none"> <li>Buffer strips or other methods of physical separation around project sites will be included to protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odor or other emissions.</li> </ul>	Contractor	Decommissioning	Monthly

	<ul style="list-style-type: none"> <li>• Hazardous materials storage, handling and use will be managed to reduce or eliminate consequences of the potential off-site release.</li> </ul> <p><b>Traffic Safety</b></p> <ul style="list-style-type: none"> <li>• Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public.</li> <li>• Emphasizing safety aspects among drivers</li> <li>• Improving driving skills and requiring licensing of drivers</li> <li>• Adopting limits for trip duration and arranging driver rosters to avoid overtiredness</li> <li>• Avoiding dangerous routes and times of day to reduce the risk of accidents</li> <li>• Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</li> </ul> <p>Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, the following measures will be applied:</p> <ul style="list-style-type: none"> <li>• Minimizing pedestrian interaction with vehicles</li> <li>• Collaboration with local authorities (traffic police unit) and local communities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations (hospital). Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaign)</li> <li>• Coordination with emergency responders (Government hospital or local social and health associations) to ensure that appropriate first aid is provided in the event of accidents</li> <li>• Using locally sourced materials, whenever possible, to minimize transport distances. Locating worker camps close to project sites and arranging worker transport system to minimizing external traffic</li> <li>• Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions</li> </ul> <p><b>Transport of Hazardous Materials</b></p> <p>Project will have procedures ensuring the compliance with local laws and requirements applicable to the transport of hazardous materials. The procedures will be:</p> <ul style="list-style-type: none"> <li>• Proper labeling of containers, including the identity and quantity of the contents, hazards, and shipper contact information</li> </ul>			
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	<ul style="list-style-type: none"> <li>• Providing a shipping document (e.g. shipping manifest) describing the contents of the load and its associated hazards in addition to the labeling of the containers.</li> <li>• Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved</li> <li>• Ensuring adequate transport vehicle specifications</li> <li>• Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures</li> <li>• Using labeling and placarding (external signs on transport vehicles) as required</li> <li>• Providing the necessary means for emergency response</li> </ul> <p>Disease Prevention</p> <p>Interventions for communicable diseases</p> <ul style="list-style-type: none"> <li>• Providing surveillance and active screening and treatment of workers</li> <li>• Preventing illness among workers in local communities (undertaking health awareness and education initiatives, training health workers in disease treatment, conducting immunization programs for workers in local community to improve health and guard against infection, providing health services)</li> <li>• Providing treatment through standard case management in on-site or community health care facilities</li> <li>• Promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization</li> </ul> <p>Interventions for vector-borne diseases</p> <ul style="list-style-type: none"> <li>• Prevention of larval and adult propagation through sanitary improvements and elimination of breeding grounds close to human settlements</li> <li>• Elimination of unusable impounded water, increase in water velocity in natural and artificial channels</li> <li>• Implementation of integrated vector control programs</li> <li>• Promoting use of repellents, clothing, netting and other barriers to prevent insect bites</li> <li>• Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs</li> <li>• Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread</li> </ul>			
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	<ul style="list-style-type: none"> <li>• Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects</li> <li>• Educating project personnel and local residents on risks</li> <li>• Prevention and available treatment, monitoring communities during high-risk seasons to detect and treat cases</li> <li>• Distributing appropriate education materials and following safety guidelines for the storage, transport and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure</li> </ul> <p>Emergency Preparedness and Response</p> <ul style="list-style-type: none"> <li>• If there is a risk to the local community from a potential emergency arising at the project site, the company will inform the community through the communication measures, namely, informing the local authorities, communicating details of the nature of emergency, communicating protection options (evacuation, quarantine), providing advices on selecting an appropriate option and vehicle mounted speakers.</li> </ul>			
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## 12. ENVIRONMENTAL MANAGEMENT PLAN AND ESTIMATE BUDGET

### 12.1 Environmental Monitoring Plan with estimated budget (Construction Phase)

Potential Impact	Monitoring Item	Monitoring Means	Allocated Budget per year (MMK)
<b>Physical Environment</b>			
Soil Degradation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and Observation	(Will be completed by Developer)
Soil Erosion	<ul style="list-style-type: none"> <li>Efficiency of erosion control measures</li> <li>Drains, waterways</li> <li>Vegetation and plants</li> <li>Concrete Aprons, concrete drains</li> <li>Deformation by erosion</li> </ul>	Inspection and Observation	
Topography	<ul style="list-style-type: none"> <li>Monitoring of design of buildings and structures</li> </ul>	Inspection and Observation	(Will be completed by Developer)
Dust Emission	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Amount of dust on road side tree leaves</li> <li>Breathing Air</li> </ul>	Inspection and Observation	(Will be completed by Developer)
Air Pollution	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Content of PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO in air</li> </ul>	Inspection, observation measuring air quality	
Greenhouse gas emissions	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Content of CO<sub>2</sub> in air</li> </ul>	Inspection, observation measuring air quality	
		Inspection, observation	

Surface water/Ground water contamination	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Water quality test for temperature, pH, SS, DO, BOD<sub>5</sub>, COD, total coliform bacteria, oil and grease</li> </ul>	measuring water quality	(Will be completed by Developer)
Noise and vibration	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Noise and vibration level</li> <li>Traffic (on-site vehicles) count</li> </ul>	Inspection, observation	(Will be completed by Developer)
		measuring and counting	(Will be completed by Developer)
Solid waste generation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Amount and kind of solid waste</li> </ul>	Inspection and observation	(Will be completed by Developer)
Changes to natural resources	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Traffic flow	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
<b>Biological Environment</b>			
Destruction of vegetation and expelling of wildlife	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Disturbance to aquatic organisms and aquatic habitats	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
<b>Social Environment</b>			
Existing social infrastructures and services	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)

Landscape and scenery	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and interviewing the affected people	(Will be completed by Developer)
Risks for infectious diseases such as AIDS/HIV due to influx of workers	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Workers' awareness on infectious diseases</li> </ul>	Inspection, observation and interviewing	(Will be completed by Developer)
Occupational safety and health (Risk of injuries and accidents to workers)	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Record of accidents and infectious disease</li> </ul>	Inspection, observation and interviewing	
Emergency risk (risk of fire, earthquake)	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	
Community Health and Safety because of construction activities and increased traffic	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Record of accidents and infectious diseases</li> </ul>	Inspection, observation and interviewing	

## 12.2 Environmental Monitoring Plan with estimated budget (Operation Phase)

Potential Impact	Monitoring Item	Monitoring Means	Allocated Budget per year (MMK)
<b>Physical Environment</b>			
Soil Degradation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and Observation	(Will be completed by Developer)
Dust Emission	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection, observation	(Will be completed by Developer)
Air Pollution	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Content of NO<sub>2</sub>, SO<sub>2</sub>, CO, PM<sub>2.5</sub>, PM<sub>10</sub> in air</li> </ul>	Inspection, observation measuring	
Greenhouse gas emissions	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Content of greenhouse gases in air (CO<sub>2</sub>, hydrofluorocarbons etc.)</li> </ul>	Inspection, observation measuring	
Surface water/Ground water contamination	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection, observation	

	<ul style="list-style-type: none"> <li>Water temperature, pH, SS, DO, BOD5, COD, colour and odour, Total Nitrogen, Total Phosphorus, Sulphide, oil and grease, total coliform bacteria, formaldehyde, phenols, free chlorine, heavy metals such as zinc, chromium, arsenic, copper, mercury, cadmium, barium, lead and nickel</li> <li>Discharge water from each source to the waterways</li> </ul>	measuring	
Increased water demand	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Noise and vibration	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
		measuring	(Will be completed by Developer)
Increased solid waste generation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Increased wastewater generation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Hazardous waste generation	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Changes to Natural Resources	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Increased traffic flow	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> <li>Traffic count</li> </ul>	Inspection, observation and counting	(Will be completed by Developer)

Foul Odor and Vectors	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
<b>Biological Environment</b>			
Changes to terrestrial flora and fauna	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Changes to aquatic flora and fauna	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	
<b>Social Environment</b>			
Inconveniency with socio-economic change	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Risk of injuries and accidents to workers	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	(Will be completed by Developer)
Increased Emergency risk (risk of fire)	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	
Community Health and Safety because of project operation activities and increased traffic	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	
Light Intrusion	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Inspection and observation	

### 12.3 Environmental Monitoring Plan with estimated budget (Decommissioning Phase)

Potential Impact	Monitoring Item	Monitoring Means	Allocated Budget per year (MMK)
<b>Physical Environment</b>			
Dust Emission and Air Pollution	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)
Greenhouse gas emissions	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	
Surface water contamination	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)
Noise and vibration	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)
Solid waste generation (Hazardous and Non-Hazardous)	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)
<b>Social Environment</b>			
Living and livelihood	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation	(Will be completed by Developer)
Risks for infectious diseases such as AIDS/HIV due to influx of workers	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	(Will be completed by Developer)
Occupational safety and health (Risk of injuries and	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	

accidents to workers)			
Community Health and Safety because of demolition activities and increased traffic	<ul style="list-style-type: none"> <li>Monitoring of mitigation measures and aspects for monitoring in Environmental Management Plan table</li> </ul>	Observation and inspection	

## 13. PUBLIC CONSULTATION

### 13.1 Findings and Recommendations

#### Findings

1. As there is only one primary school in Nyaunghnitpin Agriculture and Livestock Zone (3), it is found that Middle School is needed.
2. It is observed that the workers experience difficulties to work in Hmawbi, Hlegu and Htauk Kyant township. When the industrial zone is developed, they should be hired to employ in the zone.
3. It is found that a dispensary / hospital is needed because it is difficult for the people to go to Ngar Su Daung village for medical treatment.
4. The cultivators at Zone (3) cannot get the water supply from Kalihtaw dam, it is found that water from this dam should be provided.
5. It is necessary to provide a cemetery land for the people who are living in Nyaunghnitpin Agriculture and Livestock Zone (3) because they don't have land for burial.
6. It is necessary to upgrade the roads for the people because the roads outside of Nyaunghnapin Convention Center are bad.
7. People worry for their health because there will be factories that produce bad odor in the Industrial zone. So that they don't want to build such factories in the zone.
8. People want agricultural and livestock processing export companies in the industrial zone because the zone itself is used for agriculture and livestock breeding.
9. It is necessary for people to access to clean drinking water because they have to use water from the well and tube well.
10. Tenant worry for losing lands when the landlords sell their lands with high price when the industrial zone is developed.
11. People worry for degradation of cultivated land because of chemical and industrial wastes from the Industrial Zone.
12. People and Buddhist monks worry that there will be slaughter houses in the Industrial Zone.
13. Thought the agricultural zone has been established, it is found that there is not enough reservoir water so that people have to rely on the well.

#### Recommendations

1. Although the households can access to the electricity, they experience power outage. Therefore, it is recommended that electricity supply grid should be upgraded.
2. Roads near the industrial zone are very poor in condition so that they can't be used in the raining season. The road network among villages should be developed as CSR Plan.
3. There are no ambulance and good dispensary / hospital for emergency health issues, therefore the ambulance and good dispensary / hospital are needed.
4. Although it is a cultivated zone, some places in the zone don't access to the water supply for cultivation. So that they can't be useful for cultivation. Therefore, it will be more convenient for local people if they are provided water for cultivation.
5. Trainings should be provided the local people so that local workers can be easily recruited when the industrial zone is developed.
6. As there is lack of job opportunity in the region, the local people migrated to work. When the industrial zone is developed, they might come back for working at the zone. Therefore, advanced preparations should be carried out.
7. There can be heavy floods in the raining season in the region, therefore advanced

- preparation should be carried for better drainage system for the Industrial zone.
8. Industrial zone should include factories for production of value-added agricultural and livestock products. Agricultural and livestock breeding should be expended by providing modern technical skills.
  9. Local people want the developer to start the industrial zone as soon as possible. The developer needs to engage with the local people.
  10. When the industrial zone is developed, it is suggested that a recreation center or a playground should be included for the wellbeing of the workers.

### **13.2 Public Consultation for establishing Nyaunghnapin Industrial Zone**

Date; 8<sup>th</sup> February

2019 Time; 13:00

hours

Venue; Zone (3) Meeting Hall, Agricultural and Livestock Breeding Zone (3),

Nyaung hnit pin Agricultural and Livestock Breeding Zonal Area, Hlegu Township, Yangon Region.

U Aung Lin (MSR) acted as M.C at the ceremony. He introduced MSR Company experts with the attendees and read out the agenda. The agenda and the list of attendees are attached in Appendix.

#### **Discussions**

**1. U Maung Maung Kyaw**, Chairman

Agricultural and Livestock Breeding Zone (3),

Nyaunghnapin Agricultural and Livestock Zonal Area

Hlegu Township

Regarding the discussion held today, you might have known about why public consultation at was held. MSR Company is carrying out environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) in order that an Industrial Zone will be able to be established in the nearby Nyaunghnapin National Congress Complex through the cooperation between Korean Government Company and Myanmar Government the project will be explained to the people in the neighbourhood and the people's suggestions and feedbacks will be included in the report. So, this discussion is held for this purpose. The experts from MSR will explain in every detail. As for me, I invited those living in the zone. We have to pay attention to the experts and ask them to clarify what they explain. I express my thanks to all of you.

**2. U Aung Lin**, SIA in – Charge

EIA Department, MSR

Yangon

We're from MSR – Myanmar Survey Research Company in Myanmar, it's a research company. Our company is a third party. It's not a governmental organization. We do marketing research and economic research, Environmental Impact Assessment. For the purpose of setting up an economic zone in this Nyaunghnapin Congress Complex over one year ago, 3 Sub-troupes, including 10 members in each from ESIA Department of MSR Company have been here for 6 times and finished doing assessments. One of these 3 sub- troupes is a sub-troupe that conducts assessments by taking measurements of water, wind and earth. They have carried out a study. Another team is the one that makes an assessment of whether or not there is an impact on trees and wild live in the neighbourhood and in the complex. They finished studies on what sort of trees and creatures.

Another team is the one led by me that makes social and Economic Impact Assessment. Our team went to the people's residences in the neighbourhood and has carried out studies into their livelihoods, foods, economic, social, and educational and health situation. Now, today our team leaders will give explanation to the people attending here. As the industrial zone is internationally standardized project, we' ve carried out studies over one year and there have also been queries put by the people against fastest implementation . First of all, may I express my thanks to you for coming to listen to our explanation. I also make a request to share our explanation to those who cannot attend this discussion. This time, the limited population has been invited according to the situation of the hall. When the discussion takes place next time, the discussion will be widely held. Next time, authorities concerned of Township level and Regional level will also be invited.

The project that has international status has been made known to people. The suggestions of the people have been obtained. The company carrying out the project needs to understand the people's requirements. The company needs to know what people's requirements the company needs to know, what people's requirements are and what difficulties they are facing. If so, the construction company must know what are to be carried out and what responsibilities to be taken. I request you all to make further suggestions about our findings and discussions about emergence of this industrial zone through concerted effort. May I conclude here and thank all of you.

### **3. U Ko Ko Soe Lwin Thaw**, Secretary

GIS & IT Specialist

ESIA Department, MSR

I'll give a brief presentation about this project. This project will be implemented through the cooperation between Myanmar Government. Ministry of Construction and Korean Government. Land and Housing Corporation (LH) the project will be implemented on 500 acres of land. Korean Government will provide plot of land, transportation, electricity and water. For these matters, Myanmar Government will get loan with less interest from Korean Government. Myanmar Government will lease them the land. Korean Government will provide fund and implement the project from the start to the end. The implement of the project will be of benefit to the State Government, people and local residents.

The phase one of this project will include a garment factory and food production factory. Another sector is logistics that will include spare parts and accessories producing factory, construction material producing factory. In phase Two, There will be buildings for inhabitants, IT Training Schools, and other training schools. The phase one has been planned

to start in later 2020. As there has been some negotiations with Myanmar Government, it is to be started in later 2020. Our EIA, SIA Report will be submitted to the State Government in April this year. I conclude my portion of presentation here. Thank you all.

#### 4. **U Phone Myint Tun**, Engineer

ESIA Department, MSR

Yangon

Mingalaba (Be auspicious!) My name is U Phone Myint Tun. I'm a retired engineer from the armed forces. MSR Company assesses the impact of the project on socio- economic life of the people in the project area and its neighborhood and on physical environment. The Project is to shape the design to be emerged as shown with picture. There will be buildings for inhabitants. The remaining portion will be an industrial zone including factories. People earn their living through agriculture and livestock breeding in this area. If there emerges an industrial zone, there will be in need of human labour. The locals in the neighborhood will get jobs. The emergence of factories may bring in benefits as well as bad impact. What our MSR does is to assess the guidelines to be followed by the developer to create improved and changed situation by implementing the project without any deterioration of the formal socio-economic and physical situation. We also make carrying out a study of do's and don'ts for impact assessment that is to be included and mentioned in the report. The assessments of wind, water and land were recorded a year ago. The assessment is necessarily carried out in order that air pollution, water pollution and land slide may not occur when the situation is changed due to the implementation of this project. We have records of water and land. We have recorded the situation of the air pollution after taking measurements.

Once the project starts, water will be fetched from the nearby dam as allowed by the State. Electricity will be provided by the State. Arrangements will be made so as not to reduce the power of electricity being consumed by the locals as the factory takes it. Water is to be used after being purified by the built-in water purifier. The waste water will be discarded after being systematically purified through wastewater treatment plant. We make an assessment in order that the project to be implemented has no bad impact on socio- economic life of the locals in the vicinity and physical situation. We want to get the project completed. That is why we have made assessments.

This is our first presentation. When the public consultation is held for the next time, the detailed facts of the factories will be presented.

There will be better transportation and in people will be in good health will have good education and good socio- economic life if this area will be changed into an industrial zone from the status of agriculture and livestock breeding. We'll make presentation on how arrangements will be made to have less or no bad impact. What I explain now is study on physical situation and how to have good impact. You may suggest and discuss something that you do not understand or if there is anything necessary.

#### 5. **U Kyan Dyne Aung**, Environmental Engineering Management Specialist

ESIA Department, MSR.

I'll give an explanation about legal affair. If is something about the regulation to be followed by the company that is implementing the project when it is doing so. There are laws and by laws that which facts are to be assessed in carrying out Environmental Impact

Assessment and Social Impact Assessment. We have to assess how the project can have bad or good impact on water, wind, air and land. If the project has bad impact, the arrangement to get it deteriorated or to get it eradicated must be followed. Although this project is a joint venture between the Project Company and Myanmar Government, the project company has, as it is an overseas company, to comply with the investment law. If to follow the provision that waste and waste water of the factory must be discarded only if they have been purified by the waste water treatment plant to the limited extent. It is also to follow the agreements and law signed by Myanmar Government in cooperation with international organization and other nation.

There are mainly three sections in writing a report to carry out a project. At the first phase, there is a report before the construction starts. At the second phase, the report is about the process of construction. Another report is written when the ground is being levelled and the foundation is being dug. After the construction, there is a report to be written on the bases of the studies on how men can be harmed or how those injuries or harms can be prevented when the factory is put into operation. The last one, when the term of the project is over and there is no more operation of the factory, is the management plan of how to remove factories and buildings must be included in the report. When the factory emerges, the management plan of how to eradicate possible bad impact will be included and written in the report. The one who implement the project has to take responsibilities to carry out the written presentation in the report. Fund must be allocated for each sector of the factory and small teams need to be formed to carry out each sector. Not only project developer but also factories involved and company have to follow the report. Factories wise and company wise teams must be formed in carrying out the project. When laws, by-laws and restrictions are put into practice, there are inconveniences. If they are reformed and changed, the presentation of the people must be followed without ignoring them, keeping touch with people and without having any bad impact on people. We've to accept and reform their suggestion. What I want to explain is enough. Thank you.

## 6. U Aung Lin, SIA in- Charge

ESIA Department, MSR.

I'm the leader of the team that makes the assessment of the impact on the socio-economic life. We've to carry out the studies of the lives of villagers in the vicinity of the project area. There are things that the villagers themselves have no idea. But we've to obtain the knowledge of them to be included and mentioned in the report. This report is presented to the Ministry of Natural Environmental Conservation and the owner of project construction to read by themselves. After reading this report, the ministry makes a remark about whether or not this project should be implemented. There are totally a population of about 10,000 including people living close to Nyaungnabin Industrial Zone and those living in both village tracks. We've interviewed village elders, those that belong to administration and the Venerable Sayadaws presiding in monasteries out of them and recorded what they have answered. There are 57 informants. This survey provides us with a lot of findings. Most of them go to Hmawbi, Hlegu and Yangon and work there as they are unemployed. If there emerges an industrial zone, they said they want to get jobs. As there is no health-care service center, they have to go to Ngazutaung clinic and Hlegu hospital for receiving medical treatments. But during the rainy season. The roads are so bad that they have difficulties. If the factories run, population will increase and there will be so densely populated. So, they presented that they need a hospital.

Another difficulty is that those living in the zone have no graveyard if there arises a funeral. As the circular roads around the zone are too bad in the rainy season, the school going children are in trouble. As the water is not enough for agriculture, the water from tube-wells is being used. For drinking water, they need clean and fresh drinking water. They have presented that they need jobs and needs to be given training since construction, of the Industrial zone started. They said they feel worried about the inclusion of chemical factories and the inclusion of chemicals in discarded waste- water. They suggested not including such factories. There will be over 200 factories in the industrial zone- including garment factories, car spare- parts and accessories factory and transportation service.

What I view is that they need jobs. There are villages where there is no hospital and clinic for health, no primary school for education road- communication needs to be much improved. The project implementing company will fulfil the requirements of villages by using Corporate Social Responsibility (CSR) fund. For that matter we've suggestion to be given the purpose of holding this meeting and giving explanation is to make people know what they should know, and people side may make suggestion at this meeting. So, you may query your requirements and make suggestion. Thank you all.

**7. U Phone Myint Htun, Engineer**

ESIA Department, MSR.

We'd like to encourage the people attending here to discuss your opinion and give suggestions. Your opinion may be different from ours. We're never concerned with the company implementing project nor the government. We're said to be bystanders. We're a third- party organization. We hold a meeting and give explanation for the benefits of the people. So, you may feel free to query what you want to know and give suggestions.

**8. U Maung Maung Kyaw, Chairman**

Nyaunghnapin Agriculture and Livestock Breeding Zone (3)  
Hlegu Township

There is one thing to be worried about. It's the matter of electricity. After the emergence of the industrial zone, the factories will use a lot of power and we're worried about being lack of electricity for agriculture and livestock breeding.

**9. Mr. Shin Hyo Sub**

Company Representative

Residential Representative Office of Korea, Yangon

All Mingalaba! (Be auspicious to all!). I'm a staff member of L.H. Company owned by Korean Government. I've been a Residential Representative of Residential Representation Office. Thank you very much.

**10. U Than Myint**

Agricultural and Livestock Breeding Zone (3)  
Nyaunghnapin Area, Hlegu Township

Nyaungnapin Agricultural and Livestock Breeding Zone No.1, 2 and 3 were started implementing in 2000. Zone 3 started business in 2004. The entrepreneurs have collectively paid the road tax and electricity bill since the zone started running. We have to get our area electrified at our own expense. We perfectly had 230 volts from 2004 to 2008. Now, we have not had enough voltage for a long time. Electricity often goes out. If sometimes comes and sometimes goes out. As the light goes out, water cannot be put up to the plantation. Water cannot be poured on to the plantation. As the plants are not poured with water, they die. Water does not flow through drains. Water is not available. When people die there is no graveyard where dead person can be buried or cremated. If there is a plan, we'd like to request the company implementing the industrial zone to fulfil those requirements. The main requirement of our zone is to have good internal zone roads. School boys and school girls find it very difficult to go to school in mud during the monsoon. I present it to let the company, construction zone with the government know it. Thank you.

**11. U Aung Lin, SIA in- Change**

ESIA Department, MSR.

The presentation of U Than Myint will be added and presented in the report. We'll present it because the other sectors will run smoothly if the road communication is good.

**12. U Phone Myint Htun, Engineer**

ESIA Department, MSR.

Yangon

May I give you a little more explanation about better road- communication that U Than Myint presented. There is a plan to build a 4- lane- road from No.3 crossroad to Nyaungnapin along the main road situated in front of the project complex. It is nearly 10 miles long. The separate electric current will be used for industrial zone. So the electric current the locals are now using will not be taken. So the electric power will not be reduced.

**13. U Aung Lin, SIA in – Charge**

ESIA Department, MSR

Yangon

I want to present road affairs. Road has 2 sectors. The entrance road to the industrial zone and internal roads in the zone. The Ministry of Construction has to promote the status of the main entrance road and the company to build industrial zone has to take responsibilities for internal roads. Regarding electricity, the electric power will be taken from the government's national grid. It will start with 66 KW increasing step by step until the whole industrial zone can be powered.

**14. Daw Thazin Nwe, Interpreter**

Residential Representative office, Korea

Yangon.

You needn't be worried about the reduction in electricity. But an industrial zone cannot be built only with the electric power in the current given to the quarters and agricultural and live-stock Breeding. For industrial zone-specific electric power must be provided. But there is

no connection with the electric current, now in use. The Ministry of Construction will take responsibilities for road, water and electricity outside the complex. KMIC through the cooperation between Korea and Myanmar will carry out building roads, providing water and electricity inside the complex of industrial zone. The internal and external plan will be simultaneously carried out.

**15. U Maung Maung Kyaw**, Chairman

Agricultural and Livestock Breeding Zone (3)

Nyaunghnapin Zone Area, Hlegu Township

We're worried about the difference between the faint light in the zone in the neighbourhood and villages and the bright light in the complex of industrial zone. I've ever seen in some areas before. It is unfair. What I want to say is that people and village in our neighbourhood want to share the electric current taken for industrial zone. If industrial zone develops, the villages and the local residents in its vicinity have to be in higher status. That is why I present it.

**16. U Aung Lin**, SIA in- Charge

ESIA Department, MSR

Yangon

Enough electricity and better road- communication – the development sector of village and local residents in the neighbourhood of the zone by constructing an industrial zone. People are asking for them. People living in the neighbourhood of the zone have electrified themselves at their own expense. Lamp- posts and cables have been bought through self-reliance. Water must be provided through water pipes until it reaches home. To provide them all must be written and mentioned in the report.

**17. U Sai Zeyar Min**, Nyaunghnapin Village

Hlegu Township

I want to present road- Communication. I've heard that the status the main road will be raised in building this industrial zone. I want to know whether or not the status of this road is raised until it reaches Ngasutaung. The workers will have to use this road when they go to factories in the industrial zone. Many of the workers will be from our village track.

There is another thing I'd like to suggest. When I study the plan of the industrial project plan, there is one thing lacking. There should be a workers' recreation center either inside or outside the industrial zone complex. That is why I want to give a suggestion that a sportsground, or a park or a swimming pool in this plan for the workers to overcome stress and strain in this plan.

**18. U Myint Kyaw**, Administrator

Kyarinn Village Track

Hlegu Township

My name is U Myint Kyaw an Administrator for Kyarinn Village Track. The management section is out of question in constructing an industrial zone through the cooperation between Korea and Myanmar. What I want to make a request is to think of road communication, health, social affairs and employment of local residents. I'd like to request again to employ local young people as an accountant a computer user, or a basic worker according to their respective

status. There are 7 villages in my village track. I have to take responsibilities for agricultural and livestock breeding zone 2 and zone 3. There are totally 1300 houses. There are totally a population of about 6000 including the population in the village legally recognized by the Ministry of Home Affairs and those in the other villages that are not legally recognized by the Ministry of Home Affairs. There are many workers available from my village track. What I mainly want to say is that the main road from No.3, crossroad to Ngazutaung needs to be built until it reaches Ngazutaung village. As the road is narrow, accidents often occur during the rainy season. That is why I suggest extending this road. Thank you.

**19. U Than Myint**

Zone (3)

Agricultural and livestock Breeding Zone

Nyaunghnapin Area

Hlegu Township

The heads of the State invited foreign investment even by going abroad. In some places, they might need to communicate humbly. Even when the foreign investment comes, it is inconvenient for them because the workers here protest against them. What we need is to change the mind – set of Myanmar people. The company that comes here to do business has to actually play its role. And the people here should be provided with employment opportunities and other responsibility.

**20. U Kan Myint**

Nyaunghnapin Village

Nyaunghnapin Village Track

Hlegu Township

I'm U Kan Myint from Nyaunghnapin Village. There is a village known as Phayarthonsu in Nyaunghnapin village Track. There is no primary school in that village. And it has many houses. They need a primary school for children's education. I'd like to suggest that the company to construct the industrial zone is requested to carry out it if the company can help them.

**21. Daw Hnin Yi Win, Mid- wife**

Rural – Health Department

Kyarinn Village Track

Hlegu Township

I'm from Kyarinn Village Track. Rural – Health Department. I'm taking responsibilities of the health affairs of a population about of 800, including those from Agricultural and livestock Breeding zone (2) and zone (3). I've to travel for health affairs in the zonal area during the monsoon. The roads in the zonal area are of red ochre. In monsoon, they become muddy and people find it difficult to go on it. Students going on them have difficulties. Zone No. (3) Has a population over of 1350. Most muddy roads are inside the zone. So repairing these roads should be put into consideration.

**22. Daw Thazin New, Interpreter**

Residential Representative Office, Korea

Yangon

I want to inform you of the training school. Giving training is included in my programme. Those have been drawn as plans in the programme. I cannot say for sure it will be carried out. Another thing is employment matter. I've heard that people in the neighbouring villages and in this agricultural and Livestock breeding zone want to be employed. Don't be worried about that. We're the ones to be worried about that. We're worried about getting workers as our industrial zone needs to employ about 100,000 workers.

**23. U Phone Myint Htun, Engineer**

ESIA Department, MSR

Yangon

Local people might have heard what the teacher has now said. People here are worried about not getting job. The Korean company building industrial zone get worried about not getting enough workers because they need about 100,000 workers. People here no need to be worried about. Even though everyone joins the job, there still in need of more workers. The basic level factory workers only need to be literate or have primary level education. It has been said that there are programmes to give training regarding factories. After the training, the high or low positions will be determined by their respective skills. There will be some positions that need expertise. I want to say don't be worried about getting jobs.

**24. Mr. Shine Hyo Sub, Company Representative**

Residential Representative office, Korea

Yangon

I work with LH Company, owned by Korea LH Company has been carrying out industrial zones for about 20 years. What is to be first put into consideration when an industrial zone is to be implemented in Korea is that the industrial project must not have bad and dangerous impact on the people in the neighborhood must be developed the same as the industrial zone.

Now, people from Korea ask me whether or not there are enough population and enough workers in the neighborhood of the industrial zone. When an industrial zone emerges, environmental development also follows immediately. It will bring many things that help the neighbouring region. So I'd like to say to local people to help together to the emergence of an industrial zone. Korea government gives us much help from behind to make this industrial zone come into being. I want to say I'll keep on trying to fast implement the industrial zone. Thank you.

**25. U Maung Maung Kyaw, Chairman**

Zone No (3)

Agricultural and Livestock Breeding zone

Nyaunghnapin Area

Hlegu Township

I've heard that the industrial zone will include garment factories. I want to know if the investment will come from only Korea or from other places and if the workers from Myanmar or those from other countries can come. For example, is it possible for Thai to come and work here? Because people from Thailand come and see this zone. They returned as nothing is

carried out here. So I ask you. Another thing I want to ask has been only garment factory can be included and not any other else. Why I ask this question is that one of my friends wants to lease land and build a factory to produce spare parts of the tractors.

**26. Daw Thazin New**, Interpreter

Korea Residential Representative Office

Yangon

Any citizen can come and invest here. There is no restriction. To build the factory in the place specified is what we temporarily have drawn as a plan. But this cannot be restricted. If a factory is to be built, someone can lease the land for 50 years. Our KMIC side will provide infrastructure. As we are carrying out G 2 G project, nobody can come and do something as they wish.

**27. U Maung Maung Kyaw**, Chairman

Agricultural and Livestock Breeding Zone (3)

Nyaungnabin Area

Hlegu Township

Factories will be built on 550 acres of land for establishing an industrial zone through Korean – Myanmar Cooperation. According to the programme of the chief of Ministers of Yangon Region, Agricultural and livestock Breeding. Training School will be built on the remaining 30 acres of land, taking place in the former congress buildings. The Training School together with the industrial zone in this complex will be simultaneously developed. The other zones are trying to provide themselves with water. Water is being carried along the drains that link to Kalihtaw Dam. The drains are crossing zone (2). Through the reliance on this project, the other people will have the right to use more water. In trying to get water for this project as well as for these zones, the drains may cross your compounds and fences. So all have to contribute to it and not to refuse the drainage system crossing your areas. Even though drains have been dug since 2000. The trees in some places beside the drains have even rather grown up. These trees should be felled when it is necessary to extend the drains. Be mindful of which should be given priority to- tree or water. I do request to share this message to other people and may I conclude my presentation here.

The public consultation is over at 3:00 pm.

### **Public Consultation Agenda**

- (1) Reading out the agenda and announcement is made that the ceremony has opened.
- (2) Nyaungnabin Agricultural and Livestock Breeding Zone (3), Chairman U Maung Maung Kyaw delivers an opening speech.
- (3) U Aung Lin from MSR provides an explanation for carrying out EIA and SIA.
- (4) U Ko Ko Soe Lwin Thaw from MSR offers an explanation of project affairs.
- (5) U Phone Myint Htun (Engineer) from MSR offers an explanation of physical affairs.
- (6) U Kyan Dye Aung from MSR offers an explanation of policy and environmental management.
- (7) U Aung Lin from MSR offers explanation of Social Impact Assessment (SIA) and Environmental Impact Assessment (EIA).
- (8) Attendees query what they want to know and give suggestions.

(9) Those concerned answer the queries.

(10) Local people attending there are served with food and drinks.

(11) Concluding remark is delivered and announcement is made that the public consultation is over.

The list of attendees at the public consultation on establishing Nyaungnnapin Industrial Complex

Serial No.	Name	Designation	Address	Phone No.	Signature
1.	U Aung Lin	SIA in- Charge	MSR, Yangon	09 400977121	
2.	U Phone Myint Htun	Engineer	MSR, Yangon		
3.	U Ko Ko Soe Lwin Thaw	Secretary, EIA Dept.	MSR, Yangon		
4.	U Kyan Dyne Aung	Environmental Specialist	MSR, Yangon		
5.	U Ohn Kyaing	SIA Team, Member	MSR, Yangon	09 799139844	
6.	U Ye Min Aung	Logistics	MSR, Yangon		
7.	U Ko Sai	Logistics	MSR, Yangon		
8.	U Than Myint	Road Administrator	MSR, Yangon		

9.	U Win Myint	Administrator of Ten Households	Kyarinn Ahshe		
10.	U Maung Htay	Road Administrator	Zone (3)		
11.	U Myint Swe				
12.	U Tin Moe				
13.	U Kyaw Thu Win		Zone (3)		
14.	U Win Aye		Takutone Village		
15.	U Khin Maung Phyu		Zone (3)		
16.	U Tun Wai				
17.	U Mon Gyi				
18.	Ko Kyaw Soe Naing		Zone (3)		
19.	Ko Zaw Aung				
20.	U Win		Kyarinn Anauk Village		
21.	U Kyaw Hsan Min	Road Administrator	Takutone Village		
22.	U Win Oo		Zone (3)		
23.	U Thuya Zaw		Zone (3)		
24.	Daw Tin Moe Khaing				
25.	Ko Pyae		Zone (3)		
26.	U Maung Myint		Zone (3)		
27.	U Maung Maung Kyaw	Chairman	Zone (3)		
28.	U Khin Myint	Administrator of 100 Households	Ngasutaung		
29.	U Sai Zeyar Min				
30.	U Than Htike Oo	Administrator of 10 Households	Hsonkone		
31.	U Tin Win	Village Elder			

32.	U Chit Shwe	Village Elder			
33.	U Aung Than Htoo	Administrator of 10 Households			
34.	U Aye Kyaw	Administrator of 100 Households	Hsonkone		
35.	U Aung Myint Thein		Zone(3)		
36.	Daw E' Htun		Hlin, Zone (3)		
37.	Khin Maung Win		Zone (3)		
38.	Myo Thant Htun		Zone (3)		
39.	U Thein Shwe		Zone (3)		
40.	U Aung Htin		Zone (3)		
41.	U Than Naing		Zone (3)		
42.	U Aung Naing OO	Administrator of 100 Households	Kyarkansu Village		
43.	U Win Than	Administrator of 100 Households	Kyarkansu Village		
44.	U La Win	Village Elder	Kyarkansu Village		
45.	U Myint Kyaw	Administrator	Kyarinn Ahshe Village		
46.	U Kan Myint	Administrator of 100 Households	Nyaunghnapi n Village		
48.	U Soe Aung	Administrator	Nyaunghnapi n Village		
49.	U Pyone Cho	Village Elder			
50.	U Win Maw Htun	Administrator of 100 Households	Kyarkansu Village		
51.	U Myint Aung	Administrator of 100 Households	Kyarkansu Village		
52.	U Tin Ngwe	Administrator of 100 Households	Kyarkansu Village		

**The photo of Nyaunghnapin Public Consultation on establishing Industrial Complex**



Figure 0-1: U Aung Lin (MSR) making an announcement that the ceremony opens



Figure 0-2: U Maung Maung Kyaw, Chairman of Zone (3), Nyaunghnapin Agricultural and Livestock Breeding Zone, Hlegu Township, delivering an opening speech



Figure 0-3: U Aung Lin (SIA in-Charge, MSR), explaining ESIA needs to be carried out



Figure 0-4: U Ko Ko Soe Lwin Thaw, Secretary, ESIA Department, explaining project.



Figure 0-5: U Phone Myint Tun, Engineer, explaining physical affairs



Figure 0-6: U Phone Myint Tun, Engineer, explaining physical affairs



Figure 0-7: U Kyan Dye Aung, Natural Environmental Conservationist, explaining policy affairs



Figure 0-8: U Aung Lin, SIA in-Charge, explaining SIA implementation



Figure 0-9: U Than Myint, Zone (3), Nyaunghnapin Agricultural and Livestock Breeding Zone, Hlegu Township, discussing



Figure 0-10: U Sai Zeyar Min, Ngazutaung Village, giving suggestions



Figure 0-11: U Myint Kyaw, Administrator, Kyarin Village Tract giving suggestions



Figure 0-12: U Kan Myint, Nyaungnnapin Village, giving suggestions



Figure 0-13: Daw Hnin Yi Win, Mid-wife, Rural Health Department, Kyarinn Village Tract, giving suggestion



Figure 0-14: Daw Thazin Nwe, Korea Residential Representative Office, explaining



Figure 0-15: Mr Shin Hyo Sub, Company Representative, Korea Residential Representative Office, explaining.



Figure 0-16: Local people, Departmental Heads, Administrators of village tracts, attending public consultation

## 14. CONCLUSION AND RECOMMENDATIONS

The Industrial Complex project proposed by the Korea L H Consortium Myanmar has strategic value on many fronts. As Myanmar believes that the establishment of industrial zones throughout the country will contribute to the development of the national economy, it could also be said that the Project is strategic in the economic sense. The Project will contribute to the economic development of the commercial city, Yangon of Myanmar and, thence, to the economic development of the country. The economic cooperation between the two countries will also be strengthened.

The Project will seek to develop the socio-economic conditions of the people living in the region. There is no denying that, once the Project is implemented, it will substantially enhance mutually beneficial Myanmar-Korea trade. It also has the huge potential of attracting investors from inside and outside the country by establishing a favourable investment environment. At the micro-economic level, the Project will promote entrepreneurship and create job opportunities.

In terms of the living environment, most of the impacts could be controlled and limited in and around the project area. Major negative impacts such as but not limited to air pollution, surface water/ground water contamination, solid waste generation, traffic flow are expected for construction, operation and decommissioning phases but their significance levels are medium. However, implementation of appropriate mitigation and management plan will minimize these impacts.

In terms of the natural environment, the major negative impact is the clearance of existing vegetation during construction phase, though no sensitive ecological protection area is involved. However, implementation of appropriate mitigation measures, such as creating green areas and sodding of public spaces as soon as possible and keeping the existing environmental conditions as much as possible will minimize the impact on the ecosystem.

In terms of the social environment, the existing social infrastructures and services, risks for infectious diseases, occupational health and safety and community health and safety are expected. However, implementation of appropriate mitigation and management plan, such as to manage working conditions during the construction work and to provide security and maintain safety prevention measures during construction/operation phase will minimize these impacts.

On the other hand, some positive impacts of the Project such as increase in job opportunities and improvement of social infrastructure are also expected. There are no land issues for the project and the community living nearby villages are pleased to see the project implementation as early as possible. They would like to get employment in the project.

The residual impacts, effects on watercourses, groundwater contamination, air pollution, dust emission, community health and safety, are expected but their magnitude is low and are reversible. The duration of these impacts are intermittent and short term and level of significance is minimal.

The cumulative impacts could be expected on air quality, water quality, traffic, community health and safety, greenhouse gas emissions and solid waste generation due to different activities of livestock farms, fish farms, and agricultural production businesses in the surrounding area of the proposed project. The cumulative impacts typically result from the actions of multiple stakeholders, it is necessary to engage with these stakeholders for effective collaboration and coordination. Therefore, the project developer plans to initiate collaborative engagement in impact management with others including project proponents, government agencies, affected communities, Environmental NGOs, conservation groups, and expert groups for the programs but not limited to collaborative protection and enhancement of regional areas to preserve biodiversity, collaborative engagement in other regional cumulative

impact management strategies, and participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts, wherever applicable.

In consideration of the result of the EIA study for the Project, the Environmental Management Plans (EMPs) including adequate mitigation measures to reduce the negative impacts and Environmental Monitoring Plan (EMP) including budget allocation are proposed for each phase of the Project: construction, operation and decommissioning phases. For the pre-construction phase, no negative impacts are judged for physical, biological and social environment.

It is confirmed that the environmental, social and health impacts of the Project were assessed, and the Environmental Management Plan formulated properly. In the process of EIA, opportunity of public involvement was ensured and comments from the public and MONREC were reflected into the final EIA Report. Thus, the EIA was completed in accordance with the requirements of the EIA Procedure properly for the project proponent to follow the EMP accordingly.

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## 16. Appendices

### Appendix 1

## FIRE SAFETY MANAGEMENT AND FIRE EMERGENCY PLAN

### FIRE SAFETY MANAGEMENT

#### 1 INTRODUCTION AND SCOPE

- 1.1 Fire is a hazard in any part of the premises. Its consequences include the threat to the lives or health and safety of relevant persons, damage to or loss of property and severe interruption to normal business activities or opportunities.
- 1.2 Managing the risk of fire demands and fire safety precautions based on a combination of appropriate prevention and protection measures depending upon building use and occupancy.
- 1.3 This fire safety management and fire emergency plan applies to all premises which are to any extent under the control of the **The Korea L.H Myanmar Consortium** as the employer and owner. Its requirements extend to all persons at those premises including staff, guests and contractors whether permanently or temporarily engaged.
- 1.4 **The Korea L.H Myanmar Consortium** will, so far as is reasonably practicable, and in accordance with legal obligations and standards, in respect of every premises to:
  - provide and maintain passive and active fire prevention, protection and measures according to the purpose or use of the building, the numbers of occupants and the activities or processes undertaken therein;
  - provide comprehensible and relevant information to staff and others, through the provision and availability of emergency instructions or fire safety plans and the risks identified by relevant risk assessments;
  - provide a programme of fire safety training;
  - carry out and keep under review a fire risk assessment to analyse building and process fire risks, the existing preventive and protective measures and to identify areas for improvement;
  - have in place a programme of works to improve or maintain the existing fire safety specifications;
  - identify a sufficient number of persons, whether staff, security or others, to be present at all times the building is occupied with responsibility for initiating the fire evacuation procedure and provide information and assistance to the fire service;
  - where appropriate, to prepare and keep under review risk assessments in relation to the use, storage, handling, disposal and transportation of dangerous substances and ensure that, so far as is reasonably practicable, the risks associated with dangerous substances are reduced or controlled.

## **2 PRACTICAL FIRE SAFETY ARRANGEMENTS**

- 2.1 As part of a holistic fire safety management system, in addition to the management action outlined below, considerations of passive and active fire precautions are essential.
- 2.2 Passive fire precautions are concerned with the physical conditions in premises which are designed to facilitate containment of fire by design, construction and layout, effective communication and safe evacuation. In particular,
- materials specification, design, construction and inspection of buildings, fire doors and escape routes taking into account the needs of service users, people with disabilities, contractors, the public, etc;
  - appropriate safe and secure location of building services e.g. gas and electricity;
  - provision of clear fire safety signage for escape routes and final exits in conformity with the Myanmar Fire Brigade rules and Myanmar National Building Code (2016).
  - provision of prominently located fire action notices (e.g. by fire alarm manual break glass points) to inform people of the action to be taken in the event of fire; and
  - education and training of staff in fire safety arrangements, in particular evacuation procedures and drills.
- 2.3 Active fire precautions are those features of the fire safety management system that detect and operate in the event of a fire, including fire alarm systems, emergency lighting systems and firefighting equipment. In particular,
- the installation, maintenance, inspection and weekly testing of fire alarms;
  - the appropriate design, location, operation, monthly inspection and annual testing of adequate (emergency) lighting systems for fire escape routes;
  - the provision, use, appropriate type and location, and annual maintenance of portable fire extinguishers.
  - A quarterly / six monthly / annual premises fire safety inspection will be carried out.
- 2.4 The fire safety arrangements will be based on the followings:
- Effective planning, organisation, control, monitoring and review of protective and preventative measures
  - Fire safety risk assessments and building audits
  - Fire safety systems and maintenance
  - Fire warden and staff training
  - Fire evacuation drills
  - Building design, alterations and commissioning

### **3 PLANNING**

- 3.1 Fire risk assessments are a requirement and a structured approach to determining the risk of fire occurring in a premise or from a work activity, and identifying the precautions necessary to eliminate, reduce or manage the risk. The outcome of the risk assessment must be incorporated in the fire emergency plan.
- 3.2 Fire Risk Assessments must be carried out and reviewed regularly (recommended to be annually) or when there is any building alteration or change of occupation and use of the premises, or following a fire incident/emergency, etc.
- 3.3 The risk evaluation and appropriate control measures to be taken into account will include those practical fire safety arrangements outlined above.
- 3.4 Risk assessments must take into account those who could be affected, e.g. numbers involved, their location, physical and mental capabilities and employees of organizations with whom a workplace is shared. The significant findings of the fire safety risk assessment will be made known to all other responsible persons as appropriate.
- 3.5 Where appropriate, an individual Personal Emergency Evacuation Plan (PEEP) must be developed for staff or service users who have known disabilities that will impact on their ability to evacuate the particular premises.
- 3.6 Maintenance of fire safety systems include:
  - Fire detection and warning system
  - Emergency lighting
  - Fire fighting facilities
  - Emergency routes and exits
  - Fire safety signs and notices
  - Portable electrical appliances (PAT) and premises installation testing (5 yearly)
- 3.7 Fire Warden and staff training will be provided through a competent trainer. It is the responsibility of all Fire Wardens to attend one refresher training annually on one of the dates available. A sample fire safety training programme can be found in Appendix 3.
- 3.8 Fire evacuation exercises will be carried out each term / 3 monthly, 6 monthly / annually within individual premises. The purpose of these exercises is to educate premises occupants in the correct manner of evacuating a building in the event of an emergency situation and to meet legal obligations. All evacuations will be conducted by the Fire Wardens. Pre and post de-briefing sessions will accompany each evacuation drill.
- 3.9 Provisions will be made for the safe evacuation of disabled people.
- 3.10 Fire evacuation of a building will be in accordance with established procedures in the fire emergency plan. In the event of a fire alarm outside of normal business hours, building occupants are to evacuate the building. All staff, guests and contractors will be made aware of the fire procedures.
- 3.11 All building design work shall comply with relevant codes and standards. New building works and refurbishment projects that include fire safety equipment and systems will be sanctioned by the concerned government departments.
- 3.12 Testing of building passive and active fire evacuation systems are to be conducted by the responsible Fire Department officer at agreed appropriate times during normal hours and in line with current standards. All building fire wardens will be trained in the use of the evacuation system and operate from pro-forma instructions.
- 3.13 Fire wardens will report any faults or problems to the Manager.
- 3.14 A fire safety log book will be kept to record the details of all tests on passive and active preventative and protective measures, as well as training and fire drills.

### **4 ORGANIZATION AND CONTROL**

- 4.1 Specific named individual responsibility for overall responsibility for Fire Safety, maintenance, Emergency Plans and Staff Training can be found in this plan.
- 4.2 Managers / Section Heads / Department Managers with responsibility for premises or parts of premises will:

- ensure that this Policy and/or any departmental fire safety policies/codes of practice that complement this Policy are in place, properly implemented and reviewed.
- ensure that a Responsible Person is appointed for all of their premises to oversee and implement fire safety arrangements, and ensure that they are competent and appropriately trained to undertake their duties;
- ensure that arrangements are in place for the completion of fire risk assessments, including, where appropriate, technical surveys in respect of fire protection;
- ensure that fire, security, and health and safety arrangements at each premise are complementary;
- ensure that fire risk assessments are carried out for all their workplaces, and for specific activities such as hot working involving welding, cutting, work with bitumen, etc.;
- ensure, in conjunction with the outcome of the fire risk assessment that the optimum number and type of fire extinguishers are installed in appropriate locations;
- ensure that fire alarm and detection systems, emergency lighting and fire extinguishers are appropriately located and properly maintained;
- ensure that a robust and effective emergency plan is in place at each location to safely evacuate all persons, whether employees, visitors or service users and this emergency plan must take into account people with mobility, some sensory and some learning impairments, including those with temporary impairments, which will affect their ability to use stairs or otherwise evacuate premises promptly. the plan must be internally deliverable and not reliant on the Fire and Rescue Service to complete the evacuation;
- arrange for the emergency plan to be issued to their employees, guests, etc. to inform them what to do in the event of fire, particularly safe evacuation;
- arrange for a competent responsible person to be nominated to oversee and implement fire safety arrangements at their workplace(s) on their behalf;
- ensure that if there is any doubt about the provision of new or replacement fire extinguishers;
- ensure that staff are appropriately trained in fire safety procedures to reflect the requirements of the fire risk assessment;
- ensure that a copy of the current fire risk assessment for their premises is readily accessible, its provisions complied with;
- ensure that fire risk assessments are reviewed at least annually or whenever there is any building alteration, change of occupation or use of the premises or following an incident involving fire;
- ensure that effective arrangements are in place for contacting the emergency services;
- ensure that the Fire and Rescue Service are aware of any significant hazards associated with the premises e.g. oxygen cylinders, storage of petrol, etc; and
- confirm that their quarterly premises fire safety inspections address fire safety arrangements.

4.3 The Competent Persons (who must be competent to carry out this role) must:

- assist and support with the preparation and review (at least annually) of fire safety risk assessments;
- ensure compliance with the outcomes of the Fire Risk Assessment and that the necessary control measures are implemented;
- prepare and review the emergency plan issued to all staff;
- ensure information on fire safety arrangements is available to service users and guests;
- ensure all staff and, where appropriate, contractors are instructed in the emergency plan;
- arrange and review fire drills at a frequency of not less than six months;
- specify and rehearse the arrangements for assisting guests, disabled people or those with temporary physical impairments to safely evacuate the premises. Where appropriate, a PEEP must be developed;

- ensure Fire Alarms are regularly tested at the recommended frequency e.g. weekly;
- monitor that fire alarm systems, detection devices, emergency lighting and fire extinguishers are appropriately and regularly maintained;
- keep the fire log book or equivalent up to date;
- ensure that fire action notices (displayed as a minimum at fire alarm call points) and fire signage are appropriate and kept up to date;
- ensure all escape routes are kept clear of obstructions and that access to fire extinguishers and fire alarms is not impeded;
- ensure that the annual testing of portable electrical equipment and periodic testing (5 yearly) of the fixed electrical installations has been carried out, and
  
- ensure that quarterly fire safety inspections of the premises are carried out and that these address fire safety arrangements.

4.4 Employees must:

- ensure they are familiar with the emergency plan for their workplace and co-operate by participating in fire evacuation/drill procedures and by observing practical fire safety arrangements;
- know, and co-operate with, the responsible person for their workplace;
- report to their manager or supervisor any concerns about fire safety;
- be familiar with all escape routes;
- not wedge fire doors open, nor block or obstruct them;
- be aware of the action to be taken on discovering a fire, hearing a fire alarm, for raising the alarm (including the location of fire alarm call points) and calling the fire and rescue service;
- promptly evacuate the premises, in accordance with the emergency plan, to a place of safety without putting themselves and others at risk, and NOT attempt to extinguish a fire unless they have been specifically trained; and
- comply with the No Smoking legislation.

## 5 MONITORING

5.1 The following Key Performance Indicators will be used to monitor the effectiveness of the Fire Safety Management Plan: -

- i. Number of fires recorded annually / number of fire related incidents.
- ii. Achieving set schedules and time frames (evacuation drills and building audits).
- iii. Measuring the number of Fire Service call outs against cause.
- iv. Number and nature of enforcement, alterations or prohibition notices from statutory authorities.
- v. Quarterly / six monthly/ annual premises inspection and meetings to ensure actions and progress are made.
- vi. Annual audit of all fire systems by the manager.

## 6 REVIEW

6.1 Annual audit of all fire systems by the manager to ascertain compliance with not only statutory provisions but with this Fire Safety Management Plan.

6.2 Active reviews will take place quarterly prior to any likely accident or event.

6.3 Reactive reviews will take place following a fire safety event occurring.

6.4 A review will also be undertaken following a fire, changes to the premises construction and facilities, new procedures, new equipment, new materials and changes in staff numbers and roles.

## 7 Fire Emergency Plan

All aspects of the plan will consider out of hours occupation and identify where there would be differences e.g. personnel; locked doors; different escape routes etc.

### 7.1 Training and Training Provision

Identify any training needed and how it will be provided. This will include the following:

- Staff identified as trained in the use of fire equipment.
- Staff identified as trained in the use of the fire panel.
- Staff identified to register guests at the assembly point(s).
- Staff identified as having duties specific to the type of evacuation.
- Method of ensuring everyone understands how to operate the fire alarm.
- Method of ensuring everyone has sufficient instruction and training for fire evacuation.
- Method of ensuring guests / contractors have sufficient information on procedures in the event of an emergency evacuation.

## **7.2 Information Distribution**

Detail the method(s) of informing personnel (incl. guests / contractors) of escape routes. This will include the following:

- Instruction
- Training
- Emergency exit / route signage
- Fire action Notices
- Include method of informing personnel of an alternative escape route should the main one be blocked or inaccessible. (Consideration should also be given to a route that leads past a potential arson attack areas, such as near rubbish skips.)
- The Emergency Plan

## **7.3 What People / Staff Should Do If They Discover a Fire**

- Raise the alarm by operating the nearest fire alarm call point
- Evacuate to a safe place
- DO NOT USE THE LIFT (unless it has been designated as a refuge or part of the emergency escape route)
- Trained personnel to tackle the fire only where appropriate
- Where appropriate check toilets and close windows and doors on the way out
- If have responsibilities for assisting persons with Personal Evacuation Plans respond as required following the actions as identified in the Plan
- Leave the building by the nearest exit
- Do not stop or return to collect personal belongings
- Ensure visitors are escorted from the building to the assembly point
- Close any doors en-route without delaying your escape
- You must remain at the assembly place
- Return to the building only when authorised to do so

## **7.4 What People / Staff Should Do If They Hear the Fire Alarm**

If a person also has responsibilities for assisting persons with Personal Evacuation Plans respond as identified in the Plan. If not then:

- Leave the building by the nearest exit
- Close any doors en-route without delaying your escape
- Do not stop or return to collect personal belongings
- Do not use any fire fighting equipment unless you have been trained
- Do pass any information to the building responsible person at the assembly point
- Remain at the assembly place
- Return to the building only when authorised to do so

## **7.5 Contacting the Emergency Services**

Detail:

- Who will contact the emergency services?
- What are the means of calling the emergency services? For example, by mobile telephone or landline
- Include a method in the event of a power failure

## **7.6 Identify Processes, Machines or Power That Must Be Shut Down**

This would include the following where appropriate:

- Staff responsible for ensuring any hot work equipment is turned off
- Technology departments
- Welding
- Cookery
- Kitchen

### **7.7. Specific Arrangements for Any High-Risk Areas**

For Example:

- Boiler room
- Chemical storage areas
- Gas storage
- Generators
- Work processes

### **7.8 Emergency Services Liaison Procedures**

- Who will liaise with the emergency services on arrival?
- What information will they have and how will they get it?
- How will the person, identified above, direct the emergency services to the emergency? i.e. will they meet them at the gate or at a pre-determined place?
- How will the emergency services be able to identify this person? e.g. hi-viz vest, armband etc
- If anyone is missing and where they were last seen

#### **7.8.1 Specific Information for the Emergency Services**

How will the emergency services be given specific information such as:

- Type of emergency
- Location of the fire / incident
- Missing persons
- Flammable material stores
- Location of high risk areas
- Any unusual activities such as building works or temporary structures
- Hazardous work process

#### **7.8.2 Location of information**

Detail:

- Where will the information be kept on risks

E.g. Maps / sketches / alarm identification?

- For example - held near the fire panel.

#### **7.8.3 Accounting for Personnel**

- How will all people be accounted for?
- How will the manager be informed?
- Who will ensure that all personnel are accounted for?
- How will this be managed if there is more than one assembly area?
- What is the procedure if someone is missing?
- How are the emergency services informed? (Note: Only the Fire Service personnel with appropriate breathing apparatus can enter the building if there is a person identified as missing)

### **7.9 Escape Routes**

A map or diagram will be included for ease of reference. Include other relevant information such as details of fire fighting equipment provided, location of designated 'Safe Refuges', types

and location of emergency exit signs, locations of manual break glass points and emergency lighting.

### 7.10 Assembly Points

Give the locations of assembly points, including:

- the point where guests/ contractors must assemble
- Identify how each assembly area is recognised
- Identify who should be in each assembly area e.g. groups or departments or sections
- Identify the locations of any designated safe refuges
- Where possible provide plans or schematic diagrams

### 7.11 Identify Persons Especially at Risk

- Identify lone workers, contractors and the areas where they may be at risk
- Include methods of escape and identify how they will be located
- If there is sleeping accommodation on site, identify the method of ensuring that they are safely out of the building and accounted for

### 7.12 Evacuation Arrangements for Disabled People

The safe and effective evacuation of disabled people needs careful thought. Management procedures need to be in place which takes account of the various scenarios that may arise. For example, the procedures adopted for people with a disability are employed in the building will be different to those for person with a disability visiting the building that will be unfamiliar with its layout.

Systems of evacuation that may be implemented include:

- **Progressive Horizontal Evacuation.** This system can be used in buildings with a phased alarm system. It involves a person passing from one 'fire compartment' into another that is not part of the initial evacuation zone. A 'fire compartment' is a part of a building separated from other parts of the same building by fire-resisting walls, ceilings, floors and doors of 60 minutes fire resisting construction.
- **Evacuation by Stairs.** This method involves the use of equipment such as special evacuation chairs but is usually only possible if people are being evacuated downwards or horizontally.
- **Use of Refuges.** Relatively safe waiting areas for short periods. They are not areas where disabled people should be left alone indefinitely until rescued by the fire brigade or until the fire is extinguished. *(This should not be confused with the use of refuges in progressive horizontal evacuation)*

A refuge is an area that is separated from the fire by a fire-resisting construction and has access via a safe route to a final fire exit and be clearly marked up with appropriate signage. It provides a temporary space for people to wait for others who will then help them evacuate.

Identify the method of ensuring that persons with any disability (permanent or temporary) are evacuated or taken to a designated 'Safe Refuge' (if one is in place), until they can be evacuated in safety. Identify what communication channels will be used to ensure that persons in the 'Safe Refuge' are kept informed about what is happening.

Designate responsibilities for persons at special risk and:

- Who is responsible for ensuring that personnel at special risk are conducted to a place of safety or refuge until they can be evacuated in safety?
- Have they had any specific training e.g. using the 'evacuation chair'?

### **7.13 Staff with Specific Responsibilities**

Give the name (post) and duties of identified personnel in the event of a fire or other emergency. E.g. the fire marshals / fire wardens, ushers

This would include backup personnel in the event that identified personnel are not available.

### **7.14 Overall Control**

- Who is in overall control of the emergency situation and what are their responsibilities?
- Who records the emergency situation and actions taken?

A senior person would be nominated to:

- Take overall control of the evacuation
- Ensure that other people with specific duties have taken relevant action
- Account for all persons in the premises
- Liaise with the Fire Department
- Initiate any additional response in relation to the care of people with special needs

### **7.15 Fire Marshals and Fire Wardens**

Fire marshals / fire wardens are valuable in any premises and vital in large ones. Fire Marshals / Fire Wardens will always be given responsibility for a specific area, i.e. a floor or a section, and will have general duties in an evacuation such as:

- Who are the Fire Wardens and what are their responsibilities?
- Do they 'sweep' the building on their way out?
- Do they carry out 'first aid' fire fighting if trained and safe to do so?
- How do they ensure they do not work alone and put themselves at risk?
- Proceed to the assembly point close doors on route
- Helping the person in overall control of the evacuation by confirming their area has been checked

### **7.16 Fire Fighting**

- Who is trained to use the fire fighting equipment?
- What are their responsibilities?
- Where is fire fighting equipment located?

### **7.17 Fire Control Panel**

- Who will check the fire panel?
- What is their next step?
- What do they do with the information?
- Who is responsible for silencing and resetting the panel and on what occasions?

### **7.18 Contingency Plans**

Have contingency plans for when life safety systems such as evacuation lifts, fire-detection and warning systems, sprinklers or smoke control systems, emergency lighting or building power system are out of order.

As part of the emergency plan it is good practice to prepare post-incident plans for dealing with situations that might arise such as those involving:

- unaccompanied children;
- people with personal belongings (especially valuables) still in the building;
- people wishing to rejoin friends;
- getting people away from the building (e.g. to transport);
- inclement weather; or
- the building cannot be re-entered / reoccupied.

#### **7.19 Re-Entering the Building**

- How people be prevented from re-entering the building?
- How will people know when they can re-enter the building?
- Note: If the emergency services have been called then the Fire Department Officer is responsible for giving permission for re-entry to the building

**EXAMPLE FIRE SAFETY MAINTENANCE CHECKLIST**

	YES	NO	N/A	COMMENTS
<b>Daily Checks</b>				
Escape Routes				
Can all fire exits be opened immediately and easily?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are fire doors clear of obstruction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are escape route clear?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fire Warning Systems				
Is the main indicator panel showing "normal"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are whistles, gongs or air horns in their correct place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Escape Lighting				
Are luminaries and exit signs in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the emergency lighting and signs working normally?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fire fighting Equipment				
Are all fire extinguishers in place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are all fire extinguishers clearly visible?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are all fire hydrants accessible for the fire service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Weekly Checks</b>				
Escape Routes				
Do all emergency fastening devices work correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are fire doors clear of obstruction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are all external escape routes clear?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fire Warning Systems				
Did the fire alarm work correctly when tested?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did staff and all others hear the alarm working?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did any linked fire protection system operate correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did visual alarms, pagers or vibrating pads work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do voice alarms work and was the message understood?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Escape Lighting				
Are charging indicators visible and illuminated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fire fighting Equipment				
Are all fire fighting equipment in working order?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are all fire extinguishers mounted 1 - 1½ metres?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Monthly Checks**

## Escape Routes

Do all electronic release mechanisms work correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do all automatic doors “failsafe” in the open position?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all self-closing devices working correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all door seals and intumescent strips in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all external stairs in good condition and non-slip?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do all roller shutters for compartmentation working correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do all internal fire doors close against their rebate / stop?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Escape Lighting

Do all luminaries and exit signs working when tested?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are emergency generators working correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Fire fighting Equipment

Is the “pressure” in stored pressure extinguishers correct?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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YES	NO	N/A	COMMENTS
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**Three Monthly Checks**

## General

Are emergency tanks / ponds at their normal / correct level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are vehicles blocking fire hydrants or access to them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional items from manufacturers requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Six Monthly Checks**

## General

Have sprinkler systems been tested by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have release and closing mechanisms on fire resisting compartment doors and shutters been tested?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Fire Warning Systems

Has the system been checked by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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## Escape Lighting

Do all luminaries work for a third of their rated value?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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**Annual Checks**

## Escape Routes

Do all fire doors work correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Is escape route compartmentation in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Fire Warning Systems</b>			
Has the system been checked by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Escape Lighting</b>			
Do all luminaries operate on test for their full duration?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the system been checked by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Fire fighting Equipment</b>			
Has all equipment been checked by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Miscellaneous**

Have dry / wet risers been tested by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has smoke control systems been tested by a competent person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has external access for the fire and rescue service been checked for availability at all times?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have any fire fighters switches been tested?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are fire assembly points clearly indicated by signs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## **EXAMPLE FIRE SAFETY TRAINING PROGRAMME**

All employees will receive adequate fire safety training and all fire safety training sessions will be delivered by a competent person. There will be one / two fire drills per year to test the fire safety training.

### **Fire Safety Training Sessions**

<b>New Employees:</b>	Induction Programme
<b>Current Employees:</b>	One / Two training session per year
<b>Fire Wardens:</b>	One / Two training session per year specific to their duties
<b>Managers:</b>	One / Two training session per year specific to their duties and including fire safety risk assessment, responding to fire hazards, fault reporting procedures, liaising with the fire service, record keeping, induction of new staff, fire safety policies and procedures.

### **Fire Safety Training Topics**

- The significant findings from the fire risk assessment and fire safety policies;
- What to do on discovering a fire;
- How to raise the alarm, including the locations of fire alarm call points (break glass points);
- The action to take upon hearing the fire alarm;
- The evacuation procedure for alerting guests, residents and visitors including, where appropriate, directing them to exits and assembly points at a place of total safety;
- The arrangements for calling the fire and rescue service;
- The location and, where appropriate, the correct use of portable fire extinguishers and fire-fighting equipment;
- Knowledge of escape routes including stairways and especially those not in regular use;
- How to open all emergency exit doors;
- The appreciation of the importance of fire doors, keeping them closed and not wedged open to prevent the spread of smoke and heat, keeping escape routes unobstructed;
- Where appropriate, isolating electrical power and gas supplies and stopping machines and processes;
- The safe use of and risks from storing and working with highly flammable and explosive substances;
- General fire precautions, fire awareness and good housekeeping practices;
- The no smoking policy (where applicable);
- Special provisions for assisting disabled people and any training needed;
- Identifying fire hazards and fire incidents reporting procedures; and
- Equipment fault reporting procedures.

## Appendix 2

### Emergency Response Plan

The Korea L.H Myanmar Consortium is committed to the safety and well-being of its staff, employees and visitors. With this commitment, the Consortium established an emergency response plan and the emergency response team to manage and respond the emergency conditions.

The summary of the plan including procedures and practices to be followed in responding to emergency situations, namely, utility failure and fire and natural disaster like earthquake, storm, and floods is as follows:

#### Utility Failures

These include electrical outages, plumbing failure, gas leaks, steam line breaks, ventilation problems, elevator failures, etc. and when the utility failures occur, the people who are using these utilities or facing with these incidents have to follow the following procedures.

- Remain calm
- Immediately notify Security in the compound at given phone number -----
- If the building must be evacuated, follow the instructions on Building Evacuation
- Unplug all electrical equipment (including computers) and turn off light switches
- Use a flashlight: Do not light candles or use other kinds of flames for lighting
- Laboratory personnel:
  - Secure all experiments, unplug electrical equipment, and shut off research gases prior to evacuating
  - Close all fume hoods and chemical containers
- Elevators:
  - Remain calm
  - Use the Call Button of Phone to call for help
  - Do not try to climb out or exit the elevator without assistance

#### Fire

The detailed procedures are described in Fire Safety Management and Fire Emergency Plan.

#### Earthquakes

In the event of an earthquake:

- Stay away from large windows, shelving systems, or tall room partitions
- Get under a desk, table, door arch, or stairwell
- If none of these is available: move against an interior wall and cover your head with your arms
- Remain under cover until the movement subsides
- After the shaking stops, survey your immediate area for trapped or injured persons and ruptured utilities (water, gas, etc.)
- If damage has occurred in your area, inform Safety and Security immediately
- If it is safe to do so, remain at your location and await further instructions from responsible personnel
- Do not evacuate until instructed by emergency personnel
- After an earthquake:
  - Put on enclosed shoes to protect against broken glass
  - If the power is out use a flashlight. Do not light a match or candle
  - Be alert for safety hazards such as fire, electrical wires, gas leaks, etc.
  - Check on others. If there are injuries or other urgent problems, report them to

#### Security

- Give or seek first aid. Assist any disabled persons in finding a safe place for them
- Evacuate if the building seems unsafe or if instructed to do so:
- Use stairs, not elevators
- Unplug small electrical appliances
- Bring keys, purses, wallets, warm clothing
- Be prepared for aftershocks
- Cooperate with emergency personnel, keep informed, and remain calm

#### Floods

Minor or area flooding in the compound could occur as a result of a water main break, loss of power to sump pumps, or major multiple rainstorms.

- Secure vital equipment, records, and other important papers
- Move to higher, safer place
- Shut off all electrical equipment
- If in a lab, secure all laboratory experiments
- Do not attempt to drive or walk through flooded areas
- Wait for further instructions on immediate action from responsible staff and Security
- If the building must be evacuated, follow the instructions on Building Evacuation
- Do not return to your building if you have been evacuated by flooding until you have been instructed to do so by responsible personnel
- If you are assisting with flood cleanup, report immediately to Environmental Health and Safety unit any oil, chemical, or radioactive materials suspected of mixing with flood waters

#### Storms and Tornadoes

If storms and tornadoes happen

- Go to a basement, or lower floor of interior hallway or corridor (preferably a steel-framed or reinforced concrete building)
- Seek shelter under a sturdy workbench or heavy furniture if no basement is available
- Avoid:
  - Top floors of buildings
  - Areas with glass windows or doors
  - Auditoriums, gymnasiums, cafeterias, or other areas with large, free-span roofs
- If out in the open:
  - Cars -do not wait out the storm in a car; cars are not safe in tornadoes
  - Move away from the path of the tornado at a right-angle direction
  - Lie flat in the nearest depression, ditch, or ravine if there is no time to escape

#### Medical Emergency

If someone is injured or becomes ill:

- Stay Calm
- Dial **the nearest hospital or ambulance department number** and explain the type of emergency, the location, condition, and number of victims
- Let the dispatcher know of any safety hazards - chemical spill, fire, fumes, etc.

- Do not hang up unless told to do so by the dispatcher
- Do not move the victim unless there is danger of further injury if she/he is not moved
- Render first-aid or Cardiopulmonary Resuscitation (CPR) only if you have been trained
- Do not leave the injured person except to summon help
- Comfort the victim until emergency medical services arrive
- Have someone stand outside the building to flag down the ambulance and/or Safety and Security when they reach the vicinity

### **Shelter in Place/Safe Shelter**

Shelter in place is useful when evacuation is not an option. Refuge is sought in an interior room with few or no windows. It is helpful to identify these locations within the department ahead of time and to ensure employees are familiar.

- Stop operations in the building.
- If there are visitors in the building, provide for their safety by asking them to stay—not leave. When public safety officials provide directions to shelter in place, they want everyone to take those steps immediately, where they are.
- Close and lock all doors, windows, and other openings to the outside.
- If necessary/possible, turn off heating or cooling system.
- Select interior room(s) above the ground floor with the fewest windows and vents. The room(s) should be large enough for everyone to sit comfortably and quietly. Use multiple rooms if necessary.
- Stay away from windows and doors.
- Remain calm and await further instructions.

**DO NOT** leave the room until directed to do so by a public safety official.

Note: There will be an orientation or training (including refresher course) related to the emergency response plan and procedures for all staff and employees every six months. Also, the practical exercise will be conducted on a regular basis. The emergency plan would be updated as needed.

Appendix 3

ညောင်နှစ်ပင် Industrial Complex တည်ဆောက်ရေးအတွက် ငြိမ်သုလ်ထုနှင့် တွေ့ဆုံဆွေးနွေးပွဲသို့ တက်ရောက်သူများစာရင်း

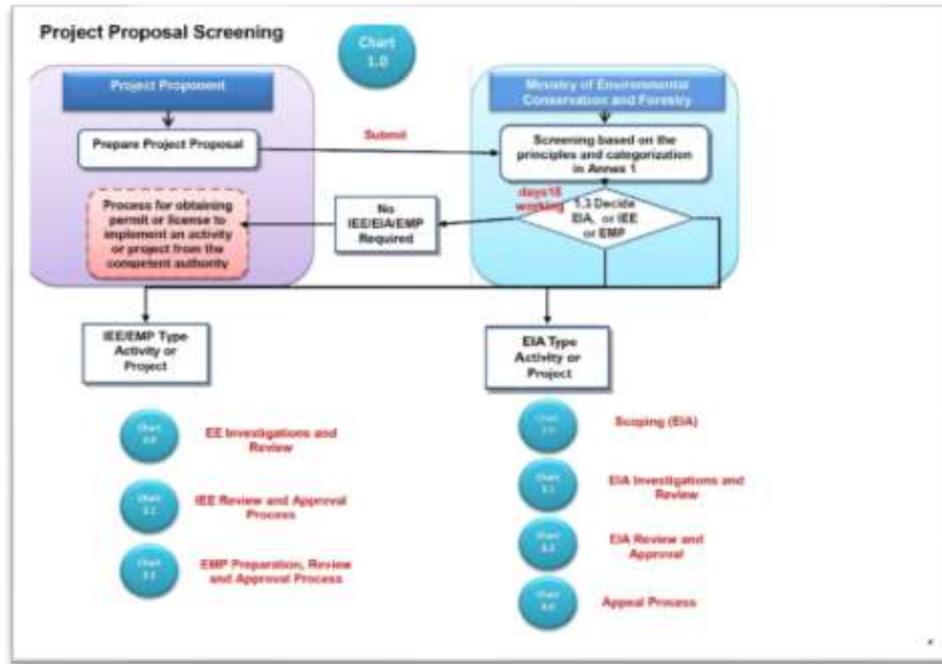
စဉ်	အမည်	ရာထူး	နေရပ်	ဖုန်းနံပါတ်	လက်မှတ်
၀	ဦးစောစော	ESIA နည်းဇာတ်ရေးဆရာ	MSR - ရန်ကင်းမြို့	၀၉ ၈၅၅၁၀၈၀	
၂	ဦး ဖုန်းဖြူ	ရေဒီယိုပညာ	" "		
၃	ဦး ကျော်စွာ	ကမ်းခြေဖွံ့ဖြိုးရေး	" "		
၄	ဦး ကျော်စွာ		" "		
၅	ဦး ကျော်စွာ	SSA နည်းဇာတ်ရေးဆရာ	" "	၀၉ ၇၇၇၁၃၇၉၈၇	
၆	ဦး နေအောင်	logistic	" "		
၇	ဦး ကျော်စွာ	"	" "		
၈	ဦး သန်းမြင့်	လမ်းဖွံ့ဖြိုးရေး	ရန် (၃)		
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၁၀	ဦး မောင်မြင့်	လမ်းဖွံ့ဖြိုးရေး	ရန် (၃)		
၁၁	ဦး မြင့်စွာ				
၁၂	ဦး တင်မြင့်		ရန် (၃)		
၁၃	ဦး ကျော်စွာ		ကမ်းခြေဖွံ့ဖြိုးရေး		
၁၄	ဦး ဝင်းမြင့်		ရန် (၃)		
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၂၂	ဦး စောစော		ရန် (၃)		
၂၃	ဦး စောစော		ရန် (၃)		
၂၄	ဦး စောစော		ရန် (၃)		

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၃၈	ဦးအောင်အောင်	လက်ထောက်	"		
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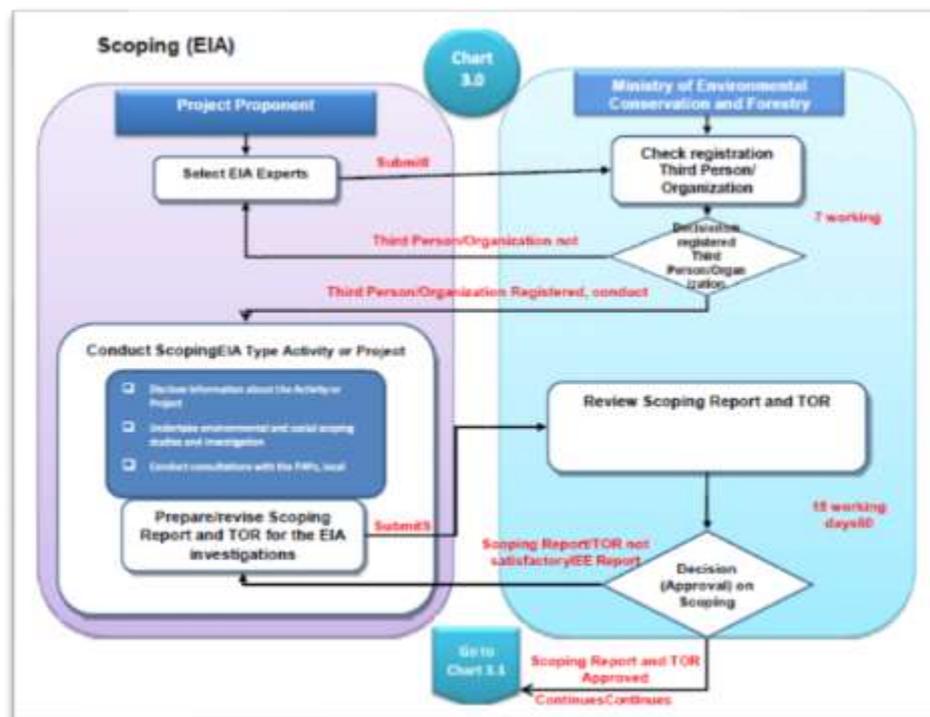
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၄၉	ဦးဖိုးစွယ်	ရုပ်ပုံဆွဲရေး	ဆောင်းရွတ်ပင်ရွာ		
၅၀	ဦးထွန်းမောင်ထွန်း	ဥက္ကဋ္ဌ	ဇောင်ရွတ်ပင်ရွာ	၀၇၇၃၁၀၁၆၄၃	
၅၁	ဦးဖုန်းစန်း		ဇောင်ရွတ်ပင်ရွာ		
၅၂	ဦးစန်းစွယ်		ဇောင်ရွတ်ပင်ရွာ		
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Appendix 4

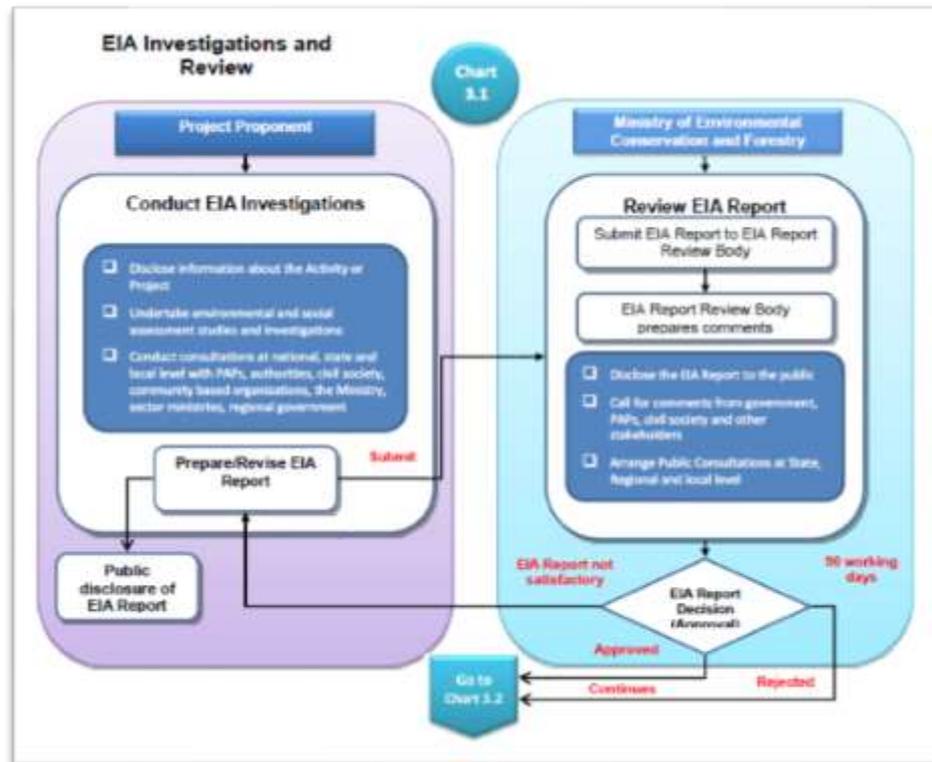
Project Proposal Screening Flow Chart



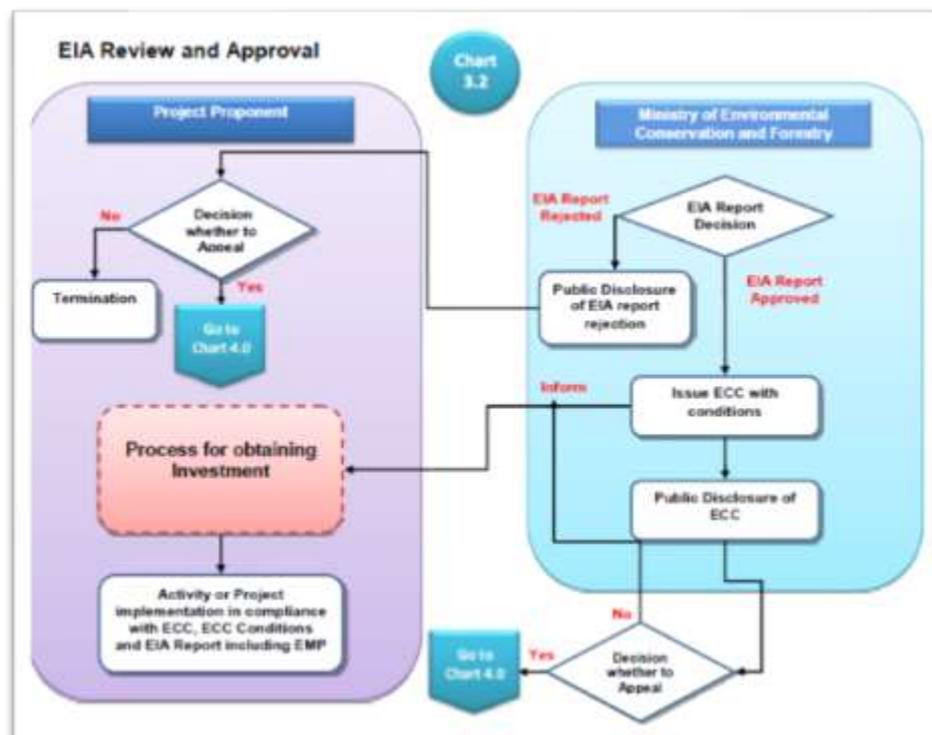
Scoping Flow Chart



EIA Investigation and Review Flow Chart



EIA Review and Approval Flow Chart



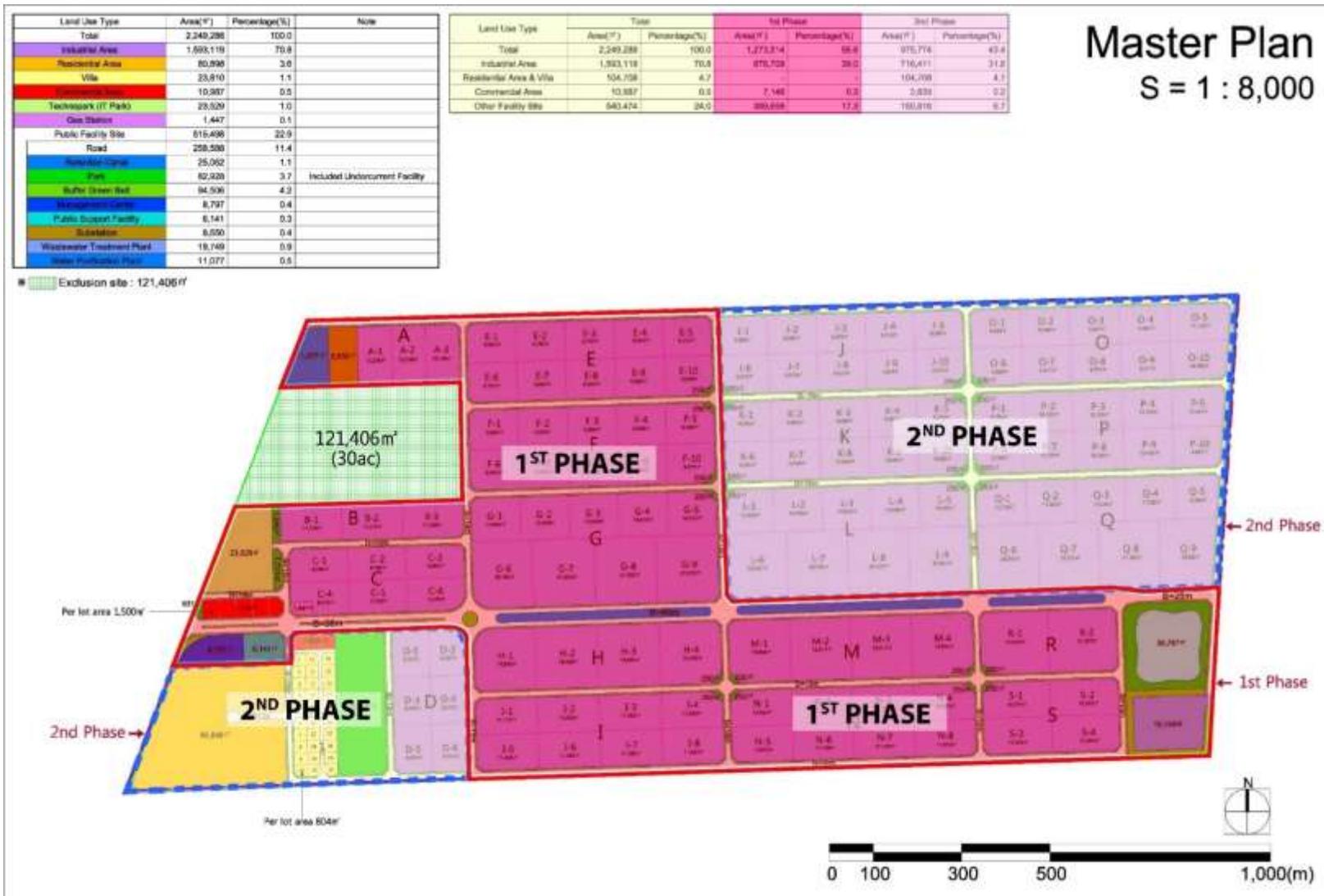
**Appendix 5      Aerial Photo of Existing Project Site (Taken by MSR Drone Team)**



**Appendix 5-1 Aerial Photo of Existing Project Site (Taken by MSR Drone Team)**



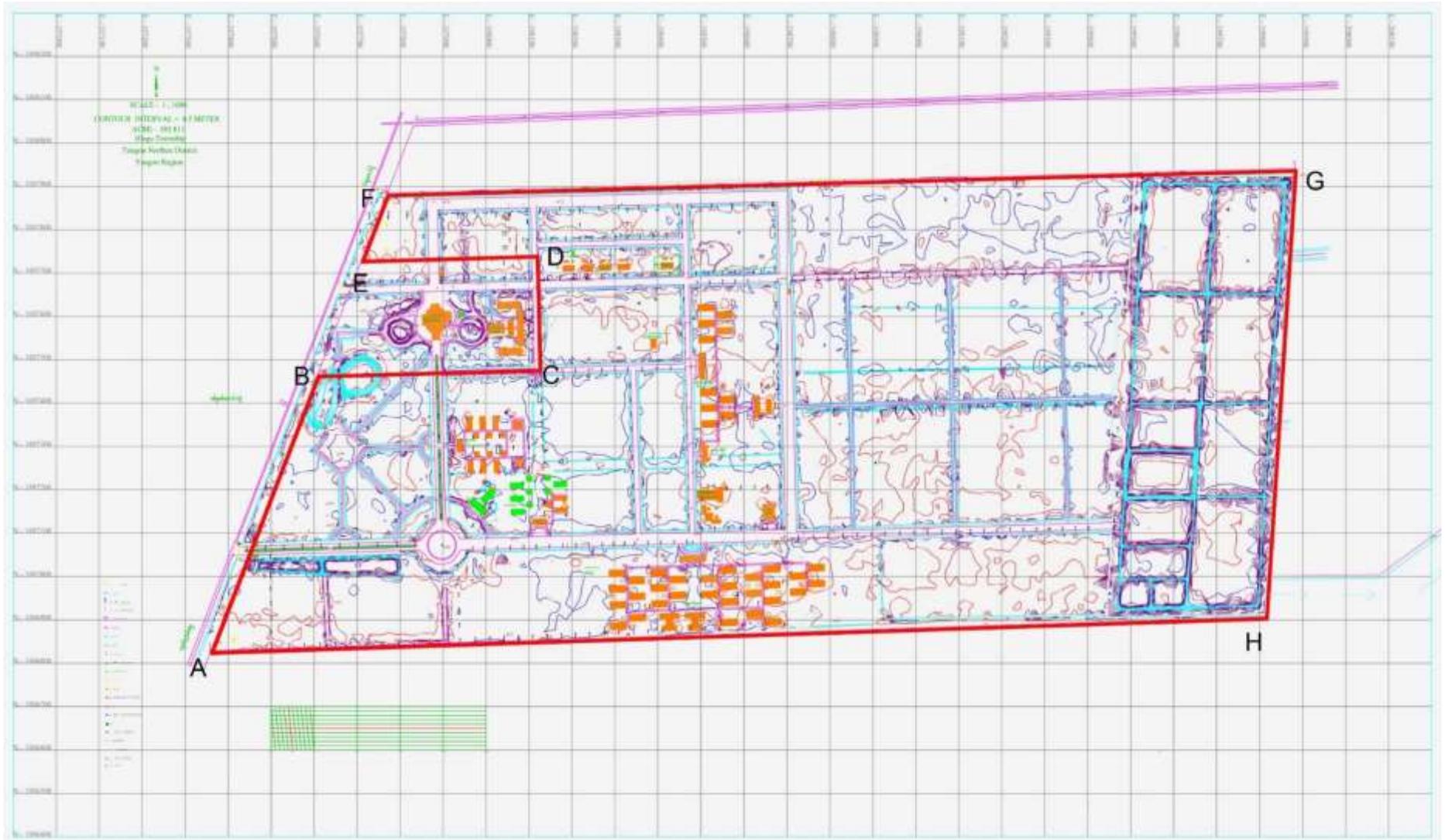
## Appendix 6 Project Summary



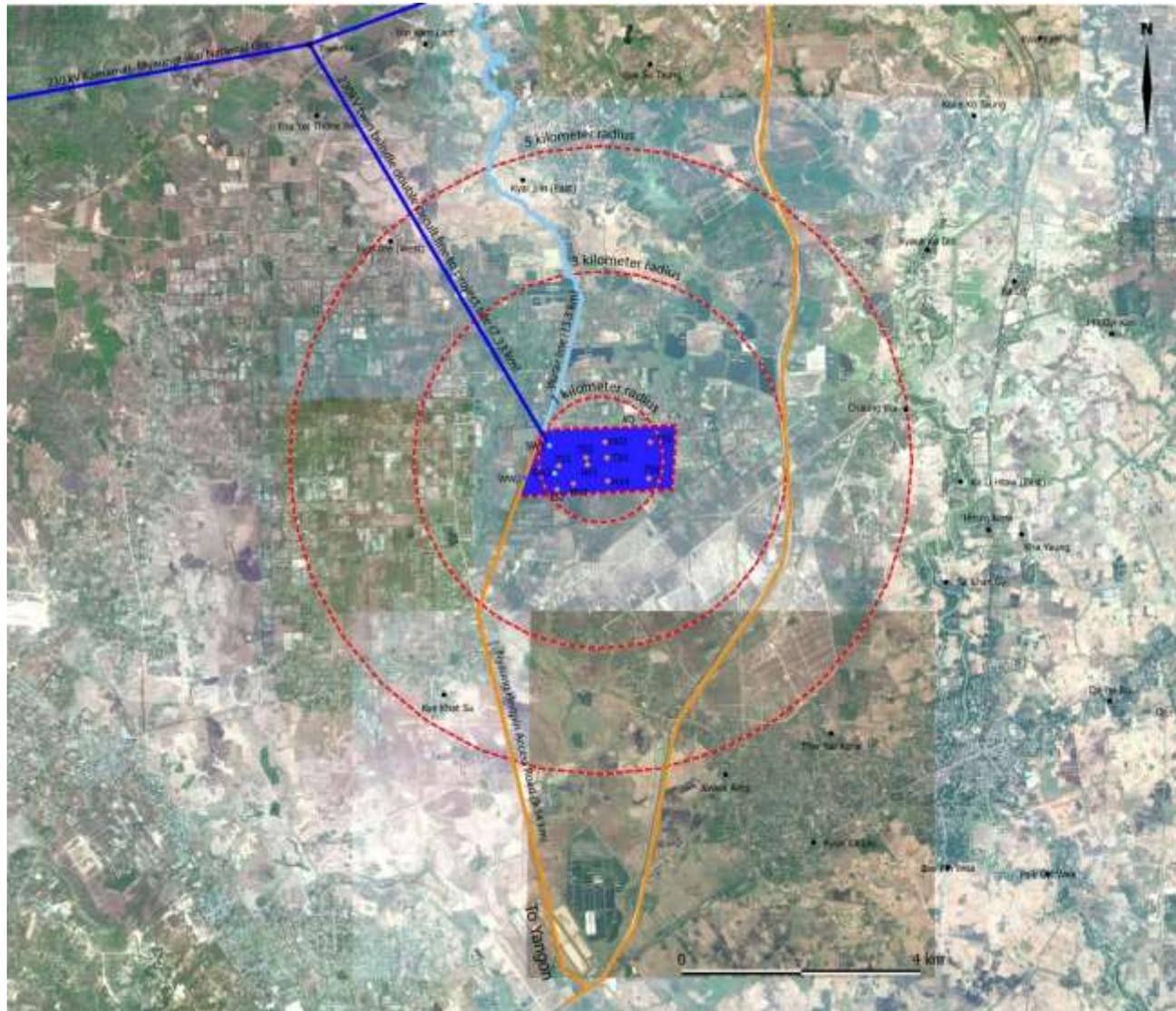
**Appendix 7      Project Layout Plan (Artist impression)**



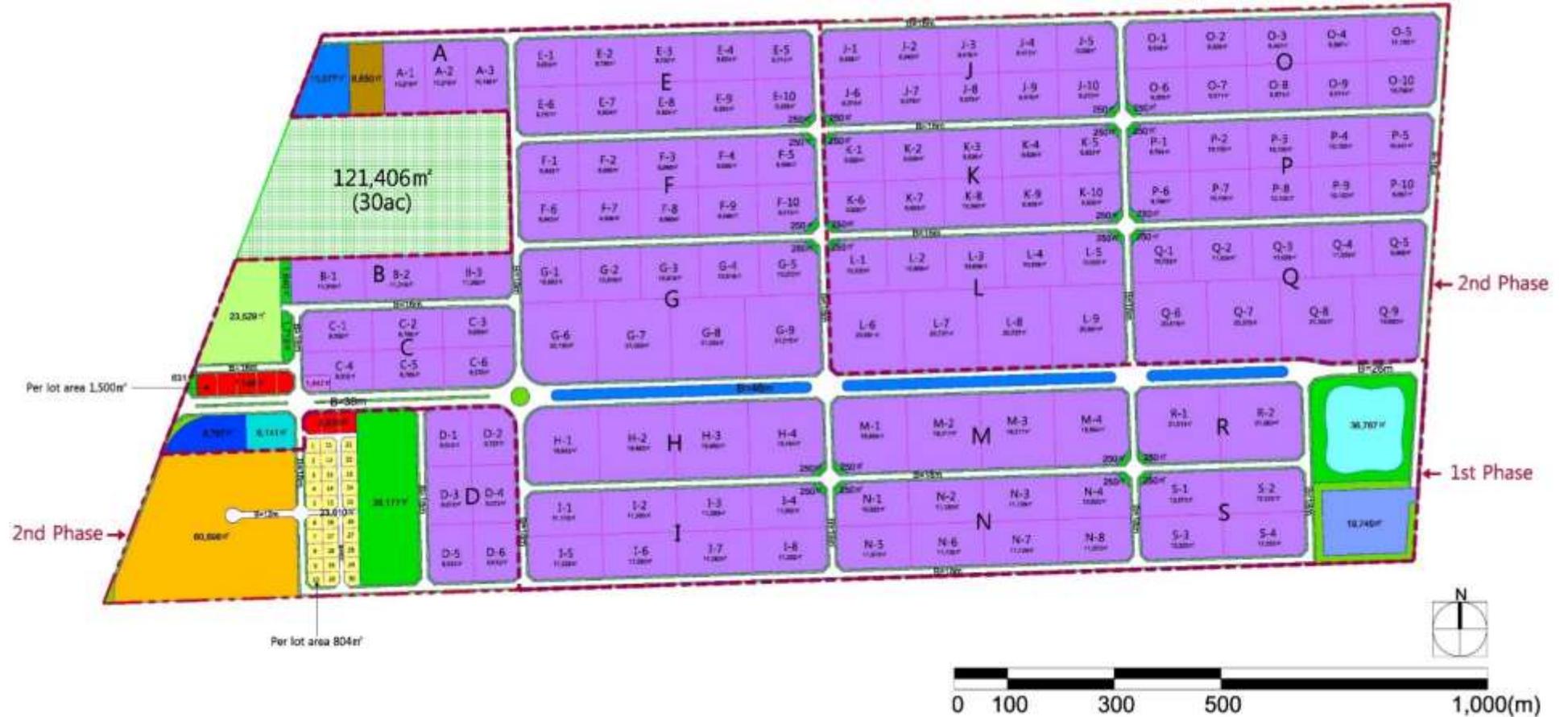
## Appendix 8 Topography



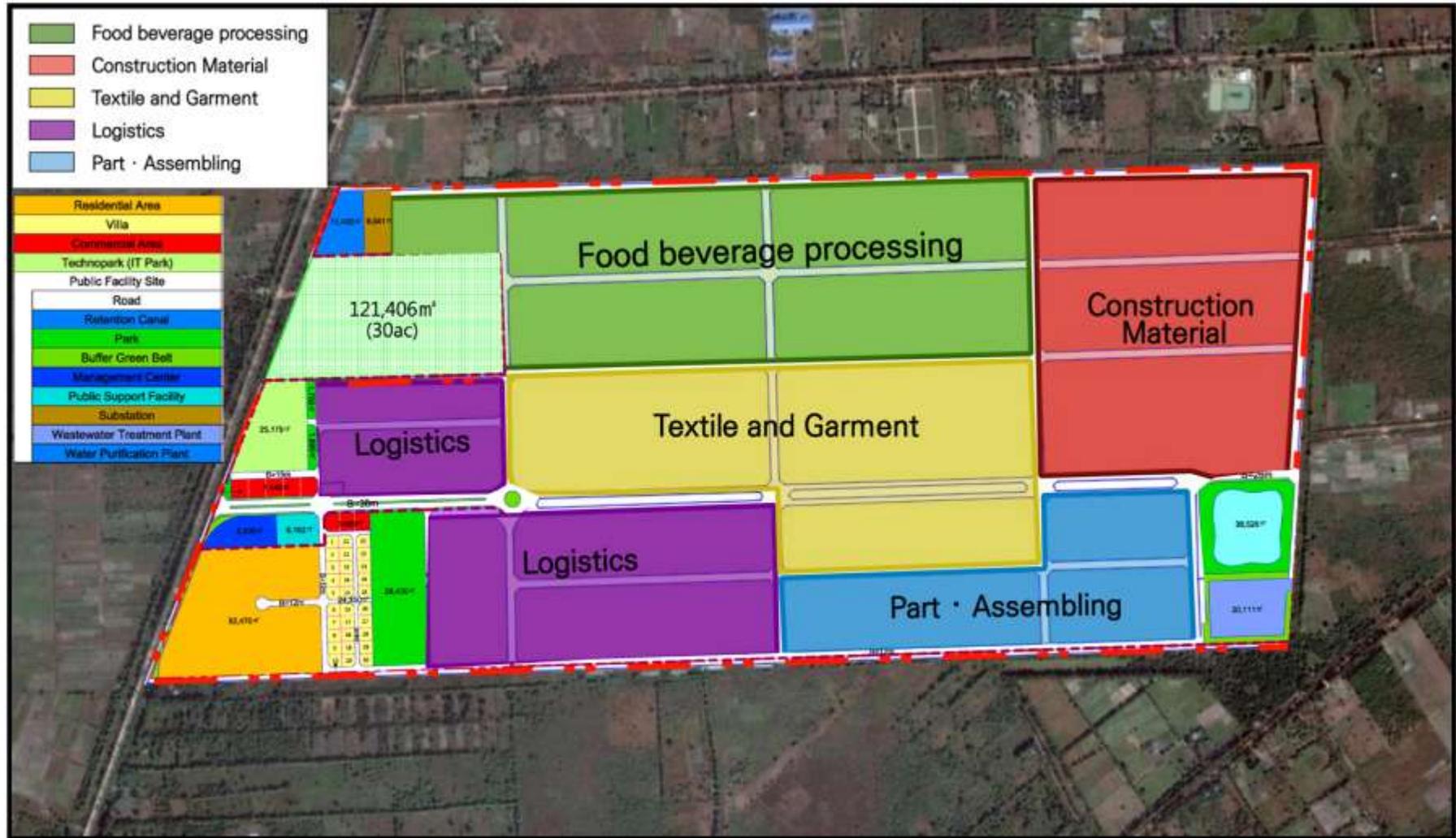
### Appendix 9 Map of setting the study limit



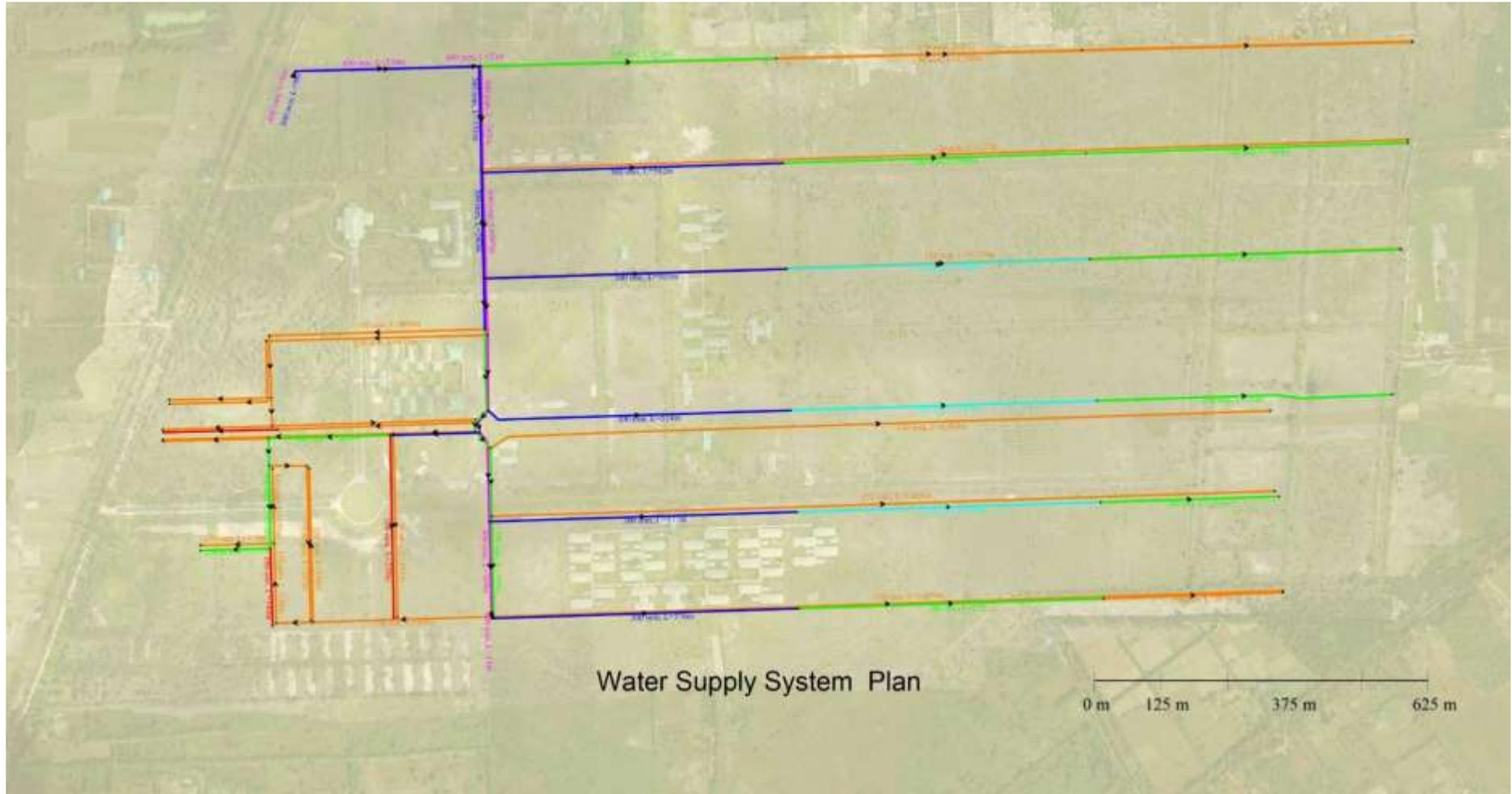
## Appendix 10 Lot Layout and Land Use Plan Drawing



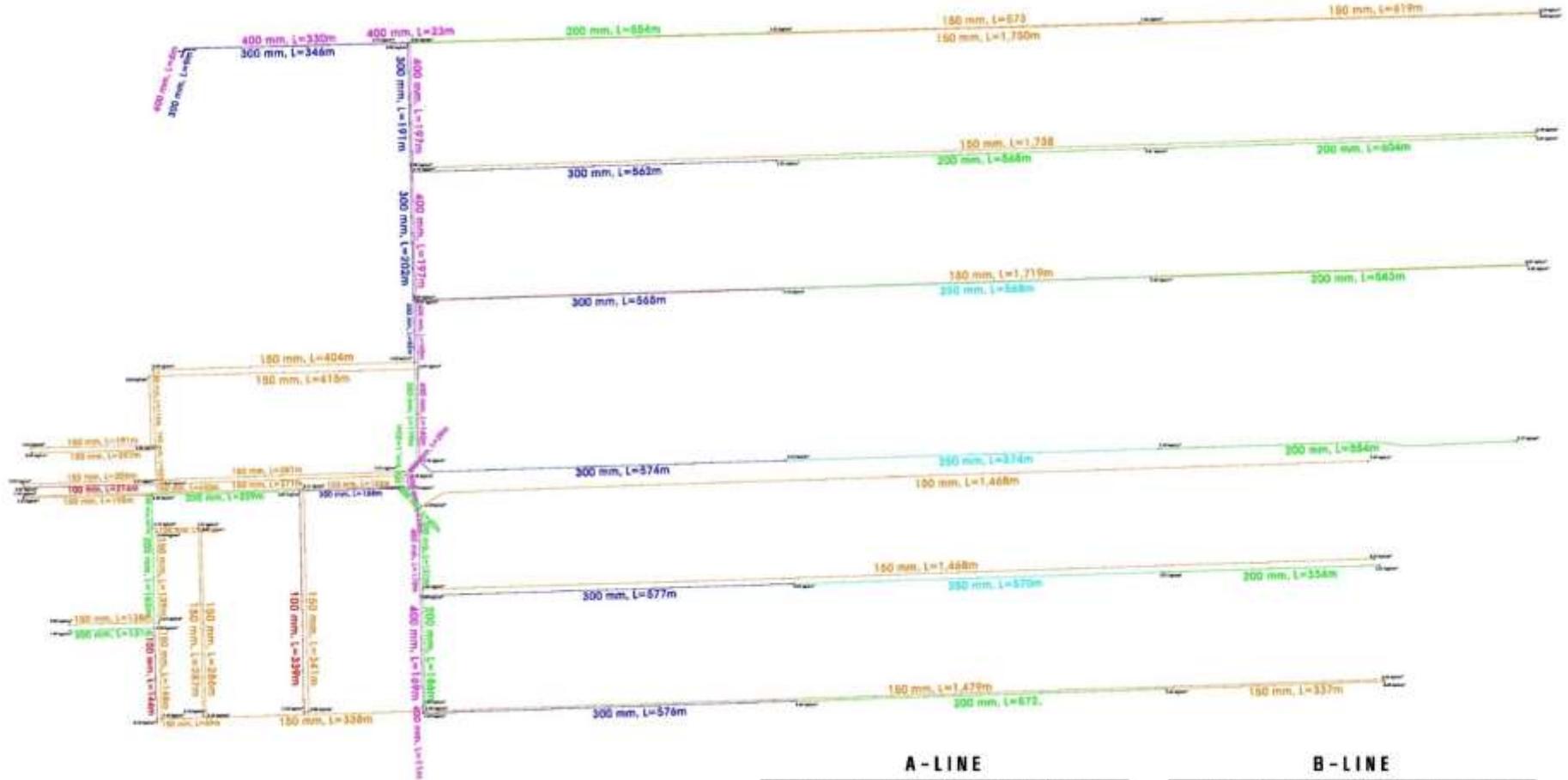
### Appendix 10-1 Lot Layout and Land Use Plan Drawing



## Appendix 11 Diagram of water supply system



### Appendix 11-1 Diagram of water supply system



**A - LINE**

Particulars	Standard	Unit	Quantity	Explanatory
PPE	D100	M	-	
	D150	M	13,015	
	D200	M	058	
	D250	M	-	
	D300	M	843	
	D400	M	-	

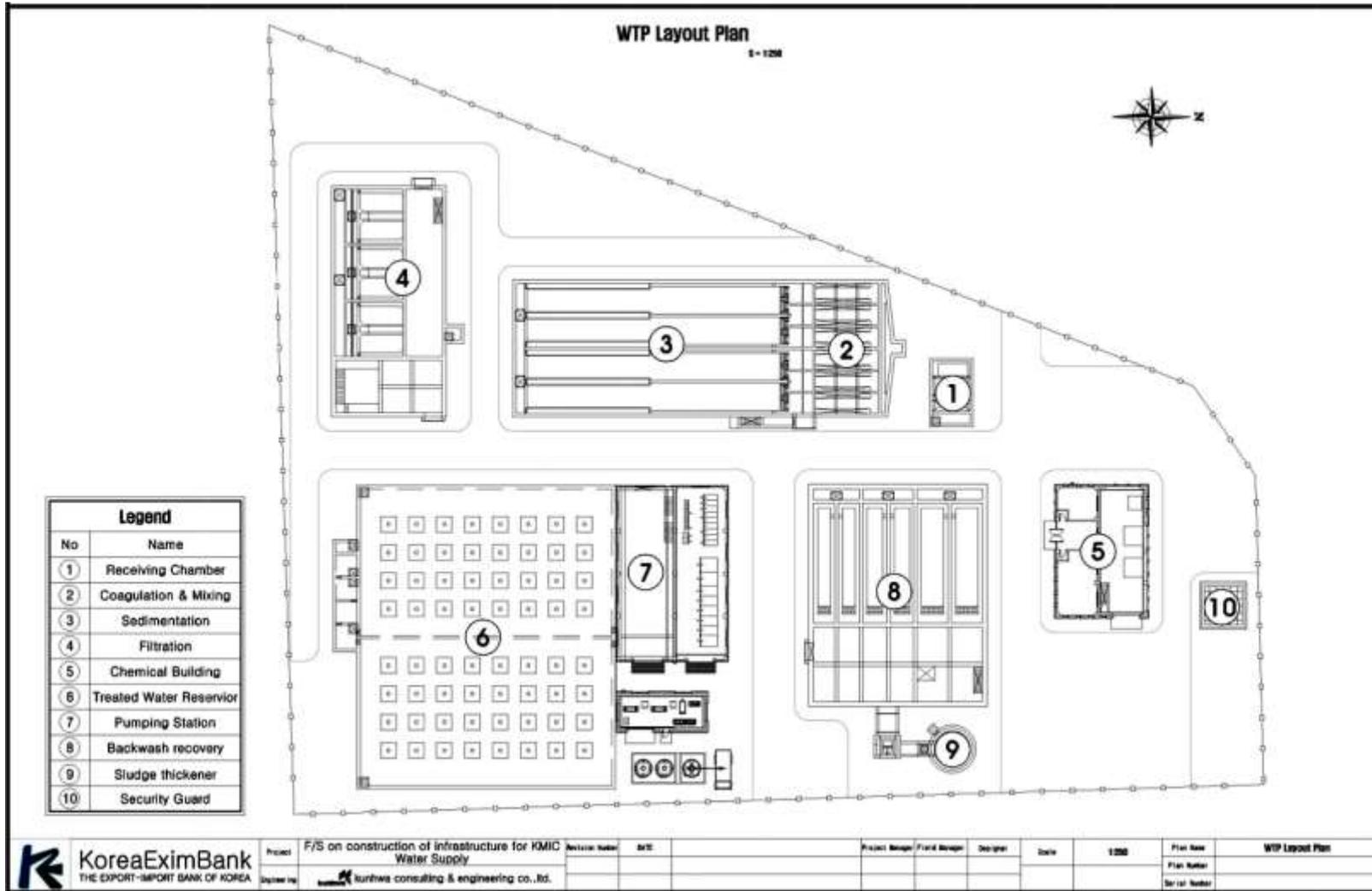
**B - LINE**

Particulars	Standard	Unit	Quantity	Explanatory
PPE	D100	M	097	
	D150	M	3,174	
	D200	M	3,761	
	D250	M	2,294	
	D300	M	3,022	
	D400	M	1,398	

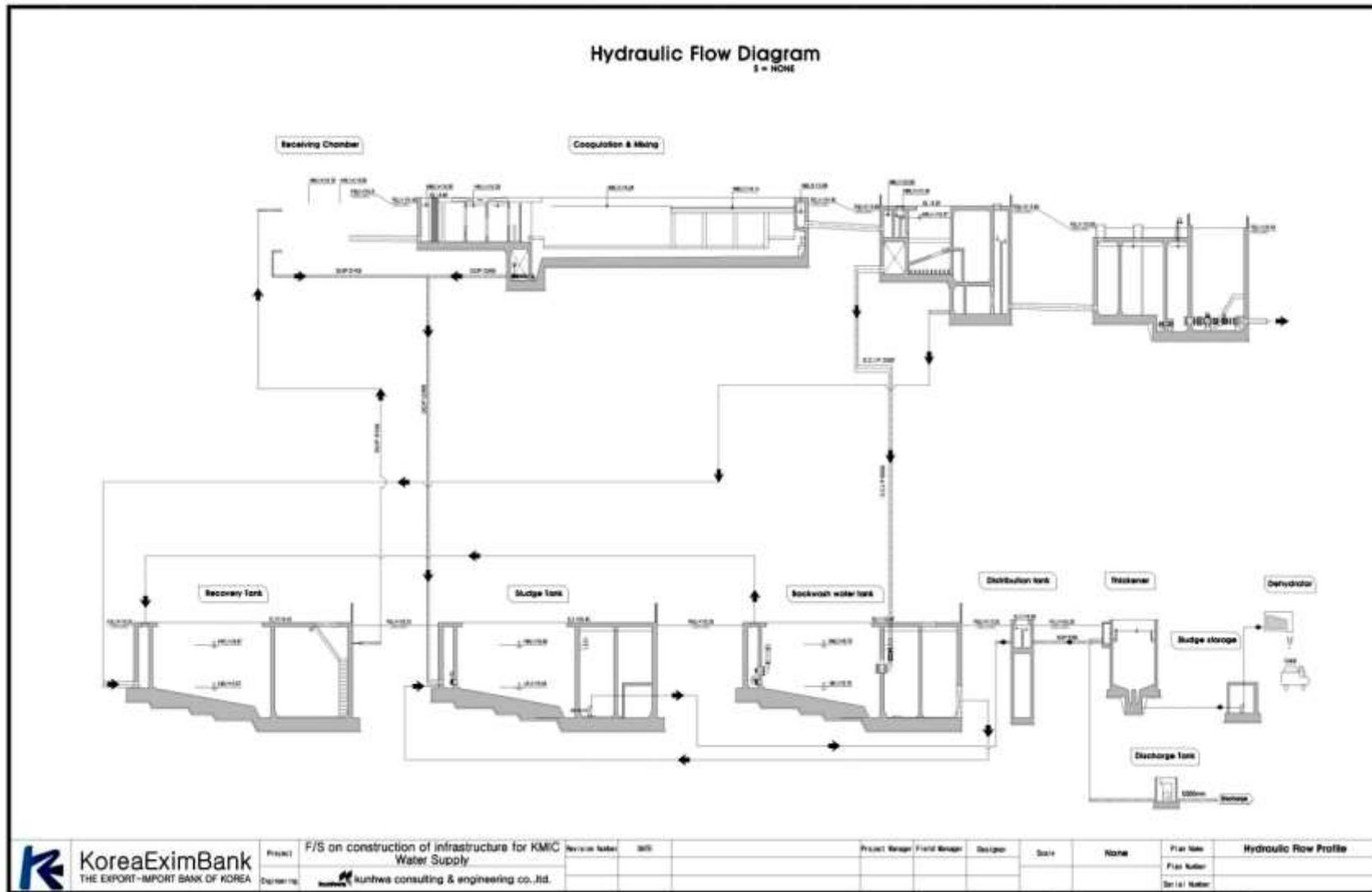
## Appendix 12 Location map of Water Treatment Plant



### Appendix 13 Water Treatment Plant Layout Plan



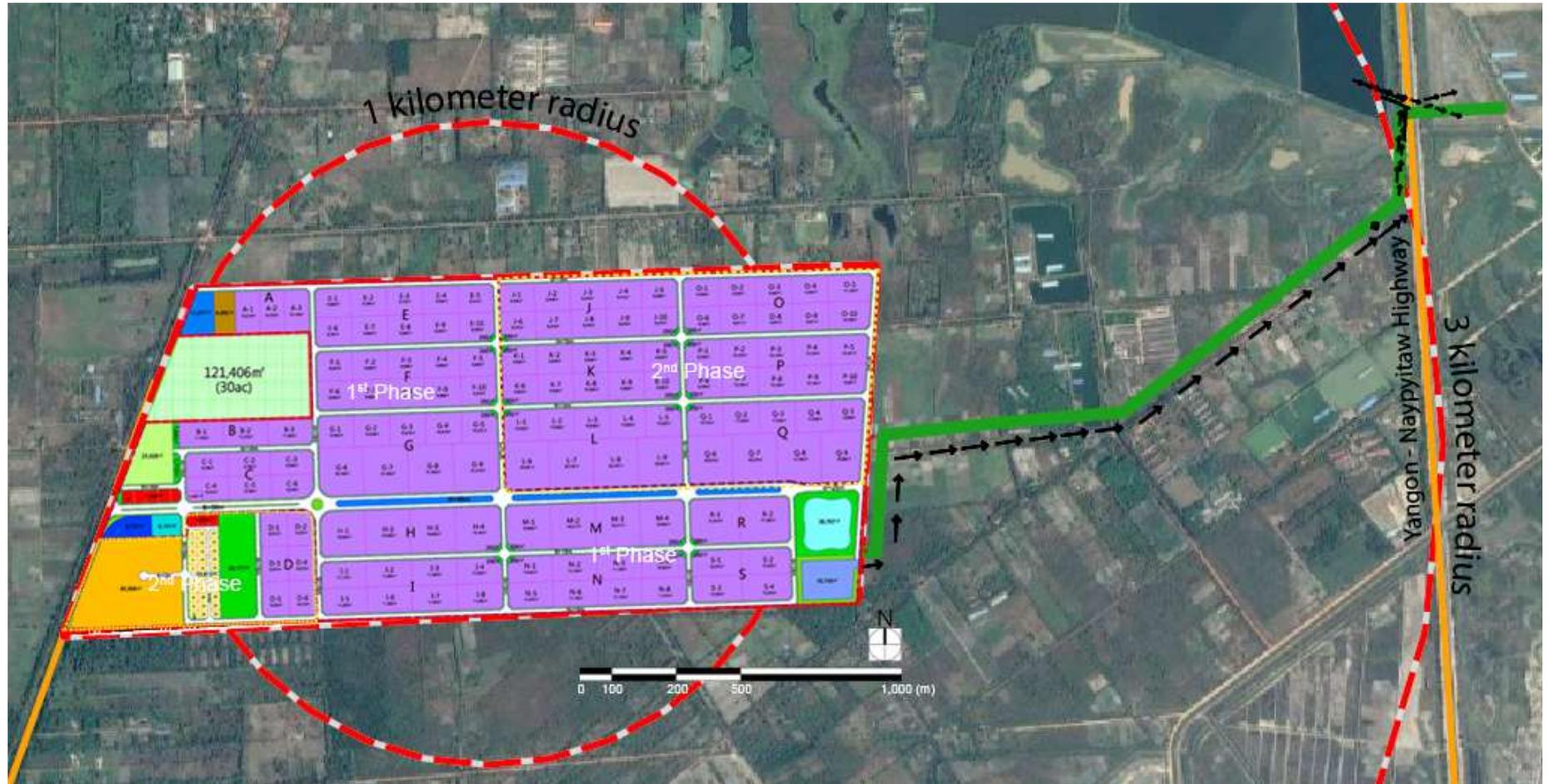
## Appendix 14 Hydraulic Flow Diagram



## Appendix 15 Wastewater Treatment Plant Location Map



### Appendix 16 Proposed Drainage



## Appendix 17 Wastewater System Plan



## Appendix 18 Drainage Layout Plan

