



ENVIRONMENTAL MANAGEMENT PLAN
for
Limestone Mining
at
Pha-yar-kone Mining Block, Taung Philar Area,
Lei-way Township, Nay Pyi Taw Council Area
by
Max Myanmar Manufacturing Co., Ltd



(Myanmar Environment Sustainable Conservation)

October 2016



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CONTENTS

| | |
|---|-------|
| DECLARATION (By Max Myanmar Manufacturing Co., Ltd)..... | (i) |
| DECLARATION (By MESC)..... | (ii) |
| EXECUTIVE SUMMARY | (iii) |
| ACRONYMS AND ABBREVIATION | 1 |
| 1. INTRODUCTION..... | 3 |
| 2. DESCRIPTION OF THE PROPOSED PROJECT..... | 7 |
| 2.1 Project Background, objectives and descriptions..... | 7 |
| 2.1.1 Background | 7 |
| 2.1.2 Project objectives..... | 7 |
| 2.2 Description of the project (project details)..... | 8 |
| 2.3 Project alternative..... | 17 |
| 3. POLICY, LEGAL AND INSTITUTIONAL FRAME WORK..... | 19 |
| 3.1 Corporate Environmental Policy of Max Myanmar Manufacturing Co., Ltd | 19 |
| 3.1.1 Environmental Policy and Legal Frame work..... | 20 |
| 3.1.2 Myanmar Laws relating to environment | 20 |
| 3.1.3 Institutional frame work of the project proponent and Myanmar Governmental Agencies responsible for IEE/EIA/EMP..... | 22 |
| 3.1.4 Standards for Environmental and Social Sustainability | 24 |
| 3.1.5 Environmental and/or Health Standards related to the project | 28 |
| 3.1.5.1 Air quality | 28 |
| 3.1.5.2 Water quality..... | 28 |
| 3.1.5.3 Noise level | 30 |
| 3.1.5.4 Odour | 30 |
| 4. GOVERNING PARAMETERS | 31 |
| 4.1 Water quality..... | 31 |
| 4.2 Air quality | 31 |
| 4.3 Noise Level | 31 |
| 4.4 Soil (Guideline) | 31 |
| 4.5 Occupational health and safety standards | 32 |

| | |
|--|----|
| 5. SUMMARY OF IMPACTS | 33 |
| 5.1 During the Pre-construction Phase..... | 33 |
| 5.2 During the Construction Phase | 34 |
| 5.2.1 Potential negative impact due to the construction of access road..... | 34 |
| 5.2.2 Potential negative impact on traffic | 34 |
| 5.2.3 Potential negative impacts on air environment | 34 |
| 5.2.4 Potential negative impact: noise and vibration..... | 34 |
| 5.2.5 Potential negative impact on soil | 34 |
| 5.2.6 Potential negative impacts on water environment..... | 35 |
| 5.2.7 Potential negative impact on biodiversity (biological environment) | 35 |
| 5.2.8 Potential negative impact on the socio-economic component of the environment | 36 |
| 5.2.9 Potential negative impacts on the cultural component of the environment | 36 |
| 5.2.10 Potential negative impact on the visual component of the environment | 36 |
| 5.3 During the Operation Phase | 36 |
| 5.3.1 Negative impact of blasting and other mining activities | 37 |
| 5.3.2 Negative impacts due to overburden and topsoil (mine waste) | 37 |
| 5.3.3 Negative impact: loss of non-living resources | 38 |
| 5.3.4 Potential negative impact on traffic | 38 |
| 5.3.5 Potential negative impacts: dust and smoke..... | 38 |
| 5.3.6 Potential negative impact: noise and vibration..... | 38 |
| 5.3.7 Potential impacts on soil (soil erosion and contamination) | 38 |
| 5.3.8 Potential impact on water environment..... | 39 |
| 5.3.9 Potential impacts of power supply on national demand and vice versa..... | 39 |
| 5.3.10 Potential impact on the biological component (biodiversity) | 40 |
| 5.3.11 Potential negative impacts on the socio-economic component of the environment | 40 |
| 5.3.12 Potential negative impact: lack of good safety practice and health education..... | 41 |
| 5.3.13 Potential negative impacts: lack of emergency and health (hospital services) | 41 |
| 5.3.14 Potential negative impacts on the cultural component of the environment | 42 |
| 5.3.15 Potential negative impacts on the visual component of the environment | 42 |

| | |
|---|----|
| 5.3.16 Potential negative impact: public perception | 42 |
| 5.4 During the Mine closure and Rehabilitation Phase | 43 |
| 5.5 Positive impacts..... | 43 |
| 6. DESCRIPTION OF PROPOSED MITIGATION MEASURES | 44 |
| 6.1 Proposed mitigation measures and EMP during the four phases of the project life | 44 |
| 6.2 Summary for overall EMP | 56 |
| 7. MONITORING PROGRAMME..... | 57 |
| 7.1 Summary of monitoring programme | 58 |
| 8. REPORTING REQUIREMENT | 61 |
| 8.1 Internal monitoring and inspection reporting..... | 61 |
| 8.2 Incident, accident and emergency reporting | 61 |
| 8.3 Measuring performance indicators and interpreting and acting on the indicators | 62 |
| 8.4 Reporting on training programmes | 62 |
| 9. EMERGENCY PLAN..... | 63 |
| 9.1 Emergency procedures (generalized)..... | 63 |
| 9.2 Emergency response and contingency procedures (in brief)..... | 64 |
| 10. CAPACITY BUILDING AND TRAINING | 65 |
| 11. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE | 66 |
| 11.1 Purposes of the consultation during the preparation of the EMP report..... | 67 |
| 11.2 Methodology and approach | 67 |
| 11.3 Summary of consultation activities | 68 |
| 11.4 Consultation meeting (public hearings)..... | 70 |
| 11.5 Summary of main comments received from the stakeholders/locals | 73 |
| 11.6 How the comments were taken into account | 74 |
| 11.7 Information Disclosure..... | 78 |
| 11.8 Recommendation for future consultation | 80 |
| 12. WORK PLAN AND IMPLEMENTATION OF SCHEDULE | 81 |
| 12.1 During the Preconstruction Phase..... | 81 |
| 12.2 During the Construction Phase | 82 |

| | |
|--|----|
| 12.3 During the Operation Phase..... | 82 |
| 12.4 During the Mine closure and Rehabilitation Phase..... | 83 |
| 12.5 Fund for Environmental Management Plan (EMP) | 83 |
| REFERENCES..... | 84 |
| ANNEX..... | 86 |

List of Tables

| | |
|--|----|
| Table 1 Proposed mitigation measures and EMP during the Pre-construction Phase | 44 |
| Table 2 Proposed mitigation measures and EMP during the Construction Phase | 44 |
| Table 3 Proposed mitigation measures and EMP during the Operation Phase..... | 49 |
| Table 4 Proposed mitigation measures and EMP during the Mine closure/Rehabilitation Phase | 56 |
| Table 5 Summary of monitoring programme in tabulated form for Construction Phase | 58 |
| Table 6 Summary of monitoring programme in tabulated form for Operation Phase | 59 |
| Table 7 Summary of monitoring programme in tabulated form for Decommissioning/Mine Closure and Rehabilitation Phase | 60 |

List of figures

| | |
|--|----|
| Figure 1 Map showing the proposed site (Lei-way Township)..... | 9 |
| Figure 2 Satellite image of the factory and its surrounding | 10 |
| Figure 3 Map of eastern part of Leiway Township showing project site | 10 |
| Figure 4 Map showing the Pha-yar-kone quarry block..... | 11 |
| Figure 5 Dimension of Pha-yar-kone quarry block..... | 12 |
| Figure 6 Signboard of the quarry site | 13 |
| Figure 7 The proposed quarry site | 13 |

| | |
|--|----|
| Figure 8 Fuel oil depot | 14 |
| Figure 9 Workshop..... | 14 |
| Figure 10 Magazine..... | 14 |
| Figure 11 Stockpile of mined out materials | 15 |
| Figure 12 Shed for mined out materials..... | 15 |
| Figure 13 Heavy machinery | 16 |
| Figure 14 Signboard of the village | 68 |
| Figure 15 Public consultation meeting | 69 |
| Figure 16 KII interview | 69 |
| Figure 17 Focal Group Discussion (FGD)..... | 70 |
| Figure 18 10 miles hard top road..... | 78 |
| Figure 19 Mei-hor Bridge..... | 79 |
| Figure 20 Schools at Aung Nan Cho village (Left) and at Aung Chan Thar village (Right) donated and built by Max Myanmar Company..... | 79 |
| Figure 21 Village library donated and built by Max Myanmar Company | 79 |
| Figure 22 Shwe Hpone Pwint Pagoda built by Max Myanmar Company..... | 80 |
| Figure 23 Two monasteries, left and right, built by Max Myanmar Company | 80 |
| Figure 24 Generalized time frame for planning and implementation of EMP and MP during the four phases of project life..... | 81 |

DECLARATION

(By Max Myanmar Manufacturing Co., Ltd)

Max Myanmar Manufacturing Co., Ltd pledges to comply with the Environmental Laws, Rules and Regulations. The company also pledges to undertake the mitigation measures and implement all the Environmental Management Plans (EMP) including Monitoring Plan (MP) prescribed in this report.

U Moe Thu Zaw

General Manager

Max Myanmar Manufacturing Co., Ltd

DECLARATION

(By MESC)

We hereby, declare that the information submitted in this report is, to the best of our knowledge, true and accurate up to the date of submitting this report.

The report is confidential between Max Myanmar Manufacturing Company Limited and the consultant firm Myanmar Environment Sustainable Conservation (MESC) until the report is submitted to the authorities concerned.

The report has been prepared by MESC with utmost effort with all reasonable skills, care and diligence within the term of contract with the client (Max Myanmar Manufacturing Co., Ltd). Recommendations are based on our experience, using professional judgment and based on the information that is available to us.

Above all, the preparation of this report strictly followed the environmental regulations and guidelines set up, and particularly the IEE/EIA/EMP format laid down, by the Environmental Conservation Department, formerly Ministry of Environmental Conservation and Forestry (MOECAF), now the Ministry of Natural Resources and Environmental Conservation (MONREC).



U Myint Kyaw Thura,
Managing Director
Biodiversity Specialist and IEE/EIA/EMP
practitioner and appraiser
Myanmar Environment Sustainable
Conservation (MESC)

EXECUTIVE SUMMARY

This is the Environmental Management Plan (EMP) for the mining of limestone at the 50 acres Block at Taung Philar Area, Lei-way Township, Nay Pyi Taw Council Area, submitted by Max Myanmar Manufacturing Co., Ltd.

Max Myanmar Manufacturing Company has already obtained the permit for the mining/quarry and large scale extraction of limestone from this mining block in 2015. The mining site (project site) is located at N.Lat. 19° 30' 55.0" and E. Long. 96° 23' 55.2". It is situated at a distance of 2 miles south-east from Aung Nan Cho village (Taung Philar Area) and on the western slope of Taung Philar Mountain.

The site is 10 miles east of Yangon-Mandalay Highway; 25.5 miles south east of Nay Pyi Taw Council Area and 178 miles north of Yangon.

The Area of the site, the lease area, is 50 acres.

The estimated budget is Ks 3,160.4 million and U\$ 0.68 million.

Electricity will be sourced from Max Myanmar Cement plant which is 2 miles west. (The cement plant sourced its electricity from the main gridline (33KV line) at Thae Phyu village, 13 miles away.)

Water will be sourced from a small stream nearby; water requirement for mining will be minimal.

The company has contracted the consultant firm, Myanmar Environment Sustainable Conservation (MESC) to conduct Environmental Impact Assessment and formulate an Environmental Management Plan (EMP) for the mining of limestone.

The EMP covers all the four phases of the project, namely the Pre-construction Phase, the Construction, the Operation and the Mine Closure/Rehabilitation Phase. All the potential impacts (negative and positive) anticipated and identified during the four phases are mentioned. The mitigation measures to be taken and the EMP are addressed.

The potential negative impacts anticipated and identified are as follows:

During the Pre-construction (Planning) Phase

- 1) The potential negative impacts on the locals into anti-project and pro-projects groups due to instigation by activists and radical environmentalists.
- 2) The potential hiking of land and property price by speculators due to the project.
- 3) The potential false claim for compensation by certain unscrupulous locals.

During the Construction Phase

- 1) Potential negative impacts due to the construction of access road
- 2) Potential negative impacts on traffic
- 3) Potential negative impacts on air environment: dust, smoke and gas emission
- 4) Potential negative impacts: noise and vibration
- 5) Potential negative impacts on soil
- 6) Potential negative impacts on water environment
- 7) Potential negative impacts on biodiversity (biological environment)
- 8) Potential negative impacts on the socio-economic components of the environment
- 9) Potential negative impacts on the cultural components of the environment
- 10) Potential negative impacts on the visual components of the environment

During the Operation Phase

- 1) Negative impacts of blasting and other mining activities
- 2) Negative impacts due to overburden and top soil (mine waste)
- 3) Negative impacts : loss of non-living resources
- 4) Potential negative impacts on traffic
- 5) Potential negative impacts: dust and smoke
- 6) Potential negative impacts: noise and vibration
- 7) Potential negative impacts on soil
- 8) Potential negative impacts on water environment
- 9) Potential negative impacts of power supply on national demand and vice versa
- 10) Potential negative impacts on the biological component (biodiversity): flora and fauna
- 11) Potential negative impacts on the socio-economic components of the environment
- 12) Potential negative impacts: lack of good safety practice and health education
- 13) Potential negative impacts: lack of emergency and health (hospital) services
- 14) Potential negative impacts on the cultural components of the environment
- 15) Potential negative impacts on the visual components of the environment

16) Potential negative impacts: public conception

During the Mine closure/Rehabilitation Phase

- 1) The potential negative impact on the aesthetics of the landscape and potential residual impacts.

Potential Positive (beneficial) Impacts

These potential positive impacts will be in the form of provision of temporary jobs during the Construction Phase 1 year and provision of long term jobs (up to 30 years) during the long Operation Phase.

The project will boost the local economy and bring benefit to locals who are involved in sub-contract works, those involve in catering and service works etc. The project will contribute to the upgrade of infrastructure eg. construction of 10 miles road, building of 2 schools, one clinic, and one library through Coporate Social Responsibility (CSR) scheme.

At national level the benefit will accrue to the country in the form of direct investment of Ks - 3,160.4 million and U\$ 0.68 million; increase in the GDP, increased investment, employment, earning and also increased in taxes, duties and revenues.

Mitigation measure EMP and MP

Proposed mitigation/corrective measures to be taken for each and every negative impact are described in detail in **Section-6** of this EMP report. Mitigation and EMP are different sides of the same coin and mitigation measures are integral part of EMP. So EMP has to be prescribed based on negative impact and subsequent mitigation measures.

The Monitoring Programme (MP) to be implemented during the Construction Phase, Operation Phase and Mine closure/Rehabilitation Phase are also described in detail in **Section-7** of this report.

Other aspects

This EMP report also deals with the Policy, Legal and Administration Frame Work (**Section-3**) and the Governing Parameters (**Section-4**). In (**Section-5**) the impacts, both negative and positive, anticipated and identified during the four phases of the project life are summarized.

The report also deals with Monitoring Programme for EMP (**Section-8**), emergency plan for EMP (**Section-9**) and capacity building and training for EMP (**Section-10**). In (**Section-11**) public consultation and information disclosure is mentioned in relative detail.

The last section, (**Section-12**), deals with the overall and generalized work plan and implementation of schedule.

ACRONYMS AND ABBREVIATION

| | |
|--------|--|
| ADB | Asian Development Bank |
| ASEAN | Association of South-East Asian Nations |
| BOD | Biochemical Oxygen Demand |
| BTA | Best Technology Available |
| CGM | Complaints and Grievances Mechanism |
| COD | Chemical Oxygen Demand |
| CSR | Corporate Social Responsibility |
| dBA | Decibel A- weighting |
| DM | Department of Mines |
| ECD | Environmental Conservation Department |
| EHS | Environmental Health and Safety |
| EIA | Environmental Impact Assessment |
| EITI | Extractive Industry Transparency Initiative |
| EMP | Environmental Management Plan |
| EU | European Union |
| FGD | Focal Group Discussion |
| GDP | Gross Domestic Products |
| ID | Identity Card |
| IFC | International Finance Corporation |
| KII | Key Informant Interview |
| MESC | Myanmar Environment Sustainable Conservation |
| MOECAP | Ministry of Environmental Conservation and Forestry |
| MONREC | Ministry of Natural Resources and Environmental Conservation |
| MP | Monitoring Plan |
| NGO | Non-Government Organization |

| | |
|------|------------------------------------|
| PEB | Payment for Ecosystem Benefits |
| PES | Payment for Ecosystem Services |
| PPE | Personnel Protection Equipment |
| 4Rs | Reduce, reuse, recover and recycle |
| SS | Secondary Source |
| STD | Sexually Transmitted Diseases |
| TDS | Total Dissolved Salts |
| TSS | Total Suspended Solid |
| YCDC | Yangon City Development Committee |

1. INTRODUCTION

Limestone, the alkaline sedimentary rock, occurs throughout this planet earth. In Myanmar limestone mountains and hills are common physical features of the nation and there are abundant limestone resources in the country.

Limestone has various uses but it is the essential raw material for the production of cement, an essential commodity for the infrastructural developments of the nations.

With a view to increasing the cement production and hence the infrastructure development of the nation, Max Myanmar Manufacturing Co., Ltd has proposed for the mining/quarrying of limestone at Taung Philar area, Lei-way Township, Nay Pyi Taw Council Area.

Brief description of the project proponent

Max Myanmar Manufacturing Co., Ltd was officially registered in 2007 and renewed as a limited company in January, 2015. (Document: 1230/2007-2008, Date: 2-1-2015 See ANNEX)

Name of the project proponent : Max Myanmar Manufacturing Co., Ltd.

Address : No.123, Alan-pya Pagoda Road, Dagon Township,
Yangon Region, Myanmar

Telephone : 01 530776

Fax : 01 682168

E-mail : maxmyanmar@maxmyanmar.com

Contact person : U Moe Thu Zaw

Phone : 09 8623955

E-mail : mtzsdpmx@gmail.com

Objectives : The mining of limestone for the production of Portland cement

Particulars of executive and administrative body

| Name | Nationality & National Registration Card No. | Address of resident | Designation | Other business occupation |
|----------------------------|---|--|---|---------------------------------|
| U Pho Zaw (a) U Zaw Zaw | Myanmar 12/Ba Ha Na (N)084544 | No.9, Inya Yeikthar Street, Mayangone Township, Yangon | Chairman and Managing Director | Merchant |
| U Soe Tint | Myanmar 12/Ka Ma Ta (N)018745 | No.14/15, Thiri Mingalar Street (2), (8) Quarter, Kamayut Township, Yangon | Vice chairman and Director | Merchant |

| | | | | |
|-------------------------------|-------------------------------------|--|----------------------------------|----------|
| U Ohn Kyaw (a) U Aye Thwin | Myanmar 14/Ya Ka Na (N)017084 | No.11/12, Thiri Mingalar Street (2), (8) Quarter, Kamayut Township, Yangon | Vice chairman and Director | Merchant |
| Daw Htay Htay Khine | Myanmar 12/Ba Ha Na (N)007040 | No.9, Inya Yeikthar Street, Mayangone Township, Yangon | Director | Merchant |

The company is 100% owned by nationals, all shareholders are nationals and foreigners are not involved in this investment.

Each share is worth 10,000 (kyats ten thousand only).

The total number shares allotted are 150,000 shares.

Four executive (allottees) members have taken the number of shares as follow:-

U Pho Zaw (a) U Zaw Zaw has taken - 100,000 number of shares

U Soe Tint has taken - 18,750 number of shares

U Ohn Kyaw (a) U Aye Thwin has taken - 18,750 number of shares

Daw Htay Htay Khine has taken - 12,500 number of shares

About the consultant firm, Myanmar Environment Sustainable Conservation Co., Ltd (MESCC)

MESCC is a consultant firm officially registered in 2014 as a limited company (a consultant/service company) at the Ministry of National Planning and Economic Development. Document: YaKa-8(Ga) 001/2014(004720), dated: 6th June, 2014. Registration No. 830/2014-2015, (20-5-2014).

The firm has yet to be registered at the Environmental Conservation Department, MONREC, waiting for detail instructions from environment authority.

Contact Address : Room no. (B -5), Building no.72, Marlar-Myaing 6th Street, 16 Ward, Hlaing Township, Yangon

Contact person : Myint Kyaw Thura
95 9 420105071

Contact number : 95 9 73044903

E-mail : myanmar.esc@gmail.com

Members of MESC who are IEE/EIA appraisers, or IEE/EIA practitioners or who are involved in this IEE/EIA project are as follows:-

| Name | Nationality & National Registration Card No. | Designation |
|---------------------|---|--|
| U Myint Kyaw Thura | Myanmar 12/Da Ga Ta (N)028349 | Managing Director, Biodiversity Specialist (Fauna), EIA practitioner and EIA Appraiser |
| Daw Khin Nway Naing | Myanmar 9/Pa Kha Ka (N)001252 | Biodiversity Specialist (Flora), Environment Researcher |
| U Tin Tun Aung | Myanmar 12/U Ka Ma (N)172111 | Engineer and EIA practitioner |
| U Than Soe Oo | Myanmar 9/Ma Na Ma (N) 050808 | EIA practitioner |
| Daw Thin Thin Yee | Myanmar 12/Tha Ga Ka (N)039292 | Chemical Environment Researcher, Computer Programmer |
| U Oakka Kyaw Thu | Myanmar 7/Ya Ta Ya (N) 090371 | Geologist |
| U Saw Han Shein | Myanmar 10/Ma La Ma (N)008173 | Retired Professor, EIA Practitioner and Appraiser |

MESC has also part time members working as free lances.

The firm is not in a position to employ all its part time members on a permanent basis.

These are botanists, zoologists, ornithologists, ecologists, aquatic ecologists and social scientists working with this firm.

For the physical and chemical environmental studies MESC has to hire experts, say for example, from the Health Department and from registered laboratory in Yangon. Since portable test kits are sometime not reliable, experts from the Health Department have to be hired for the analysis of air quality. Experts from a registered laboratory were hired for the analysis of water (or samples have to be sent to the laboratory).

Members of MESC have quite a lot of experiences with IEE, EIA and SIA works.

So far, starting from 2014 MESC has conducted some EIA and IEE projects. These were:

1. EIA for State House Hotel Development Project at the Combined Office in Downtown, Yangon (Prime Residence Co., Ltd). 2014
2. Environmental Impact Assessment on Myanmar Typical Production Iron & Steel Plant at Myaung Tagar Industrial Zone, Yangon (Myanmar Typical Production Co., Ltd). 2014
3. ESIA of Taung Philar cement factory for Max Myanmar Manufacturing Co., Ltd. 2015
4. ESIA of Kalaywa Coal Mine for Max Myanmar Co., Ltd at Kalaywa Township, Sagaing Region. 2015

5. EIA for Upgrade of Jet Fuel Storage Tanks Farm and Facility at Mingalardon Airport, Yangon. 2015
6. ESIA for Htoo International Industry Group Coal Mine at Kalaywa Township, Sagaing Region. 2015.
7. IEE for the Construction and Operation of "Sittway Hotel" at Kyay Pin Gyi Ward, Sittway, Rakhine State. 2015
8. EIA for Construction and Operation of Cement factory at Pyi-nyaung, Tharzi Township, Mandalay Region for Blue Diamond Cement Co., Ltd. 2015
9. Environmental Impact Assessment (EIA) for the mining of coal, by Shwe Taung Mining Co., Ltd at Paluzawa area, Kalaywa Township, Sagaing Region 2015.
10. EIA for Construction and Operation of Cement factory at Kupyin village, Tharzi Township, Mandalay Region for Shwe Taung Cement Co., Ltd. 2015.
11. Environmental Impact Assessment (EIA) for the mining of coal, by Tun Thwin Mining Co., Ltd Co., Ltd at Kalaywa Township, Sagaing Region 2016.
12. Environmental Management Plan (EMP) for Kalaywa coal mine by Max Myanmar Co., Ltd at Kalaywa Township, Sagaing Region 2016.
13. Environmental Management Plan (EMP) for Kalaywa coal mine by Tun Thwin Mining Co., Ltd at Kalaywa Township, Sagaing Region 2016.
14. Environmental Management Plan (EMP) for Kalaywa coal mine by Htoo International Industry Group of Company at Kalaywa Township, Sagaing Region 2016.
15. Environmental Management Plan (EMP) for the operation of BAT Myanmar cigarette factory by British American Tobacco Myanmar Limited at Shwe Than Lwin Industrial Zone, Hlaing Tharyar Township, Yangon 2016.
16. Environmental Management Plan (EMP) for Prospecting, Exploration and Feasibility Study of Gold, Copper and Associated Minerals by Myanmar Reserves Development (MRD) Co., Ltd at Aingyi Area, Kawlin Township, Sagaing Region 2016.
17. Environmental Management Plan (EMP) for Prospecting, Exploration and Feasibility Study of Gold, Copper and Associated Minerals by Myanmar Reserves Development (MRD) Co., Ltd at Okshitpin and Kaba Area, Pinlebu Township, Sagaing Region 2016.
18. Environmental Management Plan (EMP) for Prospecting, Exploration and Feasibility Study of Tin and Tungsten by Southern Nonferrous Metal Co., Ltd in Hpekon Township, Shan State 2016.

19. Environmental Management Plan (EMP) for Limestone mining at Pha-yar-kone Mining Block (50 acres) Taung Philar Area by Max Myanmar Manufacturing Co., Ltd in Leiway Township, Nay Pyi Taw Council Area (Just completed 2016).

On going project

1. Environmental Management Plan (EMP) for Limestone mining at Taung-philar Mountain Block (230 acres) Taung Philar Area by Max Myanmar Manufacturing Co., Ltd in Leiway Township, Nay Pyi Taw Council Area.
2. EIA for the project to Upgrade Max Myanmar Cement at Taung Philar.
3. Environmental Impact Assessment (EIA) for the granite quarry operated by Htoo Naing Lin Co.,Ltd (formerly Joe Yadanar Co., Ltd) in Paung Township, Mon State.
4. Initial Environment Examination (IEE) for the granite quarry operated by Linn Shwe Sin Co., Ltd (formerly Htun Tauk Sa Co., Ltd) in Paung Township, Mon State.
5. Environmental Impact Assessment (EIA) for Petroleum Storage and Distribution Terminal near Mandalay, by Puma Energy Asia Sun Co., Ltd.

2. DESCRIPTION OF THE PROPOSED PROJECT

2.1 Project background, objectives and description

2.1.1 Background

The geological formation of Taung Philar Mountain and associated hill possesses abundant limestone for the extraction of this rock. Max Myanmar Manufacturing Company has started production of Portland cement in February 2010. The former production capacity was 500 ton/day but that was in the process of upgrade to 2100 ton/day. Formerly the wet process" technology was applied but later the dry process" technology was adopted after major change and renovation carried out.

The permit for mining limestone from these 50 acres Pha-yar-kone Taung Block was already obtained since 2006 and the license for large scale production was obtained in 2015. This block was kept since 2006 as a reserved mine/quarry by the company. To boost the production capacity of cement at Max Myanmar Cement Plant near by the company has now proposed for the mining and extraction of limestone from this mining/quarry reserved block.

2.1.2 Project objectives

The main objectives are:

- to produce quality cement to meet the demand of the nation
- to contribute to the development of the industrial sector
- to contribute to the development of the construction sector and

- to contribute to the development of the further development of the infrastructure of the nation

2.2 Description of the project

| | |
|------------------------------------|--|
| Title of the project | : The project for the mining of limestone at Pha-yar-kone Mining Block at Taung Philar Area, Leiway Township |
| Proposed by | : Max Myanmar Manufacturing Co., Ltd |
| Address (a) Main Office | : No.123, Alan-pya Pagoda Road, Dagon Township, Yangon Region, Myanmar |
| Telephone | : 01 530776 |
| Fax | : 01 682168 |
| E-mail | : maxmyanmar@maxmyanmar.com |
| Address (b) Branch Office | : Max Myanmar Cement, Taung Philar Area, Leiway Township, Nay Pyi Taw Council Area, Myanmar. |
| Telephone | : 09 49205023-24 |
| E-mail | : maxcement.npt@gmail.com |
| Location of project site | : Taung Philar Area, Leiway Township, Nay Pyi Taw Council Area |
| GPS positions of the proposed site | : N. Lat. 19° 30' 55.0" E. long. 96° 23' 55.2" |
| Elevation | : 160 m |

The area and size

The proposed project site or lease area (the mining/quarrying block) is rectangular in shape and the size is 50 acres. It is on a hill lock called Pha-yar-kone Taung and 1 mile away from the factory. Two miles away in the north-west is Aung-nan-cho village, under the Zali-nget-gyi Taung village tract.

The project site is within the Mei-hor Reserved Forest; the forest is partially degraded. The whole area including the cement factory and compound, the existing mining/quarry site in the N.west is about 485 acres. Shwe Hpone Pwint Pagoda, donated and built by the Max Myanmar is 200 metres away in the west.

The site is 10 miles east of Yangon-Mandalay Highway; 25.5 south west of Nay Pyi Taw Council Area and 178 miles north of Yangon.

A new 1 mile access road from the cement factory will be built.



Figure-1: Map showing the proposed site (Lei-way Township)



Figure-2: Satellite image of the factory and its surrounding

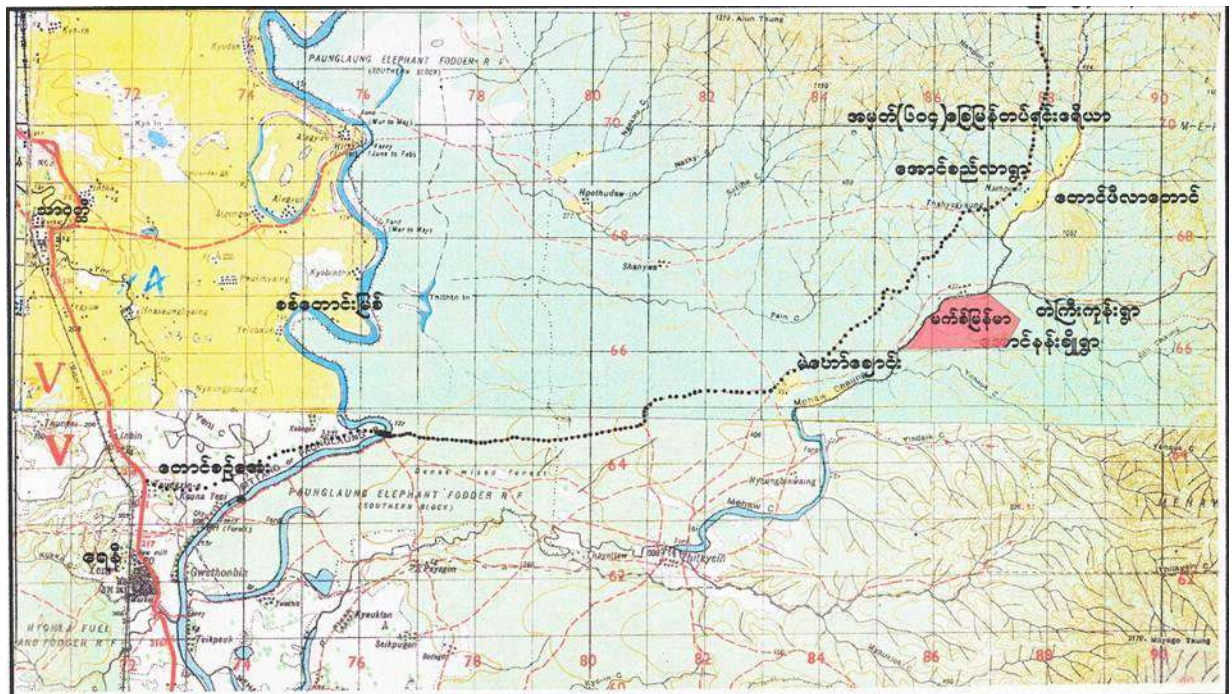
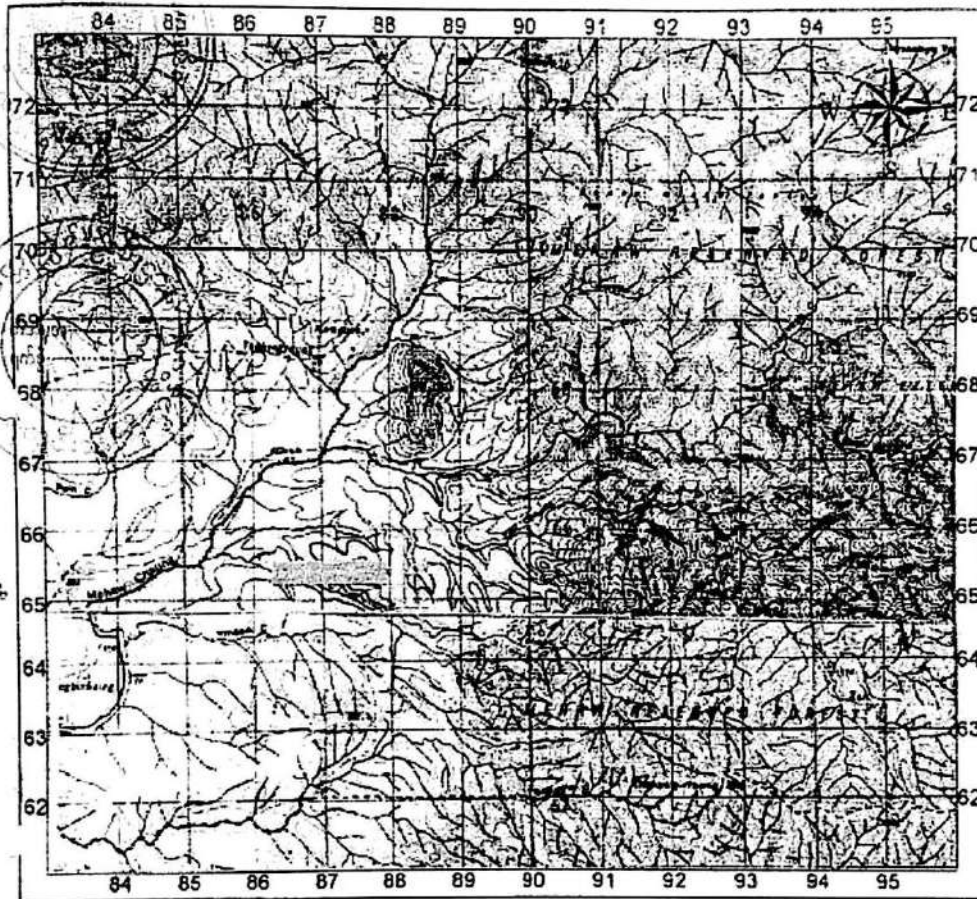


Figure-3: Map of eastern part of Leiway Township showing project site

မက်စမြန်မာထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်၏ နေပြည်တော်ကောင်စီနယ်မြေ၊ လယ်လေးမြို့နယ်၊ ဘုရားကုန်း ဒေသ၊
 ထုံးကျောင်း(စက်မှုတွင်းထွက်ကုန်ကြမ်း) အကြီးစား ထုတ်လုပ်မှုလုပ်ငန်းဆောင်ရွက်မည့် လုပ်ကွက် ၏
 တည်နေရာပြမြေပုံ၊

မြေပုံအမှတ် ၅၄-၁၁-၁၁ ၆ နှင့် ၇၁၁၁ အင်္ဂလိပ်စာရေး



အညွှန်း

ဘုရားကုန်း လုပ်ကွက်
 A - 882 659
 B - 883 659
 C - 883 655
 D - 884 655
 E - 884 649
 F - 882 649

မြေဧရိယာ(၅၀)ဧက
 (၀.၂၀၂၃) စတုရန်းကီလိုမီတာ

(စစ်ဆေးသူ)

[Signature]

(အတည်ပြုသူ)

[Signature]

Figure-4: Map showing the Pha-yar-kone quarry block

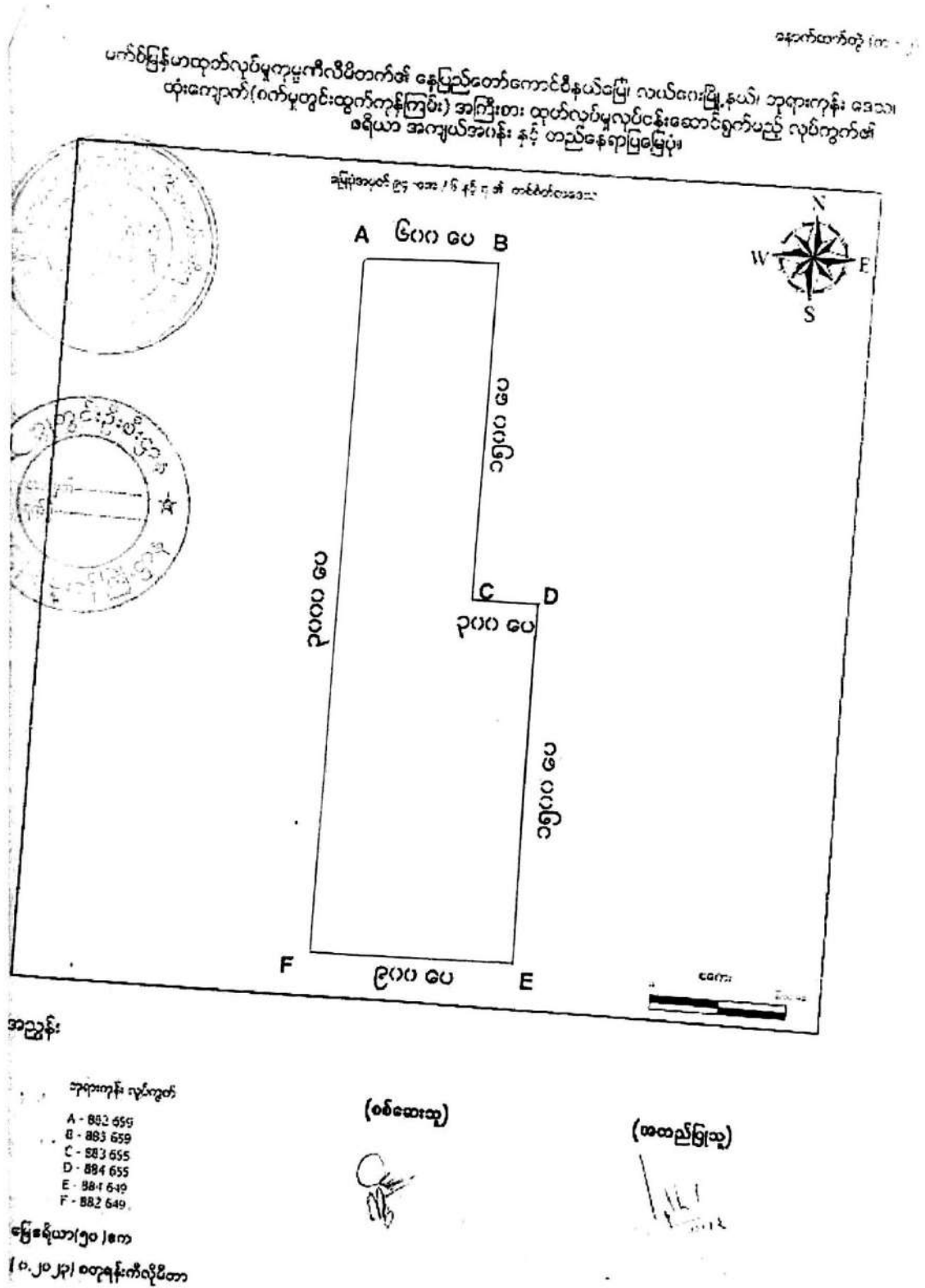


Figure-5: Dimension of Pha-yar-kone quarry block



Figure-6: Signboard of the quarry site



Figure-7: The proposed quarry site

Main component at the mining/quarry site

Buildings and structures will be small ones and these will include:

- 1) Office building (for geologists, mining engineers, demolition experts and general staff)
- 2) Fuel oil depot
- 3) Store
- 4) Workshop
- 5) Magazine (Explosives dump) and
- 6) Probably a long conveyor line



Figure-8: Fuel oil depot



Figure-9: Workshop



Figure-10: Magazine

Other main component

- 1) Park for heavy machinery and vehicles
- 2) Crushing facility
- 3) Grinding facility
- 4) Screening
- 5) Dump site for stockpile of crude limestone
- 6) Dump site for stockpile of pulverized limestone
- 7) Dump site for stockpile of overburden
- 8) Dump site for stockpile of top soil
- 9) Blast shelter



Figure-11: Stockpile of mined out materials



Figure-12: Shed for mined out materials

Heavy machinery, equipment and vehicles

- 1) Excavator
- 2) Bull dozer
- 3) Dump truck
- 4) Wheel loader
- 5) Truck
- 6) Generator
- 7) Drilling machine



Figure-13: Heavy machinery

**Estimated budget for
limestone/alabaster quarry (rough
estimation)**

: Ks 3,160.4 million and U\$ 0.68 million

Construction Phase

: at most 1 year

Operation Phase

: 10 years and renewable

Production target

: 100,000 ton/year

Monthly fuel requirement

: Diesel 240,000 gals/year

Petroleun 150 gals/year

Lubricant oil 7,000 gals/year

Grease 1,500 Kg/year

Hydraulic oil 1,200 gals/year

Electricity

: Will be sourced from the cement factory (which is source from the gridline (33KV) at Thae Phyu village, 13 miles away). There will be back up generators in case of power outage.

Water

: Water will be sourced from a small stream (water requirement in limestone quarry will be minimal except for occasional dust suppression).

Staffing

: 1 geologist, 1 mining engineer, 1 demolition expert and workers totaling 38 (more will be employed after the factory is upgraded)

2.3 Project alternative

Sometimes it is necessary to have Plan A and Plan B (alternative plan) for the implementation of a proposed project. This can ensure the project to progress smoothly and successfully even if a change in plan has to be undertaken. The alternative plan can be in form of alternative site for the project or alternative method or technology for the operation of the project.

In the case of selection of project site if the original Plan A site is not appropriate the Plan B should be duly selected. For instance if Plan A site has the following issues:

- i) it is inside a protected area or wildlife sanctuary or bird sanctuary
- ii) it is too close to big lake or reservoir that serves as water drinking source for a city

- iii) it is inside or too close to historical cultural and religious monuments or sites including archaeological ones
- iv) it is inside or too close to agricultural land or animal farms
- v) it is prone to natural disasters – floods, violent storm, land slide etc. and
- vi) the issue of land disputes or land grabbing.

All these above-mentioned issues, particularly the last one, can provokes loud public out cry or mass protest and can eventually leads to political instability of the region, if not the whole country. In such a case there is no other choice but to discard Plan A and select Plan B for the long term benefit of the project. In this context we see no necessary alternative or better alternative for switching from Plan A to Plan B. In this Max Myanmar cement project we, the EMP team saw no better alternative. Cement factories are site specific; could be established only in limestone area (limestone Mountains and hills). There was/is no public outcry or mass protest and it seems the company is in a certain degree of harmony with local community.

There can be alternative plans for the relocation or reorientation of the main components of the project if necessary --- such as the reorientation or relocation the mills, conveyor lines, stores, silos etc. But as the EMP team has no expert on engineering layout plan and design and believes that the layout plan and design provided by the project proponent is practical and viable, the team has no suggestion to give for relocation and reorientation in the layout plan.

As regards alternative method or technology Max Myanmar cement factory would apply "Dry Process" technology as an alternative for the conventional "Wet Process" one. And the alternative target of production was 2100 ton/day rather than the original target, 500 ton/day. The dry process "technology would also considerably economize the operation given the fact that this process required less electricity, less fuel and less water; following the basic principle of sustainably sound production of cement.

As regards demand alternative the EMP team suggested the company using electricity energy more efficiently rather than building more alternative generating capacity. The EMP team also suggested the application of solar panels for domestic uses such as for offices, living quarters and guest houses.

Regarding input or supply alternative the EMP team suggested the harvesting and use of rainwater as far as possible for the conservation of water resource. Rain water could be used for watering plants, suppressing dust, washing machinery and vehicles and other domestic uses.

The company should be prepared for any better alternative in the near future. As new technologies are emerging quite rapidly nowadays the company should be ready to adopt any state-of-the-art technology or any better alternative. This could also involve a change or an alternative in the design in structure and organization of the factory.

3. POLICY, LEGAL AND ADMINISTRATION FRAME WORK

3.1 Corporate Environmental policy of Max Myanmar Manufacturing Co., Ltd

Max Myanmar Manufacturing Co., Ltd, one of the leading cement production companies in Myanmar has environmental policy of its own. The first and foremost policy is to obey, abide and comply with all laws and rules relating to physical and social environment. Most of all, it will follow all the rules and regulations set up by the Environmental Conservation Department, the main agency responsible for environmental management in Myanmar. The company pledges to do a mining business that will be environmentally sound as far as possible.

The company shall endeavour to:

- operate the limestone quarry with an environmentally and socially responsible manner and to comply with laws and regulation
- prevent pollution of surrounding area; monitoring and adopting suitable measures for environment protection
- implement EMP effectively to mitigate pollution of water, land, air, noise and dust and proper disposal of waste
- develop green belt in available space
- conserve natural resources and energy as far as possible
- if possible recycling of waste through the principles of 4 Rs (reduce, reuse, recover, recycle), and
- create environmental awareness among employees and local community through education and training

Corporate Social Responsibility (CSR) and community development

The company very well realizes that the ethic code of 21th century big business is not to make profit at the expense of the environment and the local community. And that the big business should not focus only on economically viable venture but also on environmentally and functionally sound, ecologically viable as well as socially sustainable venture.

CSR has become mandatory in many countries and it is also now an official policy of most big companies. Max Myanmar Manufacturing Co., Ltd had already implemented CSR programmes as far as possible and will continue to do so and carry out community assistance and community development. Generous compensation would be provided if there is any loss or damage due to the implementation of this project. Moreover charity works and donation works had been carried out and this trend will be continued.

So far Max Myanmar Manufacturing Co., Ltd spent about Ks 525,860,000 not including materials and kinds in donation, charity and community assistance works.

Another form of CSR is the reforestation of mine area after mine closure. Max Myanmar Manufacturing Co., Ltd is already reforested 500 acres of land with teak.

3.1.1 Environmental Policy and Legal Frame work

There were/are several laws since the colonial days which were/are one way or another pertaining to the environment of the country.

The Protection and Conservation of the Environment was the priority of successive governments.

The National Commissions of Environmental Affairs (NCEA) was formed in 1990. Myanmar Agenda-21 was outlined which contains social, economic, institutional and infrastructural improvement programmes and, most of all, environmental conservation programmes.

Respective ministries devised 56 environmental policies and regulations directly related with environmental conservation and protection.

The National Environmental Conservation Committee (NECC) was formed in 2011 with the aim to achieve sound environmental management in the country.

With a view to effectively implementing the protection and conservation of the environment the new government in 2016 has created the new ministry, Ministry of Natural Resources and Environmental Conservation (MONREC). It is believed that effective and meaningful management of the environmental affair will be achieved. The Environmental Conservation Department (ECD) is the focal and coordinating agency for the overall and detail environmental management through out the country.

3.1.2 Myanmar Laws relating to environment

The Ministry of Environmental Conservation and Forestry (MOECAF) under the previous government has published a book "National Biodiversity and Action Plan" where 54 Laws and Acts relating to environment were listed.

In doing quarry business Max Myanmar Manufacturing Co., Ltd shall comply with the following Laws and Acts:

1. Myanmar Mine Law, 1994
2. The Protection of WildLife and Protected Area Law, 1994
3. Conservation of Environmental law, 2012
4. Conservation of Environmental Rules, 2014
5. The forest Law, 1992

6. The Explosive Substances Act, 1908
7. The Protection and Preservation of Cultural Heritage Region Law, 1998
8. Myanmar High Way Law, 2000
9. Myanmar Insurance Law, 1993
10. Fire Brigade Law, 2012
11. Myanmar Citizen Investment Law, 2012
12. The Social Security Law, 2012
13. Workmen's Compensation Act, 1923
14. Minimum Wages Law, 2013, and
15. The Public Health Law, 2012

International and Regional Conventions and Protocols

Myanmar has either signed or ratified no less than thirty treaties, conventions and protocols concerning environment, it is learnt.

Some of the regional conventions or protocols signed or ratified by Myanmar are:

- (i) ASEAN Agreement on Conservation of Nature and Natural Resources. Kuala Lumpur, 1985
- (ii) Agreement on Aquatic Centre in Asia and Pacific Bangkok, 1988
- (iii) ASEAN Agreement on Tran-boundary Haze Pollution, 2002
- (iv) Establishment of ASEAN Regional Centre for Biodiversity, 2005

Some of the international conventions and protocol which are of importance are:

- (i) Convention on Wetlands of internationally importance, RAMSAR 1971 and amended, 1987
- (ii) Convention for the protection of World Culture and National Heritages. Paris, 1972
- (iii) Convention on International trade in Endangered Species of wild Fauna and Flora. Washington, 1973, and amended, Bonn, 1979
- (iv) International convention for the prevention of pollution from ships. London, 1973
- (v) Agreement to promote compliance with International Conservation and Management measures by fishing vessels on the high sea. Bonn, 1973

- (vi) Convention on the prevention of marine pollution from land based sources. Paris, 1974
- (vii) Convention on Law of the Sea. UNCLOS, 1982
- (viii) Convention on conservation of migratory species of wild animals. Bern, 1983
- (ix) Vienna convention for the protection of Ozone Layer. Vienna, 1985
- (x) Convention on Biological Diversity. Rio-de-Janero, 1992
- (xi) U N Frame work Convention on Climate Change, 1992
- (xii) Kyoto Protocol on the frame work convention on climate change. Kyoto, 1998
- (xiii) Protocol on Bio safety. Cartagena, 2000
- (xiv) Convention on Persistent Organic Pollution (POP). Stockholm, 2004

3.1.3 Institutional frame work of the project proponent and Myanmar Government responsible for IEE/EIA/EMP

Max Myanmar Manufacturing Co., Ltd was officially registered as a limited company in 2007 and renewed in 2015. The company is partially involved in limestone quarry and cement production business. The executives are also involved in other business such as merchant.

There are 4 executive members; one chairman and managing director, two vice chairman and directors, one director. The company institutional structure at the cement factory is 302 staffs including 38 staffs at quarry site and also a few dozen daily wagers. After the cement plant is upgraded and in full operation more staffs will be employed.

Regarding Myanmar Government responsible for IEE/EIA/EMP the Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation (MONREC) is responsible for all the management of EMP, IEE, EIA and SIA activities. Especially the Environmental Conservation Department, (ECD) is officially responsible for the management of IEE, EIA and SIA activities taking places all over in the country. The department is also the focal and coordinating agency for the overall environmental management in the country. This department is actually a directorate headed by a Director-General, and then a Deputy Director-General. Under the directorate there are four departments, namely, the Administration Department; the Department of Policy, International Relation, Training and Research; the Environmental Protection Department and the Department of Resources Conservation and Envoronmental Impacts Assessment. These four departments are headed each by a Director. The Directorate is responsible for

- implementing environmental conservation policy
- designing and implementing monitoring programmes

- prescribing environmental quality standards and,
- conducting activities relating to waste management and conducting environmental impacts assessments

Recently various Environmental Conservation Departments at States and Regional levels under the Directorate were established in all the 14 States and Regions of the nation. This will surely greatly enhance the conservation of the environment and especially the management of the environment of the country.

Some of the regulations or guidelines for conducting EMP, IEE and EIA in Myanmar are:

- (i) Environmental Impact Assessment Rules. (Draft), 1999 by the then Ministry of Environment, of the previous government.
- (ii) Directives No.20/2013 (dated 13-3-2013) on Environmental Impact Assessment Regulation. MOECAF
- (iii) EIA Guideline (excerpt from proceeding of Meeting held in Nay Pyi Taw regarding EIA, 23-9-2013. MOECAF
- (iv) EIA Guideline 2014, from website of MOECAF, www.fdmoecef.gov.mm/com.
- (v) The Environmental Conservation Law, the Pyidaungsu Hluttaw Law No. 9/2012
- (vi) Administrative Instruction of Environmental Impact Assessment Procedure. MOECAF Notification No..../2015, Nay Pyi Taw, 2015

The regional EIA guideline set up by Asian Development Bank (ADB) in 2006 includes the following principles which are in essence, similar to the guideline of ECD, MOECAF. They are:

- protect the environment for future generations
- ensure safe, productive and aesthetically pleasing environment
- attain all beneficial uses of the environment without any undesirable consequences
- preserve important historic, cultural, religious and natural aspects of national heritage
- enhance quality of renewable sources, recycle delectable resources
- identify critical environment problems, find solution
- obtain public participation for collective decision
- harmonize development and conservation
- predict and monitor impacts, access its cumulative impact and mitigate the impacts
- analyse the cost and benefit

3.1.4 Standards for Environmental and Social Sustainability

The ethic code for 21th century big business is not to make profit at the expense of the environment and the local community.

The big company should not focus only on economically viable venture but also on functionally sound and ecologically viable as well as socially sustainable venture.

Corporate Social Responsibility (CSR)

CSR has become mandatory in most developed countries. It has also become mandatory for big companies doing business in developing countries. In fact it has become an official policy of many big companies worldwide.

A big company that is doing business in an area must commit itself to environmental and social sustainability. The motto is "**do not harm the environment and the people**".

The company must take the responsibility for community development as far as possible. A certain amount of budget or 2 percent of the net profit has to be allocated for CSR activities, it is learnt. However there is no rule or regulation yet for the percentage of budget to be allocated for undertaking CSR activities.

Many view CSR as a form of compensation for the environmental and socio-economic components impacted. The main objective of CSR is more than mitigation and compensation; but also for the economic and social development of the community impacted by the project. The compensation for land or property lost or damaged due to project, the construction of school, and clinic, the improvement for infrastructure and the provision of alternative livelihoods, donations, charities etc. are parts of CSR activities. The CSR activities must be meaningful and effective, not a mere formality.

The main essence of CSR is taking the responsibility for the community development. And the main principles of CSR are:

- not to destroy the environment
- not to infringe on human rights
- not to get involve in child labour or forced labour, and
- not to get involve in bribery and corruption in league with corrupt officials or authorities when doing business.

Extractive Industry Transparency Initiatives (EITI)

EITI has also become mandatory in most developed countries.

When a big company is involved in extractive industry business activities (oil, gas, coal, minerals, gemstones etc.) the company must promote transparency of revenue payment from extractive industry project to the government. The company must publically disclose it

material project payment to the government (such as royalties, taxes, revenues and profit sharing).

As part of EITI the locals in the project should have the required information about the project to a certain extent, though not necessary all the details. At least the company must provide the information on the objective of the project, the duration of the project, the estimated quantity of the deposit (oil or minerals), the rate to be extracted (per month or per year), the price of the extracted mineral and the estimate budget for the whole project and so on.

The anticipated negative impacts and the preventive or mitigation measures to be applied should also be explained to the locals. The beneficial (positive) impacts as a result of the project should be also explained.

EITI applies not only to the extraction of non-living resources (mineral, coal, oil, gas, gems etc.) but also to the extraction of living natural resources (timber, charcoal, food, other forest products etc.) from land and fish and aquatic living resources from the sea.

Payment for Ecosystem Service (PES)

Ecosystems, large or small, have been providing their services to mankind from time immemorial. In this era of environmental awareness the ethic of 21th century big business is not to take the service of ecosystem for granted. Every service provided by an ecosystem must not be considered as free of charge but must be paid for.

The ecosystem services could be categorized into (7) parts:

- 1) Ecosystem service in the form of harvested goods. "Harvested goods" can be in the form of living resources (food, timber, fish etc.) or in the form of non-living resources (oil, gas, minerals, coal etc.)
- 2) Ecosystem service in the form of aesthetic beauty. For example, scenic spot of tourist attraction which is a source of that generates income for the local or the country.
- 3) Ecosystem service in the form of provision of drinking water, for instance, lake ecosystem, river ecosystem, reservoir
- 4) Ecosystem service in the form of purification of water, for instance, wetland ecosystem; conservation of water and soil, for instance, watershed ecosystem
- 5) Ecosystem service in the form of provision of sanctuary for birds and wildlife animals of interest for the people; for example, birds sanctuary, wildlife park, national park
- 6) Ecosystem service in the form of generation of O₂ from plants; for instance, forest, jungle ecosystem, aquatic plant ecosystem and,
- 7) Ecosystem service in the form of sequestration of CO₂ and stabilization of climate by plants; for instance, forest, jungle ecosystem, aquatic plant ecosystem.

When a small ecosystem such as a forest or jungle is to be impacted by a project the company must take the responsibility of restoring the ecosystem (forest). The easy and pragmatic way is planting trees at the affected area and carrying out the reforestation task. This is tantamount to payment for ecosystem service (PES), or in other word, payment for the ecosystem service provided by the biological (biotic) component of the ecosystem (that is the forest). In the same way the conservation and maintenance of a drinking water reservoir is tantamount to payment for ecosystem service (PES) provided by an abiotic (non living) component of the ecosystem (that is the reservoir).

International Finance Corporation (IFC), Policy on Environmental and Social Sustainability (2012)

There are eight performance standards for a big company to do business in a new area.

I) Assessment and Management of Environmental and Social Risks and Impacts

- identify and evaluate environmental and social risks and impacts of the project
- adopt mitigation measures to avoid, or if avoidance is not possible, minimize or mitigate the impact; compensate for the impacts on people and on the environment
- promote improved environmental and social performance through the effective use of management system
- ensure that grievances from the effected people are responded and managed appropriately
- promote and provide means for adequate engagement with the community throughout the project period

II) Labour and Working Conditions

- promote the fair treatment, non-discrimination and equal opportunity of workers
- establish, maintain and improve the worker-management relationship
- promote compliance with national employment and labour laws
- promote safe and healthy working conditions and the health of workers
- avoid the use of forced labour and child labour

III) Resource Efficiency and Pollution Prevention

- avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities
- promote more sustainable use of resources, including energy and water
- reduce project-related GHG emissions

IV) Community Health, Safety and Security

- avoid adverse impact on the health and safety of the community during the project life
- ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the community

V) Land Acquisition and Involuntary Resettlement

- avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs
- avoid forced eviction
- avoid, or where avoidance is not possible, minimize social and economic impacts from land acquisition or restriction on land use by
 - (i) providing compensation for loss of assets at replacement cost (value of asset plus transaction costs), and
 - (ii) ensure that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those effected
- improve or restore, the livelihoods and standards of living of displaced persons

VI) Biodiversity Conservation and Sustainable Management of living Natural Resources

- protect and conserve biodiversity
- maintain the benefits from ecosystem services
- promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities

VII) Indigenous Peoples

- ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of indigenous peoples
- avoid adverse impacts of project on indigenous people, or when avoidance is not possible, minimize and/or compensate for such impacts
- promote sustainable development benefits and opportunities for indigenous people in a culturally appropriate manner
- establish and maintain an ongoing relationship with these people throughout the project period
- respect and preserve the culture, knowledge and practices of indigenous peoples

VIII) Cultural Heritage

- protect cultural heritage from the adverse impacts of project activities and support its preservation
- promote the equitable sharing of benefits from the use of cultural heritage

3.1.5 Environmental and/or Health Standards related to the project

3.1.5.1 Air Quality

The followings are from the general guidelines for air emission (from Notification No.615/2015, December 2015, by ECD, MOECAAF)

| 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 | 12 |
| | 24-hour | 25 |
| Sulfur dioxide | 24-hour | 20 |
| | 10-minute | 500 |

^a Particulate matter 10 micrometers or less in diameter

^b Particulate matter 2.5 micrometers or less in diameter

3.1.5.2 Water quality

The general guideline for waste water and others (from Notification No.615/2015, December 2015, by ECD, MOECAAF)

(Waste water, storm water runoff, effluent and sanitary discharges (general application))

| Parameter | Unit | Guideline value |
|---------------------------------|------|-----------------|
| 5 day biochemical oxygen demand | mg/l | 50 |
| Ammonia | mg/l | 10 |
| Arsenic | mg/l | 0.1 |
| Cadmium | mg/l | 0.1 |
| Chemical oxygen demand | mg/l | 250 |
| Chlorine (total residual) | mg/l | 0.2 |
| Chromium (hexavalent) | mg/l | 0.1 |
| Chromium (total) | mg/l | 0.5 |
| Copper | mg/l | 0.5 |
| Cyanide (free) | mg/l | 0.1 |
| Cyanide (total) | mg/l | 1 |
| Fluoride | mg/l | 20 |
| Heavy metals (total) | mg/l | 10 |
| Iron | mg/l | 3.5 |

| | | |
|-------------------------|-------------------|-----------------|
| Lead | mg/l | 0.1 |
| Mercury | mg/l | 0.01 |
| Nickel | mg/l | 0.5 |
| Oil and grease | mg/l | 10 |
| pH | S.U. ^a | 6-9 |
| Phenols | mg/l | 0.5 |
| Selenium | mg/l | 0.1 |
| Silver | mg/l | 0.5 |
| Sulphide | mg/l | 1 |
| Temperature increase | °C | <3 ^b |
| Total coliform bacteria | 100 ml | 400 |
| Total phosphorus | mg/l | 2 |
| Total suspended solids | mg/l | 50 |
| Zinc | mg/l | 2 |

Site runoff and waste water discharges (Construction Phase)

| Parameter | Unit | Guideline value |
|--------------------------------------|-------------------|-----------------|
| Biochemical oxygen demand | mg/l | 30 |
| Chemical oxygen demand | mg/l | 125 |
| Oil and grease | mg/l | 10 |
| pH | S.U. ^a | 6-9 |
| Total coliform bacteria ⁴ | mg/l | 400 |
| Total nitrogen | mg/l | 10 |
| Total phosphorus | mg/l | 2 |
| Total suspended solids | mg/l | 50 |

IFC emission and effluent guidelines

| Sr. No | Pollutants | Units | Guideline value |
|--------|-----------------------------|-------|-----------------|
| 1. | Total suspended solid (TSS) | mg/l | 50 |
| 2. | pH | SU | 6-9 |
| 3. | COD | mg/l | 150 |
| 4. | BOD | mg/l | 50 |
| 5. | Oil and grease | mg/l | 10 |
| 6. | Arsenic | mg/l | 0.1 |
| 7. | Cadmium | mg/l | 0.05 |
| 8. | Chromium (VI) | mg/l | 0.1 |
| 9. | Copper | mg/l | 0.3 |
| 10. | Cyanide | mg/l | 1.0 |
| 11. | Cyanide free | mg/l | 0.1 |
| 12. | Cyanide WAD | mg/l | 0.5 |
| 13. | Iron (total) | mg/l | 2.0 |
| 14. | Lead | mg/l | 0.2 |

| | | | |
|-----|-------------|------|-----------------------|
| 15. | Mercury | mg/l | 0.002 |
| 16. | Nickel | mg/l | 0.5 |
| 17. | Phenols | mg/l | 0.5 |
| 18. | Zinc | mg/l | 0.5 |
| 19. | Temperature | °C | < degree defferential |

3.1.5.3 Noise Level

The general guide line for noise (from Notification No.615/2015, December 2015, by MOECAAF)

| Receptor | One hour LAeq (dBA) ^a | |
|--|--|--|
| | Daytime 07:00 - 22:00 (10:00 - 22:00 for public holidays) | Nighttime 22:00 - 07:00 (22:00 - 10:00 for public holidays) |
| Residential institutional educational | 55 | 45 |
| Industrial, commercial | 70 | 70 |

^a Equivalent continuous sound level in decibels

Note: Noise leve must not be 3 dBA higher than standards level. If higher mitigate or reduce.

3.1.5.4 Odour

Guideline standard for odorant unit is between 5 and 10.

The overall guidelines and standards for mining can be downloaded from the internet. Here are some examples:

- i) IFC Good Practice Guideline for mining construction materials.
[http://www.icmm.com>document](http://www.icmm.com/document), 2007
- ii) IFC Environmental, Health and Safety Guidelines for mining, including limestone.
IFC>wam.2007
- iii) IFC. Environmental, Health and Safety General Guidelines. 2007.

The standards are for developed countries but Max Myanmar Company should try to follow the standards as far as possible.

4. GOVERNING PARAMETERS

Environmental standards and guideline values for air, water, noise and odour were already mentioned earlier in **Section-3**. These will not be repeated here.

4.1 Water quality

Guideline value for waste water, storm water runoff, effluent and sanitary discharges were already mentioned earlier (**Section-3.1.5.2**).

Drinking water

Water quality standard (Guideline values), WHO 1993.

Guideline values (Reference values) for naturally occurring chemicals which are of health significance in drinking water

| | |
|------------|------------|
| Arsenic | 0.01 mg/l |
| Barium | 0.7 mg/l |
| Boron | 0.5 mg/l |
| Chromium | 0.05 mg/l |
| Fluoride | 16.5 mg/l |
| Manganese | 0.05 mg/l |
| Molybdenum | 0.07 mg/l |
| Uranium | 0.015 mg/l |

(Also refers to IS: 10500 (1991) Norm and IS: 2296 Class C norm)

4.2 Air quality

The general guideline values for air emission were already mentioned earlier (**Section-3.1.5.1**).

4.3 Noise level

Already mentioned earlier (**Section 3.1.5.3**) will not be repeated here.

4.4 Soil (Guideline)

- no radioactive substance
- no toxic substances and chemicals, (cyanide, arsenic-each less than 0.1 mg/l)
- if possible, no heavy metals-lead, mercury, cadmium etc (lead, cadmium less than 0.1 mg/l, mercury less than 0.01 mg/l)

- stability and consistency of soil; not prone to subsidence and sink hole
- engineering bed rock (firm base) at appropriate depth; (for construction purpose)

Note: (soil microbiology, soil nutrient status, physical and chemical parameter are at the present beyond the scope of EMP/IEE/EIA studies)

4.5 Occupational health and safety standards

(a) Air quality at work place

- SO₂ must not exceed 20µg/m³ (24 hrs period)
- NO₂ must not exceed 40µg/m³ (1 hr period)
- CO must not exceed 30,000µg/m³ (1 hr period)
- Respiratory suspended particulate matter (RSPM-PM_{2.5-10}) not exceed 25 and 50µg/m³ (24 hrs)
- Suspended Particulate Matter and dark smoke (SPM-DS): not exceed 150µg/m³ (24 hrs)
- Ozone must not exceed 100µg/m³ (8 hrs period)

Note: Provide Personnel Protection Equipment (PPE) - face mask, mouth/nose cover especially for workers exposed to long period of smoke and dust.

(b) Noise and vibration at work place

- Noise level not exceed 85dBA

Note: Provide PPE- ear protector, ear muff to workers exposed to long period of high noise level.

(c) Solid and hazardous waste

- No radioactive substance, no toxic substances

Note: Provide PPE- hand gloves, rubber boots to worker handling any solid waste; train them first.

(d) Waste water

Disposal of liquid waste

Criteria for treated industrial waste water discharged into canal, water way, river etc.

(The two most important disinfectants are Chlorine at 5 mg/l and Monochloramine at 3 mg/l)

Follow the guideline values for waste water already mentioned in **Section-3.1.5.2.**

(e) Drinking water

Water quality standard (Guideline values) by WHO 1993; already described earlier.

(f) Safety management

Manage to meet the air quality, SO_x, NO_x and RSPM. Manage so that any possible leakage or emission of air pollutants will not affect worker's health and safety. Also maintain temperature and humidity.

Provision of PPE is necessary if workers are exposed for long hours.

Manage for effective waste water treatment and discharge (Already mentioned earlier). Provision of PPE to workers handling waste water.

(g) Communicative diseases including HIV/AIDS

- All workers must pass medical examination prior to being employed.
- Manage for the prevention and control of outbreak of epidemic or communicative diseases-such as dengue fever, cholera, eyesores, influenza, SARS, H₁N₁, H₅N₁, Zika etc
- Make condoms available for the prevention of sexually transmitted diseases (STD) including HIV/AIDS. (This may or may not be appropriate in a conservative society with Buddhist belief, culture and tradition.)

5. SUMMARY OF IMPACTS

5.1 During the Pre-construction Phase

As far as limestone mining/quarry is concerned the Pre-construction Phase is the planning and the early preparation phase.

The works mainly involve all paper works for the permit or license and/ease and other necessary official documents; the procurement of equipment, machinery and vehicles.

The potential negative impacts identified are:

- Potential polarization of the locals into anti-project and pro-project groups due to instigation by activists and radical environmentalists.
- Potential hiking of land and property price by the speculators due to the project.
- Potential false claim for compensation by certain unscrupulous locals. These cases are not uncommon and it is hard to verify when customary law is applied. The proponent company usually gives in for the sake of building good relation with the locals.

5.2 The potential negative impacts during the Construction Phase (duration: 1 year)

The works mainly involve the construction of access road, preparation of sites for mining/quarry, and sites for stockpiling of crude limestone (mined out limestone), sites for dumping of soil and overburden, and the construction of facility such as office, stores work shop, oil depot; crushing and grinding facility, conveyor and park for heavy machinery and vehicles etc. 10 potential negative impacts are identified.

5.2.1 Potential negative impacts due to the construction of access road

Vegetation may have to be cleared and this may have negative impact in the form of disturbance on the biodiversity (wildlife), certain loss of vegetation, habitat fragmentation, habitat destruction and certain habitat loss. The construction of access road can eventually lead to soil erosion.

5.2.2 Potential negative impacts on traffic

Although the area is not a heavy traffic area the repetitive movements of heavy trucks can have impact on the local road users (motorcyclists and pedestrians). The mobilization of huge quantity of building materials can also have impact on the traffic.

5.2.3 Potential negative impacts on air environment

Vegetation clearing, land leveling, removal of top soil and all kinds of earth works for construction and virtually all construction activities and vehicular movement lead to the generation of dust, smoke and gas emission.

Dust of PM_{10} is a nuisance but that of $PM_{2.5}$ and PM_1 are of serious health concern.

5.2.4 Potential negative impacts: noise and vibration

The construction work, vehicular movement, and the operation of heavy machinery all generate noise of high level and substantial level of vibration.

High noise level is not only a nuisance but can impair hearing. Vibration can damage machinery and buildings.

5.2.5 Potential negative impacts on soil

The earth work which is an integral part of construction work can alter the profile and structure of soil. Spillage of fuel oils and chemicals during the construction work, from machinery and vehicles can contaminate the soil.

There is also the potential erodibility of soil and soil loss due to the removal of vegetation for access road construction and the mining facility. Other impacts are: soil compaction due to repetitive movement of vehicles and heavy machinery and the potential percolation of domestic sewage into the sub-surface layer and hence under ground water.

5.2.6 Potential negative impacts on water environment

a) Surface water

- if there is a stream or river near the site there can be potential contamination of surface water due to spillages of hydrocarbons and contaminated runoff sources from contaminated soil. (There is a small natural pond nearby and this can be impacted if not well-managed.)
- potential altered surface flow dynamic due to removal of top soil and alteration in the on site topography
- increase of siltation in the stream with the runoff carrying sediment; increased runoff from cleared area (during the rainy season only)

b) Ground water

- potential groundwater contamination due to percolation of hydrocarbons, drill fluids and chemically contaminated water
- potential contamination due to seepage of ablutions and domestic wastes
- impact on the level of groundwater if tube well has to be used and large quantity of underground water have to be utilized (tube well may not be necessary in this area)

5.2.7 Potential negative impacts on biodiversity

a) Flora

- destruction and removal of natural vegetation during construction of access and site clearance
- damage to natural vegetation due to deposition of dust emitted during vehicular movements and exploration activities, restricting photosynthesis
- probable cutting of trees for use as fire wood by local workers
- damage to natural vegetation due to spillage of hydrocarbons and chemicals
- potential major damage due to accidental bush/forest fire caused by careless workers

b) Fauna

- potential direct impact on threatened faunal species
- potential habitat, fragmentation, destruction and loss
- potential damage on wildlife and birds breeding grounds, nesting, foraging or roosting in the project area due to exploration activities

- potential disturbance due to noise and visual intrusion due to exploration activities which will scare away the wildlife
- potential limitation of movement for land fauna (wildlife) and also for domestic animals
- potential injury or death of animals due to spillages of hydrocarbons and also due to vehicular movements
- potential loss of wildlife due to hunting or trapping of animals by workers, if any

5.2.8 Potential negative impacts on the socio-economic component of the environment

- potential damage to existing roads caused by movement of heavy trucks and machinery; and continual uses of vehicles moving to and from the sites can impact the safety of people and domestic animals
- generation of dust, and noise causing potential disturbance or nuisance to the local people
- potential contamination of local drinking water sources due to quarry activities
- potential siltation of nearby paddy fields or other farms during rainy season due to quarry activities (there is a small corn field near the quarry site)
- ill-social behavior of workers or locals can lead to quarrels and brawls among themselves or with locals; theft, misappropriation of materials and money, vandalism, unethical sexual practice or sexual offences, spread of Sexually Transmitted Diseases (STD) and so on. (the site is near Aung Nan Cho village). These can have also certain negative impact on the project

5.2.9 Potential negative impacts on the cultural components of the environment

The impacts are not anticipated as there are no pagoda, Buddhist monasteries, mosque, church, Hindu temple and sacred site inside the lease area. The Shwe Hpone Pwint Pagoda and the monastery donated and built by the company is well-outside the lease area.

5.2.10 Potential negative impacts on the visual component of the environment

The impacts are not anticipated as there is no prominent landmark or no scenic spot of potential tourist's attraction to be implemented. There will be no change in relief and alteration of landscape during the Construction Phase.

5.3 During the Operation Phase

This is the phase where the mining/quarrying and extraction of limestone/alabaster is undertaken.

5.3.1 Negative impacts of blasting and other mining activities

To extract the raw materials for cement such as limestone, blasting has to be carried out first. The company uses emulsion type explosive for blasting the rock. The impacts posed by blasting includes physical injury (accidentally), loud noise and vibration.

Physical injury or even fatality can happen if chunks or pieces of rock burst out and fall upon employees due to huge explosion associated with blasting.

The sound of explosion is very loud indeed and this can easily impair hearing and pose a major health issue. The sound of explosion is the most severe noise pollution of the project and can has impact on the local people of Aung Nan Cho village which is just about two miles away.

Other quarry activities such as drilling (before blasting), excavation, collection and transportation of limestone and other materials inevitably cause noise pollution at least in the quarry site.

Vibration associated with loud explosion will have certain impact on the environment. It will scare wildlife away and can has impact on tall building or at least 2-3 storey brick houses in the vicinity. Repeated explosions and vibrations over a long time can substantially damage any brick building. (Fortunately there are only one or two brick houses in Aung Nan Cho village.)

Minor landslide can occur in the mountain side, particularly during the rainy season, due to explosion and vibration.

5.3.2 Negative impact due to overburden and top soil (mine waste)

Huge amount of quarried out materials (limestone, clay) and overburden are generated in quarry activities. A wide area is needed to stockpile them. While the required materials (limestone etc) is evacuated and replaced from time to time the overburden usually remains forever, unless there is a chance to utilize it.

The overburden will have great impact on the area, altering the soil profile, changing or blocking the natural drainage system of the area and also the stream if there is one nearby, severely impacting the aquatic life of the stream.

Overburden also has an impact on the relief and topography of the area.

The erosion or sliding of the overburden, or the slope failure or the collapse will have severe negative impact on the surrounding. Especially during the raining season the impacts will be worse. There can be impact of run off from overburden stockpiles on water bodies causing serious turbidity and siltation. It can also impact on ground water quality due to leakage. If the site is close to agricultural land it can have undesirable impacts.

The spillage of top soil and overburden during transportation is also an issue.

5.3.3 Negative impact: loss of non-living resources

Not only living natural resources (biodiversity) are impacted by quarry activities but also non-living natural resources (limestone, clay, etc.) are impacted. These non-living natural resources are lost forever since they are not renewable. So the impact is inevitable, and irreversible. By the end of the Operation Phase the whole limestone mountain will be gone.

5.3.4 Potential negative impact on traffic

The impact will be quite significant if the limestone materials, either crude or processed (pulverized), have to be transported by heavy trucks. (The mining site is quite far from the factory.) Heavy trucks will increase the wear and tear of the road or even damage the road.

5.3.5 Potential negative impact: dust and smoke

The impacts will be more or less the same as during the Construction Phase but long term. There is a high level of PM, SO₂ and NO_x in dust while VOCs, SO₂, CO and NO are found in smoke.

The mining, extracting and processing activities of limestone involve, drilling, blasting, shoveling, ripping, transport, crushing, grinding, screening and stockpiling. All these activities together with vehicular movements generate dust (and also smoke).

The sources of smoke (gas emission) are from heavy machinery, vehicles and equipment used during this long term phase.

5.3.6 Potential negative impact: noise and vibration

All the above --mentioned mining activities also generate noise and vibration.

Extremely loud noise and severe vibration are generated during the blasting of the limestone. But this is limited to a few seconds per day. Excavation and transportation of the raw material (limestone) would inevitably cause noise pollution in the area. (This is already mentioned in the impact of blasting.)

Crushing, grinding, screening and operation of heavy machinery and heavy truck also generate loud noise and vibration.

Increase of ambient noise level will cause disturbance or nuisance for the employees, but working in noisy workplace for long hours can impair hearing.

There can be damage to local structures due to vibration. Vibration and loud noise are one way or another, associated.

5.3.7 Potential impact on soil (soil erosion and contamination)

The impacts will be in the form of soil erosion, damage to soil profile, potential soil contamination and potential percolation of contaminants and domestic waste into the sub-surface layer and hence underground water.

Blasting and excavation works will lead to damage to soil profile, major erosion and even minor landslide.

Fuel and other oils spill and domestic waste can contaminate the surface and sub-surface soil.

5.3.8 Potential impact on water environment

Small quantity of water may be used in drilling but the consumption of water during mining, extraction and processing will be minimal and so the impact on the quantity will be minimal. The impacts can be on the surface and ground water environment.

a) Surface water

- if there is a stream or river near the site there can be potential contamination of surface water due to spillages of hydrocarbons and contaminated runoff sources from contaminated soil
- potential altered surface flow dynamic due to removal of top soil and alteration in the on site topography
- increase of siltation in the stream with the runoff carrying sediment; increased runoff from cleared area (during the rainy season only)

b) Ground water

- potential groundwater contamination due to percolation of hydrocarbons, drill fluids and chemically contaminated water
- potential contamination due to seepage of ablutions and domestic wastes
- impact on the level of groundwater if tube well has to be used and large quantity of underground water have to be utilized (tube well may not be necessary in this area)

5.3.9 Potential impact of power supply on national demand and vice versa

The total electricity consumption after the factory is upgrade will be 13.3 MW. This is a substantial increase in national power demand given the fact that the whole national consumption is only about 2000 plus MW. Electricity consumption at the quarry site is also substantial.

The nation is witnessing power outage from time to time due to defect in electricity or due to natural disaster or due to deliberate load shedding. Because there is no efficient means of regulating power supply so far, the easiest and pragmatic way is load shedding whenever there is case of overload. This is probably the pragmatic policy of electricity authority. There were/are precedents of load shedding practiced in the industrial zone of Yangon, and other parts as well. The company should not rely entirely on the national grid line.

As there will be no mining activity at night switch off the power and light at night and conserve electricity as far as possible.

5.3.10 Potential impact on the biological component (biodiversity)

Since the lease area is a forest land the negative impacts can be significant. The impact on the flora and fauna can be as follows:

a) Flora

- destruction and removal of natural vegetation for mining and extraction works
- damage to natural vegetation due to deposition of dust emitted during vehicular movements and exploration activities, restricting photosynthesis
- probable cutting of trees for use as fire wood by local workers
- damage to natural vegetation due to spillage of hydrocarbons and chemicals
- potential major damage due to accidental bush/forest fire caused by careless workers

b) Fauna

- potential direct impact on threatened faunal species
- potential habitat, fragmentation, destruction and loss
- potential damage on wildlife and birds breeding grounds, nesting, foraging or roosting in the project area due to quarry activities
- potential disturbance due to noise and visual intrusion due to quarry activities which will scare away the wildlife
- potential limitation of movement for land fauna (wildlife) and also for domestic animals
- potential injury or death of animals due to spillages of hydrocarbons and also due to vehicular movements
- potential loss of wildlife due to hunting or trapping of animals by workers, if any

5.3.11 Potential negative impact on the socio-economic component of the environment

The mining of limestone can have certain negative impact on the life of the local people. These can be in the forms of:

- potential damage to existing roads caused by movement of heavy trucks and machinery; and continual uses of vehicles moving to and from the sites can impact the safety of people and domestic animals

- generation of dust, and noise causing potential disturbance or nuisance to the local people
- potential contamination of local drinking water sources due to quarry activities
- potential siltation of nearby paddy fields during rainy season due to quarry activities
- ill-social behavior of workers or locals can lead to quarrels and brawls among themselves or with locals; theft, misappropriation of materials and money, vandalism, unethical sexual practice or sexual offences, spread of Sexually Transmitted Diseases (STD) and so on (if the site is near a village). These can have also certain negative impact on the project.

Generally some of the negative impact can be:

- physical displacement of land, property due to land acquisition (not found and not anticipated)
- loss of natural resources or livelihood, mental agony and risk of food security etc.
- may be physically effected due to air and noise pollution, disturbance in their daily life

5.3.12 Potential negative impact: lack of good safety practice and health education

These two factors can have significant negative impacts on the workers and hence the project. Occupational safety and health is essential for the affective and successful implementation of the mining or quarry works. Good working practices, good engineering practice and good safety practices are necessary. Mining or quarry work involves the use of machinery and involves challenging job which can cause injury or even death to careless or unskilled workers. Creation of safety work place is essential.

The lack of hygiene can lead to out break of diarrhea. Harmful insect bites and snake bites cannot be ruled out in this area.

Accidents in workplace (physical injuries or even death) can occur during mining/quarry operation-- eg. slips, trips and falls, falling rocks and impacts with moving machinery such as front loaders, dozers, crushers etc. Accidental injury from explosion during blasting can be fatal.

5.3.13 Potential negative impact: lack of emergency and health (hospital) services

The lack of emergency and health service can be a constraint regarding provision of health care for workers in potential emergency. If an accident that effect many people occurs the available service in the area may be prone to inadequate. The township hospital at Lei-way of course, cannot solve such a serious problem. Most of the serious health cases are to be referred to the main hospital in Nay Pyi Taw Council Area. This hospital is about 25 miles away but it has adequate health facility, probably the best public hospital (government

institution) in Myanmar. The cost of treatment is not so high. There are certain private hospitals in Yangon (178 miles away) where there may be better treatment system but the cost is exorbitant.

Natural disasters such as violent storms and great floods are ruled out for this area; there is no precedent of such a disaster within memory. (Earthquake is not taken in consideration. It is a case of the fall of sky as a Burmese saying goes which means all have to suffer if the sky falls, so why bother?) But there can be potential for fire break out as the use of fuel oil for heavy machinery and truck is involved.

5.3.14 Potential negative impact on the cultural component of the environment

The impacts are not anticipated as there are no pagoda, Buddhist monasteries, mosque, church, Hindu temple and sacred site inside the lease area. The Shwe Hpone Pwint Pagoda and the monastery donated and built by the company is well-outside the lease area.

The situation, as far as negative impact on the cultural component, will be the same as during the Construction Phase.

5.3.15 Potential negative impact on the visual component of the environment

So far not anticipated at the moment, as there is no prominent landmark or no scenic spot of potential tourist attraction to be impacted.

But after several years (or more than one decade) of operation there can be a change in relief and alteration of landscape. By the end of the Operation Phase (30 years from now) the whole mountain may be gone.

The mining and excavation of limestone and the eventual creation of mine voids, dents and large pits as well as the emergence of large mounds of soil and overburden also alter the topography of the landscape. Stream flow and drainage pattern may also alter due to mining activities, especially during the rainy season.

Another visual impact may be in the form of bright light at night. Conditions are dark at night in this area. So the local community, even from a distance, can have so called lighting offensive at night. Bright light at night has the potential to attract hundreds of insects and kill them.

5.3.16 Potential negative impact: public perception

This can be either positive or negative. It is quite difficult to identify the public perception. Activists and radical environmentalists can make the local communities to have a negative perception on the factory. Ill-disciplined and rowdy workers, particularly construction workers, can lead to negative perception on the factory by the locals.

During the Construction Phase the local people may have high hope and expectation for employment. But later they may become disillusioned if their hope of employment is not realized to full extent as the factory can never employ each and every one who wants a job.

Good relation with the local community will have positive impact on the factory while the impact will be negative if the relation is bad.

5.4 During the Mine closure and Rehabilitation Phase

The Decommissioning Phase (mine closure) comes after the long Operation Phase which usually last for several decades (up to 50 years) depending on the availability of limestone/alabaster resource. At the end of the long Operation Phase the relief of the land will change or the landscape will greatly altered, and that will depend on the duration and the magnitude of the mining operation. Large dents or large pits of mined out or excavated sites will remain greatly impacting the aesthetic natural beauty of the original landscape. Large amount of overburdens will be left here and there. The company can simply walk away and leave the site if it will be no longer use after operation. (This is known as abandonment phase and commonly practiced in some countries with abundant land area many years ago.) But in this era of environmental awareness such a practice is no longer allowed.

At the end of the long Operation Phase (30-50 years) the landscape will be greatly altered; pits, dents and voids of mined out sites and large mounds of overburdens will remain. In this era of environmental awareness the company cannot simply abandon the site and walk away after the Operation Phase.

Even if the company wants to abandon its old site it still has the responsibility for carrying out decommissioning and rehabilitation of the abandoned site. Decommissioning plan (mine closure plan) is now the most important environmental requirement in mining projects.

A mine closure plan that incorporates both physical rehabilitation and socio-economic considerations must be an integral part of the project life cycle.

5.5 Positive impacts

The positive impacts or benefits so far gained since the operation of the cement factory will be briefly mentioned and certain benefit to be gained in mining/quarry programme also described.

During the Construction Phase of the major project (cement project) almost 1000 workers were temporarily employed for one year. The project then had boosted the local economy and brought economic benefit to the local who were involved in extraction/production of building materials -- eg. sand, gravel, bricks. Timber merchants and merchant of construction merchandize -- eg. iron rod, bar, roofing, aluminium sheet, glass panel, cement etc. were able to promote their sales. Many jobs associated with construction sector were created.

During the Operation Phase of the major project (cement project) 302 permanent jobs were provided. The company has contributed greatly to the upgrade of infrastructure such as two schools, one clinic, one library, two monasteries and the 10 miles road. The company's factory has boosted the local economy to some extent: teashop, food shop, grocery and stalls have sprung up in Aung Chan Thar village and vicinity. In short the company has implemented comprehensive and effective CSR programme with good wills.

On national level the main cement project has already brought to the country in the form of direct investment of Ks 31,603.15 millions and U\$ 6.8 millions for the whole project, including quarry operation, in the initial stage and another U\$ 34.3375 millions for the upgrade of the project.

For this new limestone mine/quarry another investment of Ks 3,160.4 million and U\$ 0.68 million is undertaken. These investments have contributed to the increase in GDP of the nation. The country has benefited from increase in investment, increase in employment, increase in earning, increase in taxes, duties and revenue etc.

While Max Myanmar Manufacturing Company should try to mitigate or minimize negative impacts it should, on the other hand, enhance and maximize the positive impacts to their optimum.

6. DESCRIPTION OF PROPOSED MITIGATION MEASURES

Since mitigation measures are integral part of EMP they should be considered together. EMP has to focus on and address all negative impacts and subsequent mitigation measures. The EMP will also cover other aspects of environment pertaining the mining site and mining activities.

6.1 Proposed mitigation measures and EMP during the four phases of the project life

Table-1: Proposed mitigation measures and EMP during the Pre-construction Phase

| Sr. No | Negative impacts (significant and insignificant) | EMP and mitigation/corrective measures |
|--------|---|--|
| 1. | Potential polarization of the local community into anti and pro-project group | <ul style="list-style-type: none"> - early public meeting and consultation - prioritize hiring locals over hiring personnel from beyond |
| 2. | Potential hiking of land and property | <ul style="list-style-type: none"> - early public meeting and consultation - staffs should not get involve themselves in speculative business |
| 3. | Potential false claim for compensation | <ul style="list-style-type: none"> - early public meeting and consultation - ask the help of legal expert eg. customary law, customary rights - compromise is necessary for long term good relation |

Table-2: Proposed mitigation measures and EMP during the Construction Phase

| Sr. No | Negative impacts (significant and insignificant) | EMP and mitigation/corrective measures |
|--------|---|---|
| 1. | Potential negative impacts due to the construction of access road | <ul style="list-style-type: none"> - plan for the sustainable construction of access road; plan to minimize disturbance to the biodiversity - do no clear vegetation more than necessary; minimal vegetation should be removed - route should be selected so that a minimum number of big trees are felled |

| | | |
|----|---|--|
| | | <ul style="list-style-type: none"> - avoid water bodies as far as possible; also drainage features - ensure surface leveling to prevent soil erosion - use drainage ditches to ensure that water leaves the road with minimal erosion - when access road needs to be constructed assess the area and identify the habitat or breeding ground of wildlife - if possible, avoid construction on steep slope to reduce the need for cut and fill - preserved top soil as far as possible for rehabilitation (vegetating) work later |
| 2. | Potential negative impact on traffic | <ul style="list-style-type: none"> - draw up a traffic management plan - schedule the timing for vehicular movements - educate the drivers to practice defensive driving - set up speed limit for vehicles |
| 3. | Potential negative impacts on air environment: dust and smoke | <ul style="list-style-type: none"> - draw up a plan for air quality management to meet statutory requirement (rules, regulations, Municipal Act) - plan in the Pre- construction Phase for the procurement of equipment, vehicles that emit less smoke (to be certified for emission compliance) - keep equipment and vehicles well-maintained - use machinery and vehicle with low emission rate; use fuel with low sulphur content - avoid open burning of debris - spray water for suppression of dust - restrict vehicular movement; maintain road clear of mud and dirt - limit open stockpile of earth, sand etc - minimize drop height during loading and unloading - provide PPE to workers who are exposed to smoke or dust for long period - try to meet statutory requirement and guideline values for emission - local community should be able to file complaint regarding dust and smoke |
| 4. | Potential negative impacts noise and vibration | <ul style="list-style-type: none"> - plan in the Pre-construction Phase for procurement of equipment, and vehicles that emit lower noise level - plan for noise management, to meet statutory requirement (rules, regulations) - install silencers and mufflers - switch off or throttle down equipment during idle period - avoid construction work at night - schedule high noise activity only during day time hours - provide PPE to workers exposed to prolonged high noise level - manage vibration of machine, equipment and vehicle - if possible install vibration absorbers - design for stable foundation, even for temporary purpose - limit the speed of vehicles - local community should be able to file complaint regarding noise vibration |
| 5. | Potential negative impact on soil | <ul style="list-style-type: none"> - plan for the management and conservation of soil - during earth work the top soil should be separately stockpiled from other sub-surface soil or rocks |

| | | |
|----|--|---|
| | | <ul style="list-style-type: none"> - top soil removed should be stored on higher ground outside the normal flood level; excavated top soil should be removed from all areas where physical disturbances (wind, water) of the surface occur - top soil should not be used for maintaining access road or for building - stockpiles of top soil should be grassed or allowed to naturally vegetate for stabilization and prevent erosion - during rehabilitation top soil should be effectively used to promote the natural growth of vegetation; top soil fertility, and biological quality should be monitored and a management plan should be implemented (if necessary) - oil spilled should be cleaned up immediately; do not wash down with water but used absorbents or saw dust placed in a 25 litres container to be treated as semi-hazardous waste - prevent wash water from carrying earth and materials into drainage system - vehicles and machinery should be adequately maintained to prevent fuel leaks resulting to soil contamination - drip trays and designated bunded site should be used to protect soil from hydrocarbons, greases, drill fluids etc. - all waste materials (earth, rocks) resulting from construction work should be disposed of at a designated spot - solid waste and liquid waste from field camp should be also disposed of at designated spot - educate and train the workers for good house keeping practice; do not litter; do not pollute the area - after completion of construction work at a site rake the compacted soil at site or camp and respread the stockpiled top soil to naturally revegetate the area |
| 6. | <p>Potential negative impact on water environment</p> <p>(a) Surface water</p> | <ul style="list-style-type: none"> - if there is a stream or river plan and manage so that quarry activities will not impact the surface water (There is a small natural pond not far from the site) - avoid water bodies as far as possible when constructing or upgrading area roads - when clearing for site remove vegetation prior to top soil removal in order to limit the effect of site clearance on surface water flow dynamics - storage of fuel oil as well as used fuel oil should be done in a designated bunded side until removal - drip trays and designated bunded site should be used to protect surface water from hydrocarbon spills - maintain vehicles and machinery adequately to prevent spillages resulting in surface water contamination - when handling fuel oil avoid accidental spillages into the surface water; should spillages occur implement appropriate clean up immediately - avoid disposing of waste (both liquid and solid) into water bodies; only release waste water if quality is acceptable or after treatment - top soil should be allowed to naturally vegetate in order to stabilize soil particles and thus preventing erosion and limiting siltation to surface water |

| | | |
|----|--|---|
| | | <ul style="list-style-type: none"> - if quarry site takes place along a river or stream regularly monitor surface water quality (or at least monitor surface water general condition by means of visual inspection) regularly. (There is no stream nearby) |
| | (b) Ground water | <ul style="list-style-type: none"> - plan and manage to prevent the contamination of soil and eventually groundwater - plan to manage quarry activities so that there will have no severe negative impact on ground water - for storage of fuel drip trays and designated bunded site should be used to protect soil (and hence ground water) from hydrocarbon - the same should be done for used oil and grease - adequately maintain vehicle and machinery to prevent spillages resulting in groundwater contamination - avoid spillage during the handling of fuel oil - should accidental spillages occur implement appropriate clean up immediately; do not wash down spill with water; use absorbents or saw dust for clean up - plan for management of temporary latrines to prevent eventual contamination of groundwater; spread soil or ash into the latrines from time to time; when backfilling all the pits, holes, dents etc. resulting from quarry also backfill the latrines |
| 7. | <p>Potential negative impact on biological component (biodiversity)</p> <p>(a) Flora</p> | <ul style="list-style-type: none"> - plan for the protection and conservation the flora as far as possible. (The quarry site is inside Mei-hor Reserved Forest area. The forest is already partially degraded but the impact can be significant if the work is not well-managed.) - plan for minimum disturbance to the flora when conducting quarry activities; - do not clear vegetation than necessary for the construction of access road and quarry site; restrict the removal of vegetation; avoid as far as possible the cutting of big trees - control and minimize dust and eventual disposition of dust on leaves on plants restricting photosynthesis - prevent the spillages of hydrocarbons which has negative impact on plants especially on the root system - drip trays and designated bunded side should be used to protect vegetation from hydrocarbons - storage of fuel and storage of used fuel should be done in a designated bunded site - restrict the movement of vehicles to the access road; not to impact grass, herbs and small plants - restrict the collection of fire wood; do not cut trees for fuel wood but collect fuel wood from fallen trees, dried logs or branches or use charcoal for cooking - fire for cooking should only be made in dedicated spot cleared from vegetation - avoid open burning of debris - educate workers for fire awareness and protection; prohibit the discard of burning cigarette butts carelessly; get rid of all debris that can cause fire - provide basic fire fighting training for a few workers |

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| | | <ul style="list-style-type: none"> - identify sensitive species and habitats and try to avoid such spots as far as possible - promote environment awareness to workers - try to stop illegal logging; inform the authority if there is any - implement rehabilitation to promote natural vegetation establishment after completion of quarry at a site |
| | (b) Fauna | <ul style="list-style-type: none"> - plan and implement the protection and conservation of wildlife as far as possible. (The protection and conservation of forest is tantamount to protection and conservation of wildlife) - ensure that quarry works have minimal disturbance or wildlife - restrict vehicular movement to the access road to prevent habitat disturbance of birds and animals - prohibit the hunting and/or trapping of wild animals big and small including rodents, birds, reptiles and amphibians by workers - promote environmental awareness for workers - prevent the potential injury or death of wildlife due to vehicular movements especially during night time - prevent the potential injury or death of wildlife due to spillages of hydrocarbons, drill fluids and chemicals - avoid the use of excessive bright light for long hours at night to prevent the aggregation and eventual death of large number of insects (offensive bright light in the forest at night will also scare away wild animals from their natural foraging or breeding ground) - identify sensitive species which need to be avoided; avoid the disturbance of animal habitat such as nest and breeding ground as far as possible |
| 8. | Potential negative impacts on socio-economic component of the environment | <ul style="list-style-type: none"> - plan to avoid or minimize the potential negative impacts on the socio-economic life of the locals as well as the company workers - follow the regulations not to do quarry works in the area of the village, cultivated area and religious compound of the village - if dust is generated either from vehicular movement or quarry works, try to suppress dust as far as possible (water spray); reduce the speed of vehicles when passing near the village - educate the drivers for defensive driving, to maintain zero accident for the safety of the locals and domestic animals - avoid the contamination of the drinking water source of the locals - avoid the siltation of nearby paddy field or farms due to quarry activities - try to build good relation with the locals - conduct public consultation so that the locals will have a positive perception on the project - educate the workers for appropriate behavior when dealing with locals; to respect their culture and tradition - draw up a plan for management of misbehavior and social illness - apply punitive measures such as suspension of the wrong doer - strictly prohibit the drinking of alcohol during working hours; totally ban the use of narcotics among workers - the authority and employees of the company should not personally get involve in land and property speculation activities, if any - consider for Corporate Social Responsibility (CSR) action to be taken |

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| | | when actual mining operation commence |
| 9. | Potential impact on the cultural component of the environment | <ul style="list-style-type: none"> - plan and manage to avoid negative impact on the cultural component, if any - follow the requirements not to do quarry works in area of religious, cultural and archeological heritage sites - if there is any religious, cultural and archeological site within 25 meters from the site it should be clearly marked to prevent any accidental damage - if archeological site or artifact were discovered during exploration work this should be reported to the authority in time |
| 10. | Potential impact on the visual component of the environment | - mitigation not necessary. There is no conspicuous historical or cultural monument in the area. There is also no prominent landscape of scenic spot or of aesthetic beauty of potential tourist attraction |

Table-3: Proposed mitigation measures and EMP during the Operation Phase

| Sr. No | Negative impacts (significant and insignificant) | EMP and mitigation/corrective measures |
|--------|---|---|
| 1. | Negative impacts of blasting and other mining/quarry activities | <ul style="list-style-type: none"> - plan and manage for systematic and safe blasting; select best blasting design - select only spot with limestone; careful observation of quarry/mining faces - if possible fence off the blasting area to prevent children and animals straying into the area - comply with rules and regulation eg. Re: the Explosive Substance Act, 1908 - follow acceptable blasting practices eg. those that resulted in more rock fragmentation and lower vibration (eg. relatively shallow slanting drill holes method) - select appropriate explosives eg. use emulsion type - keep explosives in maximum security depot/magazine - use standard detonation fuses and materials; store detonators and explosives separately; do not use outdated explosives - fly rock happens if there is too much energy in the explosion; minimize blast damage - all drillings and blasting must be strictly supervised by competent demolition experts - provide adequate training for blasting and the safety storage, handling and application of explosives - distribute quarry/mining operation manuals to workers - conduct blasting according to a consistent time table eg. at 09:00 hrs every day or every other day or every Monday and etc - sound the sirens 5 minutes before blasting - inform the nearby local community in advance about the consistent timetable for blasting - provide adequate PPE, ear, muffs, ear protectors, safety goggles to workers; first aid equipment |

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| | | <ul style="list-style-type: none"> - also provide adequate training for other mining/quarry activities such as excavation and extraction, crushing, grinding and screening works, safety transportation and stockpiling of mined out limestone and also top soil and overburden |
| 2. | Negative impact due to overburden and top soil (mine waste) | <ul style="list-style-type: none"> - plan for effective management for systemic stockpiling of mined out limestone, overburdens and top soil; minimize impacts on the environment - do not clear vegetation more than necessary for stockpiles - keep top soil and overburden separately - manage for the stockpiling of overburden and top soil; no spill over, no sliding, no erosion, no blocking of natural drainage system; no entering into stream, cultivated areas and village area - never choose a slope as a dumpsite but level the slope first for stabilization - the stockpiles (of top soil or overburden) must have a minimum slope of not more than 37° for effective stabilization - let the grass or herb grow on the overburden for stabilization biologically (spread a thin layer of top soil on overburden) - if possible construct retaining wall to stop erosion or sliding; furnish the wall with weep holes to drain out water during the wet season - regulate runoff from overburden and top soil dump by construction small check dams; sediment traps or drains - back fill mined out/quarried out pits, holes, with overburden - when limestone is exhausted (when mining is complete) re-vegetate the area; use top soil for planting trees - avoid all collateral damages due to mining and stockpiling of overburden and top soil as far as possible |
| 3. | Negative impacts loss of non-living resources (limestone) | <ul style="list-style-type: none"> - plan for long term sustainable exploitation of limestone - mining engineers must investigate the mining area in detail and draw up a plan for systematic and effective mining at mineralized spots or area (to avoid blasting the spots with no limestone) - if the whole mountain was sheer limestone as supposed to be then systematic mining of portion after portion to be carried out - avoid over extraction (more than necessary); conserve natural resources - check and calculate the extraction rate on a monthly and yearly basis |
| 4. | Potential negative impacts on traffic | <ul style="list-style-type: none"> - draw up a traffic management plans (even though the traffic was light; road users were mostly motorcyclists and pedestrians) - schedule the logistics especially for trucks - set up signage at the intersection of the access road and highway - avoid overloading heavy truck - educate the driver (especially heavy trucks drivers) for driving at reduced speed and adhere to the principle of defensive driving - comply with motor vehicle law, 2015 - if possible, use conveyor line rather than trucks for transportation of crude or pulverized limestone - local community should be able to file complaint regarding traffic |
| 5. | Potential negative impact: dust and | <ul style="list-style-type: none"> - draw up a plan for air quality management for the long term Operation Phase |

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| | smoke | <ul style="list-style-type: none"> - try to meet all statutory requirements (rules, regulations); follow the guideline values prescribed by ECD, MOECAP (2015) - do not clear the vegetation (grass) and leave the land have more than necessary - consolidate and compact all area to prevent generation of dust due to wind - apply dust extractor and filter at drilling or apply wet drilling - do not blast when strong wind is blowing; also stop excavation/extraction for a while when strong wind is blowing - if possible, apply wet processing at crusher, grinder, screening site - spray water adequately to suppress dust - reduce the speed of vehicle to reduce dust generation - restrict vehicular movement; maintain road, clear of mud and dirt - limit open stockpile of earth and sand - minimize drop height during loading and unloading - avoid open burning of debris or solid waste - keep equipment and vehicles well-maintained - use fuel with low emission rate (eg. fuel with low sulphur content) - provide PPE (eg. face masks, mouth and nose covers, gas masks) to workers exposed to long hours of dust and smoke; fit excavator with air conditioned cabin for operators - local community should be able to file complaint regarding noise |
| 6. | Impacts: noise and vibration | <ul style="list-style-type: none"> - plan for the management of noise vibration - avoid blasting and all other mining/quarry activities at night (should be restricted to the hours between sunrise and sunset) - restrict or limit vehicular and heavy machinery movements - plan for appropriate choice of machinery and vehicles (that emit low noise level); method of working, efficient material handling - installation of noise abating devices eg. silencers, mufflers at air inlet and outlet of fan and compressor; place noisier sources far away in overall design - well-operated and well-maintained vehicles and machinery generate lower noise level and prevent undesirable noise level - modified old machinery, vehicles and equipment by incorporating minor design change for reducing noise level - if possible erect barrier or create enclosure to block, redirect or reduce noise level - develop green belt (plant trees) around the mining/quarry site; trees abate noise and serve as noise sink (pollution sink) - create smooth road surface as far as possible to mitigate vibration due to vehicular and heavy machinery movement - create suitable foundation design for machinery and equipment (eg. crusher, grinder, screen etc.) to mitigate vibration - if necessary install vibration absorbers or vibration absorbers or vibration abators - provide adequate PPE eg. ear muffs, ear protectors to workers exposed to long hours of high noise level; fit excavator, bulldozer with air conditioned cabin for operators - conduct regular noise monitoring to ensure that the levels are within noise exposure standard (not higher than 85-90 dBA) |

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| | | <ul style="list-style-type: none"> - the local community should be able to file complaint regarding noise |
| 7. | Potential impact on soil (soil erosion and contamination) | <ul style="list-style-type: none"> - plan for the management of top soil and overburden to prevent erosion and sliding - also draw up a plan for management of conservation of the surface soil - stockpile mined out limestone, top soil and overburden separately - systematic stockpiling should be done for stabilization as already mentioned for overburden and top soil maintenance; stockpile should be also on higher ground outside normal flood area - implement soil conservation techniques at the area (but not at the mining spot) to prevent soil erosion during rainy season - stabilize the exposed ground as far as possible - prevent wash water from carrying earth and materials into the stream or natural drainage system - plan for prevention and mitigation of contamination; prevent oil or chemical spills - oil spilled should be cleaned up immediately; do not wash down with water but use absorbents or saw dust - vehicles and machinery should be maintained to prevent oil leaks resulting to soil contamination - bund fuel or chemical depot to prevent spreading of spill - properly instruct workers with respect to handling of fuel oil and clean up of spills; educate them for good house keeping practice - display warning signs; identify high risk spill area (eg. oil depot, generator etc.) - backfill all pits and holes after the completion of mining/quarrying - rehabilitate the area (plan trees) |
| 8. | Potential negative impact on water (insignificant) (a) Surface water | <ul style="list-style-type: none"> - plan and manage for preventing pollution on the water environment - follow rules and regulations (eg. Conservation of Water Resources and River Law, 2006; Conservation of Environment Law 2012 and Rule 2014) - if there is a stream neary by manage so that mining/quarry activities will not impact the surface water - manage for the stability of top soil and oveburden to prevent erosion and sliding and siltation; not to impact surface water flow dynamic or alter water courses and not to impact on aquatic biodiversity - fuel oil depot should be away from a stream; the depot should be banded to protect surface water from oil spill - when handling fuel oil avoid accidental spillages into surface water; should spillage occur implement appropriate clean up immediately - avoid disposing of waste (liquid and solid) into water bodies - manage water conservation; reduce water consumption; if possible use recycle water for dust suppression and watering plants; harvest rain water - apply a monitoring plan for water quantity and quality based on simple parameter eg. temperature, pH and total alkalinity |
| | (b) Ground water | <ul style="list-style-type: none"> - Plan and manage to prevent the contamination of soil and enventually ground water - plan to manage quarry activities so that there will have no severe negative impact on ground water |

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| | | <ul style="list-style-type: none"> - for storage of fuel drip trays and designated bunded site should be used to protect soil (and hence ground water) from hydrocarbon - the same should be done for used oil and grease - adequately maintain vehicle and machinery to prevent spillages resulting in groundwater contamination - avoid spillage during the handling of fuel oil - should accidental spillages occur implement appropriate clean up immediately; do not wash down spill with water; use absorbents or saw dust for clean up - plan for management of temporary latrines at site to prevent eventual contamination of ground water; spread soil or ash into the laterines from time to time; backfill the latrine and use another new one |
| 9. | Impact of power supply on national demand and vice versa | <ul style="list-style-type: none"> - draw up a plan for the conservation of energy - ensure that the consumption of electricity be in the workframe as stated earlier - use equipment and machinery that are energy efficient - install renewable energy system (solar panels) if possible - use backup generator during power outage for limited period - regularly monitor electricity consumption - have regular consultation with electricity authority |
| 10. | Potential negative impact on biodiversity component of the environment (a) Flora | <ul style="list-style-type: none"> - plan and manage for the protection and conservation of the biological component of the environment - comply with law, rules and regulation (the Protection of WildLife and Protected Area Law, 1994; Conservation of Environment Law 2012 and Regulation 2014) - plan for the protection and conservation the flora as far as possible. (The quarry site is inside Mei-hor Reserved Forest area. The forest is already partially degraded. The impact can be significant if the work is not well-managed.) - plan for minimum disturbance to the flora when conducting mining/quarry activities; - do not clear vegetation than necessary for the construction of access road, quarry and mining site; restrict the removal of vegetation; avoid as far as possible the cutting of big trees - control and minimize dust and eventual disposition of dust on leaves on plants restricting photosynthesis - prevent the spillages of hydrocarbons which has negative impact on plants especially on the root system - drip trays and designated bunded side should be used to protect vegetation from hydrocarbons - storage of fuel and storage of used fuel should be done in a designated bunded site - restrict the movement of vehicles to the access road; not to impact grass, herbs and small plants - restrict the collection of fire wood; do not cut trees for fuel wood but collect fuel wood from fallen trees, dried logs or branches or use charcoal for cooking - fire for cooking should only be made in dedicated spot cleared from vegetation - avoid open burning of debris |

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| | | <ul style="list-style-type: none"> - educate workers for fire awareness and protection; prohibit the discard of burning cigarette butts carelessly; get rid of all debris that can cause fire - provide basic fire fighting training for a few workers - identify sensitive species and habitats and try to avoid such spots as far as possible - promote environment awareness to workers - try to stop illegal logging; inform the authority if there is any - implement rehabilitation to promote natural vegetation establishment after completion of quarry at a site |
| | (b) Fauna | <ul style="list-style-type: none"> - plan and implement the protection and conservation of wildlife as far as possible. (The protection and conservation of forest is tantamount to protection and conservation of wildlife) - ensure that mining/quarry works have minimal disturbance or wildlife - restrict vehicular movement to the access road to prevent habitat disturbance of birds and animals - prohibit the hunting and/or trapping of wild animals big and small including rodents, birds, reptiles and amphibians by workers - promote environmental awareness for workers - prevent the potential injury or death of wildlife due to vehicular movements especially during night time - prevent the potential injury or death of wildlife due to spillages of hydrocarbons, drill fluids and chemicals - avoid the use of excessive bright light for long hours at night to prevent the aggregation and eventual death of large number of insects (offensive bright light in the forest at night will also scare away wild animals from their natural foraging or breeding ground) - identify sensitive species which need to be avoided; avoid the disturbance of animal habitat such as nest and breeding ground as far as possible |
| 11. | Potential negative impacts on socio-economic component of the environment | <ul style="list-style-type: none"> - plan to avoid or minimize the potential negative impacts on the socio-economic life of the locals as well as the company workers - if dust is generated either from vehicular movement or quarry works, try to suppress dust as far as possible (water spray); reduce the speed of vehicles when passing near the village - educate the drivers for defensive driving, to maintain zero accident for the safety of the locals and domestic animals - avoid the contamination of the drinking water source of the locals - avoid the siltation of nearby paddy fields and farms due to quarry activities - try to build good relation with the locals - conduct public consultation so that the locals will have a positive perception on the project - educate the workers for appropriate behavior when dealing with locals; to respect their culture and tradition - the authority and employees of the company should not personally get involve in land and property speculation activities, if any - consider for Corporate Social Responsibility (CSR) action to be taken when actual mining operation commence - draw up a plan for management of misbehavior and social illness |

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| | | <ul style="list-style-type: none"> - educate and train workers for discipline and code of conducts - apply punitive measures such as suspension of the wrong doer - strictly prohibit the drinking of alcohol during working hours; ban the use of narcotics and stimulants - deal with workers on a fair and square basis - avoid unhealthy relationship with workers; they should not be over worked and underpaid |
| 12. | Impact: lack of good safety practices and health education | <ul style="list-style-type: none"> - create safety condition for work places (mining/quarry) site, and associated area eg. crushers; grinders, screeners and stockpile sites) - educate and train workers for good working practice, good engineering practice, good safety practice and good house keeping practice so that these good practices will be ingrained in each and every worker's mind - prevent and avoid accidents and try to achieve zero accident at work places - educate and train them for health education and hygiene - train a few workers in First Aid Training - keep first aid kit well-stocked with medicines and drugs comprising anti-malaria, anticholera, anti-toxicant and anti-poison for harmful insect and snake bites |
| 13. | Impact: lack of emergency and health (hospital) services | <ul style="list-style-type: none"> - draw up a plan for emergency; carefully plan effective emergency contingency response and procedures - train some workers for firefighting while some for first aid programme - provision of firefighting equipments and tools; provision of first aid kits and adequate medicines - organize mock drills for firefighting and first aid programme regularly - provide adequate PPEs - give priority to installation of lightning rods and arresters - apply safe and effective procedures for storage of fuel and chemical - display warning signs - accidents, or near-missed to be duly reported - display addresses/phone numbers of Fire Brigade, Ambulance Service, Hospital, Police Station - take out insurance for the cement plant and also fire insurance - educate workers for safety awareness and also awareness of health and hygiene - provide proper sanitation facility, eg. bath rooms, toilets etc. |
| 14. | Potential impact on the cultural component of the environment | <ul style="list-style-type: none"> - mitigation not necessary since there are none to be impacted. Shwe Hpone Pwint Pagoda is quite far away and cannot be impacted. However; plan and manage to avoid negative impact on the pagoda and any other component, if any. - if there is any religious, cultural and archeological site within 25 meter from the site it should be clearly marked to prevent any accidental damage - if archeological site or buried artifact were discovered during quarry works this should be reported to the authority in time |
| 15. | Potential impact on the visual component of the environment | <ul style="list-style-type: none"> - plan and execute mining/quarry which is focused on visual appeal (random mining will leave ugly dents, pits and holes here and there on the slope) - carefully select site and conduct systematic blasting and mining are |

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| | | <p>portion or one block at a time rather than random blastings and minings</p> <ul style="list-style-type: none"> - do not clear vegetation more than necessary before mining (eg. during preparation for mining site) - backfill the voids, pits and dents after completion of a work site - revegetate the site (plant trees) - continue the creation of green belt in available space as far as possible - as regards painting buildings and structures (eg. office, ware house, workshop, depot etc.) use aesthetically pleasing paints and colours - apply appropriate lighting only for security reason; avoid an excessive use of light at night especially offensive light - use yellow light instead of white light not to attract insects; if so many insects aggregate turn off the light for a while |
| 16. | Impact: public conception | <ul style="list-style-type: none"> - plan and manage for building good relation with the local community; - appoint a public relation officer (liaison officer) to deal with the locals - maintain the ongoing good relation with the villagers - implement CSR activities and other social assistant programme - prioritize the hiring of locals over hiring personnel from beyond; promote employment of women - uphold the culture and tradition of the area - educate on appropriate behaviours in the neighbourhood pertaining to local culture and etiquettes - implement an appropriate complaint and grievance (if any) procedures with feedback mechanism; keep a log book for all complaints or grievances - heed to the views and opinions of the villagers - communicate the availability of job opportunities to the locals from time to time if there is any vacancy in job |

Table-4: Proposed mitigation measures and EMP during the Mine closure/ Rehabilitation Phase

| Sr. No | Negative impacts (significant and insignificant) | EMP and mitigation/corrective measures |
|--------|---|--|
| 1. | Potential negative impact on aesthetics of the landscape and potential residual impacts | <ul style="list-style-type: none"> - plan for a proper decommissioning procedure - hire decommissioning contractor - put up for sale some of the reusable equipment, materials etc - ask the contractor to remove all debris and waste including contaminated soil, if any, and to be disposed off at approved landfill - plan and implement rehabilitation task - continues the rehabilitation and monitoring works for at least one year until a luxuriant green zone is created |

6.2 Summary of overall EMP

EMP should also cover the following main aspects of environmental management for doing environmentally sound business.

- EMP for application of environmentally sound idea and methodology

- EMP for procurement of ecologically friendly equipment and machinery that generate less smoke, less noise level and vibration; equipment that are fuel efficient and energy efficient
- EMP for air pollution management
- EMP for water pollution management
- EMP for land pollution management
- EMP for good working practices and good safety practices
- EMP for conservation of water, fuel and energy
- EMP for rehabilitation after completion of project and
- EMP for maintenance of high environmental performance standard

Finally it should be borne in mind that EMP will serve no purpose if it is not implemented with true spirits. Only working with true spirits can achieve effective and meaningful EMP implementation.

7. MONITORING PROGRAMME

Environmental monitoring plan is of paramount importance for the effective execution and successful implementation of EMP.

Environmental monitoring focuses on the work environment which includes, pollution control, waste management, health and safety of workers, safety of the facilities; and also on the biological, socio-economic, cultural and visual components of the environment. Monitoring works should also specially focus on all activities that have been identified to have potentially significant impacts on the environment. There should be also specific occupational health and safety monitoring programme. The objectives of monitoring are:-

- to measure impacts that occur during the four phases of the project
- to ensure compliance with statutory requirements
- to determine the effectiveness of mitigation measures and other measures, and
- to assist in the implementation of EMP

First a small EMP cell consisting of 2-5 members has to be formed; the manager should be the EMP authority. If possible these cell members should be deployed full time for doing monitoring and inspection works.

Monitoring has to be carried on a regular basis; the findings or observation have to be systematically catalogued and documented and effective feedback (report back) must be duly done. The authority has to take action in a timely manner.

Monitoring frequency should be sufficient to provide representative data for the parameters being monitored. Monitoring should be conducted by members of EMP cell or trained personnel using properly calibrated and maintained equipment.

The two potential impacts during the Pre-construction Phase are socio-economic in nature and so monitoring work is not necessary.

However daily monitoring might be necessary during the Construction Phase of 2 years duration. Regular or occasional monitoring will be required during the long operation periods (30 years). It might be necessary to monitor Decommissioning Phase which will take 1-2 months, and Rehabilitation Phase, 1 year.

7.1 Summary of monitoring programme

Table-5: Summary of monitoring programme in tabulated form for Construction Phase

| Sr. No | Components | Parameters to be monitored | Frequency |
|--------|--|---|--|
| 1. | Weather | - monitor weather - listen to weather news (meteorology news), forecasts | - Daily - Daily |
| 2. | Mobilization and preparation works | - monitor the haulage of trucks - monitor stockpiling, storage of building materials | - Daily - Weekly |
| 3. | Traffic | - monitor schedule of vehicle movements | - Weekly |
| 4. | Air environment | - monitor SO ₂ , NO ₂ , PM and others, if possible | - Once |
| 5. | Noise and vibration | - monitor noise level in dBA | - Once |
| 6. | Contamination of soil and ground water | - monitor spillage of fuel oil, grease, hydraulic oils etc | - Weekly |
| 7. | Erosion and siltation | - monitor earth work and drainage system | - Weekly (during rainy season) |
| 8. | Water environment | - monitor pH, oil & grease, TDS, TSS, BOD, COD, sulphate, nitrate, chloride | - Once |
| 9. | Waste (solid), construction tailings, debris | - monitor type, amount generated, reused, recycled, transported off site and disposal | - Weekly |
| 10. | Biodiversity component | - monitor clearing of forest - monitor the nursery of saplings for planting during Operation Phase | - Monthly - Monthly |
| 11. | Social illness; disciplinary action | - monitor the conducts of workers - monitor the effectiveness of disciplinary action | - Weekly or monthly - From time to time |
| 12. | Emergency, health | - monitor facilities for emergency | - Quarterly |

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| | and safety | preparedness - monitor emergency and response programme - monitor training (firefighting and first aid) and drills and their effectiveness | - From time to time - Regularly |
| 13. | Potential security | - monitor performance of security staffs | - From time to time |
| 14. | Construction work | - monitor overall construction work for health and safety | - Daily |
| 15. | Material procurement and consumption | - monitor procurement of building materials, and consumption | - Weekly or monthly |
| 16. | Fuel oil consumption | - monitor oil purchased, used, used oil generated, oil waste | - Weekly or monthly |
| 17. | Routine operation of equipment | - monitor operation hours of equipment - distance traveled of vehicles - log books | - Weekly - Weekly - Weekly |

Table-6: Summary of monitoring programme in tabulated form for Operation Phase

| Sr. No | Components | Parameters to be monitored | Frequency |
|--------|--|---|---|
| 1. | Weather | - monitor weather - listen to weather news, forecasts | - Daily - Daily |
| 2. | Blasting activity | - monitor preparation for blasting - monitor blasting and aftermath | - Every blast - Every blast |
| 3. | Excavation/extraction work (extraction of crude limestone) | - monitor manual excavation - monitor excavator performance - monitor limestone quantity extracted - monitor stockpiling | - Daily - Daily - Daily - Daily |
| 4. | Limestone processing; crushing, grinding, screening, transport, stockpiles | - monitor crusher, grinder, screen performance - stockpile of pulverized limestone (quantity) - truck or conveyor | - From time to time - From time to time - From time to time |
| 5. | Air quality | - monitor SO ₂ , NO ₂ , PM and other, if possible | - Annually |
| 6. | Air emission | - monitor SO ₂ , NO ₂ , PM, GHG if possible - wearing of PPE (if necessary) | - Annually - Regularly |
| 7. | Noise and vibration | - monitor noise level in dBA - wearing of PPE at mine site | - Quarterly - From time to time |
| 8. | Overburdens | - monitor locations, size and stability condition | - Monthly (rainy season) |
| 9. | Erosion and siltation | - monitor overburden, natural drainage system | - Weekly (rainy season) |
| 10. | Extraction of coal | - monitor and calculate amount of extraction | - Monthly |
| 11. | Water | - monitor water consumption - monitor flow rate and water level at stream | - Weekly - Monthly |
| 12. | Solid waste | - monitor industrial, domestic, office wastes, debris; amount generated, recycled, or reused; check work place | - Monthly |
| 13. | Waste water (sewage) | - monitor amount generated, treatment (septic tank, common treatment tank) | - Monthly |
| 14. | Traffic | - monitor schedule of vehicle movement, log book for each vehicle | - Weekly |
| 15. | Water quality | - test pH, oil & grease, TSS, TDS, BOD, | - Annual |

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| | | COD chloride etc | |
| 16. | Materials procurement | - monitor all materials purchased, consumed and unaccounted for | - Monthly |
| 17. | Fuel oil consumption | - monitor oil purchased, used, used oil generated, oil waste | - Monthly |
| 18. | Routine operation of equipment | - monitor operation hours of equipment and machines - monitor distance travelled of vehicles - monitor log books | - Weekly - Weekly - Weekly |
| 19. | Biodiversity | - inspect selection of new quarry site - monitor clearing of vegetation - monitor reforestation effort | - Before starting a new site - Ditto - Monthly |
| 20. | Social illness | - check disciplinary action taken - monitor conducts of worker | - From time to time - Regularly |
| 21. | Emergency | - inspect facilities for emergency preparedness - monitor training (firefighting and first aid) and drill for emergency - monitor overall occupational health and safety including occupational accident and diseases | - Quarterly - Regularly - From time to time |
| 22. | Security | - monitor performance of security staffs | - Weekly |
| 23. | Capacity building | - monitor effectiveness of capacity building programme and other training including first aid | - From time to time |
| 24. | Environmental performance standard | - monitor the overall programme for high environmental performance standard - monitor the overall effectiveness of pollution management | - Monthly - Monthly |
| 25. | Compliance with regulation, a legal requirement | - monitor all main activities to ensure compliance with legal requirement and corporate commitment | - Monthly |
| 26. | Effectiveness of mitigation measures | - monitor mitigation measures taken and check their effectiveness | - From time to time |
| 27. | Rehabilitation for each site (after completion of mining at a site) | - monitor tree planting and rehabilitation for each site after completion of mining for that site | - After completion for a site |

Table-7: Summary of monitoring programme in tabulated form for Decommissioning/ Mine Closure and Rehabilitation Phase

| Sr. No | Components | Parameters to be monitored | Frequency |
|--------|---|--|-------------------|
| 1. | Decommissioning/mine closure (at office compound and mine site) | - monitor the Decommissioning/mine closure works (dismantling, torn down, removal, refilling pits and leveling ground) | - Daily or weekly |
| 2. | Rehabilitation (at office compound and mine site) | - monitor rehabilitation works (plant nursery, planting, growing, tending) | - Monthly |

EMP covers so many aspects of a project and so MP too has to cover most, if not all EMP. In the **Table-5, 6 and 7** shown above MP covered virtually all aspects of EMP as far as the environmental was concerned.

In addition to Monitoring Plan there should be Auditing Plan in the form of Internal Environmental Audit and External Environmental Audit.

The audits will assess the Environmental Performance of the operation in complying with environmental laws, rules and regulations.

The purposes are to ensure that all activities are:

- in compliance with the EMP
- upholding best practices environmental management performance in day to day operation

8. REPORTING REQUIREMENT

Reporting is necessary for the effective and successful implementation of EMP.

8.1 Internal monitoring and inspection reporting

The physical and social parameters to be monitored are already mentioned earlier. Each and every monitoring/inspection work carried out by members of EMP cell must be catalogued in relevant log books. The internal monitoring and inspection will also have to involve in checking the performance of machinery, equipment and vehicles or at least the regular monitoring/checking of the log books of machinery, equipment and vehicle. All these findings or observations have to be reported.

Members of the EMP and MP cell will also have to check the log book or registered book weekly or monthly. Member of MP cell do not need to report on their work on daily basis. However there should be a monthly reporting session for effective communication with the EMP leader or authority.

8.2 Incident, accident and emergency reporting

In cases of incident and accident (including near miss) prompt reporting has to be carried out. This must be in the form of verbal reporting followed by written statement, after emergency and contingency procedures have been undertaken.

The written statement should be more comprehensive and should include the location and cause of accident, the time, extent and intensity and how actions for emergency and contingency procedures were taken. Estimate of loss will have to be followed later. A good reporting will help the EMP leader and authority to take future action, to learn lesson from the incident or accident and enable them to draw future plan for health, safety risks and emergency management.

Reporting on incidents of misbehaviour such as quarrels, and brawls etc may not be necessary. It is actually the duty of the security staff to take action.

8.3 Measuring performance indicators and interpreting and acting on the indicators

Based on the finding or observation from the monitoring or inspection on the performance of EMP and MP cell members a report on the performance including the assessment of the performance and its effectiveness or success has to be submitted to the authority. This will have to be undertaken on a regular basis and the performance has to be documented and registered.

It is very important to report regularly on evaluation of mitigation/corrective measures taken. Evaluation should be made during regular monitoring/inspection works.

There must be a mechanism for auditing the EMP and its implementation processes. This will involve reviewing all the log books, registered books, documents and reports. This will help in reviewing and verifying the EMP implementation and also assist in assessing the effectiveness or success of the EMP.

As mentioned earlier there must be a separate log book for registering complaints and grievances, if any. Prompt reporting on complaints and grievance is necessary and the authority has to take necessary measures in a timely manner.

8.4 Reporting on training programmes

As mentioned earlier there must be regular monitoring and inspection of all training programmes provided, namely, capacity building training, training provided for safety such as firefighting training and training provided for health such as First Aid Training; also training for quick response and preparedness such as drills and mock drills.

It is not necessary to monitor every session of a training programme and its process. But it is necessary to monitor, inspect and watch every drill, mock drill or rehearsal.

EMP cell members conducting monitoring and inspection works must be able to interpret and assess the overall condition of the training processes especially assessment of the effectiveness and applicability of each training.

A report on the training including assessment on its effectiveness must be submitted at the end of each and every training programme.

Finally Annual review should be prepared and an Annual Environmental Management Report should be submitted.

This annual report/review will summarize the key activities and environmental performance for the preceeding 12 months. It will also include comprehensive review of monitoring results and complaints records, if any.

9. EMERGENCY PLAN

The chance for major accident to occur in a well-managed quarry and the mining site was very remote.

Violent storm and earthquake could be ruled out for his area; there was no precedent of such disasters within memory and the area was not on a fault line. Up to 2014 flood was ruled out; but what had happened in July and August of last year (2015) indicated how major floods could be unpredictable in this era of climate change or rather climate disruption. There were major floods in 11 out of 14 states and regions of the country resulting in catastrophe.

Accident like fire break out, especially bush/forest fire could not be totally ruled out given the nature of the work. In this EMP report emergency plan would mainly focus on emergency and contingency plan for outbreak of fire.

9.1 Emergency procedures (generalized)

- first draw up a plan for prevention/mitigation measures for fire accident
- carefully plan for emergency response and procedures
- provide firefighting training for some workers
- provide adequate firefighting facility, water ponds, hydrants, water jet pumps, and fire extinguishers; provide adequate PPEs such as firefighting suits, if possible. (The company has two fire engines, firefighting vehicles.)
- regularly check the firefighting facility, its readiness; ponds to be always filled with water
- organize mock drills regularly and assess the effectiveness of drills and training; assess the readiness, quick response and quick evacuation processes
- provide First Aid Training to some workers
- provide adequate first aid facility-such as stretchers, equipment, first aid kits including medicines; regularly check the condition of first aid facility
- display addresses and phone numbers of Fire Fighting Brigade, Ambulance Service, Hospital's emergency department, police station etc so that everyone can see easily
- set up effective alarm system and control system
- take out insurance for the company; also insurance for fire and for disaster
- effectively install lightning arrestors, lightning strips and rods, down lead and grounding electrodes
- deploy tight security all the time (arson and sabotage could not be totally ruled out due to anti-big business, anti-tycoon and anti-crony mindset of certain people)

9.2 Emergency response and contingency procedures (in brief)

The objectives of Emergency response are:

- to minimize confusion through effective delegation of responsibilities
- to minimize danger or safety risks by providing first aids
- to minimize damage to property and the environment by isolating the incident
- to minimize operation and preserve business asset as far as practical

a) For fire accident (generalized)

- sound the fire alarm (electronically or manually)
- switch off main switch
- implement rapid and effective firefighting process
- rapid evacuation process for workers, important materials, belongings
- first aid treatment, if any injury, and subsequent admission to hospital for serious cases
- implement effective relief programme
- implement follow up rehabilitation programme

b) For storm and flood (generalized)

- emergency and contingency procedures mainly include; evacuation of workers and important materials
- taking shelter at appropriate place, to higher ground for flood; to reliable shelter for storm
- first aid treatment if necessary
- provision of temporary shelter, water and food
- rescue operation during disaster and aftermath
- implement rapid relief programme
- implement followup rehabilitation programme

c) For devastating earthquake (generalized)

- take immediate shelter such as undertable, under bed or inside cupboard etc
- rapid evacuation of workers property to safe location

- provide temporary shelter, water and food
- first aid treatment if necessary
- immediate rescue work only in the aftermath
- implement rapid relief programme
- implement follow up rehabilitation programme

d) For accident at work place or sudden illness

- for accident immediate first aid treatment and quick admission to the hospital
- for sudden illness like cholera, diarrhea immediate treatment and admission to hospital necessary
- snake bites or injury caused by poisonous insects, animals---also need immediate treatment and admission to the hospital

10. CAPACITY BUILDING AND TRAINING

EMP and environmental monitoring is a new subject even in developed western countries. EMP cell leader and EMP cell members should try to be aware of the latest information regarding environment and environmental activities carried out in developed countries.

EMP cell leader or EMP officer should be able to recommend measures to improve environmental condition. He/she should be able to implement control and protective measures for effective implementation of EMP. He/she should be also able to ensure suitability, adequacy and effectiveness of the MP implemented.

Training is essential for effective and efficient implementation of EMP and MP. However it is not yet practical to plan for capacity building of the EMP cell members up to standard of developed countries. Training needs should be identified based on the existing and available capacity of the company and project personnel.

The approach should be a pragmatic one based on the availability of qualified personnel and materials and equipment.

The two pragmatic training programmes, Fire Fighting and First Aid Training are already addressed. One capacity building and training of importance for EMP cell members will be practical training for conducting monitoring and inspection and for assessment of the finding or observation. The parameters to be monitored and inspected are already mentioned earlier.

The training programme for monitoring and inspection work involves the selection or location of the spot/place and the parameter to be monitored. As already mentioned earlier the parameters include physical ones---air, noise level, water, waste as well as social aspects

already mentioned, and inspecting the performance of workers and workers compliance with environmental requirements.

The capacity building and training programme should also cover other basic aspects such as:

- conduct environmental awareness to the staffs/workers
- conduct safety programme to create safety awareness among staffs/workers
- train staffs/workers on general safety measures and, if necessary, conduct safety rehearsal or safety drill to educate them

The training programme will instruct EMP and MP cell members how to keep log books or registered books and how to carry out observations and findings. They will be provided with abbreviated specific forms (short to the point) for filling; and also abbreviated forms for reporting incidents and accidents, or grievances.

As regards the actual monitoring and inspection this will be carried out in the form of visual inspection only. It is not practical at the moment yet for the members of EMP and MP cell to monitor (test) the physical parameters that involves the use of equipment and chemicals for this purpose, for instance, air test kit, water test kit, noise level detecting kit etc. These portable kits are sometimes not reliable and intended for high school students in developed countries during their excursion trip, mainly just for training purpose not for accuracy.

For the sake of accuracy to a certain extent relatively sophisticated equipments as well as relatively complex chemical analysis are required. Therefore specially trained technicians or experts, for instance, from the Health Department or from YCDC have to be hired for air quality analysis and water samples have to be sent to registered laboratory in Yangon for analysis.

Max Myanmar Manufacturing Co., Ltd has at the moment a quality control laboratory (for cement quality). The company can procure the equipment and chemicals necessary for monitoring and testing the environmental parameters. The company can train its EMP cell members in the operation of these requirements and the application of chemicals for EMP implementation, especially for testing and analysis of air and water quality. This should be considered in advance because in the near future EMP implementation will become mandatory or compulsory.

11. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Public consultation is an integral part of EIA, IEE and EMP. Involving the public participation in the EIA, IEE and EMP work are fundamental to increasing the understanding and acceptance of the project.

Public consultation and participation should be started as early as possible in the preparation of EIA and IEE. And it has to be a continuous process, especially during the Operation Phase, carry out from time to time.

11.1 Purposes of the consultation during the preparation of the EMP report

- to enlighten the locals/stakeholders about the project
- to increase the understanding and acceptance of the project
- to give the locals/stakeholders the opportunity to present their views, opinions, perception of the project, express their concerns, complaints, grievances etc
- to identify impacts and issues that are not immediately obvious to project proponent and the EMP team
- to access social assistant and community development needs for the locals/stakeholders
- to gain community consent and to interact with the people to further strengthen existing cordial relationship
- to tap local knowledge and to negotiate for mutually beneficial future that is sustainable and locally relevant

Requirements for public consultations:

- public consultation should be conducted in the early phase of project
- must ensure the direct involvement of the locals/stakeholders
- must ensure that all locals/stakeholders who are interested will have the chance to fully participate and express their views, especially the vulnerable and marginalized groups,
- it should be a continuous process --- throughout the entire phase of the project, especially during the long Operation Phase, and
- there must be an action plan or response programme such as complaints and grievances mechanism (CGM) to tackle any issue.

11.2 Methodology and approach

Standard methodology applied here includes:

- (i) **Consensus building:** First of all a pre-sensitizing visits to the local authority (village Administrator and party, elders) and briefing on the proposed project was carried out, and ask for their approval and assistant for holding the public consultation.
- (ii) **Transect walk:** site visit (visit to the village) and conduct visual inspection, and overall observational survey of community profile and village socio-economic situation.

(iii)**Actual public consultation meeting:** mainly involves disclosure of the proposed project and giving complete and accurate information; consultation mainly in the form of two-way conversation --- listening and talking; waiting for their response; further discussion.

(iv)**Interviews and discussions:**

- in the form of KII/SS, (Key Informant Interview/Secondary Source) for the gathering of secondary baseline socio-economical data and community profile with the aid of quasi questionnaires
- in the form of FGD (Focal Group Discussion); structured interview with few selected people (authority, knowledgeable persons, separate gender etc) especially for ranking the pressing need of the locals and for prioritizing the needs for community assistance and implementation of CSR.

11.3 Summary of consultation activities

Date : 11 September 2016

Time : 10:30 hrs

Venue : Nursery school, Aung Nan Cho Village

Attendance : 51 persons

This public consultation meeting was held for both projects, namely, EMP for mining/quarry of limestone at Pha-yar-kone Hillock Block and EMP for mining/quarrying of limestone at Taung Philar Mountain Block. Aung Nan Cho village is situated between these two proposed sites, one in the S.E and another in the S.W.

Each member of all households (130 households) was invited and the attendance rate was about 40%. There was no community group (local based civil organization) in the area.



Figure-14: Signboard of the village

Topic

The official disclosure the proposed limestone/alabaster project and explained in relative detail, providing clear, accurate and relevant information. The locals were explained on the environment assessment work to be conducted for EMP for those two proposed sites (blocks). The potential impacts on the physical, biological, social, cultural and visual components of the environment to be identified and mitigation measures to be taken together with the EMP and MP to be implemented were explained. Community assistance and development and the CSR actions already taken and to be taken in the future by the company were also discussed later.



Figure-15: Public consultation meeting



Figure-16: KII interview



Figure-17: Focal Group Discussion (FGD)

11.4 Consultation meeting (public hearing)

a) Previous consultation meeting

Several meetings have already taken places between the company officials and the villages since the cement factory was established in 2008. (Actually meetings have been conducted even in the Preconstruction Phase, that is, prior to 2008.)

Those previous meetings had encompassed a variety of agendas: such as employment of the locals at the factory, and implementation of generous and effective CSR programme and so on the previous public consultation meetings have resulted in the provision of permanent and temporary jobs to the locals; the upgrade of infrastructure (a 10 miles hard top road, 2 schools, one new clinic, one new library, two new monasteries and one new pagoda); and the electrification of the village, schools and monastery; and finally the community assistance in the form of charities and donations.

b) The consultation meeting during EMP study and minutes of the meeting

This was held on 11-9-2016.

Minutes of the meeting

First a member of the village administrator, U Kyaw Yar, very briefly explained to the participants, locals, stakeholders, why this public meeting was held.

The officer of the company U Win Aye explained to the locals/stakeholders about the proposed project, as far as possible, in relative details and gave clear, accurate and relevant information on the proposed project.

The officer went on explaining how a lease of 10 years was granted; how the company has to pay 3% mineral tax and a dead rent of Ks 2000/sq.km/year to the Department of Mines; how the company had to pay a tax rate of Ks 5000/acre/year to the Forest Department since the site is within the Mei-hor Reserved Forest.

Lastly there would be income tax to be duly paid. All these will contribute to the national revenue. He also mentioned the CSR activities so far undertaken by the company for the good of the people and area.

Then the EMP team leader U Myint Kyaw Thura explained to them about the EMP study to be conducted in the coming days and that all the findings, both potential negative and positive impacts, together with mitigation/corrective/remedial measures to be duly taken would be reported. And that the EMP report would also contain MP for sustainable operation of the quarry.

He also told them that this MESC consultant firm which is going to conduct EMP is a third party and is strictly neutral, having goodwill towards both the company (project proponent) and the stakeholders/locals. And that the EMP members are pragmatic rather than emotional people when it comes to environmental issues and with genuine national development always in mind.

The locals/stakeholders were then invited and encouraged to give comments; to express their views, opinions, concerns and perception; and also to lodge or present their complaints and grievances, if any.

At the same time sheet of papers were distributed to the locals/stakeholders to express their views, opinions, concerns and perceptions; and also to lodge or present their complaints and grievances in written statement if they feel reluctant to speak frankly in front of others; and that they could return the paper today or tomorrow at their convenience, but before the EMP team leave the study area for Yangon.

The participants were again invited and encouraged to lodge or present complaints or grievance, if any.

One local, U Aung Shein, said that the company has established the village library, and for this, he is grateful; he wants the company to improve that portion the road (built by the company) near the village and to expand the village electrification scheme to each and every household (not only to all the lamp post for street lighting only).

U Zaw Min Oo, said that what we really want is for the effective village electrification; and that in the future more villagers should be prioritized for employment at the cement factory or mining site.

On local U Saw Tin Myat wanted to know for sure whether the health condition of the locals will be effected or not due to project including both the factory and the mining site.

U Mya Soe Oo wanted to know if there are risks due to the present of overburden.

U Zaw Lin said that there are only a couple of brick houses in the village but in one or two houses small cracks appeared due to the effect of blasting. And he was not sure which companies was most responsible sine there are three companies, namely, Max Myanmar, YCDC, and Asia World and also a few smaller ones operating limestone mining, all of them

not very far from the village. They should all reduce the intensity of the explosion when blasting.

U Ba Mya wanted the company to sell the cement in retail for the sake of convenience for the villagers.

U Ohn Pe said he wanted Asia World Company to fix the exact and consistent time table for blasting (as what Max Myanmar has done) and want all companies to reduce the scale of blasting.

U Saw Peter Win expressed his view that Max Myanmar Cement and the village have acquired a mutual reliance or a symbiotic relationship. The village has witnessed development in many aspects due to this cement plant. He wanted the officials of the factory to pay more visits to the village to see what they can do for the betterment of the village.

U Nay Win Aung wanted to know why the consultant firm, MESC, is doing survey work only to Max Myanmar. There are other big companies like the cement plant of YCDC, Asia World and other smaller ones doing limestone quarry. EMP should also cover those companies' activities. He realized that those companies have come into existence due to national cement demand. And the village has developed to a great extent due to the existence of these companies. At the moment what they need is effective village electrification.

Now he knows that Max Myanmar Cement will upgrade its production capacity from 500 ton/day to 2100 ton/day. He would like to ask the company for mitigation of smoke as far as possible because smoke of small magnitude sometimes reaches the village area.

If the company does not take full responsibility for effective village electrification the villagers will try to procure a transformer for a sub-station and the company continues the existing provision of electricity.

U Antony said that he wanted to expand his farm but the factory officials prevented him for doing so because the plot is within the 500 acres reforestation scheme implemented by the company.

U Soe Naung wanted to know how the village monitoring group (monitoring committee) shall be formed and their duty.

Lastly, three locals said that the local community is not against the existing project and the proposed project (limestone quarry). The main thing they want is effective village electrification.

The villagers then proposed the setting up of a village monitoring committee comprising the following villagers:-

- 1) U Kyaw Yar - member of village administrator
- 2) U Saw Nay May Kaw Htoo

- 3) U Saw Kyaw Swar Htun
- 4) U Zaw Min Oo
- 5) U Saw Tin Myint
- 6) U Thant Zin Aung
- 7) U Zaw Linn
- 8) U Nay Win Aung
- 9) U Wilson Thein Htay
- 10) U Roland Htun

(Five villagers who were late comers have not signed in the attendance sheets.)

When asked about their public relation with the company they said that the relationship is quite good. And that the company should find a way for the mutual benefit -- a win -- win situation, for the company and the village and that assistance should continue.

Before the public consultation meeting was over the EMP team leader said that this would not be the first and only meeting but that the consultation programme was a continuous process. He then informed the stakeholders/locals that a Complaints and Grievance Mechanism (CGM) would be set up for the whole project period and that if there were any grievance to lodge now and in the future any one could do this in written statement directly to the authority of the company. The authority would duly take prompt action. And that this CGM and feedback procedures would be prescribed in the EMP report to be submitted later.

The public consultation meeting was over at 12:00 hrs.

A Key Informant Interview/Secondary Source (KII/SS) gathering was conducted one day earlier on 10th September 2016. Only few people, one member of Ward Administration, a clerk, a few knowledgeable elders and interested people were involved. It was simply gathering secondary baseline socio-economic data and assessing community profile.

The interview was a structured one in the form of questionnaires.

After the public consultation, another small meeting, Focal Group Discussion (FGD) was held. Only selected few were involved, one member of the ward authority and knowledgeable persons. Discussion involved ranking the pressing needs of the locals and prioritizing the needs mentioned earlier during the consultation meeting.

11.5 Summary of main comments received from the stakeholders/locals

There was no complaint or grievance concerning land grabbing, which was expected before the meeting. There was also no evidence of land grabbing, forced eviction and forced relocation.

The followings were comments expressed by the local during the public consultation meeting:

- Needs**
- The need to improve or renovate the portion of road the (built by the company) near the village.
 - The need for effective (entire) village electrification (not only for street lighting but also for electricity for every household). They will procure a transformer if necessary.
 - The need to prioritize the employment of locals.
 - Want the company, to do retail sale of cement for villager's convenience.
 - The need for other companies, namely, Asia World, YCDC Cement and other smaller ones to conduct EMP.
 - The need for Asia World Company to fix exact timetable for blasting.
 - The need for the company to do more mitigation for smoke impact, even though insignificant, when the upgraded plant is in operation.
 - The need to set up a Monitoring Committee.
 - The need for all companies to reduce the scale of explosion during blasting.
- Concerns**
- Concern for the health condition of the villagers.
 - Concern for the risk due to the existence of overburden and top soil stockpiles.
- Complaints**
- Vibrations from blasting has resulted in small cracks in two houses (luckily the large majority of houses are wooden or bamboo houses).
 - One local wants to expand his small farm but was prevented from doing so by the factory officials.

11.6 How comments were taken into account

All the comments (complaint, concern, need, opinion) were noted and documented and later kept in the file of consultant firm (MESC) office and were also included in the EMP report.

The comments were reported back to the cement plant authority for taking necessary action.

The responsible persons of the company and EMP team members on their parts have also promptly tried to answer all the comments on the spot as far as possible.

1) Needs

- To renovate the portion of road (built by Max Myanmar Company) near the village.

The officer of the company replied that he will report this to the company's authority promptly.

- The need for effective (entire) village electrification.

The EMP team leader said that this is not the first time the locals are asking for village electrification. He had decomunted this during his first survey. So the company should take this into serious consideration.

The company's officer replied that he will report this to the company's authority. The EMP team leader said that since streeting lighting at all the lamp posts has already achieved it will be quite easy for each household to access the electricity. The village elders can set up a fund and implement this. The idea of procuring a separate transformer for the sub-station is also a very good idea.

- The need to prioritize the employing of the locals.

The company's officer replied that the company is exactly doing this, and that when these two new mining/quarry sites materialize more locals can be employed.

- Want the company to do retail sale of cement.

The company's officer replied that this seems quite simple but actually not so simple since the company factory is totally involved only in wholesale marketing of the cement. He would however report this matter to the factory; authority.

- Want the company to continue the good CSR work.

The company's officer told the local to be rest assured for this. They could easily compare the CSR activities of Max Myanmar Cement with those of other companies operating in this area. They could see the great difference. The authority of the company has philanthropic mindsets.

- The need for other companies, namely Asia World, YCDC Cement, and others also to conduct EMP.

Both the company's officer and EMP team leader said that they where not in a position to suggest this to those companies. It is their responsibility. If possible the local community should ask for this.

- For this the need for Asia World Company to fix exact time table for blasting.

Again both the company officer and EMP leader replied that they were not in a position to suggest this to Asia World Company. Instead the villagers should ask or demand for this.

- The need for Max Myanmar Company to do more mitigation for smoke when the plant is upgraded and in operation.

The company officer and EMP team said they would report this back to the company's authority and try their best for this. The villagers could see that new technology would result in emission of less smoke.

As for the new proposed mining/quarry site dust would be generated. A more detail mitigation measures would be prescribed in this EMP report. Smoke and dust of course could be mitigated.

- The need to set up a monitoring committee.

A committee comprising 10 villagers was organized during the meeting. The EMP team leader said that officials from the cement factory should be also included in the final set up.

This committee has the responsibility to monitor all companies that is, all cement companies, mining/quarry companies operating in this area for the sake of maintaining healthy environment for the whole area.

- The need for all companies to reduce the scales of explosion during blasting.

The company's officer replied that he would report this matter back to the factory's authority promptly.

The EMP team leader said that there was exact mitigation measures prescribe for blasting. In the real world it is not possible to minimize the very high noise level but only mitigate it to a great extent. The mitigation measures to be prescribed in this EMP report would be based on the best available technology.

2) Concerns

- Concern for the health condition of the villagers.

The EMP team leader said that since this was a generalized concern it was quite difficult to answer. Limestone mountains were/are ideal landscapes for the production of cement and minings were taking places the world over. Since limestone is the essential raw building materials essential for the development of the infrastructure of every nation limestone is mined or quarried throughout the world. Actually this is the way infrastructures of countries are developed and there is no other way round. In virtually every country there are thousand and thousand of people living near or around limestone mines/quarries. For these people mining or quarrying of limestone and associated activities have become a way of life. There were/are no well-known specific or severe cases of health problem for the people living in those areas. Serious issue or problem, if any, is usually due to the instigation of activists and radical environmentalist who usually are against all developmental projects or against all big businesses.

In some developed and prosperous countries with perfect infrastructure system limestone or granite mountain are already gone due to severe exploitations of there resources taking places for centuries. These mountains may be a resource "curse" for the local community living near or around mines or quarries but actually a "blessing" for the country in the form of essential infrastructure development of the nations. Sometimes it is necessary to sacrifice a mountain or a micro-ecosystem for the sake of development of a nation.

- Concern for the risk due to the existence of stockpiles over of burdens and topsoil.

The EMP team leader said that there are surely the potential negative impacts in the form of erosion, sliding, blocking of natural drainage system, blocking of water courses (rivulet, streams) and effecting aquatic ecosystem, siltation of water courses and siltation of cultivated land and so on.

But if all the mitigation measures to be taken as prescribed in the EMP report are strictly follow the risk will surely be minimized.

3) Complaints

- Small cracks appeared due to vibration associated with blasting.

The company's officer said he will look into this matter personally and report back to the factory authority. Compensation or repairing of wall with small cracks should be made. The EMP team leader said that there were/are precedents of small cracks in many building in Hpa-an City which is on the eastern side of the Thanlwin River. The limestone mining/quarry site near Myaing-ka-lay village is on the western side of the river about 3 miles away. He has so far heard nothing of any compensation taken by the big cement factory at Myaing-ka-lay. But in this era of environmental awareness and environmental conservation there has to be compensation for any damage, big or small.

- One local wants to expand his small farm but was prevented by factory's officials.

The company's officer said action has to be taken as the villager was encroaching into Max Myanmar land property where reforestation programme is being carried out. (Aung Nan Cho village is a young village which came into existence in 1992. The village was founded in accordance with the decree of a major general who was then the Commander of the Central Command. It fact it was a result of forced resettlement of local people from some hamlets under the control of the insurgents. The village is inside the Mei-hor Reserved Forest. Whether the farms or fields owned by the villagers have official papers/documents or not is unclear. The compensation scheme of Ks 200,000 for each acre carried out by Max Myanmar Company was in accordance with Customary Rights usually executed in remote rural area.)

11.7 Information Disclosure

Public consultation made at the project site on 11-9-2016 involving the local community, responsible persons from the company and EMP team was made public. The information was released and the news appeared, in brief, in a Daily Newspaper, The Voice Daily, on 15-9-2016. (See ANNEX for part of the newspaper)

CSR programme implamented, so far

As a result of CSR scheme 14 villagers have been employed permanently with their salaries ranging from Ks 120,000 to Ks 180,000. Several dozers were provided temporary job during the Construction Phase of the cement project about 2 years. The previous CSR programmer implementation in the form of the construction of 10 miles hard top road which directly benefited the two villages, the building of one bridge across the Mei-hor rivulet; the building of 2 schools, 1 clinic and 1 library and the donation and building of one pagoda (the Shwe Hpone Pwint Pagoda) and two monasteries; and the electricfication of the monastery, schools and the village (to all the lamp posts of the village but not to every household yet).

The previous CSR scheme also involved the compensation for land acquisition. Twenty five villagers were compensated at the rate of Ks 200,000 per acre (the total acreage about 100 acres). This was arranged through Customary Law or Customary Right, perspectives.

Previous CSR scheme also also involved charity and donations and the money spent so far for CSR programe amounted to Ks 525,860,000 not including materials and kinds in donation, charity and community assistance works.



Figure-18: 10 miles hard top road



Figure-19: Mei-hor Bridge



Figure-20: Schools at Aung Nan Cho village (Left) and at Aung Chan Thar village (Right) donated and built by Max Myanmar Company



Figure-21: Village library donated and built by Max Myanmar Company



Figure-22: Shwe Hpone Pwint Pagoda built by Max Myanmar Company



Figure-23: Two monasteries, left and right, built by Max Myanmar Company

11.8 Recommendation for future consultation

As mentioned earlier public consultation must be a continuous process throughout the project period, from the Pre-construction Phase, through the Construction Phase and Operation Phase to the Decommissioning Phase. As regards the long Operation Phase (30 years) there should be regular public consultations annually or bi-annually depending on the situation, or from time to time whenever there is a need for public consultation. This is very important for maintaining the long term cordial relationship with the locals and hence the long term benefit for quarry business.

The Complaints and Grievances Mechanism (CGM) programme should be implemented throughout the entire Operation Phase period. It should be practical and applicable and effective. The public relation officer and EMP cell leader should always give special attention to CGM.

The complaints handling and response must be effective. A hotline for complaint must be set up. The date and time of complaints, detail of complaint, action taken and if no action is required the reason why must be all recorded and documented. There can be also follow up contact with complainant.

Future public consultation should involve the continuation of CSR programme (affordable programme) and donation and charity works as far as possible.

12. WORK PLAN AND IMPLEMENTATION OF SCHEDULE

This is merely the work plan and schedule for the effective implementation of EMP during the four phases, namely, Preconstruction, Construction, Operation and Mine closure/ Rehabilitation Phase, of the project life. In other word, this is not the main work plan and schedule for the main business of limestone mining/quarry, cement marketing during the four phases of the project life.

EMP plans and implementation should be formulated since in the early Preconstruction Phase through the Construction Phase, Operation Phase and up to the early Mine closure Phase.

MP plans and implementation should be started at the early Construction Phase through the Operation Phase to the end of Mine closure/ Rehabilitation Phase.

A generalized time frame for planning and implementation of EMP and MP is shown in the **Figure-24** below.

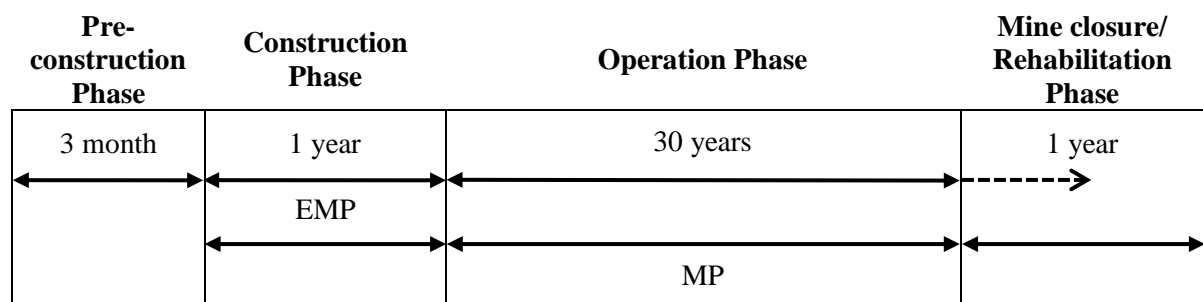


Figure-24: Generalized time frame for planning and implementation of EMP and MP during the four phases of project life

12.1 During the Preconstruction Phase

EMP should be taken into serious consideration in the very early planning stage for the Preconstruction Phase works. For instance, the procurement of environmentally friendly tools, equipment, machinery and vehicles etc. for the quarry works. This will include the purchase of tools that are durable, and reliable but not so expensive; purchase of machinery equipment and vehicles that emit less smoke and generate lower noise level and vibration; and machinery and vehicles that are fuel efficient, those that consume less fuel, less energy

and use less water for conservation purposes. In other words, tools and methodology that are of practical application for sustainable construction activities shall be applied.

Plan for this phase will include this procurement for drilling equipment and accessories; explosives and detonators and accessories; excavators and dozers (together with air-conditioned cabin to be installed for operator); dump trucks, crushing machines and accessories, grinding machines, screening machines, filters etc.

In addition devices such as noise and vibration abators, silencers, a variety of PPE such as masks, face mask, gas masks; goggles, ear muffs, gloves, boots, safety belts, special outfits, etc should be procured in advance.

Hand tools such as hammers, spikes and chisels and also facilities for first aids and for fire fighting (eg. fire extinguisher) should be procured in advance.

There should be detail plan for the selection and procurement of a variety of building materials for sand, gravel, bricks, cements, timbers to iron rods, glass panel, sheet, roofings and so on. Also the materials for installation, furnishing and finishing works- eg. plumbing system, electric system, paints and varnishes etc, in short, all the detail plan for the construction of buildings and structures at the mine/quarry site. When planning for the procurement of all the above-mentioned material items serious consideration should be taken for the selection of ecologically friendly materials. After that implementation of procurement will follow.

The three mitigation measures to be taken and the EMP to be implemented in the Preconstruction Phase were already described earlier in **Section-6**. MP is not necessary yet in this phase.

12.2 During the Construction Phase

It is estimated that this phase will last for 1 year and that is for structures at mine site only.

As regards EMP the 10 mitigation measures to be taken and the EMP to be implemented during this phase were already described earlier in tabulated form in **Section-6**. Members of EMP cell should follow this instruction and carry out their duties efficiently.

As regards MP the 16 components and parameters to be monitored during this construction Phase were already described earlier in tabulated form in **Section-7, 7.1**.

12.3 During the Operation Phase

It is estimated that this long term phase will last for up to 30 years.

As it is the most important phase of the whole project effective EMP and MP should be implemented during this phase. The long term sustainable success of the whole project also depends very much on the effectiveness of EMP and MP implementation by efficient EMP cell members.

The 16 mitigation measures to be taken and the EMP to be implemented during the Operation Phase were already mentioned earlier in tabulated form in **Section-6**.

The 28 components and parameters to be monitored were also already mentioned earlier in tabulated form in **Section-7, 7.1**.

12.4 During the Mine closure/Rehabilitation Phase

It is estimated that this phase will last for 1 year.

During this phase the limestone mine/quarry will be decommissioned and closed. Works involve the removal of machinery, equipment, vehicles, the dismantling and tearing down of building and structures; the reuse or put up for sale for some materials; the disposal of unwanted materials and removal of contaminated soil; and the clearing of the site. Other main works will include backfilling of pits and dents resulted from mining/quarrying activities and leveling of the ground.

After that the rehabilitation task will have to be implemented, mainly in the form of re-vegetation.

EMP for mine closure/rehabilitation should be formulated in advance. The mitigation measures to be taken and EMP to be implemented during this Mine closure/Rehabilitation Phase were already mentioned earlier in tabulated form in **Section-6**.

The two components and parameters to be monitored were also already described in tabulated form in **Section-7, 7.1**.

The mine closure and subsequent rehabilitation was once considered unimportant and unnecessary. But in this era of environmental awareness effective mine closure and environmentally sound rehabilitation has become mandatory. A mine closure plan that incorporates both physical rehabilitation and socio-economic consideration must be now an integral part of the project life cycle. These should be considered:

- future public health and safety are not compromised after mine closure
- the after-use of the old site is beneficial and sustainable to the local community in the long term, and
- adverse socio-economic impacts after mine closure are minimized while socio-economic benefits are maximized.

12.5 Fund for Environmental Management Plan (EMP)

A fund for EMP must be set up for the smooth and effective implementation of EMP. A small percentage of the budget, preferably 0.5-1.0% must be set aside for the setting up of EMP fund. (This is quite different from fund for implementation for CSR programme which is raised normally from 2% of the net profit). This EMP fund could not cover the whole project periods of 30 plus years. This should be considered as seed money; as time went on more

money would have to be added. Unfortunately if major accident happens the executives of the company would have to make new decision concerning EMP fund (Emergency, contingency, health and safety, even welfare plans were all parts of EMP).

Finally there should be Management Review for EMP.

This should be reviewed on an annual basis. The review will include:

- finding of internal and external environmental audits
- achievement against the environmental objectives and targets
- environmental objectives and targets for the coming year
- stakeholders concerns and other informations, and
- aspects and impacts in relevant to the up coming operation and environmental policy

REFERENCES

- 1) EIA Report (final) for limestone quarry, India. ifc.org>ifcext>spiwebsite1, rsf.EIAR.
- 2) Environmental Impact Assessment Guideline Manual for Mining of Minerals. Ministry of Environmental and Forest Government of India, New Dehli, Feb.2010.
- 3) Environmental Impact of Mining Wikipedia, <https://en.m.wikipedia.org/wiki/envir>.
- 4) Environmental Monitoring of small scale mining areas in Rwanda, windhock, Kigali, September 2011.
- 5) Environ Planners Ltd.2010. EIA for cement plant and limestone quarry for Cement Jamaica Limited, Jama, 2010.
- 6) Final EIA/EMP Report of Zinzaka limestone Mine. 16-7-2016. www.mantec.consultants.com.
- 7) Frank, D. 2012. Social Impact Assessment of Project Development. Guide for Australian Region.
- 8) International Finance Corporation (IFC) 2007.Environmental, Health and Safety Guidelines for Mining.
- 9) MESC-EMP for prospecting exploration and feasibility study for copper, gold and associated minerals at Aingyi Area, Kawlin Town ship, Sagaing Region.
- 10) MESC, January, 2015 ESIA for the project to upgrade Max Myanmar Cement Plant, Taung Philar.

- 11) MESC (Myanmar Environment Sustainable Conservation) EMP for Tun Thwin Coal Mine, Kalaywa, Sagaing Region, 2016.
- 12) MESC, September, 2015. EIA on Blue Diamond Cement Factory at Pyi Nyaung, Tharzi Township, Mandalay Region.
- 13) Mining and the Environmental Impact Guide. Gauteng Dept. of Agriculture, Environment and Conservation, S. Africa. 2008.
- 14) MOECAAF (MONREC). 2012. Directives No.20/2013, dated: 13-3-2013 on Environmental Impact Assessment Regulation.
- 15) MOECAAF (MONREC). 2012 Environmental Conservation Law, the Hluttaw Law No.9/2012
- 16) MOECAAF (MONREC). 2014. website. www.fdmoecaf.gov.mm/com. EIA guideline, 2014.
- 17) MOECAAF (MONREC). 2015. Administrative Instruction of Environmental Impact Assessment Procedure Notification. No.----/2015, Nay Pyi Taw, 2015
- 18) MOECAAF (MONREC). 2015. National Environmental Quality (Emission) Guidelines. The Ministry of Environmental Conservation and Forestry, 29-12-2015.
- 19) Overview of Mining and its impacts; a guide book. <https://www.elaw.org/files/mining-eia>.
- 20) Report on Regional Geology of Myanmar. Dept. Geological Engineering; faculty of Engineering, Gadjab Mada University, April, 2010.
- 21) Win Htein. Update on the Myanmar Mining Laws. Dept. of Mines, Ministry of Mines. <http://charltonmyanmar.com/wp>.

ANNEX

သက်တမ်းတိုး



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ 005819
အမျိုးသားစီမံကိန်းနှင့် စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှုဝန်ကြီးဌာန
ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

အမှတ်၁၂၃၄...../၂၀၀၇-၂၀၀၈

မြန်မာနိုင်ငံ ကုမ္ပဏီများ အက်ဥပဒေအရ မက်စ်. (မြန်မာ). ထုတ်လုပ်မှု ကုမ္ပဏီ. လီမိတက်
.....အား ပေးရန်တာဝန် ကန့်သတ်ထားသော လီမိတက်
ကုမ္ပဏီအဖြစ် ၂၀၀၇. နှစ်... ဒီဇင်ဘာ... လ၊ ၁၇... ရက်နေ့တွင် မှတ်ပုံတင်ထားခြင်းအား
၂၀၁၅... နှစ်... ဇန်နဝါရီ... လ၊ ၂... ရက်နေ့မှစ၍ သက်တမ်းတိုး ခွင့်ပြုလိုက်သည်။


ညွှန်ကြားရေးမှူးချုပ် (ကိုယ်စား)
(နိလာမူ၊ ဒုတိယညွှန်ကြားရေးမှူး)


ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

THE GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF NATIONAL PLANNING AND ECONOMIC DEVELOPMENT

CERTIFICATE OF INCORPORATION

NO. 1230 of 2007-2008

I hereby certify that the tenure of MAX (MYANMAR) MANUFACTURING
COMPANY LIMITED incorporated under the
Myanmar Companies Act on 17th DECEMBER, 2007
is renewed with effected from 2nd JANUARY, 2015


For Director General
(Nilar Mu, Deputy Director)

Directorate of Investment and Company Administration

ကုမ္ပဏီနှင့်သက်ဆိုင်သည့်အချက်အလက်များ

- (က) အုပ်ချုပ်မှုဒါရိုက်တာအမည်၊ ဦးဇော်ဇော်.....(၁၂/ဗဟန(နိုင်)၀၈၄၅၄၄.)
- (ခ) ကုမ္ပဏီ ရုံးခန်းလိပ်စာ၊ အမှတ်(၁၂၃)၊ အလံပြဘုရားလမ်း၊.....
ဒဂုံမြို့နယ်၊ ရန်ကုန်မြို့၊.....
- (ဂ) ဆက်သွယ်ရန် ဖုန်းနံပါတ်၊ ၀၁-၂၅၅၈၁၉၊ ၀၁-၂၅၅၈၃၈.....
- (ဃ) ဒါရိုက်တာများ အမည်စာရင်း(၁) ဦးစိုးတင့်.....
၁၂/ကမတ(နိုင်)၀၁၈၇၄၅
(၂) ဦးအုန်းကျော် (ခ) ဦးအေးသွင်
၁၄/ရကန(နိုင်)၀၁၇၀၈၄
(၃) ဒေါ်ဌေးဌေးနိုင်
၁၂/ကမရ(နိုင်)၀၀၇၀၄၀

- မှတ်ချက်။ (၁) ဤကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်သည်မှတ်ပုံတင်ရက်စွဲ(၁၇-၁၂-၂၀၁၄)မှ (၁၆-၁၂-၂၀၁၉)ရက်နေ့အထိ(၅)နှစ်သက်တမ်းအတွက်သာ ဖြစ်သည်။ သက်တမ်း မကုန်ဆုံးမီ (၃)လအလိုတွင် သက်တမ်းတိုးရန် ရင်းနှီးမြှုပ်နှံမှုနှင့် ကုမ္ပဏီများ ညွှန်ကြားမှု ဦးစီးဌာနသို့ လျှောက်ထား ရမည်။
- (၂) ကုမ္ပဏီ အနေဖြင့် သင်းဖွဲ့မှတ်တမ်းတွင်အဆိုပြု တင်ပြထားသော လုပ်ငန်းရည်ရွယ်ချက်များကိုသာ လုပ်ကိုင်ရမည်။
- (၃) သင်းဖွဲ့မှတ်တမ်းပါ ရည်ရွယ်ချက်များသည် သက်ဆိုင်ရာ ပြည်ထောင်စု ဝန်ကြီးဌာန၏ တည်ဆဲဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်း များနှင့်အညီ ခွင့်ပြုချက် ရရှိမှသာ ဆောင်ရွက်ခွင့် ရှိမည် ဖြစ်ပါသည်။
- (၄) လုပ်ငန်းရည်ရွယ်ချက် ပြောင်းလဲ လုပ်ကိုင်လိုပါက ပြောင်းလဲ လုပ်ကိုင်လိုသည့် လုပ်ငန်း ရည်ရွယ်ချက်များအား သင်းဖွဲ့မှတ်တမ်းတွင် ပြင်ဆင်မှတ်ပုံတင်ရန်အတွက် ဒါရိုက်တာအဖွဲ့(BOD)၏ အထူး အစည်းအဝေး ဆုံးဖြတ်ချက် မှတ်တမ်းနှင့်အတူ ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများ ညွှန်ကြားမှု ဦးစီးဌာန သို့ လျှောက်ထား ရမည်။



ညွှန်ကြားရေးမှူးချုပ် (ကိုယ်စား)
(မော်မော်စိုး ၊ လက်ထောက်ညွှန်ကြားရေးမှူး)

လာရောက်ထုတ်ယူသည့် ရက်စွဲ၊



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သတ္တုတွင်းဝန်ကြီးဌာန
ဝန်ကြီးရုံး
တော်သတ္တုအကြီးစားထုတ်လုပ်ရန်ခွင့်ပြုမိန့်

ခွင့်ပြုမိန့်အမှတ်၊ ၀၀၁၅ / ၂၀၁၅

ရက်စွဲ၊ ၂၀၁၅ ခုနှစ်၊ မတ်လ ၂၁ ရက်။

အောက်ဖော်ပြပါ အဖွဲ့အစည်းအား မြန်မာသတ္တုတွင်းဥပဒေအရ အောက်ပါအချက်အလက်များနှင့်အညီ ဓာတ်သတ္တု
အကြီးစားထုတ်လုပ်ရန်ခွင့်ပြုလိုက်သည်။

၁။ ခွင့်ပြုမိန့်ရသူ၏

(က) အမည်နှင့် နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ်-

(ခ) အဖွဲ့အစည်းအမည်နှင့်

- မက်စ်(မြန်မာ)ထုတ်လုပ်မှုကုမ္ပဏီလီမိတက်

အဖွဲ့အစည်းပုဂ္ဂိုလ်တစ်ဦးအမှတ်

- ၁၂၀၀/၂၀၀၇-၂၀၀၈

(ဂ) ဆက်သွယ်ရန်နေရပ်လိပ်စာ

- အမှတ်(၁၂၃)အလံပြဘုရားလမ်း၊ စင်္ကြံမြို့နယ်၊

တယ်လီဖုန်းအမှတ်၊ ဖက်စ်၊ အမှတ်

- ရန်ကုန်တိုင်းဒေသကြီး

ဖုန်း- ၀၁-၂၅၅၈၁၉၊ ၀၁-၂၅၅၈၃၈

၂။ ခွင့်ပြုဧရိယာ၏

(က) တည်နေရာ၊ ကျေးရွာ၊ မြို့နယ်၊

- ဘုရားတန်းလုပ်ကွက်၊ တောင်မီလာဒေသ၊

ခရိုင်၊ ပြည်နယ်/တိုင်းဒေသကြီး၊

- လယ်ဝေးမြို့နယ်၊ နေပြည်တော်

(ခ) အကျယ်အဝန်း (ဝတုရန်းကီလိုမီတာ)

- ၅၀ ဧက (၀.၂၀၂၃ ဝတုရန်းကီလိုမီတာ)

(ဂ) နယ်နိမိတ်သတ်မှတ်ချက်

- ပြင်ပညွှန်းစဉ် အ/၆၁၇(၈၈)၂၆၅၉(၈၈)၃၆၅၉(၈၈)၃၆၅၉(၈၈)၃၆၅၉၊
၈၈၄၆၄၉(၈၈)၂၆၄၉(၂၆)တွဲမြေပုံပါအကျယ်အဝန်းအတိုင်း၊

၃။ ခွင့်ပြုဧရိယာ၏နယ်မြေ

- လယ်ဝေးမြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန

အုပ်ချုပ်မှုဆိုင်ရာအဖွဲ့အစည်း

၄။ တစ်ဆင့်သွားလာဝင်ထွက်ခွင့်

- လယ်ဝေးမြို့နယ်

၅။ ခွင့်ပြုသည့်ဓာတ်သတ္တုအမျိုးအစား

- ဖုံးကွယ်(စက်မှုတွင်းထွက်တုန်ကြမ်း)

၆။ ခွင့်ပြုသည့်ဓာတ်သတ္တုတူးဖော်မှုနှင့်

- ပြင်ပပါမင်းလင်းဖွင့်တူးဖောက်ခြင်းအမှတ်(၃)သတ္တုတွင်းလုပ်ငန်း
မှ ဆဏ္ဍာတုခွင့်ပြုသော ဆင့်တက်မြေပြင်ခြင်းနည်းစနစ်

၇။ ခွင့်ပြုသက်တမ်း

- (၁၀)နှစ်

၈။ စတင်လုပ်ကိုင် ခွင့်ပြုသည့်ရက်စွဲ

- ၁၈.၃.၂၀၁၅

၉။ ခွင့်ပြုမိန့်ကုန်ဆုံးသည့်ရက်စွဲ

- ၁၇.၃.၂၀၂၅

၁၀။ ပုံသေမြေငှားရမ်းခ (Dead Rent)

-

(က) တူထောင်ပူကာလ

- ပထမနှစ် တစ်စတုရန်းကီလိုမီတာအတွက် ၁၄၀၀၀၀၀ ကျပ်နှုန်း

(ခ) ထုတ်လုပ်မှုကာလ

- တစ်စတုရန်းကီလိုမီတာအတွက်တစ်နှစ်လျှင် ၂၀၀၀၀၀၀ ကျပ်နှုန်း

၁၁။ ဓာတ်သတ္တုခွန်

- (၃%)

၁၂။ စည်းကမ်းချက်များ

- အောက်ပါစည်းကမ်းချက်များအတိုင်းတိကျစွာလိုက်နာရမည်။

စည်းကမ်းချက်များ

၁။ ဓာတ်သတ္တုထုတ်လုပ်ရန် ခွင့်ပြုမိန့်ရရှိသူသည်-

(က) ခွင့်ပြုဧရိယာသို့ဥပဒေနှင့်အညီ ဝင်ရောက်လုပ်ကိုင်ခွင့်ရှိသည်။

မြန်မာနိုင်ငံ ပြည်တွင်းစစ်ကို ဒေါ်အောင်ဆန်းစုကြည် အဆုံးသတ်နိုင်ပါမည်လော



ထုံးကျောက်တူးဖော်ရေးအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ရေးဆွဲမည်

ရန်ကုန် စက်တင်ဘာ ၁၄



ရန်ကုန်မြို့နယ်၊ ထုံးကျောက်တူးဖော်ရေးအတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်

ဘီလပ်မြေစက်ရုံစီမံကိန်း အကောင်အထည်ဖော်ရန် ထုံးကျောက်တောင်လုပ်ကွက်အတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ရေးဆွဲမည်ဖြစ်ကြောင်း Myanmar Environment Sustainable

Conservation Co.,Ltd.(MESCC) ထံမှ သိရသည်။ နေပြည်တော် လယ်ဝေးမြို့နယ်၊ လေီငှက်ကြီးတောင်အုပ်စု၊ အောင်နန်းချိုကျေးရွာ၌ စက်တင်ဘာလ ၁၁ ရက်နေ့က

Max Myanmar Manufacturing Co.,Ltd. ကဦးစီး၍ ဘီလပ်မြေစက်ရုံစီမံကိန်း၏ ထုံးကျောက်တောင်လုပ်ကွက်အတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (Environmental Management

Plan- EMP) ကိုရေးဆွဲရန် လူထုတွေ့ဆုံပွဲ ပြုလုပ်ခဲ့ကြောင်း MESCC မှ အမှုဆောင် ဒါရိုက်တာ ဦးမြင့်ကျော်သူရက ပြောကြားသည်။

အဆိုပါစီမံကိန်း၏ ထုံးကျောက်တောင်လုပ်ကွက် ၂၃၀ ဧကနှင့် ဧက ၅၀ အတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် လုပ်ငန်းများကို ဒေသခံများအား ရှင်းလင်းတင်ပြခဲ့ပြီး ၎င်းတို့၏လိုအပ်ချက်နှင့် သဘောထားကို မေးမြန်းခဲ့ရာတွင် ယင်းဒေသ၌ လျှပ်စစ်မီးလိုအပ်ချက်ရှိနေသည့်အတွက် လျှပ်စစ်မီးအထောက်အပံ့ပေးစေလိုရာ ကုမ္ပဏီက ကျေးရွာရှိ စာသင်ကျောင်း နှင့် လမ်းမီးများကို စတင်ပေးထားကြောင်း ၎င်းကပြောဆိုသည်။

စီမံကိန်းကို နေပြည်တော်၊ လယ်ဝေးမြို့နယ်မှ မိုင် ၃၀ အကွာ လေီငှက်ကြီးတောင်အုပ်စု၊ အောင်နန်းချိုကျေးရွာအနီးတွင် အကောင်အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်ပြီး တစ်နေ့လျှင် ဘီလပ်မြေတန်ချိန် ၂၁၀၀ ထွက်ရှိမည်ဖြစ်ကြောင်း စီမံကိန်းဆိုင်ရာ အချက်အလက်များအရ သိရသည်။

ကျေးရွာအမည်-~~အထွေထွေ~~

နေ့စွဲ-၂၀-၁-၂၀၁၆

အမည်အဝေးတက်ရောက်သူများစာရင်း

| စဉ် | အမည် | လက်မှတ် | မှတ်ချက် |
|-----|-----------------|---------|----------|
| ၀. | ဦး စာအုပ် (အေး) | | |
| ၁. | ဦး စော စော | | |
| ၂. | ဦး ဖြူဖြူ | | |
| ၃. | ဦး ဝင်း စော | ဝင်း | |
| ၄. | ဦး ဘန်စော | ဘန် | |
| ၅. | ဦး မောင်မောင် | | |
| ၆. | ဦး ဦး ဦးစော | အောင် | |
| ၇. | ဦး ဦး ဦးစော | အောင် | |
| ၈. | ဦး ဖြူဖြူ | | |
| ၉. | ဦး မောင်မောင် | | |
| ၁၀. | ဦး မောင်မောင် | | |
| ၁၁. | ဦး ဦးစော | အောင် | |
| ၁၂. | ဦး ဘန်စော | ဘန် | |
| ၁၃. | ဦး ဘန်စော | ဘန် | |
| ၁၄. | ဦး ဘန်စော | | |
| ၁၅. | ဦး မောင်မောင် | အောင် | |

ကျေးရွာအမည်-တောင်ကြီးမြို့

နေ့စွဲ-၁၁-၉-၂၀၁၆

အစည်းအဝေးတက်ရောက်သူများစာရင်း

| စဉ် | အမည် | လက်မှတ် | မှတ်ချက် |
|-----|-------------|---------|----------|
| ၁၆ | ဦး စောဇော် | | |
| ၁၇ | ဦး မင်း | | |
| ၁၈ | ဦး စောအောင် | | |
| ၁၉ | ဦး ရွှေစော | | |
| ၂၀ | ဦး စောကြီး | | |
| ၂၁ | ဦး စောကြီး | | |
| ၂၂ | ဦး စောအောင် | | |
| ၂၃ | ဦး မင်း | | |
| ၂၄ | ဦး ရွှေစော | | |
| ၂၅ | ဦး စောအောင် | | |
| ၂၆ | ဦး မင်း | | |
| ၂၇ | ဦး စောအောင် | | |
| ၂၈ | ဦး စောအောင် | | |
| ၂၉ | ဦး စောအောင် | | |
| ၃၀ | ဦး စောအောင် | | |



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