Shwe Taung Development Co.,Ltd

Environmental Impact Assessment (EIA)

For

Quarry Production Mine

Mandalay Region, Mandalay District

Patheingyi Township, Plot No-555/ Chinkon-Yema,

Kyuwon, Sub Plot (23), (15) Acres

Prepared by

SEE-Trust
Nay Wun Myat(s) Co.,Ltd

December,2023

Content

အကျဉ်းချုပ်အစီရင်ခံစာ ..... I-XXVI

Executive Summary ..... A-X

ABBREVIATION ..... Y

Chapter-1 1

Introduction 1
1.1 Background 1
1.2 Project Proponent 2
1.3 License for extraction quarry 3
1.4 Environmental Service Provider 5
1.5 Terms of Reference (TOR) for Service Provider 5
1.6 Scope and Methodology of EIA studies 7
1.6.1 Scope 7
1.6.2 Methodology 7
1.7 Time Frame 8
1.8 Authorized for quarry mine production 9
1.9 Organization Structure of Company 9
1.10 Organization Structure of project implementation team 12
1.11 Responsibility party of Environmental and Social Affair 12
1.12 Work schedule of SDC's quarry mine 13
1.13 Comments of Proponent 13
1.14 Comment on Community Health by Health Expert 13
1.15 Brief of Chapter 14

Chapter-2 15

Legal Requirement and Commitment 15
2.1 Introduction 15
2.2 Legal Requirement 15

Chapter-3 27

Description of Project and Alternatives 27
3.1 Introduction 27
3.2 Location of the Project 27
3.3 Mine Permit and production target 33
3.4 Current Scenario 33
3.5 Components of project 33
3.6 The SDC base camps and its facilities 33
3.6.1 Building 33

3.6.2 Electricity 34
3.6.3 Water 35
3.6.4 Fuel requirement 35
3.6.5 Fire Protection 36
3.6.6 Plants 36
3.6.7 CSR 36
3.6.8 Crushing Mill 36
3.7 Topography and Geological Formation 37
3.8 Estimation of line stone 40
3.9 Mine Plan 40
3.9.1 Main Access Road Plan 41
3.9.2 Extraction Plan 42
3.9.3 Removing overburden 44
3.9.4 Man Power requirement 44
3.9.5 Machinery 45
3.9.6 Drilling and blasting 45
3.9.7 Description of the SDC quarry production mine project 46
3.10 Work Plan for the Preconstruction and Construction Phase 47
3.11 Roads 47
3.12 Current mining method of SDC 50
3.12.1 Method 50
3.12.2 Production process 50
3.12.3 Drilling and Blasting 51
3.12.4 Patten of drill holes 52
3.12.5 Explosives 53
3.13 Alternatives 53
Chapter-4 73
Initial Study on Existing Environment 73
4.1 Objectives 73
4.2 Topography and Geological Formation 73
4.3.1 Transportation 75
4.4 Soil Type 76
4.5 Climate Data 78
4.6 Population of Mandalay Region 80
4.6.1 Patheingyi Township 80
4.7 Social Economic Situation of Surrounding Village 82
4.8 Health and Education 83
4.9 Culture and Historical Building 83
4.10 Waste Management 84

4.10.1 Solid Waste 84
4.10.2 Estimation of waste from project 84
4.10.3 Hazardous Waste 87
4.10.4 Waste Water 87
4.11 Air Quality 87
4.12 Noise 89
4.13 Forest and Biodiversity 90
4.13.1 Forest and trees 91
4.13.2 Biodiversity 92
4.14 Summarized of Chapter 4 93
Chapter-5 94
Public Consultation Disclosure 94
5.1 Consultation Meetings 94
5.1.1 Reason for not conducted consultation meeting after first scoping report 94
5.2 Conducting consultation meeting after submitted second version of Scoping report (2022, August) 94
5.2.1 Objectives of consultation meeting 94
5.3 Conducting consultation meeting after getting the approval of scoping report (2023, November) 97
5.4 Way Forward 100
5.5 Conclusion of Public Consultation 100
Chapter (6) 101
Scope and Methodology 101
6.1 Justification for conducting EIA 101
6.2 Objective 101
6.3 Terms of Reference (T.O.R) for Third-Party 101
6.4 Methodology 104
6.5 Time Frame for EIA process 105
6.6 Introduction 106
6.7 Phases for Study 106
6.8 Study work natures 106
6.9 Study Location 106
6.10 Proposed method for data collection 108
6.11 Study of social environment 108
6.12 Methodology for Cultural Heritage 109
6.13 Visual Amenity 109
6.14 Methodology for Health impact assessment 109
6.14.1 Proposed Assessing method 109
6.15 Methodology for Biodiversity 110

6.15.1 Objectives 110
6.15.2 Area of Influence 110
6.15.3 Methodology 110
6.16 Methodology for Physical component 110
6.17 Methodology for social-economic study 111
6.18 Summary 111
Chapter 7 112
Identification of Possible Impacts 112
7.1 Methodology & Approach for identification of impact 112
7.2 Analysis of Potential Impact during construction, operation and decommissioning phase (initial study) 113
7.3 Residual Impact 115
7.4 Social Impact 115
7.5 Mitigation Plan 115
7.6 Potential impacts and mitigation measure 116
7.7 Explanation of Impacts 118
7.8 Proposed Mitigation Measures 118
7.8.1 Visual Amenity Impact 118
7.8.2 Noise Impact 118
7.8.3 Vibration Impact/ Seismic Impact 119
7.8.4 Air Pollution Impact 119
7.8.5 Climate Change Impact 120
7.8.6 Soil Erosion and Sedimentation 120
7.8.7 Land Subsidence 120
7.8.8 Soil Contamination, Soil Pollution, or Land Pollution 121
7.8.9 Water Pollution 122
7.8.10 Health and Safety 122
7.8.11 Social Impact 123
7.8.12 Impact on Biodiversity and Ecosystem 123
7.9 Work Safety 124
7.10 Risk Assessment 126
7.11 Goal 126
7.12 Assessment Steps 127
7.13 Assessment Matrix 127
7.14 Risks and precautions 128
7.15 Summary of Chapter 128
Chapter (8) 129
Cumulative Impact Assessment 129
8.1 Study on Cumulative Impacts Assessment 129

Chapter (9) **131**

Environmental Management Plan, particularly mitigation and monitoring plan 131
9.1 Institutional Requirement 131
9.2 Environmental Management Plan 131
9.2.1 Mitigation Plan 132
9.2.2 Monitoring Plan for operation stage 140
9.3 Health and Safety Plan 144
9.3.1 Community Health Care 144
9.3.2 Prevention of respiratory problems 145
9.3.3 Accident rate 145
9.3.4 Health impacts and mitigation 145
9.3.5 Action plan 146
9.3.6 Occupational Environmental Health and Safety (OEHS) Plan 146
9.3.6.1 Objectives 146
9.3.6.2 Methodology and process 146
9.3.6.3 Possible Risk 146
9.3.6.4 Work Plan 147
9.3.6.5 Risk, mitigation plans and budget for OEHS 148
9.3.6.6 Monitoring 149
9.4 Waste Disposals 149
9.4.1 Types and Quantity 149
9.5 Oil spill response plan 149
9.6 Firefighting 150
9.7 Landslide 150
9.8 Mine closure plan 150
9.9 Emergency Response and Preparedness Plan 152
9.9.1 Purpose of plan 152
9.9.2 Planning process 152
9.9.3 Objective 153
9.9.4 Possible risk 153
9.9.5 Develop of an onsite emergency team 153
9.9.6 Responsibility of team 153
9.9.7 Preparation Measures 154
9.10 Training 155
9.11 Reporting 155
9.12 Grievance Mechanism 155
9.13 Information disclosure 157

Chapter (10) **158**

Commitment, Conclusion and Recommendation 158

10.1 Commitment 158
10.2 Recommendation 158
10.3 Conclusion 159
REFERENCES 160

Tables

Table (1-1) Member of EIA Service Team 5
Table (3-1) Building based camp 33
Table (3-2) Water utilization 35
Table (3-3) Fuel consumption 36
Table (3-4) Layer wise yield calculation 40
Table (3-5) Man power requirement 44
Table (3-6) Machinery Requirement 45
Table (3-7) Drilling and blasting standards 45
Table (3-8) Quarry Mine Method 65
Table (3-9) Blasting Method 69
Table (3-10) Evaluation of project alternatives 71
Table (4-1) Soil Characteristic and recommended land use type 77
Table (4-3) Salient points of region 80
Table (4-4) Demographic of Patheingyi Township 80
Table (4-6) Layer wise waste calculation 85
Table (4-7) Comparison of air quality on 2018 87
Table (4-8) Air quality result at 2021 December 88
Table (4-9) List of trees and shrub 91
Table (7-1) Impact Assessment Parameters and Its Scale 112
Table (7-2) Significance of Impacts 112
Table (7-3) Potential impacts for construction operation and decommissioning phase 113
Table (7-4) Potential impacts to be mitigate currently 116
Table (7-5) Personal Protection Equipment and their function 125
Table (7-6) Safety signage and their description. 126
Table (8-1) Cumulative Impacts 130
Table (9-1) Mitigation Plan for Operation Stage 133
Table (9-2) Mitigation plan for decommissioning phase 137
Table (9-3) Monitoring plan for operation phase 140
Table (9-4) Monitoring plan for decommissioning stage 142
Table (9-1) Impacts and Its Mitigation Plan For OEHS 147
Table (9-3) Mitigation and Contingency plan 154

Figures

Figure (1-1) License and map of land form (105) 3
Figure (1-2) License and map of land form (106) 4
Figure (1-3) Flow chart of Methodology for the Environmental Impact Assessment Study 8
Figure (1-4) Organization of General Administration Department 9
Figure (1-5) Corporate structure 10
Figure (1-6) Organization of quarry production 12
Figure (3-1) Location of Project 28
Figure (3-2) Satellite map of SDC mine 29
Figure (3-3) Google map of mine location and surrounding 30
Figure (3-4) Location map of SDC mine and transport route 31
Figure (3-5) Location of SDC mine and surrounding, road and power line 32
Figure (3-6) Flow plan of current based camp 34
Figure (3-7) Flow chart of mill 37
Figure (3-8) Topography map of Project 38
Figure(3-9)Topography and drainage feature 39
Figure (3-10) Road design 41
Figure (3-11) Typical cross section of main road 42
Figure (3-12) Complete extraction plan map 42
Figure (3-13), (3-14), (3-15), (3-16) and (3-17) Sample drawing of sections 43
Figure (3-18) Typical road design 48
Figure (3-19) Cross section of road 49
Figure (3-20) Slope Cambers 49
Figure(3-21) Road alignment of SDC quarry mine 50
Figure (3-22) Process chart of quarry production 51
Figure (3-23) Square or rectangular Pattern 52
Figure (3-25) Parameter of Blasting Operation 53
Figure (3-26) Conceptual diagram of buffer blast holes used in conjunction with presplitting 62
Figure (4-1) Geological formation of Project Area 73
Figure (4-2) Fault and Geological formation of project and surrounding township 74
Figure (4-3) Map of Mandalay Region and its townships 75
Figure (4-4) Soil map of Mandalay division 76
Figure (4-5) Spatial variability in average annual rainfall as influence by various climate drivers 79
Figure (4-6) Average daytime and night times temperature 79

Figure (4-7) Population pyramid 81
Figure (4-8) Percentage of Patheingyi religions 81
Figure (4-9) Livelihood of Community 82
Figure (4-10) Close up Map of STD mine 86
Figure (4-11) Map shown biodiversity conservation area, culture and Historical area 90
Figure (6-1) Flow chart of Methodology for the Environmental Impact Assessment Study 105
Figure (6-2) Map showing the Study area 107
Figure (6-3) Scope of Study 108
Figure (8-1) Location of adjacent mines 129
Figure (9-1) Basic Steps in Grievance Procedure 156

Appendixs

Appendix (A) Shwe Taung Company Registration 162
Appendix (B) Director List 163
Appendix (C) Sub to Ton 164
Appendix (D) Third Party Registration 165
Appendix (E) Proponent's Commitment letter 167
Appendix (F) Third Party's Commitment letter 167
Appendix (G) Approval to conduct EIA From Shwe Taung Co 169
Appendix (H) Third Party Approval letter 170
Appendix (I) Posting Signboard at Project 172
Appendix (G) License for Quarry Production 174
Appendix (K) Form (105) 176
Appendix (L) Export/import Registration 177
Appendix (M) Shwe Taung Development Co.,Ltd's Business Sectors 178
Appendix (N) Power point for Public Consultation Meeting 179
Appendix (O) Attended list 184
Appendix (P) Record Photos 187

အကျဉ်းချုပ်အစီရင်ခံစာ

ဤပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာသည် ရွှေတောင်ဖွံ့ဖြိုးရေးကုမ္ပဏီလီမိတက် (SDC) ၏ ဆောက်လုပ်ရေးလုပ်ငန်းသုံးကျောက်ထုတ်လုပ်ရေးလုပ်ငန်းအတွက် ပြုစုခြင်းဖြစ်ပါသည်။ မန္တလေးတိုင်း၊ မန္တလေးခရိုင်၊ ပုသိမ်ကြီးမြို့နယ်၊ ချင်းလုံ၊ ရေမ၊ ကြူဝန်း ၅၅၅(က)၊ အကွက်ငယ် (၂၃) တွင် တည်ရှိပါသည်။ လုပ်ကွက်ဧရိယာ (၁၅) ဧကဖြစ်ပြီး နှစ်စဉ်ခွင့်ပြုထားသည့်ထုတ်လုပ်မှုပမာဏမှာ ၁၃၀၀၀ ကျင်း၊ ၅၆၅၅၀ တန်ဖြစ်ပါသည်။

ဤလုပ်ငန်းကို ဆီးထရပ်၊ နေဝန်းမြတ်ကုမ္ပဏီ (SEE–Trust) ကဆောင်ရွက်ရန် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဦးစီးဌာန၏ (၃၊ ၇၊ ၂၀၂၀) ရက်စွဲပါအမှတ် EIA– ၂/၉ (၀၆၀/၂၀၂၀) ခွင့်ပြုခဲ့ပါသည်။

SDC သည် ဖွံ့ဖြိုးမှုလုပ်ငန်းဆောင်ရွက်လျက်ရှိသော နိုင်ငံသားပိုင်ကုမ္ပဏီကြီးဖြစ်ပါသည်။ ယင်း၏ အဓိကလုပ်ငန်းခွဲများမှာအောက်ပါအတိုင်းဖြစ်ပါသည်။

ရွှေတောင်ဆောက်လုပ်ရေးပစ္စည်း

- အင်ဂျင်နီယာနှင့်ဆောက်လုပ်ရေးလုပ်ငန်း
- အခြေခံအဆောက်အဦရင်းနှီးမြှုပ်နှံမှု
- နေထိုင်မှုစနစ် (Life style)
- အိမ်ယာလုပ်ငန်း

တတိယအဖွဲ့မှ ဤလုပ်ငန်းကို အထောင်ထည်ဖော်ဆောင်ရွက်သူများမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

စဉ်	အမည်	တာဝန်	ကျွမ်းကျင်နယ်ပယ်
၁။	ဦးဇော်ဝင်း	အဖွဲ့ခေါင်းဆောင်	သစ်တောနှင့်ဇီဝမျိုးစုံမျိုးကွဲ၊ စက်မှုလုပ်ငန်းနှင့် ဂေဟဗေဒစီမံခန့်ခွဲခြင်း
၂။	ဦးသန်းထွန်း	အဖွဲ့ဝင်	တိုးချဲ့ပညာပေးခြင်း၊ မြေဆီလွှာ နှင့် ရေဝေ ရေလဲ စီမံခန့်ခွဲခြင်း
၃။	ဒေါ်သင်းသင်းမြတ်	အဖွဲ့ဝင်	စီးပွားရေးလေ့လာမှု
၄။	ဦးခင်ခန်းခန်	အဖွဲ့ဝင်	ပတ်ဝန်းကျင်ဆိုင်ရာသိပ္ပံ, GIS
၅။	ဦးခင်မောင်ဌေး	အဖွဲ့ဝင်	လူမှုရေးသိပ္ပံ
၆။	ဦးမျိုးကျော်သူ	အဖွဲ့ဝင်	အလုပ်သမားဥပဒေ၊ စီမံခန့်ခွဲရေး
၇။	ဦးစိုးလင်း	ကွင်းဆင်းအဖွဲ့	စမ်းသပ်တိုင်းတာခြင်း နှင့် သတင်းအချက်အလက်စုဆောင်းခြင်း
၈။	ဦးမျိုးမင်းပိုင်	ကွင်းဆင်းအဖွဲ့	စမ်းသပ်တိုင်းတာခြင်း နှင့် သတင်းအချက်အလက်စုဆောင်းခြင်း
၉။	ဦးခင်မောင်လင်း	ကွင်းဆင်းလက်ထောက်	စမ်းသပ်တိုင်းတာခြင်း နှင့် သတင်းအချက်အလက်စုဆောင်းခြင်း

ဆောင်ရွက်သည့်နည်းလမ်း

ဤလေ့လာမှုသည် အဓိကအားဖြင့် ရုပ်ပိုင်းဆိုင်ရာ၊ ဇီဝဆိုင်ရာနှင့် လူမှုရေးနယ်ပယ် (၃) ရပ်ကို အခြေခံလေ့လာထားပါသည်။ ရုပ်ပိုင်းဆိုင်ရာဖြစ်သော လေ၊ ရေ၊ မြေ စသည့် အရည်အသွေးများကို ကွင်းဆင်းလေ့လာတိုင်းတာဆောင်ရွက်သည့် နည်းလမ်း၊ တွေ့ဆုံဆွေးနွေးခြင်း၊ ကွင်းဆင်းလေ့လာစာရင်းကောက်ခြင်းများဆောင်ရွက်သည့်နည်းနှင့် သက်ဆိုင်ရာဌာန၊ အဖွဲ့အစည်း၊ ပုဂ္ဂိုလ်၊ စာတမ်းများမှ ရယူသည့် နည်းလမ်းများဖြင့် ဆောင်ရွက်ခဲ့ပါသည်။

လေ့လာဆောင်ရွက်ရန်လျာထားကာလ

မူလလျာထားချက်မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။ သို့သော်ကိုဗစ်ရောဂါပြန့်ပွားမှုအခြေအနေနှင့် လက်ရှိဖြစ်ပေါ်နေသည့် အခြေအနေအရပ်ရပ်ကြောင့်နှောင့်နှေးကြန့်ကြာခဲ့ပါသည်။

တတိယအဖွဲ့အား အတည်ပြုရန်လုပ်ငန်း	-	စာချုပ်ပြီးလျှင်ပြီးခြင်း
ကွင်းဆင်းလုပ်ငန်း	-	တတိယအဖွဲ့အတည်ပြုပြီး (၇) ရက်
အများပြည်သူတွေ့ဆုံပွဲ	-	ကွင်းဆင်း စချိန်မှ (၇) ရက်
အကြံဉာဏ်ရယူခြင်း	-	ကွင်းဆင်း စချိန်မှ (၁၅) ရက်
နယ်ပယ်သတ်မှတ်အစီရင်ခံစာတင်ပြခြင်း	-	ကွင်းဆင်း စချိန်မှ (၁၅) ရက်
အသေးစိပ်လေ့လာခြင်း	-	နယ်ပယ်သတ်မှတ်အစီရင်ခံစာအတည်ပြုချက်ရပြီး (၄၅) ရက်
ဒုတတိယအကြိမ်အများပြည်သူတွေ့ဆုံပွဲ	-	အသေးစိပ်လေ့လာပြီး (၃၀) ရက် လုပ်ရက် (၇) ရက်
အကြံဉာဏ်ရယူခြင်း၊ သတင်းဖြန့်ဝေခြင်း	-	အများပြည်သူတွေ့ဆုံပွဲအပြီး (၁၅) ရက်
အစီရင်ခံစာတင်ပြခြင်း	-	အများပြည်သူတွေ့ဆုံပွဲအပြီး (၄၅) ရက်
စုစုပေါင်းလုပ်ရက်	-	(၁၇၁) ရက်

စီမံကိန်းလုပ်ငန်းအစီအစဉ်

SDC ၏ စီမံကိန်းလုပ်ငန်းလျာထားအစီအစဉ်မှာအောက်ပါအတိုင်းဖြစ်ပါသည်။

ကြိုတင်ပြင်ဆင်မှုကာလ	-	၂၀၁၇
ဆောက်လုပ်ရေးကာလ	-	၂၀၁၈
လည်ပတ်ကာလ	-	၂၀၁၉ မှ ၂၀၄၉ (သို့မဟုတ်) ၂၀၆၉
ပိတ်သိမ်းကာလ	-	၂၀၄၉ (သို့မဟုတ်) ၂၀၆၉
ပြုပြင်တည်ဆောက်ခြင်း	-	၂၀၄၉ သို့မဟုတ် ၂၀၆၉ (ဇွန် မှ ဒီဇင်ဘာ)

လုပ်ငန်းအကောင်ထည်ဖော်မှုမှာအခြေအနေအရပ်ရပ်ကြောင့် လျာထားချက်ထက်နောက်ကျလျက်ရှိပါသည်။

ဥပဒေပိုင်းဆိုင်ရာများကို အခန်း (၂)၌ ဥပဒေအမည်နာမများနှင့်တကွ ဖော်ပြထားပါသည်။ ပတ်ဝန်းကျင်ဆိုင်ရာဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်း၊ အမျိုးသားစွန့်ထုတ်မှုစံနှုန်းများနှင့် ဆက်နွယ်သည့် အခြားဥပဒေများ၊ အပြည်ပြည်ဆိုင်ရာသဘောတူညီစံနှုန်းများကိုပါ ဖော်ပြထားပါသည်။ လုပ်ငန်းရှင် အပိုင်းကလည်း ဥပဒေများကို လိုက်နာရန် ကတိကဝတ်ပြုဖော်ပြထားပါသည်။

လိုက်နာဆောင်ရွက်ရမည့်လွှတ်ထုတ်မှုစံနှုန်းသတ်မှတ်ချက်များကို အောက်ပါအတိုင်းဖော်ပြထားပါသည်။

စွန့်ထုတ်အရည်၏ ပါဝင်ပမာဏသည် အောက်ပါစံချိန်စံညွှန်းအတွင်းတွင်ရှိရမည်။

တိုင်းတာသည့်အမျိုးအစား	ယူနစ်	အမြင့်ဆုံးပါဝင်နှုန်း
Biological Oxygen demand	mg/L	30
Chemical oxygen demand	mg/L	125
Oil and grease	mg/L	10
pH	SU[a]	6-9
Total coliform bacteria	100mL	400
Total Nitrogen	mg/L	10
Total Phosphorus	mg/L	2
Total suspend solid	mg/L	50

လေအရည်အသွေးသည် အောက်ပါ အမျိုးသားပတ်ဝန်းကျင်အရည်အသွေး(လွှတ်ထုတ်မှု) လမ်းညွှန်ချက် အတွင်းတွင် ရှိရမည်။

တိုင်းတာသည့်အမျိုးအစား	ပျမ်းမျှကာလ	လမ်းညွှန်ချက်စံနှုန်း µg/m³
နိုက်ထြိုဂျင်ဒိုင်အောက်ဆိုဒ်	၁ နှစ် ၁ နာရီ	၄၀ ၂၀၀
အိုဇုန်း	၈ နာရီ (နေ့စဉ်) အမြင့်ဆုံး	၁၀၀
အမှုန်အမွှား PM_{10}[a]	၁ နှစ် ၂၄ နာရီ	၂၀ ၅၀
အမှုန်အမွှား $PM_{2.5}$[b]	၁ နှစ် ၂၄ နာရီ	၁၀ ၂၅
ဆာလဖာဒိုင်အောက်ဆိုဒ်	၂၄ နာရီ ၁၀ မိနစ်	၂၀ ၅၀၀

ဆူညံသံအရည်အသွေး

တိုင်းတာသည့်နေရာ	One-hour L Aeq (dBA)[a]	
	နေ့ ၀၇:၀၀ – ၂၂:၀၀ အများပြည်သူဝိတ်ရက် (၁၀:၀၀-၂၂:၀၀)	ည ၂၂:၀၀ – ၀၇:၀၀ အများပြည်သူဝိတ်ရက် (၂၂:၀၀ -၁၀:၀၀)
နေအိမ်၊ ကျောင်းနှင့် လူနေထိုင်ရာပတ်ဝန်းကျင်	၅၅	၄၅
အလုပ်ရုံ၊ စက်ရုံ	၇၀	၇၀

ရေအရည်အသွေး

တိုင်းတာသည့်အမျိုးအစား	ယူနစ်	WHO စံနှုန်း
pH	SU	-
Turbidity	NTU	5
Total Hardness	mg/L	500
Iron	mg/L	0.3
Sulphate	mg/L	500
Dissolved Solid	mg/L	1000
Suspended Solid	mg/L	-

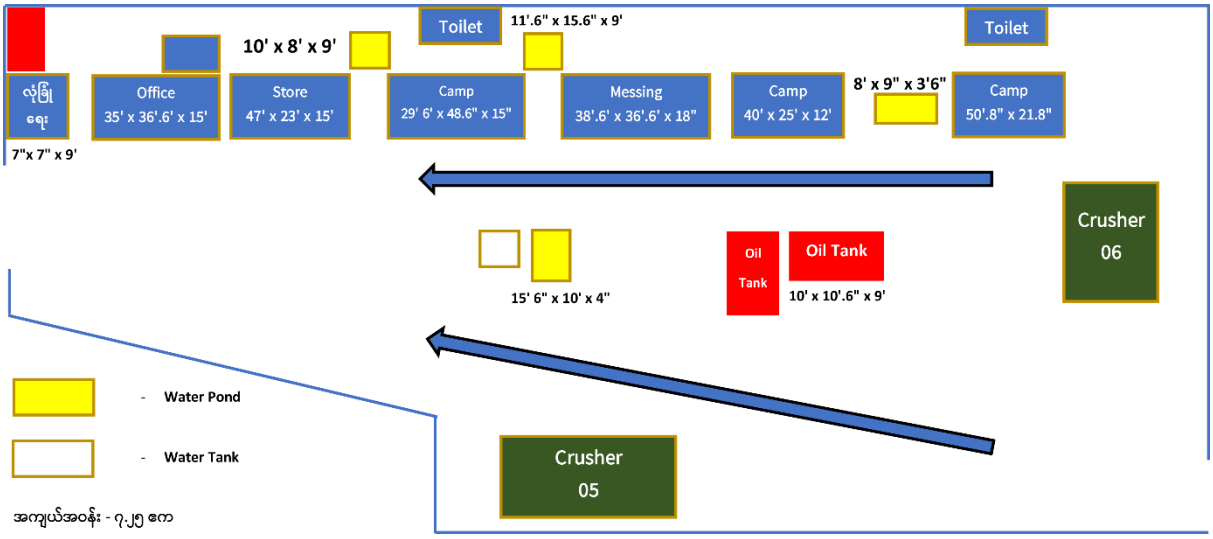
တည်နေရာပြမြေပုံ၊ ကောင်းကင်ဓါတ်ပုံ၊ လေ့လာမည့်နယ်ပယ်ပြမြေပုံတို့ကို ဖော်ပြထားပါသည်။ ကျောက်ထုတ်လုပ်ကွက်မှာ မန္တလေး-လားရှိုး အမြန်လမ်းဘေးတွင် တည်ရှိသည့် ကျောက်တောင်များတွင် ရှိပါသည်။ ထုတ်လုပ်ခွင့်လိုင်စင်ကို ခရိုင်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနမှ ထုတ်ပေးပါသည်။ နှစ်စဉ် သက်တမ်းတိုးလိုင်စင် ထုတ်ယူရသည့်စနစ် ဖြစ်ပါသည်။

ထုတ်လုပ်သည့်ကျောက်အမျိုးအစားမှာ (၆"×၄") (၄"×၃") (၂"×၁") နှင့် ကျောက်မှုံ (chip)များ ဖြစ်ပါသည်။ SDC ၏ဆောက်လုပ်ရေး၊ အခြေခံအဆောက်အဦစီမံကိန်းများတွင် အသုံးပြုရန် ထုတ်ယူမည် ဖြစ်ပါသည်။

ထုတ်လုပ်သည့်စနစ်မှာ မြေပေါ်တူးဖော်သည့်စနစ် (Open pit mining) ဖြစ်ပါသည်။ ကျောက်များ အပေါ်ရှိမြေသားကို ဖယ်ထုတ်ခြင်း၊ ကျောက်တုံးများကို ကျင်းတူးခြင်း၊ ကျင်းအတွင်းဖောက်ခွဲပစ္စည်းများ ထည့်၍ ဖောက်ခွဲခြင်းနှင့် ကွဲကျလာသည့် ကျောက်အကြီး၊ အငယ်များကို လိုအပ်သည့် အရွယ်ရစေရန်

ကြိတ်ခွဲခြင်းများ ဆောင်ရွက်သည့်စနစ်ဖြစ်ပါသည်။ ဤကျောက်ကွက်မှ စုစုပေါင်းထွက်နိုင်သည့် ကျောက်ပမာဏမှာ ၅၃၁၊ ၃၂၄ ကျင်းဖြစ်ပါသည်။

စီမံကိန်း၏ အခြေစိုက်နေရာမှာ စီမံကိန်းဧရိယာပြင်ပရှိ ကြူဝန်းရွာတွင်ရှိသောမြေ (၇.၂) ဧကတွင် တည်ရှိပါသည်။ အခြေစိုက်စခန်းအတွင်း ကျောက်ခွဲစက်ငယ်တစ်လုံးလည်းထားရှိပါသည်။ အခြေစိုက်စခန်း၏ တည်ရှိဖွဲ့စည်းမှုမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။



လုပ်ငန်းအတွက် လျှပ်စစ်ကို လျှပ်စစ်လုပ်ငန်းမှ ရရှိပါသည်။ ၅၀၀ ကေဗွီအေ ထရန်စဖော်မာထားရှိပါသည်။ လုပ်ငန်း၏ နှစ်စဉ်လိုအပ်သောရေပမာဏမှာ ၄၀၀,၀၀၀ ဂါလံဖြစ်ပြီး စခန်းသုံးရေကို ရေတွင်းမှ လည်းကောင်း၊ လုပ်ငန်းသုံးရေကို နဒေါင်းကျချောင်းနှင့် ဆည်တော်လေးမြောင်းမှ ရယူပါသည်။ တစ်နှစ်လုံးရေလုံလောက်စွာရရှိပါသည်။

လုပ်ငန်းသုံးဆီလိုအပ်ချက်မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ဆီအမျိုးအစား	လိုအပ်ချက် (ဂါလံ)	
	လစဉ်	နှစ်စဉ်
ဒီဇယ်	၁,၈၀၀	၁၈,၀၀၀
အင်ဂျင်ဝိုင်	၃၅၀	၃,၀၀၀
ဟိုက်ဒရောလစ်	၂၅၀	၃,၀၀၀

အမာခံဝန်ထမ်း (၃၉) ဦးဖြင့် လည်ပတ်မည်ဖြစ်ပါသည်။ ယန္တရားလိုအပ်ချက်မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။ SDC ၏ ကျောက်ထုတ်လုပ်ငန်းအစီအစဉ်အသေးစိပ်ကို အခန်း(၃) တွင် ဖော်ပြထားပါသည်။ အောက်ပါစက် (၁၄) လုံးသုံးမည်ဖြစ်ပါသည်။

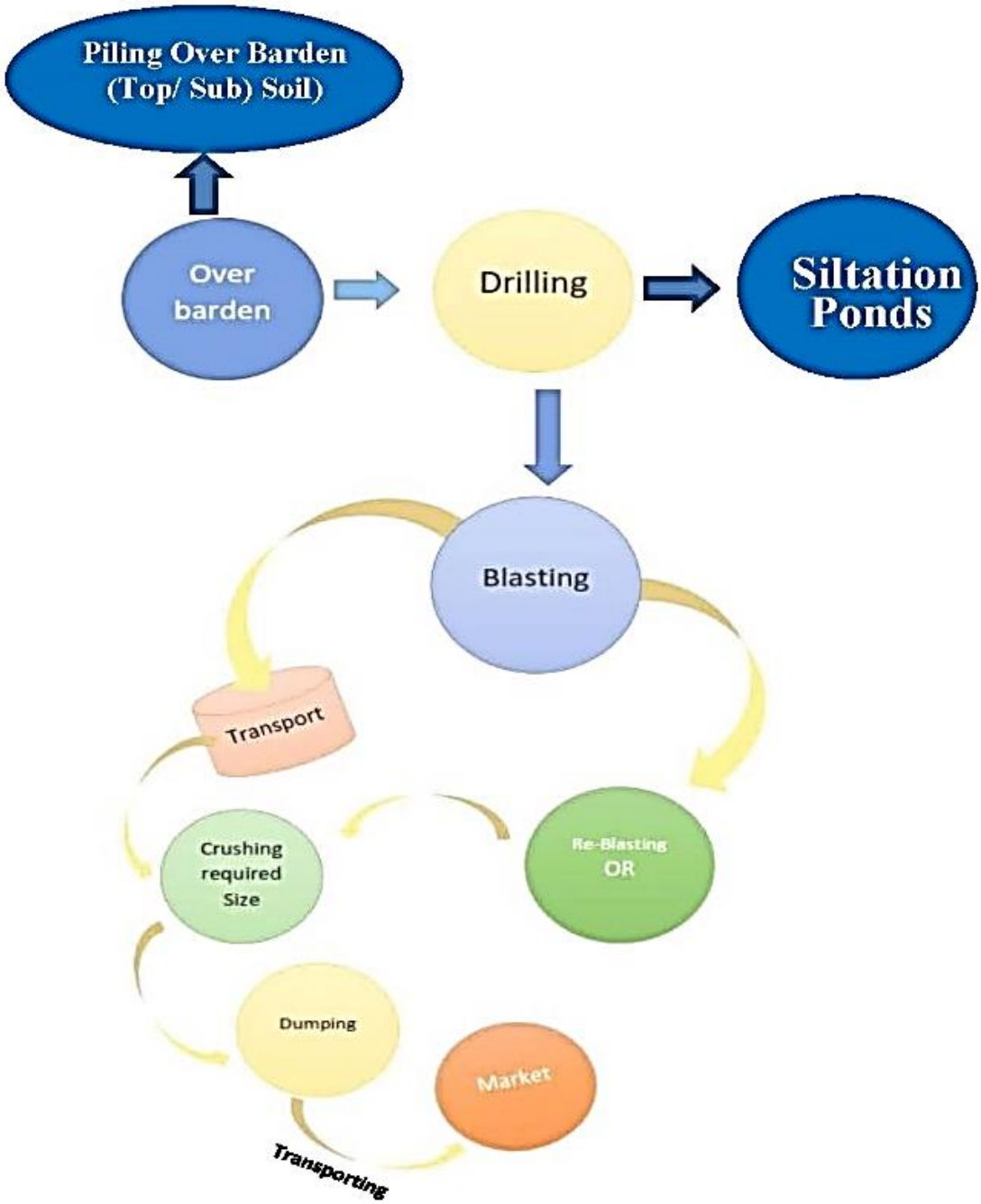
1.	944-Hydraulic Excavator	1	Loading
2.	934 Hydraulic Excavator	1	Mucking and Breaker
3.	Dozer	1	Quarry
4.	Crawler Drill (Hydraulic)	1	Production
5.	Crawler Drill (Pneumatic)	1	Development
6.	Dump Truck	4	Quarry to Crusher
7.	Wheel Loader	1	Crusher
8.	Water Boxer	1	Quarry to Crusher
9.	4 x 4 Double Cub	1	Office & Site
10.	Canter (10')	1	Office & Site
11.	Crushing Plant	1	120 ton per 1 hour

ကျင်းဖောက်ခြင်းနှင့် ဖောက်ခွဲခြင်းစံနှုန်းမှာ အောက်ပါဇယားအတိုင်းဖြစ်ပါသည်။

No.	Requirement	Quantity	Remark
Drilling			
1.	Drilling Pattern		
2.	Burden	2m	
3.	Spacing	2m	
4.	Drill Depth	9m	
5.	Number of Drill hole	24 holes	Per Day
6.	Drilling Meter	216 m	Per Day
Explosive & Accessories (Production)			
7.	Emulsion or Ammonium	300 kg	Per Day
8.	Electric Detonator	24 Pcs	Per Day
9.	Primer – CE	24 Pcs	Per Day
10.	Detonating Cord	36 m	Primer booster
11.	Leg wire	250 m	Per Day
12.	Blasting Volume	200 suds	Per Day
Explosive & Accessories (Development)			
13.	Emulsion or ammonium	63 kg	Per Day
14.	Electric Detonator	20 Pcs	Per Day
15.	Primer – CE	20 Pcs	Per Day
16.	Detonating Cord	25 m	Primer + booster

17.	Leg Wire	200 m	Per Day
18.	Blasting Volume	60 suds	Per Day

ကျောက်ထုတ်လုပ်ငန်းစဉ်ပြကားချပ်ကို အောက်ပါအတိုင်းဖော်ပြထားပါသည်။



နှစ်စဉ်ဖောက်ခွဲရန်အမိုနီယမ်နိုက်ထရိတ် ၄.၅ တန်နှင့် ဖောက်ခွဲပစ္စည်း (၁၈) တန်လိုအပ်ပါသည်။ ဖောက်ခွဲယမ်းများကို ခလရ တပ်စခန်းယမ်းတိုက်မှ သုံးစွဲမည့်အခါတွင် ထုတ်ယူရပါသည်။ လုပ်ကွက်၌ ယမ်းများကို တာရှည်နှင့် အမြောက်အမြားထားခွင့်မရှိပါ။

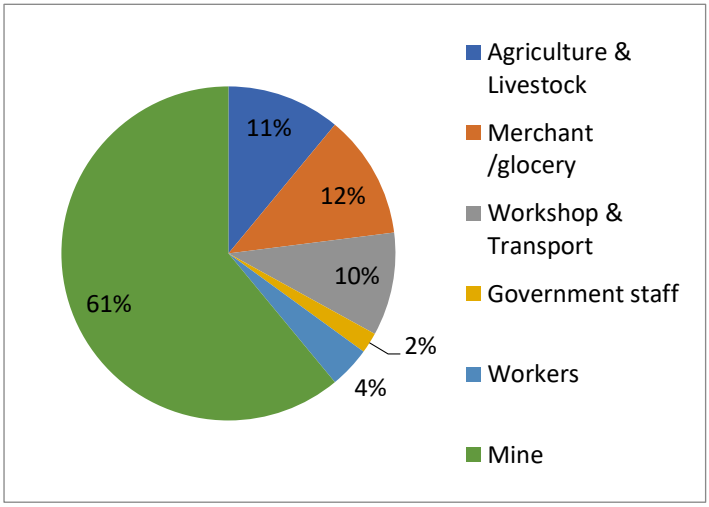
လက်ရှိပတ်ဝန်းကျင်နှင့် လူမှုရေးအခြေအနေ

စီမံကိန်းမှာ မြန်မာနိုင်ငံအလယ်ပိုင်း (အပူပိုင်း ဒေသ)တွင် ကျရောက်ပါသည်။ ပျမ်းမျှတစ်နှစ် မိုးရေချိန် (၄၀ လက်မ မှ ၅၀ လက်မ) အတွင်းခံရရှိပါသည်။ အမြင့်ပေမှာ ပင်လယ်ရေမျက်နှာပြင်အထက် ပေ ၅၀၀ မှ ၆၅၀ အတွင်း တည်ရှိပါသည်။ အဓိကစီးဆင်းသောမြစ်မှာ မြစ်ငယ်မြစ်နှင့် ဧရာဝတီမြစ်တို့ဖြစ်ပါသည်။ ဘူမိဗေဒဖွဲ့စည်းမှုမှာ Tectono-stratigraphic (Central Cainozoic Belt) အတွင်းကျရောက်ပါသည်။

ပုသိမ်ကြီးမြို့နယ်၏ လူဦးရေမှာ ၂၆၃၇၅၅ ရှိပြီး ကျေးရွာ (၅၈) ရွာနှင့် ရပ်ကွက် (၁) ခုဖြင့် ဖွဲ့စည်းထားပါသည်။ လူဦးရေနှင့် အိမ်ခြေအနေအထားမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

ရွာအမည်	အိမ်ထောင်စု	လူဦးရေ		
		ကျား	မ	စုစုပေါင်း
ကြူဝန်း	၃၄၅	၆၂၃	၆၇၇	၁၃၀၀
ရေမ	၈၉	၁၅၈	၁၆၇	၃၂၅
အုန်းချောင်း	၂၃၇၀	၈၃၉၁	၈၈၇၇	၁၇၃၂၈
ထုံးဘို	၁၁၉၅	၂၈၈၇	၃၁၉၀	၆၀၇၇
ချင်းကုန်း				

ဒေသခံပြည်သူတို့၏ အသက်မွေးဝမ်းကြောင်းအခြေအနေမှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။



လူတစ်ဦးတစ်လဝင်ငွေမှာ ကျပ် ၂၀၀,၀၀၀/- ဖြစ်ပါသည်။ ပညာရေး၊ ကျန်းမာရေးအဆင့်အတန်းနိမ့်ကျပါသည်။ ပုသိမ်ကြီးတွင် အထွေထွေရောဂါကုဆေးရုံ (၁) ရုံ၊ အုန်းချောတွင် မျက်စိဆေးရုံ၊ အုန်းချောနှင့်

ကျွဲနဖားတွင် ကျေးလက်ကျန်းမာရေးဆေးခန်း(၂) ခန်း နှင့် ပုဂ္ဂလိက ဆေးခန်း (၁၀)ခန်း ရှိပါသည်။ ပညာရေးအနေဖြင့် အုန်းချောတွင် အထက်တန်းကျောင်း(၁) ကျောင်း၊ ထုံးဘိုတွင် အလယ်တန်းကျောင်း(၁) ကျောင်း၊ မူလတန်းနှင့် ဘုန်းတော်ကြီးပညာသင်ကျောင်း (၁)ကျောင်းစီ အုန်းချောဌ်တည်ရှိပါသည်။

ပုသိမ်ကြီးမြို့နယ်အတွင်းရှိ သမိုင်းဝင်အဆောက်အဦ/ နေရာများမှာ ရန်ကင်းတောင်၊ မြကျောက်စေတီ၊ ရွှေစာရံစေတီ၊ စံနှစ်စံစေတီ၊ ဆင်မတောင်တော်နှင့် အိမ်ရှေ့မင်းတော်တို့ဖြစ်ပြီး ရွှေစာရံဘုရားသည် လုပ်ကွက်နှင့်အနီးဆုံးနှင့် ထင်ရှားသည့်သမိုင်းဝင်စေတီဖြစ်ပါသည်။

မိုင်းစီမံကိန်းအရ ကျောက်မိုင်း၏သက်တမ်းတစ်လျှောက်စုစုပေါင်းထွက်ရှိမည့် ခန့်မှန်းစွန့်ပစ် ပစ္စည်းမှာ မြေသား ၁၅၀၀၀ ကျင်းနှင့် ကျောက်ပျက် ၂၇၀၀၀ ကျင်းဖြစ်ပါသည်။ အခြားစွန့်ပစ်ပစ္စည်း (အစိုင်အခဲ) အနေဖြင့် ရုံး၊ စခန်း၊ မီးဖိုသုံး အမှိုက်များဖြစ်ပါသည်။ ဘေးဖြစ်သောတတ်သည့်စွန့်ပစ်ပစ္စည်းများဖြစ်သော ဓါတုပစ္စည်း၊ ဖောက်ခွဲပစ္စည်း၊ သုံးပြီးဆီဟောင်း စသည်တို့ဖြစ်ပြီး စနစ်တကျစုဆောင်းပြီး သတ်မှတ်စွန့်ပစ်ရန် နေရာတွင် စနစ်တကျစွန့်ပစ်ရန်လိုအပ်ပါသည်။ လုပ်ငန်းမှ စိမ့်ထွက်ရေနှင့် စီးဆင်းရေများကို စိမ့်ဖမ်းကန များတွင် စုဆောင်းထားပြီး အနည်ထိုင်စေကာ အဆိုပါရေကို လမ်းများရေဖြန်းပက်ရာတွင် ရယူသုံးစွဲပါသည်။

၂၀၁၈ ခုနှစ်တွင် တိုင်းတာခဲ့သည့် လေထုအရည်အသွေးရလဒ်မှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

ရက်စွဲ/အချိန်	တိုင်းတာသည့် အမျိုးအစား	ရလဒ်	စံချိန်စံညွှန်း	မှတ်ချက်
၁၂/၉/၂၀၁၈ (၁၀:၀၀ နံနက်) မှ ၁၃/၉/၂၀၁၈ (၁၀:၀၀ နံနက်)	PM 10	92 µg/ m^3	50	NEQ
	PM 2.5	130 µg/ m^3	25	NEQ
	NO	42 Ppb	-	
	NO_2	12 µg/ m^3	200 µg/ m^3	
	SO_2	2.1 µg/ m^3	20 µg/ m^3	
	Co	184 Ppb	1,000 Ppb	
	RH	54%		
	Temp	31°C		

ရလဒ်အရ အမှုံအမွှားပါဝင်မှုမှာ မြန်မာ့ပတ်ဝန်းကျင်ဆိုင်ရာ စံနှုန်း(လွှတ်ထုတ်မှု) စံထက်မြင့်မားကြောင်းတွေ့ရပါသည်။

ပတ်ဝန်းကျင်လေထုအရည်အသွေးကို ၂၀၂၁ ဒီဇင်ဘာလက တိုင်းတာရရှိချက်မှာ အောက်ပါအတိုင်း ဖြစ်ပါသည်။

Para-meters	Averaging Period	Measuring Point AQM	NEQEGs	AQI Index		Remark
Date	-	23.12.2021 24.12.2021	2015	AQI	AQI Category	
CO (ppm)	1 hour 24 hours	0.0105 0.2523	-	2 (CO -8hr avg)	Good	
NO_2 (ppm)	1 hour	0.0004ppm (0.799µg/m^3)	200µg/m^3	0 (NO_2- 1hr avg)	Good	
	24 hours	0.0102ppm (19.176µg/m^3)	-	-	-	
Ozone (ppm)	8 hours daily max;	0.03ppm (60µg/m^3)	100µg/m^3	0 (O_3- 8hr avg)	Good	
SO_2 (ppm)	10 minutes	-	500µg/m^3	0 (SO_2- 1hr avg)	Good	
	24 hours	0.0003ppm (0.786 µg/m^3)	20µg/m^3			
PM_{10} (µg/m^3)	24 hours	94.2 µg/m^3	50µg/m^3	70 (PM_{10} -24hr avg)	Moderate	
$PM_{2.5}$ (µg/m^3)	24 hours	59.2 µg/m^3	25 µg/m^3	153 ($PM_{2.5}$ -24hr avg)	Unhealthy	

Remark

1 ppm	=	1000 ppb
1 ppb	=	1µg/m^3
CO 1 ppb	=	1.145 µg/m^3
NO_2 1 ppb	=	1.88 µg/m^3
NO 1 ppb	=	1.25 µg/m^3
O_3 1 ppb	=	2 µg/m^3
SO_2 1 ppb	=	2.62 µg/m^3

တိုင်းတာရလဒ်အရ CO, NO_2, Ozone, SO_2 တို့မှာ သတ်မှတ်စံနှုန်းဘောင်းအတွင်း၌ရှိပြီး အမှုန်အမွှားပမာဏမှာ မြင့်မားကြောင်းတွေ့ရပါသည်။ ဆူညံသံကို ၂၀၁၈ နှင့် ၂၀၂၁ တွင် တိုင်းတာခဲ့ရာ သတ်မှတ်စံနှုန်းအတွင်းရှိသည်ကို တွေ့ရှိရပါသည်။

ဇီဝမျိုးစုံမျိုးကွဲအနေဖြင့် ဖော်ပြပါဒေသတွင် ဆယ်စုနှစ်များစွာက ကျောက်ထုတ်လုပ်ငန်း ဆောင်ရွက်ခဲ့သည့် အားလျော်စွာ အရေးကြီးသည့်အပင်နှင့် သတ္တဝါများ မတွေ့ရပါ။

အများပြည်သူတွေ့ဆုံဆွေးနွေးပွဲကို (၂)ကြိမ်ဆောင်ရွက်ခဲ့ပါသည်။ ၂၀၂၁ ဒီဇင်ဘာ ၂၃တွင် တစ်ကြိမ်၊ ၂၀၂၃ နိုဝင်ဘာ ၂၂ တွင် တစ်ကြိမ် ကျင်းပခဲ့ပါသည်။ တွေ့ဆုံဆွေးနွေးပွဲရလဒ်အပေါ်တွင် ရှေ့ဆက်ဆောင်ရွက်မည့်အစီအစဉ်မှာ အောက်ပါအတိုင်းဖြစ်ပါသည်။

(၁) အစီရင်ခံစာတင်ပြီး (၁၅) ရက်အတွင်း EIA အစီရင်ခံစာအား အများပြည်သူများလေ့လာနိုင်ရန် ဝက်(ဘ်)ဆိုက် တင်ရန်

(၂) အစည်းအဝေးဆုံးဖြတ်ချက်၊ ဆွေးနွေးချက်များကို ဆက်လက်အကောင်အထည်ဖော်ရန်

(၃) လုပ်ငန်းရှင်မှ ဒေသခံလိုအပ်ချက်များဖြည့်စည်းပေးရန်

(၄) အစုလိုက်ဆွေးနွေးပွဲ၊ အများပြည်သူဆွေးနွေးပွဲများဆက်ကျင်းပရန်

ထိခိုက်မှု ဖော်ထုတ်ခြင်းကို အခန်း(၇) တွင် ဖော်ပြထားပါသည်။ ထိခိုက်မှုကို ကိန်းဂဏာန်းအခြေခံ ဖော်ထုတ်စနစ်နှင့် ကျွမ်းကျင်မှုဆုံးဖြတ်ချက် (Professional Judgement) ဖြင့်ဆောင်ရွက်ထားပါသည်။

အောက်ပါထိခိုက်မှုလျော့ချရေးအစီအစဉ်များရေးဆွဲထားပါသည်။

အမြင်ပသာဒ၊ ဆူညံ/တုန်ခါမှု၊ လေအရည်အသွေး၊ ရာသီဥတု ပြောင်းလဲမှု၊ မြေတိုက်စားမှု၊ တောင်ပြိုခြင်း၊ ရေအရည်အသွေး၊ ကျန်းမာရေးနှင့် အန္တရာယ်၊ လူမှုရေးထိခိုက်မှု၊ ဇီဝမျိုးစုံမျိုးကွဲနှင့် လုပ်ငန်းခွင် ဘေးကင်းရေးတို့ ဖြစ်ပါသည်။

လည်ပတ်ကာလပတ်ဝန်းကျင်သက်ရောက်မှုလျှော့ချရေးအစီအစဉ်

စဉ်	ဖြစ်နိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှု	တည်နေရာ	သက်ရောက်မှု	ကြွင်းကျန်သော သက်ရောက်မှု	လျှော့ချနိုင်သောနည်းလမ်းများ Mitigation Measures	ခန့်မှန်းကုန် ကျငွေ (မြန်မာကျပ်)	တာဝန်ရှိအဖွဲ့အစည်း
ပတ်ဝန်းကျင်ဆိုင်ရာရှုထောင့်							
က	မျက်မြင်ပသာဒ	လည်ပတ်နေရာအားလုံး	မြင်နိုင်သော အမှုန်အမွှားနည်းပါး	လျစ်လျူရှု နိုင်	ကြားခံနယ်ဖန်တီးပေးခြင်း၊ အပင်စိုက်ပေးခြင်း	-	HSE Coordinator နှင့်အဖွဲ့
ခ	လေအရည်အသွေး	လည်ပတ်နေရာအားလုံး 21°53’42.39”N 96°13’4.85” E	ဓါတ်ငွေ့လွှတ်ထုတ်မှု		• ဖုန်မထရန်ဆောင်ရွက်သည့်ပစ္စည်းများ (ရေပန်း) • လမ်းပေါ်တွင်ရေဖြန်းခြင်း လုပ်ဆောင်မည့်လုပ်ငန်းများအား အချိန်ဇယားသတ်မှတ်ခြင်း • ဖုန်ကာကွယ်နိုင်သော တစ်ကိုယ်ရည်သုံးပစ္စည်းများထောက်ပံ့ပေးခြင်း၊ ယာဉ်နှင့် စက်များအား ကောင်းမွန်စွာထိန်းသိမ်းခြင်း	၅,၀၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့
ဂ	ဆူညံသံ/ တုန်ခါမှု	လုပ်ငန်းလည်ပတ်နေရာအားလုံးနှင့် လူနေအိမ်များ	နိမ့်ပါးအလုပ်သမားနှင့်	အနည်းငယ်ထိခိုက်နိုင်	• ဆူညံသံထွက်နိုင်သောလုပ်ငန်းများအတွက်နေ့ဖက်တွင်ဆောင်ရွက်ရန် အစီအစဉ်ဆွဲရန်	၃၅၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့

		ကြိတ်ခွဲစက်များနှင့် အခြားမိုင်းလုပ်ငန်းများမှ ထွက်ပေါ်လာနိုင်သော နေရာများ 21°53’42.39”N 96°13’4.85” E	လူထုအားသက်ရောက်မှု မရှိခြင်း		• ပေါက်ကွဲအားကို ထိန်းချုပ်ရန် • တစ်ကိုယ်ရည်ကာကွယ်ရေးသုံးပစ္စည်းကို ထောက်ပံ့ပေးရန် (နားကြပ်၊ နားကာ) • ဆူညံသံထိခိုက်မှုနည်းသောပစ္စည်းများတပ်ဆင်ပေးခြင်း • ဆူညံသံနှင့် တုန်ခါမှုလျှော့ချပေးသောနည်းပညာသစ်များအသုံးပြုခြင်း • ဆူညံသောလုပ်ငန်းများအား နေ့ဖက်တွင်ဆောင်ရွက်ရန် • အသံလုံသောအဖုံးအကာ၊ အခန်းငယ်တွင် စက်များကို ထားရန် • မိုင်းဧရိယာပတ်ဝန်းကျင်တွင် လေကာတန်းများ စိုက်ခြင်း • ဖောက်ခွဲခြင်းအားအလုပ်ချိန်နောက်ပိုင်းတွင်ဆောင်ရွက်ရန် (၀၄:၀၀ - ၀၆:၀၀) • အကြားအာရုံထိခိုက်မှုရှိနိုင်သော		

					စက်ကိုင်၊ ယာဉ်မောင်းများအားပုံမှန်ကျန်းမာရေးစစ်ဆေးမှုဆောင်ရွက်ပေးခြင်း		
ဃ	ရေညစ်ညမ်းခြင်း	လည်ပတ်နေရာအားလုံး 21°53’42.39”N 96°13’4.85” E	ရေကြောင်းပြောင်းလဲခြင်း၊ ရေညစ်ညမ်းခြင်းနှင့် အနည်ပို့ချခြင်း		• နုန်းဖမ်းမြောင်းနှင့် နုန်းဖမ်းကန်များတည်ဆောက်ရန် • မိုးရေအားအသုံးပြုရန် စုဆောင်းခြင်း • ရေအရည်အသွေးအားပုံမှန်စစ်ဆေးဆောင်ရွက်ရန်	၃၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့
င	မြေ	လုပ်ငန်းလည်ပတ်နေရာအားလုံး 21°53’43.39”N 96°13’4.37” E	အနည်ပို့ချခြင်းနှင့် ညစ်ညမ်းခြင်း	အလယ်အလတ်	• ဆီနှင့် ချောဆီများအား သတိနှင့်အသုံးပြုခြင်း၊ စွန့်ပစ်ခြင်း • ဆီယိုစိမ့်မှုမဖြစ်စေရန် ကောင်းမွန်သောကိုင်တွယ်နည်းလမ်းအသုံးပြုခြင်း • အထူးသဖြင့် မိုးရာသီတွင် ရေစီးလမ်းကြောင်းကောင်းစေရန် ရေလမ်းကြောင်းနှင့်မြောင်းများ ဒီဇိုင်းဆွဲခြင်း • မြေတိုက်စားမှုမဖြစ်ပွားစေရန်	၂,၅၀၀,၀၀၀	

					သဲနှင့် သဲအိတ်များကို မြေပုံများ၏ပတ်လည်တွင်ထားရန်		
စ	ကျောက်စများလွှင့်စင်ခြင်း	လုပ်ငန်းလည်ပတ်နေရာအားလုံး	လူအားထိခိုက်မှုမရှိ (ဒဏ်ရာဖြစ်ပွားမှု)	နိမ့်ပါး	• ဖောက်ခွဲချိန်တွင် လူများအား သတိပေးခြင်း၊ ဖယ်ရှားစေခြင်း • သင့်တော်သောတည်နေရာ၊ လမ်းကြောင်းကို ညွှန်ပြပေးခြင်း • ပေါက်ကွဲပြင်းအားကို ထိန်းချုပ်ခြင်း	-	
ဆ	အနှံ့	ဖောက်ခွဲနေရာအနီး ပတ်ဝန်းကျင်နှင့် လူနေအိမ်များ	စိတ်အနှောင့်အယှက်ဖြစ်စေခြင်း	နိမ့်ပါး	• အနှံ့ထွက်ပေါ်နိုင်မှုကို ကန့်သတ်နိုင်ရန် ပစ္စည်းကိရိယာများတပ်ဆင်ခြင်း • စဉ်ဆက်မပြတ်စောင့်ကြပ်ကြည့်ရှုမှုဆောင်ရွက်ခြင်း • ထုတ်လုပ်ရေးလမ်းကြောင်းတစ်လျှောက် လေကာတန်းအပင်များစိုက်ပျိုးခြင်း	-	HSE Coordinator နှင့်အဖွဲ့
စွန့်ပစ်ပစ္စည်းများထုတ်လွှတ်ခြင်း							
က	စွန့်ပစ်အစိုင်အခဲ၊ စွန့်ပစ်အရည် နှင့် အန္တရာယ်ရှိစွန့်ပစ်	လုပ်ငန်းလည်ပတ်နေရာအားလုံး	ညစ်ညမ်းခြင်းနှင့် အနည်ပို့ချ	အသင့်အတင့် ထိခိုက်ခြင်း	• အန္တရာယ်ရှိအမှိုက်၊ ပြန်သုံးနိုင်သောအမှိုက်နှင့် ယေဘုယျအမှိုက်ဟူ၍	၁,၀၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့

	ပစ္စည်းများ		ခြင်း		ခွဲခြားစွန့်ပစ်ရန် • လုံလောက်သော အိမ်သာ ဆောက်ပေးရန် • သင့်တော်သောပုံးများတွင် အမှိုက်များကိုစုရန် • ကောင်းမွန်သော မိလ္လာစနစ်အား ပြုပြင်ထိန်းသိမ်းခြင်း၊ မိလ္လာမှ ညစ်ညမ်းနိုင်သောအခြေအနေများအား စောင့်ကြပ်ကြည့်ရှုရန် • ဆီဖိတ်စင်မှုနှင့် ယိုစိမ့်မှုကို ထိန်းချုပ်ခြင်း • စက်နှင့် ယာဉ်များအား ပုံမှန်ပြုပြင်ထိန်းသိမ်းခြင်း • ရေလမ်းကြောင်းအတွင်းသို့ အမှိုက်များမပစ်ရန် • အမှိုက်များစုရန်ကောင်းမွန်သော ရေလမ်းကြောင်းများတည်ဆောက်ခြင်း		
ဇီဝသယံဇာတများ							
က	သစ်တောနှင့်	ကျောက်ထုတ်လုပ်ရာ	သစ်တော	ထိခိုက်မှု	• သစ်ပင်ပန်းမန်များရှင်းလင်းခြင်း	၅,၀၀၀,၀၀၀	HSE Coordinator

	ဇီဝမျိုးစုံမျိုးကွဲများ	နေရာနှင့် ပတ်ဝန်းကျင်	များ၊ အပေါ်ယံမြေဆီလွှာနှင့် ကျန်ရှိသေးသော သစ်ပင် ပန်းမန်နှင့် တောရိုင်း တိရစ္ဆာန်များ ပျောက်ဆုံးခြင်း	အသေးစား	နှင့် ရေလမ်းကြောင်း ပြောင်းလဲခြင်းကို လျှော့ချရန် • ကောင်းမွန်ကျယ်ဝန်းသော ကြားခံနယ်ထားရှိရန် • သစ်ပင်ပန်းမန်နှင့် တောရိုင်း တိရစ္ဆာန်များအား ထိန်းသိမ်းရန် • ထုတ်လုပ်ရေးလမ်းကြောင်းတစ်လျှောက်အပင်များစိုက်ရန် • အလုပ်သမားနှင့် ရွာသားများအား ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး၊ အထူးသဖြင့် သစ်ပင်ပန်းမန်နှင့် တောရိုင်းတိရစ္ဆာန်များအား ထိန်းသိမ်းရာတွင် သတိပြုမိစေရန် • မန္တလေးခရိုင်ရှိ တောရိုင်းတိရစ္ဆာန်ဘေးမဲ့ ဥယျာဉ်သို့လှူရန် • ငါးဖမ်းရာတွင် ငါးလုပ်ငန်း ဥပဒေနှင့် နည်းဥပဒေ များကို လိုက်နာရန်		နှင့်အဖွဲ့

ပိတ်သိမ်းကာလပတ်ဝန်းကျင်သက်ရောက်မှုလျှော့ချရေးအစီအစဉ်

စဉ်	ဖြစ်နိုင်သော ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ရောက်မှု	တည်နေရာ	သက်ရောက်မှု	ကြွင်းကျန်သော သက်ရောက် မှု	လျော့ချနိုင်သောနည်းလမ်းများ Mitigation Measures	ခန့်မှန်းကုန်ကျငွေ (မြန်မာကျပ်)	တာဝန်ရှိအဖွဲ့အစည်း
Environmental Aspect							
က	မျက်မြင်ပသာဒ	ပိတ်သိမ်းနေရာ အားလုံး	မြင်ကွင်း အပေါ် သက် ရောက်မှု	လျစ်လျူရှုနိုင်	• အကောင်းဆုံးနည်းလမ်းများအား ဆောင်ရွက်ခြင်း • အောက်ခံမြေသားအားပြန်ဖို့ပြီး ၎င်းအပေါ်တွင်အပေါ်ယံမြေသား ပြန်ဖို့ခြင်း • အပင်များပြန်လည်စိုက်ပျိုးခြင်း	-	HSE Coordinator နှင့်အဖွဲ့
ခ	လေအရည်အသွေး	ပိတ်သိမ်းနေရာ အားလုံး	ဖုန်နှင့် ဓါတ်ငွေ့ လွှတ်ထုတ် မှု	လျစ်လျူရှုနိုင်	• အမှိုက်များအားမီးရှို့ခြင်းကို ထိန်းချုပ်ရန် • တစ်ကိုယ်ရည်သုံးကာကွယ်ပစ္စည်း (PPE) များထောက်ပံ့ပေးရန် • ရှင်းလင်းသောပိတ်သိမ်းအစီအစဉ် ရေးဆွဲခြင်း • မြေကြီးနှင့် ယာယီလမ်းများပေါ်တွင် ရေဖြန်းခြင်း	၂,၀၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့
ဂ	ဆူညံသံ/ တုန်ခါမှု	ပိတ်သိမ်းနေရာအား လုံး	အလုပ်သ မားနှင့် လူထုအား	လျစ်လျူရှုနိုင်	• နေ့အချိန်တွင်လုပ်ငန်းပိတ်သိမ်း လုပ်ငန်းများဆောင်ရွက်ရန် • အဆောက်အဦဖြိုရာတွင်ထိန်းချုပ်	၂၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့

			သက်ရောက်မှုမရှိခြင်း		ရန် • ယာဉ်နှင့်စက်များ၏အရှိန်ကိုထိန်းချုပ်ရန် • တစ်ကိုယ်ရည်သုံးကာကွယ်ပစ္စည်း(PPE) များထောက်ပံ့ပေးရန်		
ဃ	ရေသယံဇာတ	ပိတ်သိမ်းနေရာအားလုံး	ရေညစ်ညမ်းခြင်းနှင့် အနည်ပို့ချခြင်း	ထိခိုက်မှုအလယ်အလတ်	• အစိုင်အခဲနှင့် အရည်စွန့်ပစ်ပစ္စည်းများအား ရေလမ်းကြောင်းအတွင်းသို့မစွန့်ပစ်ရန် • လောင်စာဆီ၊ ချောဆီ နှင့် ဓါတုပစ္စည်းများအတွက် မစိမ့် နိုင်သောပုံးများ၊ ကန်များသုံးရန် • အမှိုက်တွင်းများအား မြေဖို့ရန် • ကမ်းပါးဘေးတွင် မြေတိုက်စားမှုမဖြစ်ရန်ကာကွယ်ခြင်း	၃၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့
စွန့်ပစ်ပစ္စည်းများထုတ်လွှတ်ခြင်း							
က	အစိုင်အခဲ၊ အရည်နှင့် ဘေးအန္တရာယ်ရှိစွန့်ပစ်ပစ္စည်းများ	ပိတ်သိမ်းနေရာအားလုံး	ရေ၊ လေ၊ မြေညစ်ညမ်းခြင်းနှင့် အနည်ပို့ချခြင်းများ	ထိခိုက်မှုနည်းပါး	• ဒီဇယ်နှင့် ချောဆီများအား သတိနှင့် အသုံးပြုခြင်း၊ သယ်ဆောင်ခြင်းနှင့် ထိန်းသိမ်းခြင်း • အမျိုးမျိုးသောအမှိုက်များအတွက် အမှိုက်ပုံးများခွဲထားခြင်း • ရေလမ်းကြောင်းအတွင်း မစွန့်ပစ်ရန် • ဖြစ်နိုင်လျှင် အမှိုက်များအား ပြန်	၂,၀၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့

					လည် ပြုပြင်အသုံးပြုခြင်း၊ စွန့်ပစ်ခြင်း နှင့် မြေဖို့ခြင်းလုပ်ရန် • နေရာရှိအမှိုက်များအား ရှင်းလင်းခြင်း • ပြန်လည်ထူထောင်ရေးလုပ်ငန်းများ ဆောင်ရွက်ရန်		
ဇီဝသယံဇာတများ							
က	ကုန်းပေါ်နှင့် ရေနေဂေဟစနစ်မှ သစ်ပင်ပန်းမန်နှင့် တောရိုင်းတိရစ္ဆာန်များ	ပိတ်သိမ်းနေရာအားလုံး	နေထိုင်ရာဒေသ ပျောက်ဆုံးခြင်းနှင့် ကျူးကျော်မျိုးစိတ်များ ဝင်လာခြင်း	ထိခိုက်မှုအနည်းငယ်	• မူရင်းနှင့် မျိုးသုဉ်းအန္တရာယ်ရှိအပင်နှင့် တိရစ္ဆာန်များကို ကာကွယ်ရန် • ကျူးကျော်မျိုးစိတ်များအားထိန်းချုပ်ရန် • မူရင်းမျိုးစိတ်နှင့် အကြီးမြန် မျိုးစိတ်များအား ပြန်စိုက်ပျိုးရန် • တရားမဝင် အမဲလိုက်ခြင်း၊ ငါးဖမ်းခြင်း၊ တာပေါ်လင်ဖြင့် အုပ်ခြင်း၊ မီးရှို့ခြင်းတို့အား ထိန်းချုပ်ခြင်းနှင့် ဒေသခံလူထုအား ပညာပေးလုပ်ငန်းများ ဆောင်ရွက်ပေးခြင်း	၃,၀၀၀,၀၀၀	HSE Coordinator နှင့်အဖွဲ့

ထိခိုက်မှု လျော့ချခြင်းကို အခန်း (၇) ဇယား (၇-၄) (၇-၅) ၌ဖော်ပြထားပါသည်။ စောင့်ကြပ်အစီအစဉ်ကို (၉-၃) (၉-၄) ဖြင့် ဖော်ပြထားပါသည်။

လည်ပတ်ကာလစောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

စဉ်	ပတ်ဝန်းကျင်ဆိုင်ရာ သက်ဆိုင်မှု	တိုင်းတာသည့် အမျိုးအစား	အချိန် ကာလ	နေရာ	ခန့်မှန်းကုန်ကျငွေ (မြန်မာကျပ်)	တာဝန်ရှိအဖွဲ့အစည်း
၁	လေ	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်း နေရာ 21°53’42.39”N 96°13’4.85” E	၅,၀၀၀,၀၀၀	HSE Coordinator နှင့် တတိယအဖွဲ့အစည်း
၂	ဆူညံသံ/တုန်ခါမှု	ဆူညံသံအဆင့်နှင့်တူညီသော dB(A) တုန်ခါမှုအဆင့် m/s^2	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်း နေရာ 21°53’42.39”N 96°13’4.85” E	၄၀၀,၀၀၀	HSE Coordinator နှင့် တတိယအဖွဲ့အစည်း
၃	စွန့်ပစ်ရေ	pH, BOD, COD, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Solid	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်းအနီးရှိမြစ်/ချောင်း 21° 53’ 294” N 96° 13’ 209” E	၃၀၀,၀၀၀	HSE Coordinator နှင့် တတိယအဖွဲ့အစည်း
၄	မြေတိုက်စားခြင်း/ မြေပြိုခြင်း	နုန်းဖမ်းမြောင်း၊ နုန်းစစ်ကန်မှ အနည်များစုဆောင်းခြင်း	မိုးရာသီ အတွင်း အပတ်စဉ်	စီမံကိန်းနေရာ 21°53’43.39”N 96°13’4.37” E	၂,၅၀၀,၀၀၀	HSE Coordinator
၅	မီးဘေးအန္တရာယ်	မျက်မြင်စစ်ဆေးခြင်း၊ မီးသတ်ဆေးဘူးပေးခြင်း	လစဉ်	စီမံကိန်းနေရာ	၁,၀၀၀,၀၀၀	HSE Coordinator

		နှင့် မီးလောင်လွယ်သော ပစ္စည်များအား ပုံမှန် စစ်ဆေးခြင်း				
၆	စွန့်ပစ်ပစ္စည်းထုတ်ခြင်း	မျက်မြင်စစ်ဆေးခြင်း	အပတ်စဉ်	စီမံကိန်းနေရာ	၁,၀၀၀,၀၀၀	ကြီးကြပ်သူ
၇	ဘေးကင်းရေးနှင့် ကျန်းမာရေး	ဘေးကင်းရေးပစ္စည်းအမျိုးအစားများ အရေအတွက်၊ ကျန်းမာရေးနှင့် မိလ္လာစနစ်အသုံးအဆောင်များထောက်ပံ့ခြင်း၊ ဆိုင်းဘုတ်တပ်ဆင်ခြင်းနှင့် ကျန်းမာရေးစောင့်ရှောက်မှုပေးခြင်း	လစဉ်	စီမံကိန်းနေရာ	၂,၀၀၀,၀၀၀	HSE Coordinator
၈	ပတ်ဝန်းကျင်ဆိုင်ရာစစ်ဆေးခြင်း	EMP၊ ပတ်ဝန်းကျင်ဆိုင်ရာ မူဝါဒ၊ ဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းများနှင့်အညီလိုက်နာစေရန်	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်းနေရာ	၁,၀၀၀,၀၀၀	HSE Coordinator, သက်ဆိုင်ရာဌာန၊ တတိယအဖွဲ့အစည်း

ပိတ်သိမ်းကာလစောင့်ကြပ်ကြည့်ရှုရေးအစီအစဉ်

စဉ်	ပတ်ဝန်းကျင်ဆိုင်ရာသက်ဆိုင်မှု	တိုင်းတာသည့် အမျိုးအစား	အချိန်ကာလ	နေရာ	ခန့်မှန်းကုန်ကျငွေ (မြန်မာကျပ်)	တာဝန်ရှိအဖွဲ့အစည်း
၁	လေ	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်းနေရာ 21°53’42.39”N 96°13’4.85” E	၂,၀၀၀,၀၀၀	HSE Coordinator & တတိယအဖွဲ့အစည်း
၂	ဆူညံသံ/တုန်ခါမှု	ဆူညံသံအဆင့်နှင့်တူညီသော dB(A) တုန်ခါမှုအဆင့် m/s^2	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်းနေရာ 21°53’42.39”N 96°13’4.85” E	၂၀၀,၀၀၀	HSE Coordinator & တတိယအဖွဲ့အစည်း
၃	ချောင်း/ ရေတွင်း	pH, Color, Turbidity, Total Hardness, BOD, Total dissolved water, Total suspended solid, Temperature	တစ်နှစ်တစ်ကြိမ်	စီမံကိန်းအနီးရှိ မြစ်/ချောင်း 21°53’41.98” N 96°13’5.93” E	၃၀၀,၀၀၀	HSE Coordinator & တတိယအဖွဲ့အစည်း
၄	စွန့်ပစ်ရေ	BOD, COD, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended	တစ်နှစ်နှစ်ကြိမ်	စီမံကိန်းအနီးရှိ မြစ်/ချောင်း	၂,၀၀၀,၀၀၀	HSE Coordinator & တတိယအဖွဲ့အစည်း

		Solid		21° 53’ 294” N 96° 13’ 209” E		
၅	မြေတိုက်စားခြင်း/ မြေပြိုခြင်း	နုန်းဖမ်းမြောင်း၊ နုန်းစစ်ကန်မှ အနည်များစုဆောင်းခြင်း	မိုးရာသီအတွင်း အပတ်စဉ်	စီမံကိန်းနေရာ 21°53’43.39”N 96°13’4.37” E	၁,၅၀၀,၀၀၀	HSE Coordinator နှင့် တတိယအဖွဲ့အစည်း
၆	မီးဘေးအန္တရာယ်	မျက်မြင်စစ်ဆေးခြင်း၊ မီးသတ်ဆေးဘူးပေးခြင်း နှင့် မီးလောင်လွယ်သောပစ္စည်များအားပုံမှန်စစ်ဆေးခြင်း	လစဉ်	စီမံကိန်းနေရာ	၁,၀၀၀,၀၀၀	HSE Coordinator & group
၇	ဘေးကင်းရေးနှင့်ကျန်းမားရေး	ဘေးကင်းရေးပစ္စည်းအမျိုးအစားများ အရေအတွက်၊ ကျန်းမာရေးနှင့် မိလ္လာစနစ် အသုံးအဆောင်များ ထောက်ပံ့ခြင်း၊ ဆိုင်းဘုတ်တပ်ဆင်ခြင်းနှင့် ကျန်းမာရေးစောင့်ရှောက်မှုပေးခြင်း	လစဉ်	စီမံကိန်းနေရာ	၂,၀၀၀,၀၀၀	HSE Coordinator နှင့် အုပ်စု
၈	ပတ်ဝန်းကျင်ဆိုင်ရာစစ်ဆေးခြင်း	EMP၊ ပတ်ဝန်းကျင်ဆိုင်ရာ မူဝါဒ၊ ဥပဒေ၊ နည်းဥပဒေနှင့် စည်းမျဉ်းများနှင့်အညီလိုက်နာစေရန်	တစ်နှစ်တစ်ကြိမ်	စီမံကိန်းနေရာ	၁,၀၀၀,၀၀၀	HSE Coordinator, သက်ဆိုင်ရာဌာန၊ တတိယအဖွဲ့အစည်း
၉	ပြန်လည်တည်ထောင်ရေး	ကျောက်မိုင်းတူးဖော်ထားသော ဧရိယာများအား ပြန်လည်ဖို့ခြင်းနှင့် အပင်များစိုက်ပျိုးခြင်း		ပိတ်သိမ်းဧရိယာ အားလုံး	၃,၀၀၀,၀၀၀	HSE Coordinator & တတိယအဖွဲ့အစည်း

ဤအခန်းတွင် အောက်ပါပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးအစီအစဉ်ခွဲ (Sub-plan)

- ကျန်းမာရေးဘေးကင်းရေး
- ပြည်သူ့ကျန်းမာရေး
- လေလမ်းကြောင်းရောဂါကာကွယ်ရေး
- လုပ်ငန်းခွင်ဘေးကင်းရှင်းရေး
- စွန့်ပစ်စီမံခြင်း
- စက်ဆီယိုဖိတ်မှုကာကွယ်ရန်
- မီးဘေးကာကွယ်ခြင်း
- တောင်ပြိုကာကွယ်ခြင်း
- ကျောက်ကွက်ပိတ်သိမ်းခြင်း
- အရေးပေါ်စီမံခန့်ခွဲမှုအစီအစဉ်
- သင်တန်း
- အစီရင်ခံခြင်း

ဤလုပ်ငန်းအတွက် အဓိကဆက်သွယ်နိုင်သည့်ပုဂ္ဂိုလ်မှာ ဦးသန့်ဇင်အေး၊ ဖုန်း - ၀၉၂၅၅၁၁၁၉၆ဖြစ်ပါသည်။

တတိယအဖွဲ့အစည်းနှင့် လုပ်ငန်းရှင်တို့၏ကတိကဝတ်ပြုခြင်းကို အခန်း (၁၀)တွင် ဖော်ပြထားပါသည်။

အခန်း	ကတိကဝတ်ပြုချက်	နောက်ဆက်တွဲ
စီမံကိန်းအဆိုပြုသူ အခန်း (၂)	- ဤအခန်းတွင်ဖော်ပြထားသော ဥပဒေ၊ နည်းဥပဒေ၊ စည်းမျဉ်းစည်းကမ်းနှင့် သဘောတူညီချက်များအတိုင်းလိုက်နာရန် - ဖောက်ခွဲပစ္စည်းများအား သယ်ယူပို့ဆောင်ခြင်း၊ သိုလှောင်ထိန်းသိမ်းခြင်း၊ အသုံးပြုခြင်းတို့နှင့် ပတ်သက်၍ သတ်မှတ်ထားသော ဥပဒေ၊ နည်းဥပဒေ၊ စည်းမျဉ်းစည်းကမ်း အတိုင်း လိုက်နာရန် - ပတ်ဝန်းကျင်ဆိုင်ရာသက်ရောက်မှု ဖြေလျှော့ခြင်းနှင့် စောင့်ကြပ်ကြည့်ရှုခြင်းအတွက် လိုအပ်သောခန့်မှန်းရသုံးငွေကို ပေးရန် စီမံကိန်း အဆိုပြုသူမှ သဘောတူခြင်း - အကယ်၍ ခန့်မှန်းချေရသုံးငွေလိုအပ်ပါက စီမံကိန်းအဆိုပြုသူမှ လိုအပ်ချက်များကို ထပ်ဖြည့်ပေးရန် သဘောတူရန်	နောက်ဆက်တွဲ (V)

အခန်း (၈)	- အစီရင်ခံစာတွင် ဖော်ပြထားသော ကိန်းဂဏန်း၊ အချက်အလက်၊ အကြောင်းအရာများသည် မှန်ကန်တိကျသေချာပါသည်	နောက်ဆက်တွဲ (V)
တတိယအဖွဲ့ အစည်း အခန်း(၈)	- ပတ်ဝန်းကျင်ဆိုင်ရာလေ့လာမှုသည် ပတ်ဝန်းကျင်ဆိုင်ရာ ဥပဒေ၊ နည်းဥပဒေ နှင့်လမ်းညွှန်ချက်များအပေါ် အခြေခံ၍ ပြင်ဆင်ထားပါသည်။ တတိယအဖွဲ့အစည်း၏ ကျင့်ဝတ်နှင့်အညီ ရေးဆွဲထားပါသည်။ • အစီရင်ခံစာအား ဘက်လိုက်မှုမပါပဲ ပြင်ဆင်ထားပါသည်။ • အစီရင်ခံစာသည် ပြည်စုံတိကျမှုရှိပါသည်။	နောက်ဆက်တွဲ (W)

အခန်း(၁၁) တွင် အောက်ပါအကြံပြုချက်များဖော်ပြထားပါသည်။

(၁) ပတ်ဝန်းကျင်ဆိုင်ရာမူဝါဒ၊ ဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်းများလိုက်နာရန်

(၂) ပတ်ဝန်းကျင်စီမံခန့်ခွဲခြင်း၊ စောင့်ကြပ်ကြည့်ရှုခြင်း၊ လုပ်ကွက်ပိတ်သိမ်းခြင်းများကို ထိရောက်အောင် ဆောင်ရွက်ရန်

(၃) ပတ်ဝန်းကျင်စီမံခန့်ခွဲခြင်းနှင့် ပတ်သက်၍ မှတ်တမ်းများထားရှိရန်နှင့် အစီရင်ခံစာတင်ပြရန်

(၄) လုပ်ကွက်ပတ်လည်တွင် ဝါး/သစ်ပင်များစိုက်ရန်

(၅) မြေလမ်းများကို ဖုန်ထခြင်းသက်သာစေရန်အတွက် ရေဖြန်းပက်ရန်

(၆) ပြည်သူကျန်းမာရေးစောင့်ရှောက်ရန်

Executive Summary

This EIA report was prepared for Shwe Taung Development Company Limited's quarry production project in Mandalay Region, Mandalay District, Patheingyi Township, Chingone-Yema-Kyuwun 555 (Ka) Subplot number (23). The mine area is (15) acres and yearly allowed extraction quarry stone is 13000 SUK or 56550 tons.

The EIA study has been done by SEE Trust, Naywunmyat(s) Co., Ltd with the approval of ECD's letter No: EIA-2/9 (060/2020) Dt: 3rd June, 2020.

The proponent is Shwe Taung Development Co., Ltd (SDC). SDC is the big development local company in Myanmar. The business divisions of SDC are:

- Shwe Taung building materials
- Shwe Taung distribution
- Shwe Taung engineering and construction
- Shwe Taung infrastructure investment
- Shwe Taung life style
- Shwe Taung real estate

The member of EIA service team is as follow:

SEE-Trust, TCR No: 0034, Dt 15 June 2016

Sr.	Name	Duty	Expertise Area
1.	U Zaw Win	Team Leader	Forest and biodiversity, Ecology management & Industry
2.	U Than Tun	Member	Extension, Watershed management & Soil
3.	Daw Thin Thin Myat	Member	Economic Study
4.	U Khin Kham Khan	Member	Environmental Science, GIS
5.	U Khin Mg Htay	Member	Social Science
6.	U Myo Kyaw Thu	Member	Labor Law, Management
7.	U Soe Lin	Field Team	Testing & data, Information Collection
8.	U Myo Min Paing	Field Team	Testing & data, Information Collection

9.	U Khin Maung Lin	Field Assistant	Testing & data, Information Collection

Methodology

The study on existing environmental resources in the project area is focused on three main resources-physical, biological and social economic resources. The physical resources such as quality of air and water inside the project are called primary data, which is collected from existing information in the field survey. This data collection is done by direct observation, interviewing and discussion with the responsible of this mine and analysis. And then, the secondary data for the socioeconomic resources is obtained from the relevant ministries/ bodies and research institutions as reference material for the preparation of EIA report. Moreover, the SEE-Trust team made key informant interviews to the local people who live in villages near by the existing project site. The impact is evaluated and mitigation measures developed for those impacts that are identified as significant.

Time frame for EIA

The original time frame of EIA process is as follow. But the processes delayed due to Covid-19 and current security reasons.

(a) To apply Third Party approval – As soon as contract signed.
(b) Field study – 7 days after approved third party by ECD (7 Working days)
(c) Public consultation meeting for scoping stage (7 working days including preparation invitation etc.)
(d) Information – dissemination and feedback collection is days after field study (15 Days).
(e) Submission of Scoping Report to ECD. (15 Working days)
(f) Detail environmental studies – As soon as Scoping report approved by ECD (45 Working days)
(g) Public consultation Meeting – One month after detail environmental study (7 working days including preparation & invitation)
(h) Information dissemination – 15 days after second public consultation meeting (15 days)
(i) Submission of final EIA report to ECD – 45 days after second consultation meeting. (45 days)
(j) Total working days – 171 days excluding days taken by ECD for approvals.

Work schedule of project

Preconstruction	-	2017
Construction	-	2018
Operation	-	2019 to 2049 or 2069
Decommissioning	-	2049/ 2069

Rehabilitation - 2049/ 2069 June to December

Here, the implementation is far beyond the schedule due to many circumstances.

The legal requirement was mentioned in chapter (two). The environmental law, rules, regulation, standard and procedures mentioned in this chapter and concern other laws as well.

National Environmental Quality (Emission) Standard prescribed this type of project, regards on air quality, noise and discharge water are as follow:

The effluent level of water must within the limit resorbed in the following standard:

Parameter	**Unit**	**Maximum Concentration**
Biological Oxygen demand	mg/L	30
Chemical oxygen demand	mg/L	125
Oil and grease	mg/L	10
pH	SU[a]	6-9
Total coliform bacteria	100mL	400
Total Nitrogen	mg/L	10
Total Phosphorus	mg/L	2
Total suspend solid	mg/L	50

The air quality must be within the following level prescribed by Environmental Quality (Emission Guidelines (2015))

Parameter	**Averaging period**	**Guideline value µg/m³**
Nitrogen dioxide	1 year 1 hour	40 200
Ozone	8 hours daily Maximum	100
Particulate matter PM_{10}[a]	1 year 24 hours	20 50
Particulate matter $PM_{2.5}$[b]	1 year 24 hr	10 25
Sulphur dioxide	24 hr 10-minute	20 500

Noise level guide line

Receptor	One-hour L Aeq (dBA)[a]	
	Day (7:00-22:00) Public holiday (10:00-22:00)	Night 22:00 – 07:00 Public holiday (22:00 – 10:00)
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70

Equivalent continuous sound level in decibels.

Water quality reference

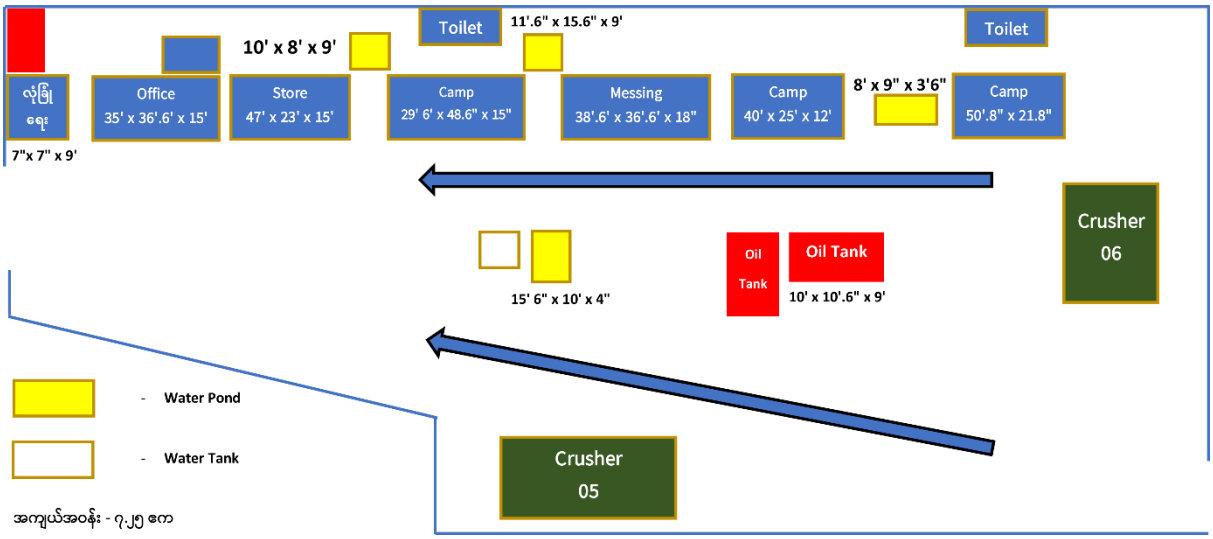
Parameter	Unit	WHO drink
pH	SU	-
Turbidity	NTU	5
Total Hardness	mg/L	500
Iron	mg/L	0.3
Sulphate	mg/L	500
Dissolved Solid	mg/L	1000
Suspended Solid	mg/L	-

The location maps and scope of study area's map are presented in this report. The mine site is near the Mandalay-Lashio high way road sides. The production permit has been issued by Mandalay District's General Administration Department. The permits were issued for one-year period and extendable for each year. The product of mine are to produce quarry stone (6″ x 9″) (3″x4″), (2″x1″) and chips for construction uses. These materials were just only of SDC own uses in the infrastructure development project.

The quarry extraction method is open pit method. The top soil over the rock are removed and blasting made the rock, and then crushed by crushing mills. So called, DBM (drilling and blasting) method. The estimate yield that can be extracted from mine is 531,824 SUD

The project base camp is at the Kyu Wun village in the (7.2) acres compound. There is small crushing mill in the compound. The flow plan of the compound shown below:

Flow plan of current base camp



The electricity for SDC was connected from EPC powerline. There is 500 KVA transformer for the camp. The total water requirement is 180,000 gallons annually. The camp use water is available from bore well in the camp and industrial use water from Sedaw Lay Canal and Nadaungkya stream, which available a lot of water for whole year.

The fuel requirements of project are as follow:

Fuel consumption

Oil type	Requirement Gallon	
	Monthly	Yearly
Diesel	1800	18,000
Engine Oil	250	3,000
Hydraulic	250	3,000

The project will run with 39 staff and labor. The required machines are as follows:

Machinery Requirement

1.	944-Hydraulic Excavator	1	Loading
2.	934 Hydraulic Excavator	1	Mucking and Breaker
3.	Dozer	1	Quarry

4.	Crawler Drill (Hydraulic)	1	Production
5.	Crawler Drill (Pneumatic)	1	Development
6.	Dump Truck	4	Quarry to Crusher
7.	Wheel Loader	1	Crusher
8.	Water Boxer	1	Quarry to Crusher
9.	4 x 4 Double Cub	1	Office & Site
10.	Canter (10')	1	Office & Site
11.	Crushing Plant	1	120 ton per 1 hour

The mine plan of SDC had been mentioned in detail in chapter (3).

The (14) numbers of machine will be used in the project.

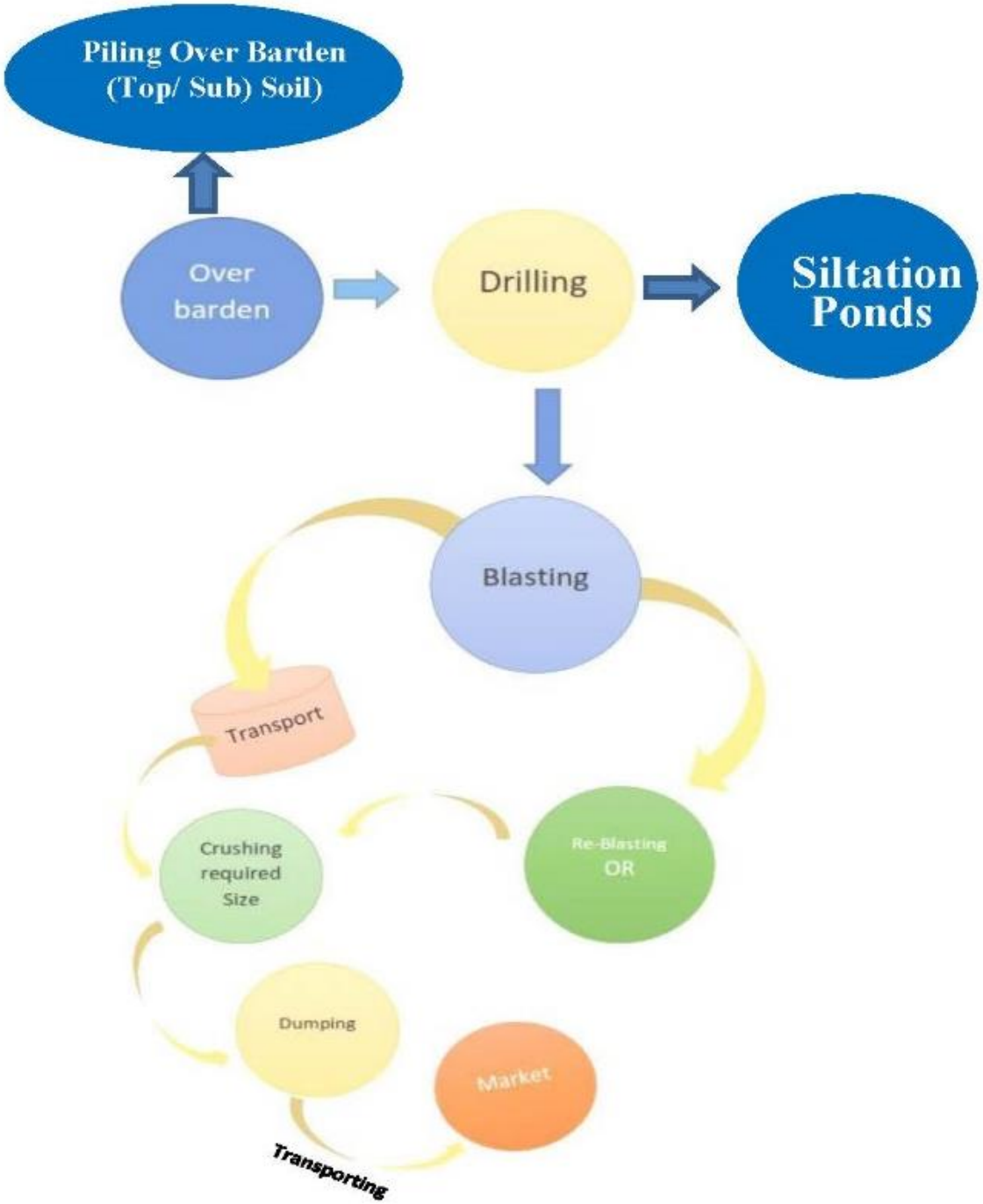
The standard drilling and blasting method are shown below:

Drilling and blasting standards

No.	Requirement	Quantity	Remark
Drilling			
1.	Drilling Pattern		
2.	Burden	2m	
3.	Spacing	2m	
4.	Drill Depth	9m	
5.	Number of Drill hole	24 holes	Per Day
6.	Drilling Meter	216 m	Per Day
Explosive & Accessories (Production)			
7.	Emulsion or Ammonium	300 kg	Per Day
8.	Electric Detonator	24 Pcs	Per Day
9.	Primer – CE	24 Pcs	Per Day
10.	Detonating Cord	36 m	Primer booster
11.	Leg wire	250 m	Per Day
12.	Blasting Volume	200 suds	Per Day
Explosive & Accessories (Development)			
13.	Emulsion or ammonium	63 kg	Per Day
14.	Electric Detonator	20 Pcs	Per Day
15.	Primer – CE	20 Pcs	Per Day
16.	Detonating Cord	25 m	Primer + booster

17.	Leg Wire	200 m	Per Day
18.	Blasting Volume	60 suds	Per Day

The process flow of quarry mine is



The annual requirement for rock explosion is 4.5 tons of Ammonium Nitrate and 18 tons of emulsion. The explosives are usually stored in Army Infantry explosive store, and carry to mine when need to use. Only temporally and small quantity allowed to store in the mine site.

Existing environments

The project is located in the central part of Myanmar, lied in the dry zone area (average rainfall 40-50 inches). Project site elevated from 500 feet to 650 feet approximately. The main rivers are Ayeyarwaddy and Myitnge river. The geological formation is tectonostratigraphic (Central Cainozoic Belt) and subdivided into central volcanic belt.

The population density of Patheingyi Township is 263725 in 58 village tract and one ward. The population and household in the area is as follows:

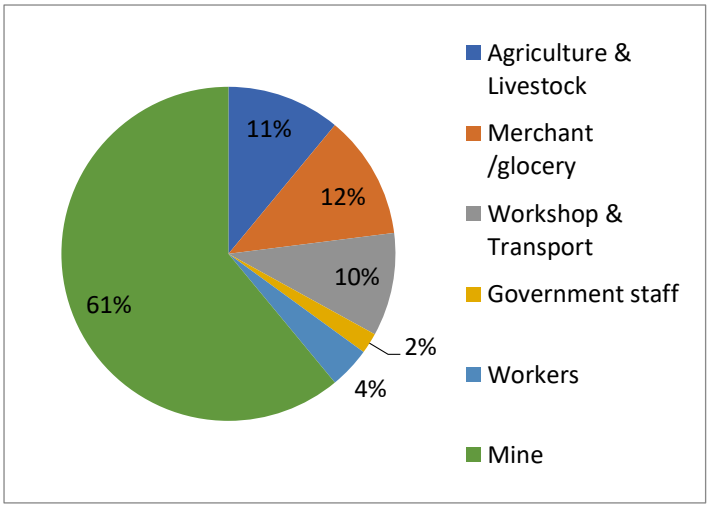
Population and household of surrounding villages

Village	Household	Population		
		Male	Female	Total
Kyuwon	345	623	677	1,300
Ye-ma	89	158	167	325
Ohnchaw	2370	8,391	8,877	17,238
Htone Bo	1195	2,887	3,190	6,077
Chingon				

Source: SEE-Trust

The livelihood of surrounding village shown as below:

Livelihood of community



The average income per capita is K 200,000. Education and health system are insufficient condition. One general hospital at Patheingyi, eye hospital (100 bedded) at Ohn Chaw, village health care in Htone Bo and Kywe Naphar village and ten private clinics. One high school in Ohn Chaw, middle school in Htone Bo and one monk education school in Ohn Chaw.

The result found in 2021 December test are as follow:

Air quality test result in December 2021

Para-meters	Averaging Period	Measuring Point AQM	NEQEGs	AQI Index		Remark
Date	-	23.12.2021 24.12.2021	2015	AQI	AQI Category	
CO (ppm)	1 hour 24 hours	0.0105 0.2523	-	2 (CO -8hr avg)	Good	
NO_2 (ppm)	1 hour	0.0004ppm (0.799µg/m^3)	200µg/m^3	0 (NO_2- 1hr avg)	Good	
	24 hours	0.0102ppm (19.176µg/m^3)	-	-	-	
Ozone (ppm)	8 hours daily max;	0.03ppm (60µg/m^3)	100µg/m^3	0 (O_3- 8hr avg)	Good	
SO_2 (ppm)	10 minutes	-	500µg/m^3	0 (SO_2- 1hr avg)	Good	
	24 hours	0.0003ppm (0.786 µg/m^3)	20µg/m^3			
PM_{10} (µg/m^3)	24 hours	94.2 µg/m^3	50µg/m^3	70 (PM_{10} -24hr avg)	Moderate	
$PM_{2.5}$ (µg/m^3)	24 hours	59.2 µg/m^3	25 µg/m^3	153 ($PM_{2.5}$ -24hr avg)	Unhealthy	

Remark

1 ppm		=	1000 ppb
1 ppb		=	1µg/m^3
CO	1 ppb	=	1.145 µg/m^3
NO_2	1 ppb	=	1.88 µg/m^3
NO	1 ppb	=	1.25 µg/m^3
O_3	1 ppb	=	2 µg/m^3
SO_2	1 ppb	=	2.62 µg/m^3

The historical building in Patheingyi Township are Yankin Taung, Mya Kyauk Sedi, Sinmatung Taw, Ein She Min Taw, etc. Among these Shwe Sar Yan Pagoda is the famous and nearest cultural and historical monument.

The mine wastes were estimated according to the mine plan 15,000 SUDs of soil and 20,000 SUD of overburden will be produced during the whole life of mine. The other solid waste will be produced from office, camp and kitchen, hazardous waste such as chemical, explosive,

used oil and lubricant shall be collected separately and disposed to the designated disposal site. Waste water shall be collected in the silt pond.

The air quality result found in 2018 measurement is shown below

Comparison of air quality in 2018

Date/Time	Substance	Result	Guideline Standard	Remarks
12/9/18 (10:00 AM)	PM 10	92 µg/ m^3	50	NEQ
to				
13/9/18 (09:10) AM	PM 2.5	130 µg/ m^3	25	NEQ
	NO	42 Ppb	-	
	NO_2	12 µg/ m^3	200 µg/ m^3	
	SO_2	2.1 µg/ m^3	20 µg/ m^3	
	CO	184 Ppb	1,000 Ppb	
	RH	54%		
	Temp	31°C		

The particulate matters were higher than NEQG standard.

According to the result, CO, NO_2, Ozone and SO_2 levels are in the NEQ (EQ) limit, but particulate matters are higher but less than 2018 air result.

The noise level is as follow: the noise level tested result for 2018 and 2021 were found pretty good conditions.

Regarding biodiversity, the important flora and fauna were not seen due to a lot of mining activities in the area for decades.

Public consultation meetings were conducted twice, one on 2021 and second meeting on 22nd Nov 2023. The way forward by the proponents and stakeholder are:

After the consultation meeting the following work shall be done.

(1) Disclosure of project report through media, website 15 days after scoping report submission
(2) The suggestion of stakeholders shall be registered and take action
(3) Proponent committed to fulfil the issues required by communities.
(4) Group meetings and PCM meeting shall be conducted.

The methodology EIA discussed in the chapter six.

The identification of impact was analyzed by the quantitative methods as well as professional judgement. The method discussed in chapter (7) impact in operation and decommissioning phases were identified.

The mitigation measure for the following impacts are prepared.

- Visual amenity
- Noise / vibration
- Air pollution
- Climate change
- Soil erosion, contamination
- Land subsidence
- Water pollution
- Health and safety
- Social impact
- Biodiversity and ecosystem
- Work safety

Mitigation and monitoring plan were designed for construction, operation and decommissioning phase in chapter 9, table (9-1) (9-2) (9-3) and (9-4) respectively.

Mitigation plan for operation phase

Sr.	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) per amount	Responsible Party
Environmental Aspect							
1.	Visual Amenity	All operation area	Low Visual Dust	Negligible	Create Buffer zone, planted trees.	-	HSE Coordinator and group
2.	Air quality	All operation area 21°53′42.39″N 96°13′4.85″ E	Gaseous emission		• Dust suppression facilities (back up water sprayer) • Spray water on road • Schedule activities impact • To provide PPE (Dusk mask) Vehicle and machinery use shall be well maintained	5,000,000	HSE Coordinator and group
3.	Noise/ Vibration	All operation area & resident Produced from crushing machines and other mining activities 21°53′42.39″N	Low negative Impact to labor & public	Minor adverse	• To draw plan for noisy activities at day time • To control the explosive pressure • To provide PPE (ear plugs & earmuff) to labor • The facility is enclosed which would further minimize noise	350,000	HSE Coordinator and group

		96°13′4.85″ E			impact • New technology applied which minimize noise and vibration • To be done noisy activities especially at day times • Machinery shall be sound proved cabin • Plant wind-break tree and bamboo at the surrounding of mine areas • The blasting has to be done at evening after working hour (between 04:00 – 06:00 PM) • Regular medical checkup has to be done for operators whom are possibility happens ear problems.		
4.	Water pollution	All operation areas 21°53′42.39″N 96°13′4.85″ E	Change of waterway, contermination and sedimentation of water		• Construct sediment traps and pond • Harvest rainfall for use • Carry out water quality regularly	300,000	HSE Coordinator and group
5.	Soil	All operation areas	sedimentat	Medium	• To use and dispose oil and	2,500,000	

		21°53′43.39″N 96°13′4.37″ E	ion and contaminat ion		lubricant with caution • Use proper handling methods to avoid spill leakages • Design the channels and ditches for proper drainage of water, particularly during rainy season • To avoid soil run off sand and filled bags has to place on the surrounding of soil piles		
6.	Fly rock	All operation areas	Negative impact to human (cause injury)	Low	• Warn and remove all person during blasting • Should guide properly position and direction • Control the explosive pressure	-	
7.	Odor	Explosion In surrounding area and residential area	Nuisance issue	Low	• The facility should be enclosed to limit exposure of potential odors if any • Continuous monitoring should take place • Plant trees as wink break along the production route	-	HSE Coordinator and group
Waste generation							
A.	Solid waste, liquid	All operation areas	Contamina	Moderate	• To segregate wastes into	1,000,000	HSE Coordinator and

	waste & hazardous waste		tion and sedimentation	adverse	hazardous, recycle and general waste • To provide adequate toilet • Waste to store in appropriate container • Proper maintain of sewage system, monitor for potential contamination from sewage • Control oil spill and leakage • Regular maintenance of machinery and vehicle • Do not throw waste to the water way • Construct good drainage with waste collection		group
Biological Resources							
A.	Forest and biodiversity	Mine area and surrounding	Lost of forest, top soil and some remaining flora and fauna	Minor adverse	• To minimize vegetation clearance and water way changes • Great buffer area • To protect remain flora & fauna • Revegetate along the production route • Awareness to labor and villagers	2,000,000	HSE Coordinator and group

					on environmental conservation, esp: to protect flora and fauna • Donate to wildlife sanctuary in Mandalay District • To follow fishery law and rules in catching of fish		

Mitigation plan for decommissioning phase

Sr.	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
Environmental Aspect							
A.	Visual amenity	All decommissioning areas	Visual impact	Negligible	• Carry out activities following best practices • Refill back the land by sub soil and placed top soil on it • Regenerate with plants	-	HSE Coordinator and Team
B.	Air	All decommissioning areas	Dust and gaseous emission	Negligible	• To control burning of waste • To provide PPE • To draw clear	2,000,000	HSE Coordinator and Team

					decommissioning plan • To spray water on ground and on the temporary roads		
C.	Noise/ Vibration	All decommissioning areas	Negative impact to workers and public	Negligible	• To decommissioning at day time • Control of demolishing buildings • To control speed of vehicles and machines • To provide PPE	200,000	HES Coordinator and Team
D.	Water resources	All decommissioning areas	Contamination and sedimentation of water	Moderate adverse	• Not dispose soil, liquid waste into water way • To use leak proof container for fuel, lubricants and chemicals • Properly fill up the waste pit with soil • To prevent soil erosion of water banks	300,000	HSE Coordinator and Team
Waste generation							
E.	Solid, liquid and	All decommissioning	Contamination	Minor	• Tousle carry and store	2,000,000	HSE Coordinator and

	hazardous waste	area	and sedimentation Water, soil, air	adverse	diesel and lubricant with caution • To keep separate waste bin for various waste • Not to dispose in the water way • To recycle, dispose, landfill if possible • Clean all the debris the area • To undertake rehabilitation works		Team
Biological Resources							
F.	Flora and fauna on terrestrial and aquatic ecosystem	All decommissioning area	Habitat loss and entrance of invasive species	Minor adverse	• To protect native, endangered flora or fauna • To control invasive species • To regenerate indigenous and fast-growing species • To control illegal hunting, fishing,	3,000,000	HSE Coordinator and Team

					tarping, burning and encroachment by educations rural people		

Monitoring plan for operation phase

Sr.	Environmental concerns	Parameter	Time frame	Location	Estimated Cost (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	Twice a year	Project site	1,500,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise level dB(A), vibration level m/s^2	Twice a year	Project site	400,000	HSE Coordinator & Third Party
3.	Waste Water	pH, BOD, COD, Total Coliform Bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Soil	Twice a year	Stream near the project site 21° 53′ 294″ N 96° 13′ 209″ E	1,500,000	HSE Coordinator & Third Party
4.	Soil erosion/ Landslide	Sediment collection from silt trap, silt ponds	Weekly during rain	Project site	1,000,000	HSE Coordinator

5.	Fire hazard	Visual inspection, fire extinguishers and regular check of combustible material Refer to fire production	Monthly	Project site	1,000,000	HSE Coordinator
6.	Waste Generation	Visual Inspection	Weekly	Project Site	1,000,000	Supervisor
7.	Safety and Health	Number of types of safety equipment provided, Health & Sanitation facilities, signage, health service	Monthly	Project Site	80,000	HSE Coordinator
8.	Environmental auditing	Access the compliance to EMP, and other environmental policy, law, rules and regulation	Twice a year	Project Site	1,000,000	HSE Coordinator, related department, third party

Monitoring plan for decommissioning phase

Sr.	Environmental concerns	Parameter	Time frame	Location	Estimated Cost (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	Twice a year	Project site	2,000,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise level dB(A), vibration level m/s^2	Twice a year	Project site	500,000	HSE Coordinator & Third Party
3.	Stream/ Well Water	pH, Color, Turbidity, Total Hardness, BOD, Total dissolved water, Total suspended solid, Temperature	Once a year	Stream water near project site	1,000,000	HSE Coordinator & Third Party
4.	Waste water	BOD, COD, pH, Total Coliform bacteria, Total Nitrogen, Total Phosphorus, Total Suspended Soild	Twice a year	Stream water near project site 21° 53′ 294″ N 96° 13′ 209″ E		
5.	Soil erosion/ Landslide	Sediment collection from silt trap, silt ponds	Weekly during rainy season	Project site	1,500,000	HSE Coordinator & third party
6.	Fire hazard	Visual inspection, fire extinguishers and regular check of combustible material Refer to fire	Monthly	Project site	2,000,000	HSE Coordinator & group

		production				
7.	Safety and Health	Number of types of safety equipment provided, Health & Sanitation facilities in camps, signage, PPE, health care/service and facility	Monthly	Project Site	1,100,000	HSE Coordinator & group
8.	Environmental auditing	Access the compliance once with EMP, and other environmental policy, law, rules and regulation	Once a year	Project Site	1,000,000	HSE Coordinator, related department, third party
9.	Rehabilitation	Recovering the open cut mining areas and re-vegetation areas		All decommissioning area	3,000,000	HSE Coordinator & third party

In this chapter, the subplans are added. The plans are:

- Health and safety plan
- Community health care
- Prevention of respiratory problems
- Occupational health and safety
- Waste disposal
- Oil spill response plan
- Fire fighting
- Landslide
- Mine closure plan
- Emergency response and preparedness plan, Grievance Procedure
- Training and reporting

The contact person of this project is U Thant Zin Aye (Director)

Phone number: 09255111966

The proponent and third party committed as follow:

Chapter	Commitment	Appendix
Proponent Chapter 2	- To abide laws, rules, acts, regulation and agreements mentioned in that chapter - To abide law, rules and regulation regards on transportation, storage and utilization of explosive materials - Proponent committed to contribute the budget estimated for environmental mitigation and monitoring. - If required more budget proponent agreed to provide the requirements	Appendix (V)
Chapter-8	- The data, facts and information mentioned in the report is true and prepared completely and precisely	Appendix (V)
Third Party Chapter-8	- Environmental study is made based on environmental law, rule and instruction. The third party practiced based on ethic. - Report was prepared without bias	Appendix (W)

	- The report is complete and precise.	

The recommendation of third party to the project are:

The following recommendation are made for effective and efficient implementation of the quarry operation activities

- To abide by Environmental Policy, Law, Rules and Regulations of Myanmar
- To efficiently implement Environmental Management Plan, Monitoring Plan, Mine close out plan and CSR.
- To keep full records of environmental management and report annually.
- To establish the tree, bamboo plant and ground cover for greening, wind break, erosion control and aesthetic purposes.
- The road maintenance, roads water spraying shall be joint done together by SYL Co.,Ltd and other two quarry mine with the coordination by village administrative committee.
- Care shall be taken for public health

Awareness of environmental conservation and climate change shall be given to labor and communities.

ABBREVIATION

BAT	-	Best Available Techniques
D	-	Duration
E	-	Extent
ECC	-	Environmental Compliance Certificate
ECD	-	Environmental Conservation Department
EIA	-	Environmental Impact Assessment
ELV	-	Emission Limit Values
EMP	-	Environmental Management Plan
HT Power Line	-	High tension Power Line
IEE	-	Initial Environmental Examination
M	-	Magnitude
MONREC	-	Ministry of Natural Resources and Environmental Conservation
P	-	Probability
PAP	-	Project Affected Person
PPE	-	Personal Protection Equipment
SDC	-	Shwe Taung Development Co.,Ltd
SP	-	Significant Point
TOR	-	terms of reference

Environmental Impact Assessment

For

Quarry Production Mine

Shwe Taung Development Co.,Ltd (U Zaw Min Oo)

Mandalay Region, Mandalay District, Patheingyi Township

Chingone, Yema, Kyuwon 555 (Ka) Sub plot (23), (15) Acres

Environmental Impact Assessment

Chapter-1

Introduction

1.1 Background

This Environmental Impact Assessment (EIA) is prepared for the quarry production of Shwe Taung Development Co., Ltd (hereinafter refer as SDC).

He had got the license from Mandalay Region, Mandalay District, Patheingyi Township, Chingone, Yema, Kyuwon-555 (Ka), Sub Plot (23). The total mine area is (15) acres and yearly extraction capacity is 13,000 SUD or 56550 tons of Quarry stone.

The implementation of the quarry project will result in the following benefits to the country.

- To supply a crush to private, government and community.
- To utilize the product for its own road construction and infrastructure development.
- To help reduce rural-urban migration through employment opportunities and to make communities more attractive to youths and unemployed.
- To help rebuild the economy and social lives of the communities and the associated provision of CSR to concerned villages around the project area.

According to Myanmar Environmental Conservation Law (2012), it requires that the proponents of every development project shall submit an Environmental Management Plan (EMP), and Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) to the Ministry of Natural Resources and Environmental conservation (MONREC). The existing project is required to conduct EIA as its production capacity is under the limit of EIA (Vide Environmental Impact Procedure 2015, Table (1) SR. 83).

Quarry Production Mine project of SDC require EIA and SDC is obliged to prepare, obtain approval for, and implement an appropriate EMP, because production of quarry to supply construction materials is within the criteria for EIA type economic activities according to the

number 83, categorization of economic activities for assessment purposes, annexed to the Environmental Impact Assessment (EIA) Procedure issued by the Ministry of Environmental Conservation and Forestry, in exercise of the power conferred by sub-section (b) of Section 42 of the Environmental Conservation Law. (Vide Environmental Impact Procedure 2015, Table (1) SR. 83).

Therefore, SDC assigned SEE-Trust, Environmental Service, Nay Wun Myat(s) Co.,Ltd for conducting the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) services. Environmental Conservation Department (ECD) has agreed SEE-Trust to conduct EIA for this project vide letter No: EIA-2/9 (060/2020) Dt 3rd June 2020.

The Key objectives of the EIA are:

- To recognize that social responsibility and environmental management are among the highest corporate priorities.
- To ensure that applicable Acts, Laws, Rules, Regulations and Guidelines are met.
- To assign clear accountability and responsibility for environmental protection and social responsibility for management and employees.
- To provide appropriate and sufficient resources, including training to achieve targeted performance levels on an ongoing basis.
- To evaluate environmental performance and social responsibility against the company environmental and other policies, objectives and targets and fleek improvement where appropriate.

Thus, this report is formulated in accordance with the existing policy, Laws, rules and instruction, and submitted as a partial fulfillment to receive the Environmental Compliance Certificate (ECC) form ECD.

1.2 Project Proponent

The project proponent for quarry production is – Shwe Taung Development Co., Ltd

Representative - U Thant Zin Aye, 12/ Oo Ka Ta (C) 023645

Phone No - 09-255111966

Address No: - Ahlone Tower, Strand Road, Riverview Garden housing.

Email: - thantzaye@shwetaungec.com

Company Registration and List of Directors are shown in Appendix (A) and (B).

Main Business of Shwe Taung Development Co., Ltd is infrastructure Development and Construction. Renovation of Airport, construction of highway road and housing.

They have advanced technology and human resources in implementations of their business.

Also care on the environment; they have their own environmental staff in their headquarters and projects.

1.3 License for extraction quarry

Mandalay Region, Mandalay District, Administrative Department's Order No: 192 Dt: 21.2.2020.
(The license and map of mine, form (105) and (106) in figure (1-1) and (1-2).
The total mine area is (15) acres and annual allowed production capacity is 15,000 Sud (Equivalent 65250 tons)
Conversion factor for Sud to Ton have been attached in Appendix (C).)
The allotted quarry mine number is Chingone, Yema, Kyuwon-555 (Ka), Sub plot (23).

Figure (1-1) License and map of land form (105)

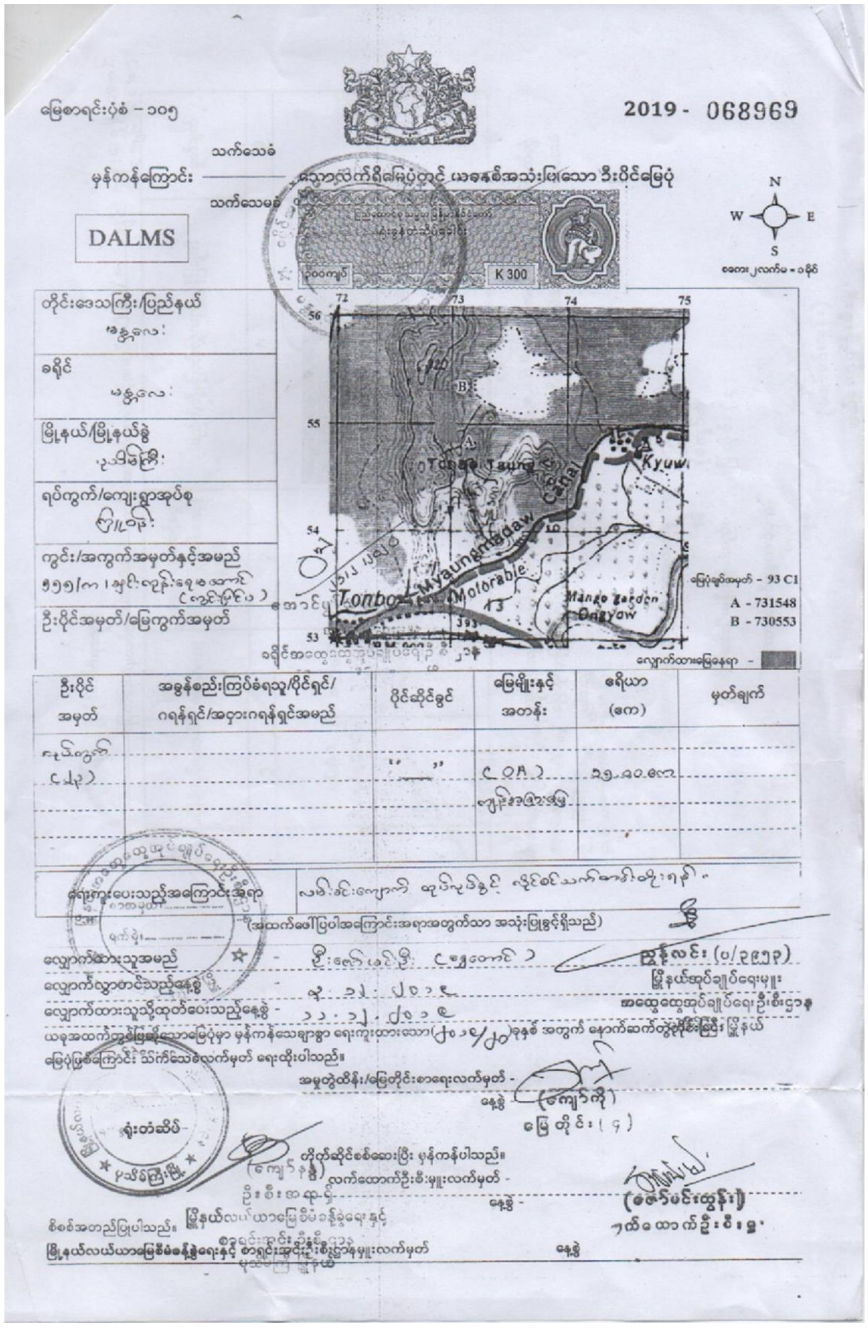
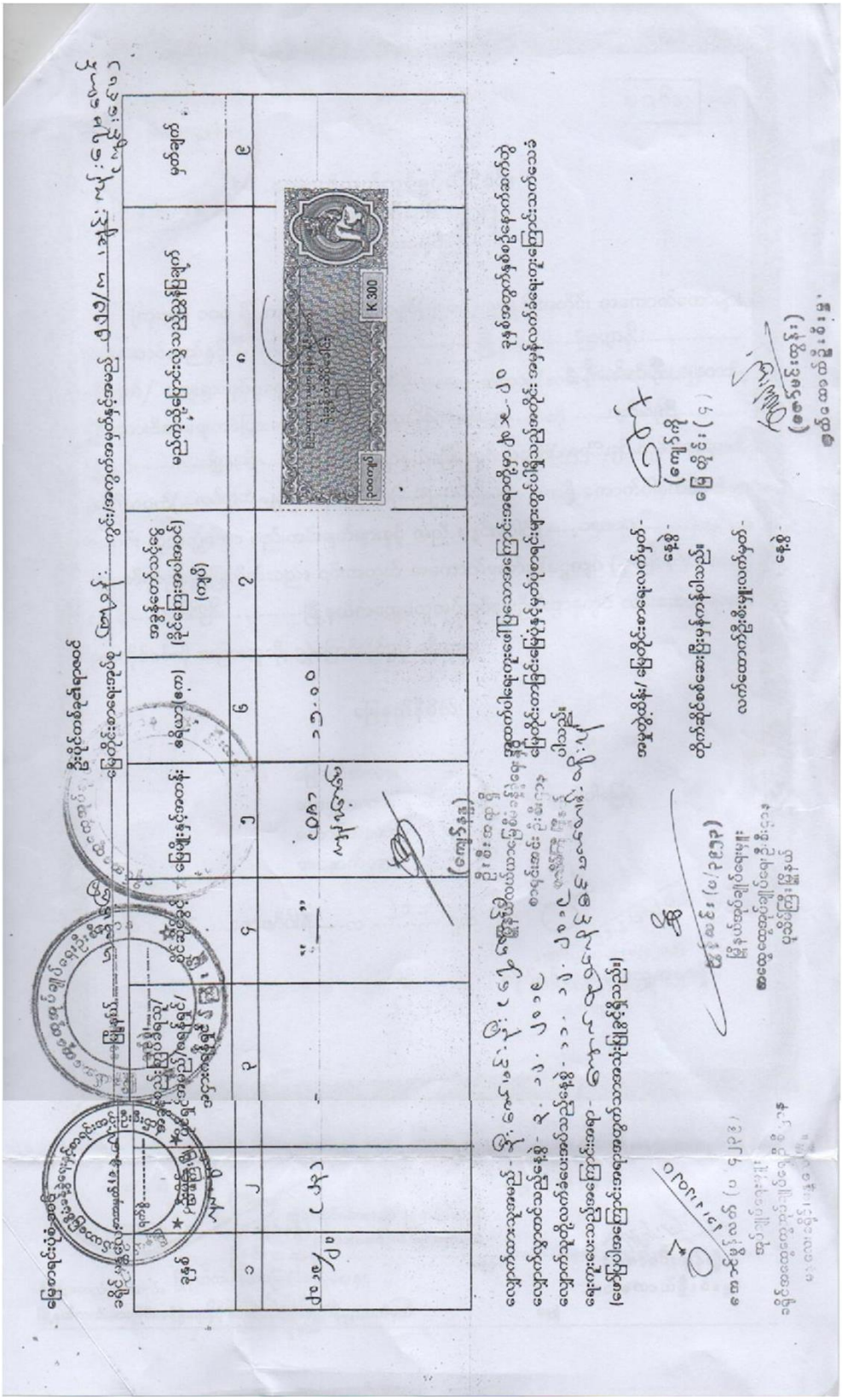


Figure (1-2) License and map of land form (106)



1.4 Environmental Service Provider

Shwe Taung Development Co., Ltd commissioned to SEE-Trust, Nay Wun Myat(s) Company Limited. This group has been registered as the interim consultant vide registration No: 0034, Dated (15 Jun 2016). (Appendix-D)

The member involved in this EIA study were as follow-:

Table (1-1) Member of EIA Service Team

Sr.	Name	Duty	Expertise Area
1.	U Zaw Win	Team Leader	Forest and biodiversity, Ecology management & Industry
2.	U Than Tun	Member	Extension, Watershed management & Soil
3.	Daw Thin Thin Myat	Member	Economic Study
4.	U Khin Kham Khan	Member	Environmental Science, GIS
5.	U Khin Mg Htay	Member	Social Science
6.	U Myo Kyaw Thu	Member	Labor Law, Management
7.	U Soe Lin	Field Team	Testing & data, Information Collection
8.	U Myo Min Paing	Field Team	Testing & data, Information Collection
9.	U Khin Maung Lin	Field Assistant	Testing & data, Information Collection

The copy of registration is attached in Appendix (D).

The full address of SEE-Trust is as follow;

SEE-Trust, Nay Wun Myat(s) Co.,Ltd (Transitional Consultant No-0034)

No.42, Pyin Nyar Tazaung Street, Quarter-43, North Dagon, Yangon. (Myanmar)

Phone: +95 95063446

+95 95162889

+95 13510442

Emil: zwin@seetrus.co

naywunmyat1@gmail.com

1.5 Terms of Reference (TOR) for Service Provider

The TOR for SEE-Trust is as follow;

1. To find and investigate the possible impact.

2. To find and study the impacts in more detail and find major impact and mitigation measures.
3. To conduct the public consulting meeting
4. To submit a scoping report to ECD.
5. Draw and Environmental Management Plan, Mitigation measure, Monitoring Plan for both construction, operation and decommissioning Phases.
6. Submit a comprehensive EIA report and EMP to ECD.

The report should cover the following headings.

1. Executive summary in Myanmar and English language
2. Introduction
3. Project Description
   (a) Location
   (b) Project Proponent
   (c) Infrastructure
   (d) Production Process
   (e) Water requirement and availability
   (f) Diesel and Electricity requirements
   (g) Labor
   (h) Chemical requirement
   (i) Heavy Machinery
   (j) Waste disposal
   (k) Land Use
   (l) Explosive
   (m) Layout of Mine
   (n) Forest and Diversity
4. Policy, Legal and institutional Framework
5. Description of Surrounding Environments
   (a) Physical Environment
   (b) Biological Environment
   (c) Socio-economic Environment
   (d) Culture features Environment
6. Identification and Assessment of Potential Impact
   (a) Methodology
   (b) Mitigation reassures
   (c) Public disclosure
   (d) Environmental Management Plan
   (e) Monitoring Plan
   (f) Corporate Social Responsibility (CSR)

(g) Plan and Commitment
(h) Estimation Cost for EMP
(i) Grievance readiness Mechanism
(j) Emergency preparedness and Response Plan.
(k) Recommendation and Conclusion.

1.6 Scope and Methodology of EIA studies

1.6.1 Scope

Study has taken into consideration three phases (Construction operation and decommissioning). This scope cover;

- Introduction
- Project description
- Provisions of Relevant policy laws, rules and regulations and commitments
- Preliminary Study on Description of Surrounding environment
- Identification and Assessment of Potential Environmental Impacts and finding Scope of study
- Mitigation measure for potential impacts
- Public consultation and disclosure
- Social economic study
- Mine plan and Mine closure plan
- Emergency preparedness plan
- Health impacts
- Recommendation

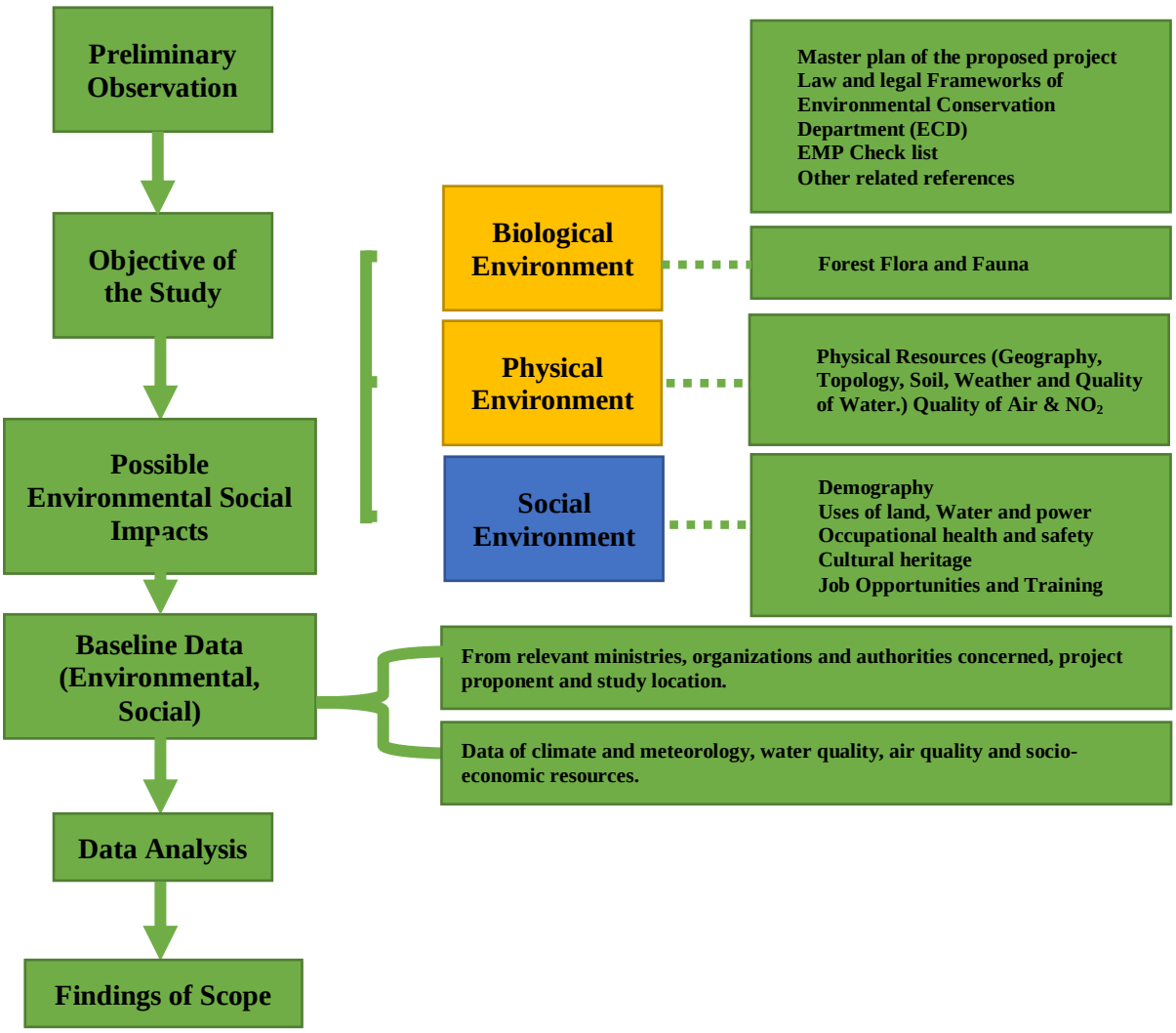
The field studies were carried out by members of SEE-Trust, Environmental Service. SEE-Trust conducted basic data collection field survey, assessment activities and review by the consultant teams of various expertise.

1.6.2 Methodology

The study on existing environmental resources in the project area is focused on three main resources-physical, biological and social economic resources. The physical resources such as quality of air and water inside the project are called primary data, which is collected from existing information in the field survey. This data collection is done by direct observation, interviewing and discussion with the responsible of this mine and analysis. And then, the secondary data for the socioeconomic resources is obtained from the relevant ministries/ bodies and research institutions as reference material for the preparation of the EIA report. Moreover, the SEE-Trust team made key informant interviews to the local people who live in villages near the existing project site. The impact is evaluated and mitigation measures

developed for those impacts that are identified as significant. Flow chart of Methodology for the Environmental Management Plan is shown in figure (1-3).

Figure (1-3) Flow chart of Methodology for the Environmental Impact Assessment Study



1.7 Time Frame

(a) **To apply Third Party approval** – As soon as the contract is signed.

(b) **Field study** – 7 days after approved third party by ECD (7 Working days)

(c) **Public consultation meeting** for scoping stage (7 working days including preparation invitation etc.)

(d) **Information** – dissemination and feedback collection is days after field study (15 Days).

(e) **Submission** of Scoping Report to ECD. (15 Working days)

(f) **Detail environmental studies** – As soon as Scoping report approved by ECD (45 Working days)

(g) **Public consultation Meeting** – One month after detail environmental study (7 working days including preparation & invitation)

(h) **Information dissemination** – 15 days after second public consultation meeting (15 days)

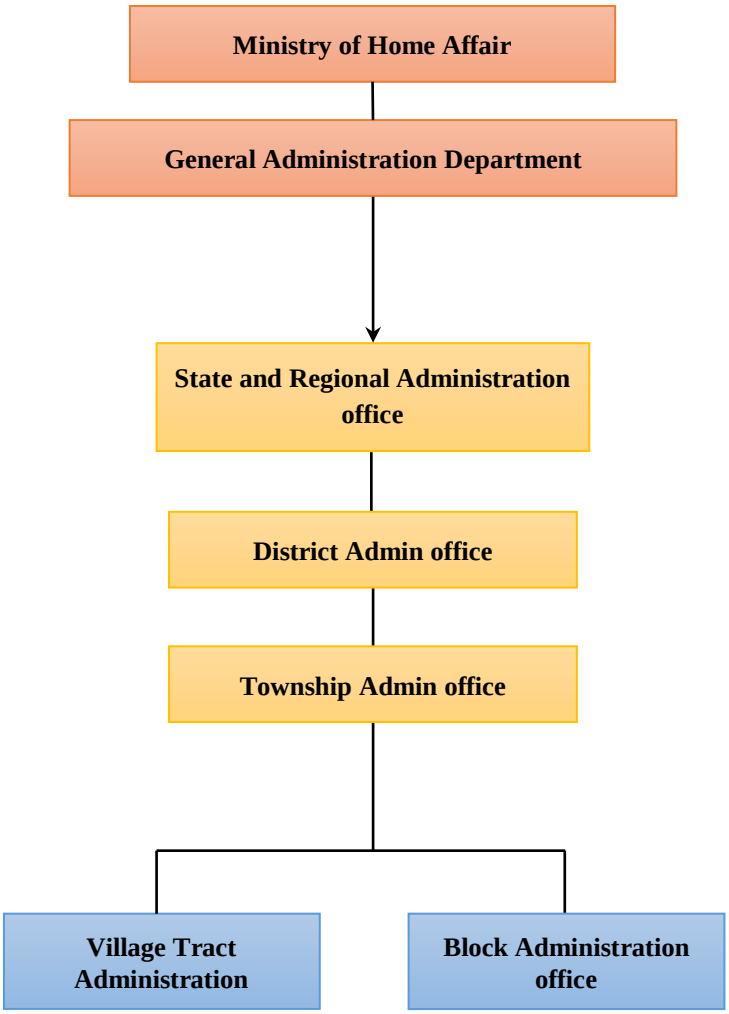
(i) **Submission** of final EIA report to ECD – 45 days after second consultation meeting. (45 days)

(j) **Total working days** – 171 days excluding days taken by ECD for approvals.

1.8 Authorized for quarry mine production

The small_scale quarry mine production and distribution is controlled and issued by the district General Administration office of the concerned district. The organization chart expressed in figure (1-4).

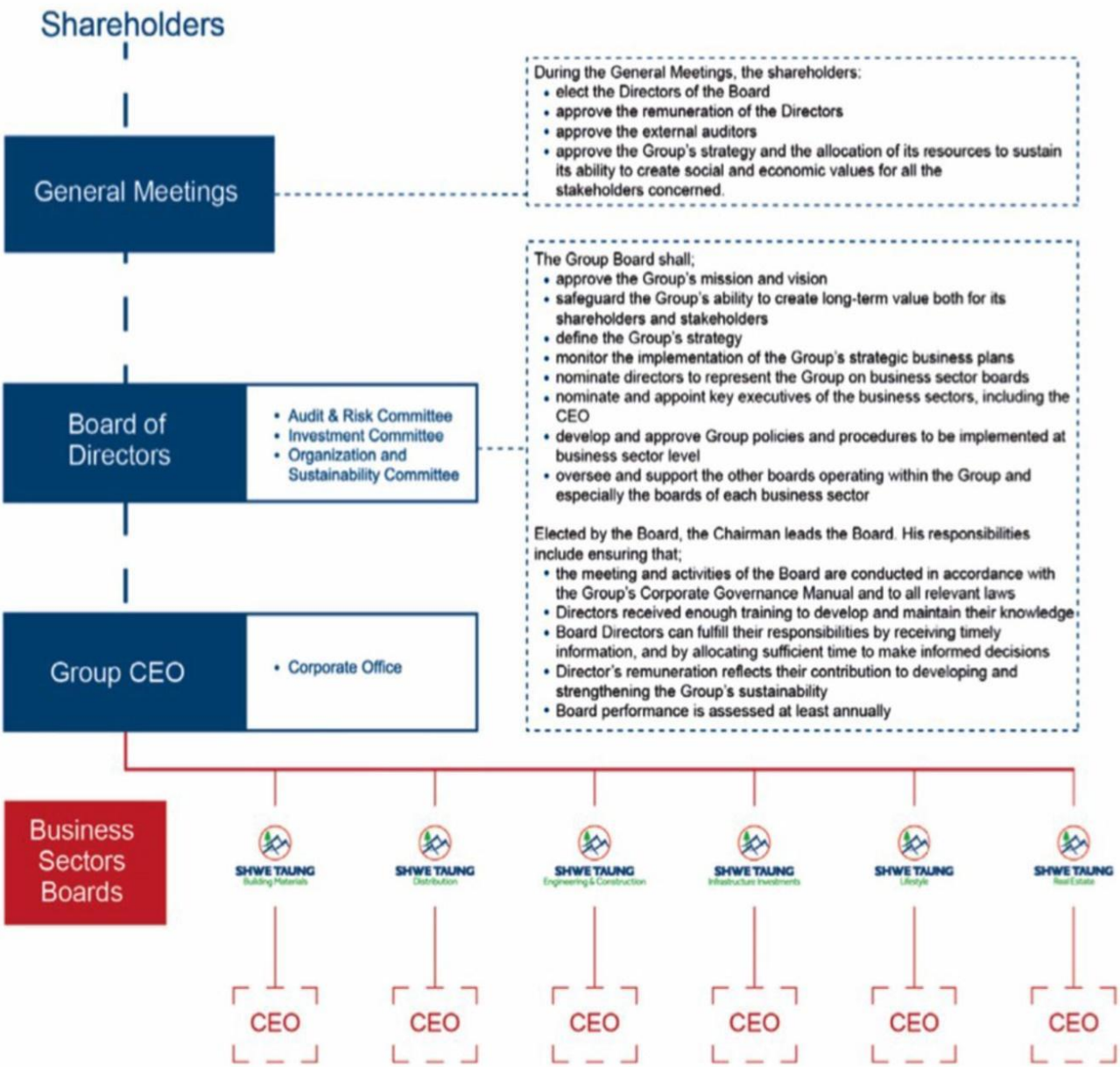
Figure (1-4) Organization of General Administration Department



1.9 Organization Structure of Company

The organization of Shwe Taung group is mentioned in Figure (1-5).

Figure (1-5) Corporate structure



Focus on the Governance of Shwe Taung Building Materials

The Board of Shwe Taung Building Materials is composed of 6 Board Members: 4 are Non-Executive Directors, and 2 are Independent, Non-Executive Directors. This Business Sector Board has established two committees:

- the Corporate Governance, Nominations & Remunerations Committee
- the Audit & Risk Committee

They both have three members and are chaired by one Independent Director. The chairperson of the Audit & Risk Committee has specific expertise in finance and risk management.

VERTICALLY INTEGRATED GROUP WITH SIX BUSINESS DIVISIONS

SHWE TAUNG Building Materials

Laying the foundation for sustainable development

- Over 500,000 m³ of concrete manufactured yearly and growing
- 2 million metric tonnes of cement production capacity
- One of the frist pre-cast manufacturers in Myanmar

SHWE TAUNG Distribution

Driving solutions for success

- 3,000+ businesses empowered to succeed
- 15 international standard petroleum stations across Myanmar
- 20,000+ daily bus passengers (between cities)

SHWE TAUNG Engineering & Construction

Building Myanmar's future

- 480+ engineers working to deliver quality projects
- 200+ building and construction projects completed
- 700km+ of road constructed 70km+ of railway under construction 50+ bridges built

SHWE TAUNG Infrastructure Investments

Enabling sustainable growth for Myanmar

- 52 MW power plant in operation
- 60 MW under development
- 262 km toll road concession & operation

SHWE TAUNG Lifestyle

Creating experiences that inspire new lifestyles

- 16+ million people listening to Padamyar FM
- 2 million moviegoers in our 9 JCGV cinemas
- 3.2 and 1.9 million customers at BreadTalk and Food Streat respectively in 2019

SHWE TAUNG Real Estate

Shaping urban landscapes

- 7 million sqft of office, retail and residential real estate under management
- 15,000+ residential units developed
- 2 million+ shoppers monthly across our Junction Centres

ABOUT SHWE TAUNG GROUP

At Shwe Taung Group, our 7,000 people are proud to belong to a leading local company that embraces international standards and contributes responsibly to the growth of Myanmar.

Ever since our business was established in the 1990s, we have consistently looked ahead and worked as one to ensure a sustainable future for our country, its people and their families. In the decades since then, our Shwe Taung Foundation has helped build over one hundred schools across the country, and continues to enrich our nation by providing opportunities for education today and tomorrow (you can find more information on page 43).

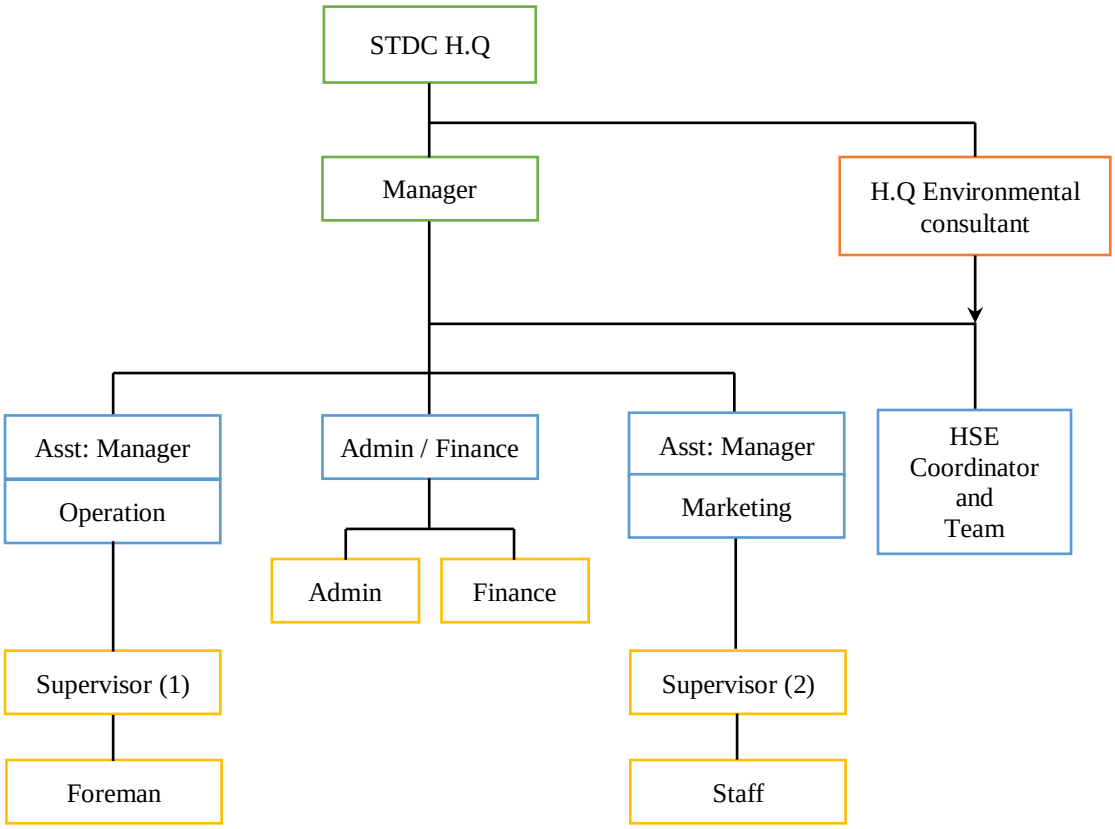
Driving us forward are our values of integrity, responsibility, entrepreneurship, and resilience, all forged over time from a commitment to set the highest standards and to comply with international best practices.

It is our shared belief in inclusive growth for all our people that inspires us to focus on caring for our customers, employees, stakeholders, partners and our community.

Together, we champion corporate social responsibility among Myanmar businesses, and our six business divisions converge upon a sustainable, long-term purpose that propels smarter growth for our nation.

1.10 Organization Structure of project implementation team

Figure (1-6) Organization of quarry production



1.11 Responsibility party of Environmental and Social Affair

The responsibility of project staff in Environmental and Social Affairs are as follow:

1.	Manager (To be recruited)	– Overall responsibility on labor, production environmental, social
2.	H.S.E officer	– Main responsible for environmental and social issues
3.	Asst: Manager (operation)	– Responsible for environmental issues, safety and health issues
4.	Asst: Manager (Marketing)	– Responsible for social and human resources affair
5.	Admin head	– Responsible for health, fire control and waste management
6.	Supervisor (1)	– Environmental monitoring
7.	Supervisor (2)	– Responsible for engagement with communities Response for grievance

1.12 Work schedule of SDC's quarry mine

Preconstruction	…….	2017
Construction	…….	2018
Operation	…….	2019 to 2049 or 2069, if they get approval for two consecutive extension terms. (Each 10 years)
Decommission	…….	2049 / 2069 Jan to April
Rehabilitation	…….	2049 / 2069 June to December

1.13 Comments of Proponent

SDC is the infrastructure development company. The quarry is the basic requirement in the construction of roads, rail and airport etc. The production of quarry products is mainly for the company's own uses.

SDC has set up the sustainable development and green development mechanism. Our group is committed to the sustainable development of environments.

1.14 Comment on Community Health by Health Expert

This type of project is possible to cause health impacts on the labor and surrounding communities. The main effects will be caused by producing dust and emission by mining processes which may cause respiratory disease. Other health impacts may be caused by impurity of water.

The community health care plan and occupational health plan must be developed by the proponents.

Communicable disease shall be cared for because of the migrated laborers. The proponent shall assist the rural health facility.

1.15 Brief of Chapter

This chapter discussed the profile of the proponent, its organization structure. The member of the third-party team involved in this EIA process also described.

Chapter-2

Legal Requirement and Commitment

2.1 Introduction

The Ministry of Environmental Conservation and Forestry (MOECAF) was reorganized as the Ministry of Natural Resources and Environmental Conservation (MONREC) on 30th, March 2016 in order to undertake both environmental and natural resources conservation and management more effectively. Under Section 3 of the Environmental Impact Assessment Procedure (2015) pursuant to section 21 of the law and Articles 52, 53 and 55 of the Environmental Conservation Rules all projects and project expansions undertaken by any organization. Which may cause an impact on environmental quality are required to obtain prior permissions from MONREC. This is in accordance with section 21 of the Environmental Conservation Law and Article 62 of the Environmental Conservation Rules, having the potential to cause adverse Impacts, are required to undertake IEE or EIA or to develop an EMP and to obtain an Environmental Compliance Certificate (ECC) in accordance with the EIA procedure.

2.2 Legal Requirement

Quarry Production project which is invested by U Thant Zin Aye (Shwe Taung Development Co.,Ltd) should comply with the existing national laws, rules and regulation of the Republic of the Union of Myanmar presented in the following table, within the legal framework. This chapter discusses and describes the involvements of laws, rules, regulations and guidelines related to the implementation of the project and the assessments of the environmental and social impacts of this project.

National laws and regulations for environmental protection applicable to the existing project are compiled and presented in the following Table (2-1).

Table (2-1) Relevant National Law and Regulations of Myanmar

Laws and Regulations	Description
Constitution of the Republic of the Union of Myanmar, 2008	
The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. Articles in the Constitution relevant to environmental protection are Articles 37,45 and 390. They are quoted below:	
Article 37	(a) The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; (b) The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces;
Article 45	The Union Shall protect and conserve natural environment.

Laws and Regulations	Description
Article 390	Every citizen has the duty to assist the Union in carrying out the following matters: (a) Preservation and safeguarding of cultural heritage; (b) Environmental conservation; (c) Striving for development of human resources; (d) Protection and preservation of public property. These three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment.
National Environmental Policy (1994)	
To achieve harmony and balance between socio-economic, natural resources and environment through the integration of environmental considerations into the development process enhancing the quality of the life of all its citizens.	
National Land Use Policy (2016)	
Objectives	(a) To promote sustainable land use management and protection of cultural heritage areas, environment, and natural resources for the interest of all people in the country; (b) To strengthen land tenure security for the livelihoods improvement and food security of all people in both urban and rural areas of the country; (c) To recognize and protect customary land tenure rights and procedures of the ethnic nationalities; (d) To develop transparent, fair, affordable and independent dispute resolution mechanisms in accordance with rule of law; (e) To promote people centered development in land resources and accountable land use administration in order to support the equitable economic development of the country; To develop a National Land Law in order to implement the above objectives of National Land Use Policy.
The Environmental Conservation Law, 2012	
The Pyidaungsu Hluttaw enacted this law by Law No.9 of 2012 on the date of 30th March 2012. The legal mechanism for ESHIA has been put in this law. This law was enacted with the objectives of: (a) To enable to implement the Myanmar National Environmental Policy; (b) To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservations in the sustainable development process; (c) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations; (d) To reclaim ecosystems as may be possible which are starting to degenerate and disappear; (e) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially; (f) To enable to implement for promoting public awareness and cooperation in educational for dis-semination of environmental perception; (g) To enable to promote international, regional and bilateral cooperation in the matters of environmental conservation; (h) To enable to cooperate with Government Departments, Government Organizations,	

International Organizations, non-government organizations and individuals in matters of environmental conservation.

The following articles are particularly relevant to EIA requirements and this project:

Article 7 of chapter 4 mentions the need for SIA and EIA for any project operated by the government or organizations or individuals.

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

- Implementing the environmental conservation policies
- Laying down, carrying out and monitoring programs for conservation and enhancement of the environment and for conservation, control and abatement not to cause environmental pollution
- Specifying categories and classes of hazardous wastes generated from the production and use of chemicals or other hazardous substances in carrying out industry agriculture, mineral production, sanitation and other activities;
- Prescribing categories of hazardous substances that may affect significantly at present or in the long run on the environment;
- Promoting and carrying out the establishment of necessary factories and stations for the treatment of solid wastes, effluents and emissions which contain toxic and hazardous substances;
- Prescribing the terms and conditions relating to effluent treatment in industrial estates and other necessary places and buildings and emissions of machines, vehicles and mechanisms;
- Laying down and carry out a system of Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment;
- Managing to cause the polluter to compensate for environmental impact, cause to contribute funds by the organizations, which obtain benefit from the natural environmental service system, cause to contribute a part of the benefit from the businesses, which explore, trade and use the natural resources in environmental conservation works.

Also, in this law. Article 14 and Article 15 are related with waste disposal in accordance with environmental standards;

14. A person causing a point source of pollution shall treat, emit drainage and deposit the substances which cause pollution in the environment in accord with stipulated environmental quality standards.
15. The owner or occupier of any business, material or place which causes a point source of pollution shall install or use an on-site facility or controlling equipment in order to monitor, control, manage, reduce or eliminate environmental pollution. If it is Impracticable, it shall be arranged to dispose of the wastes in accord with environmentally sound methods.
16. A person or organization operating business in the industrial estate or business in the SEZ or category of business stipulated by the Ministry;

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

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

(c) shall contribute the stipulated users' charge s or management fees for the environmental conservation according to the relevant industrial estate, SEZ and business organization

(d) shall comply with the directives issued for environmental conservation according to the relevant industrial estate, SEZ or business.

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

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

The Environmental Conservation Rules, 2014

The Ministry of Environmental Conservation and Forestry, in exercise of power conferred under sub-section (a) of section 42 of the Environmental Conservation Law, issues this rule by No.50 of 2014 on the date of 5th June 2014.

Rule 51	The Ministry shall assign duty to the Department for enabling to adopt and carry out the environmental impact assessment system.
Rule 52	The Ministry shall determine the categories of plan, business or activity which shall carry out environmental impact assessment
Rule 53	The Ministry shall to scrutinize whether or not it is necessary to conduct environmental impact assessment, determine the proposed plans, businesses or activities which do not include in stipulation under rule 52
Rule 56	The person who carries out any project, business or activity shall arrange and carry out for conducting the environmental impact assessment for any project, business or activity by a qualified third person or organization accepted by the Ministry.
Rule 58	The Ministry shall form the Environmental Impact Assessment Report Review Body with the experts from the relevant Government departments, Government organizations.
Rule 61	The Ministry may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee
Rule 69	a. Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place, which may affect the public directly or indirectly.
	b. Any person shall not carry out of damage the ecosystem and the natural environment, which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.

Environmental Impact Assessment Procedure (2015)
Paragraph 102, 103, 104, 105, 106, 107, 108, 109, 110, 113, 115, 117

<table>
<tr><th colspan="2">National Environmental Quality (Emission) Guidelines (2015)</th></tr>
<tr><td>1.1 Air Emissions</td><td>Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that, emissions do not result in concentrations that reach or exceed national ambient quality guidelines and standards, or in their absence
E.g Particulate matter PM 10 and 2.5 must not higher than guideline value of (50 µg/m^3 and 25 µg/m^3 within 24 hour and 20µg/m^3 and 10µg/m^3) respectively.</td></tr>
<tr><td>1.2 Effluent level</td><td>
<table>
<tr><th>Parameter</th><th>Unit</th><th>Maximum Concentration</th></tr>
<tr><td>Biological oxygen demand</td><td>mg/L</td><td>30</td></tr>
<tr><td>Chemical Oxygen demand</td><td>mg/L</td><td>125</td></tr>
<tr><td>Oil and grease</td><td>mg/L</td><td>10</td></tr>
<tr><td>PH</td><td>SU</td><td>6-9</td></tr>
<tr><td>Total coliform bacteria</td><td>100 ml</td><td>400</td></tr>
<tr><td>Total Nitrogen</td><td>mg/L</td><td>10</td></tr>
<tr><td>Total Phosphorus</td><td>mg/L</td><td>2</td></tr>
<tr><td>Total Suspended solid</td><td>mg/L</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>1.3 Noise Level</td><td>Noise impact should not exceed the prescribed level.
<table>
<tr><th rowspan="2">Receptor</th><th colspan="2">One Hour LAeq (dBA)[a]</th></tr>
<tr><th>Daytime
07:00 - 22:00
(10:00 - 22:00 for Public holidays)</th><th>Nighttime
22:00 - 07:00
(22:00 - 10:00 for Public holidays)</th></tr>
<tr><td>Residential, institutional, educational</td><td>55</td><td>45</td></tr>
<tr><td>Industrial, commercial</td><td>70</td><td>70</td></tr>
</table>
[a] Equivalent continuous sound level in decibels</td></tr>
<tr><td>2.7 Mining
2.7.1 Construction material extraction</td><td>Construction materials extraction operations do not typically generate point sources or effluents or emissions with the exception of dewatering effluents which may contain suspended solids. Effluent and storm water flows should be managed so as to achieve the following effluent levels. The principle sources of air emission are fugitive dust from earth works and materials handling and transport facilities. Prevention and control of air emissions should be sufficient to achieve the general air emission guideline for ambient air quality.</td></tr>
<tr><th colspan="2">The Forest Law, 2018</th></tr>
<tr><td colspan="2">The State Parliament had enacted the following Law in 20 Sep 2018 as Forest Law. (Pyidaungsu Hluttaw Law 29/2018).</td></tr>
</table>

Chapter II: Objectives	3. This Law shall be implemented in accordance with the following basic principles: (a) to implement the forest (forest) policy of the Cabinet; (b) to implement the natural resources and environmental conservation policy of the Government; (c) to promote the sector of public co-operation in implementing the forestry policy and the environmental conservation policy of the government.
Laws and Regulations	**Description**
Chapter IV: Management of Forest Land	9. The functions and responsibilities of the Forest Department are as follows: - (a) implementation of the forestry policy of the Government; (b) implementation of the plans relating to conservation of water, biodiversity and environment, sustained yield of forest produces and protection of forest covered land; (c) management of forest land in accordance with the provision of this Law; (d) submitting proposals to the Minister for the determination, alteration or cancellation of reserved forest, protected public forest and species of reserved trees; Whoever, within a forest land and forest covered land at the disposal of the Government: (a) is desirous of carrying out any development work or economic scheme shall obtain the prior approval of the Forestry Ministry.
Chapter XII: Offences and Penalties	40. Whoever commits any of the following acts shall, on conviction be punished with fine which may extend to Kyat 5,000 or with imprisonment for a term which may extend to 6 months or with both: (a) trespassing and encroaching in a reserved forest; (b) pasturing domestic animals or permitting domestic animals to trespass in a reserved forest; (c) breaking up any land clearing, digging or causing damage to the original condition of the land without a permit in a reserved forest; (d) causing damage to a water-course, poisoning in the water, using chemicals or explosives in the water in a reserved forest (e) catching animals, hunting or fishing in a reserved forest; (f) kindling, keeping, carrying any fire or leaving any fire burning which may set fire to the forests in a reserved forest; (h) violating any provision of the rule, procedure, order, directive or notification issued under this Law.
The Protection of Wildlife and Natural Areas Law, 1994	
The State Law and Order Restoration Council had enacted the Protection of wildlife and Natural Areas Law on 8th June, 1994	
Objectives	The objectives of this Law are as follows: - a) to implement the Government policy for wildlife protection; b) to implement the Government policy for natural areas conservation; c) to carry out in accordance with the International Conventions acceded by the State in respect of the protection and conservation of wildlife ecosystems and migratory birds; d) to protect endangered species of wildlife and their natural habitats.

Protected Wildlife	15. The Director General shall, with the approval of the Minister: a) determine and declare endangered species of wild animal which are to be protected according to the following categories: i. completely protected species of wild animals; ii. normally protected species of wild animals; iii. seasonally protected species of wild animals; b) determine and declare the endangered species of wild plants and their nature habitats thereof; c) lay down and carry out measures for the preservation of protected wildlife species;
Taking Administrative Action	31. A Forest Officer may pass an administrative order causing a fine that may extend to Kyat 10,000 to be paid, on a person who kills, hunts, wounds or raises a seasonally protected wild animal without permission during the closed season.

Public Health Law, 1972

Purpose: to ensure public health includes not only employees but also resident people and cooperation with the authorized person or organization of the health department. It is concerned with the protection of peoples' health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics. The project owner will cooperate with the authorized person or organization in line with the section 3 and 5 of said law.

Section 3: The project owner will abide by any instruction or stipulation for public health. Section 5: The project owner will accept ant inspection, anytime, anywhere if it is needed.

Prevention and control of communicable Disease Law, 1995

Purpose: to ensure a healthy work environment and prevention of communicable diseases by the cooperation with the relevant health department.
The project owner will cooperate with the health officer in line with the clause (9) of subsection (a) of section 3 of said law.
The project owner will abide by any instruction or stipulation for public health. Section 4
The project owner will inform promptly to the nearest health department or hospital if the following are occurred;(section 9)

(a) mass death of birds or chicken
(b) mass death of mouse
(c) suspense of occurring of communicable disease or occurring of communicable disease
(d) occurring of communicable disease which must be informed

The project owner will accept any inspection, anytime, anywhere if it is needed. (section 11)

Mining Law, 1994

Chapter II: Objectives	3.The objectives of this Law are as follows: a) to implement the Mineral Resources Policy of the Government: f) to protect the environmental conservation works that may have detrimental effects due to mining operation.
Chapter III: Application and	4. A person or organization, desirous of carrying out any of the following operations, shall apply to the Ministry in accordance with the stipulations for obtaining permit 8. The Ministry may grant permit for the following operations: a) large scale production of industrial mineral or stone with local investment

Chapter IV: Duties of the Holder of	12. The holder of permit shall: a) abide by the provisions of this Law, rules, orders and directives made there under;
Laws and Regulations	**Description**
Permit	b) abide by the conditions contained in the permit; c) pay rent for the land related to the permit calculated in accordance with the rates prescribed by the rules made under this Law; d) pay rent for the land for each permit separately; 13. The holder of permit shall comply with the rules prescribed under this Law Respect of the following matters: - c) making provisions for safety and the prevention of accidents in a mine and their implementation; e) making provisions for the environmental conservation works that may have detrimental effects due to mining operation;
Chapter V: Right of Utilization of Land and Water for Mineral Production	15. If, in the interest of the State, it is necessary to acquire the land where mineral production could be undertaken on a commercial scale, the Ministry shall coordinate with the relevant Ministry for the acquisition of such land in accordance with the existing Law. 16. If the holder of a mineral production permit requires the use of public water for mineral production he shall first and foremost inform the Department of such a requirement in accordance with the prescribed manner.
Chapter VI: Royalty	d). for industrial mineral or stone at the rate of 1% to 3%
Chapter IX: Taking of Action by Administrative Means	28. If the holder of permit or a person managing on his behalf or any of the worker fails to comply with any of the orders or directives made under this Law, or contravenes any of the terms of the permit, the person issuing the permit may pass any of the following administrative orders: - a) suspending all or portion of the operations carried out under the permit; b) allowing continuation of the operation, after causing the payment of fine; c) cancelling the permit;
The Factories Act, 1974	
This act contains the provisions for chemicals management and storage. Some chemicals are likely to require permits. It also requires all factories to have proper pollution control measures such as air pollution, sewage and wastewater treatment systems.	
The Private Industrial Enterprise Law, 1990	
The State Law and Order Restoration Council enacted this law by Law No.22/90 on 26th November 1990. According to this law, all private industrial enterprises shall avoid or reduce the use of polluting technology. The Supervisory Body supervises and inspects the enterprise to ensure the following:	

- No health threats from the industrial enterprise to the nearby residence;
- No fire threats or hazards;
- No source of nuisance or pollution originating from the enterprise;
- No occupational hazard to the workers and
- Compliance with the existing law.

Myanmar Citizen Investment Law (2013)

(41) The following investments shall be stipulated as prohibited investment;

(a) business/ investment activities which may bring or cause the hazardous or poisonous Wastes into the Union;

(b) Business/ investment activities which may bring technologies, medicines, flora and fauna and instruments which are still being tested abroad or which have not been obtained approvals for use, planting and cultivation except the investments which made for the purpose of research and development;

(c) Business/ investment activities which may affect the traditional culture and customs of the racial groups within the Union;

(d) Business/ investment activities which may affect the public health

(e) Business/ investment activities which may cause significant damage to the natural environment and ecosystem; and

(f) Business / investment activities, which manufacture goods or provide services that, are prohibited in accordance with applicable laws.

(42) The following investment activities shall be stipulated as restricted investment:

(a) Investment activities allowed to carry out by Government only;

(b) Investment activities restricted to foreign investors;

(c) Investment activities allowed only in form of joint ventures with a citizen owned entity or a citizen of Myanmar; and

(e) Investment activities permitted with the recommendation of the relevant ministries.

(50).(b) Foreign investor may lease land or building up to an initial period of 50 years commencing on the date of receipt of the permit or endorsement from the Commission either from the Government or governmental organizations or from private land or building owners,

(c) After the expiry of the term permitted under sub-section (b), a consecutive period of 10 years and a further consecutive period of 10 years extension to the initial period of lease land or building may be obtained with the approval of the Commission.

(f) The Commission shall, for the purpose of the development of the entire Union with the approval of Pyidaungsu Hluttaw submitted through the Government, grant a longer period for the rights to lease land or building and the rights to use land under this law, to investors who invest in least developed and remote region.

65. The Investor-

(f) shall not make any significant alteration of topography or elevation of the land on which he is entitled to lease or has rights to use, without the approval of the Commission;

(g) shall in relation to the investment business, abide by applicable laws, rules, procedures and best standards practiced internationally so as not to cause damage, pollution, loss to the natural and social environment and not to cause damage to cultural heritage;

(q) The investments, which need to obtain prior approval under the environmental conservation law and the procedures, shall take permit or endorsement of Commission before undertaking the assessment. Such Investments which obtained permit or endorsement, shall report environmental and social impact assessment to the Commission along the period in which the activities of the investments.

75.(a) With respect to the income tax exemption, the Commission will issue a notification with the approval of the Union Government to designate as Zone (1), the regions that are least-developed, and as Zone (2), the regions that are moderately developed, and as Zone.

(3) the regions that are adequately developed, and income tax exemption may be granted to investment businesses in Zone (1) for a period of 7 consecutive years including the year of consecutive years including the year of commencement the business, and investment businesses in Zone (3) for a period of 3 consecutive years including the year of commencement of the business.

Myanmar Fire Services Law, 2015

The objectives of Myanmar Fire Force Law are;

a) To take precautionary and preventive measure and loss of state own property, private property, cultural heritage and the lives and property of public due to fire and other natural disasters
b) To organize fire brigade systemically and to train the fire brigade
c) To prevent fire and to conduct release work when fire disaster, natural disaster. Epidemic disease or any kind of certain danger occurs
d) To educate, organize an inside extensively so as to achieve public corporation
e) To participate if in need for national security, peace for the citizens and law and order

The relevant Government Department or organization shall, for the purpose of precaution and prevention obtain the approval of the Fire force Department before granting permission for the following cases:

a) Constructing three-storied and above buildings market and condominium buildings,
b) Operating hotel, motel, guest house enterprise
c) Constructing factory, workshop, storage facilities and warehouse
d) Operating business expose to fire hazard by using in inflammable materials or explosive materials
e) Producing and selling fire-extinguishing apparatuses

Doing transport business, public utility vehicles train, airplane, helicopter, vessel, ship, etc.

The relevant government department or organization shall obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans.

Underground Water Act, 1930

The underground water act was enacted on the date of 21st, June in 1930 whereas it is expedient to conserve and protect underground sources of water supply in the Union of Burma. This act prohibits sinking of a tube for obtaining underground water except under and in accordance with the terms of a license granted by the water officer. Township Officer the local area concerned and the expense of such closure shall be recoverable from the owner of the tube as if it were an arrear of land-revenue.

The Settlement of Labor Dispute Law, 2012	
The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the rights of workers or having good relationship between employer and workers and making a peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and Worker justly.	
The Social Security Law (2012)	
Section 53(a)	The employers and workers shall coordinate with the Social Security Board or insurance agency in respect of keeping plans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment;
Chapter II: Formation of the Workplace Coordinating Committee	
3. In any trade in which more than 30 workers are employed, the employer, with the view to negotiating and concluding collective agreement, shall: (a) if there is any labor organization, form the Workplace Coordinating Committee with the view to make a collective bargaining as follows: **(i)** two representatives of workers nominated by each of the labor organizations; **(ii)** an equivalent number of representatives of employer; (b) if there is no labor organization, form the Workplace Coordinating Committee as follows: **(i)** two representatives of workers elected by them; 5. The Coordinating Committee shall promote the good relationship between the employer and worker or labor organization, negotiation and coordination on the conditions of employment, terms and conditions and occupational safety, health, welfare and productivity. 6.(a) If the worker or labor organization or the employer, by themselves or by representative, requests and complains their grievances to the Coordinating committee within five days, not including the official holidays, from the day of the receipt of the request. (b) The Coordinating Committee shall keep the record of settlement and shall send report on the situation of performance in accord with the stipulation to the relevant Conciliation Body.	
Chapter III: Formation of the Conciliation Body	
10. The Region or State Government shall form the Conciliation Body in the townships.	
Chapter IV: Formation of the Dispute Settlement Arbitration Body	
16. (a) The Ministry shall, with the approval of the Union Government, from the Dispute Settlement Arbitration Body in the Regions or States.	
Chapter V: Formation of Dispute Settlement Arbitration Council	
19. The Ministry shall, with the approval of the Union Government, form the Dispute Settlement Arbitration Council with 15 qualified persons of good standing from legal experts and experts in labor affairs.	
Chapter VI: Settlement of Dispute	
23. A party, employer or worker, may complain of an individual dispute relating to his grievance to the Conciliation Body and if he is not satisfied with the conciliation of such body in accord with stipulated manners, may apply to the competent court in person or by the legal representative.	

- Prevention of Hazard from chemical and related substance law (2013)
- Employment Skill Development Law (2012)
- Fire brigade law (2015), Vehicle Law (2015)
- Water resource and river maintenance law (2016)

2.2 National and International Guidelines

The National Environmental Quality (Emission) Guidelines (2015) provides the basis for regulation and control of air emissions, noise and liquid discharges from various sources in order to prevent pollution for the protection of human and ecosystem health. Moreover, the World Health Organization Guideline, and International Finance Corporation Guidelines for Mining (2007) are used for data interpretation and referred to the Environmental Management Plan of the proposed quarry operation.

2.3 Commitment

SDC had made the commitment, which is attached in Appendix(E) to abide the Environmental Conservation Law, Rules and standards and stickily follow the environmental management plan.

Proponents committed to use the required budget for environmental issues.

The proponent acknowledged that this report was prepared by using correct data and information.

Third party team committed that the assessment have been done according to the rule, regulation and procedures. (See Appendix F)

2.4 Environmental and Social Policy of the proponent

The company set down policy holds on the following objectives for the environment.

(a) Continual improvement of environmental performance objectives.
(b) Companies will follow the Environmental Law, Rule Regulations and Standard.
(c) To show responsibility and accountability of Environmental Conservation.
(d) To assist the livelihood and social condition of communities.

2.5 Approval to conduct EIA

This project has been instructed by Mandalay Region Environmental Conservation Department vide letter No: 2/6/7 EIA (361/2019) dt: 17.9.2019 (Appendix - G).

The approval of selecting SEE-Trust, NayWunMyat(s) Co.,Ltd, the third party consultant by Environmental Conservation Department vide letter No:EIA-2/9(060/2020) dt:3rd Jan 2020 (Appendix-H).

Chapter-3

Description of Project and Alternatives

3.1 Introduction

Shwe Taung Development Company Limited is the leading construction company. They are constructing Express Highways, Airports, Residential buildings, Factories etc.

So, they have their own requirements for construction material. Among them, quarry rock is also the essential raw material. Therefore, they have to produce quarry stones.

3.2 Location of the Project

The project is located at Mandalay region, Mandalay District, Patheingyi Township, Chingone- Yema, Kyu Wun Plot – 555 (ka), Sub plot No: (23). The location map shown in figure (3-1) and (3-2). The coordinate at map No: 93CI Point 731548 and 730553 the elevation is between 300-700 ft above sea level.

The surrounding area is Kyuwun village in the east, Ohnchaw village and in the west, Thawdarwin Mine and Longkan garden in the north east and Htonbo village in the south of the project. The Mandalay – Lashio highway road is in the south, passing from west to east. The village road (tar road) connected to Mandalay-Lashio road, mile past 13/4. The distance to mine is $1\frac{1}{2}$ mile tar road and half mile stone road.

Figure (3-1) Location of Project

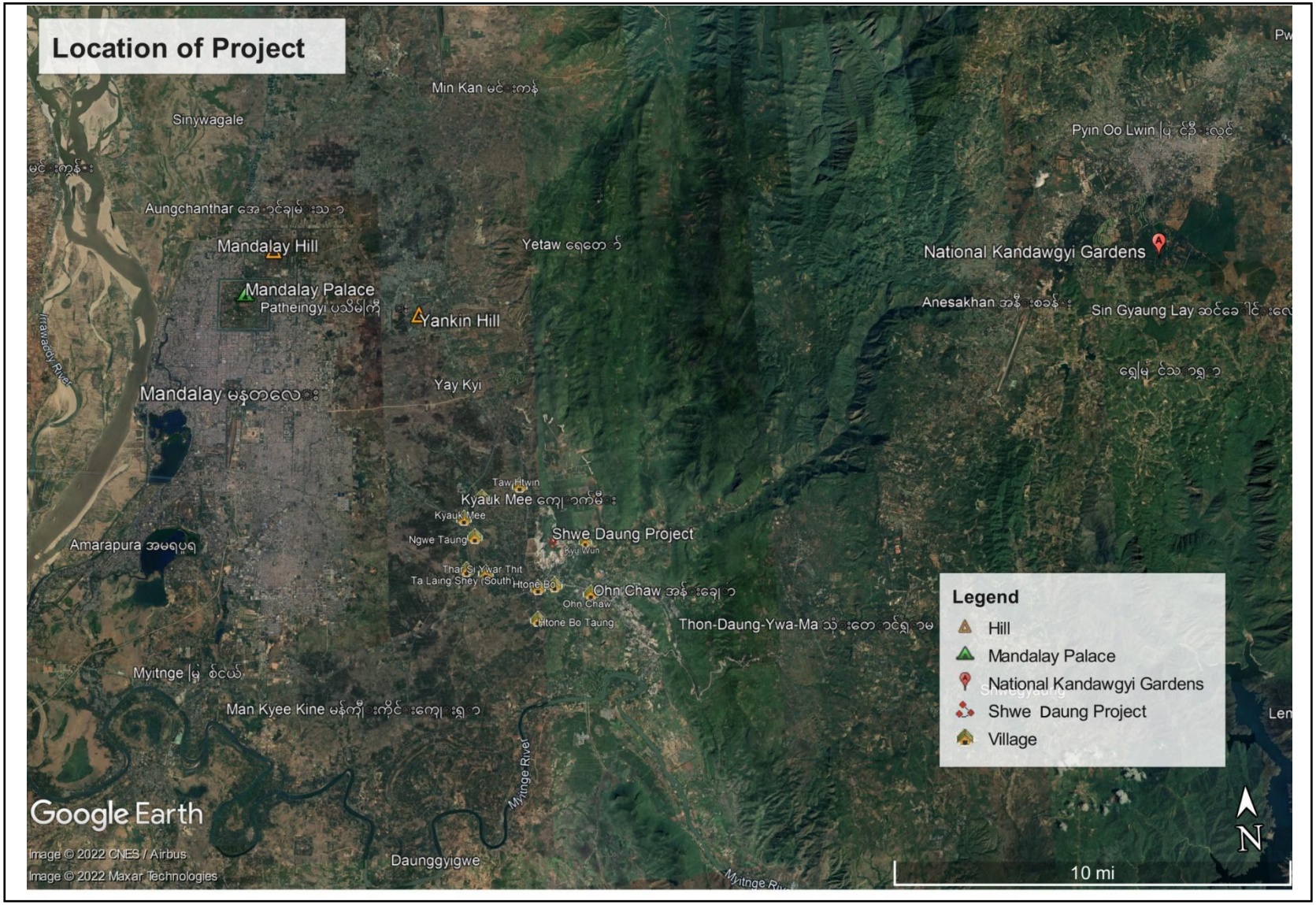


Figure (3-2) Satellite map of SDC mine

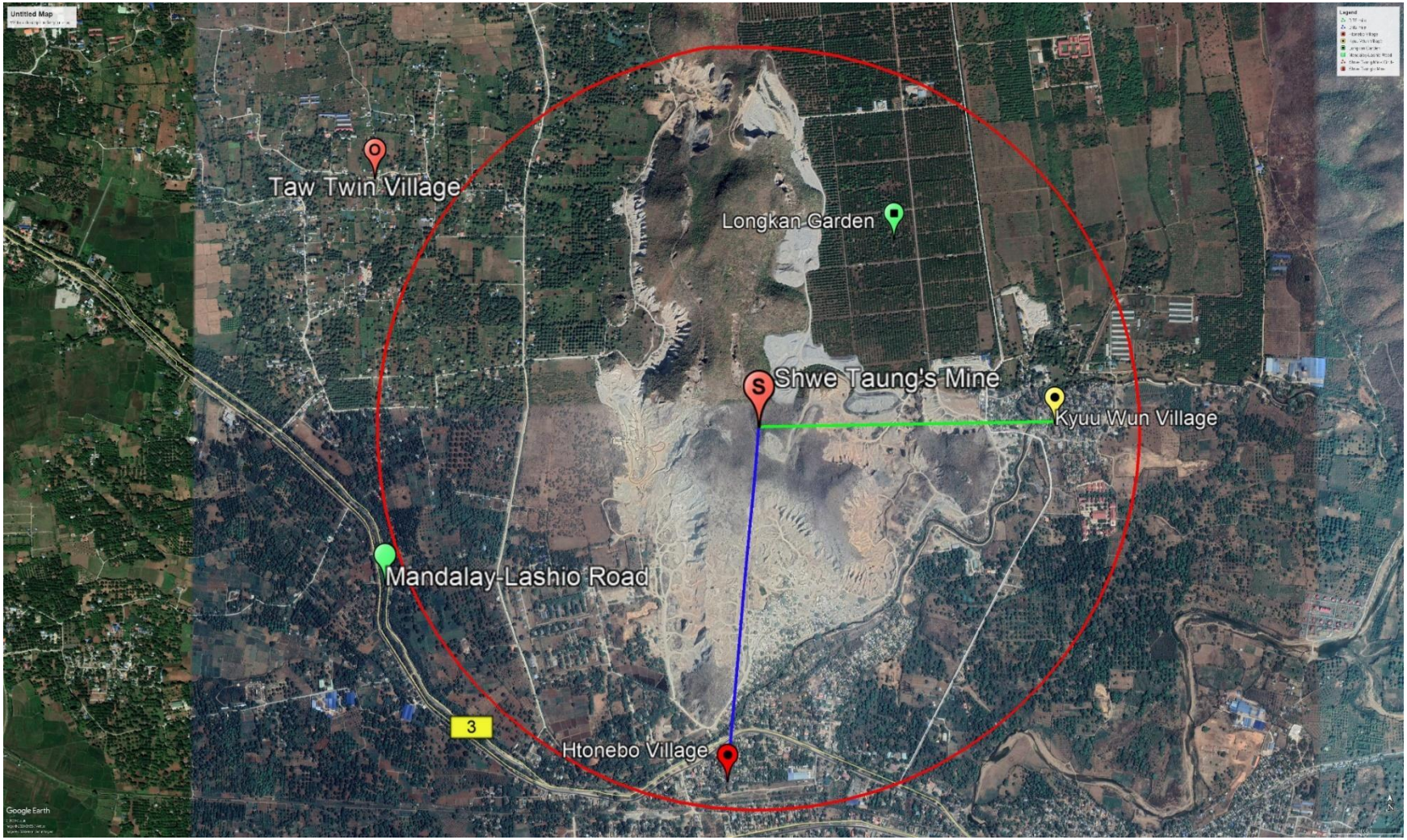


Figure (3-3) Google map of mine location and surrounding

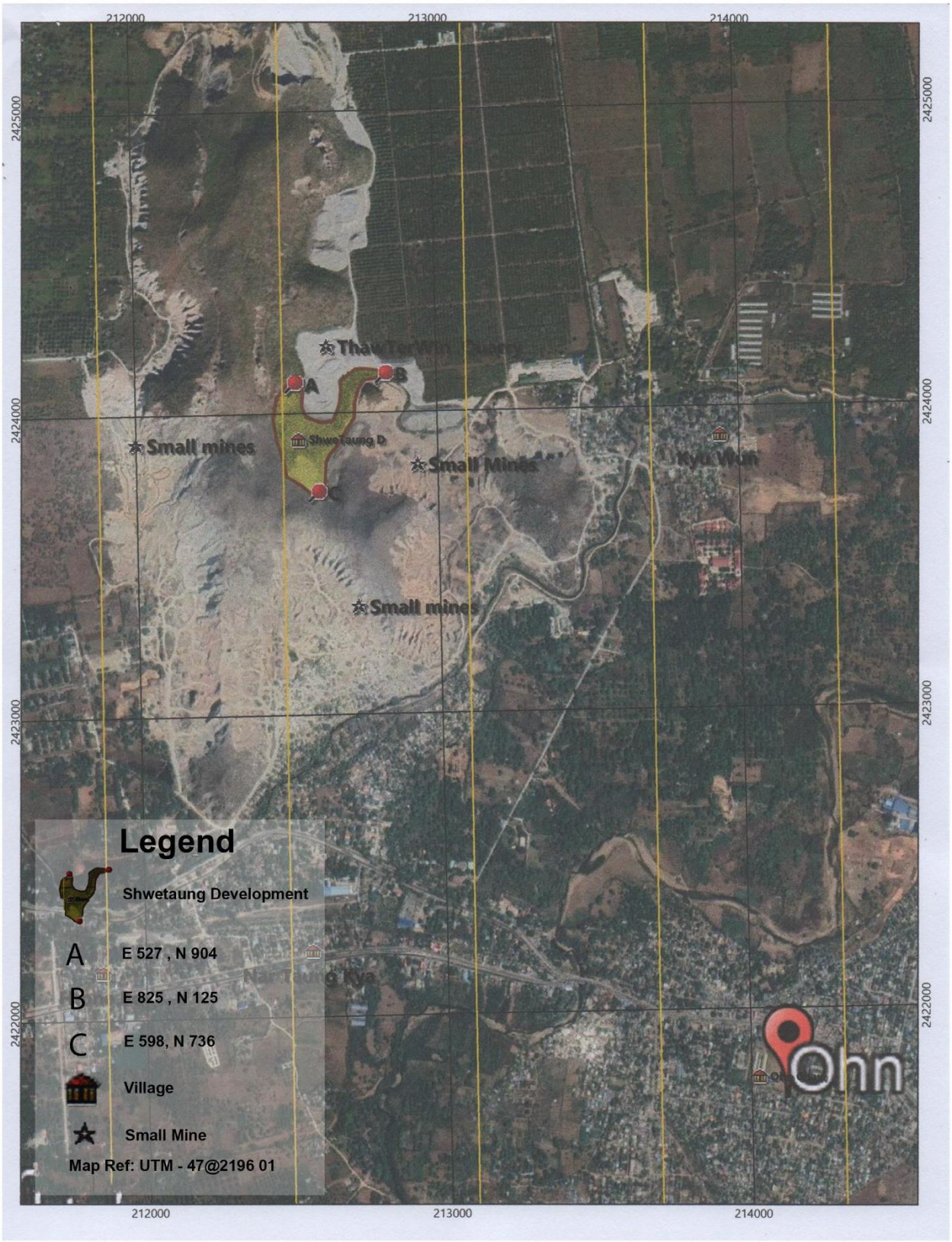
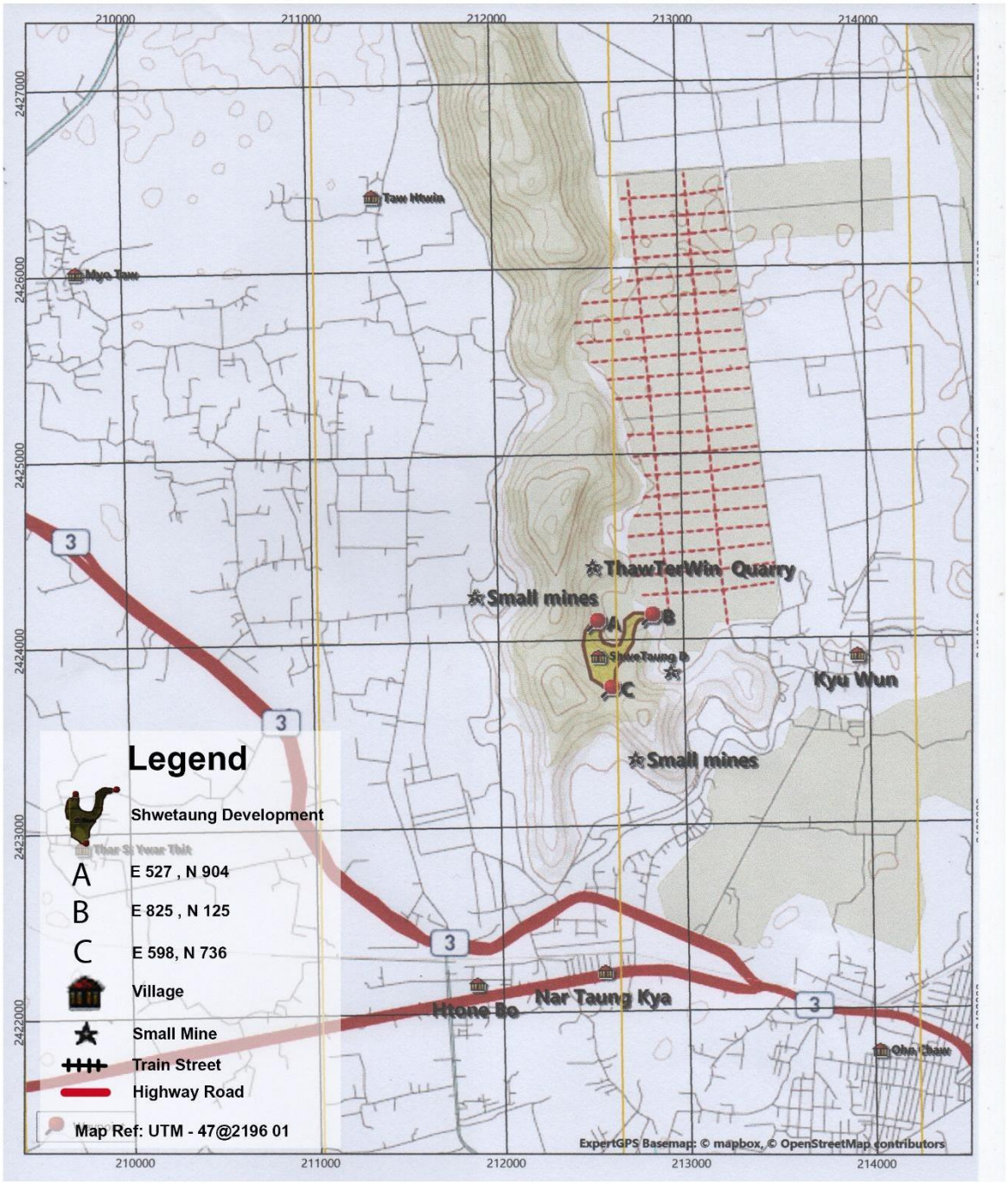
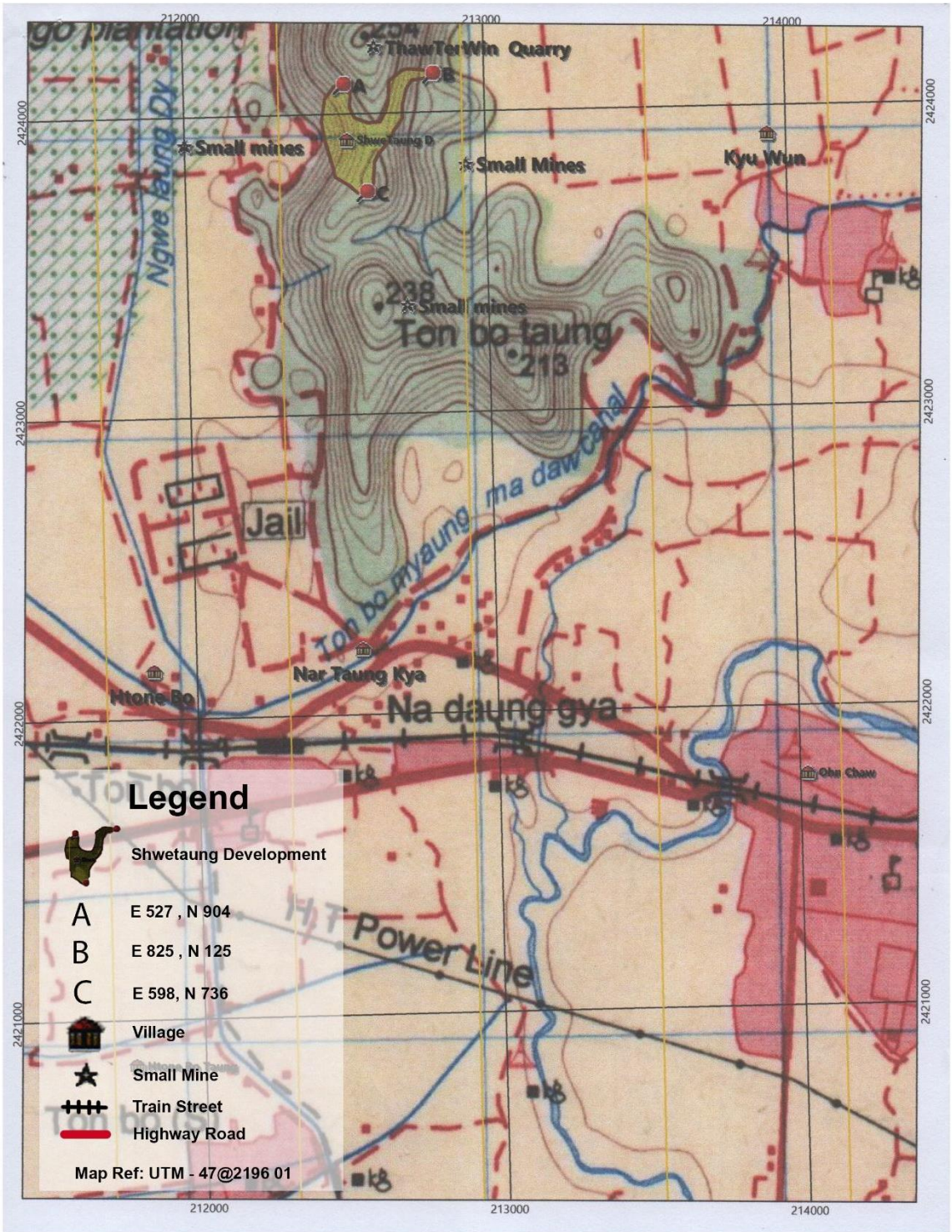


Figure (3-4) Location map of SDC mine and transport route



Label	Type	Name on GPS	Easting	Northing	Zone	Comment	Elevation	Date Created	Date Modified	Distance to Active Point	Bearing	Depth	Country
ShweTaung D	Town	ShweT	212538.128	2423916.357	47Q			7/6/2020 12:09	7/11/2020 6:03	0	0		
A	Waypoint	A	212527.055	2424094.895	47Q			7/11/2020 6:32	7/11/2020 6:36	0.111	355.41		
C	Waypoint	C	212598.878	2423736.175	47Q			7/11/2020 6:32	7/11/2020 6:37	0.118	160.33		
B	Waypoint	B	212825.779	2424125.362	47Q			7/11/2020 6:32	7/11/2020 6:37	0.221	52.96		
Kyu Wun	Town/ village	Kyu Wun	213936.492	2423906.741	47Q			7/6/2020 12:07	7/11/2020 12:31	0.868	89.36		
Nar Taung Kya	Town/ village	Nar Taung Kya	212551.172	2422218.468	47Q			7/6/2020 12:07	7/11/2020 12:31	1.054	178.52		
Htone Bo	Town/ village	Htone Bo	211855.679	2422159.001	47Q			7/6/2020 12:07	7/11/2020 12:31	1.171	200.19		
Ohn Chaw	Town	Ohn Chaw	214025.117	2421775.253	47Q			7/6/2020 12:07	7/6/2020 12:27	1.619	144.18		
Taw Htwin	Town	Taw Htwin	211356.118	2426404.709	47Q			7/6/2020 12:07	7/6/2020 12:27	1.711	333.55		
Thar Si Ywar Thit	Town	Thar Si Ywar Thit	209736.728	2422926.826	47Q			7/6/2020 12:07	7/6/2020 12:27	1.845	249.51		
Htone Bo Taung	Town	Htone Bo Taung	211767.251	2420852.045	47Q			7/6/2020 12:07	7/6/2020 12:27	1.962	193.08		
Ngwe Taung	Town	Ngwe Taung	209362.616	2424429.75	47Q			7/6/2020 12:07	7/6/2020 12:27	1.998	278.15		
Myo Taw	Town	Myo Taw	209746.827	2426021.936	47Q			7/6/2020 12:07	7/6/2020 12:27	2.171	305.99		
Ta Laing Shey (South)	Town	Ta Laing Shey (South)	208936.608	2423100.009	47Q			7/6/2020 12:07	7/6/2020 12:27	2.293	256.19		
Kyauk Mee	Town	Kyauk Mee	208950.905	2425211.975	47Q			7/6/2020 12:07	7/6/2020 12:27	2.368	288.82		

Figure (3-5) Location of SDC mine and surrounding, road and power line



Label	Type	Name on GPS	Easting	Northing	Zone	Comment	Elevation	Date Created	Date Modified	Distance to Active Point	Bearing	Depth	Country
ShweTaung D	Town	ShweT	212538.128	2423916.357	47Q			7/6/2020 12:09	7/11/2020 6:03	0	0		
A	Waypoint	A	212527.055	2424094.895	47Q			7/11/2020 6:32	7/11/2020 6:36	0.111	355.41		
C	Waypoint	C	212598.878	2423736.175	47Q			7/11/2020 6:32	7/11/2020 6:37	0.118	160.33		
B	Waypoint	B	212825.779	2424125.362	47Q			7/11/2020 6:32	7/11/2020 6:37	0.221	52.96		
Kyu Wun	Town/ village	Kyu Wun	213936.492	2423906.741	47Q			7/6/2020 12:07	7/11/2020 12:31	0.868	89.36		
Nar Taung Kya	Town/ village	Nar Taung Kya	212551.172	2422218.468	47Q			7/6/2020 12:07	7/11/2020 12:31	1.054	178.52		
Htone Bo	Town/ village	Htone Bo	211855.679	2422159.001	47Q			7/6/2020 12:07	7/11/2020 12:31	1.171	200.19		
Ohn Chaw	Town	Ohn Chaw	214025.117	2421775.253	47Q			7/6/2020 12:07	7/6/2020 12:27	1.619	144.18		
Taw Htwin	Town	Taw Htwin	211356.118	2426404.709	47Q			7/6/2020 12:07	7/6/2020 12:27	1.711	333.55		
Thar Si Ywar Thit	Town	Thar Si Ywar Thit	209736.728	2422926.826	47Q			7/6/2020 12:07	7/6/2020 12:27	1.845	249.51		
Htone Bo Taung	Town	Htone Bo Taung	211767.251	2420852.045	47Q			7/6/2020 12:07	7/6/2020 12:27	1.962	193.08		
Ngwe Taung	Town	Ngwe Taung	209362.616	2424429.75	47Q			7/6/2020 12:07	7/6/2020 12:27	1.998	278.15		
Myo Taw	Town	Myo Taw	209746.827	2426021.936	47Q			7/6/2020 12:07	7/6/2020 12:27	2.171	305.99		
Ta Laing Shey (South)	Town	Ta Laing Shey (South)	208936.608	2423100.009	47Q			7/6/2020 12:07	7/6/2020 12:27	2.293	256.19		
Kyauk Mee	Town	Kyauk Mee	208950.905	2425211.975	47Q			7/6/2020 12:07	7/6/2020 12:27	2.368	288.82		

3.3 Mine Permit and production target

Mine permit has been issued to U That Zin Oo, representative of Shwe Taung Development Co.,Ltd (SDC). The permitted area is (15) Acres in the location mentioned in para 3.2. The annual permit for extraction is 13,000 Sud (56550 Metric ton). 1 Sud (100 Cu Ft = 4.35 Metric Ton). The mine permit and land department's land form (105) map shown. The permit was issued for one year, and extendable yearly.

3.4 Current Scenario

SDC the base camp in the Kyu Wun village. There are also crushing mills in the compound. Currently they have got the raw material (boulder) from nearby mines which are closed with the office and SDC allotted mine.

They got and renewed the permit of the proposed mine in 2010 but not extracted yet. There is only a security building in the proposed mine area. They are Preparing to install another crushing machine near the mine and to start quarry extraction expected at the end of 2020.

So, we have to study the impacts for Preconstruction, Construction, Operation and Decommissioning Phase.

3.5 Components of project

The components in this quarry mines are

(a) Extraction of quarry rock
(b) Crushing quarry rock into required quarry stones (6 in x 9 in),(3in x 4 in) (2 in x 1 in) and chipping
(c) Transportation and marketing

3.6 The SDC base camps and its facilities

The base camp was constructed on their own land in Kyu Wun village. The total area of the land area is 7.2 acres.

3.6.1 Building

The buildings in the based camp are as follow:

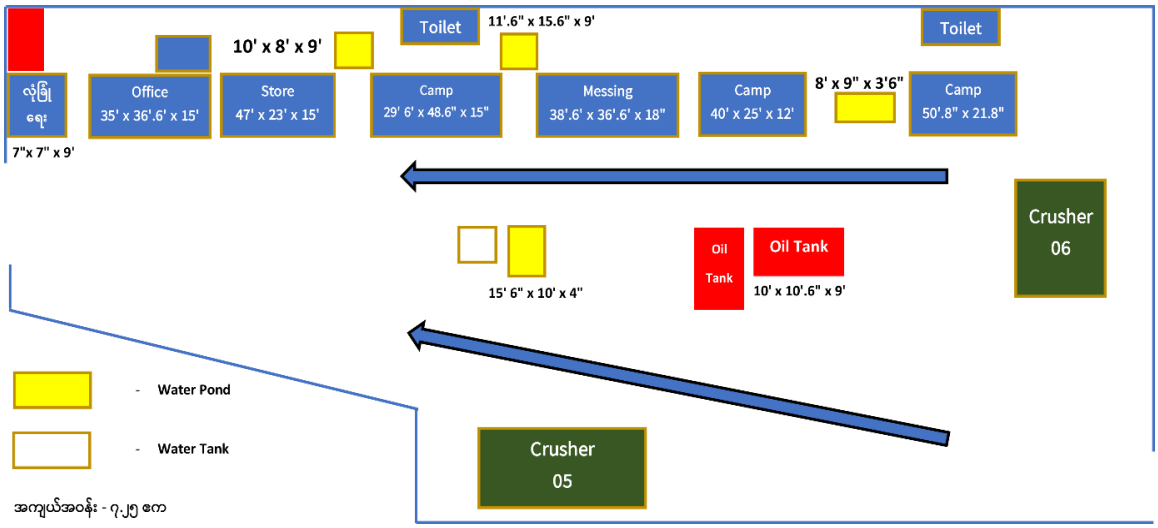
Table (3-1) Building based camp

Name of building	Specification (ft x ft)	Type	Quantity (No)
Office	35 x 36 $\frac{1}{2}$	Semi-Permanent	1
Store	47 x 23	Semi-Permanent	1

Canteen	$38\frac{1}{2}$ x $36\frac{1}{2}$	Semi-Permanent	1
Officer quarter	$29\frac{1}{2}$ x $48\frac{1}{2}$	Semi-Permanent	1
Staff quarter	40 x 25	Semi-Permanent	1
Labor quarter	50 x 21	Semi-Permanent	1
Security	7 x 7'	Semi-Permanent	6

The flow plan of the compound shown in Figure (3-6).

Figure (3-6) Flow plan of current based camp



3.6.2 Electricity

The electricity was connected from the EPC power line. There are 500 KVA transformers in the camp.

Owned transformer

There are also one standby generator (Diesel) in the camp.

3.6.3 Water

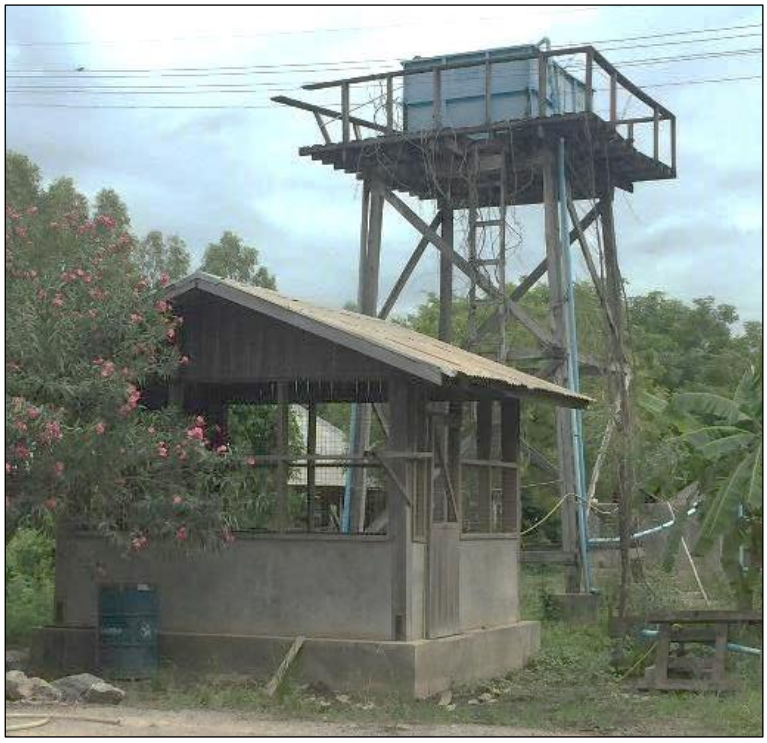
Water for the camp is from a tube well. The depth of the tube well is 300 feet. The overhead water tank is 30 ft high and 1600 gallons can store. There are also two ground water tanks which can store 4000 gallons each. The consumption of water is as follow: -

Table (3-2) Water utilization

Purpose for usage	Daily requirement (gallon)	Yearly requirement (Gallon)
Camp use	270	100,000
Industrial use and road spraying	1200	300,000

Industrial use water is collected from Sedaw Lay canal and Nadaung Kya Stream. There is no problem for water.

Overhead tank



3.6.4 Fuel requirement

The required diesel is transported from ST Oil station which is not far from the project.

Table (3-3) Fuel consumption

Oil type	Requirement Gallon	
	Monthly	Yearly
Diesel	1800	18,000
Engine Oil	250	3,000
Hydraulic	250	3,000

3.6.5 Fire Protection

Water tanks (8000) gallon and overhead water tank (1600) gallon for emergency use. 40 NOs of fire extinguishers are in place.

3.6.6 Plants

Wind breaks and ornamental trees were planted in the compound.

3.6.7 CSR

SDC donated for village road construction, school building and occasionally donated for village activities.

3.6.8 Crushing Mill

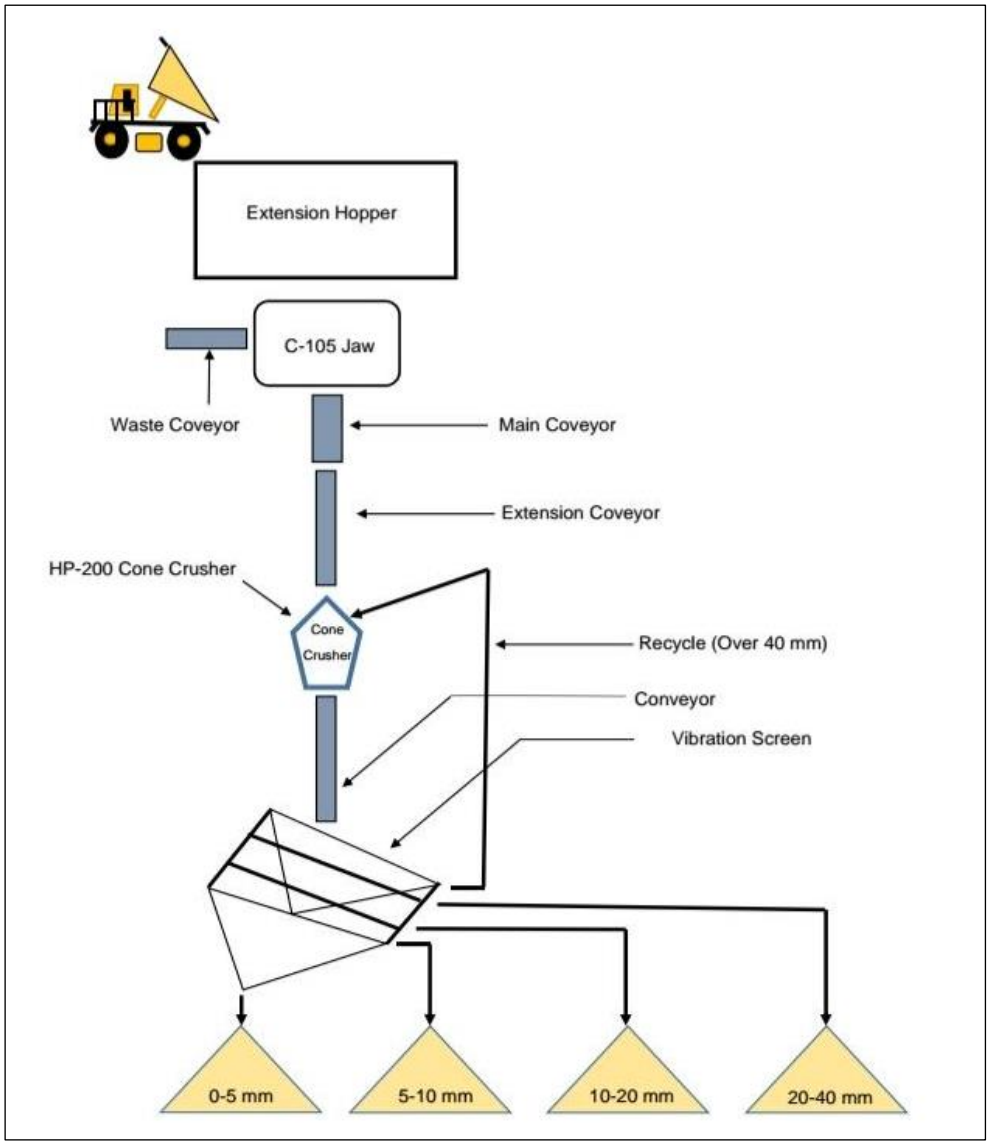
SDC established a crushing mill in the base camp compound (Outside of the Proposed project area).

since. The production capacity of the mill is 5000 tons. The raw material was bought from other mines as crushed in the mill for their own uses. The photograph and diagram shown below: -

Crushing Mill

Figure (3-7) Flow chart of mill

-

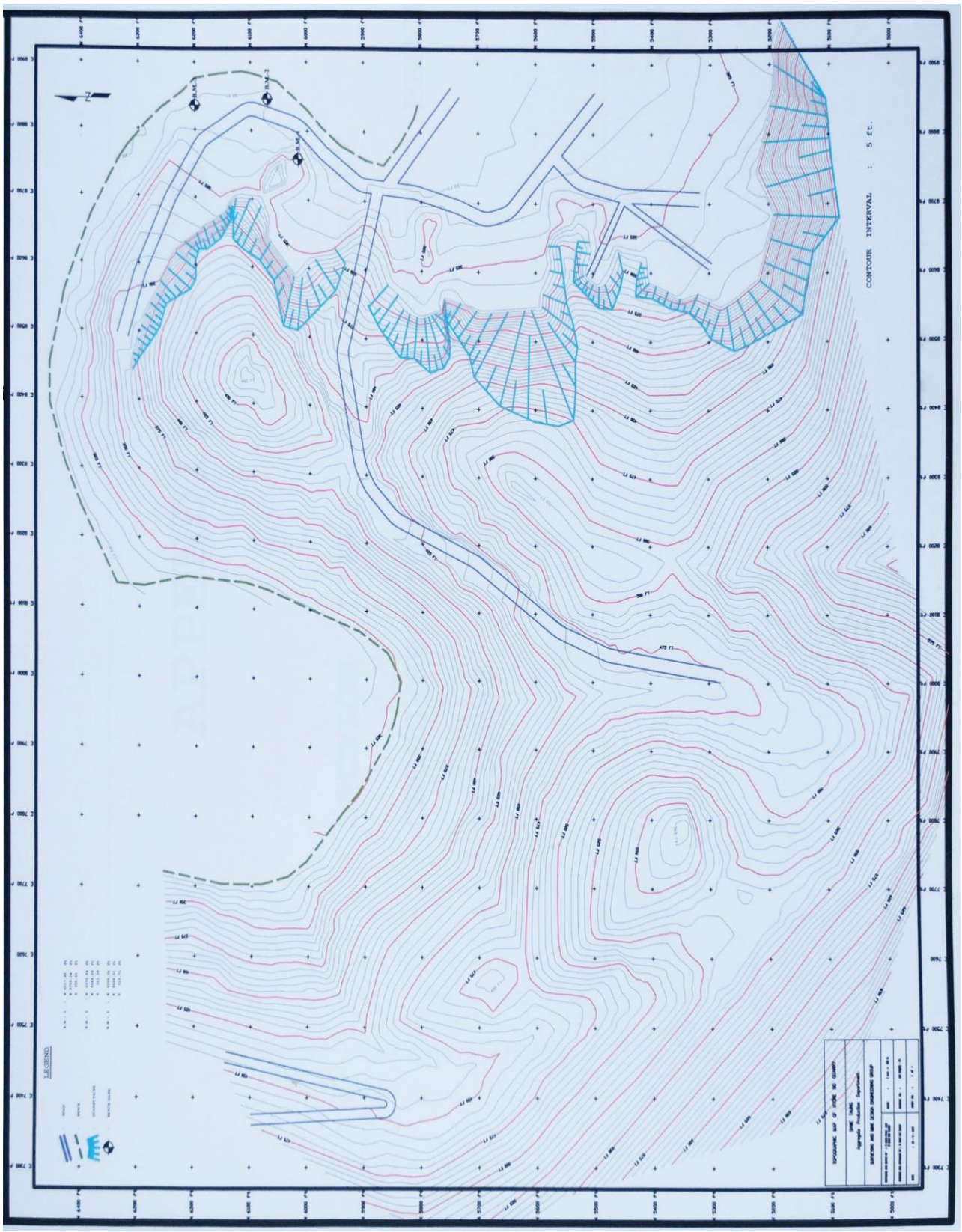


These crushers would be moved to the other project site of SDC after installed the new crushing line in the proposed project.

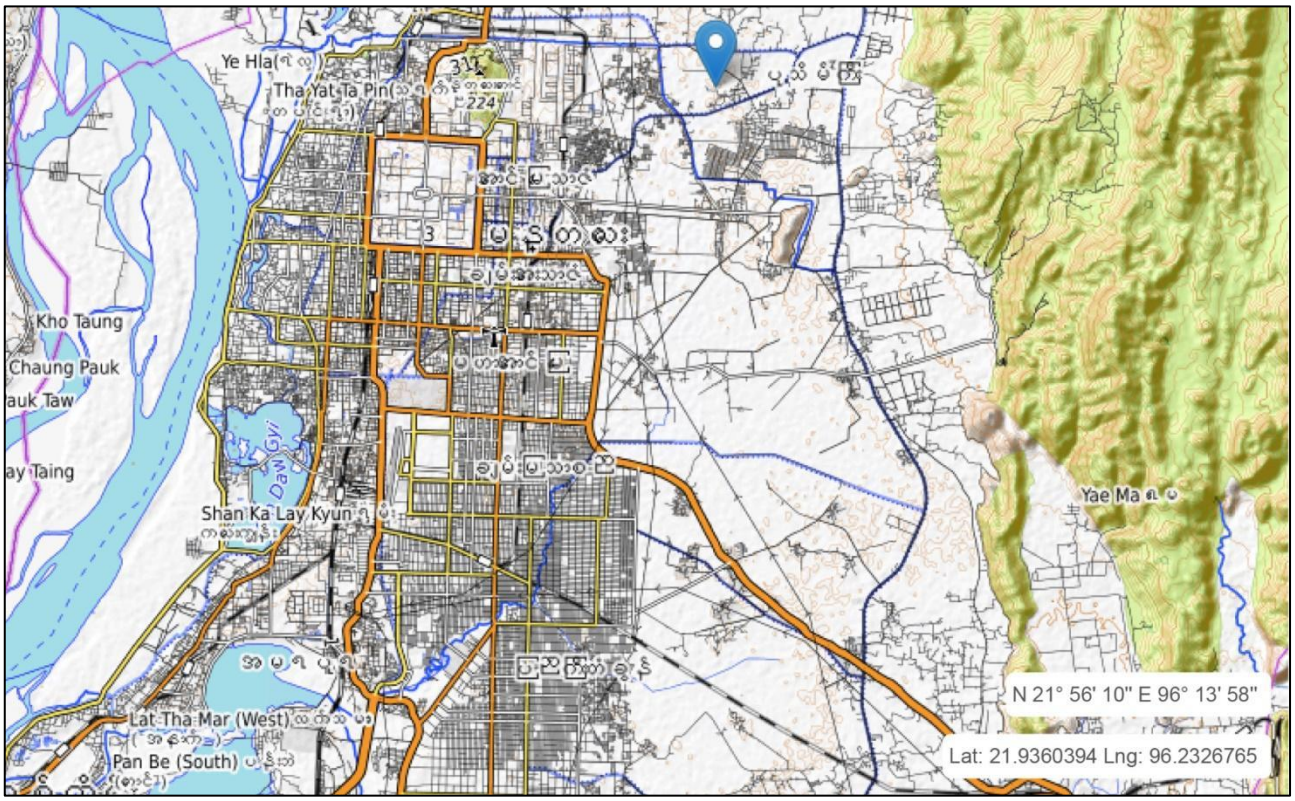
3.7 Topography and Geological Formation

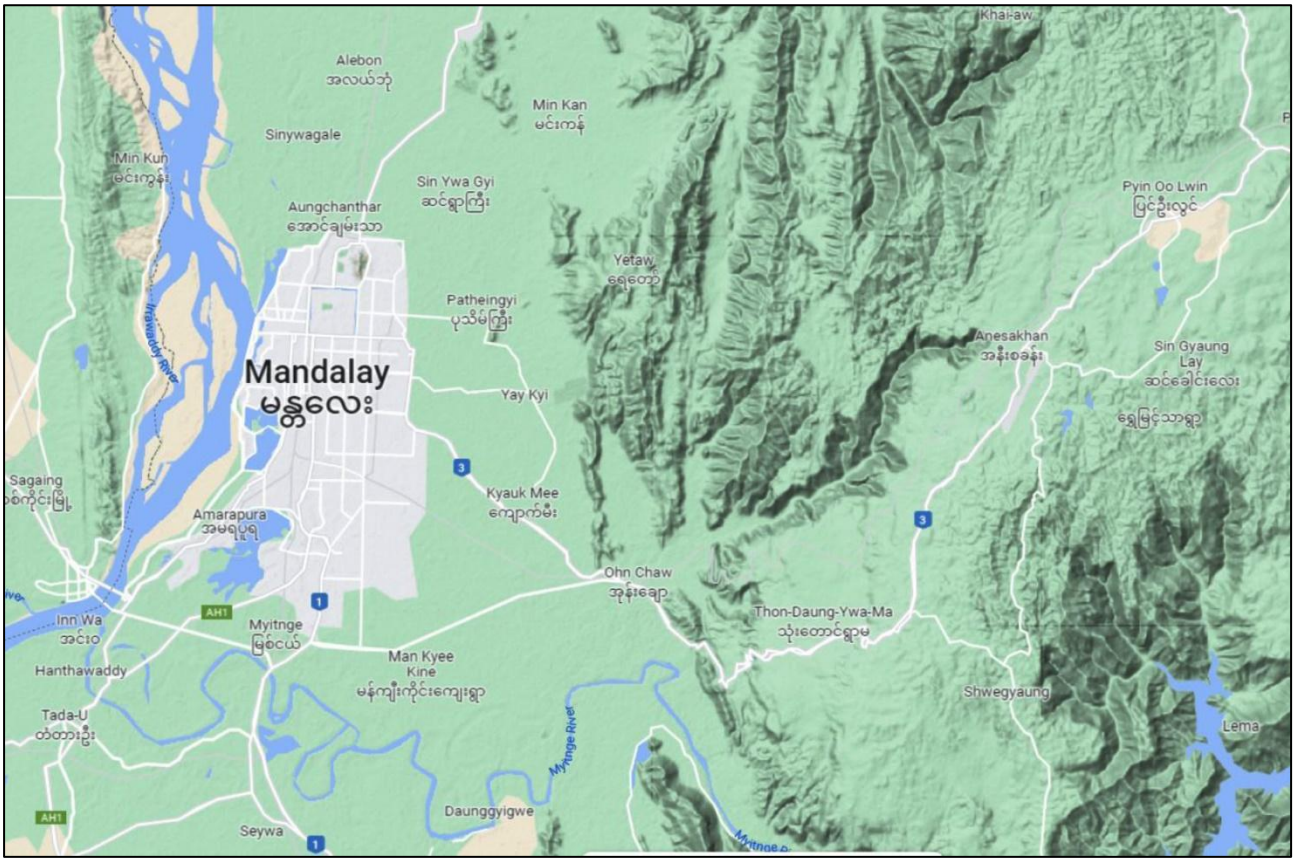
The mountain is generally spread from North to South. The elevation is between 300-700 ft above the sea level. The study area is in the central part of Myanmar, consist of tectono-stratigraphic and this area is sub divided into the central volcanic belt. The rocks are lime stones and there are in different strike and Dip. The top soil is too thin and only found small tress, shyrub and small bamboo break. The topography maps of project are is shown in (3-7). Topographic and drainage features can see in Figure (3-8) Patheingyi is located in the foot of Pyin Oo Lwin mountain. Most of are is flat and only 20% of land is cover with rocky mountains.

Figure (3-8) Topography map of Project



Figure(3-9)Topography and drainage feature





3.8 Estimation of line stone

The estimated calculation of line stones can be found in Table (3-4).

Table (3-4) Layer wise yield calculation

LEVELS	LIMESTONE (SUDs)	STONE (AFTER 20% DEDUCTION) (SUDs)	STONE CUMULATIVE (SUDs)
550FT	845.00	676	676
535FT	3,490.00	3,152	3,828
520FT	9,760.00	7,808	11,636
505FT	16,450.00	13,160	24,796
490FT	25,532.50	20,426	45,222
475FT	34,970.00	27,976	73,198
460FT	43,520.00	34,816	108,014
445FT	50,925.00	40,740	148,754
430FT	53,875.00	43,100	191,854
415FT	57,575.00	46,060	237,914
400FT	58,075.00	46,460	284,374
385FT	59,812.00	47,850	332,224
370FT	59,082.50	47,266	379,490
355FT	61,462.50	49,170	428,660
340FT	66,055.00	52,844	481,506
325FT	62,900.00	50,320	531,824
TOTAL	664,780	531,824	531,824

3.9 Mine Plan

Basically, the mine plan is based on the following.

(a) Bench height will be 10 meters and Bern width will be fixed 15 meters.

(b) Diameter of the drill will be 76 mm with a 9-meter depth.

(c) Burden should be 2 meters and spacing will be 2 meters, depending on depth of drill.

(d) Non-Working Bern – 3 meters to protect landslide and save from fallen stone

(e) Pneumatic drill will be used for Development and Hydraulic drill will be used for production.

(f) Width of transporting stones to mill input be 8-meter and shall be made proper drainage to protect erosion.

(g) Explosion – Emulsion or Ammonium will be

(h) 944 Hydraulic used excavators will be used for loading

(i) Spraying the road and mine site and crushing mill by water bowser.

(j) Yield of crushing mill

The yield crushing mill can estimated as follow:

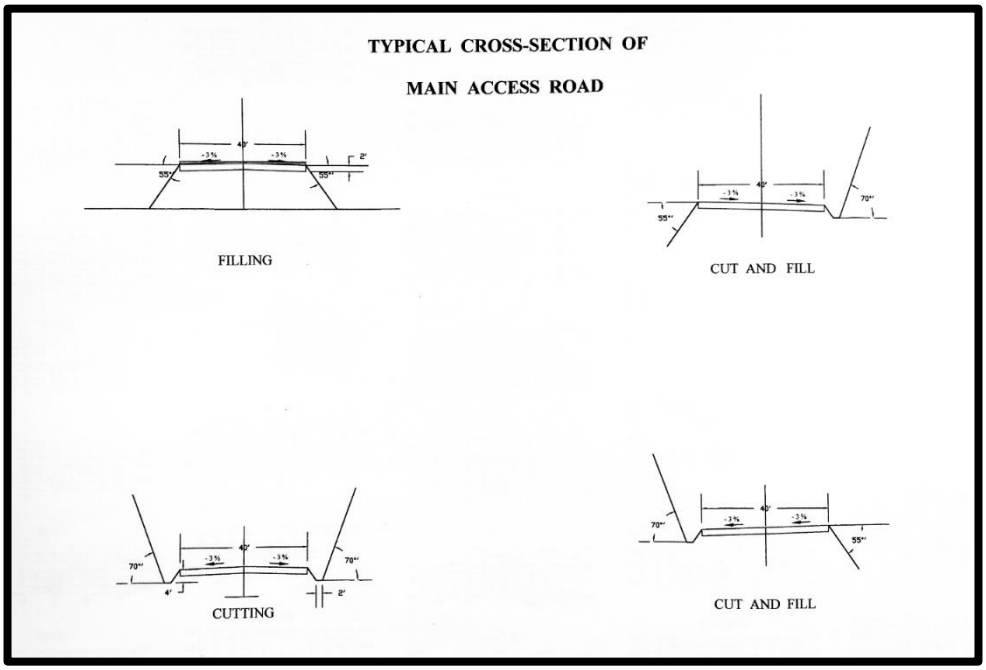
Used of Jaw crusher and cone crusher	Outturn Per hour
C – 80 Jaw crusher & GP – 100 cone crushers	100 tons
C – 105 Jaw crusher & GP – 200 cone crushers	120 tons
C – 106 Jaw crusher & GP – 11 F cone crushers	120 tons

3.9.1 Main Access Road Plan

The main access road plan map is shown in map and typical cross section of road show in figure (3-10). In road construction total cut volume is estimated at 49,000 Cu yd and total fill is 3000 Cu yd.

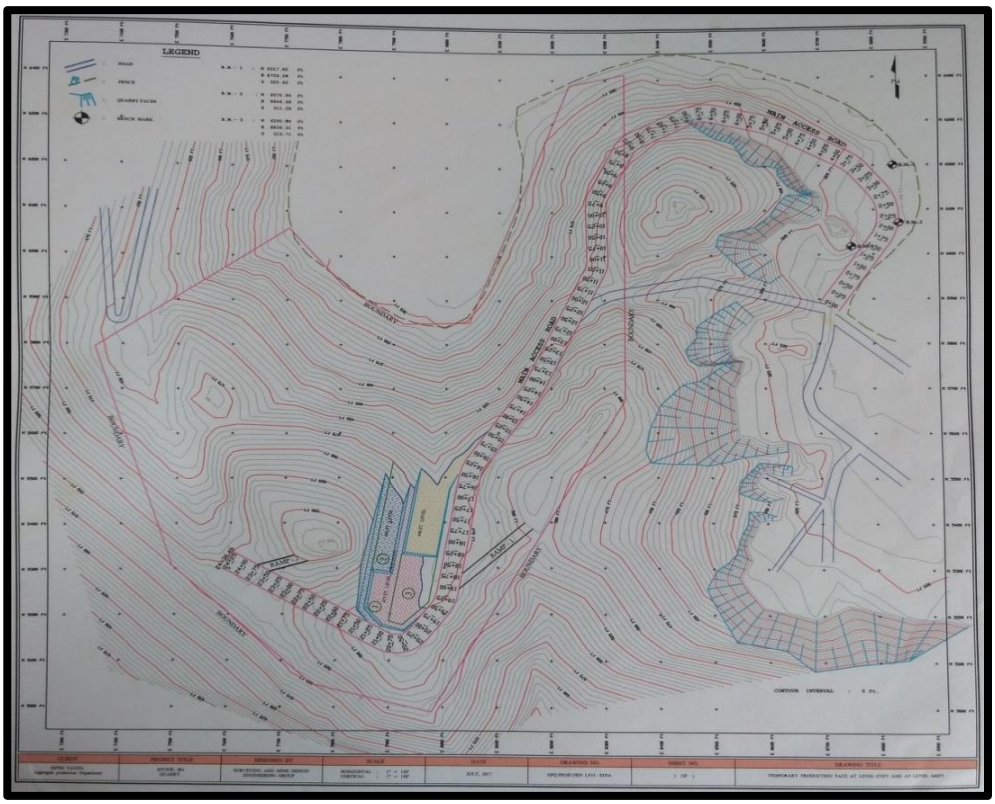
Figure (3-10) Road design

Figure (3-11) Typical cross section of main road



3.9.2 Extraction Plan

Figure (3-12) Complete extraction plan map



The extraction plan map is mentioned in Map (3-12) and sample drawing of sections are Figure (3-13), (3-14), (3-15), (3-16) and (3-17).

Figure (3-13), (3-14), (3-15), (3-16) and (3-17) Sample drawing of sections

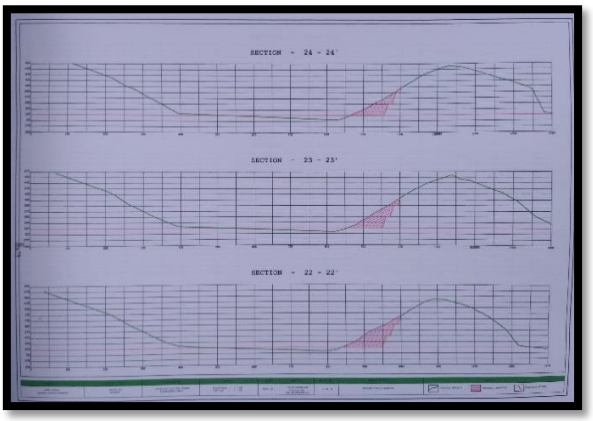


Figure (3-13)

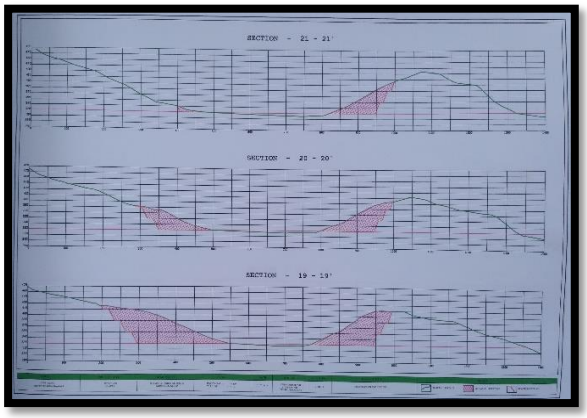


Figure (3-14)

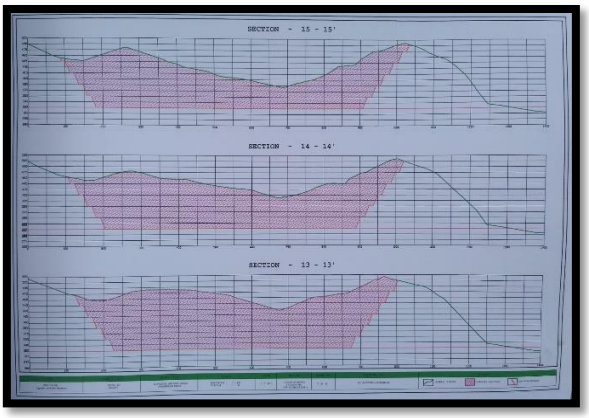


Figure (3-15)

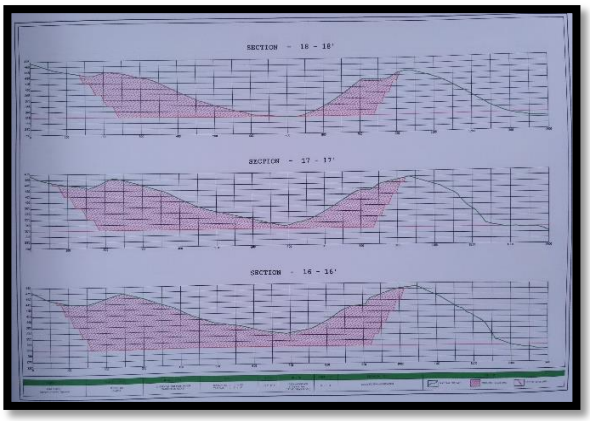


Figure (3-16)

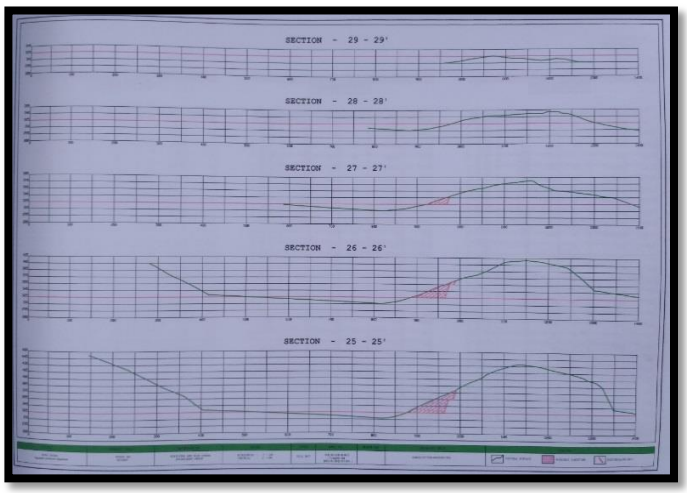


Figure (3-17)

3.9.3 Removing overburden

There is no need to consider the overburden because there is a very thin layer of soil in this area. In mining, **overburden** (also called **waste** or **spoil**) is the material that lies above an area that lends itself to economical exploitation, such as the rock, soil, and ecosystem that lies above a coal seam or ore body. Overburden is distinct from tailings, the material that remains after economically valuable components have been extracted from the generally finely milled ore. Overburden is removed during surface mining, but is typically not contaminated with toxic components. Overburden may also be used to restore an exhausted mining site during reclamation. **Inter-burden** is material that lies between two areas of economic interest, such as the material separating coal seams within strata.

3.9.4 Man Power requirement

Manpower requirement is mentioned below.

(organization structure shown in Chapter 1, para (1.10), Figure (1-6).

Table (3-5) Man power requirement

No.	Requirement	Quantity	Remark
1.	Senior Mine Production Engineer	1	Mining
2.	Mine Production Engineer	1	Mining
3.	Junior Mine Production Engineer	1	Mining
4.	Senior Crushing Plant Engineer	1	Mechanical
5.	Crushing Plant Engineer	1	Electrical Power
6.	Junior Plant Engineer	1	Mechanical
7.	Junior Crushing Plant Engineer	1	
8.	Supporting Team Leader	2	
9.	Store Assistant	1	
10.	Store Helper	1	
11.	Admin & HR Associate	1	
12.	Admin Helper	1	
13.	Account Specialist	1	
14.	Safety	1	Skill
15.	Welder	1	Skill
16.	Blaster	1	General
17.	Blaster & Helper	6	Skill
18.	Crusher	1	General
19.	Crusher Helper	6	
20.	Driver	1	
21.	Security	4	
22.	Cook	3	

23.	Cleaner	1	
	Total	**39**	

3.9.5 Machinery

Machinery list can find in below table.

Table (3-6) Machinery Requirement

No.	Requirement	Quantity	Remark
1.	944-Hydraulic Excavator	1	Loading
2.	934 Hydraulic Excavator	1	Mucking and Breaker
3.	Dozer	1	Quarry
4.	Crawler Drill (Hydraulic)	1	Production
5.	Crawler Drill (Pneumatic)	1	Development
6.	Dump Truck	4	Quarry to Crusher
7.	Wheel Loader	1	Crusher
8.	Water Boxer	1	Quarry to Crusher
9.	4 x 4 Double Cub	1	Office & Site
10.	Canter (10')	1	Office & Site
11.	Crushing Plant	1	120 ton per 1 hour

3.9.6 Drilling and blasting

The standard for drilling and blasting for development and production can find in Table (3-7).

Table (3-7) Drilling and blasting standards

No.	Requirement	Quantity	Remark
Drilling			
1.	Drilling Pattern		
2.	Burden	2m	
3.	Spacing	2m	
4.	Drill Depth	9m	
5.	Number of Drill hole	24 holes	Per Day
6.	Drilling Meter	216 m	Per Day
Explosive & Accessories (Production)			
7.	Emulsion or Ammonium	300 kg	Per Day

8.	Electric Detonator	24 Pcs	Per Day
9.	Primer – CE	24 Pcs	Per Day
10.	Detonating Cord	36 m	Primer booster
11.	Leg wire	250 m	Per Day
12.	Blasting Volume	200 suds	Per Day
Explosive & Accessories (Development)			
13.	Emulsion or ammonium	63 kg	Per Day
14.	Electric Detonator	20 Pcs	Per Day
15.	Primer – CE	20 Pcs	Per Day
16.	Detonating Cord	25 m	Primer + booster
17.	Leg Wire	200 m	Per Day
18.	Blasting Volume	60 suds	Per Day

3.9.7 Description of the SDC quarry production mine project

SDC will produce 65250 tons of quarry stone annually from (15) acre of land, situated in Mandalay region, Mandalay District, Patheingyi Township, Chingone- Yema, Kyu Wun Plot – 555 (ka), Sub plot No: (23), to supply construction materials. The coordinate at map No: 93CI Point 731548 and 730553 the elevation is between 300-700 ft above sea level. The total mine area is (15) acres and annual allowed production capacity is 15,000 Sud (Equivalent 65250 tons). It is estimated that SDC quarry mine can produce limestone 664,780 suds, limestone (after 20% deduction) 531,824 suds, limestone cumulative 531,824 suds from that area. It is estimated that the area can produce limestone for 35 to 44 years if quarry is extracted 15000 sud annually. It has impacts on visual amenity, noise, vibration, air, water, soil, social, health and safety etc.

SDC established a crushing mill in the base camp compound (Outside of Proposed project area), in Kyuwun village, which will have an impact on air and noise mainly. SDC will construct (12) buildings for office, store, canteen, office quarter, labor quarter, security and two crusher, water pond and water tank at base camp. Solid waste, liquid waste and hazardous waste from base camp has an impact on soil and water. SDC will use 500,000 gallons of water / year from tube wells for camp use and 480,000 gallons of water/ year from Se daw Lay canal and Nadaung Kya Stream. Use of water from borewells leads to depletion of the groundwater because of which the groundwater stock or pool may get exhausted and groundwater is only used as a source. Land subsidence is the lowering of the land-surface elevation from changes that take place underground. Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; Land subsidence

is most often caused by human activities, mainly from the removal of subsurface water. Here are some other things that can cause land subsidence: aquifer-system compaction, drainage of organic soils, underground mining, hydro compaction, natural compaction, sinkholes, and thawing permafrost. SDC will use 18,000 gallons of diesel/ year, 3,000 gallons of engine oil/ year, and 3000 gallons of hydraulic/ year for extraction of quarry by using one dozer, one excavator and two trucks. The use of heavy machines emits greenhouse gas and it will have an impact on air pollution, global warming and climate change. The main access road plan map is shown in map and the length of the new road is (1.2) Miles, typical cross section of road shown in figure (3-18). In road construction total cut volume is estimated at 49,000 Cu yd and total fill is 3000 Cu yd. Road construction has an impact on soil and water. If mitigation measures cannot be done from cut and fill of soil in road construction, soil erosion, sedimentation, and water pollution will become the negative impacts.

3.10 Work Plan for the Preconstruction and Construction Phase

The works to be done during pre-construction stage were:

1. Feasibility study
2. Grand survey
3. Yield Calculation
4. Road Construction
5. Construction of temporary building
6. Importing and transportation of machine and equipment to site

These activities had been done and discussed in the mine plan in detail

The works for the construction stage are as follows: As the construction phase was over, the works were almost completed.

- Road Construction
- Construction of building
- Land cleaning
- Mill installation
- Staff and labor recruitment
- Test running

3.11 Roads

The road alignment is based on the mine plan. The specifications of roads are as follow:

Road in the mine

(a)	Typical road and drainage	-	See figure (3-17)
(b)	Road distance	-	1.2 mile See figure (3-17)
(c)	Road width	-	40 ft (extra 10′ in curve)

			See figure (3-17)
(d)	Maximum gradient	-	30° Figure (3-18)
(e)	Angle of Cutting Above the road	-	70°
(f)	Angle of Cutting On slope	-	55°
(g)	Side drain will be		
	Constructed, the size		
	Of drain is	-	2 ft wide, 4 ft depth
(h)	Slope camber (Goss slope)	-	3-10% from Centre of road figure (3-19)
	Slope Camber		
	Out sloped	-	3-5 % down to slope
	In sloped	-	3-5% down to ditch line of Cut figure (3-19)
(i)	Road alignment	-	Road alignment drawing thrown in figure (3-20)

For safety in transporting rock from site (hilly areas) to the Crushing mill and dump site proper drainage (side drains and culvert) shall be constructed.

For the crush mill to the market, transporting by village road which connected to highway road. The distance is about (2½) miles. The roads were upgraded by quarry mine companies.

Figure (3-18) Typical road design

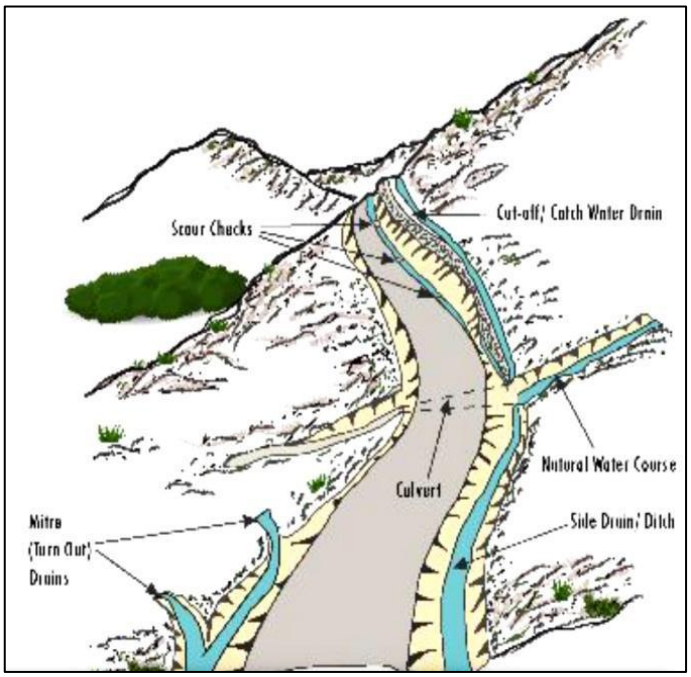
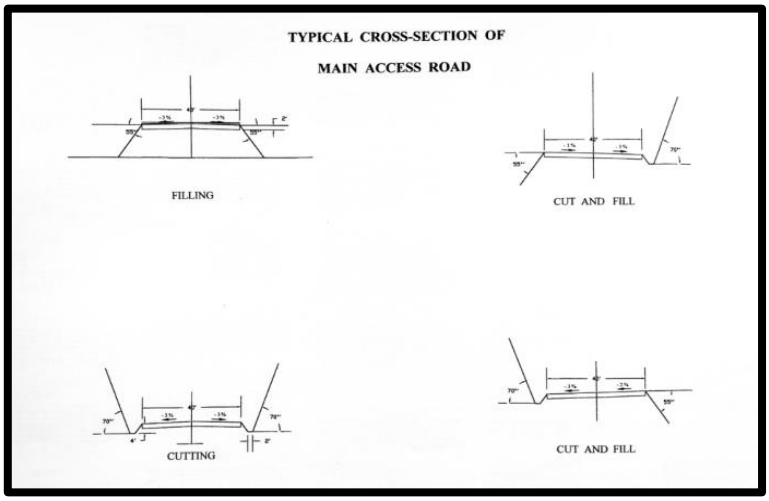


Figure (3-19) Cross section of road



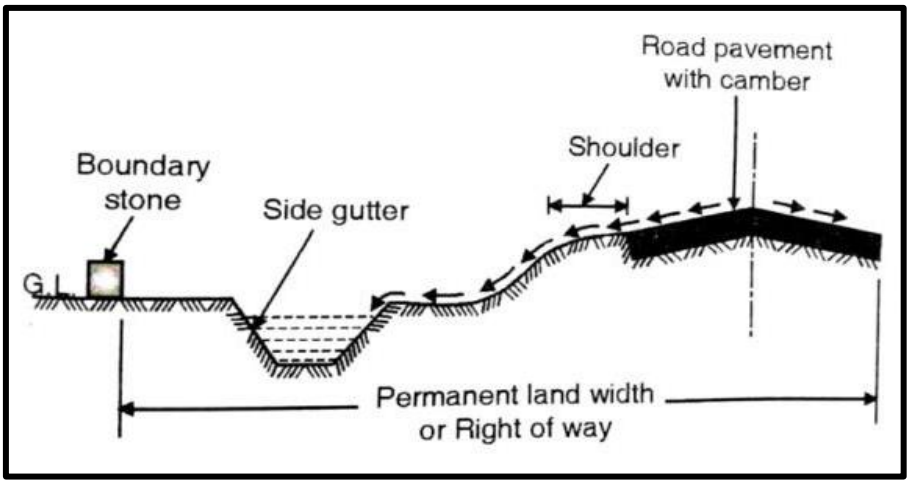
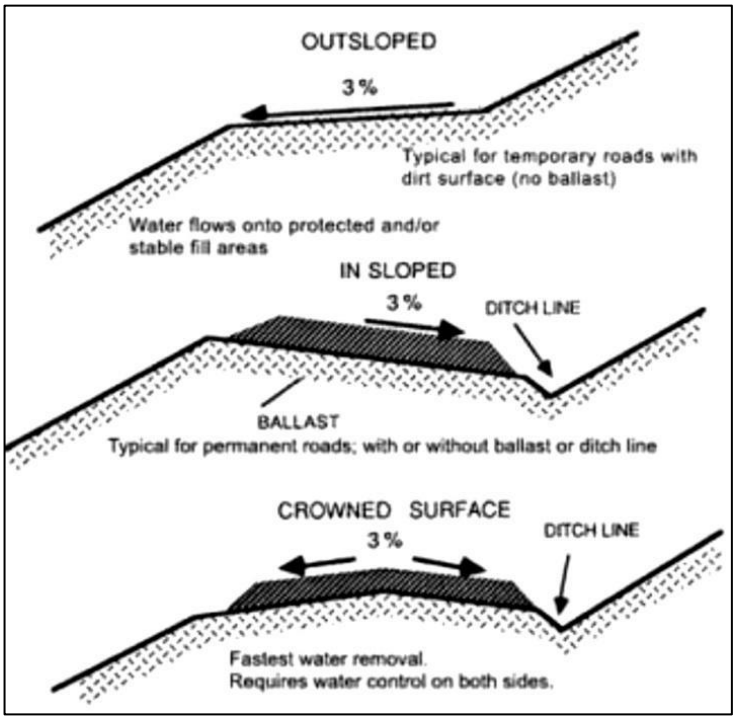
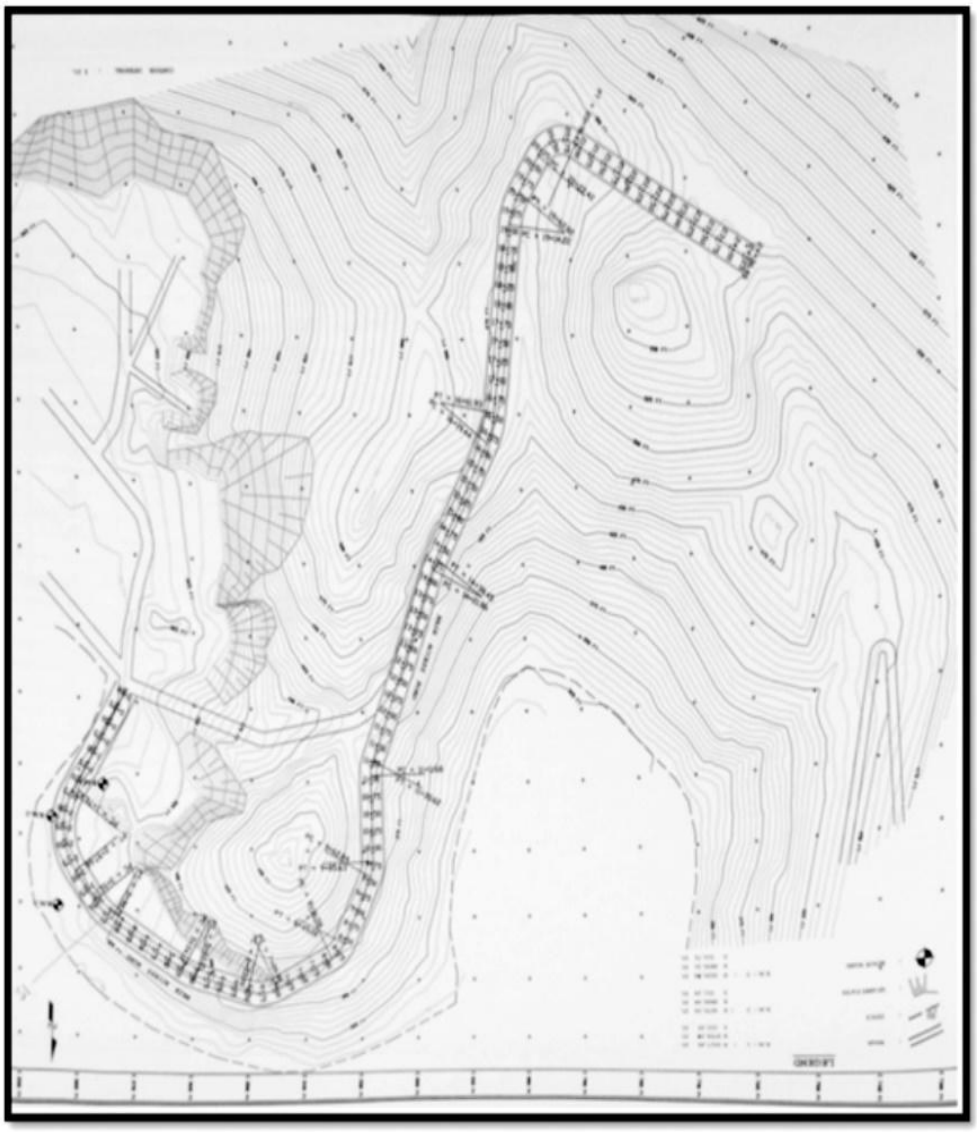


Figure (3-20) Slope Cambers



Figure(3-21) Road alignment of SDC quarry mine



In road construction it was estimated to cut 49,000 cu yd and total fill is 3000 cu yd.

3.12 Current mining method of SDC

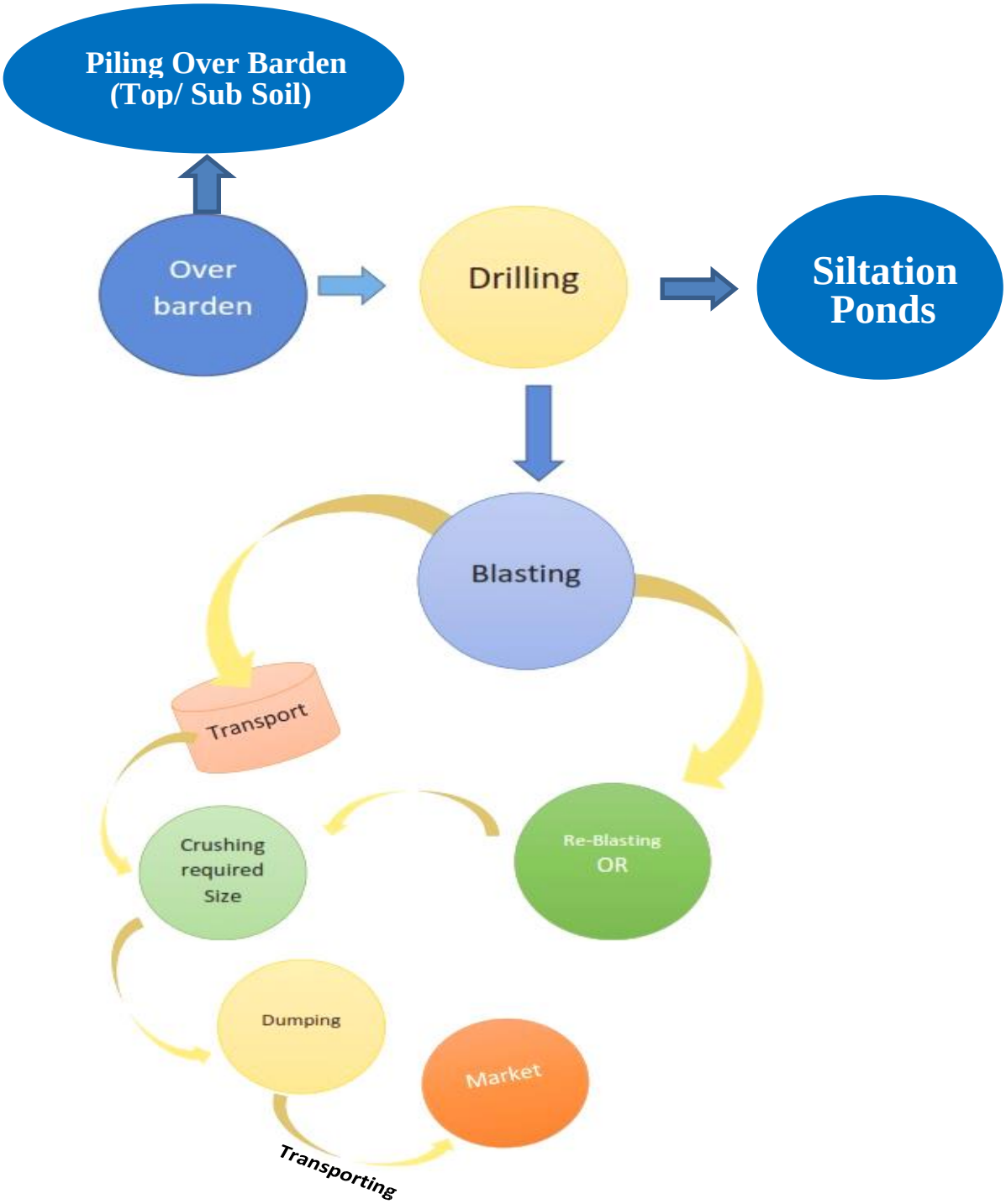
3.12.1 Method

SDC extracted by using one surface, included strip mining, open-pit mining and mountaintop removal mining, in which soil overlying the rock (the overburden) were removed.

3.12.2 Production process

The overall production process shown in figure (3-21).

Figure (3-22) Process chart of quarry production



3.12.3 Drilling and Blasting

SDC used Drilling and blasting method (DBM) used for rock excavation, due to low investment, cheap explosive energy. Blasting operations involve (1) setting a drill pattern (2) drilling blast hole (3) placing explosives in blast holes, (4) detonating the explosive (5) getting rid of fragmented material (6) secondary blasting if there is overburden.

Drilling is one of the first operations to be carried out in a quarry to extract the material for further processing. It is to make a hole in hard materials such as rocks or earth and blasting is to break the rock for excavation with the use of explosives, such as ANFO.

Holes are drilled into the rock with a crawler drill or breaker excavator, which are then filled with ANFO.

Detonation of the explosives, which cause the rock to collapse. Drill rigs will work along the benches of the pit with 4 meters in height.

3.12.4 Patten of drill holes

SDC used the square or rectangular pattern and staged pattern depending on the conditions.

Figure (3-23) Square or rectangular Pattern

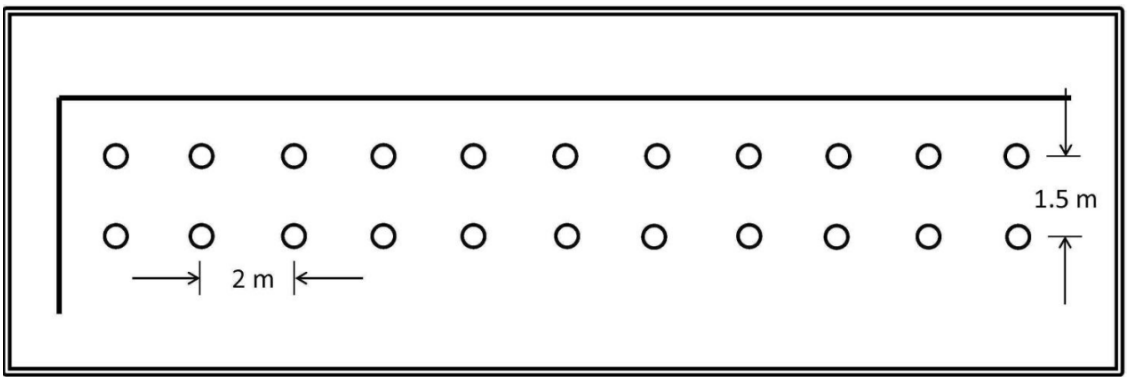


Figure (3-24) Staggered Patten

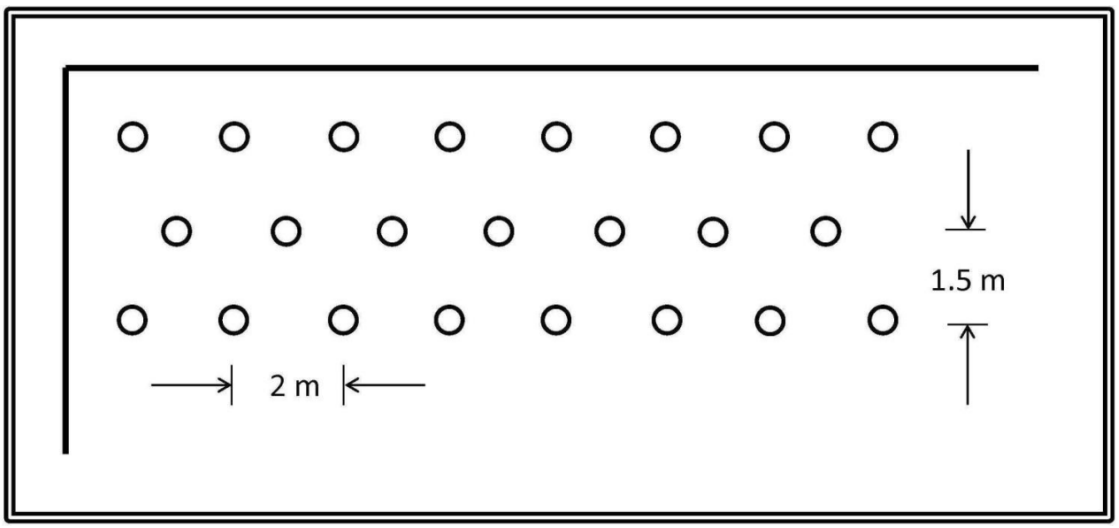
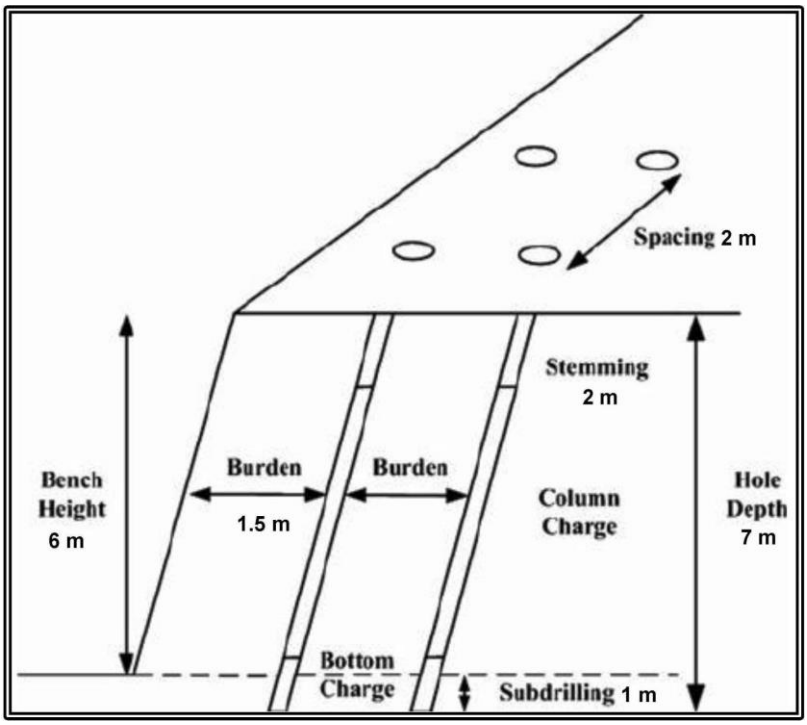


Figure (3-25) Parameter of Blasting Operation



3.12.5 Explosives

Ammonium Nitrate emulsion and electric detonator used for explosion of rock-Average consumption is 4.5 tons for AMN and 18 tons of emulsion annually. The explosives were stored. The explosives were taken from Army infantry stores to use in mine. Only allowed temporary storage of explosives in the mine site.

3.13 Alternatives

There are no alternatives to change the business or site, because this land is not suitable for Forest plantation or agriculture as the low forest plantation or agriculture as the low fertile soil and thin layer of topsoil as well as drought weather. The limestone requirements were high in the upper Myanmar area and it is in one of the accessible areas.

If the mine production was not done there would be loss of job opportunity to the local communities and possible illegal extraction of lime stones. If possible, they may use more advanced technology in production of quarries. SDC will conduct the blasting works within the permissible explosive limit, by following the procedure, to have a minimal impact on civil properties in the surrounding area.

- Application of time-delay between individual boreholes;
- Reduction in the borehole number at the same time of the time-delay;
- Application of the periodic blasts and the appropriate time between sequences of the blasts;

- Application of the graduated charge and appropriate timing between the charges;
- Distribution of the quarry wall in more benches and, as a consequence, reduction in the charge capacity for one borehole.

There are no alternative ways to modify or change.

Other ways of alternative for mining, drilling, blasting

- SDC will use one of the surface mining methods. Surface mining including strip mining, open-pit mining and mountaintop removal mining. Surface mining is a broad category of mining in which soil and rock overlying the mineral deposit (the overburden) are removed. Ways of alternatives for surface mining is "Underground mining". Underground mining means the extraction of rocks, minerals and industrial materials, other than coal, oil and gas, from the earth by developing entries or shafts from the surface to the seam or deposit before recovering the product by underground extraction methods. Underground mining is used to extract ore from below the surface of the earth safely, economically and with as little waste as possible. The entry from the surface to an underground mine may be through a horizontal or vertical tunnel, known as an adit, shaft or decline. The major advantages of underground mining over open pit mining are lessened environmental impacts, greater selectivity, and reduced exposure to weather. Much less land surface is necessary for the operation of an underground mine than for an open pit mine of the same production size.
- SDC will use "Drilling and blasting" techniques for rock fragmentation. SDC will drill 24 holes per day. "Drilling and blasting" techniques involve (1) setting up a drill pattern (2) drilling blast holes (3) placing explosives in the blast holes (4) detonating the explosives (5) getting rid of the fragmented material (6) secondary blasting if there is overburden.
- SDC will use one of the six controlled blasting techniques that can be implemented to improve high wall stability. Ways of alternatives for controlled blasting techniques are (1) line drilling, (2) trim blasting, (3) buffer blasting, (4) smooth wall blasting, (5) air decking, and (6) presplitting.

Ways of alternative in mining

Quarry can be extracted from the surface of the land, underground of the land and underwater such as stream, river and watercourse based on the location and abundance of quarry resources, distance between quarry mine and end user, crushing mill.

Advantage and disadvantage of surface mining, underground mining and underwater mining

The three main methods of mining are Open-pit, underwater, and underground mining.

1. **Open-pit mining**, also known as opencast mining, is a surface mining technique that extracts minerals from an open pit in the ground. Surface mining, including strip mining, open-pit mining and mountaintop removal mining, is a broad category of mining in which soil and rock overlying the mineral deposit (the overburden) are removed, in contrast to underground mining, in which the overlying rock is left in place, and the mineral is removed through. Open-pit mining is the most common method used throughout the world for mineral mining and does not require extractive methods or tunnels. This surface mining technique is used when mineral or ore deposits are found relatively close to the surface of the earth. Open-pits are sometimes called 'quarries' when they produce building materials and dimension stone.

Open-pit is one of the most common mining methods used and starts from the earth's surface, maintaining exposure to the surface throughout the extraction period. The excavation usually has stepped sides to ensure the safety of the miners and a wide ramp where equipment can travel, allowing the product to be removed efficiently from the site. Open-pit mining is practical when the ore-bodies of the rock are large and located closer to the surface.

2. **Benefits of open-pit mining include**:

- Ease-of-use for mass production
- Small shut-down expense
- Ability to mine selectively for certain grades of ore
- Comparatively small crew size
- Elimination of safety hazards that can accompany complex underground mining operations
- Easy drainage of subsurface water
- No machinery restrictions - even heavy and bulky machinery can be utilized
- Lower capital and operating costs

Advantages of open-pit mining include

1. Powerful trucks and shovels can be used to move large volumes of rock.
2. Equipment not restricted by the size of the opening you are working in.
3. Faster production.
4. Lower cost to mine means lower grades of ore are economic to mine.

Decommissioning at open pit mines

1. After mining finishes, the mine area must undergo rehabilitation to minimize environmental damage. This step in the mining process is critical to ensuring the sustainability of the land for future use.
2. First, waste dumps are contoured to flatten them out and stabilize them. If the ore contains sulfites, it is covered with a layer of clay to prevent rain and oxygen from oxidizing the sulfides into sulfuric acid, which is also known as acid mine drainage.
3. Then, the waste dump is covered with soil, vegetation is planted, and the area is fenced to prevent livestock from eating the newly planted vegetation. This layer will eventually erode but in the meantime, it will allow the leaching of heavy metals to occur slowly enough for the surrounding environment to absorb them.
4. The open pit is also fenced off to prevent access, and over time fills up with groundwater unless the groundwater levels are excessively deep.

Strip mining (also known as open cast, mountaintop or surface mining) involves scraping away earth and rocks to get to coal buried near the surface. In many cases, mountains are literally blasted apart to reach thin coal seams within, leaving permanent scars on the landscape as a result. Strip mining accounts for about 40 percent of the world's coal mines but, in some countries, such as Australia,

open cast mines make up 80 percent of mines. Even though it's highly destructive, industry often prefers strip mining as it requires less labor and yields more coal than underground mining.

Impacts of strip mining:

- Strip mining destroys landscapes, forests and wildlife habitats at the site of the mine when trees, plants, and topsoil are cleared from the mining area. This in turn leads to soil erosion and destruction of agricultural land.
- When rain washes the loosened top soil into streams, sediments pollute waterways. This can hurt fish and smother plant life downstream, and cause disfiguration of river channels and streams, which leads to flooding.
- There is an increased risk of chemical contamination of groundwater when minerals in upturned earth seep into the water table, and watersheds are destroyed when disfigured land loses the water it once held.
- Strip mining causes dust and noise pollution when topsoil is disrupted with heavy machinery and coal dust is created in mines.

The result of all this is barren land that stays contaminated long after a coal mine shuts down. Although many countries require reclamation plans for coal mining sites, undoing all the environmental damages to water supplies, destroyed habitats, and poor air quality is a long and problematic task. This land disturbance is on a vast scale. In the US, between 1930 and 2000, coal mining altered about 2.4 million hectares [5.9 million acres] of natural landscape, most of it originally forest. Attempts to re-seed land destroyed by coal mining is difficult because the mining process has so thoroughly damaged the soil. For example, in Montana, replanting projects had a success rate of only 20-30 percent, while in some places in Colorado only 10 percent of oak aspen seedlings that were planted survived.

Placer mining, ancient method of using water to excavate, transport, concentrate, and recover heavy minerals from alluvial or placer deposits. Examples of deposits mined by means of this technique are the gold-bearing sands and gravel that settle out from rapidly moving streams and rivers at points where the current slows down. Placer mining occurs on a much smaller scale than other methods of surface mining. Due to the smaller scale of placer mining, it does less damage to the surrounding environment compared to other methods of surface mining, though it can still disrupt river ecosystems with pollution and sediments. Placer mining has the potential to seriously damage watersheds and fish health, especially if regulations are not followed. and survival. fish health, and may carry other heavy metal contaminants. Due to the smaller scale of placer mining, it does less damage to the surrounding environment compared to other methods of surface mining, though it can still disrupt river ecosystems with pollution and sediments. Placer mining can be less damaging to the environment than surface mines, as the sediment is returned to the water after the minerals have been extracted. Compare surface, subsurface, and placer mining in terms of damage to the environment.

Underground mining means the extraction of rocks, minerals and industrial materials, other than coal, oil and gas, from the earth by developing entries or shafts from the surface to the seam or deposit before recovering the product by underground extraction methods. Underground mining is used to extract ore from below the surface of the earth safely, economically and with as little waste as possible. The entry from the surface to an underground mine may be through a horizontal or vertical tunnel, known as an adit, shaft or decline. The major advantages of underground mining over open pit mining are lessened environmental impacts, greater selectivity, and reduced exposure to weather.

Much less land surface is necessary for the operation of an underground mine than for an open pit mine of the same production size. Underground coal mining generally affects the land surface, ground water, and surface water. In some areas, mining and subsidence have lowered ground-water levels, causing some wells and streams to go dry, changes in water quality, and structural damage to buildings, roads, pipelines, and reservoirs. Further ore bodies are located deeper, the ore is extracted in an underground mine, which brings higher production costs and lower productivity. An underground mine also takes longer to setup, and demands considerably higher investment costs. Surface mining, including strip mining, open-pit mining and mountaintop removal mining, is a broad category of mining in which soil and rock overlying the mineral deposit (the overburden) are removed, in contrast to underground mining, in which the overlying rock is left in place, and the mineral is removed through. Underground mining causes huge amounts of waste earth and rock to be brought to the surface – waste that often becomes toxic when it comes into contact with air and water. It causes subsidence as mines collapse and the land above it starts to sink. ... Coal mining produces also greenhouse gas emissions.

Impacts of underground mining

- Underground mining causes huge amounts of waste earth and rock to be brought to the surface – waste that often becomes toxic when it comes into contact with air and water.
- It causes subsidence as mines collapse and the land above it starts to sink. This causes serious damage to buildings.
- It lowers the water table, changing the flow of groundwater and streams. In Germany for example, over 500 million cubic meters of water are pumped out of the ground every year. Only a small percentage of this is used by industry or local towns – the rest is wasted. What's worse is that removing so much water creates a kind of funnel that drains water from an area much larger than the immediate coal-mining environment.

Advantage and Disadvantage of underwater mining

Underwater Mining

Fluvial aggregates (sand and gravel) are mined in Myanmar both during the day and at night [using various extraction techniques. For example, mixed grain size aggregates are directly excavated from the sand bars during the dry season and stocked on temporary storage-piles, near the banks. But the main technique of aggregates mining on the Ayeyarwaddy River is managed by direct dredging of the river bed using mobile floating structures organized in clusters of dredgers, pushers, and barges. The dredgers extract the aggregates by suction throughout a pipe, sort them, and transfer them to the barges using water as fluid. The barges have variable storage capacity and are moved by pusher boats that can drive one or two attached barges simultaneously toward the main towns or Yangon (Charles 2021).

Advantages of underwater mining

1. Safety of workers is assured as they do not need to work in dangerous places due to remote control of the machinery.
2. Underwater mine workers have lower levels of asthma, pneumonia, emphysema, chronic bronchitis, wheeze and chronic cough due to no significant dust emissions in underwater mining if it is compared to surface mining.

3. High social opposition and land use conflict is not likely, since underwater mining is the exploitation of resources from flooded areas.
4. Groundwater does not need to be pumped out of the mine continuously. So, the local water table will not be affected.
5. Lower energy consumption, lower the carbon footprint of the operation, less energy will be required to transport ore to the surface,
6. Limiting the effects of the mining operation on surrounding hydrological systems, vegetation, and ecosystems.
7. No significant noise or dust emissions due to hydrostatic effects
8. Sidewalls are expected to be more stable underwater than in dry conditions,
9. Better sidewall stability can probably be expected compared to conventional open-pit mining,
10. No erosion, no freezing, balanced hydrostatic pressure, no adverse phreatic surfaces, no weakening due to blast vibrations
11. Smaller risk of fuel, chemical and lubricant spills than in conventional mining, possible impacts on ground-water chemistry,
12. Lower visual impact on landscape than conventional mining (Edine Bakker 2020)

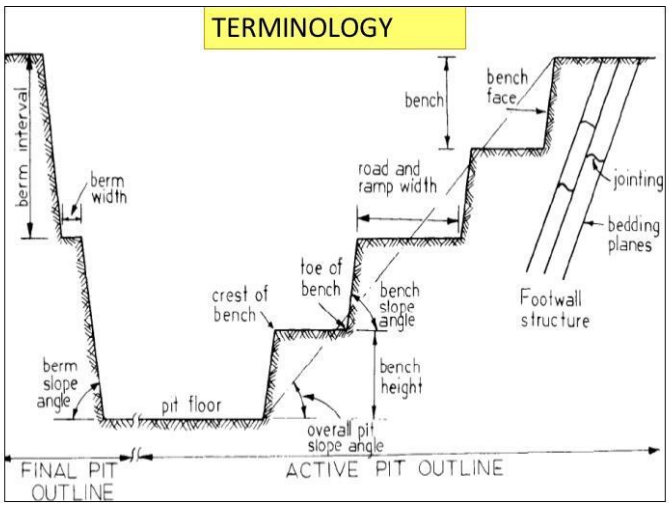
Disadvantages of underwater mining

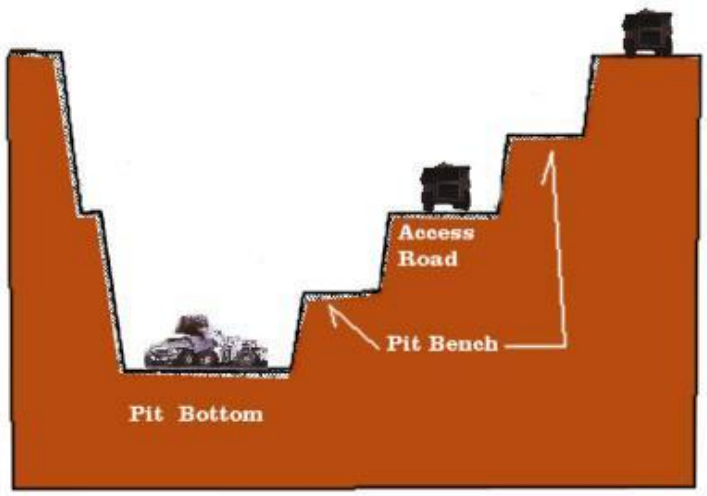
1. Sidewalls above the water table are subject to erosion, Sand and gravel deposits come from river channels, river floodplains, and glacial deposits. Excessive in-stream sand-and-gravel mining causes the degradation of rivers. In-stream gravel mining involves the mechanical removal of gravel and sand directly from the active channel of rivers and streams. As a result, bridges and other structures may be undermined, spawning gravels lost and alluvial water tables lowered. Extraction of gravel from large river's beds such as the Ayeyarwaddy River lowers the river bottom, which may lead to bank erosion. Depletion of sand in the streambed and along coastal areas causes the deepening of rivers and estuaries, and the enlargement of river mouths and coastal inlets. The negative impact may be both short and long term, local and remote, in upstream and downstream, in river bed and bank or adjacent areas. Dredging not only causes vertical instability in the channel bed, but also causes lateral instability in the form of accelerated stream bank erosion and channel widening.
2. The scraping of the underwater floor by machines can alter or destroy habitats, leading to the loss of species and fragmentation or loss of ecosystem structure and function.
3. Mining can pollute the aquatic environment by producing sediment, changes in pH, toxic heavy metals, and alterations in stream channel and stream flow.
4. Underwater mining will threaten the aquatic ecosystem, if it releases dangerous substances such as arsenic, cadmium, copper, cyanide, zinc or mercury that are harmful to fish, wildlife and humans. If acid leaks into waterways, it will kill every living thing downstream

Ways of alternative in blasting works

1. Drilling and blasting method (DBM) is globally used for rock excavation due to low investment, cheap explosive energy, easy acceptability among the stakeholders, possibility of dealing with different shapes and sizes of openings and reasonably faster rate of advancement in a suitable geotechnical mining condition. This makes DBM a preferred method of rock excavation. DBM inevitably damages surrounding rock mass due to formation of a network of fine cracks leading to safety and stability problems. Rock mass damage zone surrounding an underground opening consists of an over-break zone (failed zone), damaged zone and a disturbed zone. Blasting remains the most commonly used method for fragmenting rock masses, despite the problems of fly rock, vibration, gas pressures and overbreak. Over-break as well as damaged zones have a significant impact on the project cost, construction period, safety and performance of the underground structures. In the case of the civic tunnels, damaged zones can adversely affect the stability of the structure and hence they need to be accounted for while designing support systems for openings. Damage or overbreak not only endangers the safety of structure and cost escalation but also delayed completion. Too large a damage zone endangers the safety of the front-line workers due to reduction of stand-up time especially for poor rock mass.
2. The blasting works should use controlled blasting techniques that can be implemented to improve high wall stability and to reduce vibration impact. Drilling and blasting is the controlled use of explosives and other methods such as gas pressure blasting pyrotechnics, to break rock for excavation. It is practiced most often in mining, quarrying and civil engineering such as dam, tunnel or road construction. The result of rock blasting is often known as a rock cut. Blasting operations involve (1) setting up a drill pattern (2) drilling blast holes (3) placing explosives in the blast holes (4) detonating the explosives (5) getting rid of the fragmented material (6) secondary blasting if there is overburden. Vibration impact/ seismic impact can cause substantial damage to structures. Excessive levels of structural vibration due to ground vibration from blasting cause vibration impact. Mining operations that use blasting techniques often cause the risk of sliding. Landslides can also be provoked by man-made vibrations from blasting operations. The blasting works should be conducted within the permissible explosive limit, to have a minimal impact on civil properties in the surrounding area, by the application of time-delay between individual boreholes. It needs the reduction in the borehole number at the same time of the time-delay in a locality. It needs the application of the periodic blasts and the appropriate time between sequences of the blasts by using electronic detonators, which can increase the safety and accuracy of blasting works and their timing. The blasting works should use controlled blasting techniques that can be implemented to improve highwall stability and reduce vibration impact by the application of the graduated charge(load) and appropriate timing between the charges. By applying an appropriate millisecond timing interval, it is possible to lower the intensity of vibrations to the levels that the citizens will not perceive as negative effects inside the building.

   It needs to apply good practice for rock fall hazard assessment, rock slope excavation, contractual arrangements and the use and design of temporary rock fall mitigation measures, with particular emphasis on roadside slopes. It was confirmed that many instability mechanisms are found on the walls of the quarry and cause a high risk of rock fall during the rainy season, by using rock mass characterization techniques, kinematic study and stability analysis. Distribution of the quarry wall in more benches can reduce the load (charge) capacity for one borehole and prevent rock fall and landslide.





Rock fall prevention (inside slope treatment) and rock fall protection (roadside barriers) should be considered. It needs to apply the use of specialized barriers and rock fences to mitigate the risk of rock fall hazard. The six controlled blasting techniques are (1) line drilling, (2) trim blasting, (3) buffer blasting, (4) smooth wall blasting, (5) air decking, and (6) presplitting.

Line drilling

Line drilling has a number of requirements that must be satisfied to ensure success. The first requirement is that the drill holes must be 38 to 76 mm in diameter and not loaded with explosives. Drill holes that are greater than these diameters are seldom used due to performance issues and increased drilling costs. A second requirement is the reduction in the burden and spacing for the last row of production holes in the blast. The burden and spacing for the last row of holes is reduced 50% to 75% of the other production holes . This is coupled with the fact that the last row of holes is loaded with less explosives. The last row of

production holes is typically only loaded with 50% of the amount of explosives for other holes. The explosives in these holes should be well distributed along the entire length, through the use of decks, if necessary. A detonating cord is recommended downhole to ensure detonation. The final and most important requirement for line drilling is the spacing of the line drill boreholes. These boreholes are only spaced 2 to 4 times the diameter of the borehole. This will cause the boreholes to act as a perforated plane of weakness that will reduce the amount of overbreak that will occur during the production blast.

Due to the design of the line drill technique, there are a number of known limitations and considerations that affect the performance of any line drilling operation. The first and most important of these considerations is the high amount of drill accuracy required. While all controlled blasting techniques require varying degrees of drilling accuracy, it is imperative that borehole deviation is minimized when performing a line drill blast. Because the line drill holes are unloaded and simply act as a weakness plane, any deviation will directly affect the results of the excavation line.

In-plane deviation will cause an uneven face at the excavation line. There are two concerns related to this situation. The first is the potential safety concern related to the uneven material possibly being fractured by the production blast but not successfully fragmented from the excavation line. The fragmented material may eventually slough from the excavation line and can cause damage to personnel or equipment. The second concern is that there will be uneven burdens along the face for the next production blast, which may adversely affect the results of the blasting operation. Out-of-plane deviation will leave either excessive toe at the bottom of the blast or caprock at the top of the blast.

The final performance issue related to line drilling is the bench height limitation. By relying on the line drill holes as the only form of a weakness plane, complex geology will reduce the effectiveness of any line drill operation as stress will concentrate around these naturally occurring discontinuities over man-made discontinuities. These geologic features will limit the effective height of the bench so that the amount of geologic conditions that are present in the blast are limited. The final consideration for line drilling is the expenses associated with drilling additional holes. Line drilling requires the most holes compared to other controlled blasting techniques and may be cost prohibitive.

Trim blasting

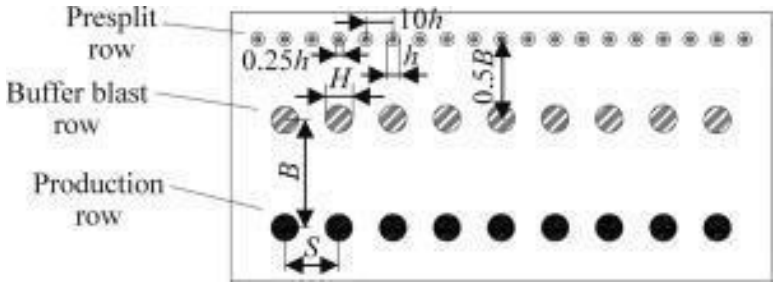
Trim blasting has relatively few requirements for successful implementation. Trim blasting is used in conjunction with large-diameter cartridge charges taped on detonating cord at predetermined intervals. These trim blast holes are often fired simultaneously or in groups to maximize the amount of charge per eight millisecond (8 ms) delay intervals. The final requirement for trim blasting is the drilling and initiation of the blast. Typically, trim blasts are drilled and initiated after the primary production blast has occurred. This makes trim blasting unique when compared to other controlled blasting techniques since it allows for full observation of the geology of the excavation line prior to drilling and loading of the holes. This reduces the number of assumptions that are required to design the trim blast when compared to other controlled blasting techniques.

Many of the limitations of trim blasting are shared with smooth wall blasting. Because trim blasting uses decoupled explosives, drill hole accuracy is critical to the success of the operation. Borehole deviations can cause excessive burdens throughout the excavation line, which reduces the overall effectiveness of the trim blast. Trim blasting is also dependent upon the "pseudo final excavation line" that was left after the primary blast. The excavation line will have variable burdens and will require a unique design each time to ensure a controlled excavation line after the trim blasting operation is complete. In addition to these concerns, the primary limitation for trim blasting is related to the production and scheduling of blasts. Because trim blast is conducted after the primary production blast, additional time is required to move the drill rigs back on to the bench and drill holes for the controlled blast shot. This creates a delay in preparations for the next production blast. This fact raises concerns with work and equipment safety. There will be a period of time where the personnel and equipment are working and operating near a highwall or an underground heading where no measures have been taken to reduce or control overbreak. Due to these issues, trim blasting is rarely chosen as the controlled blasting technique for many operations.

Buffer blasting

Buffer blasting is a compromise solution between production and safety. There are relatively few special requirements that must be met for a successful operation. However, buffer blasting is rarely used as the sole controlled blasting technique and is most often employed in conjunction with another controlled blasting technique, such as presplitting. This is shown conceptually in Figure (4-10). production hole diameter, burden, and spacing are denoted as *H*, *B*, and *S*, respectively. Presplit hole diameter and spacing are denoted as *h* and *s*, respectively. The most important requirement for successfully conducting a buffer blast operation is that the last row of holes is loaded with no more than 50% of the explosives that are used in the other production holes. It is also important that these explosives are well distributed within the borehole to help improve fragmentation of the rock mass. This will cause a smaller amount of overbreak into the final excavation line, without significantly increasing the time required to perform the operation, or significantly increasing the economics of the blast operation.

Figure (3-26) Conceptual diagram of buffer blast holes used in conjunction with presplitting



Smooth wall blasting

Smooth wall blasting is the most commonly used underground technique and was developed in Sweden. The smooth wall line technique is composed around the final excavation line underground where the holes are lightly loaded to reduce the amount of overbreak. These explosives are also decoupled from the sides of the borehole . The final feature of smooth

wall blasting is that the smooth wall holes are initiated after the primary blast. Smooth wall blasting will allow blast damage to extend beyond the smooth wall line before they are initiated. The most damaged rock will be removed from the final excavation line and result in a smooth profile for the perimeter. If more smooth wall holes are required than can be initiated in a single 8 ms time period, the holes should be fired in groups that will maximize the charge per delay. The borehole spacing in smooth wall blasting can be larger than those used in presplit blasting operations. The typical starting point for burden-to-spacing ratio for smooth wall blasting is 1.5:1. To ensure maximum relief of the rock, a pilot heading is sometimes used. A pilot heading is a smaller tunnel that is excavated in the center or near the top of the designed tunnel. After the pilot heading has been completely excavated, the cross-section is drilled and shot. This allows for the use of smooth blasting around a greater portion of the excavation line.

The smooth wall technique also involves more perimeter drill holes when compared to conventional underground methods. Drilling costs have the greatest impact on the economics of any blasting operation. Additionally, smooth wall blasting is known to have performance issues in weak rock formations. If the rock mass is too weak to support itself, the smooth wall blast will not eliminate the need for additional support. Drilling accuracy is a paramount concern with smooth wall blasting. Due to the additional challenges of drilling and blasting in an underground heading, drill accuracy is critical to the success of a smooth wall blast. When the smooth wall holes cannot all be fired on a single delay, the relief is limited to the arch and partially down the rib because of the muckpile. Therefore, smooth blasting results will degrade further down the rib of the excavation line, which may cause safety concerns in larger entries.

Air decking

There are a few key features of air decking that must be followed to ensure successful implementation. The first is to ensure a uniform air deck length for each of the holes. Large deviations of air deck length between holes in the blast will create issues with stresses imparted on the adjacent rock mass and will reduce the effectiveness of the air deck. Two empirical correlations between air deck length and fragmentation are suggested by Melnikov et al. One of these used total charge length, including the air deck, and the other with charge diameter. Further studies have shown conformity with these empirical correlations. Placement of the air deck within the powder column is an additional concern. Jhanwar conducted a study and found that placing the air deck in the middle or at the top of the column achieved similar results. However, placing the air deck at the bottom of the powder column generated poor fragmentation and caused issues with excessive burden at the bottom of the face for the next blast. The standard practice for air decking is to place the air space in the middle of the explosive column. This will concentrate all of the explosive at the bottom of the borehole and reduce concerns with excessive burden at the toe. Additionally, any damage that does extend beyond the final excavation line is lower on the face when compared to a technique that distributes the explosive throughout the entire length of the powder column. This reduces danger to personnel and equipment if a rock fall does occur because it will happen lower on the face and have less travel time. The air deck should only be placed in the top of the explosive column when it is particularly important to ensure proper fragmentation of the top of the explosive column. There are a few design considerations that must be accounted for when using air decked blast holes.

The primary concern with the air decking technique is performance-related issues. Studies have shown that air decks perform optimally in soft- and medium-strength sedimentary rock masses. The air decking technique is noted to work particularly well in highly jointed sedimentary rock masses because the amount of shock energy required to generate additional cracks is minimal. This may result in incomplete fragmentation of the rock mass and leave loose fragments on the excavation line.

Another engineering concern with air decking is the placement of an instrument into the borehole to hold the stemming in place on top of the air deck. In most cases, a stemming plug is deployed down the hole to remedy this issue. However, it is difficult to accurately measure the depth at which the stemming plug is deployed in the borehole. This makes it difficult to keep the air deck length between holes similar, reducing the effectiveness of the air deck. A final consideration for air decking is the diameter of the borehole used in the blast. It is generally accepted that air decking will produce results that are comparable but not quite as good as presplitting. This is especially true in situations where a small borehole diameter is used. In these scenarios, it is more appropriate to employ the pre splitting technique. When compared to the presplitting technique, the air decking technique does not require additional boreholes or specialty explosive products. Therefore, a large increase in blasting operations costs is not experienced.

Presplit blasting

- The purpose of the presplit row of holes is to generate a vertical, continuous, and thorough fracture plane at the back of the excavation line. These holes are generally smaller in diameter than those holes drilled for primary production. Table shows an example of a vertical presplit fracture plane created after a successful pre split blasting operation.
- Presplit blasting can reduce the attenuation coefficient of stress wave by half, and the vibration absorption ratio could reach 50.2%; the impact of dynamic loads on the end-wall slope stability coefficient is 1.98%, which proves that pre split blasting plays an important role in shock absorption of blast casting. Presplit blasting involves drilling a single row of holes along the back of the final excavation zone. Unlike smooth wall blasting, the presplit holes are fired on the first delay of the production blast. The presplit technique is the most commonly used controlled blasting technique for surface operations.

Table (3-8) Quarry Mine Method

Sr.	Criteria	Quarry Mine Method		
		Surface Mining (strip mining, open-pit mining, Placer mining **and mountaintop removal mining)**	**Underground Mining (Tunneling techniques.)**	**Underwater mining (underwater mine exploration robotic system)**
1	Safety of mine workers	Injury caused by fly rock, rock fall, car accidents, dusty, noisy, Elimination of safety hazards that can accompany complex underground mining operations, Easy drainage of subsurface water	Mining is one of the most perilous occupations in the world in terms of injuries and fatalities, and also due to the long-term health effects associated with it. Long term effects include respiratory problems such as **pneumoconiosis, asbestosis, and silicosis**. More Risk, More hazards, Suffocation, Oxygen shortage, underground flood, greater safety risks, shortage of underground labor,	Moderate to low numbers of workers, (special training required for some positions), no need to work in dangerous places due to remote control of the machinery, lower requirements to assure worker health & safety
2	Health of workers	Lung cancer, loss of hearing,	Loss of life at underground mining	no significant noise or dust emissions due to hydrostatic effects
3	Social impact	High social opposition is likely due to the vibration, shake, noise, dust, visual amenity, unpleasant feeling to see the open pit mining,	Social opposition is likely due to the vibration, noise, dust,	High social opposition is not likely, since the main purpose of underwater mining technology is the exploitation of

				resources in abandoned flooded open-pit mines, where land is already degrade
4	Environmental impact	visual amenity impact, noise impact, vibration impact/ seismic impact, air pollution impact, climate change impact, soil erosion, sedimentation, land subsidence(the loss of land elevation), soil contamination, soil pollution, or land pollution, water pollution caused by disposal of solid waste, sediments, water pollution caused by the disposal of fluid/ liquid waste, hazardous waste, secondary contamination of water supplies within and underlying the soil, Sidewall stability is defined by the geotechnical properties of host rock and geological conditions; often a limiting factor for further mine development.	The major advantages of underground mining over open pit mining are lessened environmental impacts. noise impact, vibration impact/ seismic impact, climate change impact, land subsidence (the loss of land elevation), soil contamination, soil pollution, or land pollution, water pollution caused by disposal of solid waste, sediments, water pollution caused by the disposal of fluid/ liquid waste, hazardous waste, secondary contamination of water supplies within and underlying the soil, and the possibility of subsidence.	- Groundwater does not need to be pumped out of the mine continuously, - lower energy consumption, - lower the carbon footprint of the operation, - local water table will not be affected, - Limiting the effects of the mining operation on surrounding hydrological systems, vegetation, and ecosystems. - no significant noise or dust emissions due to hydrostatic effects - less energy will be required to transport ore to the surface, - sidewalls are expected to be more stable underwater than in dry conditions, - Better sidewall stability can probably be expected compared to conventional open-pit mining, - no erosion, no freezing, balanced hydrostatic pressure, no adverse phreatic surfaces, no weakening due to blast vibrations (Edina Bakker 2020) - Smaller risk of fuel, chemical and lubricant spills than in conventional mining, possible impacts on

				ground-water chemistry, only sidewalls above water table are subject to erosion, lower visual **impact** on landscape than conventional mining; low water pH can limit use of the machinery of Viable Alternative Mine Operating System - Sand and gravel deposits come from river channels, river floodplains, and glacial deposits. Excessive instream sand-and-gravel mining causes the degradation of rivers. Gravel from large river's beds such as the Ayeyarwaddy River Instream mining lowers the stream bottom, which may lead to bank erosion. Depletion of sand in the streambed and along coastal areas causes the deepening of rivers and estuaries, and the enlargement of river mouths and coastal inlets.
5	Economic point of view	Economically feasible. Lower capital and operation cost, Excavator, hauling trucks or conveyor belts, primary and secondary crusher, extractive waste and tailings deposits, equipment for lowering the water table, accommodation for workers; equipment cost is relatively easy to determine.	Higher cost, higher production costs and lower productivity Higher cost, a longer development period, lower recovery of ore**,**	Modular submerged cutter(s), riser and positioning barge with pumps, dewatering station, control room, accommodation for workers, generators (in case of remote location), cost of equipment not yet defined
6	Impact on biodiversity	Loss of biodiversity, threats to biodiversity	Reduce the threat to biodiversity	The scraping of the underwater floor by machines can alter or destroy habitats, leading to the loss of species and fragmentation or loss of ecosystem

				structure and function. Mining can pollute the aquatic environment by producing sediment, changes in pH, toxic heavy metals, and alterations in stream channel and stream flow.
7	Impact on Ecosystem	Terrestrial ecosystem is threatened by surface mining	Reduce the threat to terrestrial ecosystem	Threat to aquatic ecosystems, because mines release dangerous substances such as arsenic, cadmium, copper, cyanide, zinc or mercury that are harmful to fish, wildlife and humans. Many also leak acid into waterways, killing almost every living thing downstream.
8	Haulage	Trucks or conveyor belts; significant amount of energy and equipment is required	Underground mining causes huge amounts of waste earth and rock to be brought to the surface. So, significant amount of energy and equipment is required in underground mining	Ore is transported in suspension, lower energy requirements due to hydrostatic effect

Table (3-9) Blasting Method

Sr.	Criteria	Blasting Method					
		Line drilling	**Trim blasting**	**Buffer blasting**	**Smooth wall blasting**	**Air decking**	**Presplit blasting**
	Safety and production	The burden and spacing for the last row of holes is reduced 50% to 75% of the other production holes. perforated plane of weakness that will reduce the amount of overbreak. the line drill holes are unloaded and simply act as a weakness plane, the potential safety concern related to the uneven material possibly being fractured by the production blast but not successfully fragmented from the excavation line. The fragmented material may eventually slough from the	Because trim blast is conducted after the primary production blast, additional time is required to move the drill rigs back on to the bench and drill holes for the controlled blast shot. This creates a delay in preparations for the next production blast. This fact raises concerns with work and equipment safety. There will be a period of time where the personnel and equipment are working and operating near a highwall or an	Buffer blasting is a compromise solution between production and safety Buffer blasting will cause a smaller amount of overbreak into the final excavation line, without significantly increasing the time required to perform the operation, or significantly increasing the economics of the blast operation.	Smooth wall blasting will allow blast damage to extend beyond the smooth wall line before they are initiated. The most damaged rock will be removed from the final excavation line and result in a smooth profile for the perimeter. Smooth blasting results will degrade further down the rib of the excavation line, which may	The standard practice for air decking is to place the air space in the middle of the explosive column. This will concentrate all of the explosive at the bottom of the borehole and reduce concerns with excessive burden at the toe. Additionally, any damage that does extend beyond the final excavation line is lower on the face when compared to a technique that distributes the explosive throughout the	Presplit blasting can reduce the attenuation coefficient of stress wave by half, and the vibration absorption ratio could reach 50.2%; the impact of dynamic loads on the end-wall slope stability coefficient is 1.98%, which proves that presplit blasting plays an important role in shock absorption of blast casting. Presplit blasting involves drilling a single row of holes along the back of the final excavation zone. Unlike smooth wall blasting, the presplit

		excavation line and can cause damage to personnel or equipment. The second concern is that there will be uneven burdens along the face for the next production blast, which may adversely affect the results of the blasting operation. Line drilling requires the most holes compared to other controlled blasting techniques and may be cost prohibitive. reduce the amount of overbreak	underground heading where no measures have been taken to reduce or control overbreak. Due to these issues, trim blasting is rarely chosen as the controlled blasting technique for many operations.		cause safety concerns in larger entries.	entire length of the powder column. reduces danger to personnel and equipment if a rock fall does occur because it will happen lower on the face and have less travel time	holes are fired on the first delay of the production blast. The presplit technique is the most commonly used controlled blasting technique for surface operations.

Evaluation of project alternative

Table (3-10) Evaluation of project alternatives

Biodiversity

Constant	Current Location/Condition	Change of Location/ modification	No Project
Flora / Fauna	– The mine is located out of the forest area. Forest area is degraded. Most areas are covered with stone. – But flora and fauna can live in some good forested areas and plantations. – Mine owner have a greening plan in the available surrounding areas.	Not possible to change the location	- For such a case, nations can lose the quarry resources in the strategic site. - Loss of job creation and community development.

Transportation

Constant	Current Location	Modification	Remark
Transportation	– The mine site is near to the high way road	– It is not easy to re-establish the machinery and equipment – The impacts from the use of machinery and vehicles can be minimized by mitigation measures.	– The short transportation route would be minimized the impacts from carbon footprint, fuel burning to environment.

Quarry Method

Constant	Current Method	Modification	Change of Method
Environmental impact Health impact	Current method is cost efficient and familiar method for Myanmar. By following good practice, the impact can reduce.	If most suitable modification method, the proponent should consider to modify.	Not justification to change.

	If invest, most advance machine it will more productive and less harmful, but constraint of investments		

Design and Technology

Constant	Current Method	Modification	Change of Method
Production design	- Extraction of rock for own use (infrastructure development) - Open pit mining - Explosion of mine - Crushing into small stones and chips - Open pit mining (blasting or explosion after drilling)	- No alternative at the moment - To modify the most advanced method, if feasible for this mine.	Not justification to change.

Environment

Constant	Current condition	Modification	No project
General Views	- Need for infrastructure development - The land has been already degraded since before running the project.	- By following the well-managed monitoring and mitigation plans, the impacts can be reduced - Although having the impacts, this project is still important for construction purposes. - The aesthetic view can be restored with regeneration plan	- For such a case, nations can lose the quarry resources in the infrastructure development. - Loss of job creation and community development

Conclusion

There is no alternative for this project at the moment.

Chapter-4

Initial Study on Existing Environment

4.1 Objectives

The objectives of preparing the EIA report for SDC's quarry mine are

(a) To find out the possible impact on environment and social condition
(b) To plan mitigation plans to reduce negative impacts
(c) To prepare an Environmental Management Plan for the suitable development of business as well as environments and social conditions.

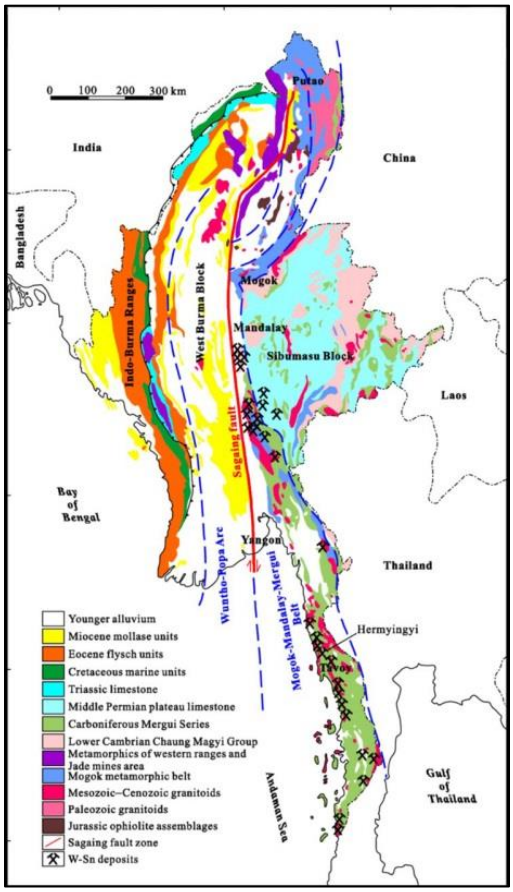
4.2 Topography and Geological Formation

The study area is in the central part of Myanmar, which is included in the dry zone area. Consists of tectono-stratigraphic (Central Cainozoic Belt) and this area is subdivided into central volcanic belt. Project site elevated from 500 feet to 650 feet above the sea level. The mine areas are on hilly Rocky Mountains.

The main river is Ayeyarwaddy river. The Myint Ngel river is the nearest river and its fall into the main Ayeyarwaddy river in the Kyaukse township.

4.2.1 Geological Formation

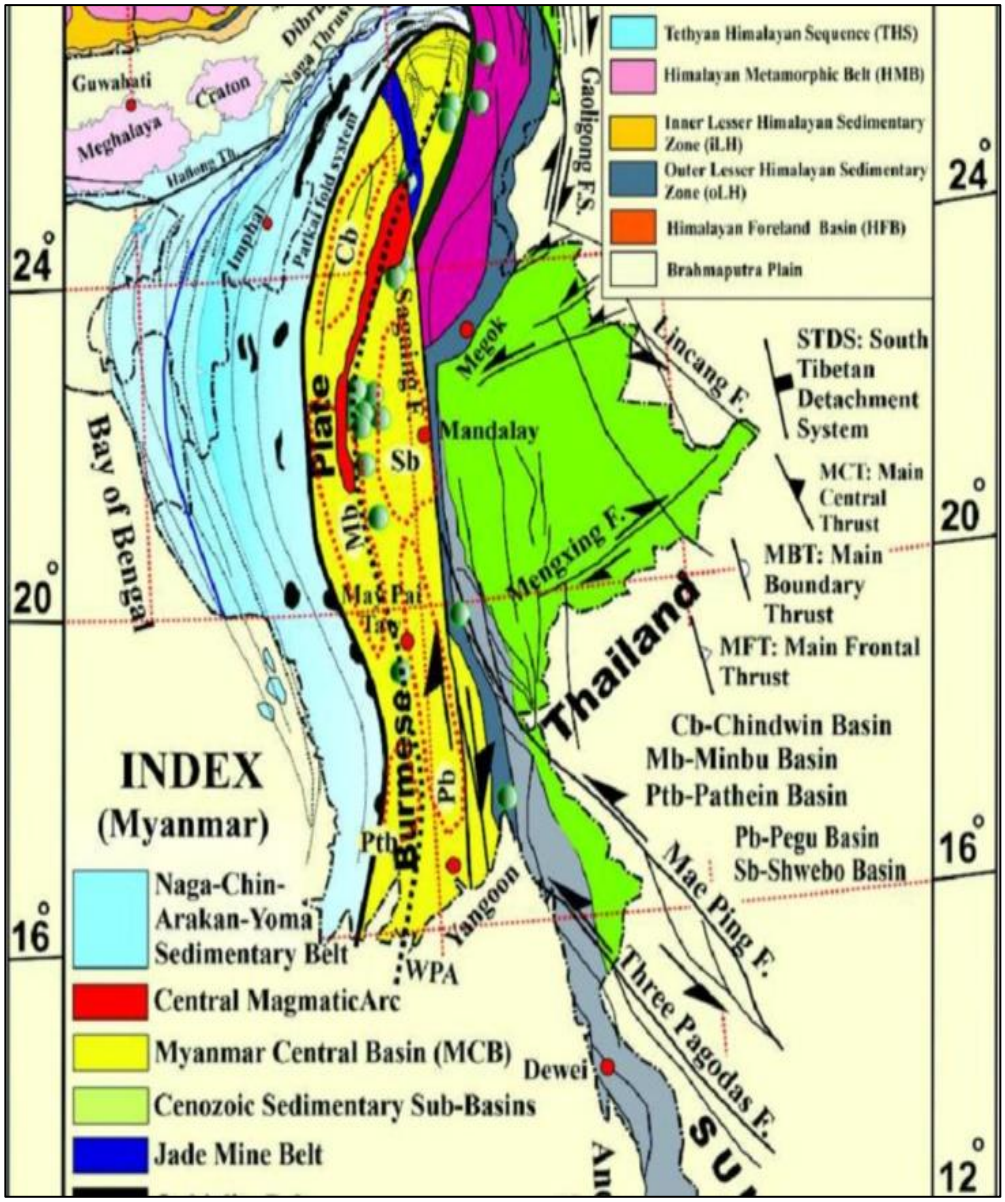
Figure (4-1) Geological formation of Project Area



Researchgate.ne

Geology of the region around Mandalay, Pyin Oo Lwin and Myogyi, showing the position of the fault zone (Extracted from Bender et d.1983).

Figure (4-2) Fault and Geological formation of project and surrounding township



Researchgate.net

4.3 Geography of Mandalay Region

Patheingyi is one of the townships of Mandalay Region. Mandalay is located in the center of the country, bordering Sagaing and Magway Region to the West, Shan state to the East, Naypyitaw, Bago Region and Kayin State in the South.

Figure (4-3) Map of Mandalay Region and its townships

Source: themimu.info

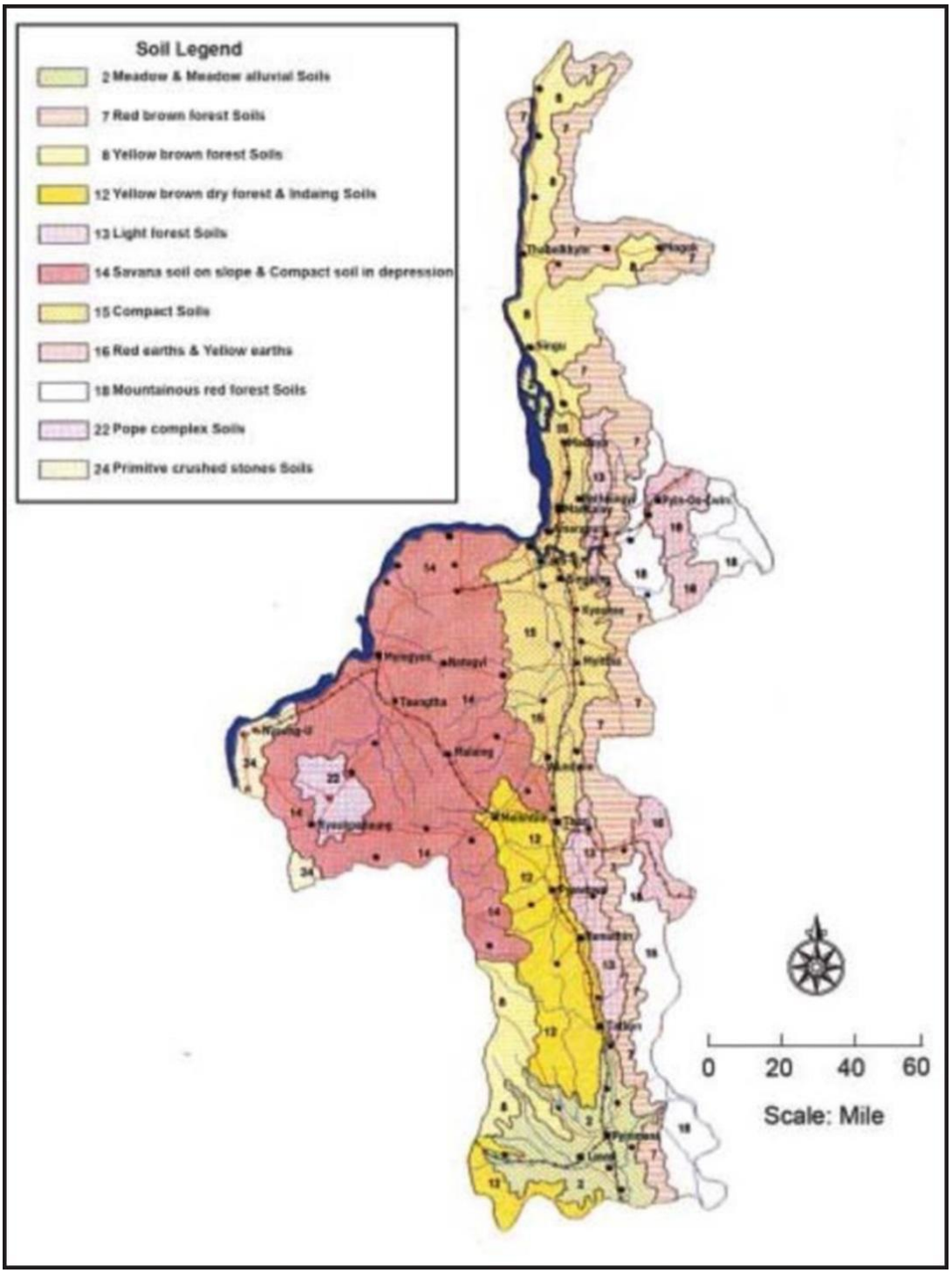
4.3.1 Transportation

Mandalay was the historical site of Myanmar as well as business center for upper Myanmar. There are road network between countries all over Myanmar. Road connected with China border as well. The railway line was connected to Yangon in the South and Myitkyinar. Airline connected with domestic airports. Mandalay has the International Airport and is connected with overseas countries. The Ayeyarwaddy river can use as an transportation of goods and inland water transport connected with Bhanmaw, Prome, Henzada and Yangon etc.

4.4 Soil Type

According to soil types and characteristics of Myanmar, land use division the Patheingyi is laid in the red brown forest soil type and yellow brown forest soil. The soil types and characteristics and map shown in figure (4-4) and table (4-1).

Figure (4-4) Soil map of Mandalay division



Source: maas.edu.mm

Table (4-1) Soil Characteristic and recommended land use type

SOIL TYPES AND SOIL CHARACTERISTICS OF MANDALAY DIVISION

Sr. No	Soil Type	Area (acre) approx	Land Use Type	Class	Land Form	Soil Depth	Texture	Soil pH	Plant Nutrients			Suitable Crops	Ameliorative Measures Required
									N	P	K		
1	Meadow & Meadow alluvial soils	548512	Rice land, Kaing	Fair	Plain	Thick	Silty clay, Clay	6-8.0	M	L	H	Rice, Vegtables, Pulses, Cotton, Sesame, Corn Sugarcane	Moderate dose of mineral fertilizer application
2	Red brown forest soils	1346348	Forest	Fair	Hilly	Med	Clay loam Sandy Loam	5.0-6.5	M	L	M	Forest	Soil conservation
3	Yellow brown forest soils	897565	Forest	Fair	Hilly	Med	Clay loam Sandy Loam	5.0-6	M	L	M	Forest	Soil conservation
4	Yellow brown dry forest & Indaing soils	897565	Forest, Upland	Fair	Hilly & slope	Med	Sandy loam, Clay		L	L	M	Forest, Orchards, Groundnut, sesame	Soil conservation
5	Light forest soils	349053	Forest	Fair	Hilly & slope	Med	Sandy loam, Clay		L	L	M	Forest, Orchards, Groundnut, sesame	Soil conservation
6	Catena of Savana soils on slopes & Compact Soils on depressions	2493236	Upland, Rice land	Good/ Fair	Undulating upland Plain	Thick	Sandy loam Clay	7.5-8.5	M	L	M	Rice, Chilli, Sugarcane, Cotton, Vegetables, Groundnut, Sesame, Pulses	Wind erosion control Planting wind break, Hight does of mineral and organic matter application
7	Compact soils	997295	Rice land, Upland	Fair	Plain	Thick	Clay	7.5-8.5	M	L	M	----- do -----	Drainage & irrigation, Moderate dose of fertilizer application
8	Red earths &Yellow earths	398918	Upland, plantation	Good	Slope, Plateau on hills	Thick	Sandy loam Clay loam	6-7	M	L	M	Groundnut, Sesame, Soybean, Orchards	Soil conservation Moderate dose of fertilizer application
9	Mountaino-usred forest soils	847700	Forest	Good	Steeply dissected	Med	Sandy loam Clay with gravel	5-5.5	M	L	H	Forest	Forest & Soil conservation
10	Popa complex soils	149594	Forest	Fair	Steeply dissected	Med	Clay loam, Clay	5-7				Forest	Forest & Soil conservation
11	Primitive crushed stonesoils	149594	Pasture	Fair	Hilly	Med	Sand & Gravel, Loamy sand					Pasture	Pasture establishments
12	Water body	301076											
	Total	9376456											

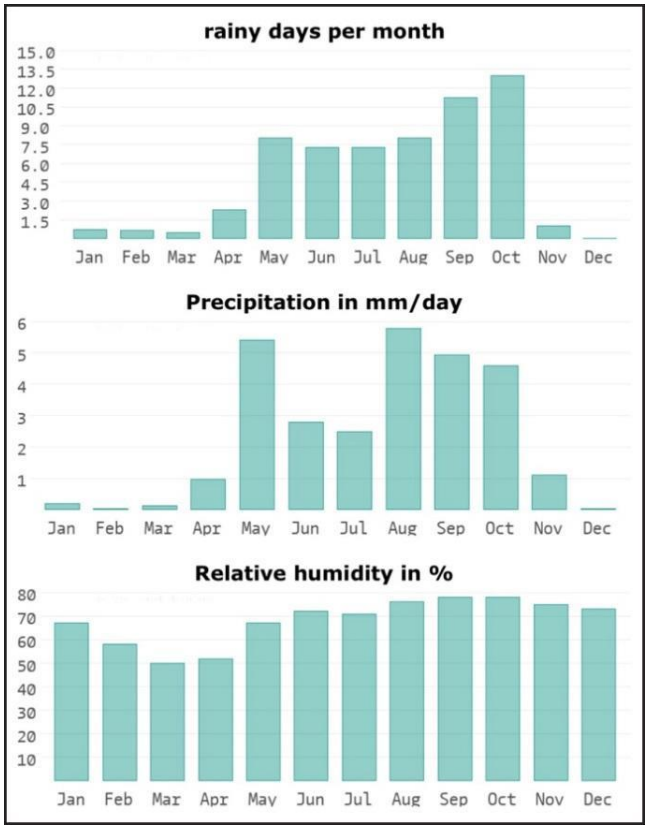
4.5 Climate Data

The rainfall data from nearest/station meteorological.

Table (4-2) Rainfall and Temperature of Mandalay Division

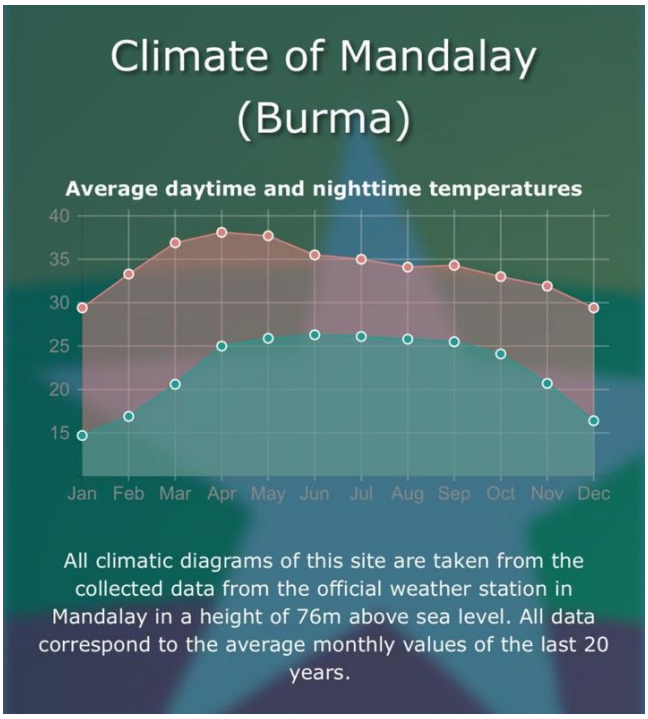
Month	Year															
	2015				2016				2017				2018			
	Rainfall		Temperature(˚C)		Rainfall		Temperature(˚C)		Rainfall		Temperature(˚C)		Rainfall		Temperature(˚C)	
	Rainy Days	Rainfall (mm)	Minimum	Maximum	Rainy Days	Rainfall (mm)	Minimum	Maximum	Rainy Days	Rainfall (mm)	Minimum	Maximum	Rainy Days	Rainfall (mm)	Minimum	Maximum
January	2	19	16.6	29.9	0	0	14.2	28.9	0	Trace	13.7	30.4	4	51	15.1	28.3
February	1	2	16.3	33.6	0	0	18.2	33.4	0	0	16.1	34.3	0	Trace	17.3	33.0
March	1	3	21.5	38.2	0	0	21.7	37.9	1	14	18.1	35.6	0	Trace	21.5	36.6
April	4	14	24.8	38.7	2	34	26.2	41.2	6	63	22.0	37.1	5	74	24.5	38.0
May	9	276	25.9	38.0	8	138	24.7	37.8	10	194	23.7	37.2	8	150	25.7	36.8
June	4	26	26.4	36.7	11	168	24.5	34.6	5	28	26.6	35.5	9	95	25.9	33.6
July	10	95	25.6	34.3	7	182	24.2	34.1	9	153	26.2	34.4	3	25	27.8	32.6
August	9	116	25.6	34.2	9	361	25.6	33.5	8	122	26.0	34.6	-	-	-	-
September	10	134	25.6	35.8	7	116	25.4	34.1	14	233	25.7	34.1	-	-	-	-
October	10	263	23.0	32.0	7	206	24.6	33.7	10	313	24.6	32.9	-	-	-	-
November	3	23	20.1	31.0	3	115	20.0	30.7	3	34	21.6	32.2	-	-	-	-
December	1	2	16.7	29.1	0	0	17.0	30.5	1	5	17.0	28.4	-	-	-	-
Total	64	973	268.1	411.5	54	1320	266.3	410.4	67	1159	261.3	406.7	29	344	157.8	238.9

Figure (4-5) Spatial variability in average annual rainfall as influence by various climate drivers



Source: MIMU, Pathinegyi Township

Figure (4-6) Average daytime and night times temperature



Source – world data.info

4.6 Population of Mandalay Region

The population of Mandalay Region (Based on 2014 Population Census) was as follow: -

Table (4-3) Salient points of region

No of District	7
No of township/Sub township	30
Total Population	6,165,723
Male	47.49%
Female	52.51%
Population density	199.6 per Km^2
Mean Household size	4.4
Dependency ratio	47.3
Literacy rate	93.8%

Source: MIMU

4.6.1 Patheingyi Township

It is located in the eastern part of Mandalay City. The township is bounded by Aungmyaytharsan township and Chanmayetharsan township. Patheingyi is still largely made up of rice paddy fields bit in the past three decades has become home to a number of universities.

The quarry mines are the popular production business in Patheingyi as well as Demographic Characteristics of Patheingyi.

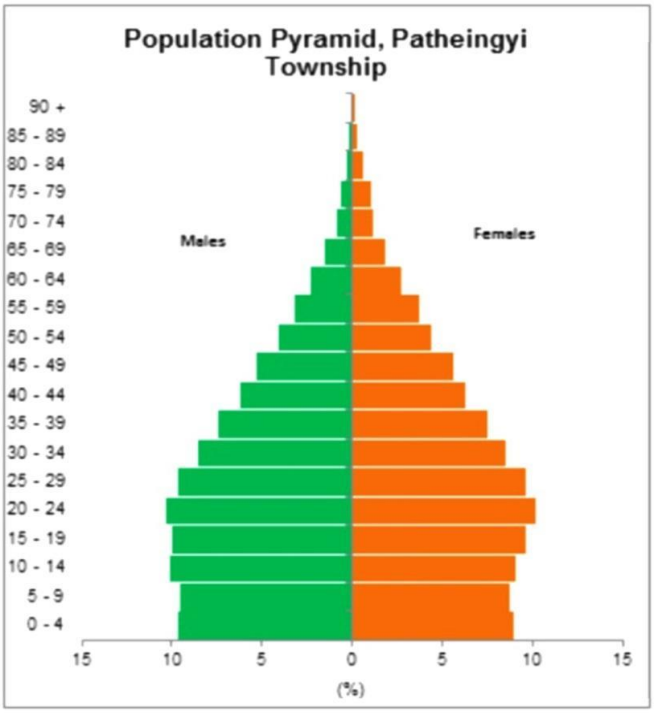
Table (4-4) Demographic of Patheingyi Township

Total Population	263,725
Males	129,004
Females	134,721
Percentage of urban population	5.0%
Area	999.7 per Km^2
Population Density	439.8 persons

No of Village Tract	58
No of Ward	1
Mean household size	4.7 persons

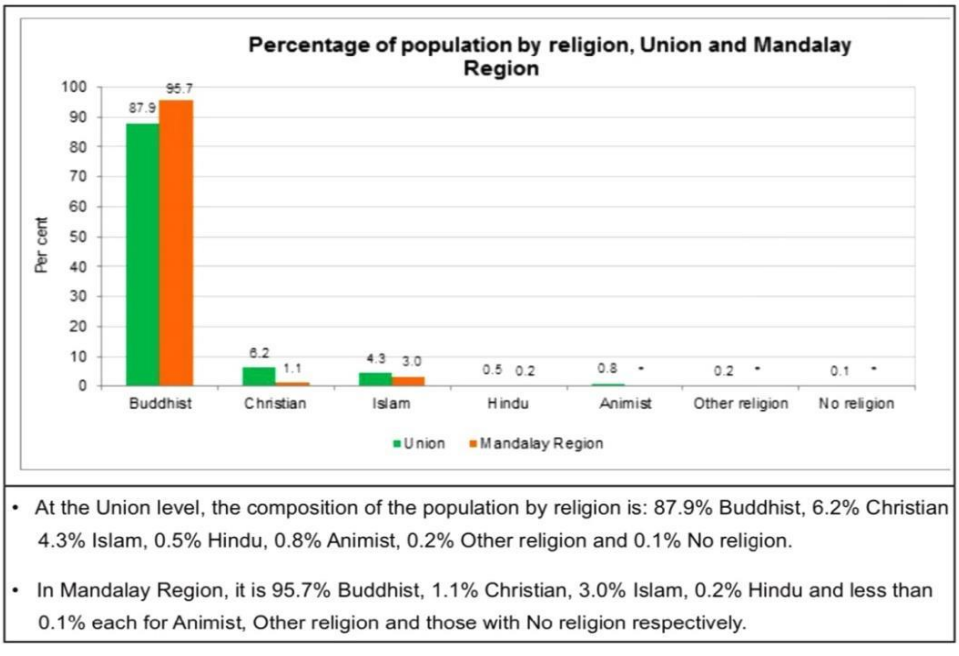
Source – Patheingyi, MIMU

Figure (4-7) Population pyramid



themimu.info

Figure (4-8) Percentage of Patheingyi religions



- At the Union level, the composition of the population by religion is: 87.9% Buddhist, 6.2% Christian 4.3% Islam, 0.5% Hindu, 0.8% Animist, 0.2% Other religion and 0.1% No religion.
- In Mandalay Region, it is 95.7% Buddhist, 1.1% Christian, 3.0% Islam, 0.2% Hindu and less than 0.1% each for Animist, Other religion and those with No religion respectively.

Note: * Less than 0.1 per cent.

4.7 Social Economic Situation of Surrounding Village

The surrounding villages were developed based on mines business. Some villagers itself was mine owners and some are miller, contractor, sub-contractors, transporting of mine products etc. Based on the projects there are many other employment and businesses for people like food stalls, restaurant workshops and mini stores. The population and household were mentioned in the table.

Table (4-5) Population and household of surrounding villages

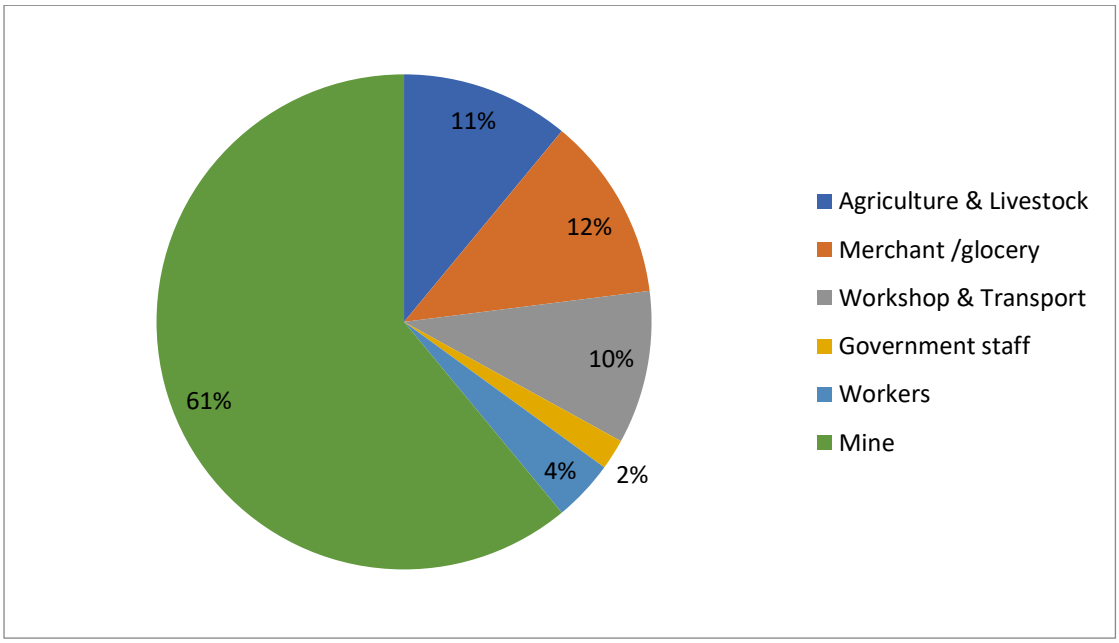
Village	Household	Population		
		Male	Female	Total
Kyuwon	345	623	677	1,300
Ye-ma	89	158	167	325
Ohnchaw	2370	8,391	8,877	17,238
Htone Bo	1195	2,887	3,190	6,077
Chingon				

Source: See Trust

The average livelihood of surrounding villages was stated in Figure (4-9).

The electricity and water are available for villages and infrastructure and housing were pretty good. The average income per capital is K 200,000/-. Education and health care was not sufficient.

Figure (4-9) Livelihood of Community



4.8 Health and Education

Fact on health and education were as follow:

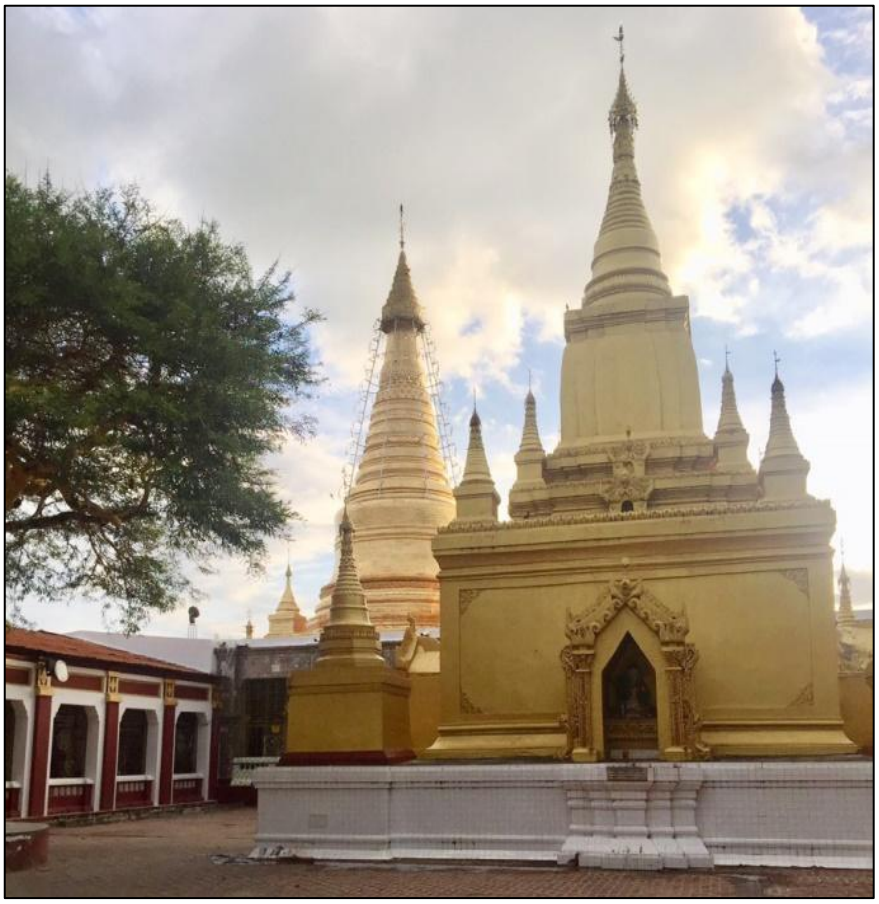
Health Care	
Hospital	- Patheingyi hospital
Eye hospital	- Ohnchaw (100 bedded)
Village Health Care	- Ohnchaw Village
	- Htone Bo Village
	- Kywe Naphar Village
Private Clinic	- Ohnchaw (8 Nos), Htone Bo (2 Nos)
Major Disease effected	- Malaria, TB, Liver, Dysentery Dihorrea
Birth-dead ration	-
Education	
High School	- Ohnchaw Village (1) Nos
Middle	- Htone Bo Village (1) Nos
Monk Education	- Ohnchaw Village (1) Nos

4.9 Culture and Historical Building

The popular historical religion buildings in Patheingyi township are as follow:

Yankin Taung	-	Yankin
Mya Kyauk Sadi	-	Yankin
Shwe Sar Yan Pagoda	-	Shwe Saryan Village
San Hnit San Pagoda	-	Yegyi Village
Simma Taing Taw	-	Ingyel Village
Ein She Min Ttan Taw	-	In Gyel Village

Among the historical buildings, Shwe Sar Yan Pagoda is the nearest of the project site. It was built by Saw Mon Hla, queen of King Anawratha.



Shwe Saryan Pagoda on the bank of Myint Ngel River.

4.10 Waste Management

There are three waste management types found by the project activities.

4.10.1 Solid Waste

Solid waste consists of waste produced from kitchen, office and camps. These wastes can be divided into general waste, hazardous waste and recycle wastages.

The proponent shall arrange three different colors of waste pan and wastage shall be separately disposed.

The major solid waste is the overburden from mining activities. According to the mine plan it will produce a total waste burden of 29, 000 SUK and soil 15,000 SUK during the life span of mine. The top soil, sub soil and rock mixed soil be filled up in the pit or no used pond area, covered with topsoil. On the top soil tree shall be planted.

4.10.2 Estimation of waste from project

The estimated wastes from mine were mentioned in the table.

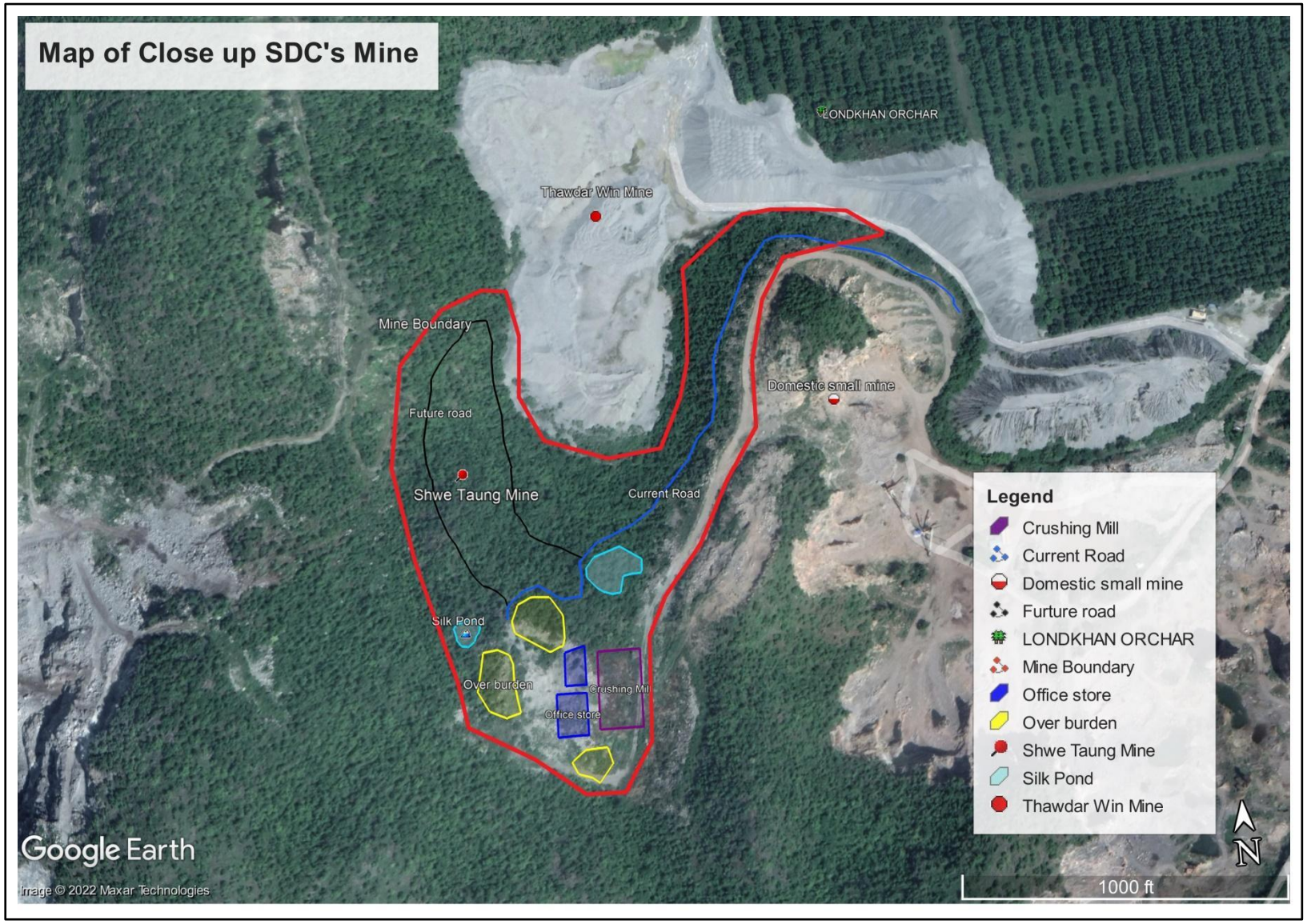
Table (4-6) Layer wise waste calculation

Levels	Solid waste from extraction (SUD)	Waste water (Gallon)	Office and comp waste (Solid)
550 ft	169	10000	
535 ft	630	10000	Average (10) tons
520 ft	1952	20000	For each year
505 ft	3290	30000	
490 ft	5106	30000	
475 ft	7890	30000	
460 ft	8650	30000	
445 ft	10185	30000	
430 ft	10775	30000	
415 ft	115150	30000	
400 ft	11615	30000	
385 ft	11962	30000	
370 ft	11816	30000	
355 ft	12292	30000	
340 ft	13211	30000	
325 ft	10064	30000	

These solid wastes overburden will be placed in the mine as per position shown in the following map.

.

Figure (4-10) Close up Map of STD mine



4.10.3 Hazardous Waste

Hazardous waste will be chemical, explosive, oil and lubricant, office waste such as ink, printer powder and plastic material. There should be disposal in the hazard waste disposal site.

Oil spill and leakage shall be carefully controlled.

4.10.4 Waste Water

Waste water will be water extracted from soil in mining activities. These waters shall be collected in the silt pond and those water should use for spraying on the dust generated areas and roads.

The waste water from camps and offices shall be drained into the garden, not drain into the stream without treatments.

The toilets shall be away from the stream and well.

4.11 Air Quality

The region air quality within the project area is over when ling dominated by removal of over burden drilling, blasting and crushing of rock. There is a large quantity of small and medium quarry mines in the Patheingyi areas, so the cumulative effect of the air quality will be affected. Mainly air pollution caused by this process has negative impacts on human health and plant.

The air quality measurement was conducted since 2018. The measurement was done by using HAZ scanner Environmental Parameter AVC Monitoring System for 24 hours, data collected in one-hour intervals. The results are shown in table (4-7) as a baseline data. The air quality measurement was conducted again in 2021, December used of AQM 65, Air station. The results are shown in the following table (4-8).

Table (4-7) Comparison of air quality on 2018

Date/Time	Substance	Result	Guideline Standard	Remarks
12/9/18 (10:00 AM)	PM 10	92 µg/ m^3	50	NEQ
to	PM 2.5	130 µg/ m^3	25	
13/9/18 (09:10) AM	NO	42 Ppb	-	
	NO_2	12 µg/ m^3	200 µg/ m^3	
	SO_2	2.1 µg/ m^3	20 µg/ m^3	
	Co	184 Ppb	1,000 Ppb	
	RH	54%		
	Temp	31°C		

Air quality results in 2018 found that PM_{10} and $PM_{2.5}$ were much higher than guideline standard whereas PM_{10} is slightly higher than standard and $PM_{2.5}$ is about five times higher than standard value.

This happened by producing dust from this mine as well as surrounding mines. The mitigation measures to control air quality by the mine owner shall be seriously done.

Table (4-8) Air quality result at 2021 December

Para-meters	Averaging Period	Measuring Point AQM	NEQEGs	AQI Index		Remark
Date	-	23.12.2021 24.12.2021	2015	AQI	AQI Category	
CO (ppm)	1 hour 24 hours	0.0105 0.2523	-	2 (CO -8hr avg)	Good	
NO_2 (ppm)	1 hour	0.0004ppm ($0.799\mu g/m^3$)	$200\mu g/m^3$	0 (NO_2- 1hr avg)	Good	
	24 hours	0.0102ppm ($19.176\mu g/m^3$)	-	-	-	
Ozone (ppm)	8 hours daily max;	0.03ppm ($60\mu g/m^3$)	$100\mu g/m^3$	0 (O_3- 8hr avg)	Good	
SO_2 (ppm)	10 minutes	-	$500\mu g/m^3$	0 (SO_2- 1hr avg)	Good	
	24 hours	0.0003ppm ($0.786\ \mu g/m^3$)	$20\mu g/m^3$			
PM_{10} ($\mu g/m^3$)	24 hours	$94.2\ \mu g/m^3$	$50\mu g/m^3$	70 (PM_{10} -24hr avg)	Moderate	
$PM_{2.5}$ ($\mu g/m^3$)	24 hours	$59.2\ \mu g/m^3$	$25\ \mu g/m^3$	153 ($PM_{2.5}$ -24hr avg)	Unhealthy	

Remark

	1 ppm	=	1000 ppb
	1 ppb	=	$1\mu g/m^3$
CO	1 ppb	=	$1.145\ \mu g/m^3$
NO_2	1 ppb	=	$1.88\ \mu g/m^3$
NO	1 ppb	=	$1.25\ \mu g/m^3$
O_3	1 ppb	=	$2\ \mu g/m^3$
SO_2	1 ppb	=	$2.62\ \mu g/m^3$

4.12 Noise

The major source of noise generating activities are excavation of overburden with machines, drilling, blasting and crushing as well as loading/unloading and transporting.

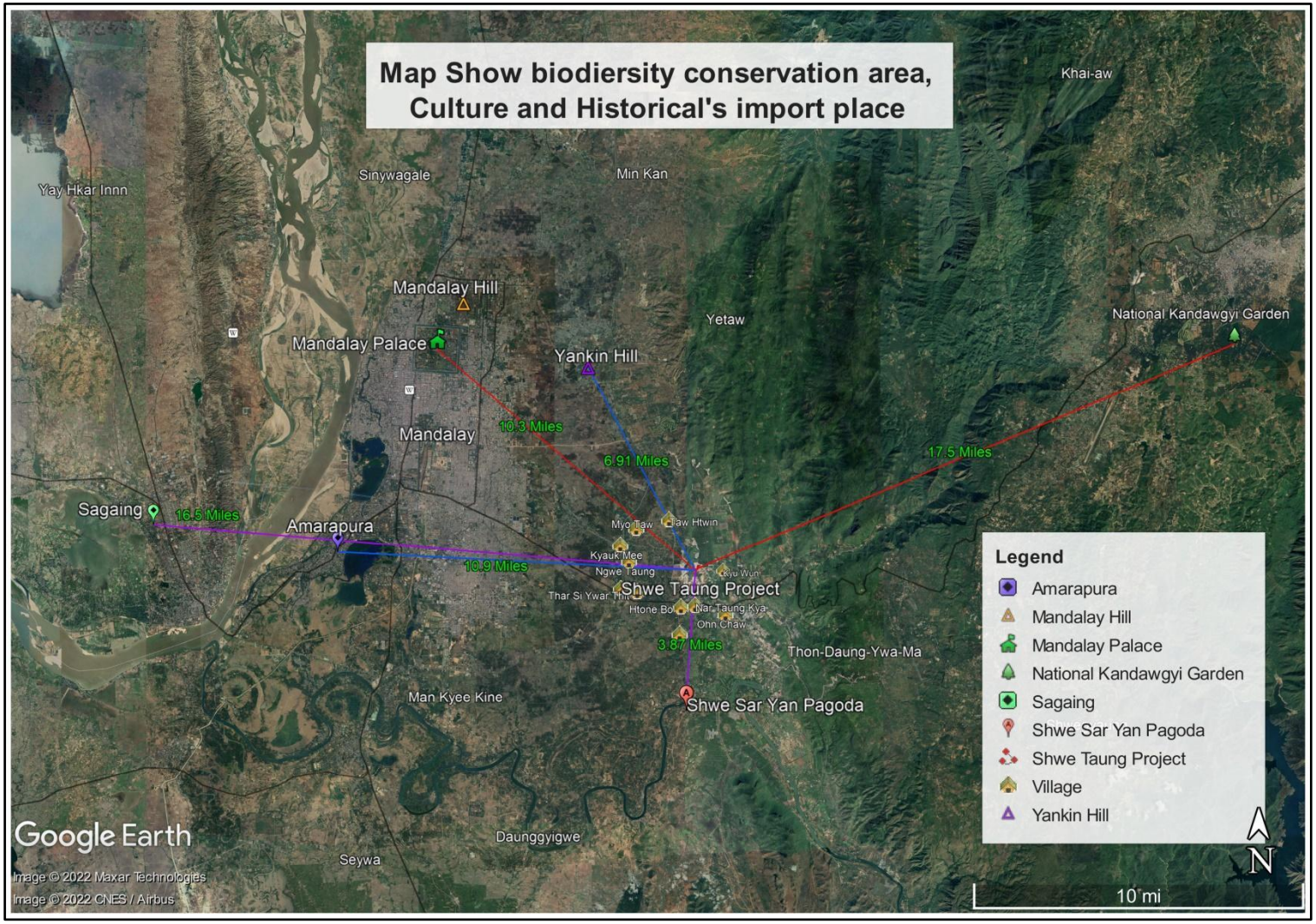
Noise monitoring (Dba) was conducted at the project site in 2018 and again in 2021. The results were compared with standard guideline value.

Location	Point	Noise Level Db					
		2018 Sept		2021, Dec		NEQ Guideline	
		Day	Night	Day	Night	Day	Night
Project Site		57	55	51	53	70	70
Village		54	44	50	43	55	45

At the time of measuring there were no mining activities.

4.13 Forest and Biodiversity

Figure (4-11) Map shown biodiversity conservation area, culture and Historical area



4.13.1 Forest and trees

The original types of forests around and Patheingyi township are Dry deciduous, Dry Forest and Dry hill forests.

The surrounding area of the Patheingyi quarry mines have only limited area of forest due to extending the industrial zone, housing and mines areas.

The forests in the mine areas are mostly medium and small trees. The forest trees are grown on Rocky Mountains and thin soil layers. Mostly the forest was degraded.

The plant species found in the area are shown in table (4-9).

Table (4-9) List of trees and shrub

Sr. No.	Common Name	Scientific Name
1.	Than	*Terminalia olliveri*
2.	Dahat	*Terminalia hamitltonia*
3.	Sha	*Acacia catechu*
4.	Zee	*Zazephes zuzuba*
5.	Be bya	*Cratoxylon nerfolium*
6.	Tamar	*Azandrachta indice*
7.	Myanmar Koko	*Aibizia lebbek*
8.	Didu	*Samalia insignis*
9.	Gyo	*Schelchera oleose*
10.	Yon	*Annogensius accuminatus*
11.	Hmen Phyu	*Randia uliginosa*
12.	Ni pasay	*Morinda tinctoria*
13.	Te	*Diospynos burmanica*
14.	Taukbyan	*Terminalia tabularis*

15.	Yinmar	*Pterocymbium tinctorium*
16.	Shawpyu	*Acacia leucocephala*
17.	Hta naung	*Cycas siamensis*
18.	Mondaing	*Dendrocalamus stritus*
19.	Hnin wa	

There are no IUCN and red list species in the mine and surrounding areas.

The Dry Zone Greening Department head office is situated in Patheingyi Township. This department is mainly responsible for re-greening activities in Dry Zone areas such as Sagaing and Mandalay regions.

This department distributed seedlings to the public for greening activities. The public are planting around the villages, farm boundaries, around the pond and lakes. Also planting activities done at clinic, hospital, office and school compound.

The dry zone area became green and people got awareness on conservation and importance of plants more or less.

The mine owners also know about their responsibility to conserve biodiversity.

4.13.2 Biodiversity

Myanmar is highly biodiversity, with more than 16000 plants, 314 mammals, 1131 birds, 293 reptiles and 139 amphibian species.

Myanmar has 14 major ecoregions, or relatively large areas of land and water. More than half of the country is covered by 3 of the 14 ecoregions. Ayeyarwaddy moist deciduous forest (20.6%), northern IndoChina subtropical forest (20.5%) and Mizoram-Manipur-Kachin rain forest (10.5%).

Overall, of the forest ecoregions (72% of Myanmar area) were classified as vulnerable (61%) and likely to be endangered unless the factors threatened their improvement.

There are Pyin Oo Lwin Basin, Minwuntaung Wildlife Sanctuary, Ayeyarwaddy Dolphin. Protected areas in river Ayeyarwaddy and Popa Monumental Park, Alongtaw Kathapa National Park, Bawditahtaung National Resource, Shinmalaung Wildlife Sanctuary and Lawkananda Wildlife Sanctuary in dry zone regions, but not so close to the project.

The flora and fauna were scarred due to the many small and medium quarry mine production in the Htonebo, Kywenaphar, Chinkon (Patheingyi Township) for over forty years. The impacts such as noise and vibration, clearing of the land for mining, air and water pollution were main causes to affect the biodiversity.

The biodiversity shall be recalled back by planting indigenous trees in the unused areas and surrounding areas as well as caring for the environment.

The donation for ecosystem conservation shall be made.

4.14 Summarized of Chapter 4

The studies on environmental conditions and social conditions in this chapter as a baseline reference for investigating impacts.

Chapter-5

Public Consultation Disclosure

According to the Environmental Impact Assessment procedure (2015), it was mentioned in para 50 that "As part of Scoping, the project proponent shall ensure that the following public consultation and participation process is carried out:

(a) Disclose information about proposed project to the public and civil society through posting on the project on proponent websites and local media including by means of prominent posting of legible signboards and advertising board at the project site which are visible to the public,

(b) Arrange the required complement of consultation meetings as advised by the Ministry, with local communities, potential PAPs, local authorities, community-based organization and civil society, and provide appropriate and timely explanation in press conferences and media interviews.

5.1 Consultation Meetings

First meeting was held on 2021 December 23 for the scoping stage. The second meeting was conducted on 2023 November 22 at SDC's office compound.

5.1.1 Reason for not conducted consultation meeting after first scoping report

Because of the pandemic, COVID-19 disease control, the public consultation meeting has not been conducted. Before, I submitted my first scoping report. The meeting will be carried at available time. But the following measures were done for disclosure

(1) Posting signboard at Project site regards on project.
(2) Posting on Project proponent website
(3) Posting on SEE-Trust Page
(4) Scoping reports can read in the project office and village tract administration office
(5) Comments will be collected at project based and village administration offices.

5.2 Conducting consultation meeting after submitted second version of Scoping report (2022, August)

5.2.1 Objectives of consultation meeting

The objective of meeting is;

1. To disclosure the information about the project during preparation of EMP
2. To get opinion from stakeholders in the implementation of the project
3. To get the transparency between investor and stakeholder

4. To collect more and reliable information
5. To commit the stakeholder for abiding environment conservation and corporate social responsibility.

5.2.2 Method and Approach

Information disclosure had been done by announcing to attend the public consultation meeting by signboards were set about invitation and brief about the project (14) days after meeting day. Also distributed invitation letters and announcements through village administrator NGO, CSO and departmental concerns had been invited.

Also arrange to attend meetings online.

Agenda

Date	-	23 Dec, 2021
Time	-	9:30 AM to 11:30 AM
Venue	-	Shwe Taung Mine Office, Kyu Wun Village

- Opening
- Welcome speech delivering by ECD
- Introduction of Third-party
- Presentation of Projects information and initial findings
- Discussion by participant
- Response by Proponent and third-party
- Wrap up and closing

Attendance

The concern departments and CSO have been invited by the proponent but unfortunately no one was attended the meeting.

Sr.	Description	No.
1.	Community	17
2.	Association	1
3.	Company	3
4.	SEE-Trust (Third Party)	3
	Total	24

Opening and Presentation

The meeting started at 9:30 AM. The master of emergency announced the agenda and explained about the selection of that meeting venue.

U Soe Lin delivered the opening speech on behalf of Shwe Taung Development Co., Ltd and Thawdar Win Construction Co., Ltd. He said that he was warmly welcome for the public consultation meeting especially in the hard time. He urged the participants to discuss openly in the meeting.

U Zaw Win, Managing Director of SEE-Trust presented the findings of those two projects. He explained about the importance of Environmental conservation and the objective of conducting the public consultation meetings. The presentation power point has been attached in the appendix.

U Soe Myint, Vice Chairman of Myanmar Quarry Production and Supply Association (upper Myanmar) explained about the activities of association in environmental issues. He explained that the associations have worked together with MTDC, and the Road traffic Department to control for reducing dust and accidents around. He urged the Quarry producer to be aware on the conservation and social issues.

Discussion

Village administrator discussed the safety of mine explosion and fly rock. He also pointed out how to control the trucks speed to reduce accidents and not to make dust on the road.

U Min Min Naung requested Shwe Taung Development Co., Ltd to construct the concrete road in the Kyu Won Village.

The proponent responded that they one following according to the departmental instruction and thein S.O.P. Anyway, thanks for the suggestion and they will care more on those issues.

Regarding construction of concrete road, he will report to H.Q and will arrange. The traffic pass to Kyu Won Village in front of SDC base camp will be reduced when the weighing machine have been installed in the new crushing mill.

U Zaw Win (SEE-Trust) said thanks for the suggestion and will record and will fill up the suggestion in the reports.

Decision

(a) There was no objection on the projects

(b) Safety measures shall be done in case of an explosion.

(c) Control strictly the truck's speed on the roads.

(d) To cover the truck with tarpaulin when carrying rocks on roads.

(e) To avoid damage of fly rock by explosion.

(f) To construct a concrete road in the portion of connection between the current tar road and SDC base camp.

Closing

U Zaw Win closed the meeting by appreciation to the participants for their contributions. He told the proponent and community to work together for the clean development of the environment.

5.3 Conducting consultation meeting after getting the approval of scoping report (2023, November)

Agenda

Date	-	22 Nov, 2023
Time	-	10:00 AM to 12:00 AM
Venue	-	Shwe Taung Mine Office, Kyu Won Village

- Opening speech delivered by the chairman of Myanmar Quarry Production and Supply Association (Upper Myanmar)
- Opening speech delivered by General Administrative Department
- Opening remarks delivered by ECD
- Presentation of Projects information and impact assessment data by third party
- Discussion by participant
- Response by Proponent and third-party
- Wrap up and closing

Attendance

The concerned departments and CSO have been invited by the proponent but unfortunately no one attended the meeting.
The community also attended 11 participants due to security reasons and interest.

Sr.	Description	No.
1.	Departmental	3
2.	Company	8
3.	Community	11
4.	SEE-Trust (Third Party)	2
	Total	24

Opening speech by Vice-president of Myanmar Quarry Production and Supply Association (MQPSA) (upper Myanmar)

U Soe Myint, vice-chairman of Myanmar Quarry Production and Supply Association (MQPSA) (upper Myanmar), delivered the opening speech on behalf of the chairman. He said that all the proponents of quarry mines understood the EMP, EIA reports were necessary to prepare to meet the instructions of the Environmental Conservation Department (ECD) in monitoring and mitigating the impacts to the environment affected by all-scale quarry mine size. He said that the quarry mine

operations had more or less impacts on the natural environment and the data results from conducting EMP or IEE or EIA would decide the receiving the license for quarry mine or extending the permission of operation. Therefore, the members of MQPSA decided to commission SEE-Trust as a third-party to carry out the EMP or EIA processes with affordable cost by negotiating. Then he said that, in such conditions, the preparation of some EMP or IEE or EIA for the small-scale quarry mines was combined in which the environmental studies were considered to cover over all the desired areas in order to save the cost of the report preparation. He said that the Myanmar Quarry Production and Supply Association (upper Myanmar) supported every conducting of environmental impact assessment as much as possible but the processes were stopped until recent time after the COVID-19. The ECD instructed the members to continue the required processes to the members and they also requested to extend the period for preparing the reports due to the current conditions. He would like to thank the ECD as the department urge to continue the required processes and they went to the fields as required. We, Myanmar Quarry Production and Supply Association (upper Myanmar), also supported all the members and provided the required data to the ECD as well as third-party as soon as possible. But due the current conditions, both the proponents and third-party had difficulties in preparing the reports due to the higher cost. He ended the speech by requesting the ECD to understand their difficulties and necessities although they provided as much as they could.

Speech by Village Head, Kyu Wun Village

U Tun Aung Kyaw said that he would like to request the proponents not to do the mine operations exceeding the limit. He said that there was a villager damaged and dead around the sink hole due to the excavation of mine near his village.

Speech by Deputy Director, Environmental Conservation Department, Mandalay Region

U Soe Win said that there were three types of conducting environmental studies based on the size of project, namely, EMP, IEE and EIA. He explained that the Shwe Taung Co. 's project needed to conduct EIA according to the size of quarry production. He said that there was no project with zero impact and the monitoring plans needed to be carried out to mitigate the impacts of the project. He said that the development project should be operating in balance with environmental conservation actions. He pointed out that environmental conservation should be considered in implementing the development projects. He explained about the type of EIA and such a report was prepared by professionals with various backgrounds permitted by the ECD in line with procedures while EMP and IEE report can be prepared by the proponents themselves. There, he reminded that the individual or group license holders should implement reports within the permitted period because if the reports were not implemented in time, the reports only could be prepared from start with the new license holder groups. He also suggested the proponent arrange the other departments to attend the EIA public consultation meeting to hear the people's voice because they were also important in decision making. He concluded that the projects might be stopped at the current but the processes could not stop and therefore he encouraged the proponents to follow the procedures.

Presentation by SEE-Trust, Third-Party

U Paing Soe Aung, representative of SEE-Trust, presented the brief of project information and he explained about the importance of environmental conservation and the objective of conducting the public consultation meeting. He also presented findings of impact assessment and mitigation plans for such impacts with PowerPoint. He welcomed the audience to participate in discussion and told the audience to feel free to discuss better plans.

Discussion

U Soe Win asked the proponent how many times they had submitted to the ECD regional office or headquarter and the year when the first report had been revised. He asked that the year submitted for the second time after the first report has been revised and he also wanted to know whether the submitted revised report had been approved or not. He wanted the proponent to confirm that there was any evidence that the report had been revised for third time. He suggested the third-party implement the report preparation before 31st January 2024 to be approved because the permitted time frame is no later than 29th February 2024 and the report for this project would be prepared from the beginning if it would not be approved within the permitted time frame.

U Kyaw Zin Lat, Representative of Shwe Taung Development Co., Ltd

He responded that there were two times submitted the reports to ECD. The first EIA report had been submitted before 2020 and the revised report was prepared and submitted as a second report in 2021. He responded that he would confirm the evidence for the revised report for a third time to the ECD.

U Soe Win, Deputy Director, Environmental Conservation Department, Mandalay Region

He asked that when the project would operate again.

U Kyaw Zin Lat, Representative of Shwe Taung Development Co., Ltd

He responded that the project was planned to operate based on the Sagaing-Monywa-Shwebo Highway. The quarry production from this project was not for sale to other customers and it was only aimed to operate the construction work on Sagaing-Monywa-Shwebo Highway. Therefore, the project would operate again when the construction works on Sagaing-Monywa-Shwebo Highway would be available. He also added that the death case in the quarry mine was not related to their company and it happened in the other mine site and the death of villagers was not also by the mistake of the project site.

Decision

1. There is no objection on the project
2. Proponent shall abide the environmental laws, rules, regulation, National Environmental Quality (Emission) Guideline, procedure and concern laws, rules and regulations
3. Proponent promised to contribute CSR funds (2% of annual profit)
4. Third-party team shall be submitted EIA report in time.

5.4 Way Forward

After the consultation meeting the following work shall be done.

(1) Disclosure of project report through media, website 15 days after EIA report submission

(2) The suggestion of stakeholders shall be registered and take action

(3) Proponents will fulfill the issues required by communities.

(4) Group meetings and PCM meetings shall be conducted.

5.5 Conclusion of Public Consultation

By conducting PCM, the stakeholders have got more transparent about the project and environmental awareness. Valuable advice from the stakeholder shall be useful in report writing.

Further meetings shall be conducted regarding the community development and environmental safeguarding.

Chapter (6)

Scope and Methodology

6.1 Justification for conducting EIA

Quarry Production project which was invested by U Zaw Min Oo (SDC) should comply with the existing national laws, rules and regulation of the Republic of Myanmar. According to Environmental Impact Assessment procedure, appendix (A) SR.83 the production capacity of this mine shall be conducted Environmental Impact Assessment (EIA).

6.2 Objective

The objective of EIA are:

(b) To find the possible impacts caused by project
(c) To formulate the mitigation measure for least impacts to the environments
(d) To harmony and balance between business environments and socio-economic.

6.3 Terms of Reference (T.O.R) for Third-Party

Objectives

Terms of reference define the purpose and structures of a project, committee, meeting, negotiation or any similar collection of people who have agreed to walk together to accomplish a shared goal.

Here the TOR is binding between the third party team and ECD as well as proponents for the purpose for quality EIA studies.

The TOR for SEE-Trust are as follow;

1. To find and investigate the possible impact.
2. To find and study the impacts in more detail and find major impact and mitigation Measures.
3. To conduct the public consulting meeting
4. To submit a scoping report to ECD.
5. Draw and Environmental Management Plan, Mitigation measure, Monitoring Plan for both construction, operation and decommissioning Phases.
6. Submit a comprehensive EIA report and EMP to ECD. The report should cover with the following headings.

1. Executive summary in Myanmar and English language
2. Introduction
3. Project Description

a) Location
b) Project Proponent
c) Infrastructure
d) Production Process
e) Water requirement and availability
f) Diesel and Electricity requirements
g) Labor
h) Chemical requirement
i) Heavy Machinery
j) Waste disposal
k) Land use
l) Explosive
m) Layout of Mine
n) Forest and Diversity

4. Policy, Legal and instructional Framework
5. Description of Surrounding Environments
    a) Physical Environment
    b) Biological Environment
    c) Socio-economic Environment
    d) Culture features Environment

6. Identification and Assessment of Potential Impact
    a) Methodology
    b) Mitigation reassures
    c) Public disclosure
    d) Environmental Management Plan
    e) Monitoring Plan
    f) Corporate Social Responsibility (CSR)
    g) Plan and Commitment
    h) Estimation Cost for EMP
    i) Grievance readiness Mechanism
    j) Emergency preparedness and Response Plan
    k) Recommendation and Conclusion.

7. Testing National Environmental Quality (Emission)

The following test shall be done and the result should be within the guide line standard.

(a) Effluent levels

Parameter	Unit	Maximum Concentration
Biological oxygen demand	mg/l	30
Chemical oxygen demand	mg/l	125
Oil and grease	mg/l	10
pH	S.U.	6-9
Total Coliform bacteria	100 ml	400
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Total Suspended solid	mg/l	50

(b) Air quality

Parameter	Averaging period	Guideline Value µg/m^3
Nitrogen dioxide	1 year	40
Ozone	1 hour	200
Particulate matter PM_{10}	8hr daily maximum	100
	1 year	10
	24 hour	25
Particulate matter $PM_{2.5}$	1 year	10
	24 hour	25
Sulphur dioxide	24 hour	20
	10 minute	500

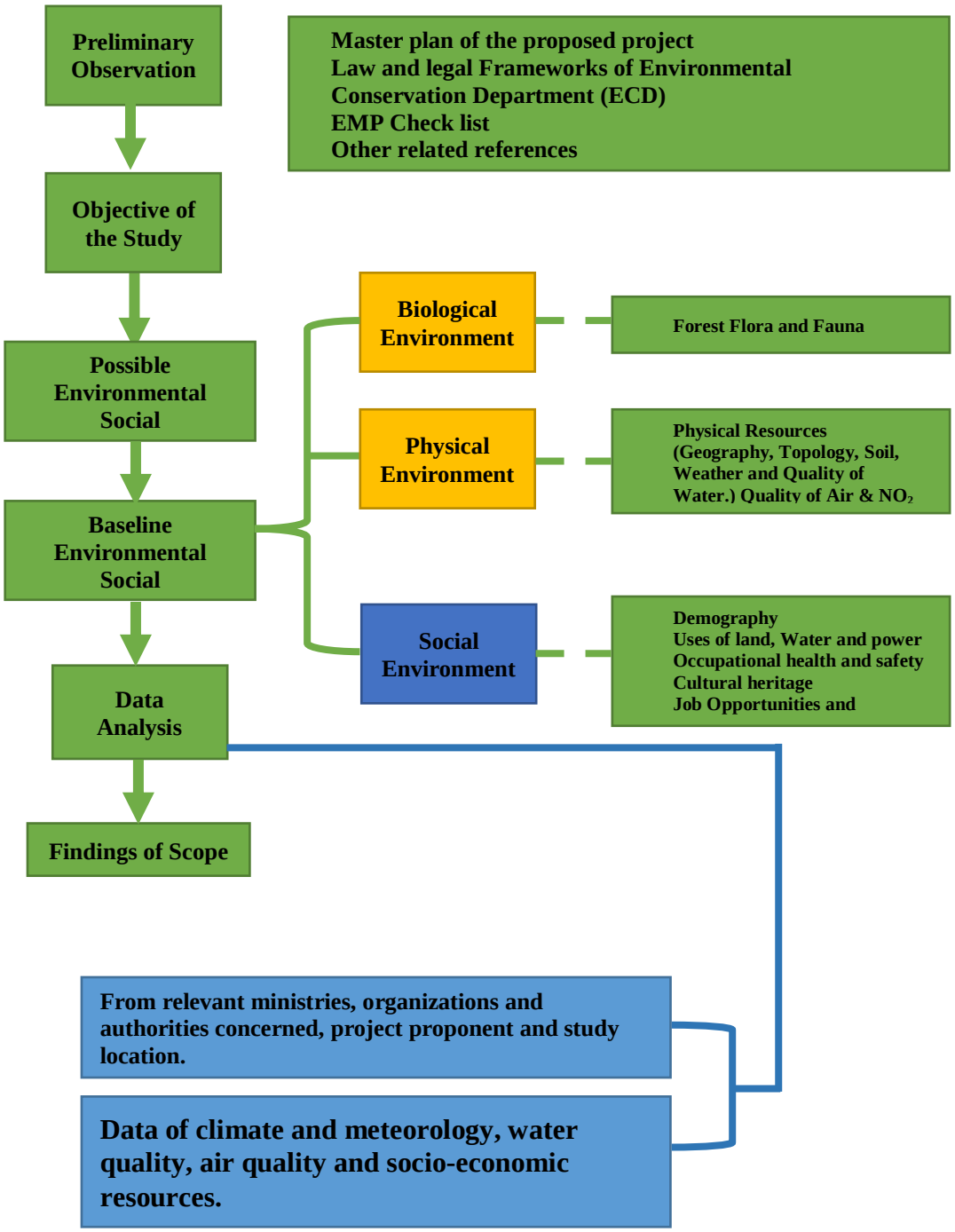
(c) Noise

Receptor	One hour LAeq (dBA)[a]	
	Day time **07:00 – 22:00** **(10:00 – 22:00 for public holidays**	**Night time** **22:00 – 07:00** **(22:00 – 10:00) for public holidays**
Residential, Institutional, educational	55	45
Industrial, commercial	70	70

6.4 Methodology

The study on existing environmental resources in the project area is focused on three main resources-physical, biological and social economic resources. The physical resources such as quality of air and water inside the project are called primary data, which is collected from existing information in the field survey. This data collection is done by direct observation, interviewing and discussion with the responsible of this mine. And then, the secondary data for the socio-economic resource is obtained from the relevant ministries/ bodies and research institutions as reference material for the preparation of the EIA report. Moreover, the SEE-Trust team made key informant interviews to the local people who live in villages near the existing project site. The impact is evaluated and mitigation measures developed for those impacts that are identified as significant. Flow chart of Methodology for the Environmental Management Plan is shown in figure (6-1).

Figure (6-1) Flow chart of Methodology for the Environmental Impact Assessment Study



6.5 Time Frame for EIA process

(a) **To apply Third Party approval** – As soon as the contract is signed.

(b) **Field study** – 7 days after approved third party by ECD (7 Working days)

(c) **Public consultation meeting** for scoping stage (7 working days including preparation invitation etc.)

(d) **Information** – dissemination and feedback collection are days after field study (15 Days).

(e) **Submission** of Scoping Report to ECD. (15 Working days)

(f) **Detail environmental studies** – As soon as Scoping report approved by ECD (45 Working days)

(g) **Public consultation Meeting** – One month after detail environmental study (7 working days including preparation & invitation)

(h) **Information dissemination** – 15 days after second public consultation meeting (15 days)

(i) **Submission** of final EIA report to ECD – 45 days after second consultation meeting. (45 days)

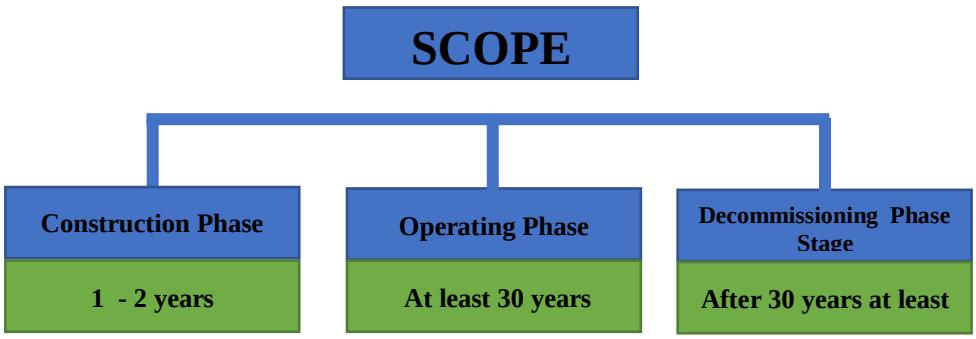
(j) **Total working days** – 171 days excluding days taken by ECD for approvals.

6.6 Introduction

Assessment of Key environmental impacts of the project during construction, operation and decommissioning phase is based on the nature and process of the project and information on the environment. The development of the project will bring changes in the local environment in terms of physical, ecological, economic and social economic aspects. There may be some positive and negative impacts in the surrounding environment including human resources. The potential impacts are predicted based on experience, learned lessons and nature of work. The finding of scope and impact of various activities are mentioned in this chapter.

6.7 Phases for Study

The study shall be done for the following project phase.



6.8 Study work natures

The study shall be made for work nature

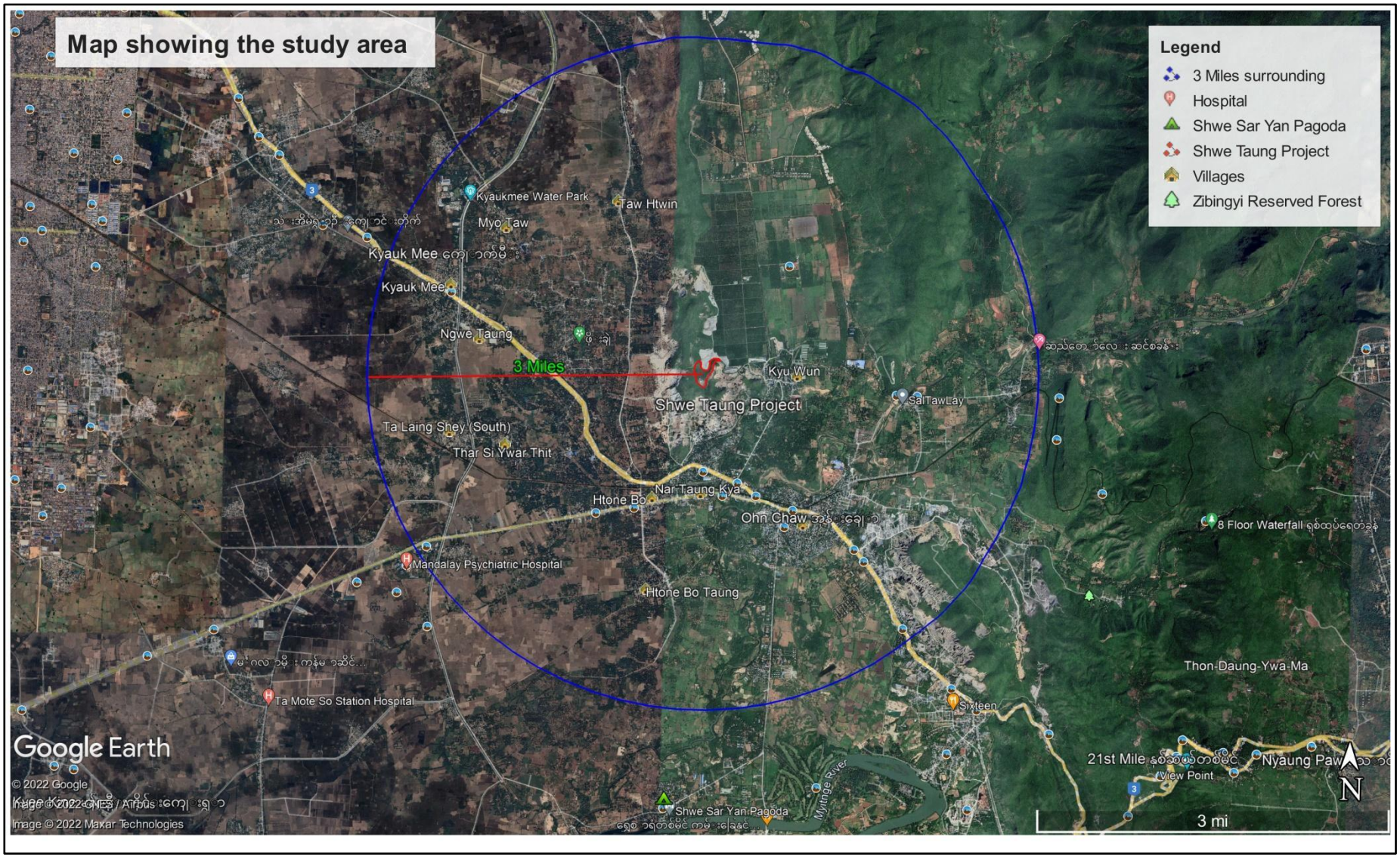
- Mining operation (Mining, Processing, Transportation and Distribution)

6.9 Study Location

It is located in Yebyu Township, Zardi Village tract, Bawar Reserved forest, Compartment No-11. The location map with GPS points are shown in (N 21° 53′ 47.5″ , E 096 ° 13′ 6.3″).

The surrounding villages are Diaktakyaw Village and Khayin Chaung village (New village), of Zerdi village tract which are within 3 miles radius of project site.

Figure (6-2) Map showing the Study area



6.10 Proposed method for data collection

The following are proposed methods for this EMO preparations: -

a. **On site measurement and Analysis**

Baseline parameters such as air quality, noise and water quality of the existing project site and biodiversity survey, social-economy survey on the site and surroundings.

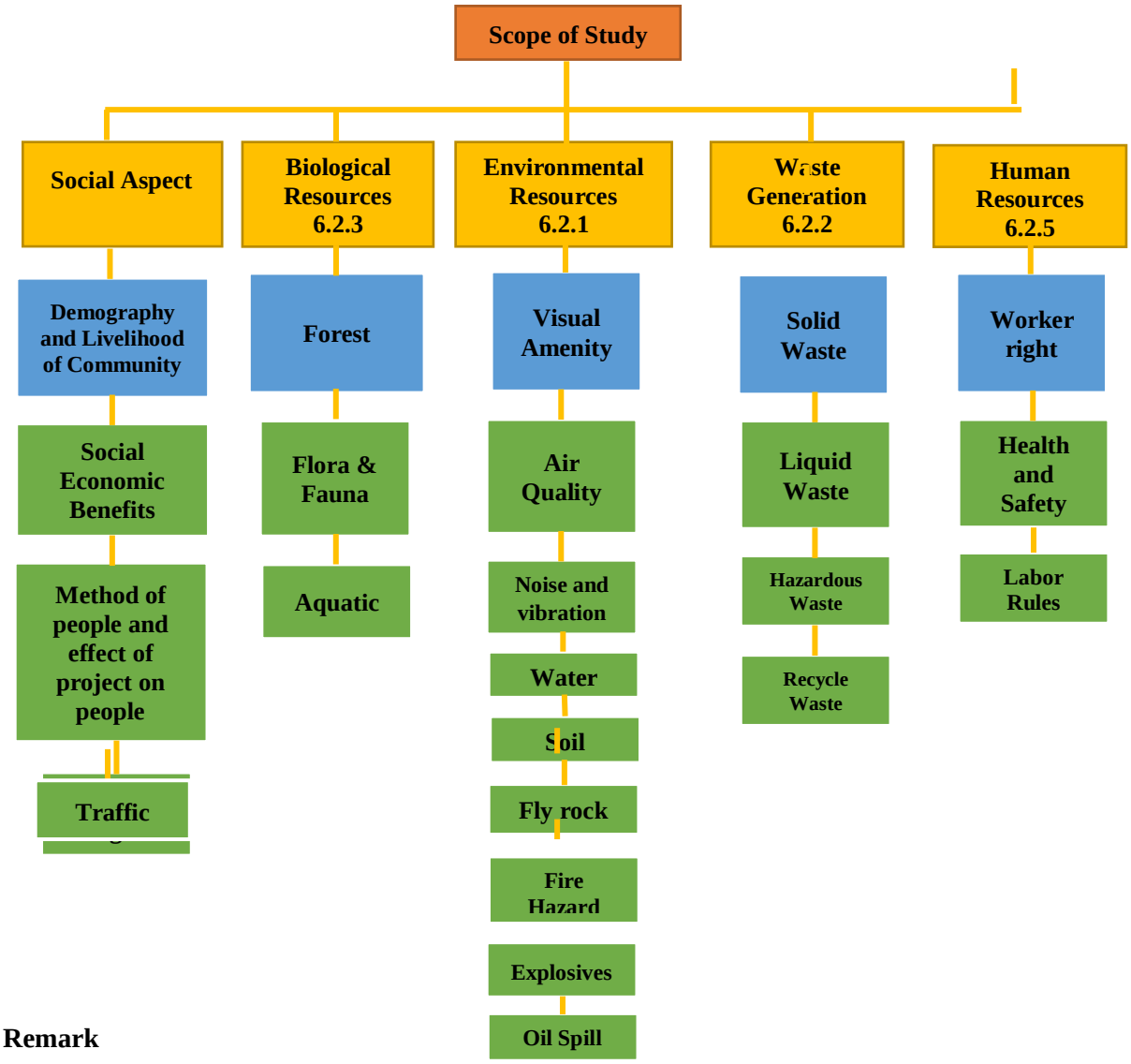
b. **Secondary data collection and Analysis**

Some data such as social economic condition, physical, biological, human resources and weather data will be collected from the official forum ship and concern department.

6.11 Study of social environment

The study for EIA is subdivided into social Aspect, Environmental aspect, Biological Aspects, Waste management and Human Resources further studies and new studies will be made on the following parameter. The detail of scope shown in figure (6-3).

Figure (6-3) Scope of Study



Remark

If found there are variable areas, value environmental components and historical place in the study area the scope should be emphasized. But according to the initial study there was no evidence of those issues.

6.12 Methodology for Cultural Heritage

Cultural heritage has to be considered throughout the EIA process and relevant expertise must be consulted. Cultural heritage and issues are integral to the whole process and require proper consideration and assessment in conjunction with the move to tangible facets of the environment. We will use the information processing Model (IPM). This process includes.

(a) Literature review

(b) Questionnaire survey – prepared by EIA specialist and Cultural heritage specialist.

(c) Responsible for all the potential stake holidays.

6.13 Visual Amenity

The original landscape will be changed because of mining. This is the uncontrollable impact but there are no cultural buildings, outstanding landscape and recreational sites in the areas.

6.14 Methodology for Health impact assessment

HTAS general objective is to provide decision making with sound information on health implication of policy, programmed or project.

A health impact assessment is six steps, a systematic approach to assessing the health consequences.

1. Screening

2. Scoping

3. Assessing

4. Recommending

5.Reporting

6. Monitoring and Evaluating

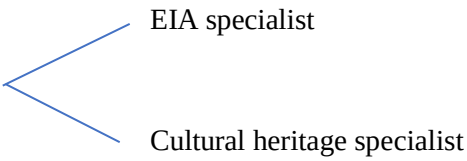
6.14.1 Proposed Assessing method

The assessing method for health in the project and surrounding area:

- Develop a health profile of the community including baseline conditions for various health conditions.
- Literature review and quantitative methods to assess likely affect the proposed project.
- Use community output to provide nuance, context, clarification, prioritizing and reality checks to the technical partner's work.
- To assess HIV transmission, vector borne disease Road safety, river and sediment etc.
- To assess climate change effect on Human Health.

Cultural heritage has to be considered in the EIA process and relevant expertise must be consulted. Cultural heritage issues are integral to the whole procedure and require proper consideration and assessment in conjunction with the move to tangible facets of the environment.

Information Processing model



Response from all the potential stakeholders.

6.15 Methodology for Biodiversity

6.15.1 Objectives

(a) To fund baseline data on flora and fauna

(b) To minimize the extent feasible and critical habitat

(c) To collect information for Biodiversity Action Plan

6.15.2 Area of Influence

The biodiversity studies will be done within the two miles radius of the project site.

The studies will be carried out in the following sites.

(a) In the mine area

(b) Surrounding forest

6.15.3 Methodology

The systematic random sampling method will be applied. The following data will be collected in each sample plot.

(a) Flora

(b) Fauna

(3) Aquatic plant

(4) Endangered flora and fauna

Literature review and interviewing with the local people will also be done.

6.16 Methodology for Physical component

Physical components have to be studied throughout the EIA process. The data will be taken from the concerned department research paper and discussion with the relevant department. Air quality, Noise will be measured by Hazz scanner, EPAS. The water quality will be collected and test at the laboratory.

6.17 Methodology for social-economic study

The social-economic studies have been carried twice during the preparation of 10 Acres plot EMP and scoping stage for (15) Acres. The data and information is also collected by PRA (Participatory rapid appraisal) exercises with relevant stakeholders and by PCM (Public Consultation meetings).

Data from township and village tract administration were also collected.

Further data and information collection for social and economic will be done in the next stage.

The areas of studies are:

(1) Population

(2) Livelihood

(3) Education

(4) Health

(5) Tradition and culture

(6) Infrastructure

The data will be collected at the village levels and information will be also collected from concerned departments and civil society.

6.18 Summary

This chapter discussed scope and methodology for impact assessments. Also mentioned the terms of reference for third parties.

Chapter 7

Identification of Possible Impacts

7.1 Methodology & Approach for identification of impact

The assessment of each impact is based on consideration of four parameters, magnitude, duration, spatial and frequency of activities, which are going to be carried out during three phases and characteristics of the project site.

The following methodology has been applied to assess the environmental impacts of the plantation operation mainly on biodiversity, air, noise, vibration, water, and waste disposal. Hazardous materials also include human beings. Each source of impact has been assessed by four parameters such as magnitude, duration, extent and probability and each access point have five scales as mentioned in the following Table (7-1).

Table (7-1) Impact Assessment Parameters and Its Scale

Assessment	Scale				
	1	2	3	4	5
Magnitude	Insignificant	Small and Will have no effect on the environment	Moderate and Will result in minor changes in the environment	High and will Result insignificant changes on environment	Very high And will result in permanent changes on environment
Duration	0-1 year	2-5 year	6-15 year	Longer than 15 year	Permanent
Extent	Limited to the Site	Limited to the Area	Limited to the region	National	International
Probability	Very improbable	Improbable	Probable	Highly probable	Definite

Then, the significant point (SP) is calculated by the following formula.

Significant Point = (Magnitude + Duration +Extent) x Probability

Impact Significance: Based on calculated significant point, impacts significance can be categorized as follows;

Table (7-2) Significance of Impacts

Significant Point (SP)	Impact Significance
<15	Very Low
15-29	Low
30-44	Moderate
45-59	High
>60	Very High

7.2 Analysis of Potential Impact during construction, operation and decommissioning phase (initial study)

Environmental Impact Assessment follows in three phases

(1) Preconstruction and construction phase

(2) Operation Phase

(3) Decommissioning phase

But at the time of EIA studies the construction phase already hovered. Here we studied back work and prepared this mitigation measure.

Table (7-3) Potential impacts for construction operation and decommissioning phase

Sr No.	Environmental Impact	Project Activities	Significance of Potential Impact					Impact significance
			A	B	C	D	E	
A. Construction Phase								
1.	Air	- Gaseous emissions from generators and vehicles. - Dust produced from land clearing road construction and construction activities.	4	1	2	5	35	Moderate
2.	Noise	- Produce from construction activities.	4	1	2	5	35	Moderate
3.	Solid Waste	- Wood, metal, iron, cement and household waste produce form construction.	3	1	2	5	30	Moderate
4.	Oil Spill	- Maintenance of machine leakage of fuel and lubricant from storage tank.	3	1	2	5	30	Moderate
5.	Health & Safety	- Injuries and accidents Physical contact spills, dust and noise.	2	2	1	4	20	Low
6.	Social economic	- Temporary job opportunities						Position
B. Operation Phase								
1.	Air	- Gaseous emissions from explosion & generator, vehicles - Fugitive dust from excavation from haul roads, from blasting, drilling, crushing and screening.	5	1	2	5	35	Moderate
2.	Flying rock	- Drilling & Crushing Breaking of rock using explosive from blasting and transportation to temporary storage area and Jetty.	3	1	1	3	15	Low

3.	Oil spill, Hazardous waste	- Maintenance of machines. Leakage of full and lubricant from storage tank and workshop. - Soil and gravel quarry from production activities	3	1	2	5	30	Moderate
4.	Solid Waste	- General waste - Household waste and food residue	3	1	2	5	30	Moderate
5.	Liquid waste	- Gray water and black water generated from camp	4	1	2	5	35	Moderate
6.	Water quality	- Change of water quality due quarry surface runoff discharge. - Degrade water quality due to removal of vegetative and aggregates - Storage of rock at Jetty	4	1	2	5	35	Moderate
7.	Soil erosion Landslide	- Due to land daring & removal of vegetation	4	1	2	5	35	Moderate
8.	Noise & vibration	- Noise from earth moving equipment, power generator processing machine, blasting drilling and transport.	4	1	2	5	35	Moderate
9.	Flora/ Fauna, aquatic	- Habitat alteration and loss by land clearing, disruption of access to water resources disturbance by noise and vibration - Increase pest and disease and invasive weed and plant	4	1	2	5	35	Moderate
10.	Health and Safety	- Physical contact, spill noise, dust - Accident and injuries to workers and communities	3	1	2	5	30	Moderate
11.	Explosives Socio-economic condition	- Job opportunity, Create jobs, road, school, clinic etc. development.	4	1	2	5	35	Positive Impact
C. Decommissioning Phase								
1.	Visual	- Change of landscape						
2.	Air	- Dust, Gaseous emission from machines and vehicles of decommissioning activities.	3	1	2	5	30	Moderate
3.	Noise &	- Demo live activities	2	1	1	4	16	Low

	Vibration							
4.	Water quality	- Oil leakage, Oil spill from demolishing machines, barges and vehicles	2	1	1	5	20	Low
5.	Solid Waste	- Wood, metal, iron, scratch, debris, use tyre and parts from decommissioning Household waste and food residue	3	1	1	5	25	Low
6.	Flora/ fauna and aquatic	- Increase pest and invasive weed and plants	1	1	1	5	15	Low
7.	Health and Safety	- Injuries and accident Physical contract spills, dust, noise.	2	2	1	4	20	Low
8.	Socio – economic condition	- A few and short-term job opportunities						Positive

7.3 Residual Impact

There will be possible residual impact occurred by mining activities. These will have an impact on groundwater and soil. These studies will have to be carried out in the next assessment steps.

7.4 Social Impact

There may be possibility to impact on communities as follow: More studies shall be done in next stage

(a) Air pollution, water pollution may impact on health

(b) Heavy traffic may cause accident

(c) Noise impact to the living environment of communities not only negative impact positive impact shall be gained by CSR programs and taken care by proponents for rural health, education and infrastructure development.

7.5 Mitigation Plan

The Environmental Management Plan (EMP) prepared for the proposed project covers the anticipated impacts of the said project at the final EIA report. The mitigation measures, management and monitoring plans should be prepared for the following phases.

- Pre-construction and Construction phase-
- Operation phase
- Decommissioning phase

Although the EIA process is under scoping stage and project is under consideration to be approved by the Government and not yet operated. But to reduce the impacts the following mitigation measures shall be done during the process of EIA.

7.6 Potential impacts and mitigation measure

Based on the initial investigation in the scoping stage, the impacts should be mitigated during the EIA studies process for less impact to the environment. The possible impacts and immediate mitigation measures in construction and especially for construction stage operation phase table (7-4).

Table (7-4) Potential impacts to be mitigate currently

No.	Potential Impact	Mitigation measure	Phase to be follow	
			Construction	Operation
1.	Visual Amenity	- Minimize visual intrusion of clearing vegetation.	✔	✔
2.	Air pollution	- Schedule activities appropriately to have least impact in land clearing, leveling land road construction. - Truck leaving the construction materials and machine directly to the project site will be properly covered. The material should not be loaded above the height of the truck's body. - Control the speed limit of truck - Ensure control of using fuel (Diesel, petrol) consumption on a daily basis for fuel efficiency and control of gaseous emission. - Regularly check machines and vehicle.	✔ ✔ ✔ ✔	✔ ✔ ✔ ✔
3.	Noise and vibration	– Select day times when the environment is least sensitive to noise in • Road construction • Construction building • Mill assembly – Use delay detonators for reducing ground vibration – To provide PPE	✔	✔ ✔
4.	Soil	- Use proper handling method to avoid spills or leakages. - Conduct vegetation clearing properly not to expose the soil in high steep areas. - Design the channel and ditches for proper drainage of water particularly during rainy 99 | P age Shwe Taung Development Co., Ltd Environmental Impact Assessment season.	✔ ✔ ✔	✔ ✔ ✔
5.	Waste generation	- To segregate wastes in to hazardous and non-hazardous	✔	✔

		waste - To provide adequate toilet. - To deposit waste properly	 ✔ ✔	 ✔ ✔
6.	Biological resources	- Great buffer areas - To protect native/ endangered flora and fauna	✔ ✔	✔ ✔
7.	Occupational Health and Safety	- To assess areas from landslides and rock fall - To make regular health checkup for the staff - To erect safety signage in the site - To provide personal protective equipment (PPE) - Dispose and transport explosives and fuel in accordance with proper handling guidelines and safety guidelines - Provide purified drinking water - Provide clinic or medical officer - Prohibit drugs and alcohol	✔ ✔ ✔ ✔ ✔ ✔ ✔	✔ ✔ ✔ ✔ ✔ ✔ ✔
8.	Fire hazard	- To provide and install fire extinguishers and signage - To provide emergency phone number and contract points - Regular inspect the vehicle and machines and electric installation - To use and store combustible materials with caution - Regular inspect machines, vehicles - Proper installation of electric.	✔ ✔ ✔ ✔ ✔ ✔	✔ ✔ ✔ ✔ ✔ ✔
9.	Socioeconomic	- To find the requirements of community - To increase job opportunities - To increase in come for local - To assist the infrastructure development of people.	✔ ✔ ✔ ✔	✔ ✔ ✔ ✔

7.7 Explanation of Impacts

There are no impacts found in the proposed project area (Mine area) as there are just in the construction stage. Based on the nearby mines' experiences, third party's experiences and voice from the communities we have planned mitigation plans to be followed during the EIA studying stage.

Possible impacts of the SDC's quarry mine project are visual amenity impact, noise impact, vibration impact/ seismic impact, air pollution impact, climate change impact, soil erosion, sedimentation, land subsidence(the loss of land elevation), soil contamination, soil pollution, or land pollution, water pollution caused by disposal of solid waste, sediments, water pollution caused by the disposal of fluid/ liquid waste, hazardous waste, secondary contamination of water supplies within and underlying the soil, health and safety threatened by fly rock, dust, noise, other accidents), social impact and impact on biodiversity and ecosystem.

7.8 Proposed Mitigation Measures

7.8.1 Visual Amenity Impact

The following activities are proposed to mitigate the visual amenity impact

1. Conduct A Residential Visual Amenity Assessment (RVAA)
2. Assesses the potential visual impact of quarry mine on the residential amenity, applying eye movement analyses on mining landscape photographs.
3. Develop a landscape restoration plan.
4. Establish instant tree nursery to provide with established trees, mature trees, wildlife fodder trees, ornamental trees
5. Plant ornamental trees, instant trees along the roadside, watercourse, gully, stream, mining area, camp, office and staff quarters.
6. Minimize environmental damage and negative impacts on local communities and make an
   annual contribution to a fund for environmental conservation. (ML Art. 13e (1))
7. Contribute to a Mine Closure Fund for environmental rehabilitation and reforestation. (ML Art 13e (2))
8. Establish forest plantations/ compensatory plantation or carry out natural regeneration (Forest Law Art 16)
9. Conduct landscaping restoration and tree planting when the quarry is exhausted.

7.8.2 Noise Impact

The following activities are proposed to mitigate the noise impact

1. Develop noise abatement strategies that are designed to reduce noise pollution.
2. Carry out blasting in a proper manner by a competent person in accordance with best practice environmental management.

3. Noise level should not exceed the prescribed levels shown in (National Environmental Quality (Emission) Guidelines 2015)
4. Minimize the likelihood of adverse effects being caused by air blast overpressure and ground-borne vibration at noise-sensitive places and on people using the surrounding area.
5. Establish green space to mitigate noise in residential areas. Plant "noise buffers" composed of trees and shrubs, which can reduce noise by five to ten decibels for every 30m width of woodland, especially sharp tones, and this reduces noise to the human ear by approximately 50%. To achieve this effect, the species and the planting design must be chosen carefully.
6. Plant the noise buffer close to the noise source (rather than close to the area to be protected).
7. Construct quiet line barrier panels, noise barrier fence, the sheer mass of masonry walls—stone, brick, stucco-covered concrete — make them the best for blocking sound. Next best, and more practical for most homeowners, would be any solid stockade or board fence.
8. Provide electronic earplugs, Electronic Hearing Protection, noise cancelling ear plug, sound blocking earplug.

7.8.3 Vibration Impact/ Seismic Impact

The following activities are proposed to mitigate the vibration impact/ seismic impact

1. Minimize the likelihood of adverse effects being caused by ground-borne vibration near residential areas.
2. Adopt a time delay method between individual boreholes for the local reduction in vibrations during blasting work, by using electronic detonators, which can increase the safety and accuracy of blasting works and their timing.
3. Install at least three portable seismometers on nearest dam to verify a dam's stability, to investigate and analyses
4. Blasting works must be done within permissible explosive limits.
5. Use controlled blasting techniques that can be implemented to improve high wall stability and reduce landslides. The six controlled blasting techniques are (1) line drilling, (2) trim blasting, (3) buffer blasting, (4) smooth wall blasting, (5) air decking, and (6) presplitting.
6. Construction of a retention wall to stop land from slipping.
7. Increase in the vegetation cover to arrest landslides.
8. Control the surface drainage to prevent the movement of landslides along with rain water.

7.8.4 Air Pollution Impact

The following activities are proposed to mitigate the air pollution impact

1. Replanting trees and conserving natural forest.

2. Suppress dust by using water sprays on stockpiles and roads, and when using machinery and cutting equipment.
3. Use a dust control fog cannon, which has high-pressure pumps together with a high number of ultra-thin nozzles to catch the majority of dust.
4. Vehicle speed restrictions will be applied on internal roads across the Project site to avoid excessive dust generation (and prevent collisions and other accidents)
5. Use covers at all vehicles carrying excavation and demolition material/waste to prevent spread of dust, excavation and demolition material.

7.8.5 Climate Change Impact

The following activities are proposed to mitigate the climate change impact

1. Apply natural carbon sinks (Reduce deforestation and degradation of forest, Establish forest plantations or carry out natural regeneration)
2. Apply the artificial carbon trapping technologies to capture carbon. (e.g large-scale power station equipped with carbon capture and storage (CCS) technology, CO_2 storage plant that can sequester five million tonnes of CO_2 from its LNG facilities)
3. Use renewable energy such as wind or solar power, while cutting dependence on fossil fuels
4. Prohibit burning of materials in open air.
5. Select machinery, equipment, vehicles and materials with relatively low CO_2 emissions.
6. Choose energy sources/fuels for equipment that produce the least amount of CO_2 emissions.

7.8.6 Soil Erosion and Sedimentation

The following activities are proposed to mitigate the soil erosion and sedimentation

1. Develop a “soil erosion control measure plan”.
2. Develop and implement “the integrated roadside vegetation management plan”
3. Prevent soil erosion from road construction (drainage system, biological management practices)

7.8.7 Land Subsidence

The following activities are proposed to mitigate the land subsidence (the loss of land elevation) caused by the use of groundwater;

1. Adopt the groundwater replenishment program to prevent the land subsidence.
2. Replenish the groundwater through direct recharge and in-lieu recharge.
3. Use two recharge methods; direct spreading and aquifer injection. Water used for direct recharge most often comes from flood flows, water conservation, recycled water, desalination and water transfers. Use a direct recharge method. Direct recharge method is storing water by allowing it to percolate directly to storage in the groundwater basin.

Some freshwater wetlands are located at points where surface water enters an underground aquifer, thereby recharging groundwater supplies.

4. Store surface water "in-lieu" of pumping groundwater, thereby storing an equal amount in the groundwater basin.
5. Develop Rain Water Harvesting Plan around the project site.
6. Apply Rain water harvesting techniques to augment ground water through gully plug, contour bund, gabion structure, percolation tank, check dam/ cement plug/ nala bund, recharge shaft, dugwell recharge, ground water dams/subsurface dyke.
7. Develop the Roof Top Rainwater / run off harvesting Plan at camp, office, staff quarter area.
8. Groundwater recharge in residential areas through recharge pit, recharge trench, tube well, recharge well,
9. Use previous concrete (also called porous concrete, permeable concrete, no fines concrete and porous pavement). Previous concrete is a special type of concrete with a high porosity used for concrete flatwork applications that allows water from precipitation and other sources to pass directly through, thereby reducing the runoff from a site and allowing groundwater recharge.
10. Use Grass pavers, which is one of the most environmentally-friendly options.

7.8.8 Soil Contamination, Soil Pollution, or Land Pollution

The following activities are proposed to mitigate the soil contamination, soil pollution, or land pollution caused by the disposal of hazardous waste;

1. Check the leakage of petroleum, diesel, engine oil, lubricants at car, machine, and store and fix regularly. Check petroleum products store and containers regularly and make required maintenance to prevent leakage of petroleum products to the soil and water.
2. Conduct the restoration of oil polluted soil, contaminated soil, polluted land by using the following methods;

I. Apply the common methods (physical, chemistry, microbiology and plant remediation.).

II. The traditional physical and chemistry method, which include soil removal and replacement,

III. Elution method,

IV. Heat treatment and thermal resolution,

V. Extraction-separation and chemical oxidation methods are used to regulate the physical processes of chemical reactions to change the physical properties of the soil and then control the contaminants effectively.

7.8.9 Water Pollution

The following activities are proposed to mitigate the water pollution caused by disposal of solid waste, sediments,

1. Develop soil erosion control measure plan, site waste management plan(SWMP)
2. Maintain road surfaces periodically for proper surface drainage. Ruts and holes should be filled in with gravel or compacted fill as soon as possible to reduce erosion potential. Berms along the edge of the road should be removed if they will trap water on the road.
3. Reuse and recycle water as much as possible, and be sure that all unusable water is disposed of safely and responsibly.
4. Conduct wastewater treatment process.

Water Pollution caused by the disposal of fluid/ liquid waste, hazardous waste, secondary contamination of water supplies within and underlying the soil,

The following activities are proposed to mitigate the water pollution caused by the disposal of fluid/ liquid waste, hazardous waste, secondary contamination of water supplies within and underlying the soil,

1. Conduct the treatment of sewage and contaminated stormwater before being discharged to surface waters, to ensure that all unusable water is disposed of safely and responsibly.
2. Toilets should be away from the stream.
3. Check petroleum products store and containers regularly and make required maintenance to prevent leakage of petroleum products to the soil and water.

7.8.10 Health and Safety

The following activities are proposed to mitigate the health and safety threatened by fly rock, dust, noise, other accidents

1. Develop “Emergency preparedness and response plan”, “Fire prevention and response plan”, “Occupational Environmental Health and Safety (OEHS) plan”,
2. Notify the public on the *blasting schedule.* The blasting schedule, which will contain, (1) Name, address, and telephone number of operator; (2) Identification of the specific areas in which blasting will take place; (3) Dates and time periods when explosives are to be detonated; (4) Methods to be used to control access to the blasting area;
3. Withdraw all the workers at the site to a safe distance of at least 200 meters from the blasting site.
4. Notify early warning, give an audio warning by blowing a whistle before igniting the fuse.
5. Carry out the blasting operation under the supervision of trained personnel.
6. Provide face shield, masks, helmet, gloves, safety boots, first aid kit,
7. Organize training programs to provide relief in times of disasters/emergencies and to promote health & care of vulnerable people, workers and communities.

7.8.11 Social Impact

The following activities are proposed to mitigate the social impact

1. Conduct Social impact assessment (SIA), to review the social effects of projects to deliver positive social outcomes and eliminate any possible negative or long-term effects.
2. Assess the effect of project activities on populations, groups, and settlements
3. Observe ongoing risk and adverse impacts on surrounding communities,
4. Conduct socio economic survey (household expenditure, income, status of housing, individual and household characteristics and living conditions)
5. Develop "Plan for Communication with community for environmental affairs and social development" and "Grievance Mechanism Plan"
6. Conduct "Corporate social responsibility Program"
7. Supply basic needs of workers
8. Donate for village activities,
9. Donate school building, hospital
10. Construction of Rural access roads.
11. Create job opportunities at construction phase and operation phase. (Employ 14 permanent staff for the post of Site Manager, Production Head, Senior Mine Engineer, HR, Security, Cook, Supervisor, Operator, Employ 25 labors)
12. Construct (12) buildings for office, store, canteen, office quarter, labor quarter, security and two stone crusher plant, water pond and water tank at base camp.
13. Prepare a jobless problem at the decommissioning phase.
14. Prepare exit strategy (when projects end their mining related humanitarian engagement. This includes the process of transitioning, handing-over, decommissioning of infrastructure and exiting or disengaging from activities, projects, programme areas),
15. Construct quiet line barrier panels, noise barrier fences, the sheer mass of masonry walls—stone, brick, stucco-covered concrete — make them the best for blocking sound. Near office and staff quarters
16. Compensate for the damage of residence due to quarry mine blast vibration and fly rock

7.8.12 Impact on Biodiversity and Ecosystem

The following activities are proposed to mitigate the impact on biodiversity and ecosystem.

1. Develop "Management Plan for biodiversity and ecosystem conservation", which include

I. Conservation of the remaining trees in mine site, and along the watercourse, stream,

II. Gap planting at mining site, watercourse, stream,

III. Ornamental trees planting along the roadside,

IV. Protection of the edible fruit trees for wildlife and establishment of wildlife garden

V. Conduct artificial regeneration or natural regeneration.

VI. Establishment of compensatory plantation or carry out natural regeneration for wildlife and ecosystem conservation.

VII. Contribute to a Mine Closure Fund for environmental rehabilitation and reforestation.

VIII. Conduct ecosystem restoration at the mine site for the benefit of current and future generations; the reclamation of degraded ecosystems; and the sustainable use of natural resources.

2. After mining finishes, at decommissioning phase, the mine area must undergo rehabilitation to minimize environmental damage to ensure the sustainability of the land for future use. (First, waste dumps are contoured to flatten them out and stabilize them. If the quarry mine site contains sulfites, it is covered with a layer of clay to prevent rain and oxygen from oxidizing the sulfides into sulfuric acid, which is also known as acid mine drainage. Then, the waste dump is covered with soil, vegetation is planted, and the area is fenced to prevent livestock from eating the newly planted vegetation. This layer will eventually erode but in the meantime, it will allow the leaching of heavy metals to occur slowly enough for the surrounding environment to absorb them. The open pit is also fenced off to prevent access, and over time fills up with groundwater unless the groundwater levels are excessively deep.)

7.9 Work Safety

During the EIA study process the following safety measures shall be followed.

(1) Transport and loading unloading machines, construction material and fuel in accordance with proper handling method and safety guidelines.

(2) Access accurate work site safety.

(3) Develop control abuse of alcohol and other drugs policy for workers.

(4) Provide personal protection equipment (PPE). (Reflective clothing, dust mask, safety boot, etc.) PPE and their function are shown in the table.

(5) To put up safety signage in the project site with sign and Myanmar language. The example signage shows below.

Table (7-5) Personal Protection Equipment and their function

Required Personal Protective Equipment	Functions of PPE	Part of the body to be protected	Features and characteristics of PPE
Earmuffs	They offer a high level of sound reduction and are suitable for high noise levels. They can be used in combination with a safety helmet.	Ear	 
Reflective clothing, safety glasses, safety helmet	They can reduce a high level of injuries or accidents by quarry operations.	Head, Eye, Body	   
Cotton earplugs	Disposable earplugs for short-term use-not suitable for high noise levels.	Ear	
Elastic earplugs			
Dust Goggles & Dust Mask	Protection from dust and fine particles etc.	Nose and mouth	
Latex Glove & Boots	Protection from injuries, and other related materials.	Hands and Legs	 

Table (7-6) Safety signage and their description.

Description	Safety Signage
These signs indicate all visitors must report to the site office and obtain permission to proceed on to the site or any work area and safety equipment must be used at all times.	
These signs should be used to make people aware of nearby dangers such as mines.	
These signs should be tagged to indicate the location of the chemical storage area.	
These signs should be used to make people aware of nearby dangers such as diesel fuel.	

7.10 Risk Assessment

Risk assessment is a tool for conducting a formal examination of the harm or hazard to people, resulting from project activities or situation.

A risk is an evaluation of the probability of the hazard occurring.

With the risk assessment process, users take a look at their organization LO.

- Identify processes and situation that may harm particularly to people
- Determine how likely it is that each hazard will occur and how severe the consequence would be
- Decide steps can take to stop these hazard

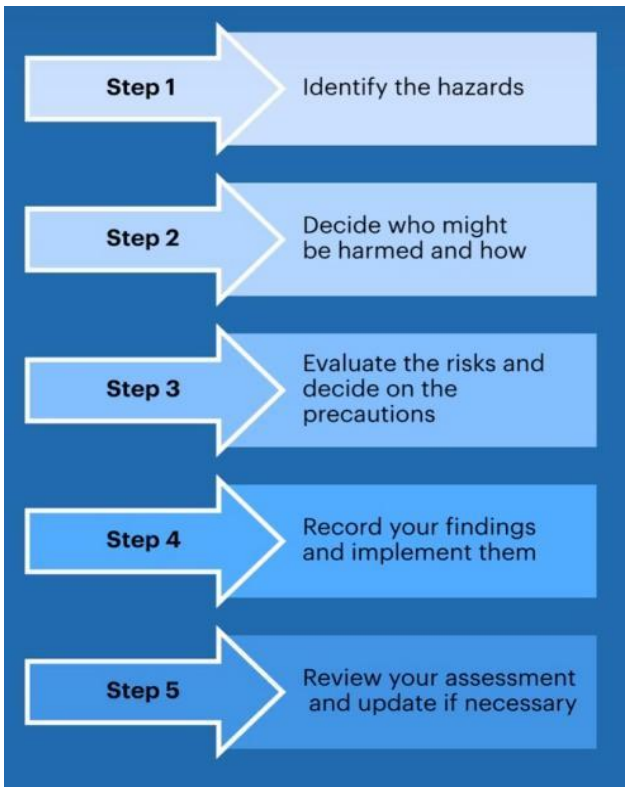
7.11 Goal

- Providing an analysis of possible threats
- Preventing injuries or illness
- Creating awareness about hazards and risk

- Justifying the cost of management risks
- Determining the budget to remediate risk
- Understanding the return on investment

7.12 Assessment Steps

The steps of assessment are as follow:



7.13 Assessment Matrix

Risk Matrix						
			Probability			
Severity			Remote	Unlikely	Possible	Likely	Certain
			1	2	3	4	5
Fatal injuries, death	Catastrophic	5	5	10	15	20	25
Extensive injuries	High	4	4	8	12	16	20
Medical assistance required	Medium	3	3	6	9	12	15
First aid procedures	Low	2	2	4	6	8	10
Small bruises, cuts	Negligable	1	1	2	3	4	5

By using above matrix the risk can be classified as follow:

Work accident	-------	4x3	=	12	Medium
Health of labor	-------	4x3	=	12	High
Health of communities	-------	3x3	=	9	Low
Fire	-------	3x4	=	12	Medium
Natural disaster	-------	4x4	=	16	High

7.14 Risks and precautions

Risk	Area	Intensity	Duration	Precaution/Mitigation
Work accident	Mine area	Medium	Working time	The precaution and mitigation of the risks are prepared in the following sub-plans Emergency Preparedness and Response Plan, Health and Safety Plan, OEHS Plan, Firefighting Plan
Health of labor	Mine/Resident	Medium	All time	
Health of Communities	Village	Low	All time	
Fire hazard		Low	All time	
Natural disaster		High	Can occur any time	

7.15 Summary of Chapter

Identification of impacts were done on this chapter. Risk assessment has also been analyzed.

Chapter (8)

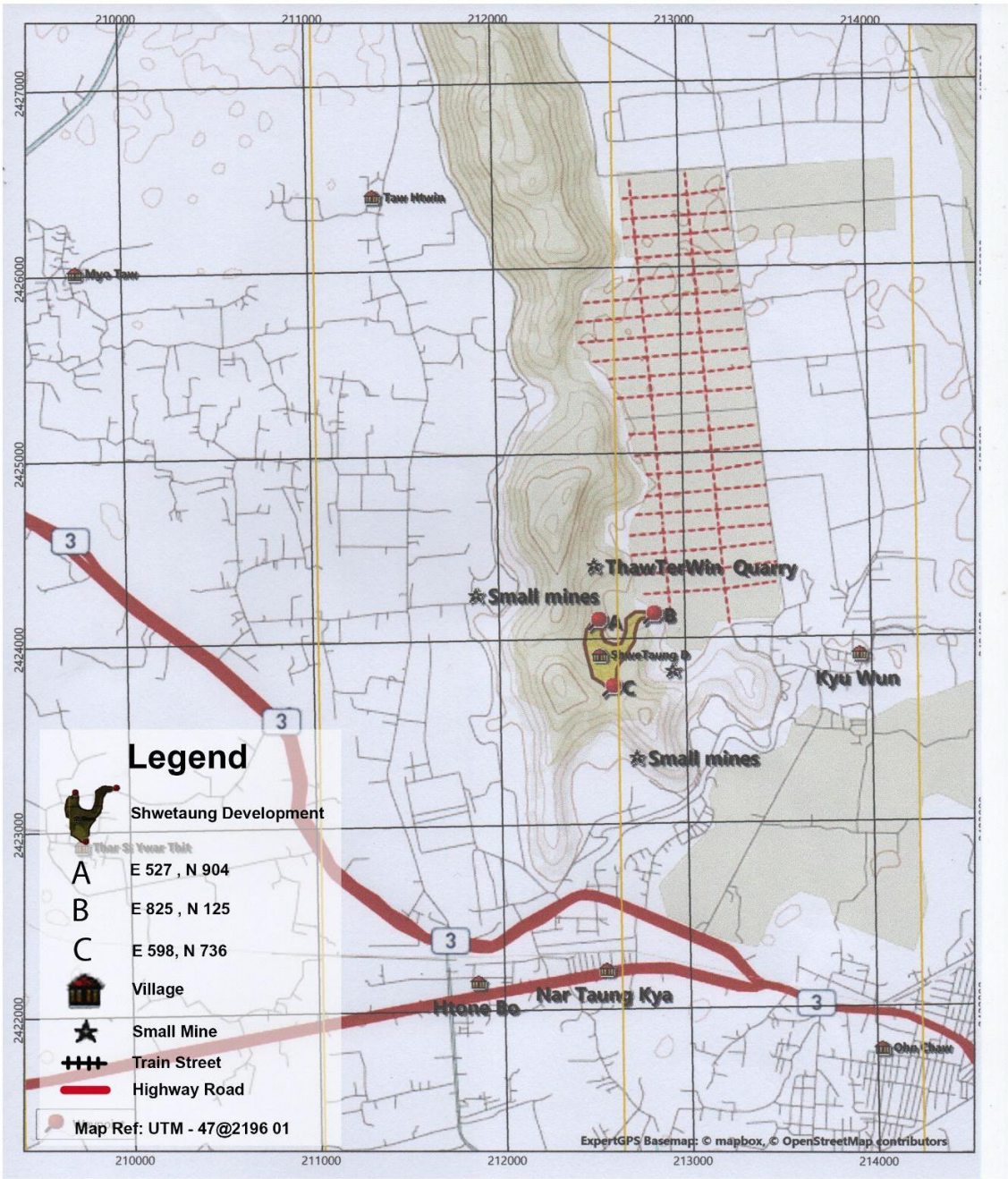
Cumulative Impact Assessment

8.1 Study on Cumulative Impacts Assessment

There is other mine in the nearby areas. The mine is Thawda Win ‘s mine about half a mile from this project.

The locations of another mine are shown below:

Figure (8-1) Location of adjacent mines



Cumulative impact will be possible to cause a combination of two projects as well as vice versa between SDC and Thawdar Win quarry mine.

The possible cumulative impacts were presented in the table (8-1)

Table (8-1) Cumulative Impacts

SR.	Parameter	Cause	Solution (Mitigation)
1.	Air quality	● Produce of dust from both project operations ● Emission caused by crushing and explosion of rocks ● Emission from machinery	● To compress dust ● Spray water on roads ● Schedule activities properly to have least impact ● Machinery and vehicles shall be well maintained for less emission ● Plant trees around the mine
2.	Noise/ vibration	● Noise/ vibration to the surrounding and labor (more noise and vibration caused by parallel operating explosion in same times)	● To schedule for the different explosion activities by two mines ● Control of explosion forces ● Use ear plug and ear mask by labor ● Not to do noisy activities at night time
3.	Water pollution and sedimentation	● Change of waterway, contamination and sedimentation into streams.	● Construct sediment traps and pond by both projects ● Design the channels and ditches for proper drainage of water particularly during rainy season by two projects
	Labor supply	● Lack of experienced labor	● Shall be recruited from outside if not available in surrounding ● Job training shall be made by companies ● The salary and incentives shall be made equally by both companies

Chapter (9)

Environmental Management Plan, particularly mitigation and monitoring plan

9.1 Institutional Requirement

This environmental management plan (EMP) is prepared as an environmental management framework for Shwe Taung Development Co., Ltd's quarry mine at Patheingyi Township, Mandalay Region. The practices, procedures and responsibilities were defined here to get complete compliance with the existing environmental policy, law, rules and departmental instruction of Myanmar.

9.2 Environmental Management Plan

The EMP prepared for the project covers the anticipated impact of the said project, mitigation measure, management and monitoring plans during the following phases:

(a) Operation phase

(b) Decommissioning phase

(As the construction phase had been already completed at the time of final reporting stage)

The objectives of EMP are:

- To identify the possible impacts of project activities
- Develop measure to minimize, mitigate and management these impacts
- Estimation of budget

The EMP is composed three parts as follows:

(a) Mitigation plan

(b) Monitoring plan

(c) Sub plans, such as

- Health and safety plan
- Occupational health and safety plan
- Community health and safety plan
- Emergency preparedness and response plan
- Oil spill response plan
- Mine close out plan
- Fire prevention and firefighting plan
- Corporate Social Responsibility plan

9.2.1 Mitigation Plan

The mitigation plans for operation and decommissioning stages are mentioned and table (9-1) and (22-B). In the table, the budget is also included. The plans are included with yearly budget estimates. If the budget is not sufficient to conduct activities the budget can be revised. The project proponent should recruit a Health, Safety and Environment (HSE) coordinator throughout the lifespan of the project. Revision of the EMP will be done.

Table (9-1) Mitigation Plan for Operation Stage

Sr.	Potential Enviromental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) per amount	Responsible Party
Environmental Aspect							
1.	Visual Amenity	All operation area	Low Visual Dust	Negligible	Create Buffer zone, planted trees.	-	HSE Coordinator and group
2.	Air quality	All operation area 21°53′42.39″N 96°13′4.85″ E	Gaseous emission		• Dust suppression facilities (back up water sprayer) • Spray water on road • Schedule activities impact • To provide PPE (Dusk mask) Vehicle and machinery use shall be well maintained	5,000,000	HSE Coordinator and group
3.	Noise/ Vibration	All operation area & resident Produced from crushing machines and other mining activities 21°53′42.39″N	Low negative Impact to labor & public	Minor adverse	• To draw plan for noisy activities at day time • To control the explosive pressure • To provide PPE (ear plugs & earmuff) to labor • The facility is enclosed which would further minimize noise impact • New technology applied which	350,000	HSE Coordinator and group

		96°13′4.85″ E			minimize noise and vibration • To be done noisy activities especially at day times • Machinery shall be sound proved cabin • Plant wind-break tree and bamboo at the surrounding of mine areas • The blasting has to be done at evening after working hour (between 04:00 – 06:00 PM) • Regular medical checkup has to be done for operators whom are possibility happens ear problems.		
4.	Water pollution	All operation areas 21°53′42.39″N 96°13′4.85″ E	Change of waterway, conterminat ion and sedimentati on of water		• Construct sediment traps and pond • Harvest rainfall for use • Carry out water quality regularly	300,000	HSE Coordinator and group
5.	Soil	All operation areas 21°53′43.39″N 96°13′4.37″ E	sedimentati on and contaminati on	Medium	• To use and dispose oil and lubricant with caution • Use proper handling methods to avoid spill leakages • Design the channels and ditches for	2,500,000	

					proper drainage of water, particularly during rainy season • To avoid soil run off sand and filled bags has to place on the surrounding of soil piles		
6.	Fly rock	All operation areas	Negative impact to human (cause injury)	Low	• Warn and remove all person during blasting • Should guide properly position and direction • Control the explosive pressure	-	
7.	Odor	Explosion In surrounding area and residental area	Nuisance issue	Low	• The facility should be enclosed to limit exposure of potential odors if any • Continuous monitoring should take place • Plant trees as wink break along the production route	-	HSE Coordinator and group
Waste generation							
1.	Solid waste, liquid waste & hazardous waste	All operation areas	Contamination and sedimentation	Moderate adverse	• To segregate wastes into hazardous, recycle and general waste • To provide adequate toilet • Waste to store in appropriate container • Proper maintain of sewage system, monitor for potential contamination	1,000,000	HSE Coordinator and group

					from sewage • Control oil spill and leakage • Regular maintenance of machinery and vehicle • Do not throw waste to the water way • Construct good drainage with waste collection		
Biological Resources							
1.	Forest and biodiversity	Mine area and surrounding	Lost of forest, top soil and some remaining flora and fauna	Minor adverse	• To minimize vegetation clearance and water way changes • Great buffer area • To protect remain flora & fauna • Revegetate along the production route • Awareness to labor and villagers on environmental conservation, esp: to protect flora and fauna • Donate to wildlife sanctuary in Mandalay District • To follow fishery law and rules in catching of fish	2,000,000	HSE Coordinator and group

Table (9-2) Mitigation plan for decommissioning phase

Sr.	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
Environmental Aspect							
A.	Visual amenity	All decommissioning areas	Visual impact	Negligible	• Carry out activities following best practices • Refill back the land by sub soil and placed top soil on it • Regenerate with plants	-	HSE Coordinator and Team
B.	Air	All decommissioning areas	Dust and gaseous emission	Negligible	• To control burning of waste • To provide PPE • To draw clear decommissioning plan • To spray water on ground and on the temporary roads	2,000,000	HSE Coordinator and Team
C.	Noise/ Vibration	All decommissioning areas	Negative impact to workers and	Negligible	• To decommissioning at day time • Control of demolishing	200,000	HES Coordinator and Team

			public		buildings • To control speed of vehicles and machines • To provide PPE		
D.	Water resources	All decommissioning areas	Contamination and sedimentation of water	Moderate adverse	• Not dispose soil, liquid waste into water way • To use leak proof container for fuel, lubricants and chemicals • Properly fill up the waste pit with soil • To prevent soil erosion of water banks	300,000	HSE Coordinator and Team
Waste generation							
E.	Solid, liquid and hazardous waste	All decommissioning area	Contamination and sedimentation Water, soil, air	Minor adverse	• Tousle carry and store diesel and lubricant with caution • To keep separate waste bin for various waste • Not to dispose in the water way • To recycle, dispose,	2,000,000	HSE Coordinator and Team

					landfill if possible • Clean all the debris the area • To undertake rehabilitation works		
Biological Resources							
F.	Flora and fauna on terrestrial and aquatic ecosystem	All decommissioning area	Habitat loss and entrance of invasive species	Minor adverse	• To protect native, endangered flora or fauna • To control invasive species • To regenerate indigenous and fast-growing species • To control illegal hunting, fishing, tarping, burning and encroachment by educations rural people	3,000,000	HSE Coordinator and Team

9.2.2 Monitoring Plan for operation stage

The monitoring plans for operation and decommissioning stages are mentioned and table (9-3) and (9-4). In the table, the budget is also included. The plans are included with yearly budget estimates. If the budget is not sufficient to conduct activities the budget can be revised. The project proponent should recruit a Health, Safety and Environment (HSE) coordinator throughout the lifespan of the project. Revision of the EMP will be done.

Table (9-3) Monitoring plan for operation phase.

Sr.	Environmental concerns	Parameter	Time frame	Location	Estimated Cost (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	Twice a year	Project site	5,000,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise level dB(A), vibration level m/s^2	Twice a year	Project site	400,000	HSE Coordinator & Third Party
3.	Waste water	BOD, COD,Total Coliform,Oil grease,Total Nitrogen,PH Temperature	3 times a year	Stream water near site	300,000	HSE Coordinator & Third Party
4.	Soil erosion/ Landslide	Sediment collection from silt trap, silt ponds	Weekly during rain	Project site	2,500,000	HSE Coordinator
5.	Fire hazard	Visual inspection, fire extinguishers and regular check of combustible material	Monthly	Project site	1,000,000	HSE Coordinator

		Refer to fire production				
6.	Waste Generation	Visual Inspection	Weekly	Project Site	1,000,000	Supervisor
7.	Safety and Health	Number of types of safety equipment provided, Health & Sanitation facilities, signage, health service	Monthly	Project Site	2,000,000	HSE Coordinator
8.	Environmental auditing	Access the compliance to EMP, and other environmental policy, law, rules and regulation	Twice a year	Project Site	1,000,000	HSE Coordinator, related department, third party

Table (9-4) Monitoring plan for decommissioning stage

Sr.	Environmental concerns	Parameter	Time frame	Location	Estimated Cost (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 & NO_2	Twice a year	Project site	2,000,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise level dB(A), vibration level m/s^2	Twice a year	Project site	200,000	HSE Coordinator & Third Party
3.	Stream/ Well Water	pH, Color, Turbidity, Total suspended solid, Temperature	Once a year	Stream water near site	300,000	HSE Coordinator & Third Party
4.	Waste water	BOD, COD, Oil and grease, pH, Total Coliform bacteria, Total Nitrogen	-	-	-	HSE Coordinator & Third Party
5.	Soil erosion/ Landslide	Sediment collection from silt trap, silt ponds	Weekly during rainy season	Project site	1,500,000	HSE Coordinator & third party
6.	Fire hazard	Visual inspection, fire	Monthly	Project site	1,000,000	HSE Coordinator &

		extinguishers and regular check of combustible material Refer to fire production				group
7.	Safety and Health	Number of types of safety equipment provided, Health & Sanitation facilities in camps, signage, PPE, health care/service and facility	Monthly	Project Site	2,000,000	HSE Coordinator & group
8.	Environmental auditing	Access the compliance once with EMP, and other environmental policy, law, rules and regulation	Once a year	Project Site	1,000,000	HSE Coordinator, related department, third party
9.	Rehabilitation	Recovering the open cut mining areas and re-vegetation areas		All decommissioning area	3,000,000	HSE Coordinator & third party

9.3 Health and Safety Plan

This community health and safety plan is intended to implement during the operation phases of the project. It aims to provide a maximum safe and sound working environment for the workers on site. This can be placed in safe condition by adopting the following measures for prevention of accidents and hazards:

To provide PPE for the labor. The specification of product are-

1. Pure Gem, single use, disposable
2. Disposable face mask (N95 face mask)
3. Pro ear mask for operator
4. Safety glass, virtue CSS, ANSIZ87 Anti-Fog
5. Latex glove and boot
6. Helmet with ear cover

- The waste materials and unnecessary soil produced from quarry production are disposed of in low ground lands.
- The drainages are systematically made to become good water courses in roads within the workplace.
- To decrease accidents, the accidents with vehicles along the roads in quarry production are protected and managed. By limiting speed, place slowdown and signage.
- The flag staff and signage are made in vehicles and machines operating within the project's site.
- There has been a proper schedule for blasting operations which should be consistent without blast time changes. Alarm should be given before blasting.
- The precautions related with occupational health and safety environmental conservation and community health and safety caused by quarry production are needed to implement systematically.
- The instructions for health and safety related with quarry production are needed to follow:
- It is needed to provide appropriate first aid training to the workers and first aid facilities at the site.

Medical checkup is usually done before acceptance to labor & staff. Also, checkups for the staff and labor at least once a year, especially to prevent silicosis.

9.3.1 Community Health Care

Proponents shall contact the village and township health department as well as health complaints from communities. Proponents will make necessary health funds for communities as well as essential precaution measures will be done.

The proponent shall arrange at least one clinic in the camp or villages and provide medication. Medical checkup for the community epically disease (Respiratory) concern with unclean air quality and dust produced from mining.

To arrange prevention and cure of endemic diseases for communities shall be done by proponents. The proponent should organize with the concerned department / organization (During the covid19 infected period proponents donate hand soap, mark for communities. Also arrange for prevention Covid).

The proposal should be organized by the community and health department for regular vaccination of communicable diseases and vaccination for children.

The proponent shall try to get a village health clinic or organize other mine owners to donate to the village. Company will assist to get clear water and a green environment. According to the baseline survey.

9.3.2 Prevention of respiratory problems

The dust produced from mining activities has a chance to have respiratory problems for labor and people who stay near the mine areas.

(1) Use PPE by labor

(2) Wash hands with clean running water and soap

(3) Clean the noise and mouth with water

(4) Compress the dust in the processing plant, mine area and trucking roads.

(5) Taken regular medical checkup

(6) Do not smoke/ reduce smoking

(7) Do breathing exercises (Deep breathing)

(8) Eating fresh ginger, watermelon etc.

(9) Awareness and health education shall be done for labor and community

9.3.3 Accident rate

Only minor injury happened in the project. During the mine life there is no causality. Some traffic accidents occur only once or twice a year with minor injuries.

9.3.4 Health impacts and mitigation

The health problems occurred on two issues. One is impacted by the quarry production and one is the nature and insufficient health care systems for the community.

Impact	Mitigation	Budget
(1) Air quantity	1. Compress the dust by project proponent 2. To reduce emission of gas from machinery and trucks 3. To plant windbreak trees along the mine 4. Village shall plant the home boundary trees to collect dust and to get clean air.	2,000,000
(2) Clean water	- To provide clean water supply for community	500,000
(3) Traffic accident	- Road signage - Control of vehicle speed - Traffic safe education - To use safety helmet by community	200,000

(4) General Health	- To educate the people on health, health living - To educate mother and child on health care - To upgrade the village health facilities - To train the staff and community on basic health care and first aid. - Yearly sport competition for the villages shall be done	200,000

9.3.5 Action plan

1. Spraying water with water bowser on trucking road regularly to compress dust
2. Control truck speed to avoid accident, to reduce air emission
3. To provide clean water for the villages
4. Awareness training on health and environment
5. Medical checkup and vaccination shall be arranged
6. Organize for getting village Health Clinic
7. Yearly sport completion for community.

9.3.6 Occupational Environmental Health and Safety (OEHS) Plan

9.3.6.1 Objectives

To promote occupational health and safety and to protect workers and other people present at work places from work-related risk to their health, safety and well-being is one of the important factors in the implementation of the project.

9.3.6.2 Methodology and process

- Risk assessments have to be conducted to find out the risk in the workplace and surrounding.
- To put sensible measures in place to control them and make sure they stay controlled
- To control these risk factors.
- An appropriate safety manual will create for healthy environment for both employers and employees.

9.3.6.3 Possible Risk

- Accident in operation
- Accident in blasting/traffic
- Health (Lungs, respiratory, general illness, endemic disease etc.)
- Landslide
- Natural disaster

9.3.6.4 Work Plan

Community health and safety plan is intended to be implemented during the operation phase of the project; it aims to provide a maximum safe and sound working environment for the laborers on site. This can be placed in safe condition by adopting the following measures for prevention of accidents and hazards.

- To decrease accidents, accidents with vehicles along the road are protected and managed. The signage is made in the work area. The vehicle speed would be limited.
- The precautions related with occupational and community health and safety caused by plantation establishment and extraction are needed to implement systematically.
- Precaution must be done well in burning operation; prior announcement shall be done before burning.
- To provide PPE to the workers, and let them use it.
- To provide appropriate first aid training to workers and first aid facilities at the site.
- To provide more medical officers (MO) in the camps.
- To arrange for emergency, transport the patient to Hospital
- Awareness and health education will be conducted on projects and villages.
- Sufficient medicine instruments will be provided
- Precaution medicine should be provided to labor in free of change (FOC)
- Care and arrange to use clean water, clean toilets.

The main impacts and mitigation are presented in the following table.

Table (9-1) Impacts and Its Mitigation Plan For OEHS

Potential Impacts	Location	Mitigation Measure	Estimated Budget (MMK)	Responsible Party
Accident occurs during work	Project Site	- Demonstration before operation started - Use PPE properly - Check by supervisor for using PPE by staff and labor	2,000,000	HSE Officer Camp In charge and M.O
Noise		- Use PPE	1,000,000	HSE Officer Camp In charge and M.O
Accident by machinery and vehicles at site and along the transport routes	Project and transport route	- Control speed limit - Signage 'Safety' - Instruct and check machinery and		HSE Officer Camp In charge and M.O

		vehicle		
Natural disasters (Flood, landslide storm etc.)	Project Site	- Emergency preparedness plan will be developed, training and formation of committee/team	1,500,000	HSE Officer Camp In charge and M.O
Effect on hazardous material and Waste	Project Site	- To provide PPE and let then use - Follow the instruction	2,000,000	HSE Officer Camp In charge and M.O PTO
- Infectious disease (Influenza, Cough flu etc.) - Vector-Borne Disease (Malaria) - Water borne disease (Skin, diarrhea dysentery etc.) - MalNutrition - Heat stroke - Hypertension and others - Food poison	Workplace, camp and home	- Precaution, prevention and care - Health education will be done - Checked regularly the camps by Medical officer - Sufficient medicine and equipment, Instruments in site clinic - Provide mosquito net - Arrange to use clean water - Emergency plan for moving the patient to hospital - Medical checkup if needed - Clean camp, clean and sufficient toilet	35,000,000	HSE Officer Camp In charge and M.O PTO
		Total	**41,500,000**	

9.3.6.5 Risk, mitigation plans and budget for OEHS

Potential risk impact, mitigation and budget are shown in Table (9-1).

9.3.6.6 Monitoring

MO and camp in charge were recorded in the book about implementation and reported to HSE officers monthly. HSE Coordinator shall check countersigned and submit reports.

9.4 Waste Disposals

9.4.1 Types and Quantity

There are two main wastes produced from mining activities except from dust and gaseous. They are:

(a) Overburden

In open cut method the overburden is the major solid waste, which tip soil, sub soil and process of rock.

The burden was pile in the mine separated into top soil and pile in the mine separated into topsoil and subsoil and pieces of rock. The subsoil was fill back into the required dug area. The top soil has to be filled on top and replanted with the tree. The pieces of low-quality pieces of rock used for local construction and road construction as a donation by the mine.

Overburden

Replanted on overburden area

9.5 Oil spill response plan

Any oil spills, regardless of size must be contained and cleaned up in a safe and effective manner. Spills that can threaten public health or the environment will need to be attended immediately. In order to determine the proper response procedures, type of discharges can be classified into incidental and non incidental depending on the following characteristics:

Incidental discharges	Non-Incidental discharges
The discharge is small (e.g., less than 20 gallons)	The discharge is large enough to spread beyond the immediate area.
The discharge can be easily contained	The discharge cannot be contained
The discharge is unlikely to reach a	The discharge may reach a navigable

Incidental discharges	Non-Incidental discharges
Navigable waterway, storm sewer or sanitary drain	Waterway, storm sewer, or sanitary drain
Cleanup procedures do not pose a health or safety hazard	The discharge requires special equipment or training to clean up
Proper response equipment is available for a safe clean up	The discharge poses a hazard to human health or the environment

9.6 Firefighting

The fire hazards can occur from use of explosive materials near diesel storage tanks and also from surrounding local communities. But the potential fire hazards in the proposed project area are low. The procedures for firefighting are:

- Inspect fire extinguishers and combustible materials in every places;
- Give fire hazardous training to workers and the nearby communities; and
- Store sufficient water for fire fighting
- Provide accurate information and organize training sessions to prevent future spills.
- Demarcated meeting place if fire occurred.
- Emergency contacts should be displayed.
- Arrange a fire alarm system.

9.7 Landslide

The soil material and small rocks on a slipping surface can become heavy with rain water and slide down due to its increased weight. The mass of moving materials can cause damage to the people and vehicles.

1. Replant tree and soil protecting plants where they have been removed to prevent erosion;
2. The surface drainage is implemented to control the movement of landslides caused by rain water and
3. Retaining wall or fences can be built in order to stop or reduce land from slipping.

9.8 Mine closure plan

Objective

The objectives of mine closure plan is as follow

(1) Not to damage the human and animals.

(2) To return back to the good environment.

(3) Recital of biodiversity.

General Concept

(1) To remove the accidental matters

(2) To fill back the earth into the drilling and earth taking areas

(3) To control soil and water erosion

(4) To rehabilitate the forest land.

Mine closure programme

The process, activities to be undertaken for reclamation and rehabilitation in respect of the following.

(I) Mined out plan

At the end of the mining period the area will be disturbed in the form of pit, road, mill and waste materials. The life of mine may be 30 to 50 years. The proposed for reclamation or rehabilitation of mined out land with manner in which the actual site of the pit will be restored for future use.

(II) Waste, reject dump management

This waste will be utilized within the pit for lying of haul roads. At the end use, OB can be reutilized as a soil base for plantation.

The waste generated during the mining period is about 60,000 m^3.

(III) Top-Soil stack and its utilization.

The top soil excavated from the quarry will be dumped separately at a predetermined place and sub separately will be utilized in spreading over reclaimed area for plantation. Precaution will be taken to limit the height of topsoil dump to 1 to 2 meters in order to preserve fertility and shelf life. It will be protected from soil erosion and fertility by planting fodder grass and leguminous plants during temporary storage.

(IV) Use of abandoned unfilled (Partially filled) Road sides, Slopes and Mine

The reclaimed area may also be considered for plantation development green belt. Some abandoned pits will be used for water storage during the rainy season. This will be untitled for irrigation and help in recharging the groundwater.

(V) Afforestation Programme

Biological reclamation, ecological restoration for the mined area by plantation of the species as per the time schedule suggested

First six months - Herbs and Grass

Next six months - Shrub, Trees

Selection of species is based on High dust capturing, fast growth, soil holding capacity, ground recharge capacity and soil enriching capacity etc. More focus in the domestic plant species rather than exotics.

(VI) Post planting Care

Post planting care is most essential for the health of growth of plantation. This will comprise

(1) Replacement of casualties at the first opportunity it self

(2) Weeding and mulching 3 times in the first year and followed by two times in year two.

(3) Protection from grazing and fire.

(VII) Measures for minimizing adverse effect are water regime

The garland drain check dam will be built around the dump to channelize run off water through setting ponds.

(VIII) Climate-Management for Improvement

Prosed plantation will improve present climate conditions. This will be continuously monitored by environmental management cell (Local communities)

(XI) Management of Flora and fauna

Existing flora will be improved by the afforestation programme. Awareness should be given to avoid belling wild animals.

This programme will be supervised by HSE officers with the participation of the community.

9.9 Emergency Response and Preparedness Plan

The purpose of emergency planning is to minimize the effect of emergency that occurs at a proposed site, to protect the loss of lives and properties from emergency cases and to aware arising from the proposed project are can accidents, fire hazard, natural disasters to cause environmental and human damaging which disrupt of operation and wild elephant encroaching to cause environmental damage which disrupts of operations. Emergency prevention through will management operation, maintenance and inspection can reduce the probability of occurrence and consequential control the effect of such outcomes.

9.9.1 Purpose of plan

The purpose of plan is as follow:

- Provide guidelines for responding to and managing a variety of emergency situation
- Reduce loss of assets and business
- Protect the community and the public
- Ensure employees have the skill and abilities to act efficiently and effectively during emergency

9.9.2 Planning process

The steps for creating an effective emergency action plan.

Step 1. Assemble team

Step 2. Conduct Risk assessment

Step 3. Establish Performance Objectives

Step 4. Create a Policy

Step 5. Develop an onsite Emergency Team

Step 6. Offer training practice and Review emergency action plans.

9.9.3 Objective

To minimize the effect of emergency occurs at project site surroundings, to protect the loss of live and properties from emergency cases.

9.9.4 Possible risk

Possible risk in MSG's mine are follow:

(1) Fire

(2) Flooding

(3) Landslide

(4) Earthquake

(5) Lighting (Thunder storm)

(6) Storm

9.9.5 Develop of an onsite emergency team

Proponents must form the site emergency team and give the authority and responsibility to the team members.

The team consists of:

(1)	General Manager	-	Leader	
(2)	Mine Managers	-	Deputy leaders	
(3)	HSE Coordinator	-	Secretary	
(4)	Medical Officer	-	Joint secretary	
(5)	Security, Fire, Electrician	-	Member	(15) Members
(6)	Supervisor, Labor head, Village head	-	Member	

9.9.6 Responsibility of team

Leader - Responsible for preparedness preventing and emergency rescue management.

Deputy Leader	-	To assist the leader
Secretary	-	To assist the leader, Dy leader and coordination, reporting and recording.
HSE Coordinator	-	Responsible for not harming environments and working together with leaders.
Medical Officer	-	First aid and medical care and arrange for movement and transport the affected people.
Supervisor, Village head, Village administrator	-	To participate in the preparation and contingency process. Information announcements to the surrounding affected people.
	-	This team is responsible ad hoc. The management team is fully responsible for contributing finance and prompt decision.

9.9.7 Preparation Measures

Table (9-3) Mitigation and Contingency plan

Risk	Impact	Livelihood effect	Mitigation	Contingency Plan
Fire	Medium	Likely	Prepare a firefighting plan. Equip instruments and form firefighting groups	Develop EPR team/ faculties
Flooding	Low	Likely	Good drainage system, Emergency sandbags will be used to control water	Rescue plan (check call care)
Earthquake	Low	Likely	Elevation level	Health and mental care
Lightening	Low	Likely	Emergency plan	Re-habitation
Storm	High	Highly	Emergency plan	
Pandemic disease	Moderate	Likely	Health education, prevention and cure	

9.10 Training

Firefighting, first aid training will be arranged for the team member. Occasionally fire drill should be conducted.

Health education and awareness program will be conducted at village level.

9.11 Reporting

According to the Environmental Impact Assessment Procedure (2015), paragraph (108, 109) the proponent will report the monitoring reports in every six-month interval to the Environmental Conservation Department (ECD). The monitoring must be done according to the monitoring plan described in the EMP or periodically as prescribed by the Ministry.

This report shall include:

(a) Documentation of compliance with all conditions;

(b) Progress made to date on implementation of the EMP against the submitted implementation schedule;

(c) Difficulties encountered in implementation the EMP recommendations remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;

(d) Number and type of non-compliance with the EMP and proposed remedial measures and timeliness for completion of remediation;

(e) Accidents and accident relating to the occupational health and safety and the environment;

(f) Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

9.12 Grievance Mechanism

Grievance Mechanism are:

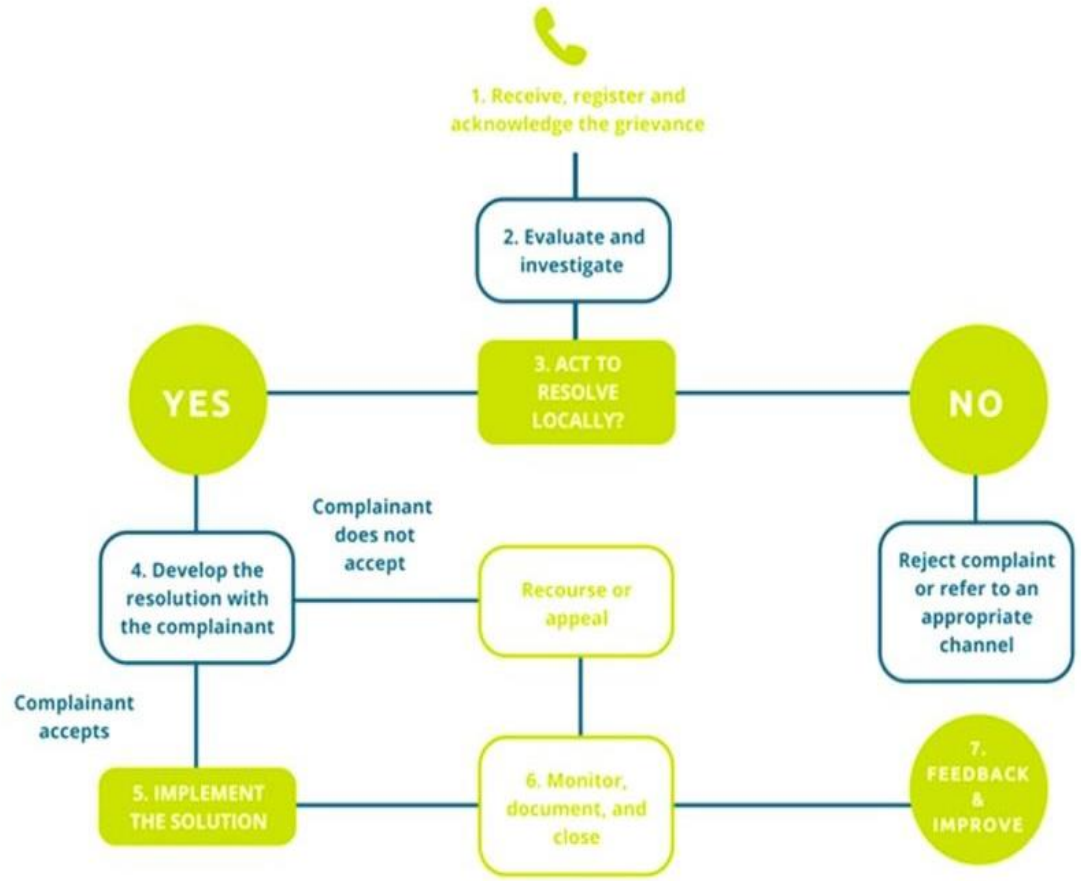
- To encourage human problem to be brought out
- To give opportunity to the workers to solve the problems
- To blow about the superior by Management
- To develop good culture
- To respect on environment and human aspect

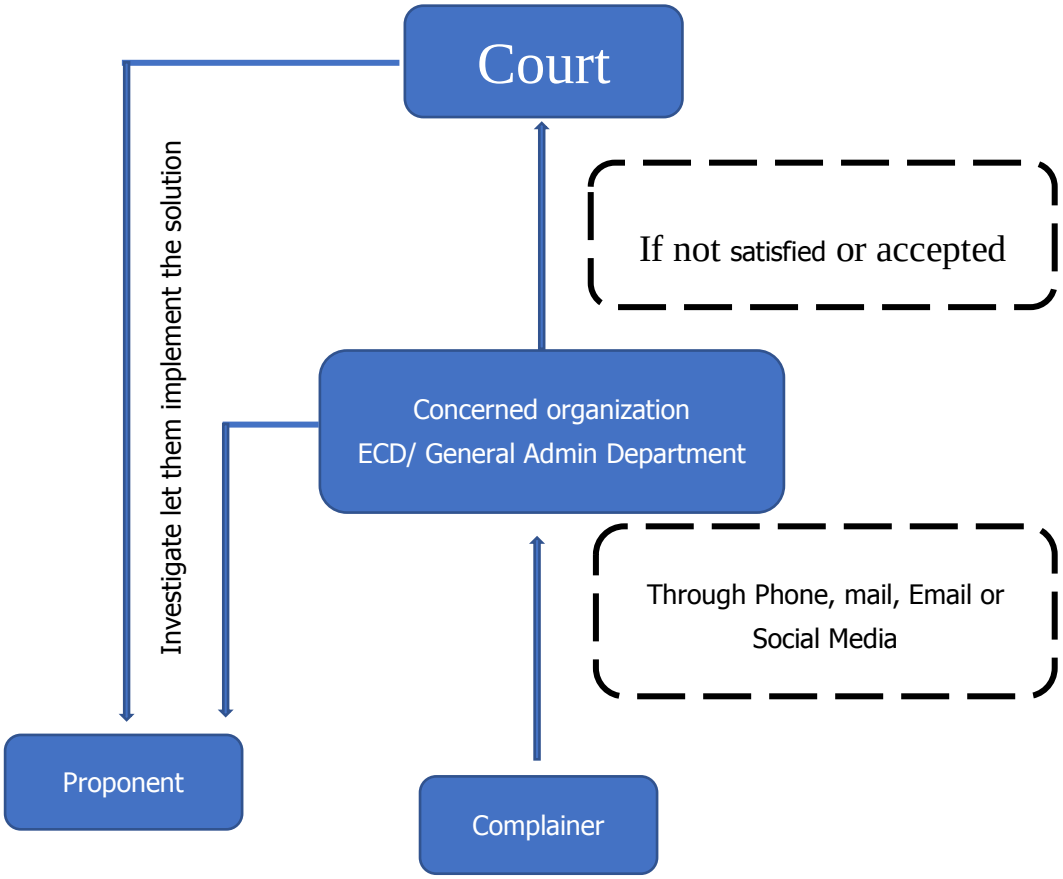
There are two types of grievance

(1) Internal
(2) External

The basic steps in a grievance procedure are shown in figure (9-1).

Figure (9-1) Basic Steps in Grievance Procedure





Address

1. Township/District/Regional Administrative office
2. Environmental Conservation Department, Dawei District, Tanintharyi Region
3. U Thant Zin Aye

   Ahlone tower,River View Garden Housing,Strand Road,Ahlone township, Yangon Region.

   Ph: 09255111966

Mail: thantzaye@shwetaungec.com

9.13 Information disclosure

Proponent has to upload this EIA report on their website no later than 15 days after the report is submitted. Also arrange report-copies in the project office and industrial management office for study by NGO, CSO and state holders. The response advice and comment will be recorded and responded back to the stake holder.

For the future regular announcements will be made to labor communities and stakeholders.

Chapter (10)

Commitment, Conclusion and Recommendation

10.1 Commitment

The proponent and third-party team have been given commitments in each chapter. The summary of commitments is:

Chapter	Commitment	Appendix
Proponent	- To abide laws, rules, acts, regulation and agreements mentioned in that chapter - To abide law, rules and regulation regards on transportation, storage and utilization of explosive materials - To establish ecosystem compensation plantation within two years. The area to be planted is 20 % of mine area - Proponents committed to contribute the budget estimated for environmental mitigation and monitoring. - If required more budget proponent agreed to provide the requirements	Appendix (V)
Chapter-8	- The data, facts and information mentioned in the report is true and prepared completely and precisely	Appendix (V)
Third Party Chapter-8	- Environmental study is made based on environmental law, rule and instruction. The third party practiced based on ethics. - Report was prepared without bias - The report is complete, précises	Appendix (W)

10.2 Recommendation

The following recommendation are made for effective and efficient implementation of the quarry operation activities

- To abide by Environmental Policy, Law, Rules and Regulations of Myanmar
- To efficiently implement Environmental Management Plan, Monitoring Plan, Mine close out plan and CSR.
- To keep full records of environmental management and report annually.

- To establish the tree, bamboo plant and ground cover for greening, wind break, erosion control and aesthetic purposes.
- The road maintenance and water spraying shall be done with the coordination by the village administrative committee.
- Care shall be taken for public health

Awareness of environmental conservation and climate change shall be given to labor and communities.

10.3 Conclusion

This project aims to produce quarry stones and chips for its own uses in infrastructure development projects. For ensuring minimum negative impacts to the environment due to the project, SDC has already committed to follow and undertake all the tasks and duties mentioned in EMP. The study team for this EIA is led by U Zaw Win of SEE-Trust, NWM(s)Co.,Ltd. (Reg: 0034).

The proponent group has great potential for helping environmental development and they are committed to Green Development and Global Sustainable Development.

REFERENCES

- Guide lines for Environmental Management Plan for Mining sector (2017) ECD
- International Finance Cooperation, 2007 Environmental, Health and Safety Guidelines for Mining, World Bank
- World Health Organization, 2010 guide lines for indoor air quality: selection pollutants regional office for Europe.
- Win Shwe 2012 Outline geology and economic mineral occurrence of the Union of Myanmar
- Environmental Science, A Global Concern (9th edition) William P Cunning ham.
- Assessment method, Turkish Environmental Law and Guide lines for Environmental Impact Assessment (IEMA, 2004)
- Environmental and Social Management System Implementation Hand Book IFC, World Bank.

Jan Feher * , Jozef Cambal, Blazej Pandula, Julian Kondela , Marian Sofranko , Tawfik Mudarri and Ivan Buchla(2021) "Research of the Technical Seismicity Due to Blasting Works in Quarries and Their Impact on the Environment and Population"

U.S. Army Map Service, 1955-

NF47-9 Mandalay https://maps.lib.utexas.edu/maps/ams/burma/txu-oclc-6924198-nf47-9.jpg and NF47-5 Maymyo https://maps.lib.utexas.edu/maps/ams/burma/txu-oclc-6924198-nf47-5.jpg

Santi Pailoplee et. al (2013) Seismic hazard analysis for Myanmar**,** https://www.researchgate.net/publication/263913403_Seismic_hazard_analysis_for_Myanma

Myanmar Times (March, 2015) Expert-highlights-Thanlwin-dam-earthquake-risk

Li Ma,et. al(3August, 2016) Research on Effects of Blast Casting Vibration and Vibration Absorption of Presplitting Blasting in Open Cast Mine https://doi.org/10.1155/2016/4091732

Steven Sayers (May 17, 2020) "Revolutionary Low Impact Rock Breaking Technology" https://www.angloamerican.com/futuresmart/stories/our-industry/mining-explained/mining-terms-explained-a-to-z/open-pit-mining-definition

Myanmar Center for Responsible Business -MCRB, 23 May 2018 Main Laws Applicable to the Mining Sector in Myanmar (https://www.myanmar-responsiblebusiness.org/pdf/SWIA/Mining/Main-Myanmar-E_and_S-Laws-Mining-Sector.pdf)

DTE Staff (30 October 2019) How technology can help in capturing carbon (https://www.downtoearth.org.in/news/climate-change/how-technology-can-help-in-capturing-carbon-67501)

Vikaspedia (India Development Gateway (InDG)) "Rain water harvesting techniques to augment ground water" https://vikaspedia.in/energy/environment/rainwater-harvesting-1/rain-water-harvesting-techniques-to-augment-ground-water#section2

Giuseppe Gambolati(2021) Land Subsidence and its Mitigation

The Complete Guide to Permeable Paving Systems

Exit Strategy, Hand-over and Decommissioning of Infrastructure https://www.emersan-compendium.org/en/x-cutting-issues/xcuttingissue/exit-strategy-hand-over-and-decommissioning-of-infrastructure

Ann M. Johnson, P.E. (2008)Best Practices Handbook for Roadside Vegetation Management

Shuguang Wanga), Yan Xub), Zhaofeng Lin, Jishi Zhang, Namkha Norbu, Wei Liu (2017)"The Harm of Petroleum-Polluted Soil and its Remediation Research"

Fault segmentation and active tectonic criteria of the Shan Scarp Fault Zone, Shan Plateau Region, Myanmar

Edine Bakker*, Gorazd Žibret and Jenny Rainbird (2020) Viable Alternative Mine Operating System -VAMOS Sustainable Underwater Mining Solution

https://scholar.googleusercontent.com/scholar?q=cache:IQtw_lDd8tcJ:scholar.google.com/+impact+of+underwater+mining&hl=en&as_sdt=0,5

Charles R. GruelEdgardo M. Latrubesse (2021)"A Monitoring System of Sand Mining in Large Rivers and Its Application to the Ayeyarwady (Irrawaddy) River, Myanmar " Hatim Dellero (2013) Hazard in an Old Abandoned Aggregate Quarry in the City of Tétouan, Morocco https://www.scirp.org/journal/articles.aspx?searchcode=Hatim+Dellero&searchfield=authors&page=1&skid=0 Rockfall

GEO REPORT No. 260, Halcrow China Limited(2011) "Study On Methods And Supervision Of Rock Breaking Operations And Provision Of Temporary Protective Barriers And Associated Measures"

The 2014 Myanmar Population and Housing Census
Department of Population, Ministry of Labour, Immigration and Population, October 2017 "Mandalay Region, Mandalay District, Patheingyi Township Report"
https://themimu.info/sites/themimu.info/files/documents/TspProfiles_Census_Patheingyi_2014_ENG.pdf

Earth resources, Environmental guidelines Ground vibration and air blast limits for mines and quarries https://earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/ground-vibration-and-airblast-limits.

Shwe Taung Company Registration

Appendix (A)

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

Certificate of Incorporation

ရွှေတောင်ဖွံ့ဖြိုး တိုးတက်မှု ကုမ္ပဏီ လီမိတက်

SHWE TAUNG DEVELOPMENT COMPANY LIMITED

Company Registration No. 177086320

မြန်မာနိုင်ငံကုမ္ပဏီများအက်ဥပဒေ ၁၉၁၄ ခုနှစ် အရ

ရွှေတောင်ဖွံ့ဖြိုး တိုးတက်မှု ကုမ္ပဏီ လီမိတက်

အား ၂၀၀၇ ခုနှစ် သြဂုတ်လ ၃ ရက်နေ့တွင်

အစုရှယ်ယာအားဖြင့် တာဝန်ကန့်သတ်ထား သည့် အများနှင့်မသက်ဆိုင်သောကုမ္ပဏီ

အဖြစ် ဖွဲ့စည်းမှတ်ပုံတင်ခွင့် ပြုလိုက်သည်။

This is to certify that

SHWE TAUNG DEVELOPMENT COMPANY LIMITED

was incorporated under the Myanmar Companies Act 1914 on 3 August 2007 as a Private Company Limited by Shares.

ကုမ္ပဏီမှတ်ပုံတင်အရာရှိ

Registrar of Companies

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

Directorate of Investment and Company Administration

Former Registration No. 263/2007-2008

Director List

Appendix (B)

ကုမ္ပဏီနှင့်သက်ဆိုင်သည့်အချက်အလက်များ

(က) အုပ်ချုပ်မှုဒါရိုက်တာအမည်၊ ဦးအောင်ဇော်နိုင် ......၁၂/လမတ(နိုင်)၀၂၅၇၅၈

(ခ) ကုမ္ပဏီ ရုံးခန်းလိပ်စာ၊ အလုံတာဝါ၊မြစ်ကမ်းသာအိမ်ယာ၊ကမ်းနားလမ်း၊ .... အလုံမြို့နယ်၊ ရန်ကုန်မြို့။ ....

(ဂ) ဆက်သွယ်ရန် ဖုန်းနံပါတ်၊ ၀၁-၂၂၇၇၀၅၊ ၂၁၂၃၂၆၊ ၂၂၄၇၈၇..........

(ဃ) ဒါရိုက်တာများ အမည်စာရင်း–..

၁။ ဒေါ်သန်းဝင်း (ဥက္ကဋ္ဌ)
၁၂/လမတ(ဧည့်)၀၀၀၀၄၇

၂။ ဦးရဲမြင့်
၁၂/တမန(နိုင်)၀၇၃၉၉၇

၃။ ဒေါ်စန္ဒာထွန်း
၁၂/လမတ(နိုင်)၀၀၀၀၆၃

၄။ ဦးဝင်းဋ္ဌေး(ခ)စောစွီတွမ်
၁၂/တမန(နိုင်)၀၇၀၄၀၆

၅။ ဦးအောင်သန်း
၁၂/ပဇတ(နိုင်)၀၂၂၇၅၀

၆။ ဦးထွန်းအောင်စန်း
၁၀/မလမ(နိုင်)၁၀၉၈၇၂

၇။ ဦးဟန်သိန်းလွင်
၁၂/လမတ(နိုင်)၀၀၀၇၈၃

၈။ ဦးချမ်းမြ
၉/မနမ(နိုင်)၀၁၂၄၀၃

၉။ ဦးမျိုးနောင်
၁၃/တကန(နိုင်)၁၅၀၉၂

မှတ်ချက်။ (၁) ဤကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်သည်မှတ်ပုံတင်ရက်စွဲ(၃-၈-၂၀၁၄)မှ (၂-၈-၂၀၁၉)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 ပြည်ထောင်စုဝန်ကြီးဌာန၏ တည်ဆဲဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်း များနှင့်အညီ ခွင့်ပြုချက် ရရှိမှသာ ဆောင်ရွက်ခွင့် ရှိမည် ဖြစ်ပါသည်။

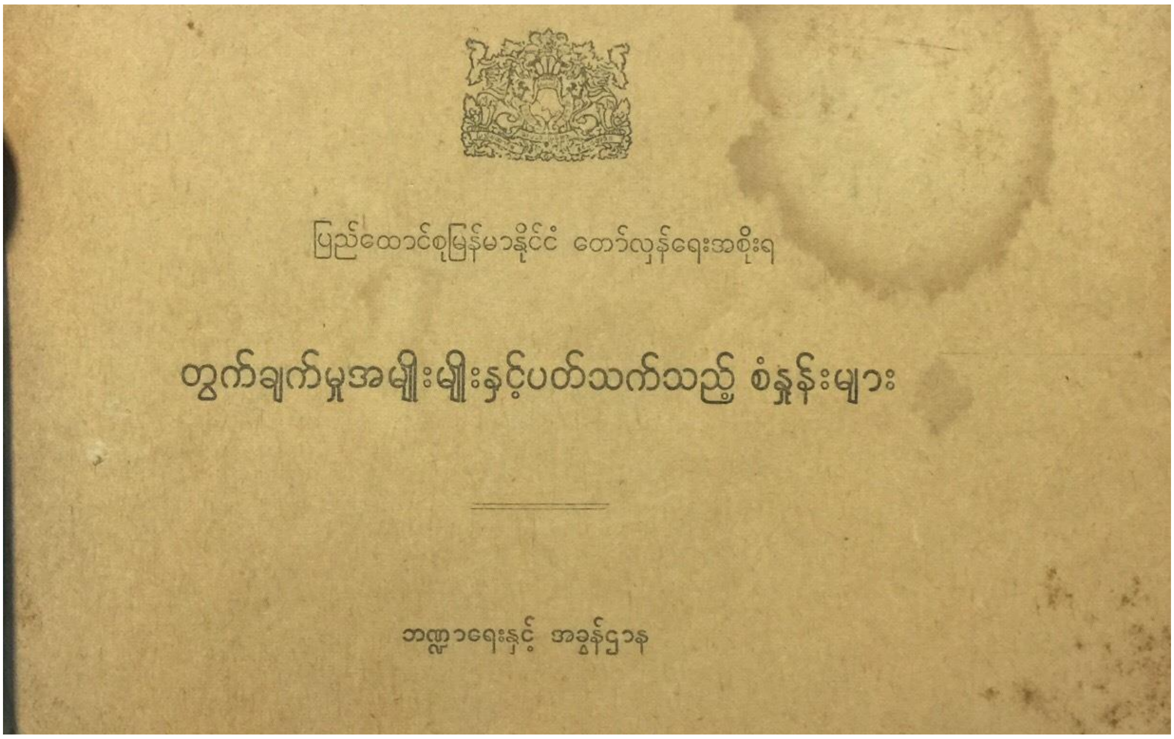
(၄) လုပ်ငန်းရည်ရွယ်ချက် ပြောင်းလဲ လုပ်ကိုင်လိုပါက ပြောင်းလဲ လုပ်ကိုင်လိုသည့် လုပ်ငန်း ရည်ရွယ်ချက်များအား သင်းဖွဲ့မှတ်တမ်းတွင် ပြင်ဆင်မှတ်ပုံတင်ရန်အတွက် ဒါရိုက်တာအဖွဲ့(BOD)၏ အထူး အစည်းအဝေး ဆုံးဖြတ်ချက် မှတ်တမ်းနှင့်အတူ ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများ ညွှန်ကြားမှု ဦးစီးဌာန သို့ လျှောက်ထား ရမည် ။

ညွှန်ကြားရေးမှူးချုပ် (ကိုယ်စား)
(မော်မော်စိုး၊ လက်ထောက်ညွှန်ကြားရေးမှူး)

လာရောက်ထုတ်ယူသည့်ရက်စွဲ၊

Appendix (C)

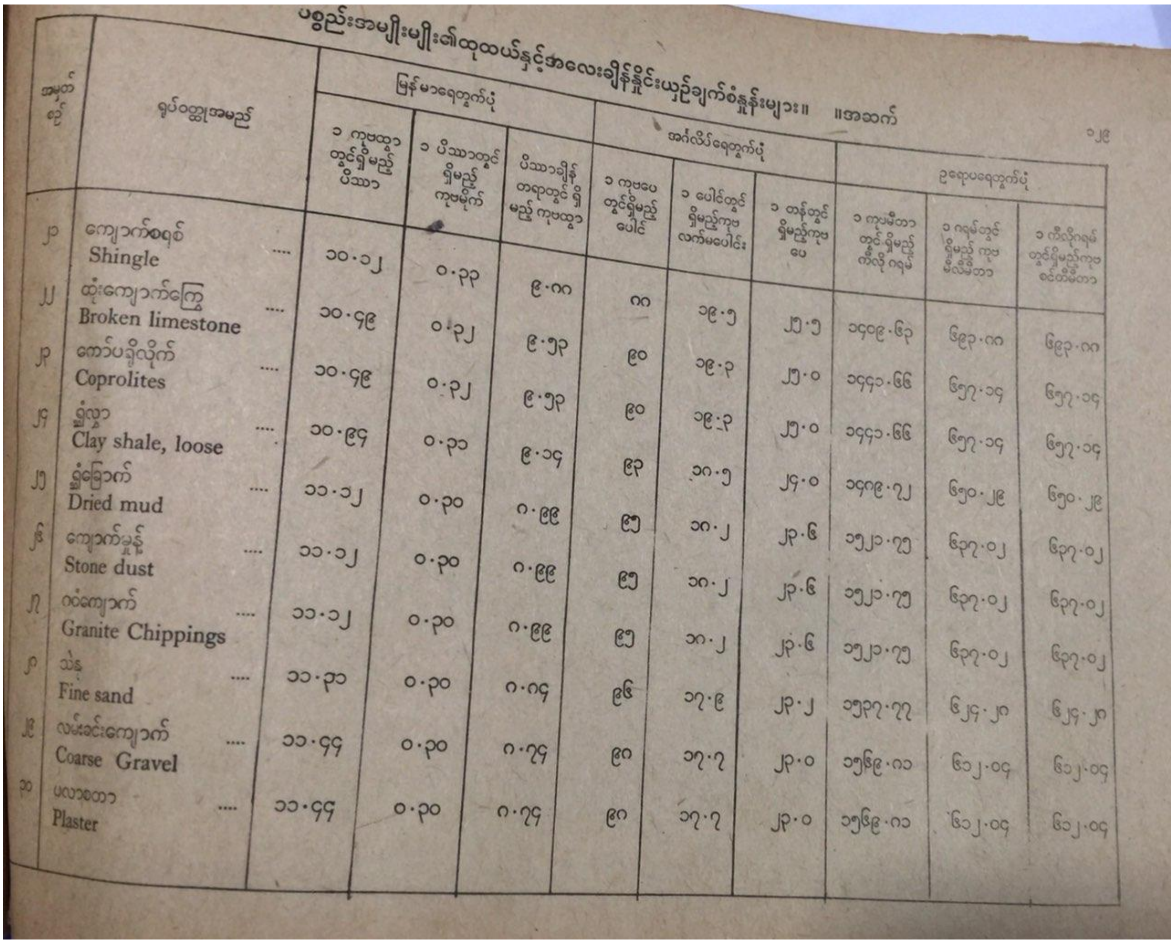
Sub to Ton



ပြည်ထောင်စုမြန်မာနိုင်ငံ တော်လှန်ရေးအစိုးရ

တွက်ချက်မှုအမျိုးမျိုးနှင့်ပတ်သက်သည့် စံနှုန်းများ

ဘဏ္ဍာရေးနှင့် အခွန်ဌာန



ပစ္စည်းအမျိုးမျိုး၏ထုထယ်နှင့်အလေးချိန်နှိုင်းယှဉ်ချက်စံနှုန်းများ။ ။အဆက် ၁၂၉

အမှတ်စဉ်	ရုပ်ဝတ္ထုအမည်	မြန်မာရေတွက်ပုံ			အင်္ဂလိပ်ရေတွက်ပုံ			ဥရောပရေတွက်ပုံ		
		၁ ကုဗထွာတွင်ရှိမည့် ပိဿာ	၁ ပိဿာတွင် ရှိမည့် ကုဗမိုက်	ပိဿာချိန် တရာတွင် ရှိမည့် ကုဗထွာ	၁ ကုဗပေ တွင်ရှိမည့် ပေါင်	၁ ပေါင်တွင် ရှိမည့်ကုဗ လက်မပေါင်း	၁ တန်တွင် ရှိမည့်ကုဗ ပေ	၁ ကုဗမီတာ တွင်ရှိမည့် ကီလိုဂရမ်	၁ ဂရမ်တွင် ရှိမည့် ကုဗ မီလီမီတာ	၁ ကီလိုဂရမ် တွင်ရှိမည့်ကုဗ စင်တီမီတာ
၂၁	ကျောက်စရစ် Shingle	၁၀·၁၂	၀·၃၃	၉·၈၈	၈၈	၁၉·၅	၂၅·၅	၁၄၀၉·၆၃	၆၉၃·၈၈	၆၉၃·၈၈
၂၂	ထုံးကျောက်ကြေ Broken limestone	၁၀·၄၉	၀·၃၂	၉·၅၃	၉၀	၁၉·၃	၂၅·၀	၁၄၄၁·၆၆	၆၅၇·၁၄	၆၅၇·၁၄
၂၃	ကော်ပရိုလိုက် Coprolites	၁၀·၄၉	၀·၃၂	၉·၅၃	၉၀	၁၉·၃	၂၅·၀	၁၄၄၁·၆၆	၆၅၇·၁၄	၆၅၇·၁၄
၂၄	ရွံ့လွှာ Clay shale, loose	၁၀·၉၄	၀·၃၀	၉·၁၄	၉၃	၁၈·၅	၂၄·၀	၁၄၀၉·၇၂	၆၅၀·၂၉	၆၅၀·၂၉
၂၅	ရွံ့ခြောက် Dried mud	၁၁·၁၂	၀·၃၀	၈·၉၉	၉၅	၁၈·၂	၂၃·၆	၁၅၂၀·၇၅	၆၃၇·၀၂	၆၃၇·၀၂
၂၆	ကျောက်မှုန့် Stone dust	၁၁·၁၂	၀·၃၀	၈·၉၉	၉၅	၁၈·၂	၂၃·၆	၁၅၂၀·၇၅	၆၃၇·၀၂	၆၃၇·၀၂
၂၇	ဝဝံကျောက် Granite Chippings	၁၁·၁၂	၀·၃၀	၈·၉၉	၉၅	၁၈·၂	၂၃·၆	၁၅၂၀·၇၅	၆၃၇·၀၂	၆၃၇·၀၂
၂၈	သဲနု Fine sand	၁၁·၃၀	၀·၃၀	၈·၈၄	၉၆	၁၇·၉	၂၃·၂	၁၅၃၇·၇၇	၆၂၄·၂၀	၆၂၄·၂၀
၂၉	လုံးခဲကျောက် Coarse Gravel	၁၁·၄၄	၀·၃၀	၈·၇၄	၉၀	၁၇·၇	၂၃·၀	၁၅၆၉·၈၁	၆၁၂·၀၄	၆၁၂·၀၄
၃၀	ပလာစတာ Plaster	၁၁·၄၄	၀·၃၀	၈·၇၄	၉၀	၁၇·၇	၂၃·၀	၁၅၆၉·၈၁	၆၁၂·၀၄	၆၁၂·၀၄

Third Party Registration

Appendix (D)

REPUBLIC OF THE UNION OF MYANMAR
Ministry of Natural Resources and Environmental Conservation
CERTIFICATE FOR TRANSITIONAL CONSULTANT REGISTRATION
(ကြားကာလအကြံပေးလုပ်ကိုင်သူမှတ်ပုံတင်ခြင်းအထောက်အထားလက်မှတ်)

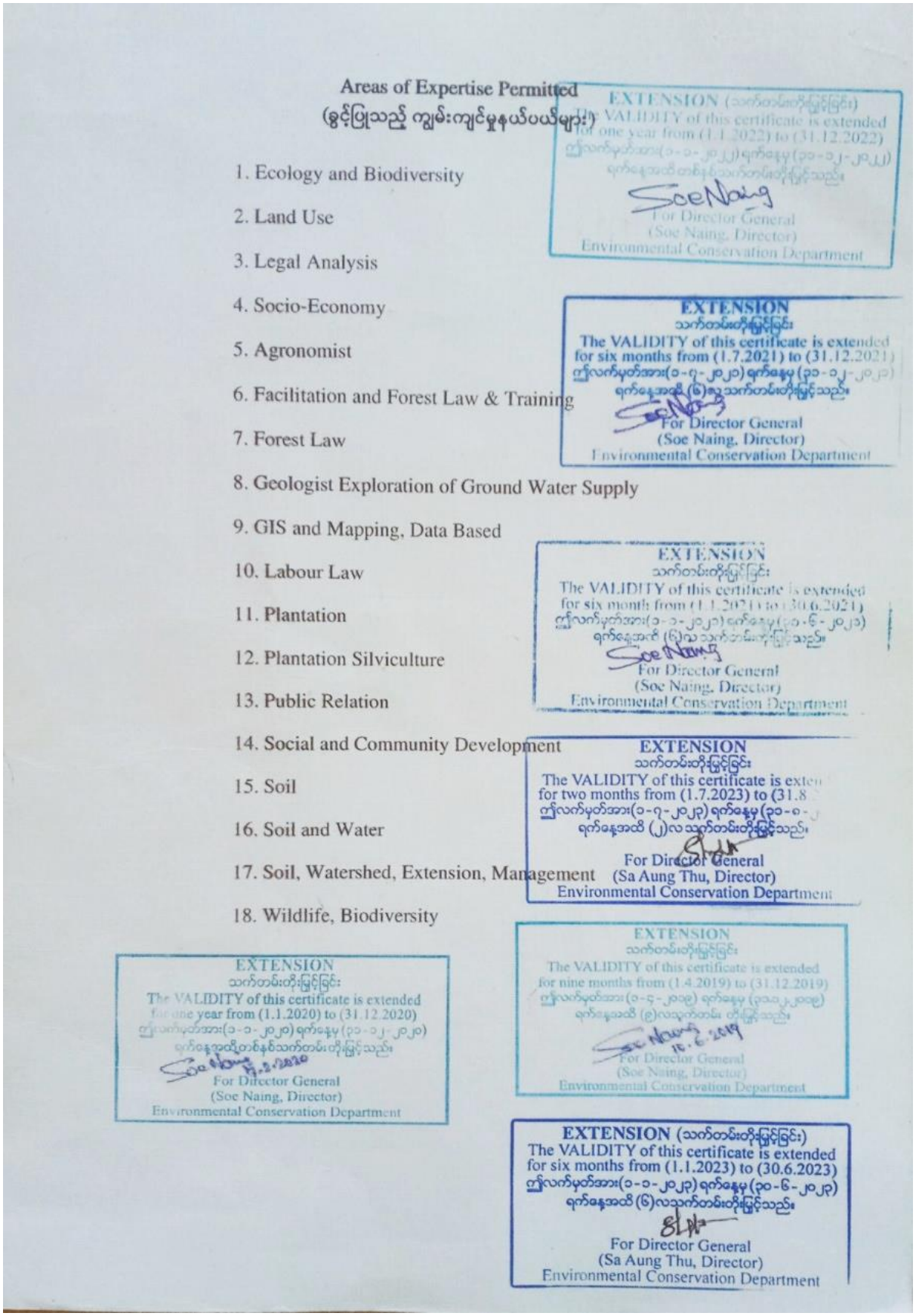
No. 0034 Date

The Ministry of Natural Resources and Environmental Conservation, hereby, issues this certificate to the organization under Environmental Impact Assessment Procedure, Notification No. 616/2015.
(ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း၊ အမိန့်ကြော်ငြာစာအမှတ်၊ ၅၁၆/၂၀၁၅ အရ သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာနသည် ဤအထောက်အထားလက်မှတ်ကို အဖွဲ့အစည်းအား ထုတ်ပေးလိုက်သည်။)

(a)	Name of Organization (အဖွဲ့အစည်းအမည်)	Nay Wun Myat (S) Co., Ltd. (SEE-TRUST)
(b)	Name of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏အမည်)	U Zaw Win
(c)	Citizenship of the representative in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏နိုင်ငံသား)	Myanmar
(d)	Identity Card /Passport Number of the representative person in the organization (အဖွဲ့အစည်းကိုယ်စားလှယ်၏ မှတ်ပုံတင်/ နိုင်ငံကူးလက်မှတ် အမှတ်)	1/ Ba Ma Na (Naing) 035861
(e)	Address of organization (ဆက်သွယ်ရန်လိပ်စာ)	No. 42, Pyin Nyar Tazaung St, Quarter (43), North Dagon, Yangon. naywunmyat1@gmail.com, 09 5063446
(f)	Type of Consultancy (အကြံပေးလုပ်ကိုင်မှုအမျိုးအစား)	Organization
(g)	Duration of validity (သက်တမ်းကုန်ဆုံးရက်)	31 March 2018

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for one year from (1.4.2018) to (31.3.2019)
ဤလက်မှတ်အား (၀၁-၀၄-၂၀၁၈) ရက်နေ့မှ (၃၁-၃-၂၀၁၉) ရက်နေ့အထိ တစ်နှစ်သက်တမ်း တိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

Director General
Environmental Conservation Department
Ministry of Natural Resources and Environmental Conservation



Areas of Expertise Permitted
(ခွင့်ပြုသည့် ကျွမ်းကျင်မှုနယ်ပယ်များ)

1. Ecology and Biodiversity
2. Land Use
3. Legal Analysis
4. Socio-Economy
5. Agronomist
6. Facilitation and Forest Law & Training
7. Forest Law
8. Geologist Exploration of Ground Water Supply
9. GIS and Mapping, Data Based
10. Labour Law
11. Plantation
12. Plantation Silviculture
13. Public Relation
14. Social and Community Development
15. Soil
16. Soil and Water
17. Soil, Watershed, Extension, Management
18. Wildlife, Biodiversity

EXTENSION (သက်တမ်းတိုးမြှင့်ခြင်း)
The VALIDITY of this certificate is extended for one year from (1.1.2022) to (31.12.2022)
ဤလက်မှတ်အား(၁-၁-၂၀၂၂)ရက်နေ့မှ (၃၁-၁၂-၂၀၂၂) ရက်နေ့အထိ တစ်နှစ်သက်တမ်းတိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for six months from (1.7.2021) to (31.12.2021)
ဤလက်မှတ်အား(၁-၇-၂၀၂၁)ရက်နေ့မှ (၃၁-၁၂-၂၀၂၁) ရက်နေ့အထိ (၆)လသက်တမ်းတိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for six month from (1.1.2021) to (30.6.2021)
ဤလက်မှတ်အား(၁-၁-၂၀၂၁)ရက်နေ့မှ (၃၀-၆-၂၀၂၁) ရက်နေ့အထိ (၆)လ သက်တမ်းတိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for two months from (1.7.2023) to (31.8
ဤလက်မှတ်အား(၁-၇-၂၀၂၃) ရက်နေ့မှ (၃၁-၈-
ရက်နေ့အထိ (၂)လ သက်တမ်းတိုးမြှင့်သည်။
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for one year from (1.1.2020) to (31.12.2020)
ဤလက်မှတ်အား(၁-၁-၂၀၂၀) ရက်နေ့မှ (၃၁-၁၂-၂၀၂၀) ရက်နေ့အထိ တစ်နှစ်သက်တမ်းတိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION
သက်တမ်းတိုးမြှင့်ခြင်း
The VALIDITY of this certificate is extended for nine months from (1.4.2019) to (31.12.2019)
ဤလက်မှတ်အား(၁-၄-၂၀၁၉) ရက်နေ့မှ (၃၁-၁၂-၂၀၁၉) ရက်နေ့အထိ (၉)လသက်တမ်း တိုးမြှင့်သည်။
For Director General
(Soe Naing, Director)
Environmental Conservation Department

EXTENSION (သက်တမ်းတိုးမြှင့်ခြင်း)
The VALIDITY of this certificate is extended for six months from (1.1.2023) to (30.6.2023)
ဤလက်မှတ်အား(၁-၁-၂၀၂၃) ရက်နေ့မှ (၃၀-၆-၂၀၂၃) ရက်နေ့အထိ (၆)လသက်တမ်းတိုးမြှင့်သည်။
For Director General
(Sa Aung Thu, Director)
Environmental Conservation Department

Proponent's Commitment letter

Appendix (E)

SHWE TAUNG

Shwe Taung Development Co., Ltd.
Ahlone Tower, Strand Road,
River View Garden Housing,
Ahlone Township, 11121
Yangon, Myanmar.

T +95 1 2314567, 2316643
+95 1 2316198, 2316741
F +95 1 2316044, 2316120
E info@shwetaunggroup.com

To

Director General

Environmental Conservation Department

Ministry of natural resource and environmental conservator

Date: 2022 Aug, (22)

Subject – Commitment letter

With regard to the above matter, we Shwe Taung Co.,Ltd has established to operate garment production process. Our company would like to make commitment on the following matters:

(a) This environmental management study of report and plan has been conducted precisely and completely by cooperation between SDC and the third party followed and based on concern laws, rules and regulation.

(b) We, proponent will following the mitigation measures and monitoring plan stated in EMP.

(c) We will follow the all committed mentioned in the report.

(d) We will contribute the budget drain in the EMP, if not sufficient to conduct extra budget will be contributed.

(e) At the mine close down (decommissioning phase) we will make sure for least impact on social and environments. Finally, we strongly commit that all our operation will be performed in environmental friendly manner.

Sincerely

(Zaw Min Oo)
Aggregate Production Head (I E&C)
Shwe Taung Development Co., Ltd.
The proponent
(For and on behalf of Shaw Taung Development)

Inspiring Lives. Sustaining Progress. **shwetaunggroup.com**

Third Party's Commitment letter

Appendix (F)

SEE - Trust, EIA Service
NAY WUN MYAT's CO., LTD.
No.282,Seventh street (North) East Gyogone,Insein Township,Yagon Myanmar
Tel/Fax : 01 8010442 , Mobile : 09 5162889 , Email : naywunmyat1@gmail.com, Website-www.naywunmyat.com

Letter No: 052 / ST / 22

Date: 2022 Aug, (22)

To whom it may concern

Subject: **Commitment for preliminary assessment and scoping report**

Regarding on the above subject, we (see Trust), Naywunmyat(s) Co would like to make commitments as follow:

(1) We have done the assessment by using our team knowledge and done completely and precisely.

(2) We have stand on the third party position and done with the good ethic.

(3) We have studied and prepared this report based on Environmental Law Rules and Regulation, Procedures and concern laws of Myanmar as well as International guiding standards.

Regards

ZAW WIN
MANAGING DIRECTOR
SEE-Trust, Naywunmyat(s) Co., Ltd.

Third party team

Reg: no – 0034

Appendix (G)

Approval to conduct EIA From Shwe Taung Co

SHWE TAUNG

Shwe Taung Development Co., Ltd.
Ahlone Tower, Strand Road,
River View Garden Housing,
Ahlone Township, 11121
Yangon, Myanmar.

T +95 1 2314567, 2316643
+95 1 2316198, 2316741
F +95 1 2316044, 2316120
E info@shwetaunggroup.com

သို့

ညွှန်ကြားရေးမှူးချုပ်
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
နေပြည်တော်။

စာအမှတ် ။ ။ STE/DC/COO(BS)/010/2019(HO)
ရက်စွဲ ။ ။ ၂၀၁၉ ခုနှစ်၊ စက်တင်ဘာလ (   )ရက်။

အကြောင်းအရာ ။ ။ <u>ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (Environmental Impact Assessment) ဆောင်ရွက်ရန် တတိယအကြံပေးအဖွဲ့အား အတည်ပြုနိုင်ပါရန် တင်ပြခြင်း။</u>

ရည်ညွှန်းချက် ။ ။ (၁) ရွှေတောင်ဖွံ့ဖြိုးတိုးတက်မှုကုမ္ပဏီလီမိတက်၏ (၁၂-၈-၂၀၁၉)ရက်စွဲပါ စာအမှတ် - 33/See Trust/2019

(၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ မန္တလေးတိုင်းဒေသကြီး၊ ညွှန်ကြားရေးမှူး ရုံး၏ (၁၇-၉-၂၀၁၉) ရက်စွဲပါစာအမှတ် - ၂/၆/၇ အီးအိုင်အေ (၃၆၀/ ၂၀၁၉)

၁။ ရွှေတောင်ဖွံ့ဖြိုးတိုးတက်မှုကုမ္ပဏီလီမိတက်သည် မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးခရိုင်၊ ပုသိမ်ကြီးမြို့နယ်၊ (၅၅၅-က) ချင်းကုန်းရေမအတွက် (၂၃) တွင် ဆောင်ရွက်မည့် ဆောက်လုပ်ရေးလုပ်ငန်း သုံးကျောက် (လမ်းခင်းကျောက်) ထုတ်လုပ်ငန်း၏ လုပ်ငန်းအဆိုပြုလွှာ တင်ပြရာ ရည်ညွှန်းချက်ပါစာ (၂)ဖြင့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) ဆောင်ရွက်ရန် ညွှန်ကြားလာပါသည်။

၂။ ယင်းလုပ်ငန်းကို ဆောင်ရွက်ရန် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနတွင် တတိယ အကြံပေး အဖွဲ့အဖြစ် မှတ်ပုံတင်ထားသည့် See Trust Environmental Service, Naywunmyat(s) Co., အား ရွေးချယ်ထားပါသည်။ (မှတ်ပုံတင်အမှတ် - 0034)

၃။ သို့ဖြစ်ပါ၍ အဆိုပါအဖွဲ့အား စိစစ်အတည်ပြုနိုင်ပါရန် အောက်ပါအထောက်အထားများနှင့်အတူ တင်ပြအပ်ပါသည်။

(၁) Submission Form
(၂) Third Party Registraion
(၃) ပါဝင်ဆောင်ရွက်မည့် ပညာရှင်စာရင်း

လေးစားစွာဖြင့်

ရွှေတောင်ဖွံ့ဖြိုးတိုးတက်မှုကုမ္ပဏီလီမိတက်

ဒုတိယညွှန်ကြားရေးမှူးချုပ် (PC/EIA)

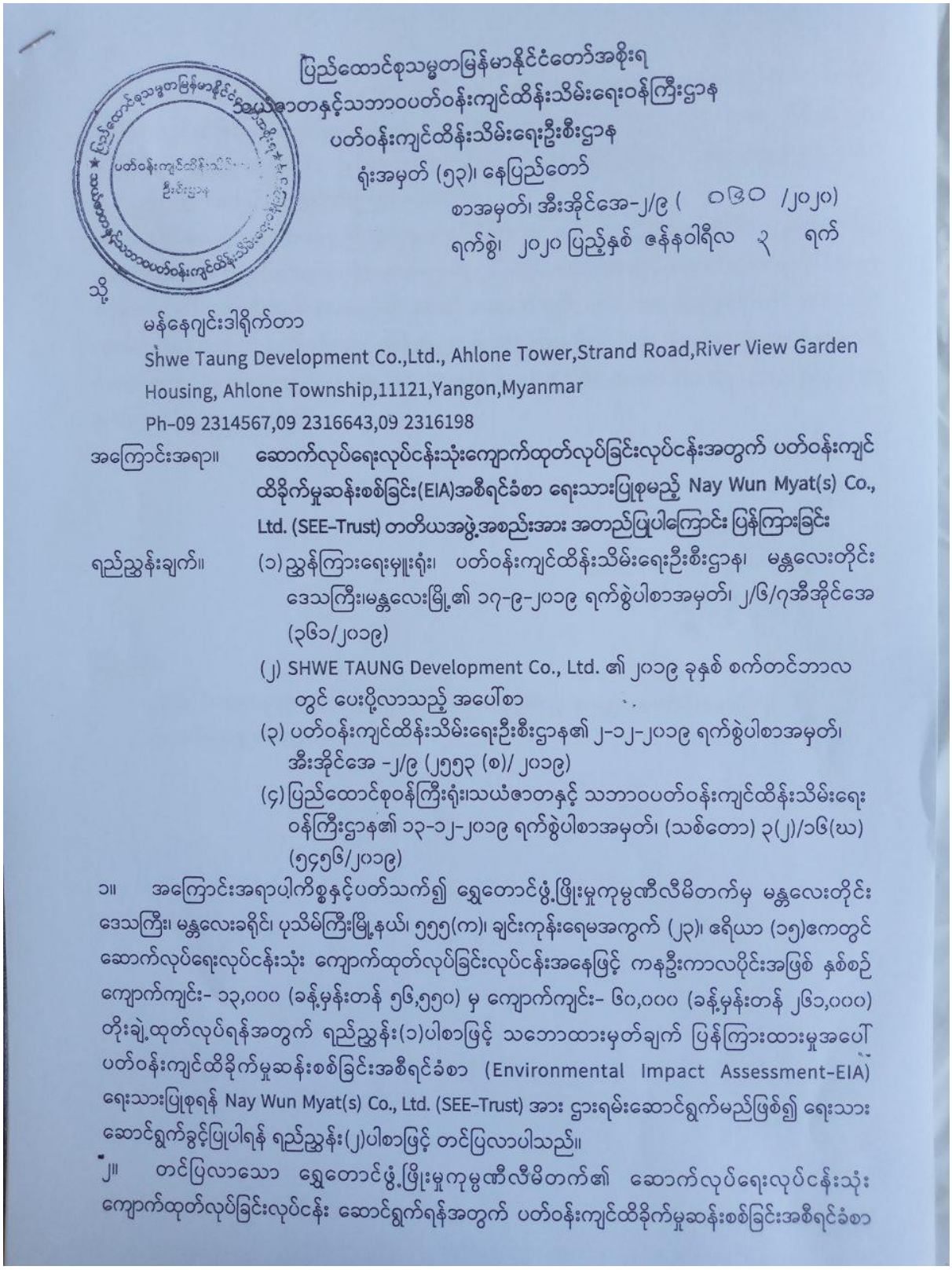
မိတ္တူကို
- ညွှန်ကြားရေးမှူး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးမြို့။
- အုပ်ချုပ်မှုဒါရိုက်တာ၊ See Trust Environmental Service, Naywunmyat(s) Co.,
- ရုံးလက်ခံ ။

Inspiring Lives. Sustaining Progress.

shwetaunggroup.com

Third Party Approval letter

Appendix (H)



ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံသယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
ရုံးအမှတ် (၅၃)၊ နေပြည်တော်
စာအမှတ်၊ အီးအိုင်အေ-၂/၉ (၀၆၀ /၂၀၂၀)
ရက်စွဲ၊ ၂၀၂၀ ပြည့်နှစ် ဇန်နဝါရီလ ၃ ရက်

သို့

မန်နေဂျင်းဒါရိုက်တာ
Shwe Taung Development Co.,Ltd., Ahlone Tower,Strand Road,River View Garden Housing, Ahlone Township,11121,Yangon,Myanmar
Ph-09 2314567,09 2316643,09 2316198

အကြောင်းအရာ။ ဆောက်လုပ်ရေးလုပ်ငန်းသုံးကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်းအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း(EIA)အစီရင်ခံစာ ရေးသားပြုစုမည့် Nay Wun Myat(s) Co., Ltd. (SEE-Trust) တတိယအဖွဲ့အစည်းအား အတည်ပြုပါကြောင်း ပြန်ကြားခြင်း

ရည်ညွှန်းချက်။ (၁) ညွှန်ကြားရေးမှူးရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး၊မန္တလေးမြို့၏ ၁၇-၉-၂၀၁၉ ရက်စွဲပါစာအမှတ်၊ ၂/ဖ/ဂအီအိုင်အေ (၃ဖ၁/၂၀၁၉)

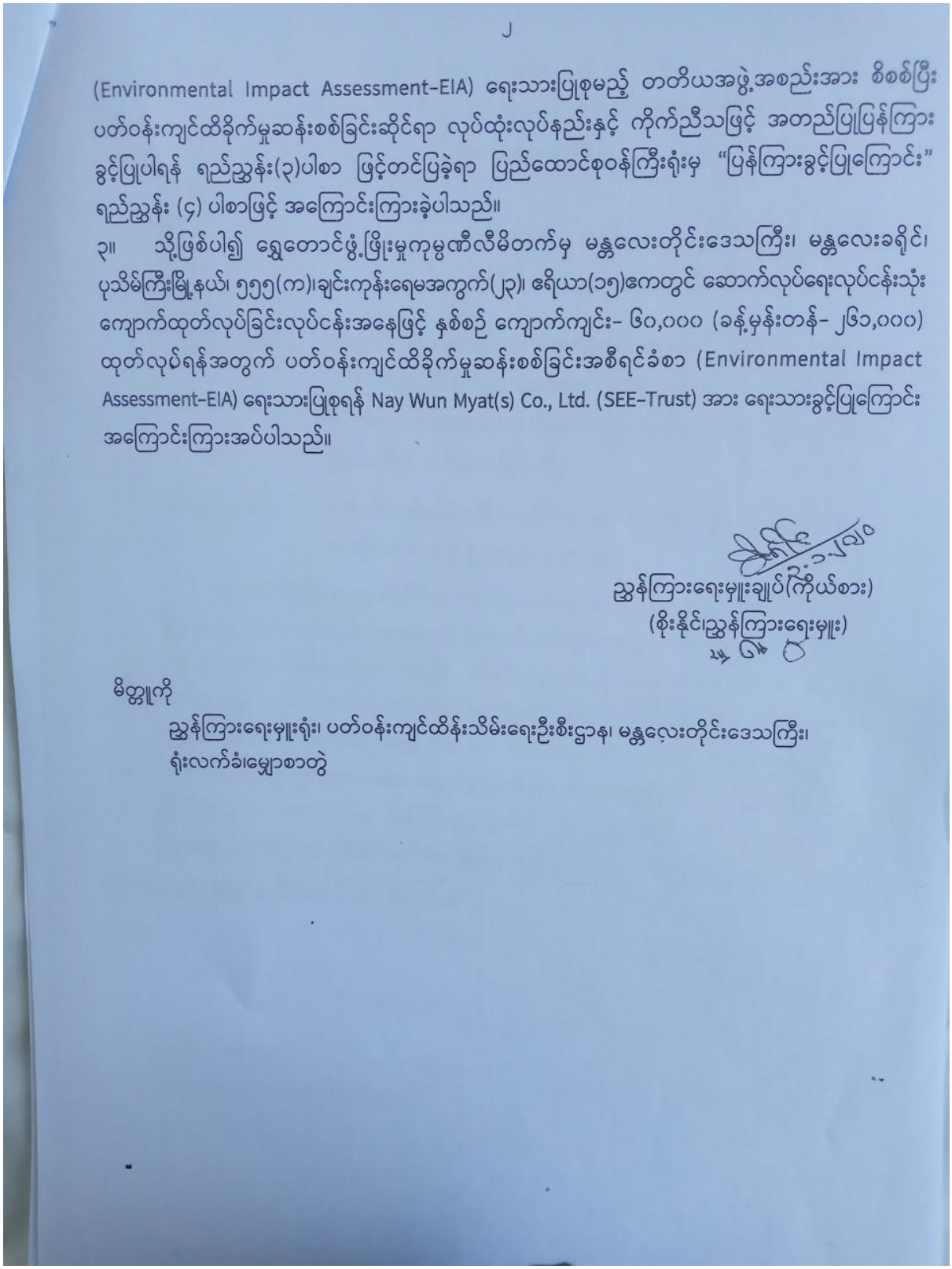
(၂) SHWE TAUNG Development Co., Ltd. ၏ ၂၀၁၉ ခုနှစ် စက်တင်ဘာလတွင် ပေးပို့လာသည့် အပေါ်စာ

(၃) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ ၂-၁၂-၂၀၁၉ ရက်စွဲပါစာအမှတ်၊ အီးအိုင်အေ -၂/၉ (၂၅၅၃ (စ)/ ၂၀၁၉)

(၄) ပြည်ထောင်စုဝန်ကြီးရုံး၊သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၏ ၁၃-၁၂-၂၀၁၉ ရက်စွဲပါစာအမှတ်၊ (သစ်တော) ၃(၂)/၁၆(ဃ) (၅၄၅၆/၂၀၁၉)

၁။ အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ ရွှေတောင်ဖွံ့ဖြိုးမှုကုမ္ပဏီလိမိတက်မှ မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးခရိုင်၊ ပုသိမ်ကြီးမြို့နယ်၊ ၅၅၅(က)၊ ချင်းကုန်းရေမအကွက် (၂၃)၊ ဧရိယာ (၁၅)ကေတွင် ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်းအနေဖြင့် ကနဦးကာလပိုင်းအဖြစ် နှစ်စဉ်ကျောက်ကျင်း- ၁၃,၀၀၀ (ခန့်မှန်းတန် ၅၆,၅၅၀) မှ ကျောက်ကျင်း- ၆၀,၀၀၀ (ခန့်မှန်းတန် ၂၆၁,၀၀၀) တိုးချဲ့ထုတ်လုပ်ရန်အတွက် ရည်ညွှန်း(၁)ပါစာဖြင့် သဘောထားမှတ်ချက် ပြန်ကြားထားမှုအပေါ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (Environmental Impact Assessment-EIA) ရေးသားပြုစုရန် Nay Wun Myat(s) Co., Ltd. (SEE-Trust) အား ဌားရမ်းဆောင်ရွက်မည်ဖြစ်၍ ရေးသားဆောင်ရွက်ခွင့်ပြုပါရန် ရည်ညွှန်း(၂)ပါစာဖြင့် တင်ပြလာပါသည်။

၂။ တင်ပြလာသော ရွှေတောင်ဖွံ့ဖြိုးမှုကုမ္ပဏီလိမိတက်၏ ဆောက်လုပ်ရေးလုပ်ငန်းသုံးကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်း ဆောင်ရွက်ရန်အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ



၂

(Environmental Impact Assessment-EIA) ရေးသားပြုစုမည့် တတိယအဖွဲ့အစည်းအား စိစစ်ပြီး ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်းနှင့် ကိုက်ညီသဖြင့် အတည်ပြုပြုန်ကြား ခွင့်ပြုပါရန် ရည်ညွှန်း(၃)ပါစာ ဖြင့်တင်ပြခဲ့ရာ ပြည်ထောင်စုဝန်ကြီးရုံးမှ "ပြန်ကြားခွင့်ပြုကြောင်း" ရည်ညွှန်း (၄) ပါစာဖြင့် အကြောင်းကြားခဲ့ပါသည်။

၃။ သို့ဖြစ်ပါ၍ ရွှေတောင်ဖွံ့ဖြိုးမှုကုမ္ပဏီလီမိတက်မှ မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးခရိုင်၊ ပုသိမ်ကြီးမြို့နယ်၊ ၅၅၅(က)၊ချင်းကုန်းရေမအကွက်(၂၃)၊ ဧရိယာ(၁၅)ကေတွင် ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်းအနေဖြင့် နှစ်စဉ် ကျောက်ကျင်း- ၆၀,၀၀၀ (ခန့်မှန်းတန်- ၂၆၁,၀၀၀) ထုတ်လုပ်ရန်အတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာ (Environmental Impact Assessment-EIA) ရေးသားပြုစုရန် Nay Wun Myat(s) Co., Ltd. (SEE-Trust) အား ရေးသားခွင့်ပြုကြောင်း အကြောင်းကြားအပ်ပါသည်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(စိုးနိုင်၊ညွှန်ကြားရေးမှူး)

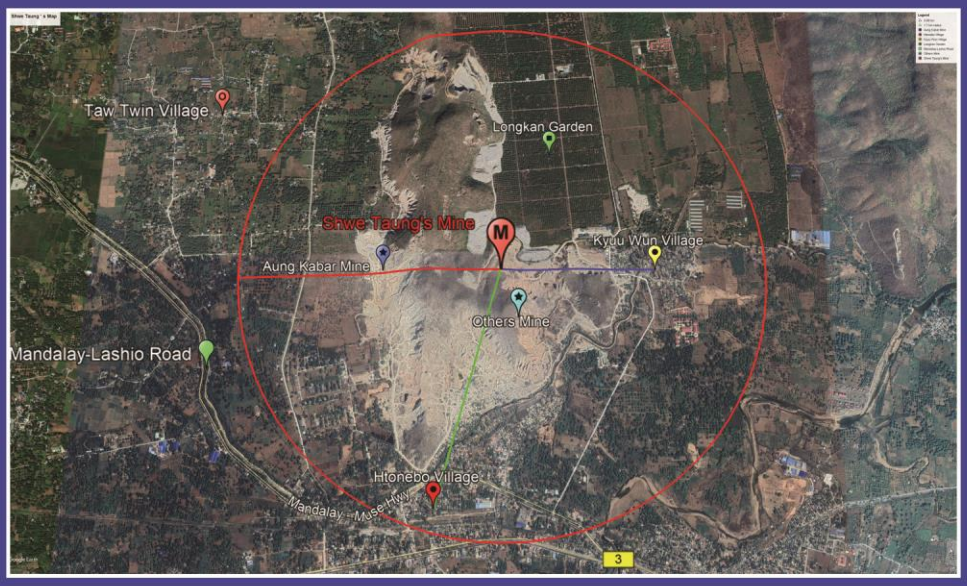
မိတ္တူကို
ညွှန်ကြားရေးမှူးရုံး၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ မန္တလေးတိုင်းဒေသကြီး၊
ရုံးလက်ခံ၊မျှောစာတွဲ

Posting Signboard at Project

Appendix (I)

ရွှေတောင်ဖွံ့ဖြိုးတိုးတက်ရေးကုမ္ပဏီလီမိတက်
(Shwetaung Development Co.,Ltd)
မန္တလေးတိုင်းဒေသကြီး၊ မန္တလေးခရိုင်၊ ပုသိမ်ကြီးမြို့နယ်
အကွက် ၅၅၅ (က) ချင်းကုန်း၊ ရေမတောင်လုပ်ကွက်
အမှတ် (၂၅) တွင် ဆောင်ရွက်မည့်
ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ငန်း

တည်နေရာ



ခွင့်ပြုမိန့်	-	ခရိုင်အုပ်ချုပ်ရေးမှူးရုံး၏ လိုင်စင်အမှတ်-၁၉၂၊ ရက်စွဲ ၂၁.၂.၂၀၂၀
ခွင့်ပြုဧရိယာ	-	(၁၅-ဧက)
တစ်နှစ်ထုတ်ရန်ခွင့်ပြုပမာဏ	-	၁၃၀၀၀ ကျင်း၊ ၆၅၂၅၀ တန်
ထုတ်လုပ်မည့်ပစ္စည်းအမျိုးအစား	-	လမ်းခင်းကျောက် ၆" x ၉" ၊ ၂" x ၄" နှင့် အကျောက်မှုံအမျိုးမျိုး
တာဝန်ခံဆောင်ရွက်မည့်သူ	-	ဦးဇော်မင်းဦး
အမည်နှင့်ဆက်သွယ်ရန်လိပ်စာ	-	အလုံတာဝါ၊ River view garden housing ကမ်းနား၊ အလုံ
အခြေစိုက်ရုံး၊ ဖုန်းနံပါတ်	-	၀၉ ၂၅၁၁၁၉၄၁

လျှပ်စစ်ရယူသုံးစွဲမည့်အစီအစဉ်

အခြေစိုက်စခန်းတွင် 500 KVA လျှပ်စစ်ရရှိထားသည်။ စီမံကိန်းနေရာတွင် 500 KVA ထရန်စဖော်မာ (၂) လုံး လျှောက်ထားခဲ့ပါသည်။

ရေရှယ်သုံးစွဲမည့်အစီအစဉ်

စီမံကိန်းနေရာတွင် မြေအောက်ရေထုတ်ယူသုံးစွဲမည်။

သုံးစွဲမည့်ယာဉ်၊ ယန္တယား

ဒိုဇာ (၁)စီး၊ မြေကော်စက် (Excavator) (၂)စီး၊ တစ်ပါထရပ် (၂)စီး၊ မီးစက် (၁)လုံး၊ ကျောက်ခွဲစက် (၁)စုံ

သုံးစွဲမည့်ဝန်ထမ်း၊ လုပ်သားအင်အား

၂၅ ဦး

သုံးစွဲမည့်လမ်း

ထုံးဘို-ကျူဝန်းကျေးရွာလမ်း

ထုတ်လုပ်မည့်နည်းစနစ်

အသေးစိတ် Mine Plan ရေးဆွဲထားပြီး ယင်းအတိုင်းလိုက်နာဆောင်ရွက်မည့် Open Cut method (တောင်ဖြိုခိုင်းခွဲထုတ်လုပ်) အသုံးပြုမည်။

ပေါက်ကွဲစေသည့်ပစ္စည်း

ခလရ (၇၆)တွင် သိုလှောင်ထားပြီး လိုအပ်ချိန်မှ ထုတ်ယူသုံးစွဲမည်။ AMNO သုံးစွဲမည်ဖြစ်သည်။

လူမှုရေးတာဝန်သိမှု

လုပ်ငန်းအပေါ်မှ အကျိုးအမြတ်၏ ၂ ရာခိုင်နှုန်းကို လူမှုရေးတာဝန်သိမှုအနေဖြင့် ပါဝင်ပေးမည်။

အသေးစိပ်များသိလိုပါက

(၁) စီမံကိန်းရုံးတွင်လည်းကောင်း ရွှေတောင်ဖွံ့ဖြိုးရေး၏ ကျေးရွာအုပ်ချုပ်ရေးမှူးရုံးတွင်လည်းကောင်း

(၂) SEE-Trust ၏ Facebook Page တွင်လည်းကောင်း (https://www.facebook.com/seetrust)

(၃) Shwetaung Development Co.,Ltd ၏ Website တွင်လည်းကောင်း အသေးစိပ်ဖတ်ရှုပြီး အကြံဉာဏ်များပေးနိုင်ပါသည်။ (https://www.shwetaunggroup.com)

ဖိတ်ခေါ်ပါသည်

အများပြည်သူများ၏ လုပ်ငန်းအပေါ်အမြင်၊ အကြံပြုချက်များ၊ ကန့်ကွက်ရန်များရှိပါက အပြုသဘောဖြင့် တင်ပြကြပါရန် ဖိတ်ခေါ်ပါသည်။

ရွှေတောင်ဖွံ့ဖြိုးတိုးတက်ရေးကုမ္ပဏီ

License for Quarry Production

Appendix (J)

L.R.IV.MINERAL-1

မူရင်း

ကျောက်ထုတ်လုပ်ခွင့်လိုင်စင်။
[အမိန့်ဆင့်ဆိုချက် ၁၉၂]
မန္တလေးခရိုင်

(ကုဗပေ ၁၀၀ ရှိ) ကျင်းရေ(၁)ကျင်းလျှင်(၂၅၀၀)ကျပ်နှုန်းအတိုင်း အကောက်တော်များ ထမ်းဆောင်သည်နှင့် ---[illegible]--- မြို့နယ်၊ [illegible] ရပ်ကွက်/ ကျေးရွာအုပ်စုနေ ---[illegible]--- ၏သား/သမီး ---[illegible]--- နိုင်ငံသားစိစစ်ရေးကတ်ပြားအမှတ် [illegible] ကို ---[illegible]--- မြို့နယ်၊ ---[illegible]--- ကျေးရွာနယ်မြေ၊ ကွင်းအမှတ်([illegible]) ဦးပိုင်အမှတ်([illegible])၊ ဧရိယာ([illegible])ဧကရှိ အောက်ပါနယ်နိမိတ်များအတွင်း ဆိုလတ္တံ့သော စည်းကမ်းချက်များနှင့် အညီ ကျင်းပေါင်း([illegible])ကျင်းကို တူးဖော်စုစည်းခွင့်ပြုလိုက်သည်။ ၎င်းအတွက် အကောက်တော်ခွန်ငွေကျပ် ([illegible]) ကို ---[illegible]--- မြို့နယ်အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာနတွင် ထမ်းဆောင်ရမည်။ ယခုလိုင်စင်ကို အခြားသူသို့ လွှဲပြောင်းနိုင်ခွင့် မရှိစေရ။

မြေနယ်နိမိတ်

မြောက်အလား -
အရှေ့အလား -
တောင်အလား -
အနောက်အလား -
} ပူးတွဲပါမြေပုံ

[illegible] ခုနှစ် ၊ [illegible] လ [illegible] ရက်

လိုင်စင်ထုတ်ပေးသူအရာရှိ

စည်းကမ်းချက်များ

(၁) အကောက်တော်ခွန် ထမ်းဆောင်မည့် ကုဗပေ (ကျင်းအရေအတွက်)ထက်ပိုမို ထုတ်ယူခြင်းမပြုရန်နှင့် ---ပထမ---- ခုနှစ်၊ မတ်လကုန်နောက်ဆုံးထား၍ အကောက်တော်ခွန်ပေးသွင်းရန်ဖြစ်ပြီးသတ်မှတ်ကာလကျော်လွန်သော်လည်း ငွေပေးသွင်းခြင်းမရှိပါက လိုင်စင်ပိတ်သိမ်းမည်ဖြစ်သည်။

(၂) ယခုလိုင်စင်မှာ ထုတ်ပေးသည့်နေ့ရက်မှ ရှေ့လာမည့် ---ပထမ--- ခုနှစ် ဖွန်လ(၃၀) ရက်နေ့တွင် စေ့ကုန်သည်ဖြစ်၍ သည်ကဲ့သို့ စေ့ကုန်သည့်အခါ ၎င်းလိုင်စင်ကို ထုတ်ပေးသူ အရာရှိ ထံပြန်အပ်ရန်။

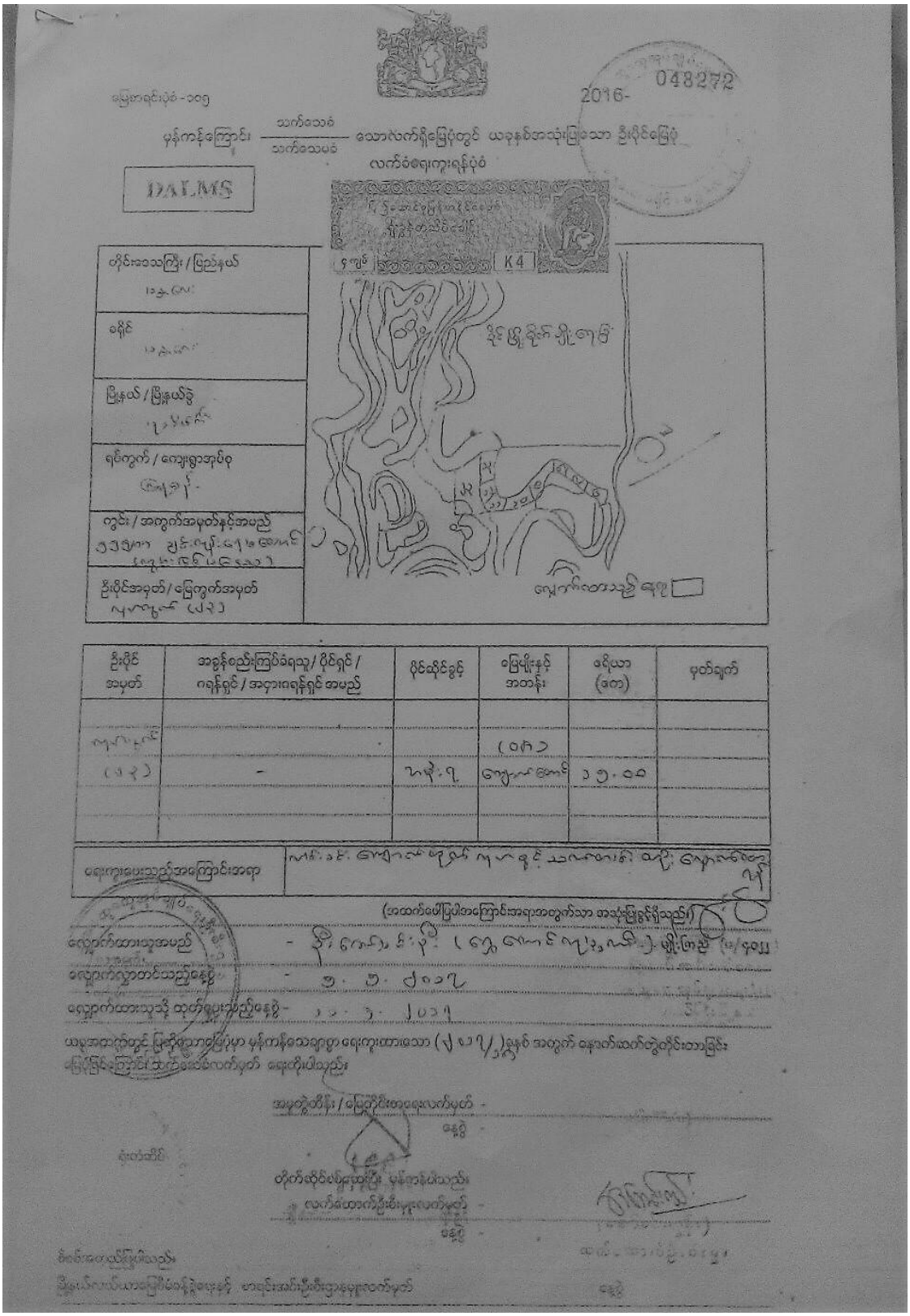
(၃) ပထမ-ပထမ ခုနှစ်အတွက် လုပ်ငန်းဆက်လက်လုပ်ကိုင် လိုပါက-ပထမ---ခုနှစ်၊ ----ဇူလိုင်------လ နောက်ဆုံးထား၍ ဤရုံးတော်သို့ သက်တမ်းတိုး လျှောက်ထားရမည်ဖြစ်ပြီး သတ်မှတ်ကာလအတွင်းသက်တမ်းတိုးလာရောက်လျှောက်ထားခြင်းမရှိသည့် လိုင်စင်များအား လုပ်ငန်းဆောင်ရွက်ခွင့် ပိတ်သိမ်းသွားမည်ဖြစ်သည်။

(၄) ဤလိုင်စင်အရ ကျောက်ထုတ်လုပ်ခြင်းဆောင်ရွက်ရာတွင် အခြားတည်ဆဲဥပဒေ၊ နည်းဥပဒေ၊ လုပ်ထုံးလုပ်နည်း၊ အမိန့် ညွှန်ကြားချက်များအား လိုက်နာရမည်ဖြစ်သည်။

(၅) အထက်ပါစည်းကမ်းချက်များအား လိုက်နာခြင်းမရှိပါက လိုင်စင်အားပိတ်သိမ်းမည်ဖြစ်ပြီး တည်ဆဲဥပဒေ၊ နည်းဥပဒေများနှင့်အညီ အရေးယူခြင်းခံရမည်။

Form (105)

Appendix (K)



Export/import Registration

Appendix (L)

2739

The Government of the Republic of the Union of Myanmar
Ministry of Commerce
Directorate of Trade

CERTIFICATE OF EXPORTER/IMPORTER REGISTRATION

1. Enterprise Name (မြန်မာ/အင်္ဂလိပ်) SHWE TAUNG DEVELOPMENT CO.,LTD.
2. Registration No: 22299(24-06-08)
3. Registration Term: FIVE YEAR
4. Start Date : 04-08-2014
5. End Date : 02-08-2019
6. Address : (မြန်မာ/အင်္ဂလိပ်) Ahlone Tower, River View Garden Housing, Strand Road, Ahlone Township, Yangon Region,Myanmar
7. Business Registration No : 263/2007-2008(3-8-2007)
8. Type of Business : (မြန်မာ/အင်္ဂလိပ်)
   - ☐ Sole Proprietorship(တစ်ဦးတည်းပိုင်)
   - ☐ Partnership(အစုအဖွဲ့)
   - ☑ Limited Company(ကုမ္ပဏီ)(Myanmar/~~Foreign~~)
   - ☐ Co-operative Society(သမဝါယမအသင်း)
   - ☐ Others(Please specify)(အခြားဖော်ပြရန်) သင်းဖွဲ့မှတ်တမ်းပါလုပ်ငန်း( )မျိုး ဆောင်ရွက်ခွင့်ရှိသည်။
9. Type of Service : ○ New ○ Extension
10. Contact No :

Telephone No.	Fax No.	e-mail
212326 227705 224787 211956	227714 211437	

11. Remarks :
HIGH TECH TOWER, NO 584,5th FLOOR, CORNER OF 7th STREET & STRAND ROAD LANMADAW T/S.

12. Terms and Conditions : စည်းကမ်းချက်များ
I hereby register the above mentioned enterprise as Exporter/Importer subject to the following terms and conditions: (အောက်ဖော်ပြပါစည်းကမ်းချက်များဖြင့် ပို့ကုန်သွင်းကုန် လုပ်ငန်းရင်းအဖြစ် မှတ်တမ်းတင်ခွင့်ပြုသည်)
(a) Line of goods permitted - all items except prohibited and restricted items.
ခွင့်ပြုသည့်ကုန်ပစ္စည်းအမျိုးအမည် - တားမြစ်ကန့်သတ်ထားသော ကုန်ပစ္စည်းအမည်များမလွဲ၍ ကျွန်ုပ်ကုန်ပစ္စည်းများဆက်လုပ်
(b) The enterprise must abide by the Export/Import rules and Regulations prescribed for the registered Exporters/Importers.(ကုမ္ပဏီနှင့်သည် မှတ်ပုံတင် ပို့ကုန်သွင်းကုန်လုပ်ငန်းလုပ်ကိုင်သူများ လိုက်နာရမည့်စည်းကမ်းချက်များကို လိုက်နာရမည်)

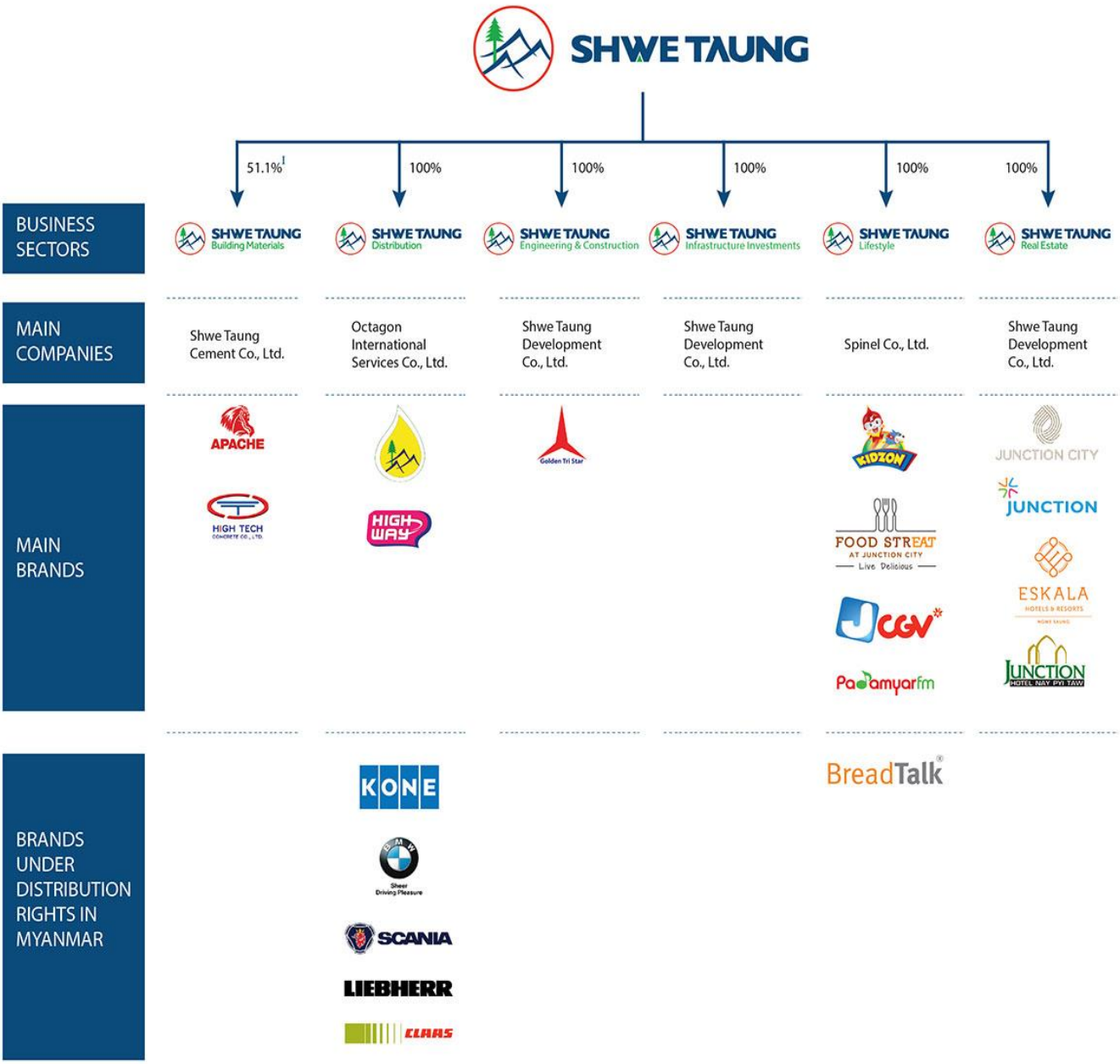
Stamp

For Director General

EIREGEX081418EIREGEX12130012

Shwe Taung Development Co.,Ltd's Business Sectors

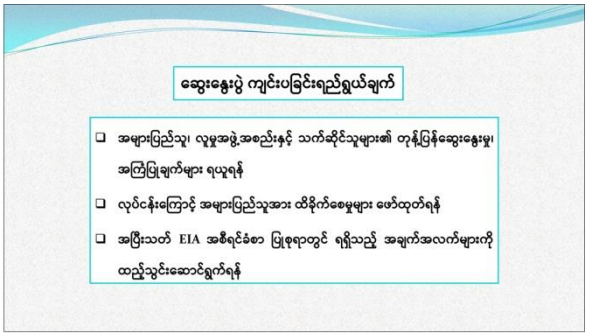
Appendix (M)

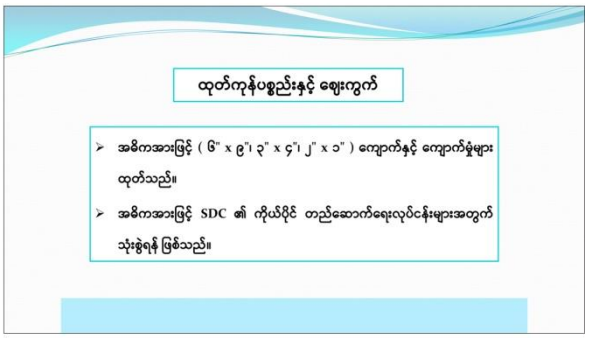


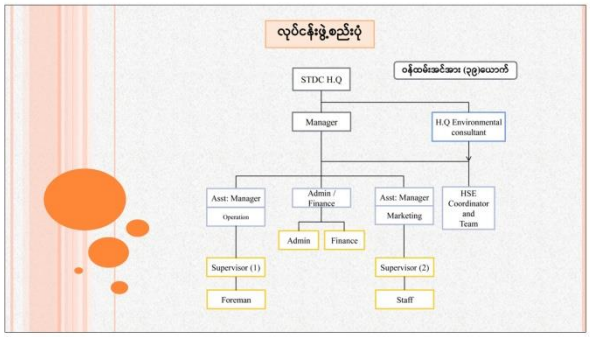
Footnotes:
I. 18.5% is owned by IFC and IFC's AMC Emerging Asia Fund ("EAF"), and the remaining by other minority shareholders.

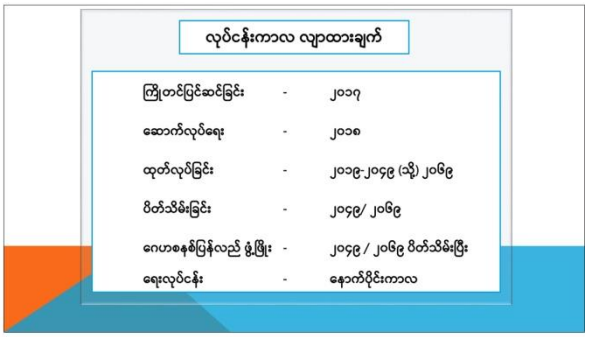
Power point for Public Consultation Meeting

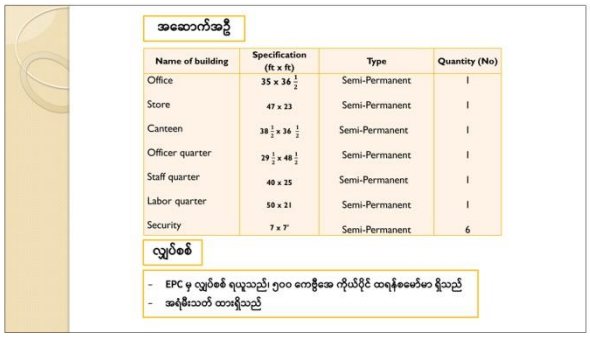
Appendix (N)











စက်သုံးဆီလိုအပ်ချက်

Oil type	Requirement Gallon	
	Monthly	Yearly
Diesel	1800	18,000
Engine Oil	250	3,000
Hydraulic	250	3,000

ST ဆီဆိုင်မှ လိုအပ်သလောက်သာ မှာယူသုံးစွဲသည်။

ယန္တရားအင်အား

No.	Requirement	Quantity	Remark
1.	944-Hydraulic Excavator	1	Loading
2.	934 Hydraulic Excavator	1	Mucking and Breaker
3.	Dozer	1	Quarry
4.	Crawler Drill (Hydraulic)	1	Production
5.	Crawler Drill (Pneumatic)	1	Development
6.	Dump Truck	4	Quarry to Crusher
7.	Wheel Loader	1	Crusher
8.	Water Boxer	1	Quarry to Crusher
9.	4 x 4 Double Cub	1	Office & Site
10.	Canter (10')	1	Office & Site
11.	Crushing Plant	1	120 ton per 1 hour

ကျောက်ထုတ်လုပ်သည့်နည်းစနစ်

- အပေါ်ယံမြေလွှာဖယ်၍ ထုတ်သည့်စနစ် Open pit mine ဖြစ်သည်
- ကျောက်တောင်များကို မိုင်းခွဲပြီး ကျလာသည့် ကျောက်တုံးများကို အသေးစိတ် ပြန်ခွဲစိပ်သည်။

ထုတ်
လုပ်
သည့်
လုပ်
ငန်း
စဉ်

ဖောက်ခွဲပစ္စည်း

- နှစ်စဉ် အမိုနီယမ်နိုက်ထရိတ် (AMN) - ၄.၅ တန်
- နှစ်စဉ် အမိုနီယမ်နိုက်ထရိတ် (Emulsion) - ၁၈ တန်

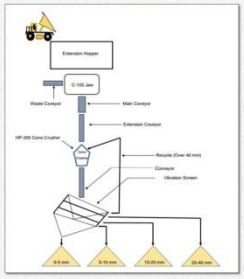
ယမ်းကို တပ်မတော်ယမ်းတိုက်မှ လိုအပ်သည့်အခါ ထုတ်ယူသုံးစွဲရသည်။

ကျောက်မိုင်း၏ မြေမျက်နှာသွင်ပြင်

ကျောက်ထွက်နိုင်ချေ ခန့်မှန်းချက်

LEVELS	LIMESTONE (Suds)	LIMESTONE (AFTER 20% DEDUCTION) (Suds)	LIMESTONE CUMULATIVE (Suds)
550FT	845.00	676	676
535FT	3,490.00	3,152	3,828
520FT	9,760.00	7,808	11,636
505FT	16,450.00	13,160	24,796
490FT	25,532.50	20,426	45,222
475FT	34,970.00	27,976	73,198
460FT	43,520.00	34,816	108,014
445FT	50,925.00	40,740	148,754
430FT	53,875.00	43,100	191,854
415FT	57,575.00	46,060	237,914
400FT	58,075.00	46,460	284,374
385FT	59,812.00	47,850	332,224
370FT	59,082.50	47,266	379,490
355FT	61,462.50	49,170	428,660
340FT	66,055.00	52,844	481,506
325FT	62,900.00	50,320	531,824
TOTAL	664,780	531,824	531,824

ကျောက်ခွဲစက်



လေထုအရည်အသွေး

Parameter	Result	NEQ(EM) Standard
$PM_{2.5}$	92 μg/m³ Δ	50
PM_{10}	130 μg/m³ Δ	25
NO	42 ppb	-
NO_2	12 μg/m³	200
SO_2	2.1 μg/m³	20
Ozone	50 μg/m³	100

ဆူညံသံ

နေရာ	ဆူညံသံ Db					
	2018 Sept		2021, Dec		NEQ Guideline	
	နေ့	ည	နေ့	ည	နေ့	ည
လုပ်ငန်းခွင်	57	55	51	53	70	70
ကျေးရွာ	54	44	50	43	55	45

ထိခိုက်မှု ဆန်းစစ်နည်း (အမှတ်ပေးစနစ်)

ဆန်းစစ်ခြင်း Assessment	အမှတ် (Scale)				
	1	2	3	4	5
အတိုင်းအတာ Magnitude(M)	မထင်ရှား	သေးငယ် ပတ်ဝန်းကျင် မထိခိုက်	အသင့်တင့် ပတ်ဝန်းကျင်ကို အသေးစားပြောင်း	မြင့် ပတ်ဝန်း ကျင်အား သိသာစွာ ပြောင်းလဲမှုရှိ	အလွန်မြင့် ထာဝရ ပြောင်းလဲစေ
ကာလ Duration (D)	၀-၁ နှစ်	၃-၅နှစ် (ပတ်ဝန်း ကျင်)	၆-၁၅ နှစ်	၁၅ အထက်	အမြဲတမ်း
ကျယ်ပြန့်မှု Extent (E)	နေရာသာဖြစ်	ဧရိယာ အတွင်းသာ	ဒေသအတွင်း	အမျိုးအစား	အပြည်ပြည် ဆိုင်ရာ
ဖြစ်နိုင်ခွင့်း Probability (P)	အလွန် မဖြစ်နိုင်	မဖြစ်နိုင်	ဖြစ်နိုင်	အလွန်ဖြစ်နိုင်	သေချာပေါက် ဖြစ်နိုင်

ထိခိုက်မှု အမှတ် SP = (M + D + E) x P

ထိခိုက်မှု အဆင့်အတန်း သတ်မှတ်ချက်

ထိခိုက်မှု အမှတ် (SP)	ထိခိုက်မှု အတင့်အတန်း
< 15	အလွန်နည်း
15-29	အနည်းငယ်
30-44	အလယ်အလတ်
45-59	မြင့်မား
➢ 60	အလွန်မြင့်မား

စိစစ်ရရှိသည့်ရလာဒ်

	ထိခိုက်မှုရလဒ်			
	တည်ဆောက်ကာလ	လည်ပတ်ကာလ	ပိတ်သိမ်းကာလ	ပေါင်း
အလွန်နည်း	-	-	-	-
အနည်းငယ်	၁	၁	၅	၇
အသင့်အတင့်	၄	၉	၁	၁၄
မြင့်	-	-	-	-
အလွန်မြင့်	-	-	-	-
အကျိုးဖြစ်	၁	၁	၁	၃

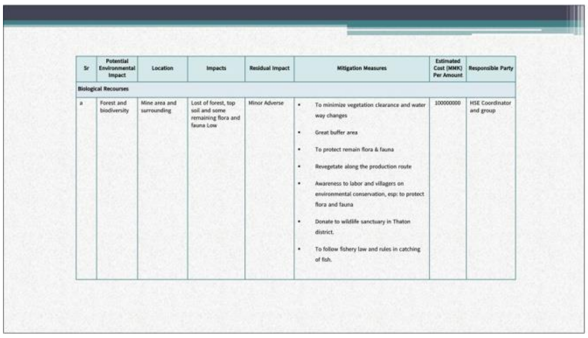
ထိခိုက်မှု လျော့ချရေး အစီအစဉ်

Mitigation Plan for Operation Stage

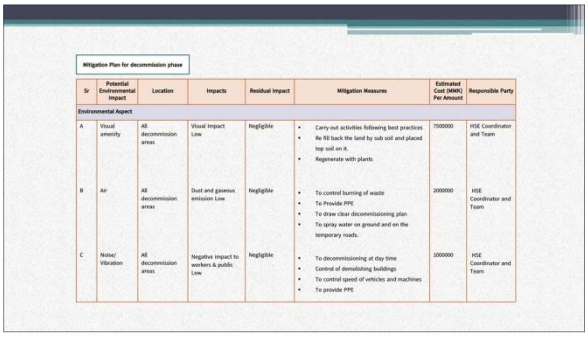
Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
Environmental Aspect							
A	Visual Amenity	All Operation area	Low Visual Dust	Negligible	Create buffer zone. Planted trees.		
B	Air quality	All Operation area	Gaseous emission		• Dust suppression facilities (back up water sprayer) • Spray water on road • Schedule activities properly to have least impact • To provide PPE (Dust mask) • Vehicle and Machinery use shall be well maintained	10000000	HSE Coordinator and group
C	Noise/ Vibration	All Operation area & resident Produce from crushing machines and other mining activities	Low Negative impact to labor & Public	Minor Adverse	• To draw plan for noisy activities at day time. • To control the explosive pressure • To provide PPE (ear plugs & earmuff) to labor • The facility is enclosed which would further minimize noise impact • New technology apply which minimize noise and vibration • To be done noisy activities especially at day time • Machinery shall be sound proved cabin • Plant wind break tree and bamboo at the surrounding of mine areas. • The blasting has to done at evening after working hour (between 4:00 -6:00 PM) • Regular medical checkup has to done for operators whom are possibility happens ear problems.	2500000	HSE Coordinator and group

Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
D	Water pollution	All operation areas	Change of water way, con termination and sedimentation of water		• Construct sediment traps and pond • Harvest rainfall for use • Carry out water quality regularly	1500000	HSE Coordinator and group moderate Adverse
E	Soil	All operation areas	Medium Sedimentation and contamination Medium		• To use and dispose oil and lubricant with caution • Use proper handling methods to avoid spill leakages,		Moderate
					• Design the channels and ditches for proper drainage of water, particularly during rainy season • To avoid soil run off sand and filled bags has to place on the surrounding of soil piles.		Minor Adverse Negligible
F	Fly rock	All operation areas	Negative impact to human (Cause injury) Low		• Warm and remove all person during blasting • Should guide properly position and direction.	500000	Minor Adverse
G	Odour	Explosion, Dusting	In surrounding area and residential area huisance issue Low		• Control the explosive pressure • The facility should be enclosed to limit exposure of potential odors if any	1000000	Moderate
					• Continuous monitoring should take place • Plant trees as wind break along the production route		

Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
H	Explosive Effect	Mine area	low vibration/noise caused by blasting Noise impact to labor and surrounding	Minor Adverse	• To provide PPE (ear plug nose mask for labor) • To avoid excess exploration • Medical checkup for exploration operators	1500000	HSE Coordinator and group
2.	Waste generation						
a	Solid Waste Liquid waste & Hazardous waste	All operation areas	Contamination and sedimentation Medium	Moderate Adverse	• To segregate wastes into hazardous, recycles and general waste • To provide adequate toilet • Waste to store in appropriate container • Proper maintain of sewage system, monitor for potential contamination from sewage • Control oil spill and leakage • Regular maintenance of Machinery and vehicle • Don't throw waste to the water way. • Construct good drainage with waste collection systems.	1000000	HSE Coordinator and group

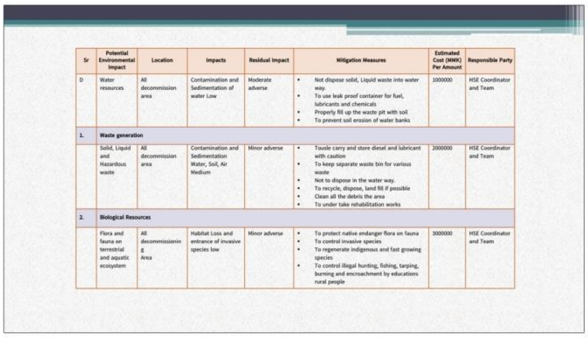


Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
Biological Recourses							
a	Forest and biodiversity	Mine area and surrounding	Lost of forest, top soil and some remaining flora and fauna Low	Minor Adverse	• To minimize vegetation clearance and water way changes • Great buffer area • To protect remain flora & fauna • Revegetate along the production route • Awareness to labor and villagers on environmental conservation, esp: to protect flora and fauna • Donate to wildlife sanctuary in Thaton district. • To follow fishery law and rules in catching of fish.	100000000	HSE Coordinator and group

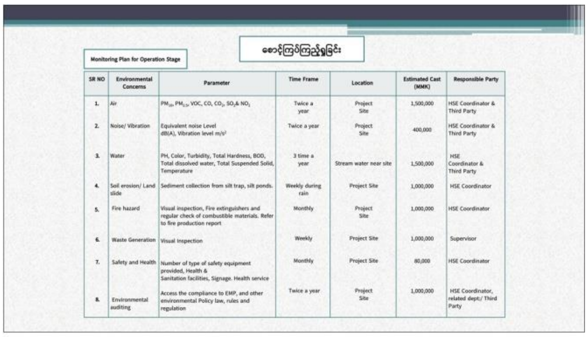


Mitigation Plan for decommission phase

Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
Environmental Aspect							
A	Visual amenity	All decommission areas	Visual Impact Low	Negligible	• Carry out activities following best practices • Re fill back the land by sub soil and placed top soil on it. • Regenerate with plants	7500000	HSE Coordinator and Team
B	Air	All decommission areas	Dust and gaseous emission Low	Negligible	• To control burning of waste • To Provide PPE • To draw clear decommissioning plan • To spray water on ground and on the temporary roads.	2000000	HSE Coordinator and Team
C	Noise/ Vibration	All decommission areas	Negative impact to workers & public Low	Negligible	• To decommissioning at day time • Control of demolishing buildings • To control speed of vehicles and machines • To provide PPE	1000000	HSE Coordinator and Team

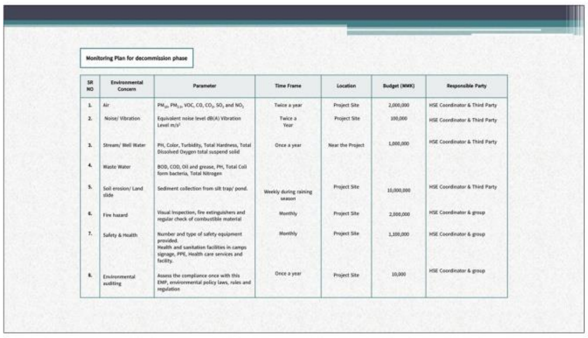


Sr	Potential Environmental Impact	Location	Impacts	Residual Impact	Mitigation Measures	Estimated Cost (MMK) Per Amount	Responsible Party
D	Water resources	All decommission area	Contamination and Sedimentation of water Low	Moderate adverse	• Not dispose solid, Liquid waste into water way. • To use leak proof container for fuel, lubricants and chemicals • Properly fill up the waste pit with soil • To prevent soil erosion of water banks	1000000	HSE Coordinator and Team
1.	**Waste generation**						
	Solid, Liquid and Hazardous waste	All decommission area	Contamination and Sedimentation Water, Soil, Air Medium	Minor adverse	• Tousle carry and store diesel and lubricant with caution • To keep separate waste bin for various waste • Not to dispose in the water way. • To recycle, dispose, land fill if possible • Clean all the debris the area • To under take rehabilitation works	2000000	HSE Coordinator and Team
2.	**Biological Resources**						
	Flora and fauna on terrestrial and aquatic ecosystem	All decommissionin g Area	Habitat Loss and entrance of invasive species low	Minor adverse	• To protect native endanger flora on fauna • To control invasive species • To regenerate indigenous and fast growing species • To control illegal hunting, fishing, tarping, burning and encroachment by educations rural people	3000000	HSE Coordinator and Team



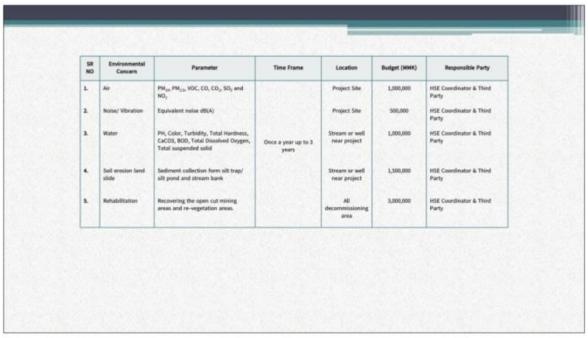
Monitoring Plan for Operation Stage

SR NO	Environmental Concerns	Parameter	Time Frame	Location	Estimated Cast (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2& NO_2	Twice a year	Project Site	1,500,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise Level dB(A), Vibration level m/s^2	Twice a year	Project Site	400,000	HSE Coordinator & Third Party
3.	Water	PH, Color, Turbidity, Total Hardness, BOD, Total dissolved water, Total Suspended Solid, Temperature	3 time a year	Stream water near site	1,500,000	HSE Coordinator & Third Party
4.	Soil erosion/ Land slide	Sediment collection from silt trap, silt ponds.	Weekly during rain	Project Site	1,000,000	HSE Coordinator
5.	Fire hazard	Visual inspection, Fire extinguishers and regular check of combustible materials. Refer to fire production report	Monthly	Project Site	1,000,000	HSE Coordinator
6.	Waste Generation	Visual Inspection	Weekly	Project Site	1,000,000	Supervisor
7.	Safety and Health	Number of type of safety equipment provided, Health & Sanitation facilities, Signage. Health service	Monthly	Project Site	80,000	HSE Coordinator
8.	Environmental auditing	Access the compliance to EMP, and other environmental Policy law, rules and regulation	Twice a year	Project Site	1,000,000	HSE Coordinator, related dept:/ Third Party

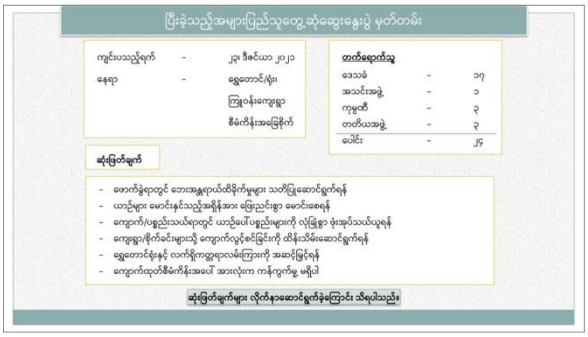


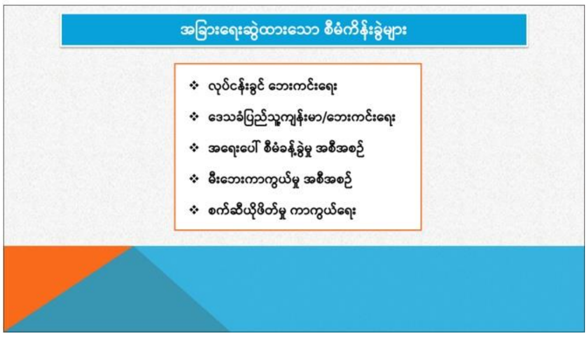
Monitoring Plan for decommission phase

SR NO	Environmental Concern	Parameter	Time Frame	Location	Budget (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 and NO_2	Twice a year	Project Site	2,000,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise level dB(A) Vibration Level m/s^2	Twice a Year	Project Site	100,000	HSE Coordinator & Third Party
3.	Stream/ Well Water	PH, Color, Turbidity, Total Hardness, Total Dissolved Oxygen total suspend solid	Once a year	Near the Project	1,000,000	HSE Coordinator & Third Party
4.	Waste Water	BOD, COD, Oil and grease, PH, Total Coli form bacteria, Total Nitrogen				
5.	Soil erosion/ Land slide	Sediment collection from silt trap/ pond.	Weekly during raining season	Project Site	10,000,000	HSE Coordinator & Third Party
6.	Fire hazard	Visual Inspection, fire extinguishers and regular check of combustible material	Monthly	Project Site	2,000,000	HSE Coordinator & group
7.	Safety & Health	Number and type of safety equipment provided. Health and sanitation facilities in camps signage, PPE, Health care services and facility.	Monthly	Project Site	1,100,000	HSE Coordinator & group
8.	Environmental auditing	Assess the compliance once with this EMP, environmental policy laws, rules and regulation	Once a year	Project Site	10,000	HSE Coordinator & group

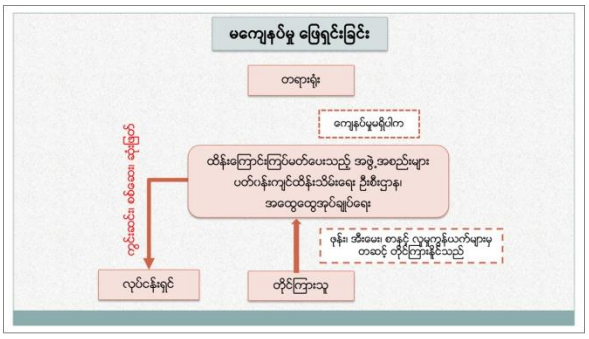


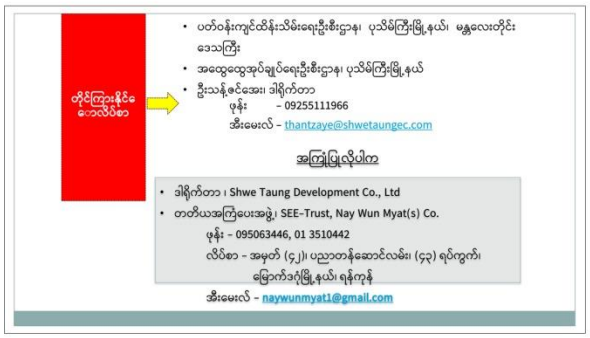
SR NO	Environmental Concern	Parameter	Time Frame	Location	Budget (MMK)	Responsible Party
1.	Air	PM_{10}, $PM_{2.5}$, VOC, CO, CO_2, SO_2 and NO_2	Once a year up to 3 years	Project Site	1,000,000	HSE Coordinator & Third Party
2.	Noise/ Vibration	Equivalent noise dB(A)		Project Site	500,000	HSE Coordinator & Third Party
3.	Water	PH, Color, Turbidity, Total Hardness, CaCO3, BOD, Total Dissolved Oxygen, Total suspended solid		Stream or well near project	1,000,000	HSE Coordinator & Third Party
4.	Soil erosion land slide	Sediment collection form silt trap/ silt pond and stream bank		Stream or well near project	1,500,000	HSE Coordinator & Third Party
5.	Rehabilitation	Recovering the open cut mining areas and re-vegetation areas.		All decommissioning area	3,000,000	HSE Coordinator & Third Party






CSR လှုမှုရေးတာဝန်သိမှု
လုပ်ငန်းရှင်က အကျိုးအမြတ်၏ ၂% ကို လူမှုရေး ရပ်ပုံဒေသဖြစ်ထည့်ဝင်ရန် သဘောတူသည်။ အောက်ပါအတိုင်း ရပ်ပုံဒေ လျာထားပါသည်။
စဉ် | လုပ်ငန်း | လျာထားချက်
၁။ | လုပ်သားများ၏ လူမှုဖူလုံရေး ဖွံ့ဖြိုး တိုးတက်ရေး | ၁ %
၂။ | လူမှုအသိုင်းအဝန်း နှင့် ဒေသဖွံ့ဖြိုးတိုးတက်ရေး | ၀.၅ %
၃။ | အခြေခံအဆောက်အဦးများ ဖွံ့ဖြိုးတိုးတက်ရေး | ၀.၂၅ %
၄။ | ပညာရေးနှင့် ကျန်းမာရေးဆိုင်ရာ ကိစ္စ | ၀.၂၅%
ပေါင်း | ၂ %


မကျေနပ်မှု ဖြေရှင်းခြင်း
တရားရုံး
ကျေနပ်မှုမရှိပါက
ထိန်းကြောင်းကြပ်မတ်ပေးသည့် အဖွဲ့အစည်းများ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဦးစီးဌာန၊ အထွေထွေအုပ်ချုပ်ရေး
ဖုန်း၊ အီးမေး၊ စာနှင့် လူမှုဘွဲ့ယက်များမှ တဆင့် တိုင်ကြားနိုင်သည်
ကွင်းဆင်း စစ်ဆေး ဆုံးဖြတ်
လုပ်ငန်းရှင်
တိုင်ကြားသူ


တိုင်ကြားနိုင်ရေးလိပ်စာ
• ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊ ပုသိမ်ကြီးမြို့နယ်၊ မန္တလေးတိုင်းဒေသကြီး
• အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန၊ ပုသိမ်ကြီးမြို့နယ်
• ဦးသန့်စင်အေး၊ ဒါရိုက်တာ
ဖုန်း – 09255111966
အီးမေးလ် – thantzaye@shwetaungec.com
အကြှပြုလိုပါက
• ဒါရိုက်တာ ၊ Shwe Taung Development Co., Ltd
• တတိယအကြံပေးအဖွဲ့၊ SEE-Trust, Nay Wun Myat(s) Co.
ဖုန်း – 095063446, 01 3510442
လိပ်စာ – အမှတ် (၄၂)၊ ပညာတန်ဆောင်လမ်း၊ (၄၃) ရပ်ကွက်၊ မြောက်ဒဂုံမြို့နယ်၊ ရန်ကုန်
အီးမေးလ် – naywunmyat1@gmail.com


နိဂုံး
❖ ဤလုပ်ငန်းသည် ဒေသ/နိုင်ငံ၏ အခြေခံ အဆောက်အဦ ဖွံ့ဖြိုးရေးအတွက် လိုအပ်သည့် အကျိုးပြုလုပ်ငန်းဖြစ်သည်။
❖ ပတ်ဝန်းကျင်အပေါ်ထိခိုက်နိုင်မှုများ ရှိသည်။
❖ ထိခိုက်မှုလျော့ချရန် အစီအစဉ်များကို လိုက်နာဆောင်ရွက် ခြင်းဖြင့် ထိခိုက်မှု အနည်းဆုံးဖြစ်အောင် ဆောင်ရွက်သွားရန်
❖ အများပြည်သူနှင့်မပြတ်တွေ့ဆုံဆွေးနွေးပြီး ပေါင်းစပ်ညှိနှိုင်း ကြရန်
❖ စီမံကိန်းဆိုင်ရာ သတင်းအချက်အလက်များကို ဖြန့်ဝေရန်


ကျေးဇူးတင်ရှိပါသည်။

Attended list

Appendix (O)

22.Nov. 2023

SHWE TAUNG

SEE-Trust

Shwe Taung Development Co., Ltd ၏ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်း၏

အများပြည်သူအားချပြခြင်းနှင့် တွေ့ဆုံဆွေးနွေးခြင်း တက်ရောက်သူများစာရင်း

စဉ်	အမည်	ရာထူး	ဌာန/ လိပ်စာ	လက်မှတ်	ဖုန်းနံပါတ်	မှတ်ချက်
၁	[illegible]	[illegible]	[illegible]	[signature]	09-796532777	
၂	[illegible]	[illegible]	[illegible]	[signature]	09.	
၃	[illegible]	[illegible]	[illegible]	[signature]	09-455799869	
၄	,, [illegible]	,,	[illegible]	[signature]	09.	
၅	,, [illegible]	,,	,,	[signature]	–	
၆	[illegible]	[illegible]	[illegible]	[signature]	09-777816078	
၇	[illegible]	,,	[illegible]	[signature]	09-792045160	
၈	[illegible]	,,	[illegible]	[signature]	–	
၉	,, [illegible]	,,	[illegible]	[signature]	09-431795540	
၁၀						

22.Nov. 2023

SHWE TAUNG

Shwe Taung Development Co., Ltd ၏ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်း၏

အများပြည်သူအားချပြခြင်းနှင့် တွေ့ဆုံဆွေးနွေးခြင်း တက်ရောက်သူများစာရင်း

SEE-Trust

စဉ်	အမည်	ရာထူး	ဌာန/ လိပ်စာ	လက်မှတ်	ဖုန်းနံပါတ်	မှတ်ချက်
၁	ဦးကျော်ဇင်လတ်	Supporting Technical	ရွှေတောင်ကုမ္ပဏီ	22/11/23	09.255112044	
၂	ဦးနိုင်ဇော်အောင်	Junior Engineer	"		09.25511375	
၃	ဦးဝင်းလှိုင်	Security	"		09.269632226	
၄	ဦးထွန်းထွန်းမြင့်	Skill labour	"		09.966145344	
၅	ဦးစည်သူလှိုင်	Skill labour	"		09.266954120	
၆	ဦးကျော်ကျော်ဦး	Skill labour	"		09.255113789	
၇	ဦးဝင်းငွေဦး	Skill labour	"		09.400991210	
၈	ဦးကျော်ကျော်	Skill labour	"		09.454612574	
၉	" စိုးလှိုင်	Skill labour	ကုန်းချော		09-969459077	
၁၀	" လှလေး	လုပ်ငန်းရှင်	ကျေးဝါနီ		09.2011513	

22.Nov.2023

SHWE TAUNG

Shwe Taung Development Co., Ltd ၏ ဆောက်လုပ်ရေးလုပ်ငန်းသုံး ကျောက်ထုတ်လုပ်ခြင်းလုပ်ငန်း၏

အများပြည်သူအားချပြခြင်းနှင့် တွေ့ဆုံဆွေးနွေးခြင်း တက်ရောက်သူများစာရင်း

SEE-Trust

စဉ်	အမည်	ရာထူး	ဌာန/ လိပ်စာ	လက်မှတ်	ဖုန်းနံပါတ်	မှတ်ချက်
၁	ဦးဦးဝင်း	ဒုတိယညွှန်ကြားရေးမှူး	E.C.D		09 97691124 3.	
၂	ဒေါ်စောပြည့်မွန်	ဒု-ဦးစီးမှူး	E.C.D		09 402665491	
၃	ဦးကျော်မျိုးသူ	ဒု-ဦးစီးမှူး	E-C-D		09-784534074	
၄	ဦးစိုးလင်း	Mgr (SEE-Trust) (Third Party)	ရေနံချောင်း		09 797944051	
၅	ဦးပိုင်စိုးအောင်	Field Officer.	SEE-Trust		09-964774468	
၆						
၇						
၈						
၉						
၁၀						

Appendix (P)

Record Photos

Report Review Form

Report Title: Environmental Impact Assessment (EIA) Report For Quarry Production Project	
Report Version : 00 Version	
Proponent: Shwe Taung Development Co., Ltd. Ahlone Tower, Strand Road, Riverview Garden housing Phone: 09-255111966	**Prepared by:** SEE-Trust Naywunmyat(s) Co., Ltd No(42), Pyinnyar tazaung Street ,Quarter (43), North Dagon Township, Yangon, Myanmar. Phone: 0950 63446 / 09 971444413 / 01 3510442

Prepared by : U Soe Win Htoon	**Position:** Principal Consultant
	Signature: 
Checked by: U Paing Soe Aung	**Position:** Program Officer
	Signature: 
Approved by: U Zaw Win	**Position:** Managing Director
	Signature: