STUDY PERIOD – DEC. 2013 TO FEB 2014 NON FOREST LAND

ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENTAL MANAGEMENT PLAN

NAME OF THE MINE – NEW UMRANGSHU LIMESTONE MINE
NEAR VILLAGE – NEW UMRANGSHU, TEHSIL- UMRAMGSHU
DISTT – DIMA HASAO (N.C. HILLS), ASSAM
LEASE AREA– 200.00 HECT,
PROJECT COST – 260 LAC
CATEGORY - "A"

PURPOSE :

1. Amalgamation & Renewal of Mining Lease
2. Proposed Production -4,44,500 tonnes/annum (ROM)

LESSEE

M/s ASSAM MINERAL DEVELOPMENT CORPORATION LTD
KHANIJ BHAWAN, BEHIND SAHJAHAN MARKET,
NEAR GANESH MANDIR, R.P. ROAD, DISPUR
GUWAHATI- 781001, ASSAM
Ph. 91-361-2384078 (Off.)
Email- amdcghy@rediffmail.com

EIA CONSULTANT

M/s UDAIPUR MINTECH PVT. LTD.
206, APEKSHA COMPLEX. SEC.-11
HIRAN MAGRI, UDAIPUR (RAJ.) – 313002
Ph. 91-294-2489672 (Off.),+919414167672 (M)
Email- ssbist@udrmintech.com

ACCREDITED BY NABET UNDER "A" CATEGORY FOR OPEN CAST MINES
S.NO. 154 DATED 05.05.2014

QCI – NABET Scheme for Accreditation of EIA Consultant Organizations *Annexure I-A*

Name of the Consultant: Udaipur Min-Tech Pvt. Ltd.

206, "Apeksha Complex",
Sector 11, Hiran Magri,
Udaipur- 313002

Sectors Approved – 01 Nos.

Sl. No.	Sector No.	Name of Sector	Category** A/B
1	1	Mining of minerals (Opencast only)	A

Total = 01 Sector*

***Sectors allocated to individual EIA Coordinators are mentioned in Annexure I-B**

(Vipin Sahni)
Director

CONTENTS

CHAPTER NO.	PARTICULARS	PAGE NO.
	COMPLIANCE TO TERM OF REFERENCE (TOR)	11-20
I	INTRODUCTION	22-33
II	PROJECT DESCRIPTION	34-52
III	DESCRIPTION OF THE ENVIRONMENT	53-120
IV	ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES	121-132
V	ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)	133
VI	ENVIRONMENTAL MONITORING PROGRAM	134-138
VII	ADDITIONAL STUDIES	139-144
VIII	PROJECT BENEFITS	145-147
IX	ENVIRONMENTAL MANAGEMENT PLAN	148-170
X	SUMMARY & CONCLUSION	171-174
XI	DISCLOSURE OF CONSULTANTS ENGAGED	175-179

INDEX

S. NO.	PARTICULAR	PAGE NO.
	CHAPTER – I	
	INTRODUCTION	**22-33**
1.1	PURPOSE OF REPORT	22
1.2	PROJECT PROPONENT	23
1.3	BRIEF PROJECT DESCRIPTION	25
1.4	PRODUCTION DETAILS	26
1.5	LOCATION AND COMMUNICATION	27
1.6	OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN	28
1.7	MARKET POTENTIAL	29
1.8	METHODOLOGY FOR EIA	29
1.9	SCOPE OF THE STUDY	30
1.10	TERMS OF REFERENCE	33
	CHAPTER – II	
	PROJECT DESCRIPTION	**34-52**
2.1	BRIEF DESCRIPTION & NATURE OF PROJECT	34
2.2	NEED OF THE PROJECT	34
2.3	LOCATION OF THE PROJECT	34
2.4	TOPOGRAPHY, DRAINAGE PATTERN	34
2.5	DEMAND-SUPPLY GAP	35
2.6	DOMESTIC/EXPORT MARKET	36
2.7	REGIONAL GEOLOGY	36
2.8	ESTIMATION OF RESERVES & MINEABLE RESERVES	40
2.9	PROPOSED METHOD OF MINING	45
2.10	EXTENT OF MECHANIZATION	45
2.11	QUANTUM OF DEVELOPMENT & TONNAGE OF PRODUCTION	49
2.12	USE OF MINERALS	49
2.13	UTILITIES AND PROPOSED SITE FACILITIES	50
	CHAPTER – III	
	DESCRIPTION OF THE ENVIRONMENT	**53-120**
3.1	GENERAL	53
3.2	STUDY AREA AT A GLANCE	54
3.3	TOPOGRAPHY	56
3.4	CLIMATIC CONDITION	58
3.5	PHYSIOGRAPHY	58
3.6	HUMAN SETTLEMENT	61
3.7	HYDROLOGICAL ASPECT	61
3.8	ATMOSPHERIC CONDITION	62
3.9	METEOROLOGY	62

3.10	AMBIENT AIR ENVIRONMENT	66
3.11	NOISE ENVIRONMENT	73
3.12	SOIL ENVIRONMENT	78
3.13	WATER ENVIRONMENT	81
3.14	BIOLOGICAL ASPECTS	86
3.15	LAND ENVIRONMENT	103
3.16	SOCIO – ECONOMIC ENVIRONMENT	109
3.17	SOCIO-ECONOMIC SURVEY	118
CHAPTER – IV		
ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES		**121-132**
4.1	INTRODUCTION	121
4.2	TOPOGRAPHY & DRAINAGE	122
4.3	IMPACT ON CLIMATE	122
4.4	IMPACT ON AIR ENVIRONMENT	123
4.5	IMPACT ON NOISE LEVEL	125
4.6	IMPACT ON WATER QUALITY	125
4.7	IMPACT ON FLORA	127
4.8	IMPACT ON FAUNA	128
4.9	IMPACT ON LAND ENVIRONMENT	128
4.10	IMPACT ON SOIL	130
4.11	IMPACT ON SOCIO-ECONOMIC ENVIRONMENT	130
4.12	STRUCTURED ENVIRONMENT MANAGEMENT ACTION PLAN	131
CHAPTER –V		
ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)		**153**
5.1	SITE ALTERNATIVES	153
5.2	TECHNOLOGY ALTERNATIVE	153
CHAPTER – VI		
ENVIRONMENTAL MONITORING PROGRAMME		**134-138**
6.1	INTRODUCTION	134
6.2	PROPOSED SET UP	135
6.3	ENVIRONMENT MANAGEMENT CELL	135
6.4	ENVIRONMENTAL POLICY	135
6.5	MONITORING SCHEDULE AND PARAMETERS	137
6.6	BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT	137
CHAPTER – VII		
ADDITIONAL STUDIES		**139-144**
7.1	INTRODUCTION	139
7.2	POSSIBLE DISASTERS TOGETHER WITH CORRECTIVE AND REMEDIAL MEASURES	140
7.3	CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUANCE	141

7.4	SOCIAL IMPACT ASSESSMENT , R&R ACTION PLAN	143
7.	DISASTER PREVENTION MEASURES	143
CHAPTER – VIII		
PROJECT BENEFITS		**145-147**
8.1	INTRODUCTION	145
8.2	IMPROVEMENT IN SOCIAL INFRASTRUCTURE	145
8.3	IMPROVEMENT IN PHYSICAL INFRASTRUCTURE	145
8.4	HEALTH AND SAFETY	146
8.5	EMPLOYMENT POTENTIAL	146
8.6	CONCLUSION	147
CHAPTER – IX		
ENVIRONMENT MANAGEMENT PLAN		**148-170**
9.1	INTRODUCTION	148
9.2	LAND RECLAMATION	149
9.3	AIR POLLUTION CONTROL MEASURES	151
9.4	NOISE POLLUTION CONTROL MEASURES	153
9.5	WATER POLLUTION CONTROL MEASURES	155
9.6	CONTROL MEASURES OF ECOLOGICAL FACTOR	156
9.7	STABILIZATION & VEGETATION OF DUMPS	157
9.8	TREATMENT & DISPOSAL OF WATER FROM MINE	158
9.9	SOIL CONSERVATION MEASURES	158
9.10	PROGRAMME OF AFFORESTATION	159
9.11	MEASURES FOR PROTECTING HISTORICAL MONUMENTS & REHABILITATION	165
9.12	MEASURES TO IMPROVE SOCIAL – ECONOMIC CONDITION	165
9.13	CORPORATE SOCIAL RESPONSIBILITIES	167
9.14	OCCUPATIONAL SAFETY & HEALTH	167
9.15	TRAINING AND HUMAN RESOURCES DEVELOPMENT	168
9.16	ENVIRONMENT MANAGEMENT CELL	169
CHAPTER – X		
SUMMARY & CONCLUSION		**171-174**
10.1	INTRODUCTION	171
10.2	AVAILABILITY OF FUNDS FOR ENVIRONMENTAL PROTECTION MEASURES	171
10.3	DETAILS OF THE PROJECT	172
10.4	IMPLEMENTATION SCHEDULE	172
10.5	BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT	173
10.6	GREENBELT DEVELOPMENT	174
10.7	RECOMMENDATION	174
CHAPTER-XI		
DISCLOSURE OF CONSULTANTS ENGAGED		**175-179**

LIST OF TABLES

TABLE NO.	PARTICULAR	PAGE NO.
1.1	LIST OF BOARD OF DIRECTORS	24
1.2	PRODUCTION DETAILS	26
1.3	PROJECT DETAILS	26
1.4	DATA GENERATION	30
2.1	LOCATION OF THE PROJECT	34
2.2	REGIONAL STRATIGRAPHIC SEQUENCE	36
2.3	LOCAL STRATIGRAPHIC SEQUENCE	38
2.4	CHEMICAL COMPOSITION	40
2.5	MEASURED MINERAL RESOURCES	41
2.6	RESERVE CALCULATION	41
2.7	PRESENTATION OF MINERAL LIMESTONE RESOURCES	44
2.8	MINEABLE RESOURCES	44
2.9	OPERATING PARAMETERS	46
2.10	EQUIPMENT REQUIRED	47
2.11	BLASTING PARAMETERS	47
2.12	PRODUCTION & WASTE GENERATION	49
2.13	CHEMICAL SPECIFICATIONS	50
2.14	PEAK WATER REQUIREMENT	
3.1	STUDY AREA AT A GLANCE	54
3.2	MEAN TEMPERATURE & RELATIVE HUMIDITY RECORDS FROM IMD STATION	63
3.2A	TEMPERATURE RECORDS AND RELATIVE HUMIDITY AT MINE SITE	63
3.3	LOCATION OF AMBIENT AIR MONITORING STATIONS	66
3.4	PROCEDURE FOR DETERMINING VARIOUS AIR QUALITY PARAMETERS	68
3.5	AMBIENT AIR QUALITY (PM10 24- HR CONC.)	69
3.6	AMBIENT AIR QUALITY (SOX 24- HR CONC.)	70
3.7	AMBIENT AIR QUALITY (NOX 24- HR CONC.)	71
3.8	COMPARISON OF AIR MONITORING RESULTS	72
3.9	LOCATION OF NOISE MONITORING STATIONS	74
3.10	NOISE LEVEL WITHIN THE STUDY AREA	76
3.11	CPCB NOISE STANDARDS	76
3.12	TRAFFIC DENSITY	77
3.13	LOCATION OF SOIL MONITORING STATIONS	79
3.14	SOIL SAMPLE ANALYSIS	81
3.15	GROUND & SURFACE WATER SAMPLING LOCATION	83
3.16	ANALYSIS RESULTS OF GROUND WATER SAMPLE	85

3.17	ANALYSIS RESULTS OF SURFACE WATER SAMPLE	86
3.18	LIST OF PLANT SPECIES RECORDED IN THE STUDY AREA	94
3.19	LIST OF MEDICINAL PLANTS SPECIES OBSERVED IN THE STUDY AREA	98
3.20	LIST OF FAUNA SPECIES OBSERVED IN THE STUDY AREA	99
3.21	LIST OF BIRD SPECIES OBSERVED IN THE STUDY AREA	101
3.22	LAND USE PATTERN ON SATELLITE IMAGE	106
3.23	LAND USE PATTERN – PRE OPERATIONAL, OPERATIONAL & POST OPERATIONAL PHASE	109
3.24	DEMOGRAPHIC STRUCTURE	112
3.25	LITERATE AND ILLITERATE POPULATION DETAILS	113
3.26	EMPLOYMENT PATTERN	115
3.27	MAIN WORKER EMPLOYMENT PATTERN	116
4.1	LAND USE PATTERN – PRE OPERATIONAL, OPERATIONAL & POST OPERATIONAL PHASE	129
4.2	ENVIRONMENTAL MANAGEMENT MATRIX	131
6.1	MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS	137
6.2	COST OF ENVIRONMENT PROTECTION MEASURES	138
8.1	EMPLOYMENT POTENTIAL	146
9.1	LAND USE OF ML AT THE END OF LEASE PERIOD	150
9.2	RECLAIMED LAND IN DIFFERENT STAGES	151
9.3	WASTE GENERATION DURING PLAN PERIOD	157
9.4	STAGE WISE PLANTATION PROGRAMME	160
9.5	SCHEDULE OF PLANTATION	160
9.6	STAGE WISE PLANTATION PROGRRAME	162
10.1	PROJECT DETAILS	172
10.2	MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS	173
10.3	COST OF ENVIRONMENTAL PROTECTION MEASURES	173

LIST OF FIGURES

FIG NO.	PARTICULAR	PAGE NO.
2.1	WATER BALANCE DIAGRAM	51
3.1	TOPOGRAPHY MAP OF THE STUDY AREA	57
3.2	DRAINAGE PATTERN OF THE STUDY AREA	60
3.3	WIND ROSE DIAGRAM	65
3.4	AIR MONITORING SAMPLING LOCATION MAP	67
3.5	NOISE AND TRAFFIC DENSITY MONITORING SAMPLING LOCATION MAP	75
3.6	SOIL MONITORING SAMPLING LOCATION MAP	80
3.7	SCHEMATIC REPRESENTATION OF SITE ELEVATION, ULTIMATE DEPTH & GROUND WATER	82
3.8	WATER SAMPLING LOCATION MAP	84
3.9	PHOTOGRAPH OF MINE LEASE AREA	88
3.10	VEGETATION OBSERVED IN THE LEASE AREA	93
3.11	LAND USE PATTERN OF THE STUDY AREA	107
3.12	SATELLITE IMAGE OF THE STUDY AREA	108
3.13	POPULATION DETAILS IN THE STUDY AREA	114
3.14	SEX RATIO IN THE STUDY AREA	114
3.15	LITERATE & ILLITERATE POPULATION IN THE STUDY AREA	114
3.16	EMPLOYMENT PATTERN IN THE STUDY AREA	117
3.17	MAIN WORKER EMPLOYMENT PATTERN IN THE STUDY AREA	117
4.1	WIND ROSE DIAGRAM	124
6.1	ENVIRONMENT MANAGEMENT CELL	135

LIST OF ANNEXURE

ANNEX NO.	PARTICULAR	PAGE NO.
I	COPY OF TOR LETTER	181-187
II	COPY OF CERTIFICATE OF INCORPORATION OF THE COMPANY	188
III	COPY OF BOARD RESOLUTION IN FAVOR OF NOMINATED OWNER	189
IV	COPY OF LIST OF BOARD OF DIRECTORS	190
V	COPY OF PHOTO ID AND ADDRESS PROOF OF THE NOMINATED OWNER	191
VI	COPY OF LEASE GRANT ORDER OF 33 HA. LAND	192-193
VII	COPY OF LEASE DEED FOR 33 HA.	194-231
VIII	COPY OF LEASE GRANT ORDER OF 167 HA. LAND	232-234
IX	COPY OF LEASE DEED FOR 167 HA.	235-276
X	COPY OF APPROVAL LETTER FOR AMALGAMATION OF LEASES	277-282
XI	DISCLOSER OF CONSULTANTS	283-285

LIST OF PLATES

PLATE NO.	PARTICULAR
1	LOCATION MAP
2	KEY PLAN
3	SURFACE PLAN
4A	GEOLOGICAL PLAN & SECTIONS
4B	GEOLOGICAL SECTIONS
5A	SURFACE LAYOUT PLAN
5B	LAYOUT SECTIONS
6	CONCEPTUAL PLAN & SECTIONS

POINTS TO BE CLARIFIED TO THE MINISTRY OF ENVIRONMENT & FORESTS, GOVT OF INDIA AS PER THE APPROVED TOR FOR NEW UMRANGSHU LIMESTONE MINE OF M/S ASSAM MINERAL DEVELOPMENT CORPORATION LTD. ASSAM, LEASE AREA 200.00 HECTARE.

<table>
<tr><th>S. No.</th><th>SUGGESTED TOR BY EAC</th><th>COMPLIANCE</th></tr>
<tr><td>1</td><td>Year-wise production details since 1994 should be given, clearly stating the Highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.</td><td>
<table>
<tr><th>Year</th><th>M.T.</th><th>Year</th><th>M.T.</th></tr>
<tr><td>1994-95</td><td>21887.950</td><td>2003-04</td><td>--</td></tr>
<tr><td>1995-96</td><td>99056.470</td><td>2004-05</td><td>--</td></tr>
<tr><td>1996-97</td><td>69478.200</td><td>2005-06</td><td>700.000</td></tr>
<tr><td>1997-98</td><td>45748.700</td><td>2006-07</td><td>2720.100</td></tr>
<tr><td>1998-99</td><td>25817.370</td><td>2007-08</td><td>23813.190</td></tr>
<tr><td>1999-00</td><td>47250.000</td><td>2008-09</td><td>19783.280</td></tr>
<tr><td>2000-01</td><td>39233.571</td><td>2009-10</td><td>44882.190</td></tr>
<tr><td>2001-02</td><td>29584.250</td><td>2010-11</td><td>39120.220</td></tr>
<tr><td>2002-03</td><td>--</td><td>2011-12</td><td>40793.09*</td></tr>
</table>
*upto December, 2011
Year- wise production details since 1994-95 is given in Chapter I, para. 1.4 table 1.2 on page no. 26 of EIA-EMP Report.</td></tr>
<tr><td>2</td><td>A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.</td><td>Copy of the document in support of the fact that the proponent is the rightful lessee of the mine details is given in Annexure II to X of EIA-EMP Report.</td></tr>
<tr><td>3</td><td>All document including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.</td><td>Copy of the document in support of the fact that the proponent is the rightful lessee of the mine details is given in Annexure II to X of EIA-EMP Report. During the plan period about 481840 cum. waste generated and management with A stone parapet wall will be constructed all around the waste dump. The wall will prevent any roll out of stones from dump. A garland drain will also be constructed all around the dump. This drain will arrest any wash out from the dump reaching the natural drainage system. For more details is given in Chapter IX, para. 9.7 on page no. 157 of EIA-EMP Report.</td></tr>
<tr><td>4</td><td>All corner coordinates of the mine lease area, superimposed on a high Resolution Imagery / toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).</td><td>All corner coordinates of the mine lease area, superimposed on a high Resolution Imagery / toposheet is incorporated. For more details please refer Chapter III, para. 3.15.1, fig. 3.11 & 3.12on page no. 107 to 108 of EIA-EMP Report. Also refer plate of surface plan.</td></tr>
<tr><td>5</td><td>Does the company have a well laid down Environment policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process / procedures to bring in to focus any infringement / deviation/</td><td>M/s. AMDC is committed to providing a quality in a manner that ensure a safe and healthy workplace for employees and minimize potential impact on the environment. For more details about the company policy and environment management cell is given in Chapter VI, para 6.2, 6.3 & 6.4 on page no. 134 to 135 of EIA-EMP Report.</td></tr>
</table>

<table>
<tr><td></td><td>violation of the Environmental or forest norms/ conditions. The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions details of this system may be given. The system of reporting of non-compliance / violations of environmental norms to the Board of Directors of the Company and / or shareholders or stakeholders at large may also be detailed in the EIA report.</td><td>Board of directors of the company details given in Chapter I, para. 1.2, table 1.1 on page no. 24 & also Annexure No. IV of EIA-EMP Report.</td></tr>
<tr><td>6</td><td>Issues relating to the mine safety, including subsidence study, blasting study etc. should be detailed. The proposed safeguard measures in each case should be provided.</td><td>All safety measures as prescribed under MMR 1961 and circulars issued by DGMS. For more details of blasting study and management is given in Chapter II, para. 2.10.1 on page no. 47 of EIA-EMP Report.</td></tr>
<tr><td>7</td><td>The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine/ lease period.</td><td>The study area comprises of 10 km zone around the mine lease boundary year-wise accretions of overburden is given below:
<table>
<tr><th rowspan="2">Year</th><th colspan="2">Waste in cum</th></tr>
<tr><th>In-situ volume</th><th>Broken rock volume</th></tr>
<tr><td>I</td><td>109870</td><td>142831</td></tr>
<tr><td>II</td><td>70150</td><td>91195</td></tr>
<tr><td>III</td><td>99910</td><td>129883</td></tr>
<tr><td>IV</td><td>106390</td><td>138307</td></tr>
<tr><td>V</td><td>95480</td><td>124124</td></tr>
<tr><td>Total</td><td>481800</td><td>626340</td></tr>
</table>
Waste generated during plan period and afterwards will be stored at the proposed site. A stone parapet wall will be constructed all around the waste dump. The wall will prevent any roll out of stones from dump. A garland drain will also be constructed all around the dump. This drain will arrest any wash out from the dump reaching the natural drainage system. There is no proposal for backfilling. For more details please refer Chapter IX, para. 9.7 on page no. 157 of EIA-EMP Report.</td></tr>
<tr><td>8</td><td>Land use of the study area delineating forest area, Agricultural land, Grazing, Wildlife Sanctuary , National Park , Migratory routes of fauna, Water bodies , Human settlement and other Ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre-operational, operational and post operational phase and submitted.</td><td>Land use of the study area delineating forest area, water bodies, open scrub land, Fallow land, Habitation, Open Degraded land based on satellite image.
<table>
<tr><th>Class Names</th><th>Area (Ha.)</th><th>% (Area)</th></tr>
<tr><td>Water Bodies</td><td>1082.79</td><td>2.57</td></tr>
<tr><td>Open Scrub Land</td><td>1152.00</td><td>2.74</td></tr>
<tr><td>Fallow Land</td><td>3190.59</td><td>7.58</td></tr>
<tr><td>Habitation</td><td>566.28</td><td>1.34</td></tr>
<tr><td>Forest</td><td>25603.02</td><td>60.79</td></tr>
<tr><td>Open Degraded</td><td>10522.44</td><td>24.98</td></tr>
<tr><td>Total</td><td>42117.12</td><td>100</td></tr>
</table>
For more details please refer Chapter III, para.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>3.15.1, on page no. 103 of EIA-EMP Report.
Land use plan of the mine lease area is prepared to encompass pre-operational, operational and post operational phase is given below.
All figures in Hect.
<table>
<tr><th>Description</th><th>Existing</th><th>At the end of 5th year</th><th>At the end of lease period</th></tr>
<tr><td>Pits</td><td>6.390</td><td>26.040</td><td>90.720</td></tr>
<tr><td>Waste Dump</td><td>3.190</td><td>6.200</td><td>10.000*</td></tr>
<tr><td>Road & Building</td><td>2.138</td><td>3.010</td><td>4.000</td></tr>
<tr><td>Plantation</td><td>5.180</td><td>15.180</td><td>27.800**</td></tr>
<tr><td>Remaining Land</td><td>183.102</td><td>149.570</td><td>67.480</td></tr>
<tr><td>Total area</td><td>200.00</td><td>200.00</td><td>200.00</td></tr>
</table>
*About 10 hect area will be planted on waste dump area. **About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office).Total 37.80 hect area will be planted at the end of lease period. For more details is given in Chapter III, para. 3.15.2, table 3.23 on page no. 109 of EIA-EMP Report.</td></tr>
<tr><td>9</td><td>Details of the land for Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.</td><td>About 10 hect. area will be used for dump, no outside dump area is proposed & no R&R plan required.</td></tr>
<tr><td>10</td><td>A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of the forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forest , the site may be inspected by the State Forest Department along with the Regional office of the Ministry to ascertain the status of forest , based on which , the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to Assist the Expert Appraisal Committees.</td><td>The lease area is govt. waste land. A biological study of the project is incorporated. Please refer Chapter III, para. 3.14, on page no. 86 of EIA-EMP Report.</td></tr>
<tr><td>11</td><td>Status of forestry clearance for the broken up area and virgin forestland involved in the project including deposition of net present</td><td>There is no forest land within the lease area. Hence, no forest clearance is required.</td></tr>
</table>

	value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	
12	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	The lease area is Govt. waste land.
13	The vegetation in the RF/ PF areas in the study area, with necessary details, should be given	Krungming Reserve Forest is about 2.0 km in west direction of the mining lease area.
14	A study shall be got done to ascertain the impact of the mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.	Krungming Reserve Forest is about 2.0 km in west direction of the mining lease area. Krungming RF will not be affected due to mining activity. The impact of the project in the core zone area i.e. land degradation, dumping etc.
15	Location of National parks , Sanctuaries, Biosphere Reserves, Wildlife Corridors , Tiger/ Elephant Reserves / Critically Polluted Areas / Aravali (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated , supported by a location map duly authenticated by Chief Wildlife Warden .Necessary clearance , as may be applicable to such project due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the State Wildlife Department / Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.	No National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves / Critically Polluted Areas / Aravali (existing as well as proposed) within 10 km of the mine lease area. Krungming Reserve Forest is about 2.0 km in west direction of the mining lease area in the buffer zone. So no clearance is required by Chief Wildlife Warden.
16	A detailed biological study of the study area [core zone & buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora & fauna, duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled –I fauna found in the study area , the necessary plan for their conservation should be	A detailed biological study of the study area [core zone & buffer zone (10 km radius of the periphery of the mine lease)] has been carried out. Details of flora & fauna based on such primary field survey given in report. For details please refer Chapter III, para. 3.14 on page no. 86 -102 of EIA-EMP Report.

<table>
<tr><td></td><td>prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.</td><td></td></tr>
<tr><td>17</td><td>Impacts, if any, of change of land use should be given.</td><td>Topography of the surrounding area will remain unchanged. While that of mining lease area will change due to mining, excavation, dumping.
<table>
<tr><td colspan="2">POST MINING LAND USE OF CORE ZONE</td></tr>
<tr><td>Activity</td><td>Area In Ha.</td></tr>
<tr><td>Pits</td><td>90.720***</td></tr>
<tr><td>Waste Dump</td><td>10.000*</td></tr>
<tr><td>Road & Building</td><td>4.000</td></tr>
<tr><td>Plantation</td><td>27.800**</td></tr>
<tr><td>Agriculture land</td><td>--</td></tr>
<tr><td>Mineral stack</td><td>--</td></tr>
<tr><td>Remaining Land</td><td>67.480</td></tr>
<tr><td>Total area</td><td>200.00</td></tr>
</table>
Total 37.80 hect area will be planted at the end of lease period. At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt. For more details please refer Chapter IX, para. 9.2, table 9.1 on page no. 150 of EIA-EMP Report.</td></tr>
<tr><td>18</td><td>R&R plan / compensation details for the project Affected People (PAP) should be furnished. While preparing the R&R plan, the relevant State / National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs/ STs and other weaker sections of the society in the study area, a need based sample survey , family –wise , should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectrol programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R& R and socio – economic aspects should be discussed</td><td>No R&R plan is required the socio-economic study is given in Chapter III, para. 3.16 on page no. 109 of EIA-EMP Report.
<table>
<tr><td>Total population</td><td>12869</td></tr>
<tr><td>No. of HH</td><td>2865</td></tr>
<tr><td>Total male</td><td>6890</td></tr>
<tr><td>Total female</td><td>5979</td></tr>
<tr><td>Scheduled cast</td><td>465 (4%)</td></tr>
<tr><td>Scheduled tribe</td><td>5676 (44%)</td></tr>
<tr><td>Literacy rate</td><td>9488 (74%)</td></tr>
<tr><td>Male literate</td><td>5397 (57%)</td></tr>
<tr><td>Female literate</td><td>4091 (43%)</td></tr>
<tr><td>Illiterate</td><td>3381 (26%)</td></tr>
</table></td></tr>
<tr><td>19</td><td>One season (non-monsoon)</td><td>One season (non-monsoon) in winter season</td></tr>
</table>

	primary baseline data on ambient air quality (PM_{10} SO_2 , & NO_x), water quality , noise level , soil and flora & fauna shall be collected and the AAQ & other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the predominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM_{10}, particularly for free silica, should be given.	(December, 2013 to February, 2014) primary baseline data on ambient air quality (PM_{10} SO_2, & NO_x), water quality, noise level, soil and flora & fauna has been collected. Site specific meteorological data also collected for more details please refer Chapter III, on page no. 53 to 120 of EIA-EMP Report. AAQ station in the study area is given in para. 3.10, fig. 3.4 on page no. 67.
20	Air quality modeling should be carried out for prediction of impact of the Project on the air quality of the area. It should also take in to account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air quality modeling has been carried out for prediction of impact of the project on the air quality of the area. For more details is given in Chapter IV, para. 4.4 on page no. 123 & Air sampling station is mark in Chapter III, fig.3.4 on page no. 67 of EIA-EMP Report.
21	The water requirement for the project, its availability and sources should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Water requirement for the project is 12.0 KLD and its availability from dug well/tube well outside the lease area. Drinking 2.0 KLD Dust suppression 5.5 KLD Plantation 4.5 KLD Total 12.0 KLD A detailed water balance diagram and for more details please refer Chapter II, para 2.13, on page no. 50 of EIA-EMP Report.
22	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.	The water requirement for the project will be fulfilled by dug well/tube well outside the lease area. So no clearance is required from competent authority.
23	Description of water conservation measures proposed to be adopted in the project should be given. Details of rainwater harvesting proposed in the project, if any,	About 56.820 hect. area will be used as a water reservoir at the end of lease period. For more details is given in Chapter IX, para. 9.5.3 on page no. 156 of EIA-EMP Report.

<table>
<tr><td></td><td>should be provided.</td><td></td></tr>
<tr><td>24</td><td>Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required should be provided.</td><td>During the mine operation surface water body will not be disturbed and not intersect the water table. So no measures are required.</td></tr>
<tr><td>25</td><td>Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data documentation in the regard may be provided. In case the working will intersect ground water table, a detailed Hydro Geological Study should be undertaken and report furnished. Necessary permission from Central Ground Water Authority for working below ground water and pumping of ground water should also be obtained and copy furnished.</td><td>No water table intersects while mining, hence no hydrological study is required. No permission is required from Central Ground Water Authority for working below ground water and pumping of ground water.
<table>
<tr><th>Highest elevation</th><th>Lowest elevation</th><th>Ultimate depth</th><th>Water level</th></tr>
<tr><td>445 mRL</td><td>315 mRL</td><td>304 mRL (11 m BGL)</td><td>295 mRL (20 m bgl) Post monsoon
290 mRL (25 m bgl) post monsoon</td></tr>
</table>
For more details please refer Chapter III, para. 3.13.2 fig. 3.7 on page no. 82 of EIA-EMP Report.</td></tr>
<tr><td>26</td><td>Details of any stream, seasonal or otherwise, passing through the lease area and modification/ diversion proposed, if any, and the impact of the same on the hydrology should be brought out.</td><td>No diversion, modification is proposed of any stream. For details please refer Chapter III, para. 3.3 fig. 3.1 on page no. 57 of EIA-EMP Report.</td></tr>
<tr><td>27</td><td>Information on site elevation, working depth, groundwater table etc. should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.</td><td>
<table>
<tr><th>Highest elevation</th><th>Lowest elevation</th><th>Ultimate depth</th><th>Water level</th></tr>
<tr><td>445 mRL</td><td>315 mRL</td><td>304 mRL (11 m BGL)</td><td>295 mRL (20 m bgl) Post monsoon 290 mRL (25 m bgl) post monsoon</td></tr>
</table>
Information on site elevation, working depth, groundwater table has been incorporated both in AMSL and bgl.
For more details please refer Chapter III, para. 3.13.2 fig. 3.7 on page no. 82 of EIA-EMP Report.</td></tr>
<tr><td>28</td><td>Quantity of solid waste generation should be estimated and details for its disposal and management provided. The quantity, volumes and and methodology planed for renewal and utilization (preferably concurrently) of top soil should be indicated. Details of backfilling proposed, if any, should also be given. It may be clearly indicated that out of the total waste generated during the mine life, how much quantity would be backfilled and how much quantity would be disposed off in the form of external dumps (number of</td><td>The year-wise accretions of overburden are given below:
<table>
<tr><th rowspan="2">Year</th><th colspan="2">Waste cum.</th></tr>
<tr><th>In-situ volume</th><th>Broken rock volume</th></tr>
<tr><td>I</td><td>109870</td><td>142831</td></tr>
<tr><td>II</td><td>70150</td><td>91195</td></tr>
<tr><td>III</td><td>99910</td><td>129883</td></tr>
<tr><td>IV</td><td>106390</td><td>138307</td></tr>
<tr><td>V</td><td>95480</td><td>124124</td></tr>
<tr><td>Total</td><td>481800</td><td>626340</td></tr>
</table>
Waste generated during plan period and afterwards will be stored at the proposed site. A stone parapet wall will be constructed all around the waste dump. The wall will prevent any roll out of stones from dump. A garland drain will</td></tr>
</table>

<table>
<tr><td></td><td>dumps, their height, slopes and terraces to be brought out).</td><td>also be constructed all around the dump. This drain will arrest any wash out from the dump reaching the natural drainage system. There is no proposal for backfilling. At the end of plan period, about 6.2 hect area under waste dumps. For more details please refer Chapter IX, para. 9.7 on page no. 157 of EIA-EMP Report.</td></tr>
<tr><td>29</td><td>A time bound Progressive Greenbelt Development plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project.</td><td>
<table>
<tr><td rowspan="2">Year
Stage</td><td colspan="5">Afforestation in Hectare</td><td rowspan="2"></td></tr>
<tr><td>Peripheral</td><td>Dump area</td><td>Barren Land</td><td>On Mined out benches</td><td>Along the nallah</td><td>No. of plants</td></tr>
<tr><td>Present</td><td>--</td><td>--</td><td>5.18</td><td>--</td><td>--</td><td>5180</td></tr>
<tr><td>Operational Phase</td><td>4.918</td><td>--</td><td>5.18</td><td>--</td><td>5.082</td><td>15180</td></tr>
<tr><td>End of Lease Period</td><td>4.918</td><td>10.00</td><td>5.5</td><td>4.5</td><td>7.8</td><td>22620</td></tr>
</table>
At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt. For more details please refer Chapter IX, para. 9.2, table 9.1 on page no. 150 of EIA-EMP Report.</td></tr>
<tr><td>30</td><td>Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.</td><td>No major impact on local transport infrastructure due to the project.
<table>
<tr><td>Traffic vehicle</td><td>No. of vehicles per day at</td></tr>
<tr><td>H.M.V.</td><td>086</td></tr>
<tr><td>L.M.V.</td><td>118</td></tr>
<tr><td>2/3 wheelers</td><td>134</td></tr>
<tr><td>Grand Total</td><td>338</td></tr>
</table>
For more details of the traffic density is given in Chapter III, para. 3.11.4 on page no. 77 of EIA-EMP Report.</td></tr>
<tr><td>31</td><td>Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.</td><td>Details of the onsite shelter and facilities will be provided as per mines rules to the mine workers. For more details please refer Chapter II, para. 2.13 on page no. 50 of EIA-EMP Report.</td></tr>
<tr><td>32</td><td>Conceptual post mining land use and reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA Report.</td><td>
<table>
<tr><td rowspan="2">Year
Stage</td><td colspan="5">Afforestation in Hectare</td><td rowspan="2"></td></tr>
<tr><td>Peripheral</td><td>Dump area</td><td>Barren Land</td><td>On Mined out benches</td><td>Along the nallah</td><td>No. of plants</td></tr>
<tr><td>Present</td><td>--</td><td>--</td><td>5.18</td><td>--</td><td>--</td><td>5180</td></tr>
<tr><td>Operational Phase</td><td>4.918</td><td>--</td><td>5.18</td><td>--</td><td>5.082</td><td>15180</td></tr>
<tr><td>End of Lease Period</td><td>4.918</td><td>10.00</td><td>5.5</td><td>4.5</td><td>7.8</td><td>22620</td></tr>
</table>
</td></tr>
</table>

		Total 37.80 hect area will be planted at the end of lease period. At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt. For more details please refer Chapter IX, para. 9.2, table 9.1 on page no. 150 of EIA-EMP Report.
33	Phase – wise plan of greenbelt development, plantation and compensatory afforestation should be charged clearly indicating the area to be covered under plantation and species to be planted. The details of plantation already done should be given.	At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt. For more details please refer Chapter IX, para. 9.2, table 9.1 on page no. 150 of EIA-EMP Report.
34	Occupational health impact of the project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.	The Occupational health and safety of all employees will be maintained as per mines rules 1955, chapter – IV-A1. Other preventative measures like rest shelter, drinking water, toilets, rotation of workers exposed to noisy area etc. For more details please refer Chapter IX, para. 9.14 on page no. 166 of EIA-EMP Report.
35	Public health implications of the project and related activities for the populations in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocation.	Public health implications of the project and related activities for the populations in the impact zone will be systematically evaluated details given in Chapter IX, para. 9.13 on page no. 166 and the recurring budgetary allocation for occupational health is 0.75 lack/year. For more details please refer Chapter X, para. 10.5, table. 10.3 on page no. 172 of EIA-EMP Report.
36	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantative dimensions may be given with time frames for implementation.	Measures to improve socio economic conditions will be positive and generated employment for local population, reduction in the migration of jobless laborers from native place to other distant place. About 36 persons will be engaged in mining operations. For more details please refer Chapter IX, para. 9.12 on page no. 165 of EIA-EMP Report.
37	Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use , loss of agriculture and grazing land, if any, occupational health impacts besides other impacts specific to the proposed project.	Detailed environmental management plan to mitigate the environmental impacts has been prepared. For more details please refer Chapter IX on page no. 148 to 169 of EIA-EMP Report.
38	Public hearing points raised and commitment of the project proponent on the same along	Public hearing will be conducted.

<table>
<tr><td></td><td>with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the project.</td><td></td></tr>
<tr><td>39</td><td>Details of litigation pending against the project , if any with direction/ order passed by any Court of Law against the Project should be given.</td><td>No litigation pending against the project.</td></tr>
<tr><td>40</td><td>The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.</td><td>The cost of the project is 260 Lac.
Capital cost for EMP – 28.0 Lac.
Recurring cost for EMP – 7.25 Lac.
For more details the budgetary provision for environmental management for EMP is given in Chapter X, para. 10.5, table 10.3 on page no.172 of EIA-EMP Report.</td></tr>
<tr><td>41</td><td>A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any.</td><td>Not Applicable.</td></tr>
<tr><td>42</td><td>Details of rainwater harvesting proposed, if any, in the project to be provided.</td><td>About 56.820 hect. area will be used as a water reservoir at the end of lease period. For more details is given in Chapter IX, para. 9.5.3 on page no. 156 of EIA-EMP Report.</td></tr>
<tr><td>43</td><td>The reclamation plan, post mine land use and progressive greenbelt development plan shall be prepared in tabular form and submitted.</td><td>The reclamation plan, post mine land use and progressive greenbelt development plan has been prepared in tabular form.
<table>
<tr><td colspan="2">POST MINING LAND USE OF CORE ZONE</td></tr>
<tr><td>Activity</td><td>Area In Ha.</td></tr>
<tr><td>Pits</td><td>90.720***</td></tr>
<tr><td>Waste Dump</td><td>10.000*</td></tr>
<tr><td>Road & Building</td><td>4.000</td></tr>
<tr><td>Plantation</td><td>27.800**</td></tr>
<tr><td>Agriculture land</td><td>--</td></tr>
<tr><td>Mineral stack</td><td>--</td></tr>
<tr><td>Remaining Land</td><td>67.480</td></tr>
<tr><td>Total area</td><td>200.00</td></tr>
</table>
Total 37.80 hect area will be planted at the end of lease period. At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt. For more details please refer Chapter IX, para. 9.2, table 9.1 on page no. 150 of EIA-EMP Report.</td></tr>
</table>

===== **** =====**

ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER - I
INTRODUCTION

Mining Environment and development have become complimentary to each other. As a result of developmental activities visible ill-effects of the environmental degradation are clear and give signals of the concern. Therefore, a sustainable development of the area involving extraction of mineral wealth vis-à-vis protection of environment is the ultimate solution for betterment of mankind.

1.1 PURPOSE OF REPORT

The Environmental Management Plan has been prepared to assess the current environmental scenario of the area and then based on the activities of mining proposed, to carry out Environmental Impact Assessment. The plan will identify and address the impacts, where these are adverse in nature, and thereafter design mitigative measures to manage such impacts in a manner as to conserve environment and ecology of the area. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized if these cannot be prevented altogether.

Environmental clearance is a statutory requirement for the new and old establishment of any mining project of which EIA has to be prepared and submitted to respective agencies of state and center level in line with EIA Notification, 1994.

As per new EIA Notification Dated 14th Sept. 2006, Environmental Clearance is required at the time of fresh grant lease, renewal of mining lease & enhancement of production where the mine lease area is 5.00 hect & above. M/s. Assam Mineral development Corporation Limited (AMDC Ltd.) decided to get Environmental Clearance under renewal category.

Therefore, AMDC Ltd. had submitted application (Form-I and Pre-Feasibility Report) for prior Environmental Clearance (EC) under renewal of mine Category for proposed production 4,44,500 TPA to MOEF, New Delhi , vide letter no. AMDC/P/277/2012-13/937 dated 26.10.2012 and Ministry received the application on 09.11.2012. Presentation of TOR was conducted on 13-15/03.2013 at MoEF, New Delhi. MoEF had released the TOR, vide order no. J-11015/443/2012-IA.II (M), dated 06.12.2013 for preparation of an Environment Impact Assessment (EIA)/EMP Report in respect of the project.

Refer Annexure No. I: Copy of Term of Reference.

1.2 PROJECT PROPONENT

The Assam Mineral Corporation Ltd. (AMDC) is public limited company wholly owned by Govt. of Assam. The company was incorporated on 19.05.1983 under Companies Act 1956; the company is having its registered office at Guwahati, Assam, **Refer Annexure No. II: Copy of Certificate of Incorporation of the Company** having the following aspects:

1. M/s Assam Mineral Development Corporation Limited is planning to excavate limestone ore.
2. The unit is coming up in New Umrangshu area of Dist. - Dima Hasao (North Cachar Hills) of Assam state.
3. The mining process to be adopted by M/s Assam Mineral Development Corporation Ltd will simply be mechanized open cast mining with the use of Excavator for loading of blasted rock
4. The mineral Limestone which will be excavated at the mine holds good market in cement industry in India.

About the Company

M/s AMDC is a Public Limited and wholly owned by Govt. of Assam. The company is controlled by Board of Directors.

Assam Mineral Development Corporation Limited is a Public Limited Company incorporated on 19 May 1983. It is classified as State Government Company and is registered at Registrar of Companies, Shillong. Its authorized share capital is Rs. 80,000,000 and its paid up capital is Rs. 48,860,000.

Assam Mineral Development Corporation Limited's Annual General Meeting (AGM) was last held on 27 September 2013 and as per records from Ministry of Corporate Affairs (MCA), its balance sheet was last filed on 31 March 2013.

Shri J. P. Baruah, Managing Director and nominated owner of the AMDC Ltd.

Refer Annexure No. III: Copy of Board Resolution in favor of Nominated owner.

TABLE 1.1: LIST OF BOARD OF DIRECTORS

S. No.	Board of Directors
1	Shri Klegdoon Engti, M L A, Chairman, AMDC Ltd.
2	Dr. P K Choudhuri, Director, AMDC Ltd.
3	Shri K C Samaria, IAS, Commissioner & Secretary, Finance Department
4	Smt. Tamiza Rahman, ACS, Dy. Secretary, Mines & Minerals Department
5	Shri Tarun Ch. Saharia, Adviser (Production), Public Enterprises Department
6	Shri L. C. Bezbaruah, Director, Geology & Mining, Assam
7	Shri Jayram Engleng, CEM, Karbi Anglong Autonomous Council, Diphu
8	Shri J. P. Baruah, Managing Director, AMDC Ltd.

Refer Annexure No. IV: Copy of Board of Directors.

Contact Person:-

Shri J.P. Baruah,
(Managing Director),
M/s. Assam Mineral Development Corporation Ltd.
Khanij Bhawan, Behind Sahjahan Market,
Near Ganesh Mandir, R.P. Road, Dispur,
Guwahati – 781001, Assam
Ph. 91 - 361 - 2384078 (off.)
E-mail:- amdcghy@rediffmail.com

Refer Annexure No. V: Copy of Photo ID and address proof of the Nominated owner.

1.3 BRIEF PROJECT DESCRIPTION

The AMDC was granted mining lease over an area of 33 hectares, near village New Umrangshu, Taluka Umrangshu, District – North Cachar, Assam for mineral limestone on 21.09.1985 vide letter no PEM/22/84/34 for a period of 20 years. **Refer Annexure No. VI: Copy of Lease Grant order of 33 ha. area.**

The Mining Lease was executed on 30.09.1988 for 20 years. **Refer Annexure No. VII: Copy of Lease Deed of 33 hect. area.**

The company was granted another lease over an area of 167 hectares in the adjacent area in New Umrangshu area vide letter no. PEM/22/84/228 dated 17.06.1992. **Refer Annexure No. VIII: Copy of Lease Grant order of 167 ha. area.**

The Mining Lease was executed on 24.08.1992 for 20 years. **Refer Annexure No. IX: Copy of Lease Deed of 167 hect. area.**

AMDC, applied for renewal of mining lease, on 22.07.2008 in Form J for both the leases along with request for amalgamation of both the leases.

Govt. of Assam approved the amalgamation of both the leases vide their letter no. PEM.22/84/Pt.I/11 dated 05.05.2010. **Refer Annexure No. X: Copy of Approval Letter for Amalgamation of leases.**

1.4 PRODUCTION DETAILS

The mining method will be mechanized open cast method of mining. The targeted productions of Limestone mineral will about 4,44,500 TPA. Production details from 1994-95 onwards:

TABLE 1.2: PRODUCTION DETAILS

Year	M.T.	Year	M.T.
1994-95	21887.950	2003-04	--
1995-96	99056.470	2004-05	--
1996-97	69478.200	2005-06	700.000
1997-98	45748.700	2006-07	2720.100
1998-99	25817.370	2007-08	23813.190
1999-00	47250.000	2008-09	19783.280
2000-01	39233.571	2009-10	44882.190
2001-02	29584.250	2010-11	39120.220
2002-03	--	2011-12	40793.09*

*upto December, 2011

TABLE 1.3: PROJECT DETAILS

S. No.	Particulars	Details
1	Name of project	New Umrangshu Limestone Area
2	Location	
3	Near village	New Umrangshu
4	Taluka	New Umrangshu
5	District	Dima Hasao (N.C Hills)
6	State	Assam
7	Nearest highway	State Highway – 7, 1.7 km in West Direction.
8	Nearest railway station & airport	Nearest Railway station is Lanka – 62 km.
9	National park, Wild life, sanctuary reserved/protective	Krungming RF – 2.0 km in west direction.

	Forest etc.	
10	Nearest water bodies	Kopili River – 7.0 km in NW, Langlai River – 8.0 km in SE, Langyen River – 3.5 km E, Mangla River – 8.1 km in NE, Umrang Dam – 6.7 km in SW.
11	Nearest town	Umrangshu is about 7 km from the lease area.

As per EIA Notification, 2006, AMDC wants Environmental Clearance from MoEF, New Delhi, for proposed production capacity of 4, 44,500 TPA of Limestone Mineral.

1.5 LOCATION AND COMMUNICATION

1.5.1 Location

M/s Assam Mineral Development Corporation Limited proposes to set up Limestone Mine near village New Umrangshu, District Dima Hasao (NC Hills), Assam. The lease area forms a part of Survey of India topo-sheet no. 83C/NE & 83C/14 lying the co-ordinates Latitudes 25°31'17.27" :: 25°32'40.56" N & Longitudes 92°47"" :: 92°47'26.39" E. The deposit can be approached by an all weathered road from Guwahati via Nangaon, Doboka and Lanka, covering 254 km. except for last 40 km. which passes through hilly terrain, the road is on flat country. The deposit is 140 km. by road from Shillong via Jowai. Umrongshu is connected with Halflong, the district H.Q. of N. C. hills, by an all-weather road of 102 km. by the SH-20. The nearest railway station is Lanka 62 km. on meter gauge section of the N.F. railway. The nearest civilian airport Borjhar is at a distance of 264 km through NH-37 from Umrangshu village.

1.5.2 Communication

Road link

The Lease area is located at a distance of about 1.7 km from SH-7.

Rail link

The nearest railway station is Lanka 62 km. is on meter gauge section of the N.F. railway.

Air link

The nearest civilian airport Borjhar is at a distance of 264 km.

1.5.3 Basic Amenities

Power

At present there is no power connection required for plan period. Umrangshu and nearby area is electrified.

Amenities

Nearest facilities like Telephone, School, Panchayat office, Primary Health Centre etc. is already available at village Umrangshu.

1.6 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The main objectives of this EMP are listed below :

- To establish the present environmental scenario.
- To anticipate the impacts of proposed future mining operations on the environment.
- To prepare a detailed action plan for implementation of mitigative measures.
- To suggest preventive and mitigative measures to minimize adverse impact and to maximize beneficial impacts.
- To prepare a compensatory afforestation scheme.
- To suggest a monitoring programmed to evaluate the effectiveness of mitigative measures.

- To suggest the formation of a core group responsible for implementation of environmental control and protective measures and monitoring of such implementation.
- To suggest a feedback mechanism enabling to make mid-course corrections.
- To prepare a capital cost estimate and annual recurring cost for Environmental Management Plan.

1.7 MARKET POTENTIAL

Limestone is an important industrial mineral having wide variety of usage depending on its physical and chemical properties. The most important and common use of limestone is in the manufacture of cement. Limestone, either directly or on calcination of lime, also finds extensive use in metallurgical, chemical, sugar, textile and other industries.

1.8 METHODOLOGY FOR EIA

M/s Udaipur Min – Tech Pvt. Ltd. was assigned the job of conduction of EIA of New Umrangshu Limestone Area, near village Umrangshu of M/s Assam Mineral Corporation Ltd.

The study was conducted within 10 Km radius from the mine as centre. The base line data collection involves the data's of air quality, water quality status, land use, socio-economic structure of the study area, existing flora, fauna, prevailing noise levels, along with the physiographical status and meteorological conditions of the area. The current report is based on the mining technique, air emissions, waste water generation and discharge and solid waste management. It also highlights the storage and safety measures to be adopted for handling of explosive.

Effective plans to mitigate the adverse impacts and suggestive pollution control measures along with environmental management plan have been summarized.

1.9 SCOPE OF THE STUDY

The terms of reference on the basis of which the EIA has been prepared are given below:

1.9.1 Data generation

The data has been generated by M/s Udaipur Min-Tech Pvt. Ltd & M/s Eco Laboratories & Consultants Pvt. Ltd. Mohali, Punjab in accordance with the requirement of statutory agencies. The monitoring and testing has been done as per the guidelines of MoEF and the IS standards. Monitoring has been conducted for the following parameters.

TABLE 1.4: DATA GENERATION

S. No	Description	No. of locations	Total No. of samples
1.0	**AIR** Ambient air monitoring (24 hourly samples), twice a week for 3 months for one season. Parameters: PM_{10},SO_2,NO_x,	6	144
1.1	Meteorological parameters will be measured at hourly duration simultaneously at one air monitoring station for 3 months **Parameters:** a. Wind speed, direction b. Relative humidity c. Temperature d. Cloudiness e. Rainfall	1	90 days
2.0	**WATER** Water/effluents sample to be collected from each of the various locations (surface and ground water) in core and buffer zone (10 km radius). Parameters: Water/effluents: tested for	2 Ground Water & 1 Surface Water	2 Ground Water & 1 Surface Water

	physical and chemical and biological parameters as well as according to applicable standards.		
3.0	SOIL	4	4 samples
4.0	NOISE Hourly readings taken for 24 hours (Leq)	6	6 sets
5.0	TRAFFIC DENSITY	1	1 set

1.9.2 Data Collection

The EIA study is being done for the Mine Lease (core zone) and area within 10 km radius (buffer zone), both of which comprise the 'study area'. The following data, through field survey and other sources has been collected by M/s Udaipur Min-Tech Pvt. Ltd, for preparing the EIA/EMP for the proposed mining lease area with related facilities.

I. Details of wild fauna and flora within a distance of 10 km from the project site and information about forests, if any.

II. Eco-sensitive places, sanctuaries, biosphere reserves within 10 km radius.

III. Major industries within 10 km radius.

IV. Religious places / historical monuments and tourist places within 10 km radius.

V. Land use pattern within core zone and buffer zone (10 km radius around the core zone) based on census and satellite image and cropping pattern.

VI. Demography and Socio-economic based on last available Census data for entire study area.

VII. Relevant meteorological data, for previous decades from Indian Meteorological Department (IMD).

VIII. Study of present environmental protection and mitigation measures in nearby operating similar projects, if any.

IX. Geo-hydrological aspects based on available data from various secondary sources.

X. Identification of water bodies, hills, roads etc. within 10 km radius.

1.9.3 Preparation of EMP

The EMP will include the following details:

a. Study of the reports like Geological report, made available by the client where as PFR and Mining Plan was prepared by M/s Udaipur Min-Tech Pvt. Ltd.

b. Present Environmental Scenario.

The base line data generated and collected as per para 1.9.1 and 1.9.2 will be used to establish the present environmental scenario.

c. Identification, prediction and evaluation of Anticipated Environmental Impact due to the proposed Mine and related facilities.

The environmental impacts would be anticipated in core and buffer zone on:

- Topography and drainage
- Climate
- Water quality(Surface/Ground)
- Hydro-geological Regime
- Air quality
- Noise Levels
- Flora and Fauna
- Traffic density
- Land-Use
- Socio-Economic Conditions
- Habitat
- Health, culture, human environment including public health, occupational health and safety
- Sensitive Places/Historical Monuments.

The impacts would be anticipated based on experience of similar projects.

d. Proposed Environmental Safeguards and Monitoring Mechanism. Relevant guidelines as per Environment Impact Assessment (EIA) Notification issued in January 1994 and subsequently on 14th September

2006 under the Environment (Protection) Act, 1986 will be kept in mind while spelling out mitigation measures.

The following aspects would be covered

i. Reclamation of areas disturbed during mining but not required for any activity after exhaustion of reserves.

ii. Measures to control the surface and ground water pollution due to various effluents to be discharged, if any.

iii. Measures to control air pollution due to proposed activities/operation.

iv. Green belt development plan and reclamation plan of mine.

v. Measures to contain noise pollution & mitigate adverse impact on workers and habitat in core and buffer zone.

vi. Pronounce the improvement in socio-economic conditions & benefits the people will get on implementation of the project.

vii. Measures to control health hazard of workers and surrounding population.

viii. Total and specific cost of control measures.

ix. Environmental monitoring, implementation organization and feedback mechanism to effect mid-course corrections.

x. Identification of flora species which can be planted in and around the project.

1.10 TERMS OF REFERENCE

The terms of reference have been issued by Ministry of Environment and Forest (MoEF), New Delhi vide order no. J-11015/443/2012-IA.II (M), dated 06.12.2013 for preparation of an Environment Impact Assessment (EIA)/EMP Report in respect of the project.

========*****==========**

CHAPTER - II
PROJECT DESCRIPTION

2.1 BRIEF DESCRIPTION & NATURE OF THE PROJECT

Mining of limestone is proposed in the mine, the lease area is 200 hect. Mining will be carried out by mechanized open cast method. Proposed production is 4, 44,500 tonnes per annum of limestone. M/s. Assam Mineral Development Corporation Limited proposes to renew the lease area for limestone mine at Umrangshu area of Dima Hasao (North Cachar Hills) District Assam.

2.2 NEED OF THE PROJECT

Limestone is an important mineral which is used in the manufacture of cement, as flux in iron and steel production, and as raw materials for chemical industries. There are now several cement factories which have come up in Assam due to the availability of high quality limestone in the region.

2.3 LOCATION OF THE PROJECT

TABLE 2.1: LOCATION OF THE PROJECT

Particulars	Details
Name of the Mine	New Umrangshu Limestone Area
Village	New Umrangshu
District	Dima Hasao
State	Assam
Lease Area	200 Hect
Latitude (N)	25°31'17.27" :: 25°32'40.56" N
Longitude (E)	92°47'54.36" :: 92°47'26.39" E.
Toposheet No	83C/NE & 83C/14

2.4 TOPOGRAPHY, DRAINAGE PATTERN

Umrangshu and neighbouring areas lie in the western extremity of N.C. hills district and are bordered on west by the Kopili river. The region constitutes the eastern flank of the Shillong plateau. The drainage system

of the area is controlled by river Kopili that flows in an east – west direction. Streams like Largen, cut across the main deposit forming ravines. The area comprises small flat – topped hillocks whose elevations vary from 580 m to around 820 m above msl. The highest point at Khandong which is approximately 12 km. west of the deposit is at 837.29 above M.S.L.

The topography of the lease area is mainly undulating land marked with shallow nallah and hilly type. The higher elevation point is 445 mRL and lower elevation point is 315 mRL.

The Amrang Nallah cuts across the lease area and flows SW to NE. Very little water remains in the nallah during eight months period of the year, however the nallah remains very active during monsoon.

2.5 DEMAND-SUPPLY GAP

The demand for cement mainly depends on the level of development and the rate of growth of the economy. There are no close substitutes for cement and hence the demand for cement is price inelastic.

With a goal of speed up the sustaining growth in the cement industry the government has taken a range of steps in the Union budget 2011-12. The infrastructure sector has received a momentum in the form of improved funds and tax related incentives offered to magnetize investors for tapping the infrastructure opportunities across the country. Introduction of tax free bonds, formation of infrastructure debt funds and formulating a comprehensive policy for developing public private partnership projects (PPPs) are some of the steps that will provide required stimulus for growth of the cement industry in India.

2.6 DOMESTIC /EXPORT MARKET

The demand for Limestone for cement making has been increasing every day. The mine project aims to cater the raw material requirement of the nearby areas cement plant. All Limestone will be used for the captive purpose.

2.7 GENERAL GEOLOGY AND LOCAL GEOLOGY:-

2.7.1 General Geology:-

The limestone deposits near New Umrangshu are part of the Carbonate belt extending from the Kopili – Kharkar confluence in the south-west to Panimur in the North-east. Along its 40 km of extension, good outcrops appear at Tumbung and at 4 km, 11th km and 13th km on the Garampani – Lanka road and also near New Umrangshu village. The width of limestone belt varies from 1 km to 2.4 km.

The limestone belongs to the Sylhet limestone Formation of the Jaintia Group of Eocene age. It is overlain by thick Shale-sandstone alternation and is underlain by Sandstone bed, which occurs at the top of Pre-Cambrian rocks. The general stratigraphic sequence of the area is given below:

TABLE 2.2: REGIONAL STRATIGRAPHIC SEQUENCE

Group	Formation		Lithological units
Jaintia (Eocene)	Kopili Shale & Sandstone		Alternation of splintery shale and fine to medium grained brownish sandstones, with occasional bands of calcareous shale.
	Sylhet Limestone Formation		Thick limestone, fossiliferous, hard, well bedded with occasional partings and bands of shale.
	Basal sandstone		White, massive, hard sandstone with impersistent coal seam
	----------Un-Conformity----------		

Jurassic	Volcanic Rock		Highly weathered trap
	----------Un-Conformity----------		
Pre-Cambrian	Basement crystalline		Granite and various gneissic rocks

The traps and Pre-Cambrians has very few exposures. Highly weathered traps exposed along the Lumding nallah and the pre-Cambrians are exposed along the Khandong ridge and at the dam sites of the Kopili Hydel Project, west of the limestone deposit.

Basal sandstones are well exposed near Kopili Kharkar confluence and on the beds of nallah cutting across the limestone country. Sylhet limestone occupies a large tract along the Kopili valley and is exposed intermittently all along its 40 km of strike length from Elli falls to Panimur.

Kopili shale and sandstones normally cap the limestone. The main exposure seen in the Umrangshu valley, which is a faulted block entirely, formed of Kopili shale and sandstone. Other good outcrops are seen at many places along Umrangshu – Lanka road.

Structure:

A thick pile of Eocene sediments consisting of shale, sandstone and limestone occur in sub-horizontal disposition. These beds rest uncomfortably over the Pre-Cambrian basement crystalline.

The general strike of the sedimentary beds is NE-SW with a dip of 2° to 6° towards SE. The limestone ridge is bounded by a major fault along its southern base. However , no major faults have been detected affecting the limestone deposit. A few minor dislocations of localized nature have been identified within the deposit. Sink holes and solution cavities are present

but they are normally restricted towards the base of the limestone bed. Limestone are well jointed.

2.7.2 Local Geology:

The limestone deposit lies along the eastern side of the Umrangshu – Lanka road at a distance of about 5 km. from Umrangshu Township. It is exposed over an area of 11 sq.km. The present prospect forms the western flank of the AMDC block of the deposit. The limestone is exposed along the bed of the deep ravine curved out by the Amrang nallah. The Amrang Nula flowing on NNE-SSE course within the prospect has moderate to steep gradient.

The block consists of two distinct limestone beds intervened by a thin but consistent shale band of approximately 6 – 8 m thick. The top and bottom bands are about 30 – 80 m thickness. The Kopili shale and sandstone immediately overlies limestone sequence occupying the high ground along the ridges. A thin mantle of top soil normally covered the Kopili formation. The bottom band limestone is underlined by Quartzite sandstone.

TABLE 2.3: LOCAL STRATIGRAPHIC SEQUENCE

Group	Formation	Lithological units	Thickness
Jaintia (Eocene)	Kopili Shale & Sandstone	Shale & sandstone	0-8 m
	Sylhet Limestone Formation	Top Band limestone	28 – 29 m
		Bottom Band limestone	50-52 m
	Basal sandstone	Sandstone with carbonaceous shale	Not Known

Description of the rocks units within the applied area:

Basal Sandstone: The Basal sandstone formation lying unconformable over the pre-Cambrian , is mainly made up of whitish to pale brown sandstone, medium to fine grained, slightly quartzite with occasional

presence of carbonaceous shale's and thin coal seams. It makes its presence along Amrang nallah.

Bottom Band limestone: Immediately above the Basal sandstone lies the bottom band limestone. The contact is a gradual one. This band was encountered in all the boreholes. It has an average thickness of about 45 m based on physical, chemical and lithological characters; this band can be classified in to three recognizable sub horizons as stated below:

(a) Top dirty gray to gray limestone with shale intercalation

(b) Middle gray to high gray massive and compact limestone.

(c) Lower gray limestone with sandy limestone band

The lower unit tends to become arenaceous towards bottom. In fact, the contact with Basal sandstone formation is more or less gradational. Thickness of sub – horizons varies from 6 to 8 m.

Thickness of middle unit varies from 20 to 28 m. Limestone of this horizon contains comparatively higher CaO with lesser Fe_2O_3, Al_2O_3 and SiO_2. The topmost horizon of limestone unit is gray in color. It shows comparatively lower CaO content and higher Fe_2O_3 and Al_2O_3 compared to underlying unit. The thickness of this unit varies from 20 to 25 m.

Intermediate shale: The top band and bottom band limestone are separated by a thin but persistent shale band, thickness of which varies from 1.75 m to 8 m. The shale is dark gray in color with occasional thin shally limestone band. In dry condition the shale breaks into thin fragments along bedding plane.

Top Band Limestone; the top band limestone shows an average thickness of 30 m. It is characterized by highly ferruginous and argillaceous carbonate with low CaO content. On the basis of physical character and chemical composition, this unit can be demarcated in to sub units. The

lower 20 to 22 m gray to dirty gray in color, highly fossiliferous, comparatively less hard and less compact with frequent presence of shally matter. The top most 8 to 10 m is reddish in color, highly ferruginous limestone. It is hard and compact with evenly distributed mega fossils.

Kopili Sandstone & Shale: The Kopili formation forms the upper most unit of the Jaintia Group and is composed of alternation of gray to brown splintery shale and yellowish brown sandstone with loose nodules of ferruginous sandstone. Thin bands of calcareous shale and impure limestone are also seen at places. This formation is encountered in two boreholes. The kopili formation generally occupies the ridge top. The sandstone is medium to fine grained well sorted, whitish to brown in color. It is soft and sometime friable. The shale is dark gray to brownish in color and splintery in nature. The limestone band shows the following chemical composition in totality:

TABLE 2.4: CHEMICAL COMPOSITION

Radicals (%)	Lime Grade	Cement Grade
SiO_2	2.40	5.38
CaO	49.50	43.02
MgO	0.47	1.31
Al_2O_3	0.95	3.01
Fe_2O_3	1.95	2.90

2.8 ESTIMATION OF RESERVES & MINEABLE RESERVES

The entire lease area of 200 Hect area has been considered for reserve estimation. The estimation of Reserves* out of Measured Mineral Resources is given below:

TABLE 2.5: MEASURED MINERAL RESOURCES

Sr. no	Resource Type (Intrinsically Economic)	UNFC Code	Resources in Million Tonnes	
			Bottom Band	Top Band
1	Measured Mineral resources	(331)	114.35	20.42

Methodology:-

Reserves of the limestone under Measured Mineral Resources category is taken into consideration for the calculation of the mineable reserve. Mineable reserve has been calculated graphically. Reserves blocked under 7.5m barrier zone and UPL and along the Amrang Nallah have been calculated by surface area method.

Detailed brake up of resources in UNFC system as given as below

TABLE 2.6: RESERVE CALCULATION

(In million tonnes)

	UNFC Code 331	Blocked in Statutory Barriers				UNFC Code 111Mineable Reserves
		UPL	7.5 Boundary Barrier	On Either side of Amrang Nallah	Total	
Bottom Band Limestone	114.35	5.7	1.86	4.62	12.18	102.17
Top Band limestone	20.42	0.44	0.51	Nil	0.95	19.47
Total	**134.77**	**6.14**	**2.37**	**4.62**	**13.13**	**121.64**

Bottom Band Limestone

Reserves (in million tonnes)		Remaining Resources (in million tonnes)				
Economic *(Mineable)*		Potentially Economic(*Non-mineable)*				Intrinsically Economic
(Mineable) Reserves	Quantity *(in-situ*	*Non-mineable*	Total Quantity *(in-situ)*	Constraints wise Break up of quantities		
Proved (111)	102.17	Pre-Feasibility	12.18	5.70	Ultimate pit limit	$Remaining Measured

		Mineral Resources (211) Non-forest land		1.86	Lease barrier/statutory pillars in U/G workings	Resources (331)
				--	Non-diverted Forest land	
				--	Permanent Infrastructure like Road, power lines, habitation	
				--	Low grade part	
				--	Non bénéficiale part	
				4.62	Others (On either side of Amrang Nallah)	

Top Band Limestone

Reserves (in million tonnes)		**Remaining Resources (in million tonnes)**				
Economic *(Mineable)*		Potentially Economic(*Non-mineable)*				Intrinsically Economic
(Mineable) Reserves	Quantity *(in-situ*	*Non-mineable*	Total Quantity *(in-situ)*	Constraints wise Break up of quantities		
Proved (111)	19.47	Pre-Feasibility Mineral Resources (211) Non-forest land	0.95	0.44	Ultimate pit limit	$Remaining Measured Resources (331)
				0.51	Lease barrier/statutory pillars in U/G workings	
				--	Non-diverted Forest land	
				--	Permanent Infrastructure like Road, power lines, habitation	
				--	Low grade part	
				--	Non bénéficiale part	
					Others (On	

					either side of Amrang Nallah)	

Summary of Resources under UNFC (Million Tonnes)

Total resources =Reserves+ remaining resources			**Limestone**	**Detailed breakup constraint wise**
Reserves	Proved	(111)	121.64	
	Probable	(121)	Nil	
		(122)	Nil	
Resources Mineral Remaining	Feasibility Mineral resources	(211)	6.14	Ultimate pit limit
			2.37	Lease barrier/ safety barrier
				Non-diverted Forest land
				Permanent Infrastructure like Road, power line, habitation
				Low grade part
				Non bénéficiale part
			4.62	Others (On either side of Amrang Nallah)
	Pre-Feasibility Mineral resources	(221)		Ultimate pit limit
				Lease barrier/ safety barrier
				Non-diverted Forest land
				Permanent Infrastructure like Road, power line, habitation
				Löw grade part
				Non bénéficiale part
				Others (*to specify*)
		(222)		Ultimate pit limit
				Lease barrier/safety barrier
				Non-diverted Forest land
				Permanent Infrastructure like Road, power line, habitation
				Low grade part
				Non beneficiable part
				Others (*to specify*)
	Measured Mineral Resources	(331)	Nil	Specify /outline
	Indicated Mineral Resources	(332)	Nil	
	Inferred Mineral Resources	(333)	142.67	

	Reconnaissance Mineral Resources	(334)		
Sub Total	Reserves (a)		121.64	
	Remaining resources(b)		155.80	
All Total Resources (a+b)			**277.44**	

TABLE 2.7: PRESENTATION OF MINERAL LIMESTONE RESOURCES (MT) AS PER UNFC

	Category	**UNFC Code**	**Quantity**
Total Resources	(A+B)		277.44
Reserves (A)	Proved	(111)	121.64
	Probable	(121)	
		(122)	
Remaining Resources (B)	Feasibility Mineral resources	(211)	13.13
	Pre-Feasibility Mineral resources	(221)	
		(222)	
	Remaining Measured Mineral Resources	(331)	
	Remaining Indicated Mineral Resources	(332)	
	Inferred Mineral Resources	(333)	142.67
	Reconnaissance Mineral Resources	(334)	

Mineable Reserves & Life of Mine:

The mine planning has been devised for a peak annual ROM production of 444,500 tonnes of ROM limestone

TABLE 2.8: MINEABLE RESERVE

a.	Total Mineable Reserves of Limestone	121.64 MT
b.	Total production (ROM) during next five years	2.02 MT
c.	Mineable Reserves of Limestone at the end of fifth year period	119.62 MT
d.	Proposed rate of production (ROM) from Sixth year onwards	0.45 MT
e.	Life of the mine after fifth year period	265 years
f.	Total Expected Life of the Mine in years	= (5 + 265) years = 269

2.9 PROPOSED METHOD OF MINING

The area is located in hilly terrain and involves development of access road and removal of overburden. Mine is in operation and ancillary facilities are already established.

It is proposed to produce 333,840 tonnes of ROM per year in the first year to 4, 44,500 tonnes per year in fifth year. The mineral produced here will be sold to nearby industries.

It is proposed to work the deposit by mechanized open cast method of mining with the use of Excavator for loading of blasted rock. Following broad design parameters have been considered.

- Bench height of 6.0 m will be developed.
- Minimum bench width will be 12 m.
- Individual bench slope will be 80^0 from vertical.
- 100-115 mm dia. blast holes using wagon drill.
- Excavator of bucket capacity 0.93 Cum. will be used.
- For ore and waste 6 tippers are proposed to be used.
- Haul roads will be developed at minimum gradient of 1:16.
- ANFO with cap sensitive explosive will be used.
- Secondary blasting will be carried out as and when required.
- Water sprinkler will be used for dust suppression in the mine.

Provisions of MMR 1961 will be strictly be adhered.

2.10 EXTENT OF MECHANIZATION

It is proposed to work the deposit by mechanized open cast method of mining with the use of Excavator for loading of blasted rock. The mineral produced here will be sold to nearby industries. It is proposed to produce 333,932 t ROM limestone's in the first year and gradually increasing to 444,574 in the fifth year.

Requirement of Machinery:-

TABLE 2.9: OPERATING PARAMETERS

No. of working Days	300
No. of Shifts per day	2
Limestone Production per Year (Max)	444,500 t
Limestone Production per Year (Max) cu.m.	170,962 cu.m.
Waste Generation in cu.m. per year (Max)	106,390 cu.m.
Total Rock handling in cu.m. In-situ	277,352 cu.m.
Total Rock handling in cu.m. In-situ per day	925
Total ROM + Waste	2404 tpd
ROM per shift	1201 t

The area is located in hilly terrain and involves development of access road and removal of overburden. The mine is in operation and all the facilities including an explosive magazine are available in the area.

Drill Machines: - The blast hole will be drilled by compressed air operated Jack hammer drill. Two drill machines will be required to meet the scheduled rate of production on two shift basis, one for OB and another for mineral.

Excavator: - Two excavators of 0.93cu.m. bucket capacity and 6 tippers of 15 t capacity will be required to meet the production target. Excavator will be used for loading of blasted rocks.

Air Compressor: One compressor will be required.

Loading equipment: Usually manual loading shall be adopted with occasional deployment of machinery i.e. JCB Model 4DX. Loading of mineral and overburden will be with the use of excavator having bucket capacity of 0.93 cu.m.

Haulage & Transport Equipment : The haulage & transport operations will be effected by 15 tone tippers of transport contractors.

TABLE 2.10: EQUIPMENT REQUIRED

S. No.	Machinery	Units	Total HP	Capacity
1.	L & T- Komatsu PC 200-6 Excavator	2	128	0.93 m3
2.	Rock Drill Wagon, Atlas Copco ICM 260	2	465	
3.	Truck, Tata Engineering LPK2516	6	2700	14 m3
4.	Komatsu Dozer – D 65 E-8	01	165	
5	Water Tanker, 9 KL capacity	01	260	9 KL
6.	Road Roller	01	82.5	
7.	Compressor CM-341	01	XAH210	

2.10.1 BLASTING:

The Holes will be drilled parallel to free face and at an inclination of 80^0 of the bench and staggered in the subsequent rows.

TABLE 2.11: BLASTING PARAMETERS

Mineral / OB (Max) per day	2,404 t
Height of bench	6.0 m
Depth of hole including sub grade drilling	7.0 m
Burden	3.5 m
Spacing	4.5 m
Volume blasted per hole (10 x 3.5 x 4.5 = 157.5)	94.5 cu.m.
Tonnes blasted per hole (157.5 x 2.5)	247 t
Powder Factor t / kg of explosive	6
Explosive per hole	42 kg
Explosive per day (2404/6 = 400 kg)	400 kg
Booster Charge 10%	40 kg / day
ANFO @ 90 %	360 kg/ day

2.10.2 Types of Explosive to be used:

For the booster charge, any cap-sensitive explosive and for column charge, any non-cap-sensitive explosive, mainly ANFO would be used. The ratio of booster charge to column charge would be 10:90.

2.10.3 Powder Factor

Powder factor is 6.0 tonnes / kg.

2.10.4 Secondary Blasting

Even a good and planned primary blast would need some secondary blasting. In similar mine about 10% of tonnage requires secondary blasting. It is proposed to carry out secondary drilling and blasting using compressed air operated Jack hammer drill and high explosives. About 40 kg of explosives for this will be required per day.

2.10.5 Storage of Explosives:

Company has a licensed magazine of 10 t capacity at its nearby mine and explosive from that magazine will be used at this mine also.

Precautionary Measures:

- Adequate precautionary measures will be taken as given below:
- Adequate siren system will be in operation.
- Legible warning sign in the language understood by the local people.
- Enough security guards, especially posted on roads etc.
- Before blasting the upper surface of the bench shall be cleaned off, of any stones lying on top, as it is a major source of flying stones.
- The trunk line of the detonating cord shall be covered with sand to reduce air over pressure, as it is major source of air blast noise.
- Controlled blasting shall be practiced and only during day time.
- All safety measures as prescribed under MMR 1961 and circulars issued by DGMS.
- The danger zone shall be distinctly demarcated (by means of red flags properly arranged and supported) at least 30 minutes before firing of holes is to commence..
- Ten minutes before firing, a siren installed for the purpose shall be blown three times for one minute each at interval of one minute.
- An effective record of instruction to guards given for working and clearance shall be maintained.

- No shots shall be fired when there is traffic on any road within danger zone.

2.11 THE QUANTUM OF DEVELOPMENT AND TONNAGE OF PRODUCTION

It is proposed to produce 330932 tonnes of ROM per year in the first year to 4, 44,574 tonnes per year in fifth year. The mineral produced here will be sold to nearby industries.

TABLE 2.12: PRODUCTION & WASTE GENERATION

Year	Over Burden Cum.	Limestone	Stripping ratio
I	109870	330932	1:0.33
II	70190	377675	1:0.19
III	99910	422760	1:0.24
IV	106390	444631	1:0.24
V	95480	444574	1:0.21
Total	**481840**	**2020572**	**1:0.24**

2.12 USE OF MINERALS

The limestone of this area will be utilised as given below;

- High grade limestone (+48% CaO for manufacture of paper grade lime to be supplied to Hindustan Paper Corporation. This grade of limestone has been designated as Paper grade Limestone.
- Cement Grade Limestone: (+45% CaO) to be supplied to mini cement plant around the lease area. Part of the limestone will be supplied to Assam Industrial Dev. Corporation's project at Ding in Nawgaon district.

Broad Specifications of limestone required by Hindustan Paper Corporation and for Cement plant are given below:

TABLE 2.13: CHEMICAL SPECIFICATIONS

	Chemical Specifications	
	Hindustan Paper Corp.	Cement Plant
CaO	50.27	44 to 52
MgO	1.23	>3.5
SiO2	3.27	To satisfy Silica moduli
Al_2O_3	1.79	<0.5
Fe_2O_3	1.29	
R_2O		<0.6
P_2O_5		<0.6
Total S as SO_3		<0.6

2.13 UTILITIES AND PROPOSED SITE FACILITIES

Mine is in operation and ancillary facilities are already established.

A. Power Supply

At present there is no power connection required for plan period.

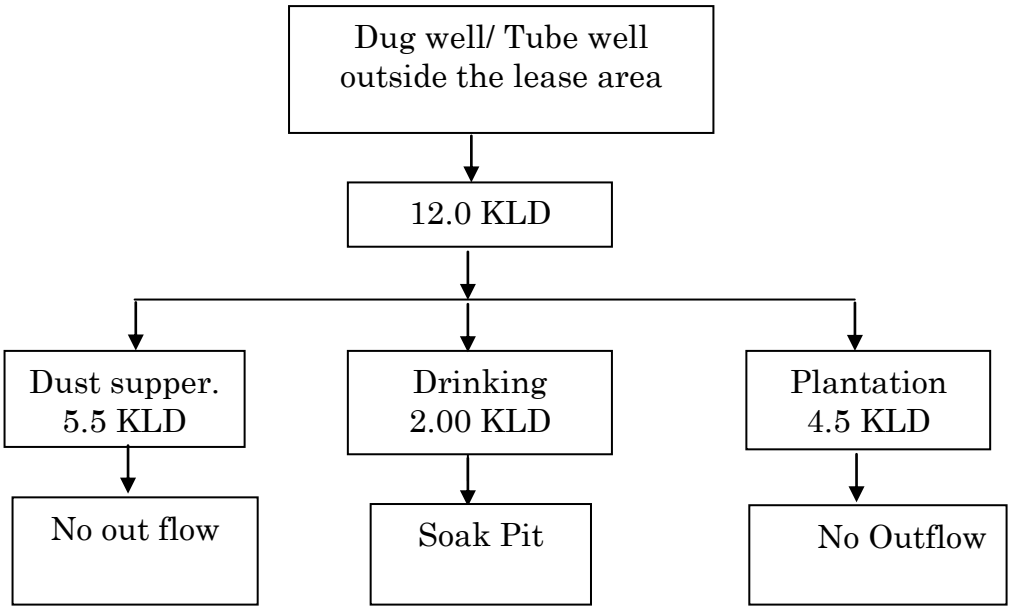
B. Water Requirement

Water requirement for domestic/drinking purpose is fulfilled through the nearby village/dug wells. The total water requirement for the project is estimated 12 KLD. Water for mining operation (dust suppression) and for domestic & drinking purpose will be supplied with the help of dug well/tube well situated in the nearby village and water tankers.

TABLE 2.14: PEAK WATER REQUIREMENT

Purpose	Total Requirement (KLD)
Drinking	2.0
Dust Suppression	5.5
Plantation	4.5
Total	**12.0**

FIGURE 2.1: WATER BALANCE DIAGRAM



C. Man Power

Total manpower required for the project is approx. 36 persons. The mining project will generate direct & indirect employment. About 36 people will get direct employment and 10-20 people will also be affected indirectly and employed with allied and related industries, such as transportation, maintenance, etc.

D. Office :

The Company has common office cum store will be available outside the lease area.

E. First Aid Room :

Regular medical checkup of the mine employees will be carried out as per the provision of Mines Rules, 1956. A first aid room with proper equipment will be maintained at the mine site office. First aid-box with all necessary facilities will be maintained and provided.

F. Latrine and Urinal :

Latrine and urinal will be provided separately for male and female worker as per Mine Rules shall be continued to be maintained.

Other services

- A store and yard is required near the office to keep tools etc.
- A fully fledged dispensary with qualified doctor will be maintained near the mine office.
- A canteen will be established and maintained.
- Drinking water, toilets and urinals as per the provisions of Mines Rules.
- Drinking water facility will also be provided near the working faces.
- Latrines, urinals, shall be provided and maintained as per Mines Rules 1955.

======******======

CHAPTER – III
DESCRIPTION OF THE ENVIRONMENT

3.1 GENERAL

3.1.1 Study area

Exploitation of mineral resources from the land through mining causes environmental and ecological instability, severe land degradation besides biological physical and socio-economic imbalance. The impact of the mining activities can be quantified through Environmental Impact Assessment Studies within the impact zone. The findings of EIA studies help in preparation of the environmental management plan for mitigating the adverse impacts.

For the purpose of studying the baseline status of the environment, core zone and buffer zone are considered for Impact Assessment. The core area for the purpose comprises mining lease area of 200 Hect. The buffer zone comprises a 10 km from around the core area.

This section contains a description of the existing baseline environmental status of the area surrounding New Umrangshu Limestone Mine the data collected has been used to define the environmental scenario of the area, against which the potential impacts of the project has been assessed.

3.1.2 Sources of Environmental Data

The baseline information on micro meteorology, ambient air quality, water quality, noise levels, soil quality and floristic descriptions are largely drawn from the data generated by M/s Udaipur Min-Tech Pvt. Ltd, M/s Eco Laboratories & Consultants Pvt. Ltd. Mohali, (Punjab), and (NABL Accredited Lab). Long term meteorological data recorded at the nearest IMD station, Silchar was collected. Apart from these, secondary data have been collected from Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Organization, District Industries

Centre, Forest Department, Central Ground Water Authority, etc. The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out during winter season i.e. December - 13 to February - 14.

3.1.3 Aspect Studied

As per the gazette notification dated 14th September 2006 and guidelines of CPCB, the study area was demarked. The study was conducted within a radius of 10 km within mine as center. The study period defined is December - 13 to February - 14.

The discipline covered by the baseline data collection programme includes the following:-

Topography, Physiography, Hydrological aspects, Atmospheric condition, Biological environment, Land use, cropping pattern & Socioeconomic aspects.

3.1.4 Presentation

Each of the aspects listed above considered ahead in a sequential manner. Data Collected during the baseline study period are given ahead and provides a sound knowledge of the existing environment.

3.2 STUDY AREA AT A GLANCE

The study area includes the villages of Umrangshu Tehsil within 10 Kms. radius from the mine as center.

TABLE 3.1: STUDY AREA AT A GLANCE

S. No.	Particulars	Details
1.0	General Particulars	
1.1	Latitude & Longitude	
	Latitude	25°31'17.27" :: 25°32'40.56" N
	Longitude	92°47'54.36" :: 92°47'26.39" E

1.2	Populations	12869
1.3	Taluka	Umrangshu
1.4	District H.Q.	Dima Hasao
2.0	Demography	
2.1	Total Population	12869
	Male	6890
	Female	5979
2.2	Literates	9488
2.3	No. of Household	2865
2.4	No. of Villages	16
3.0	Land Use Pattern Ha.	
3.1	Water Bodies	1082.79
3.2	Open Scrub Land	1152.00
3.3	Fallow Land	3190.59
3.4	Habitation	566.28
3.5	Forest	25603.02
3.6	Open Degraded	10522.44
	Total	**42117.12**
4.0	Climatology	
4.1	Total rainfall in mm. (December, 13 – February, 14)	23.2
4.2	Mean monthly maximum temp. °C	34.9
4.3	Mean monthly minimum temp. °C	8.7
4.4	Relative humidity %	42 to 100 %

3.3 TOPOGRAPHY

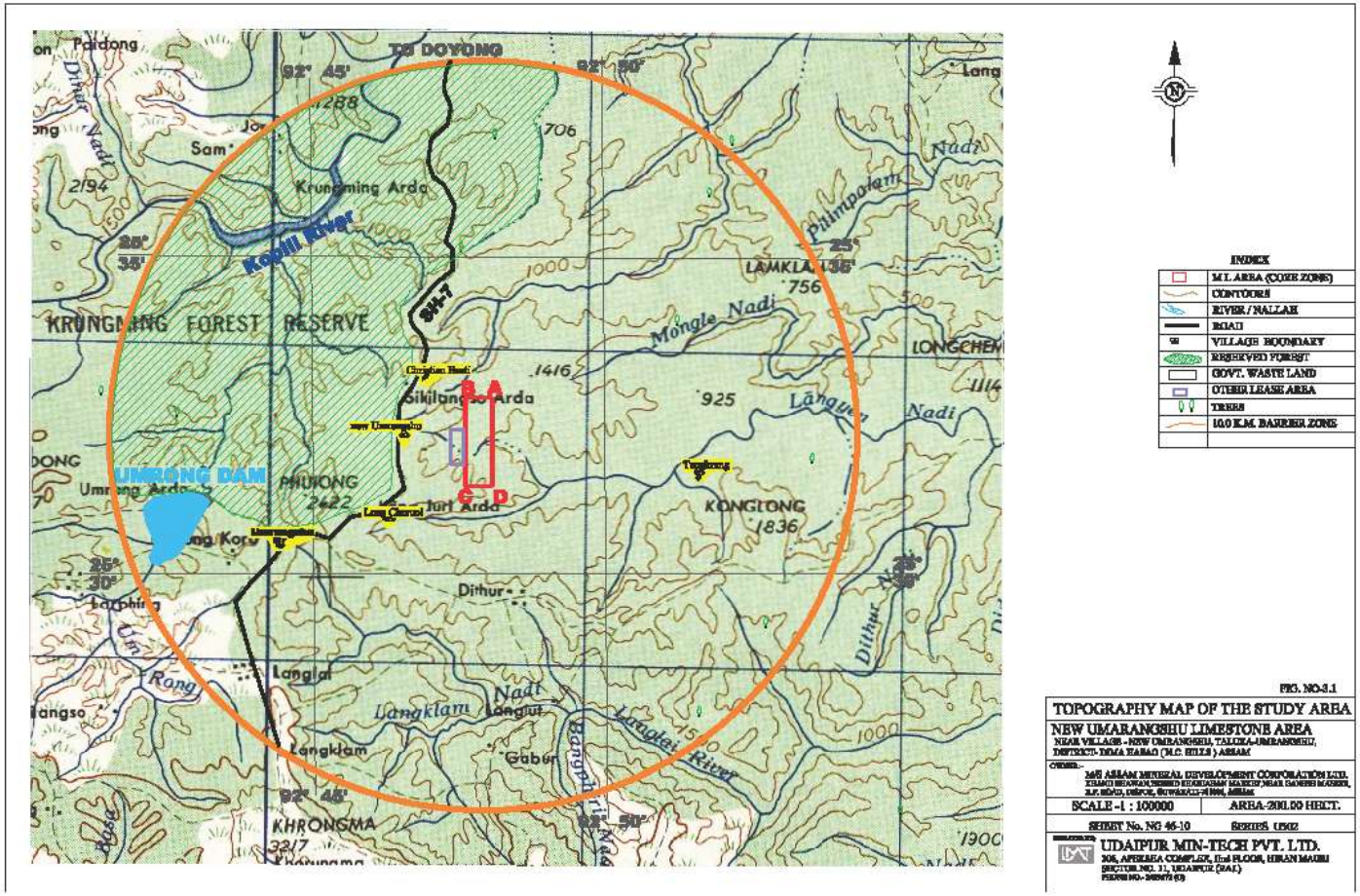
3.3.1 Existing Conditions

The topography of the lease area is mainly undulating land marked with shallow nallah and hilly type. The higher elevation point is 445 mRL and lower elevation point is 315 mRL. The Amrang Nallah cuts across the lease area and flows SW to NE. Very little water remains in the nallah

during eight months period of the year, however the nallah remains very active during monsoon.

Refer Figure 3.1: Topography Map of the Study Area.

FIGURE 3.1: TOPOGRAPHY MAP OF THE STUDY AREA



3.4 CLIMATIC CONDITION

Although the average annual rainfall of the district is 1,145 mm, there is wide range of disparity in rainfall distribution from place to place. Diyungmukh area represents a dry belt. The winter season commences from the month of October and continues up to February. The average maximum temperature is 26° C while the average minimum temperature is 14° C. The temperature is lowest in the month of January and is recorded as 6°C. The relative humidity values from 73% to 84% (1994-95). The area represents a sub-tropical climate.

CGWB, North Cachar Hills District, Assam

3.5 PHYSIOGRAPHY

3.5.1 Relief

Umrangshu and neighbouring areas lie in the western extremity of N.C. hills district and are bordered on west by the Kopili river. The region constitutes the eastern flank of the Shillong plateau. The drainage system of the area is controlled by river Kopili that flows in an east – west direction. Streams like Largen, cut across the main deposit forming ravines. The area comprises small flat – topped hillocks whose elevations vary from 580 m to around 820 m above msl. The highest point at Khandong which is approximately 12 km. west of the deposit is at 837.29 above M.S.L.

The topography of the lease area is mainly undulating land marked with shallow nallah and hilly type. The higher elevation point is 445 mRL and lower elevation point is 315 mRL.

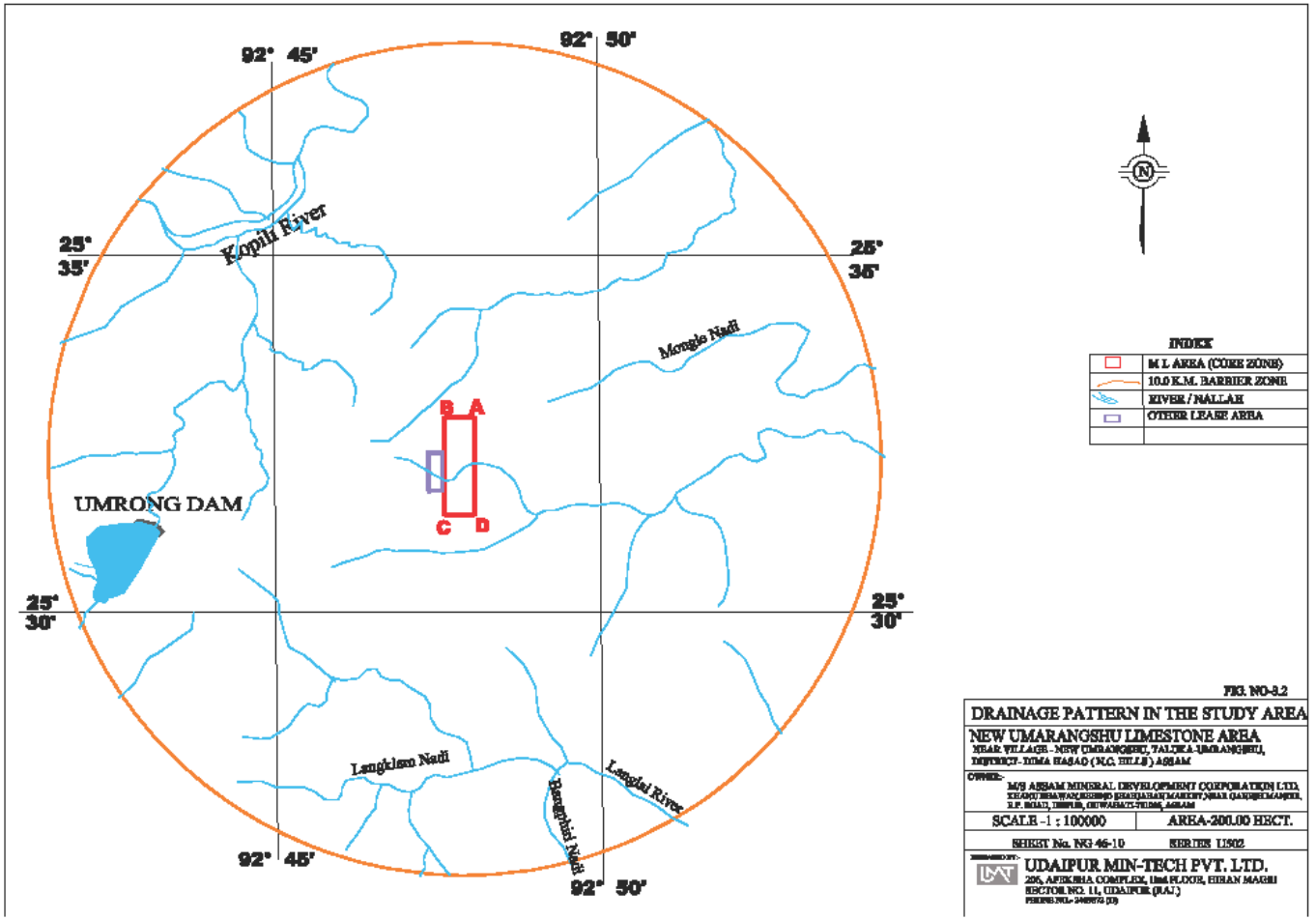
3.5.2 Drainage

Drainage pattern of the area is dendritic. The Amrang Nalla cuts across the lease area and flows SW to NE. Very little water remains in the nallah during eight months period of the year, however the nallah remains very active during monsoon.

Therefore, ground water table will not be touched due to mining operations. There will be no drainage of water to mine workings. Pumping shall be not done.

Refer Figure 3.2: Drainage Pattern of the Study Area

FIGURE 3.2: DRAINAGE PATTERN OF THE STUDY AREA



3.6 HUMAN SETTLEMENT

There is no human settlement within the lease area. Total 16 villages with 2865 household within the study area with population of 12869.

3.7 HYDROLOGICAL ASPECTS

Hydrology

Hydro geologically, the district of North Cachar Hills is divided into two distinct groups, i.e. i) semi-consolidated and ii) unconsolidated group.

Semi-consolidated rocks occupying the major parts of the district constitutes clay stone, shale, siltstone ferruginous compact sandstones, fossil ferrous limestone etc. The southern part is more argillaceous and represents poor permeability. The rock unit is well jointed and highly fractured. Ground water manifests in the forms of perennial and seasonal springs and the discharge of the spring and seepage depends on the amount of precipitation in the area. The area represents a high run-off zone.

Unconsolidated sediments constitute Recent to Sub-Recent alluvial sediments which are very restricted in nature and confined to small linear valleys. These are gravel, pebble, and sand of various grades, silt and clay.

Central Ground Water Board has drilled as many as 10 tube wells in the semi-consolidated rocks, out of which 5 tube wells are successful and rests are abandoned. The drilling depth of the tube well ranges from 23.00 to 89.45 m BGL at Umrangshu. The yield of tube well ranges from 5.3 to 58 LPM with drawdown of 3.11 to 4.22 m. The transmissivity value ranges from 7.96 to 172 m^2/day. The aquifer materials are sandstone, light grey to yellowish and grey limestone.

CGWB, North Cachar Hills District, Assam

3.7.1 Introduction

Local hydrological parameters and ground level water levels are not affected due to mining activity in the area.

Ground Water Condition

The ground water level in the area of Umrangshu limestone mine varies on an average from 60 meters to 80 meters.

3.8 ATMOSPHERIC CONDITION

Atmospheric conditions include meteorological condition and ambient air quality of the study area. Meteorological conditions with respect to wind velocity and direction in the study area was determined by IMD station Silchar. The required data for interpretation the ambient air quality of the study area was generated by establishing a monitoring network. Regular field observations as per the norms of MoEF and CPCB were taken from the established monitoring stations.

3.9 METEOROLOGY

Introduction

Meteorological factors such as wind speed; direction variation in temperature, humidity etc. play a direct role in dispersion of pollutants atmospheric pressure, rainfall and cloud cover also govern this activity. Other factors such as terrain and local topography also take part in atmospheric dispersion. Meteorology plays a vital role in affecting the dispersion of pollutants. Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long term reliable data. Such source of data is the Indian Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations. The nearest IMD stations Silchar, which is about 80 km from the mine site. Meteorological information available for this station is temperature, humidity, rainfall, wind speed and wind direction. The data

recorded at Silchar IMD station for the period December, 13 to February, 14 are summarized.

Meteorological Data's from IMD Station Silchar

The data recorded at Silchar for the study period December, 2013 to February, 2014 are temperature and relative humidity were recorded during the study period which are summarized in the below table.

TABLE 3.2: MEAN TEMPERATURE & RELATIVE HUMIDITY

Month	Temperature (°C)		Relative Humidity (%)		Wind Speed (km/hr.)			
	Max.	Min.	Max.	Min.	8.30 HRS		17.30 HRS	
					Max.	Min.	Max.	Min.
Dec., 13	27.4	8.6	100	62	06	02	--	--
Jan., 14	28.4	8.7	100	48	10	02	06	06
Feb., 14	34.6	9.9	100	40	06	02	04	04

Source – IMD Station (Silchar)

Micro - Meteorological Data's

The data recorded at site for the study period December, 2013 to February, 2014 are temperature and relative humidity were recorded during the study period which are summarized in the below table.

TABLE 3.2A: MEAN TEMPERATURE & RELATIVE HUMIDITY

Month	Temperature (°C)		Relative Humidity (%)		Wind Speed (km/hr.)			
	Max.	Min.	Max.	Min.	8.30 HRS		17.30 HRS	
					Max.	Min.	Max.	Min.
Dec., 13	28.0	8.7	100	64	08	02	06	02
Jan., 14	28.8	8.8	100	50	10	02	06	02
Feb., 14	34.9	9.6	100	42	06	02	04	02

The mean maximum temperature ranges recorded was 34.9°C and minimum temperature was 8.7°C during the study period. The relative humidity is high during the study period, being generally over 100%. Wind speed plays a dominant role in the dispersion of air pollutants. An observation of the wind rose shows that the predominant wind directions are East to West.

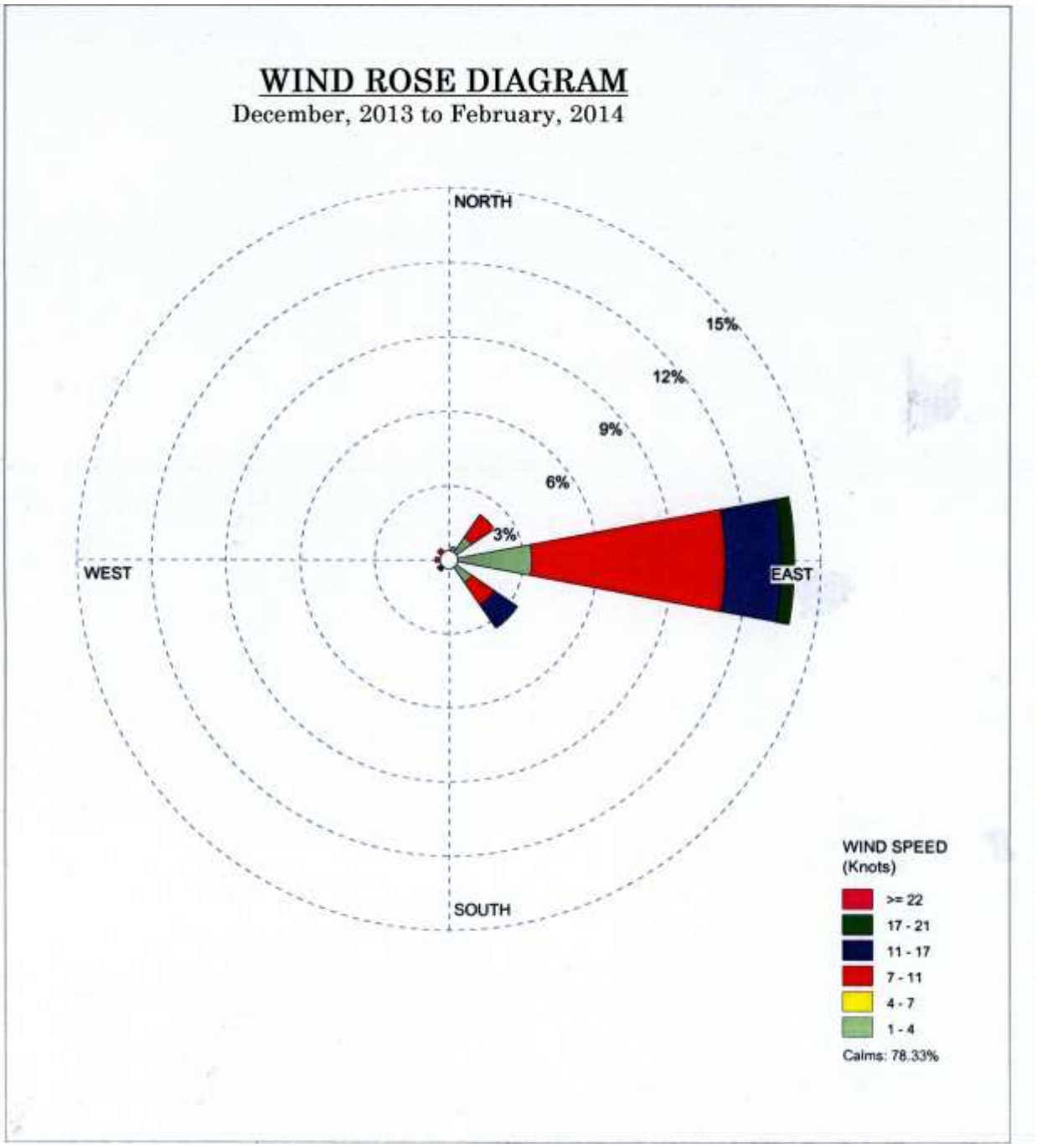
Wind Rose

Wind speed of a site plays a vital role in predicting the extent of air pollution. It gives a clear view about the extent to which air pollutants are carried before they touch the ground. Wind rose is diagrammatic representation of wind speed in a specified direction with its arms representing sixteen directions; each arm gives a clear frequency distribution of wind speed.

Wind roses are generated with the site meteorological information's initially collected. These raw data are processed with certain interpolation and stability classes and joint frequency function are developed to eventually reach to the development of wind roses.

Refer Figure 3.3: Wind Rose Diagram

FIGURE 3.3: WINDROSE DIAGRAM



3.10 AMBIENT AIR ENVIRONMENT

To establish the ambient air quality the studies were carried out during winter season of the Month December, 2013 to February, 2014.

3.10.1 Ambient Air Sampling

Ambient air quality sampling was carried out with the help of Respirable particulate matter Sampler " Respirable Dust Sampler" (RDS). The data generated by M/s Eco Laboratories & Consultants Pvt. Ltd. for ambient air quality status within 10 km. radius of the mine has been compiled along with meteorological conditions for particulars season.

3.10.2. Location of Ambient Air Sampling Stations

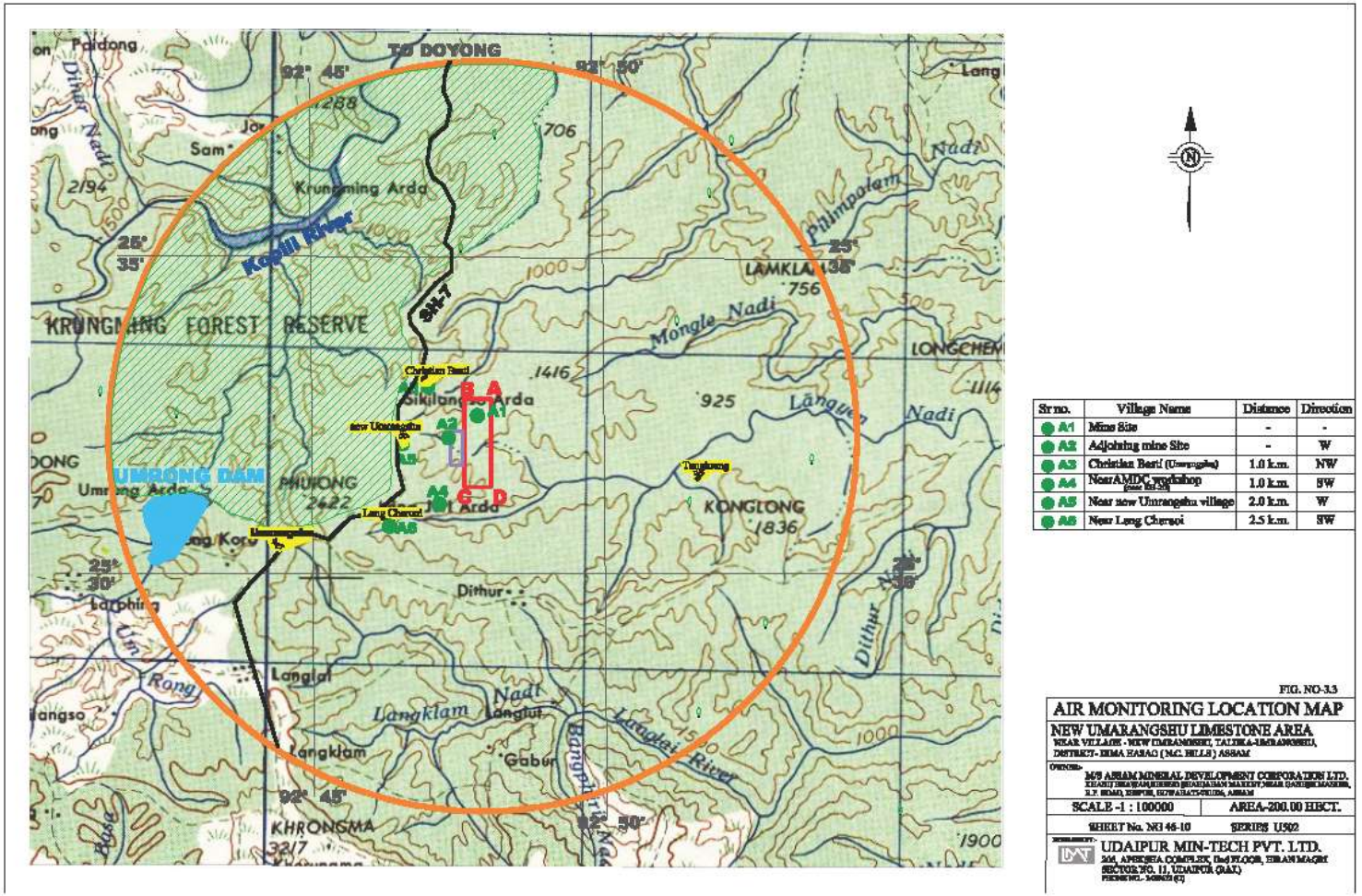
Six sampling stations were established around the core zone within 10 km radius to study the present air quality. The locations are given in below table and the area marked in Figure.

TABLE 3.3: LOCATION OF AMBIENT AIR MONITORING STATIONS

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
A1	Mine site	--	--
A2	Mine site (31 hect)	Adjoin mine area	W
A3	Near 19 Kilo Umrangshu (Chirstian Basti)	1.0	NW
A4	Near AMDC Workshop (Near SH-20)	1.0	SW
A5	Near New Umrangshu Village	2.0	W
A6	Near Leng Cheruoi	2.5	SW

Refer Figure 3.4: Ambient air sampling location in the study area.

FIGURE 3.4: AMBIENT AIR SAMPLING LOCATION IN THE STUDY AREA



3.10.3. Sampling Schedule

Twenty four hourly samples were collected from each station round the clock, twice a week for continuous three month (December, 13 to February, 2014).

3.10.4. Air quality parameter

The following parameters were analyzed for each sample.

- Particulate Matter (PM_{10})
- Sulphur dioxide (SO_2)
- Oxides of nitrogen (No_x)

The sampling and testing of ambient air quality parameters were carried out as per relevant parts of IS 5182. The brief details of testing procedure adopted are given in below table.

TABLE 3.4: PROCEDURE FOR DETERMINING VARIOUS AIR QUALITY PARAMETERS

Parameters	Testing Procedure
PM_{10}	Gravimetric method using Respirable particulate matter Sampler " Respirable Dust Sampler" (RDS) IS:5182(Part IV)1973
NOx	Absorption in dil. NaOH and then estimated calorimetrically with sulphanilamide and N(I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide(IS:5182 1975, Part VI)
SO_2	Absorption in Sodium Tetra Chloro- Mercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde(IS:5182 Part II. 1969)

The detailed results of ambient air quality are given in table below table.

TABLE 3.5: AMBIENT AIR QUALITY

(PM10, 24-hr Concentration in ug/m³)

Station ►		Mine site	Mine site (31 hect)	Near 19 Kilo Umrangshu (Chirstian Basti)	Near AMDC Workshop (Near SH-20)	Near New Umrangshu Village	Near Leng Cheruoi
S. No.▼	**Result**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
December -2013							
1.	Minimum	52.22	43.73	45.77	40.17	42.33	40.64
2.	Maximum	58.37	52.55	57.59	52.51	54.06	50.32
3.	Average	55.30	48.14	51.68	46.34	48.20	45.48
4.	98%	57.20	51.50	56.44	51.46	52.98	49.31
January – 2014							
1.	Minimum	53.21	46.11	46.09	43.46	46.19	42.03
2.	Maximum	60.27	56.62	58.25	57.87	59.3	50.30
3.	Average	56.74	51.37	52.17	50.67	52.75	45.48
4.	98%	59.06	55.49	57.09	56.71	58.11	49.29
February – 2014							
1.	Minimum	55.80	47.79	49.6	46.55	46.10	42.89
2.	Maximum	63.81	56.41	60.04	57.6	56.44	58.64
3.	Average	59.87	52.10	54.82	51.27	51.27	47.77
4.	98%	62.53	55.28	58.84	56.45	55.31	57.47

Source: Eco Laboratories & Consultants Pvt. Ltd.

TABLE 3.6: AMBIENT AIR QUALITY

(SO_x 24-hr Concentration in ug/m^3)

Station ►		Mine site	Mine site (31 hect)	Near 19 Kilo Umrangshu (Chirstian Basti)	Near AMDC Workshop (Near SH-20)	Near New Umrangshu Village	Near Leng Cheruoi
S. No.▼	**Result**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
December -2013							
1.	Minimum	4.13	3.62	4.19	3.66	4.11	3.34
2.	Maximum	6.68	6.11	6.55	5.77	6.03	5.52
3.	Average	5.41	4.87	5.37	4.72	5.07	4.43
4.	98%	6.55	5.99	6.42	5.65	5.91	5.41
January – 2014							
1.	Minimum	3.93	4.19	3.82	4.03	4.17	3.65
2.	Maximum	6.77	6.65	5.89	6.08	6.24	5.63
3.	Average	5.35	5.42	4.86	5.06	5.21	4.64
4.	98%	6.63	6.52	5.77	5.96	6.12	5.52
February – 2014							
1.	Minimum	3.78	4.63	4.55	4.29	4.31	3.74
2.	Maximum	6.85	7.42	6.37	6.46	6.44	6.21
3.	Average	5.32	6.03	5.46	5.38	5.38	4.98
4.	98%	6.71	7.27	6.24	6.33	6.31	6.09

Source: Eco Laboratories & Consultants Pvt. Ltd.

TABLE 3.7: AMBIENT AIR QUALITY

(NOx 24-hr Concentration in ug/m³)

Station ►		Mine site	Mine site (31 hect)	Near 19 Kilo Umrangshu (Chirstian Basti)	Near AMDC Workshop (Near SH-20)	Near New Umrangshu Village	Near Leng Cheruoi
S. No.▼	**Result**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
December -2013							
1.	Minimum	7.32	6.98	7.37	6.33	4.17	4.60
2.	Maximum	9.51	9.65	9.75	8.61	8.48	8.18
3.	Average	8.42	8.32	8.56	7.47	5.53	6.39
4.	98%	9.32	9.46	9.56	8.44	8.31	8.02
January – 2014							
1.	Minimum	7.51	7.07	7.29	6.65	4.13	5.34
2.	Maximum	9.77	9.82	10.04	7.54	7.79	8.31
3.	Average	8.64	8.45	8.67	7.10	5.26	6.83
4.	98%	9.57	9.62	9.84	7.39	7.63	8.14
February – 2014							
1.	Minimum	7.78	7.33	8.41	7.07	4.08	5.53
2.	Maximum	9.85	9.92	10.21	9.63	8.06	8.67
3.	Average	8.82	8.63	9.31	8.35	5.48	7.10
4.	98%	9.65	9.72	10.01	9.44	7.90	8.50

Source: Eco Laboratories & Consultants Pvt. Ltd.

The observed range of various parameters recorded, have been compared with the National Ambient Quality Standards laid down by the Central Pollution Control Board.

TABLE 3.8: COMPARISON OF AIR MONITORING RESULTS

Parameters	Mine site	Mine site (31 hect)	Near 19 Kilo Umrangshu (Chirstian Basti)	Near AMDC Workshop (Near SH-20)	Near New Umrangshu Village	Near Leng Cheruoi	NAAQS*
							Ind. & Res. , Rural use
	A1	A2	A3	A4	A5	A6	
PM_{10} Concentration							
Minimum	52.22	43.73	45.77	40.17	42.33	40.64	100
Maximum	63.81	56.62	60.04	57.87	59.3	58.64	
Average	58.02	50.18	52.91	49.02	50.82	49.64	
98% tile	62.53	55.49	58.84	56.71	58.11	57.47	
SO_2 Concentration							
Minimum	3.78	3.62	3.82	3.66	4.11	3.34	80
Maximum	6.85	7.42	6.55	6.46	6.44	6.21	
Average	5.32	5.52	5.19	5.06	5.28	4.78	
98% tile	6.71	7.27	6.42	6.33	6.31	6.09	
NOx Concentration							
Minimum	7.32	6.98	7.29	6.33	4.08	4.6	80
Maximum	9.85	9.92	10.21	9.63	8.48	8.67	
Average	8.59	8.45	8.75	7.98	6.28	6.64	
98% tile	9.65	9.72	10.01	9.44	8.31	8.50	

* NAAQS – National Ambient Air Quality Standards. 24-hr concentration in ug/m^3.

A perusal of above table shows that PM_{10}, NOx & SO_2 are well within limits prescribed for areas meant for "Residential and Rural Use.

3.11 NOISE ENVIRONMENT

Mining and allied activities are usually noise-prone activities. Excessive noise levels may cause adverse effects on human being and its associated environment including domestic animals, wild life, natural ecosystem and structure.

The noise problem is said to exist when the sound level in the air causes interference in human activities such as disturbance in sleep, work and speech communication leading to annoyance. Perception of noise by individuals varies depending on number of factors such as natural sensitivity / hearing ability, level of exposure, time of the day, socio-cultural activities etc. at the time of exposure to sound. The impact of noise at community level can have different effects varying from aesthetic impairment such as annoyance, frequent hypertension to as high as loss of hearing. The health impact of noise on individual depends on several factors, viz. physical dose (intensity of sound pressure level and duration of exposure), frequency spectrum, intermittency etc. as well as human factors like sex, age, health condition, occupational exposure etc. The background noise levels within the mine and around it were recorded using sound meter to establish the existing scenario.

3.11.1 Monitoring Methodology of Noise Level

Noise standards have been designated for different types of land use, i.e. residential, commercial, industrial and silence zones, as per 'The Noise Pollution (Regulation and Control) Rules, 2000, Notified by the Ministry of Environment and Forests, New Delhi on February 14, 2000'. Different standards have been stipulated during day time (6 am to 10 pm) and night time (10 pm to 6 am).

The noise analysis within the study area was recorded using sound level meter. The analysis reveals that the noise's well within the permissible range.

The noise rating method as Leq i.e. equivalent sound pressure level has been adopted for the measurement of noise level in various selected sampling locations of this region. It is the energy means of the noise level over a specified period and is expressed in terms of decibels. Methodology for monitoring of noise levels is given in below table.

3.11.2 Location of noise monitoring stations

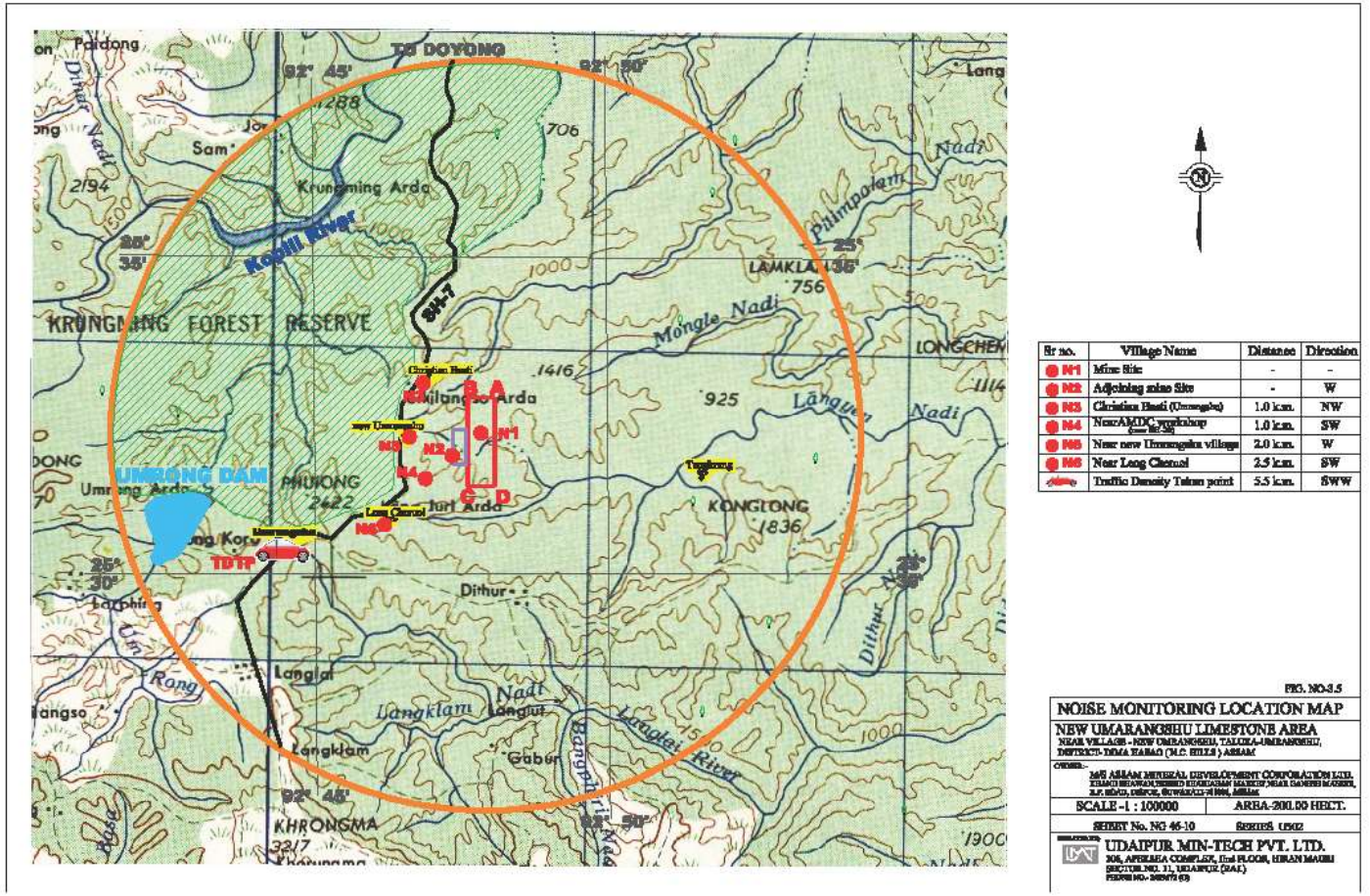
The location of Noise level monitoring is presented in below table.

TABLE 3.9: LOCATION OF NOISE MONITORING STATIONS

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
N1	Mine site	--	--
N2	Mine site (31 hect)	Adjoin mine area	W
N3	Near 19 Kilo Umrangshu (Chirstian Basti)	1.0	NW
N4	Near AMDC Workshop (Near SH-20)	1.0	SW
N5	Near New Umrangshu Village	2.0	W
N6	Near Leng Cheruoi	2.5	SW

Refer Figure 3.5: Noise Monitoring Station in the Study Area

FIGURE 3.5: NOISE & TRAFFIC DENSITY MONITORING LOCATION MAP



3.11.3 Noise Level Results

The noise monitoring within the study area was recorded using sound level meter. Noise readings were taken at six different locations in the study area.

TABLE 3.10: NOISE LEVEL WITHIN THE STUDY AREA

(Unit – dBA)

S. No	Location	Result		Test	Test Method
		Day	Night		
1	Mine site	53.4	45.8	1Hour Leq	IS:9989 : 1981 R -2002
2	Mine site (31 hect)	52.4	45.0	1Hour Leq	IS:9989 : 1981 R -2002
3	Near 19 Kilo Umrangshu (Chirstian Basti)	50.5	43.1	1Hour Leq	IS:9989 : 1981 R -2002
4	Near AMDC Workshop (Near SH-20)	52.6	43.2	1Hour Leq	IS:9989 : 1981 R -2002
5	Near New Umrangshu Village	50.7	44.7	1Hour Leq	IS:9989 : 1981 R -2002
6	Near Leng Cheruoi	47.3	42.9	1Hour Leq	IS:9989 : 1981 R -2002

Source: Eco Laboratories & Consultants Pvt. Ltd.

TABLE 3.11: CPCB NOISE STANDERD

Category of Zones	Leq in dB (A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

a. Day time is from 6.00 Am to 10.00PM.

b. Night time is reckoned between 10.00 PM to 6.00AM

c. Silence zone is defined as an area up to 100m around premises of hospitals, educational institution and courts. Use of vehicle

horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.

3.11.4 Traffic density

Traffic density measurements were performed at one location at near village Umrangshu (SH – 20, 19 Kilo to Umrangshu). Locations of these stations are marked on the map. The monitoring was performed in Jan., 2014.

Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour under the three categories were determined. The results of measurements are given in the summery in below table.

TABLE 3.12: TRAFFIC DENSITY

Traffic vehicle	**No. of vehicles per day at**
	Umrangshu (SH – 20, 19 Kilo to Umrangshu).
H.M.V.	086
L.M.V.	118
2/3 wheelers	134
Grand Total	**338**

3.12 SOIL ENVIRONMENT

Soil is defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to and influenced by genetic and environmental factors, such as, parent material, climate organism and physiochemical action of wind, water and sum light an acting over a long period of time. Soil differs from the parent materials in the morphological, physical, chemical and biological properties. Also soils differ among themselves in some or all the properties depending on the differences in the gothic and environmental factors. The soil samples were analyzed for physical and chemical characteristics.

The soil characteristic include both physical and chemical details, the soil survey was carried out by the M/s Udaipur Min-Tech Pvt. Ltd. Udaipur & M/s. Eco Laboratories & Consultants Pvt. Ltd., Mohali, to assess the soil characteristics of the area.

3.12.1 Methodology for Soil Monitoring

Soil samples from depth (0-15 cm) were collected from these villages area for estimation of the physicochemical characteristics of soil. Air-dried and Sieved samples have been used for determination of physical properties of soil. Standard methods were followed for the analysis of soil samples.

3.12.2 Soil Sampling Location

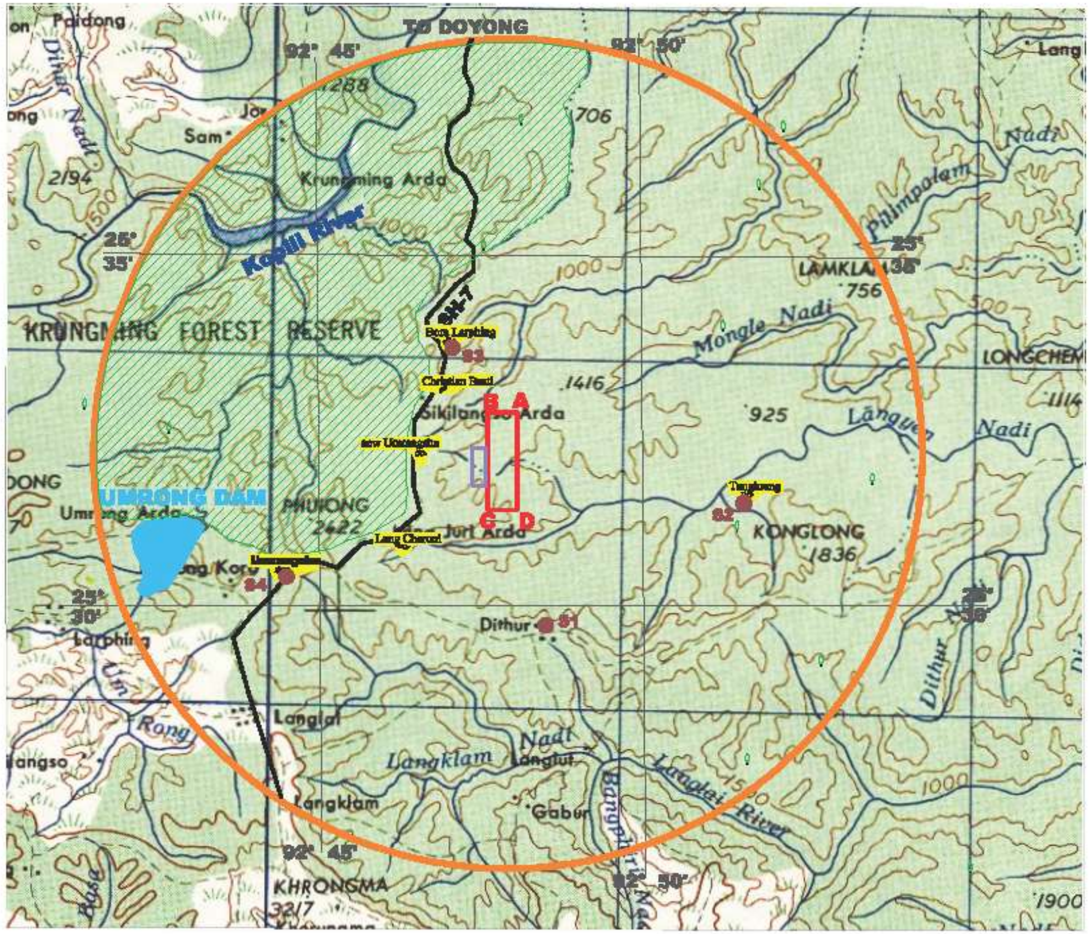
Soil survey was carried out by Environmental Expert Team, while conducting the studies for preparing the report for the main plant of the applicant, by drawing samples from various locations in winter seasons 2013-14 and analyses the same for physical and chemical parameters.

TABLE 3.13: SOIL SAMPLING LOCATIONS IN THE STUDY AREA

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
S1	Near Dithur	3.0	S
S2	Near Tungkharang	5.5	E
S3	Near Bora Larphing	2.0	NNW
S4	Near Umrangshu	5.5	SWW

Refer Figure 3.6: Soil Sampling Location in the Study Area

FIGURE 3.6: SOIL SAMPLING LOCATION IN THE STUDY AREA



Sr no.	Village Name	Distance	Direction
S1	Near Dithur	3.0 k.m.	S
S2	Near Tunglarong	5.5 k.m.	E
S3	Near Bora Larphing	2.0 k.m.	NNW
S4	Near Umrangshu	3.5 k.m.	SWW

FIG. NO-3.6

SOIL SAMPLING LOCATION MAP

NEW UMARANGSHU LIMESTONE AREA

OWNER:-
M/S ASSAM MINERAL DEVELOPMENT CORPORATION LTD.

SCALE -1 : 100000 | AREA-200.00 HECT.

SHEET No. NG 46-10 | SERIES U502

UDAIPUR MIN-TECH PVT. LTD.

SECTOR NO. 11, UDAIPUR (RAJ.)

3.12.3 Soil Analysis Results

Soil analysis was carried out and the results following below table.

TABLE 3.14: SOIL ANALYSIS RESULTS

S. No	Parameters	unit	Near Dithur	Near Tungkharang	Near Bora Larphing	Near Umrangshu
			S1	S2	S3	S4
1	pH (1:2.5)	--	7.42	6.95	6.98	7.40
2	Color	--	Blackish brown	Brown	Light brown	Brown
3	Texture	--	Sandy loam	Sandy loam	Sandy loam	Sandy loam
4	Water holding capacity	%	28.01	27.30	25.96	27.53
5	Potassium	Kg/hect	218.0	272.8	191.9	207.0
6	Nitrogen	Kg/hect	352	396.6	281.6	264.0
7	Bulk Density	gm/cc	1.22	0.160	1.66	1.35
8	Organic Matter	%	1.60	1.68	1.28	1.20
9	EC	µmhos/cm	180	140	160	143

Source: Eco Laboratories & Consultants Pvt. Ltd.

3.13 WATER ENVIRONMENT

In order to conduct EIA Studies, baseline data pertaining to water environment of the existing project was carried out evaluating the basin characteristics, drainage pattern, and hydrology.

3.13.1 Surface Water Quality

The lease Umrangshu limestone mine area falls, near village Umranghu, District – Dima Hasao of State Assam. The sample of Umrangshu dam surface water body collected and analyzed. The lease area is free of industrial pollutants.

3.13.2 Ground Water Quality Assessment

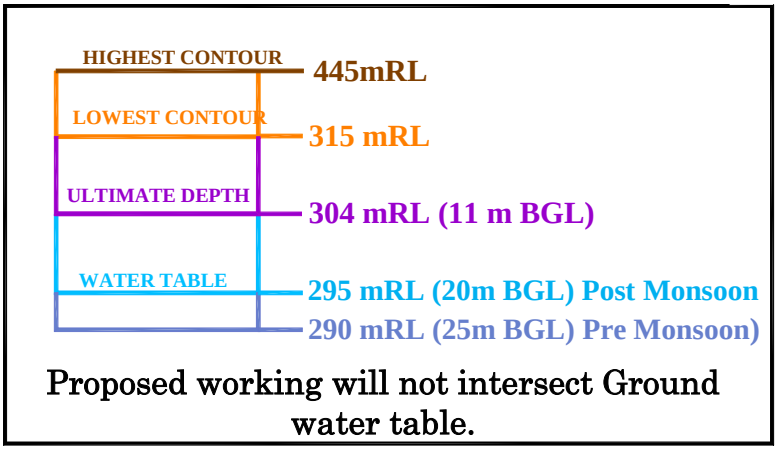
The sources of potable water are the hand pumps, tub-wells & dug well in the area. Samples were collected from the available water resources

around the mine lease area. The samples were collected & tested from different sites.

The quality of ground water was studied by collecting water samples from representative open dug wells, tube wells, & hand pumps. The details of water quality sites are given in below table. The samples were collected during winter season (Dec., 2013 to Feb., 2014).

The ground water table is in this region between 20 and 25 mts from the ground level.

FIGURE 3.7: SCHEMATIC REPRESENTATION OF SITE ELEVATION, ULTIMATE DEPTH & GROUND WATER TABLE



3.13.3 Ground Water Monitoring Methodology

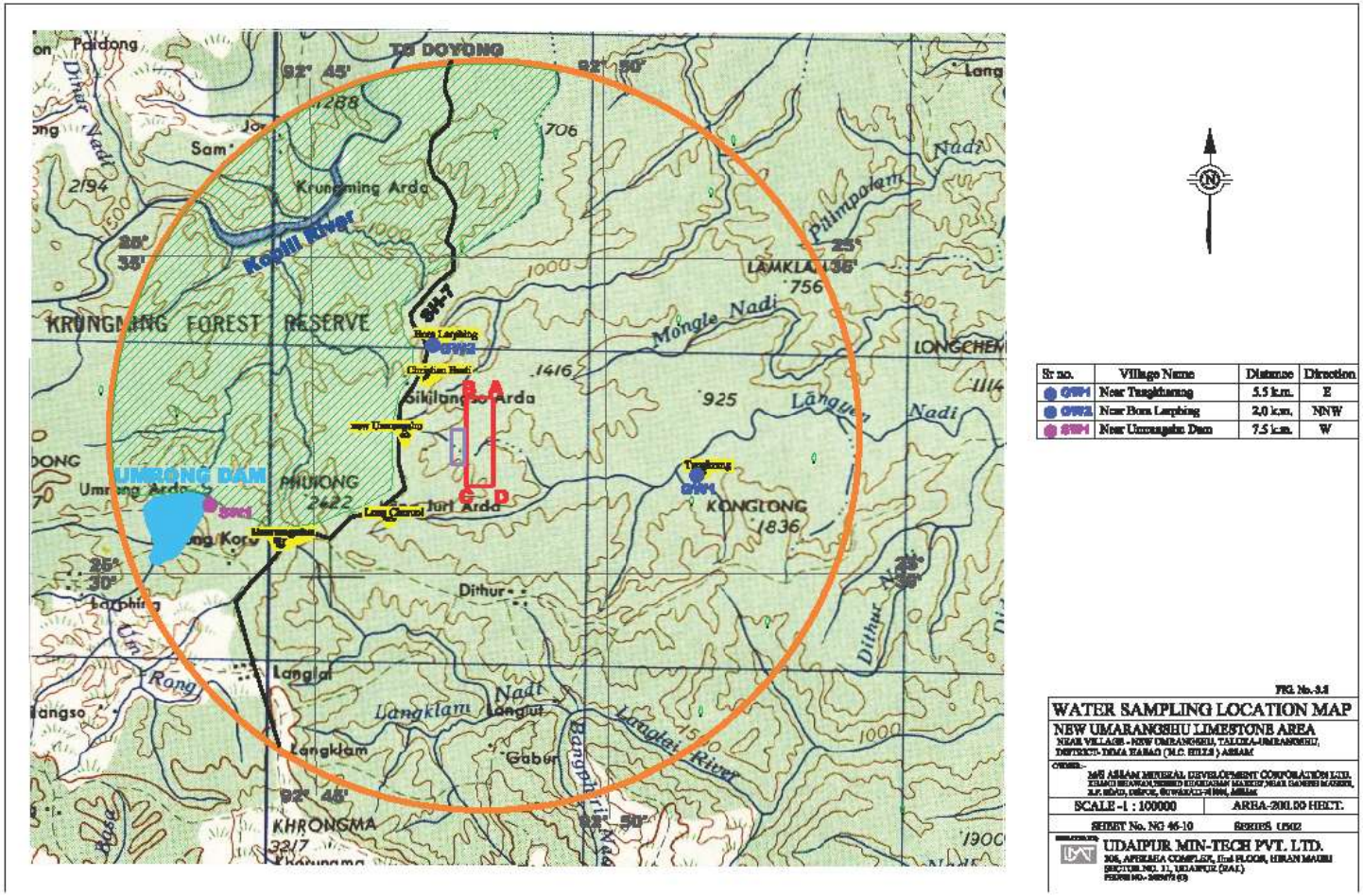
To evaluate the physico-chemical characteristics of the water resources existing in the study area, water samples from two ground water sources were collected during the winter season and characterized for physico-chemical parameters. Water samples from two ground water source were characterized. There samples were taken as grab sample and were analysed for various parameters and compared with standards IS: 10500. The locations of water sampling stations have been shown in below table.

TABLE 3.15: GROUND & SURFACE WATER SAMPLING LOCATIONS IN THE STUDY AREA

Station Code	Location	Remarks
GW1	Near Tungkharang	Ground Water
GW2	Near Bora Larphing	Ground Water
SW1	Near Umrangshu Dam	Surface Water

Refer Figure 3.8: Ground & Surface Water Sampling Station in the study area.

FIGURE 3.8: GROUND & SURFACE WATER SAMPLING LOCATION IN THE STUDY AREA



3.13.4 Analysis Report of Ground Water Quality

The quality of ground & surface water was studied by collecting two water samples from representative hand pump & wells. The physico-chemical characteristics of ground water samples presented in below table.

TABLE 3.16: ANALYSIS RESULTS OF GROUND WATER SAMPLE

S. No.	Parameter	Unit	Near Tungkharang	Near Bora Larphing
			GW1	**GW2**
1	Color	--	<5	<5
2	Odour	--	Agreeable	Agreeable
3	Turbidity	NTU	1.1	0.8
4	pH value	--	6.9	5.7
5	Total Hardness (as CaCO3)	mg/l	84	48
6	Total Dissolved solids	mg/l	240	100
7	Total suspended solid	mg/l	5.0	4.7
8	Chlorides (as Cl)	mg/l	20	14
9	Sulphate (So_4)	mg/l	7.61	6.64
10	Iron (as Fe)	mg/l	0.29	0.30
11	Nitrate (as NO3)	mg/l	3.61	3.99
12	Fluoride (as F)	mg/l	0.2	0.3

Source: Eco Laboratories & Consultants Pvt. Ltd.

A review of the above chemical analysis that there is some variation in chemical composition of water tapped from different tube wells and hand pumps, but the ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed for drinking water standards promulgated by Indian standard.

3.13.5 Analysis Report of Surface Water Quality

The quality of ground & surface water was studied by collecting one water samples from representative Umrangshu dam. The physico-chemical characteristics of surface water samples presented in below table.

TABLE 3.16: ANALYSIS RESULTS OF SURFACE WATER SAMPLE

S. No.	Parameter	Unit	Near Umrangshu Dam
			SW1
1	Color	--	<5
2	Odour	--	Agreeable
3	Turbidity	NTU	0.2
4	pH value	--	6.5
5	Total Hardness (as CaCO3)	mg/l	124
6	Total Dissolved solids	mg/l	164
7	Total suspended solid	mg/l	10
8	Chlorides (as Cl)	mg/l	8
9	Sulphate (So_4)	mg/l	12.45
10	Iron (as Fe)	mg/l	0.27
11	Nitrate (as NO3)	mg/l	2.81
12	Fluoride (as F)	mg/l	0.13
13	Dissolved Oxygen	mg/l	9.1
14	E. Coli.	--	Absent

Source: Eco Laboratories & Consultants Pvt. Ltd.

3.14 BIOLOGICAL ENVIRONMENT:

3.14.1 Biological Aspects

The basic purpose to exploring the biological environment under Environmental Impact Assessment (EIA) is to assist in the decision making process and to ensure that the project options under consideration are bio-environmental-friendly. EIA identifies ways of improving project environmentally by preventing, minimizing, mitigating or compensating for adverse impacts before exploration and development phase. The present study on the floral assessment of the proposed project is based on field survey of the area supported by secondary data from various governmental and non-governmental sources.

Objective of the study

The objectives of this study were as follows:

1. To conduct detail study for floral/ faunal/ avifaunal elements in the study area of proposed project site.
2. To assess scheduled species in the proposed site. (Rare, endangered, critically endangered, endemic and vulnerable).
3. To identify locations and features of ecological significance
4. To collect Baseline data for the study area along with a description of the existing terrestrial, wetland and aquatic vegetation.
5. To identify Impact of proposed project before exploration and during development phase on the biological environment

3.14.1 Activities undertaken during the study

1. Flora survey
   - -Identification and documentation of Tree, shrub, herb, climber and grass species
   - -Analysis of scheduled taxa of the proposed site
2. Fauna survey
   - -Identification and Documentation of Avian, Reptilian, Amphibian, Mammal and other faunal diversity
   - -Observations by direct and indirect evidences
   - -Analysis of Scheduled species
3. Study of Habitat/microhabitat for the faunal elements in the project site and surrounding areas within 10 km range from the site.
4. Photo documentation for flora and fauna (E – herbarium for flora)

Study area:

The proposed project is Limestone Mine project spread over an area of 200 hectares. The applied lease area is non-Government Barren Land situated at Village and Taluka Umrangshu, district Dima Hasao (North Cachar Hills), Assam. The lease area is located in hilly terrain and no reserves or protected forest is present within the applied area. No National Park, Sanctuary exists within 10 km of the applied area.

FIGURE 3.9: PHOTOGRAPHS OF MINE LEASE AREA

Umrangshu and neighbouring areas lie in the western extremity of N.C. hills district and are bordered on west by the Kopili River. The region constitutes the eastern flank of the Shillong plateau. The drainage system of the area is controlled by river Kopili that flows in an east – west direction. The area comprises small flat – topped hillocks whose elevations vary from 580 m to around 820 m above msl. The highest point at Khandong which is approximately 12 km. west of the deposit is at 837.29 above M.S.L.

The climate of the district of N.C. Hills is fairly diverse climate with an average annual precipitation of around 1500 mm to 2000 mm with average of 1673 mm and 40 to 90% relative humidity. The rainfall is mostly distributed between the months of July and September. About 90 percent of the annual rainfall is received during the period June to September, July and August being the rainiest months. The variation in annual rainfall from year to year is very large. During the North-East monsoon season, the relative humidity is

generally over 90 percent. The coldest month is January and the hottest month is May. 10 km buffer area was taken for the present biodiversity study from the project boundary. The study was under taken during winter season (December, 2013 to February, 2014)

3.14.2 Survey methodology

Flora

The present study on the floral assessment for the proposed project activity is based on extensive field survey of the area. The study has been conducted in winter season. The plant species were identified during floral survey and with the help of nearby institutions / University and by secondary sources. Besides the collection of plant species, information was also collected with vernacular names of plant species made by local inhabitants. In this process the whole study area was divided into different sections to get the maximum diversity of plant species. The sampling sites were selected based on land use pattern, topography and floristic composition of the study area. Data on forest type, legal status and their extent in the study area has been collected from forest department. The other relevant data on biodiversity, economically important plant species and medicinal plant, rare and endangered species in the study area have been collected during site visit and from different secondary sources.

Fauna

The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The assessment of fauna has been done by extensive field survey of the area. During survey, Line Transect method was used for the study of mammals and Transact & Patch sampling was used for Amphibians. In addition the following sources were also used during survey.

- Sighting during ecological studies
- Animal call
- Foot mark and excreta

During survey, the presence of wildlife was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area which was later confirmed from different government offices like forest department, wildlife department etc.

Avifauna

During Birds survey actual counts of birds were made following the standard survey technique. Observations were made during a walk through in the chosen transect for sighting birds. The number of birds observed in each sampling location was directly counted and listing was made. Birds were noted, counted and identified with the help of 8X40 "Optima Zenith" binocular and standard field identification guides.

Forest and forest types in the study area

Depending upon the pre-dominant species, the natural forest of the Dima Hasao, fall under the following category of subtypes-

1. Cachar Tropical evergreen Forests (IB/C3)
2. Cachar Tropical semi-evergreen Forest (2B/C3)
3. Northern Tropical, Sub-tropical Broad leaved Hill Forest Forests (8B/C2)
4. Tropical Moist Mixed Deciduous Forests- 8B (Ghogra, Oak Type)
5. Cane Brakes
6. Secondary Moist Bamboo Brakes (2B/C a)

Cachar Tropical evergreen Forests type is generally found on the lower slopes of the northern and eastern aspects. The Forest is largely composed of evergreen species. Cachar tropical semi-evergreen occurs in hill tops, ridges and the upper slopes and in the forest areas affected by Jhum in the past. The forests have both evergreen and deciduous species. Northern Sub-tropical Broad leaved Hills Forests, originally forest cover of Board leaved evergreen

species have mostly been cleared and altered by repeated felling, burning and Jhum cultivation. These are now considerable areas of open grasslands with scattered trees. In some patches almost pine, oak forests and found along with schism wallichii species.

The tree growths in these Forests are three different storeys, though they look monolithic from distant. The top consists of species like *Artocarpus Chaplasa* (Cham) *Michelia Champaca* (Titasopa), *Mansonia depikae* (Badam), *Schima wallichii* (Makrisal), *Phoebe goalparensist* (Bonsum), *Adina cordifloa* (Galdu), *Gmelina arborea* (Gamari), *Duabanga species* (Khokan) Bhelu (*Tetrameles mudiflora*), *Albezzia procera* (Koroi), *Terminalia* (Bohera etc.), Middle storey consists of trees like *Eugenia species* (Jam) *Callicarpa species* (Kum), *Emblica officinalis* (Amla) *Albezzia species* (Moj), *Holarhena antidysentrica* (Dudhuri) etc.

The under storey consists of *Eupatorium, Odoratum* (Asom Lota),*Imperata Cycindrica, Flemingia species, Leea species, Lantana camara , Zizyphus species* (Bonbogari), *Clerodendron species* (Dhatpat titu) *Litsea species, Phrtninum species* (Kaupat) *Murraya koenijii* (Narsingha), *Cnes* etc. Besides these, the forests are made impregnable with multitude of tree climbers. Dima Hasao Forests is rich in non-wood Forests products (NWEP). NWEP are Forest products of human consumption, other timber, firewood etc. These products include oil-bearing seeds, leaf edible fruits, bark yielding tannin and dye, bamboos, medicinal plants etc. These products not only meet the commercial requirements but are an important source of employment to people living in and around forest.

Bamboo Forests

The Bamboo forests occurring in the area can be classified as under 2B/la and 2B/251. The first type occurs under tree forest as a secondary storey. The main

Bamboo Forests falls under the category of secondary moist bamboo brakes. This type occurs over an extensive area almost as a pure crop, either of *Melocanna baccifera* (muli) or *Oxytenanthera parviflora* (hill jati).

Some important species found in the area are-*Dendrocalamus amiltonii* (kako/pecha) *Bambusa tulda* (jati) *Teinostachyum dulloa* (Dalu), *Melocanna bacciferra* (muli), *Oxytenanthera parviflora* (Hilljati), *Bambusa arundinacea* (kata), *Pseudostachyum polymorphum* (Bajal/Bijullee), *Bambusa pallida* (Makalo, *Oxytenanthera nigrocilliata* (Kalisundi) *Gigantochloa macrostachya* (Terai) etc.

Floral investigation

Core zone

The core zone of the study area is mine lease area. Mining of limestone is proposed in the new Umrangshu project, the lease area is 200 ha (Govt. Land,). Mining will be carried out by opencast semi-mechanized method.

The lease area is undulating in nature. The land use of the applied area is Non Govt. Barren land. The lease area is having very sparse tree species and dominant herbs and shrub species.

The species observed in the lease area are *Michelia champca, Adina cordifolia, Lagerstromia parviflora, Terminalia chebula, Mangifera indica, Albizzia procera, Bridelia retusa, Garuga pinnata, Bombax ceiba, Alstonia scholaris, Anthrocephalus cadamba, Sapium bacatum, Azadirachta indica and Parkia roxburghii.*

The Climbers, Weeds and grasses including Bamboo and canes species observed in the lease area are *Abrus precatorius, Bauhinia anguina, Saccharum spontaneum, Saccharum procerum, Thysanolaena maxima, Polinia*

ciliate, Calamus guruba, Clamus latifolius, Calamus tenuis, Daemonorps jenkinsianus, Bambusa tulda, Melocanna bambusoides.

FIGURE 3.10: VEGETATION OBSERVED IN THE LEASE AREA

Buffer Zone

The structure and composition of vegetation in the buffer zone was studied by visual observations during the site visit. The buffer zone of 10 km is dominated by bushy vegetation and agriculture fields. The study area is located in a landform, which is surrounded by hills and undulations. The tree species are observed around the human settlement, hill slopes and hill top and in peripheral areas of agriculture fields. Common tree species observed during the site visit are *Gmelina arborea, Michelia champca, Adina cordifolia, Lagerstromia parviflora, Artocarpus fraxinifolius, Terminalia chebula, Mangifera indica, Albizzia procera, Bridelia retusa, Pterospermum acerifolium, Garuga pinnata, Bombax ceiba, Alstonia scholaris, Dillenia indica, Anthrocephalus cadamba, Lannea grandis, Sterculia villosa, Sapium bacatum, Azadirachta indica and Parkia roxburghii.*

In some patches of the study area there is luxuriant growth of Climbers, Weeds and grasses including Bamboo and canes. The species observed in the study area are *Abrus precatorius, Bauhinia anguina, Bauhinia macrostachya, Bauhinia Vahlii, Mikenia macrantha, Spatholobus roxburghii, Thunbergia grandiflora, Impereta cylindrical, Phragmites karka, Saccharum spontaneum, Saccharum procerum, Thysanolaena maxima, Polinia ciliate, Calamus guruba, Clamus latifolius, Calamus tenuis, Daemonorps jenkinsianus, Bambusa tulda, Dendrocalamus hamiltonii, Melocanna bambusoides, Teinostachyum dulloa.* A detailed List of Floral Species observed in the study area is given in below table.

TABLE 3.18: LIST OF PLANT SPECIES RECORDED IN THE STUDY AREA

S. No.	Species	Name of Botanical	Family
1	Gamari	*Gmelina arborea*	Verbenaceae
2	T. Chap.	*Michelia champca*	Magnoliaceae
3	Bola	*Morus laevigate*	Moraceae
4	Haldu	*Adina cordifolia*	Rubiaceae
5	Sidha	*Lagerstromia parviflora*	Lythraceae

S. No.	Species	Name of Botanical	Family
6	B. Poma	*Chikrassia tabularia*	Meliaceae
7	B. Jam.	*Eugenia pracco*	Myrtaceae
8	B. Dima	*Dysoxlylum binectiferum*	Meliaceae
9	Mandani	*Artocarpus fraxinifolius*	Moraceae
10	Gonsoroi	*Cinnamomum cecidodaphnac*	Lauraceae
11	Hilika	*Terminalia chebula*	Combretaceae
12	Am.	*Mangifera indica*	Anacardiaceae
13	Ashoi.	*Vitex pendunwlaria*	Verbinaceae
14	Sirish	*Albizzia procera*	Ceasalpiniaceae
15	Kushir	*Bridelia retusa*	Euphorbiaceae
16	H. Poila	*Pterospermum acerifolium*	Steracuniaceae
17	Kathal	*Artocarpus integrifolia*	Moraceae
18	Khakon	*Duabanga sonnaretioides*	Lythraceae
19	Bhelu	*Tetramelia nudiflora*	Combretaceae
20	Paroli	*Stereospermum chelanoldis*	Begnoniace
21	T. Mala	*Garuga pinnata*	Burseraceae
22	Simul	*Bombax ceiba*	Malvaceae
23	Satiana	*Alstonia scholaris*	Apocynaceae
24	Owtenga	*Dillenia indica*	Dilleniaceae
25	Dhuna	*Trewia nudiflora*	Euphorbiaceae
26	Kadam	*Anthrocephalus cadamba*	Rubiaceae
27	Oxi	*Dillenia pentagyna*	Dilleniaceae
28	Jia	*Lannea grandis*	Anacardiaceae
29	Kawla	*Machilus globusa*	Louraceae
30	Udal	*Sterculia villosa*	Sterculiaceae
31	Amora	*Spondius mangifera*	Anacardiaceae
32	Seleng	*Sapium bacatum*	Euphorbiaceae
33	S. Gamari	*Premna milliflora*	Verbinaceae
34	Rali	*Gleditsia assamica*	Fabaceae
35	G. Jam	*Eugenia eperculate*	Myrtaceae
36	D. Champa	*Gironniera species*	Cretaceae
37	Boroi	*Lonicera acuminate*	Caprifoliaceae
38	B Champa	*Litsa panamonja*	Lauraceae
39	Neem	*Azadirachta indica*	Meliaceae
40	M. Seem	*Parkia roxburghii*	Leguminaceae

Climber

S. No.	LOCAL NAME	Scientific Name	Family
1	Raturmoni	*Abrus precatorius*	Papilionaceae
2	Kuchai	*Acacia pifinata*	Mimosaceae
3	Deojakhala	*Bauhinia anguina*	Caesalpiniaceae
4	Ramjakhala	*Bauhinia macrostachya*	Caesalpiniaceae
5	Nakkatilota	*Bauhinia Vahlii*	Caesalpiniaceae
6	Bakullota	*Embelia ribes*	Myrsinaceae
7	Ghilalota	*Fentada scadens*	Mimosaceae
8	Refusilota	*Mikenia macrantha*	Compositeae
9	Bagachora	*Mezonuerum cuculatum*	Caesalpiniaceae
10	Bandorkakuwa	*Mucuna prurieta*	Papilionaceae
11	Bhedalilota	*Paederia foetida*	Rubiaceae
12	Hatibandhalota	*Spatholobus roxburghii*	Papilionaceae
13	Dhekialota	*Steochlaena palustris*	Blechnaceae
14	Kukraloti	*Thunbergia grandiflora*	Acanthaceae
15	Bonbogori	*Ziziphus rugusus*	Rhamnaceae

Weed and Grasses

S. No.	Local Name	Scientific Name	Family
1	Ekra	*Eriathusravneae*	Andropogoneae
2	Kher	*Impereta cylindrical*	Andropogoneae
3	Nal	*Phragmites karka*	Arundineae
4	Khagra	*Saccharum spontaneum*	Andropogoneae
5	Kush	*Saccharum procerum*	Andropogoneae
6	Rema	*Thysanolaena maxima*	Thysanolaeneae
7	Ghanh	*Polinia ciliate*	Andropogoneae
CANES			
1	Sundi	*Calamus guruba*	-
2	Homa	*Clamus latifolius*	-
3	Jali	*Calamus tenuis*	-
4	Gola	*Daemonorps jenkinsianus*	-
Bamboo : (Dominant spp.)			
1	Jati (Wati)	*Bambusa tulda*	-
2	Pecha	*Dendrocalamus hamiltonii*	-
3	Muli	*Melocanna bambusoides*	-
4	Dulloa	*Teinostachyum dulloa*	-
5	Hill jati	*Oxytenanthera spp. (parvifolia)*	-

Source: Survey team in consultation with concern state forest officials and local people

Medicinal Plants

The economic life of the tribal communities living in the rural areas in the district is still closely linked to surrounding forests and its produce. The medicinal plants from forests are an important component of the Minor Forest Produce. Otherwise known as Non-Timber Forests Produce (NTFP). The district is rich in medicinal plants. They are principal health care resource for majority of rural people. The N.T.F.P. including medicinal plants may play more than a subsidiary role in supplementing household income. Some of the Medicinal tree, herbs and shrubs, which grow naturally in some of our forests have great potential economic value. The demand for medicinal plants is increasing within and outside countries. There is depletion of medicinal plant resource in the district due to over exploitation as well as for practice of Jhum cultivation. The Medicinal Plants are mostly harvested from wild resource i.e. forest land and only a very few of number of species are cultivated.

Some of the important Medicinal Plants species found in the district are- *Azadirachta indica* (neem), *Emblica Officinalis* (Amla), *Terminalia chebula* (Hilika) *T.belerica* (Bohera), *T. arjuna* (Arjun) *Aegle marmilos* (Bel) *Cinnamomum tamala* (Tejpata) *Crataeva magna* (Sibidokti) *Oroxyhum indica* (Bhat ghila) *Aquilaria,Agallocha* (Agar), *Taxus. Walliciana* etc. Other important herbs & shrubs etc. are - *Similax macrophylla* (Chopchini), *Rowlfia serpentine* (Sarpagarila) *Aspargus racemosus* (Satamul) *Homolaen species* (Gandhi), *Tinospora cordifolia* (Hagunilata) *Discorea alata* (Bonkapahi) *alatita* (Kath Alu) *Acalypha indica* (Bishohory), *Jatropha curcus* (Bongali Ara/Bhotera) *Swertia tita* (Chirata Tita) etc. The plants observed in the study area having some medicinal properties are presented in below table.

TABLE 3.19: LIST OF MEDICINAL PLANTS SPECIES OBSERVED IN THE STUDY AREA

S. No.	Local Name	Scientific Name	Family
1	Boss	*Acorus clamus*	Araceae
2	Ultihoth	*Achyranthes aspera*	Amaranthaceae
3	Kuhumkata	*Argimone mexicana*	Papaveraceae
4	Doachuntry	*Ageratum conizoides*	Asteraceae
5	Satmul	*Asparagus racimosus*	Asparagaceae
6	Bhang	*Cannabis sativa*	Canabinaceae
7	Lotaguti	*Caesapinia cristia*	Caesalpiniaceae
8	Konasimalu	*Commelina bengalensis*	Commelnaceae
9	Bonhaldi	*Curcuma aromatic*	Zingiberaceae
10	Kalihari	*Gloriosa superb*	Liliaceae
11	TitaPhul	*Phlogocanthus thyrsiflorus*	Acanthaceae
12	Chirata	*Swertia chirata*	Gentianaceae
13	Huin (trade name)	*Spilanthes acmella*	Compositae
14	Sarpagondha	*Rauwolfia serpentine*	Apocynaceae
15	Sonborial	*Urena lobata*	Malvaceae

Source: Survey team in consultation with concern state forest officials and local people

Fauna

Faunal assessment provides a basis for determining relative abundance and rarity of each species which is important for assessing the diversity of fauna of a particular area. Since animals are capable of movements from one place to another, this makes their study entirely different. Different animals prefer different types of habitat for food and shelter.

With increase in population and consequence expansion of shifting cultivation with increasing short period, there has been considerable degradation of these prime wild life habitats. The forest in the hill tract is habitat for great variety of wild animals, which are representative of wild life of the oriental Zoogeographic realm.

The core zone of the study area is having bushy vegetation and supports species like Field mouse (*Mus booduya*), Hare (*Lepus nigrocollis*), Mongoose (*Lapestes auropunctuatus*) and Wild boar (*Sus scrofa*), which is also confirmed by the people residing near the lease area. The buffer zone is having different land use which supports different species like jungle cat (Felis chaus), rhesus (*Macaca multta*), Samber (*Curvus unicolor*), common langur (*Presbytis entellus*), goral (*Nemorhacdus goral*), Porcupine (*Hystrix indica*) etc. The list of fauna species found in the study area is given in below table.

TABLE 3.20: LIST OF FAUNA OBSERVED IN THE STUDY AREA

S. No.	Local name	English name	Scientific name	Schedule
1	Baduli (Badur)	Fruit bat	*Rousettas*	V
2	BorIndur	Field mouse	*Mus booduya*	IV
3	Ban birali	The jungle cat	*Felis chaus*	II PART-2
4	Bandar	The rhesus	*Macaca multta*	II PART-1
5	Bholangi (sarpahu)	Samber	*Curvus unicolor*	III
6	Boroendur	Bamboo rat	*Cannomis badius*	IV
7	Chika	Mole	*Talpa micrura*	-
8	Endur	Tree shrew	*Tupia glis*	-
9	Honuman	The common	*Presbytis entellus*	II PART-1
10	Hugoripahu	Barking deer	*Muntiacus muntjak*	III
11	Khorgosh	Hare	*Lepus nigrocollis*	IV
12	Neyul	The mongoose	*Lapestes*	II PART-2
13	Paharichagal	The goral	*Nemorhacdus goral*	III
14	Sajaru	Porcupine	*Hystrix indica*	IV
15	Shiyal/Hiyal	The jackal	*Canis aureus*	II PART-2
16	Hiyal	The fox	*Vules benglensis*	II PART-2
17	Suwar (gahori)	Wild boar	*Sus scrofa*	III
18	Uood	Common otter	*Lutra lutra*	II PART-2

Source: Survey team in consultation with concern state forest officials and local people

Avifauna

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. Random destruction of natural habitats by cutting nesting trees and foraging plants for commercial use of woods and lands are the main factor responsible for narrow down in avian diversity. Both plant and bird diversity has an important role in maintaining the ecological balance and these are the indicator of health of the ecosystem. Bird diversity has a direct relationship with plant diversity. Plant diversity provides a space to birds for nesting, feeding and breeding.

During survey, The bird species which observed in the core zone are Koel, Magpie Robin, Jungle crow, House sparrow, Red Jungle Fowl, House swift, White wagtail, Little green bee eater, Yellow backed sun bird, House crow and Spotted munia etc.

The study area is having different land use pattern in the form of dense vegetation, bushy vegetation, water-bodies etc. which attracts different bird species. Most of the birds in the project area are distinctive to the habitat. During survey the species i.e. House sparrow, Pariah kite, Jungle crow, White breasted water hen, Magpie Robin, Cattle Egret, Green pigeon, Black headed oriole, Blossom headed parakeet, Rufous wood pecker, White wagtail, Koel, Common king fisher, Hoopoe, Indian roller, House crow were observed in different locations of the study area. List of birds observed in the study area are presented in below table.

TABLE 3.21: LIST OF BIRD SPECIES OBSERVED IN THE STUDY AREA

S. No.	Local name	English name	Scientific name	Schedule
1.	Babul	Baya	*Ploceus philppinus*	IV
2.	Bata	Rain quail	*Coturnix*	IV
3.	Batasi	Crested tree swift	*Hemiprocne*	IV
4.	Batasia	House swift	*Apus affinis*	IV
5.	Bhutumphec	Indian Eagle Owl	*Bubu bubu*	IV
6.	Bon murgi	Red Jungle Fowl	*Gallus gallus*	IV
7.	Bou kaka	Brainfever bird	*Cuclus varius*	IV
8.	Bulbul	Bulbul	*Pycnonotus jokosus*	IV
9.	Gharchirica	House sparrow	*Passer domesticus*	IV
10.	Chatak	Small skylark	*Alauda gulgula*	IV
11.	Cheel	Pariah kite	*Milvas migrans*	IV
12.	Darkak	Jungle crow	*Corvus*	IV
13.	Dauk	White breasted water hen	*Amaurournis*	IV
14.	Doyel	Magpie Robin	*Copsychus saularis*	IV
15.	Dub dubi	Dabchick	*Tachylaptrus*	IV
16.	Gachphecha	Spottet owlet	*Streptopelia*	IV
17.	Bogoli	Egret heron	*Egretta garzetta*	IV
18.	Kanimusuri	Grey heron	*Ardea cinerea*	IV
19.	Gorubogoli	Cattle heron	*Bubulcus ibis*	IV
20.	Haital	Green pigeon	*Treron*	IV
21.	Patmadoi	Black headed oriole	*Oriolus xanthornus*	IV
22.	Hargila	Adjucent stork	*Leptopilos dubius*	IV
23.	Hiramon	Blossomheaded parakeet	*Psittacula*	IV
24.	Hutumphech	Brown fish owl	*Ketupa zeylonensis*	IV
25.	Jalghuri	Pheasant tailed Jacana	*Hydrophaisannus*	IV
26.	Teltupi	Red rumped shallow	*Hirundo daurica*	IV
27.	Jangalipaora	Maroon backed Imperial	*Dukula badia*	IV
28.	Jangalishalik	Grey headed myna	*Sturnus*	IV
29.	Kath thukra	Rufous wood pecker	*Micropternus*	IV
30.	Dhobani	White wagtail	*Motacilla alba*	IV
31.	Kukil/kuli	Koel	*Eudynamys*	IV
32.	Lakhiphecha	Barn owl	*Tyto alba*	IV
33.	Laldhupi	Redtutle dove	*Streptopelia tranquebarica*	IV
34.	Latkan	Indian lorikeet	*Loriculus vernalis*	IV
35.	Lanjo	Pintail	*Anus acuta*	IV

36.	Machhranga	Common king fisher	*Alcedo atthis*	IV
37.	Maupiya	Fire breasted flower pecker	*Dicacum ignipectus*	IV
38.	Mohonchura	Hoopoe	*Upupa epops*	IV
39.	Munia	Spotted munia	*Lonchura*	IV
40.	Myna	Hill myna	*Gracula religiosa*	IV
41.	Neelpakhi	Fairy blue bird	*Irena puella*	IV
42.	Nilkantha	Indian roller	*Coracias bengalensis*	IV
43.	Panicowri	Little cormorant	*Phalacrocorex niger*	IV
44.	Pan duri	Darter	*Anhiga rufa*	IV
45.	Paticowri	House crow	*Corvus spendens*	IV
46.	PechKunda	Black drongo	*Dicrurus adsimilis*	IV
47.	Patringa	Little green bee eater	*Merops orientalis*	IV
48.	Phultooshi	Yellow backed sun bird	*Aethopyga siparaja*	IV
49.	Raj Chaha	Painted snipe	*Rostratula*	IV
50.	Raj hanh	Barheaded goose	*Anser indicus*	IV
51.	Raitkanda	Indian night jar	*Caprimulgus*	IV
52.	Raja rani	Scarlet minivet	*Pericroctus*	IV
53.	Sabajpeki	Gold fronted leaf bird	*Chloropsis*	IV

Source: Survey team in consultation with concern state forest officials and local people

Threatened species

During the course of survey, no threatened species were recorded in the study area.

3.15 LAND ENVIRONMENT

3.15.1 Land use of Study Area (Buffer Zone)

The total and of the study area is divided into following categories:-

i. Water bodies
ii. Open Scrub Land
iii. Fallow Land
iv. Habitation
v. Forest
vi. Open Degraded

3.15.1.1 DATA INPUT

IRS LISS3 Multispectral digital FCC (False Color Composite) data from NRSC Bhuwan Portal has been used for preparation of Land use/ Land cover thematic map of study area. Project site mine plan map & Google maps and Toposheet has been used as a reference map for preparation of base layer map like road, rail network, project site boundary, landmarks point etc.

<u>Technical Details</u>

- Satellite Image IRS LISS3
- Band Combination 2,3,4
- DIP Software ERDAS Imagine 9.2 & Arc GIS 9

3.15.1.2 METHODOLOGY

Land use / Land cover map preparation, Base map creation; and Geometric correction of satellite image has been processed using ERDAS Imagine 9.2 Software.

The methodology used for Land use pattern of study area is explained in following headings.

3.15.1.3 GEOREFERENCING OF TOPOMAPS

SOI toposheet has been geo-referenced in geographic lat/long coordinate system using ERDAS Imagine Software.

3.15.1.4 BASE MAP LAYER CREATION

Project site mine plan map & Google maps and geo-referenced toposheet has used as a reference map for base layer creation. In base layer linear, polygon and point feature like road, rail, canal, village location and project site have been created in vector data format. Base map layer information has been used for analysis of surrounding feature like road, rail, and village location near project site activity through superimposed on thematic map for data integration.

3.15.1.5 INTERPRETATION OF SATELLITE IMAGE

Hybrid technique has been used i.e. visual interpretation and digital image processing for identification of different land use and vegetation cover classes based on spectral signature of geographic feature. Spectral signature represents various land use class. Image interpretation keys are developed, based on image characteristics like color, tone, size, shape, texture, pattern, shadow, association etc., which enables interpretation of satellite images for ground feature.

For validation of Land Use Plan Ground truth data on geographic features of the study area has been collected by site visit to the area for verification of information of the different doubtful features of the study areas, which were found to be responsible for the occurrence of specific spectral reflectance behavioral patterns. Ground truth data has been carried out for verification of the ground features (esp. one in doubt) interpretation accuracy and reliability of remotely sensed data.

CONCLUSION

All vector layer superimposed on land use land cover map for final map composition and used for analysis and study of area.

3.15.1.6 Agricultural Yield of the Study Area

Kharif Crops: - The areas appear in distinct red color and smooth texture on the image. Paddy is the Kharif crop grown in the district. Cotton and Jute are grown in limited areas.

Rabi Crops: - Paddy pulses, rape, mustered, castor etc. are the main Rabi crops grown in the district.

Cropping pattern of the area depends upon the climatological conditions and need of the local population of the area. Sometimes cropping pattern may get changed during construction and operational phase because of particular requirement of specified anthropogenic activities.

Besides the above-mentioned crops Bamboo, pineapple, ginger, jackfruit, etc. are also grown in the area. Tea is the major cash crop of the area and it is grown in N.C. Hills but on a scale.

TABLE 3.22: LAND USE PATTERN ON SATELLITE IMAGE

S.no.	Class Names	Area (Ha.)	% (Area)
i	Water Bodies	1082.79	2.57
ii	Open Scrub Land	1152.00	2.74
iii	Fallow Land	3190.59	7.58
iv	Habitation	566.28	1.34
v	Forest	25603.02	60.79
vi	Open Degraded	10522.44	24.98
	Total	**42117.12**	**100**

FIGURE 3.11: LANDUSE PATTERN OF THE STUDY AREA.

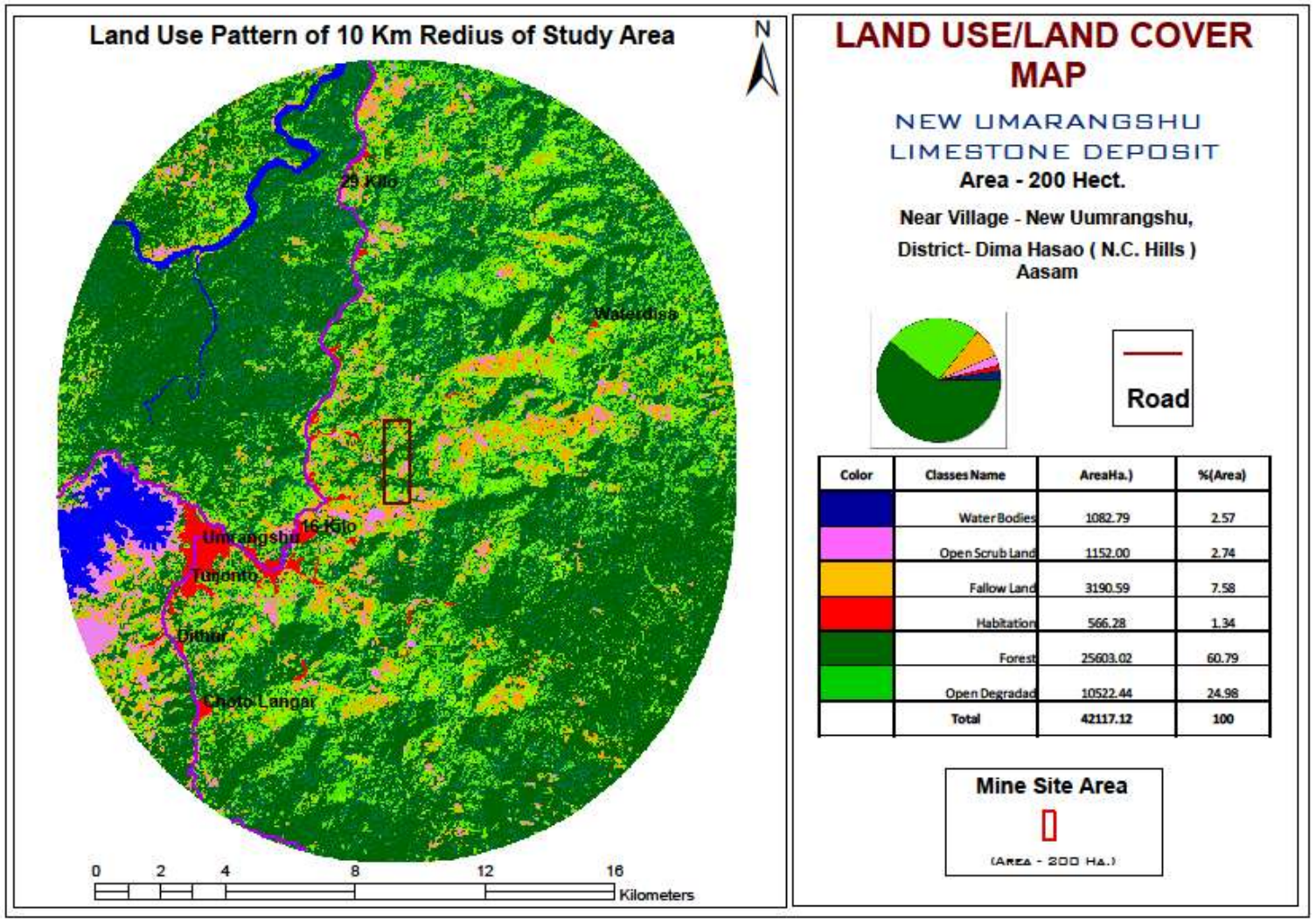
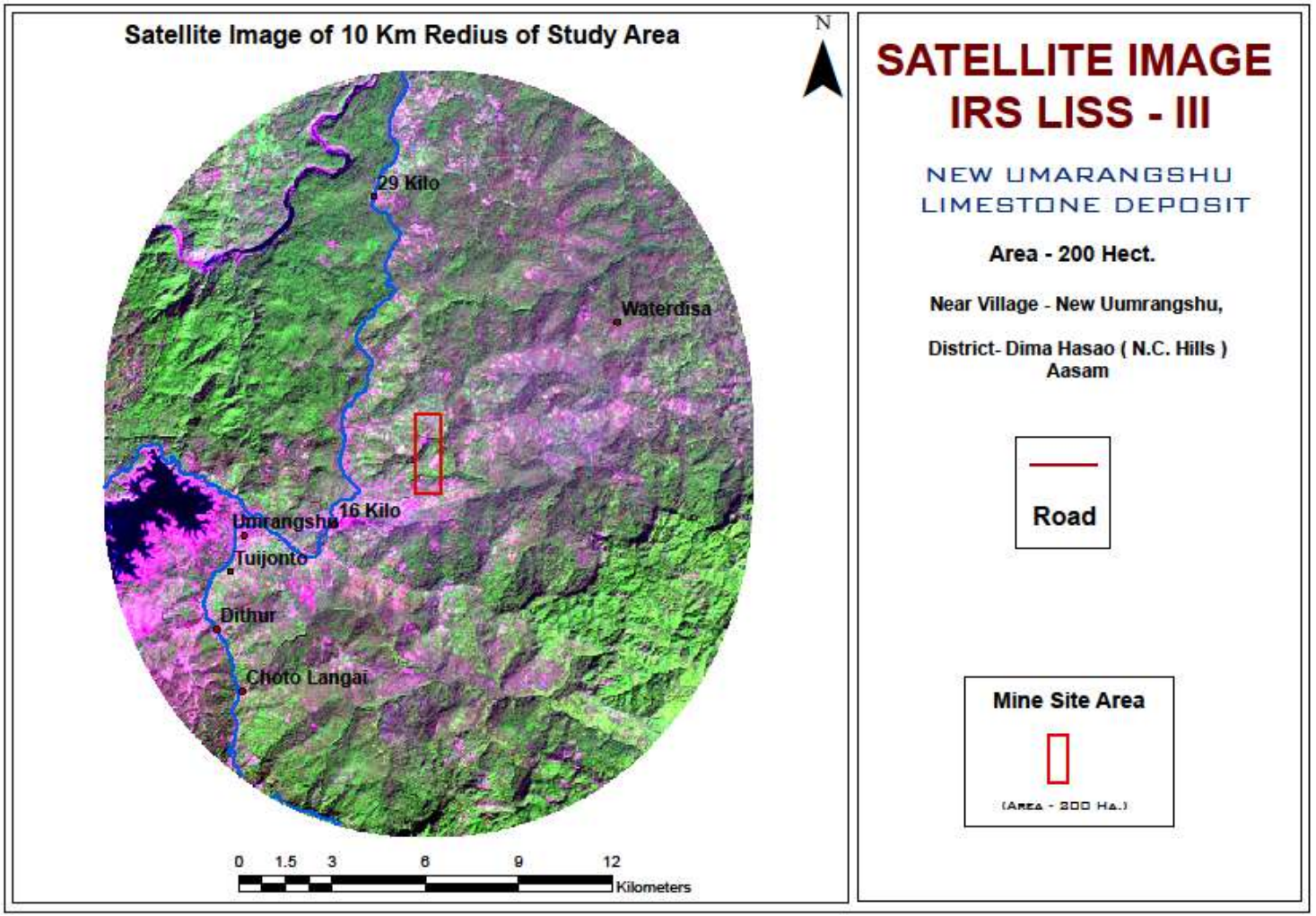


FIGURE 3.12: SETTLITE IMAGE OF THE STUDY AREA



3.15.2 Land use of Lease area (Core Zone)

The mining lease area is 200 hect. has undulating topography with shallow nallah in the area. No Agriculture field and forest land exists within the core zone. The summarized details of the type of land use covered in the lease area is indicated in below table.

TABLE 3.23: LAND USE PLAN FOR PRE- OPERATIONAL, OPERATIONAL & POST -OPERATIONAL PHASES (IN HECT.)

All figures in Hect.

S. No.	Description	Existing	At the end of 5th year	At the end of lease period
1	Pits	6.390	26.040	90.720
2	Waste Dump	3.190	6.200	10.000*
3	Road & Building	2.138	3.010	4.000
4	Plantation	5.180	15.180	27.800**
5	Agriculture land	--	--	--
6	Mineral stack	--	--	--
7	Remaining Land	183.102	149.570	67.480
	Total area	**200.00**	**200.00**	**200.00**

**About 10 hect area will be planted on waste dump area.*

***About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office). Total 37.80 hect area will be planted at the end of lease period.*

3.16 SOCIO-ECONOMIC ENVIRONMENT

3.16.1 Reconnaissance

The project is related to Limestone area and project area falls in village New Umrangshu village, District Dima Hasao, State Assam.

Any mining activity can create impact on region, the impact could be positive or negative depending on the development activities adopted and carried out by the mining industry. It is very necessary to assess socio-economic impact through mining activity. Socio-economic study is very helpful to know exact condition of the study area.

3.16.2 Baseline Status

Baseline information on the socio-economic environment was collected within 10 km radius surrounding the proposed study area. The process related database thus generated includes:

- Demographic structure
- Economic structure
- Health status
- Public awareness and their concern about the project

The primary socio economic data was collected through field survey in sample villages in study area as well as the observations by the survey team. It has been subs tainted with relevant socioeconomic data from secondary sources of various official records. viz., Census records, District statistical abstract, district health office, District industry center tourism office etc.

Socio- Economic survey done with Household survey, group discussion, Government official authority and village leaders.

3.6.2.1 Demographic Structure

The details concerning the demographic structure of the study area was collected from Census record of Dima Hasao district from Assam State, 2011 census. The details about demographic structure is given in table 3.24, literacy details in table 3.25

The salient features are as follows:

- Total population of the region as per 2011 census is 12869 out of which 6890 are male and 5979 are female. In 0-6 age group total population is 1732. Population details are shown in Fig 3.13.
- Total household are 2865 with a family size of 4 person in the study area

- Total scheduled cast population is 465(4%) and scheduled tribe population is 5676 (44%).This data indicates that 48% population belongs to SC & ST category
- Sex ratio (number of male per thousand female) in the study area overall sex ratio is 867. In 0-6 age child group sex ratio is 977, SC category 890 and in ST 965 female to per thousand male. This shows that male population is higher in the region as compared with the female population. Sex ratio is given in Fig 3.14.
- Literacy rate of the population in the study area is 9488 (74%). Male literate are 5397(57%) and female literate are 4091(43%).Illiterate population is 3381(26%) Literate and illiterate population shown in Fig 3.15.

TABLE 3.24: DEMOGRAPHIC STRUCTURE

S. No.	Village Name	No_ HH	TOT_P	TOT_M	TOT_F	P_06	M_06	F_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
Sub District Umrangso, District Dima Hasao														
1	Dithur	49	258	142	116	51	24	27	4	4	0	156	81	75
2	Lamklam	18	116	63	53	25	13	12	0	0	0	116	63	53
3	Umrangso	23	118	61	57	25	15	10	0	0	0	113	58	55
4	Lang Juri Arda	21	94	53	41	19	9	10	0	0	0	94	53	41
5	Choto Larpheng	50	256	125	131	46	23	23	0	0	0	255	125	130
6	Langlut (H)	11	64	37	27	8	5	3	0	0	0	64	37	27
7	Tungkjang	12	57	30	27	13	6	7	0	0	0	57	30	27
8	Krungring Arda	27	142	75	67	19	10	9	0	0	0	132	70	62
9	Larphing	19	123	67	56	28	18	10	0	0	0	87	48	39
10	Umrangso (TC)	2401	10376	5575	4801	1300	650	650	447	235	212	3439	1715	1724
11	Lanalut	11	64	37	27	8	5	3	0	0	0	64	37	27
12	Choto Longklam	18	116	63	53	25	13	12	0	0	0	116	63	53
13	New Umrangso	16	109	61	48	15	9	6	0	0	0	109	61	48
14	Umrangso (Umrangso 19 Km.)	85	442	219	223	68	39	29	13	6	7	352	175	177
15	Sikilangso	70	354	179	175	57	22	35	1	1	0	342	170	172
16	Mangadi Hower	34	180	103	77	25	15	10	0	0	0	180	103	77
Total		**2865**	**12869**	**6890**	**5979**	**1732**	**876**	**856**	**465**	**246**	**219**	**5676**	**2889**	**2787**

Source Primary Census abstract 2011, Sub District Umrangso, District Dima Hasao

TABLE 3.25: LITERATE AND ILLITERATE POPULATION DETAILS

S. No	Village Name	P_ LIT	M_ LIT	F_ LIT	P_ ILL	M_ ILL	F_ ILL
Sub District Umrangso, District Dima Hasao							
1	Dithur	107	67	40	151	75	76
2	Lamklam	48	28	20	68	35	33
3	Umrangso	42	20	22	76	41	35
4	Lang Juri Arda	72	44	28	22	9	13
5	Choto Larpheng	188	91	97	68	34	34
6	Langlut (H)	14	10	4	50	27	23
7	Tungkjang	19	13	6	38	17	21
8	Krungring Arda	85	51	34	57	24	33
9	Larphing	32	19	13	91	48	43
10	Umrangso (TC)	8227	4672	3555	2149	903	1246
11	Lanalut	14	10	4	50	27	23
12	Choto Longklam	48	28	20	68	35	33
13	New Umrangso	86	51	35	23	10	13
14	Umrangso (Umrangso 19 Km.)	217	116	101	225	103	122
15	Sikilangso	202	122	80	152	57	95
16	Mangadi Hower	87	55	32	93	48	45
Total		**9488**	**5397**	**4091**	**3381**	**1493**	**1888**

Source Primary Census abstract 2011, Sub district Umrangso, District Dima Hasao.

FIGURE 3.13: POPULATION DETAILS IN THE STUDY AREA

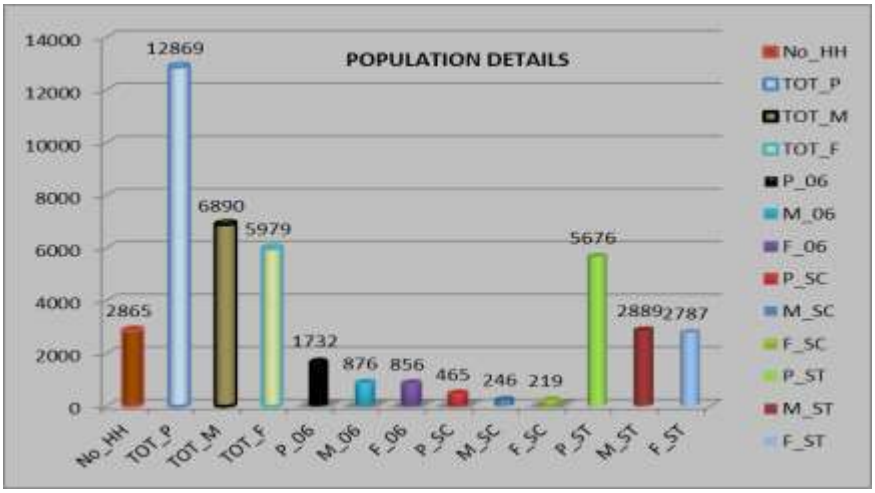


FIGURE 3.14: SEX RATIO IN THE STUDY AREA

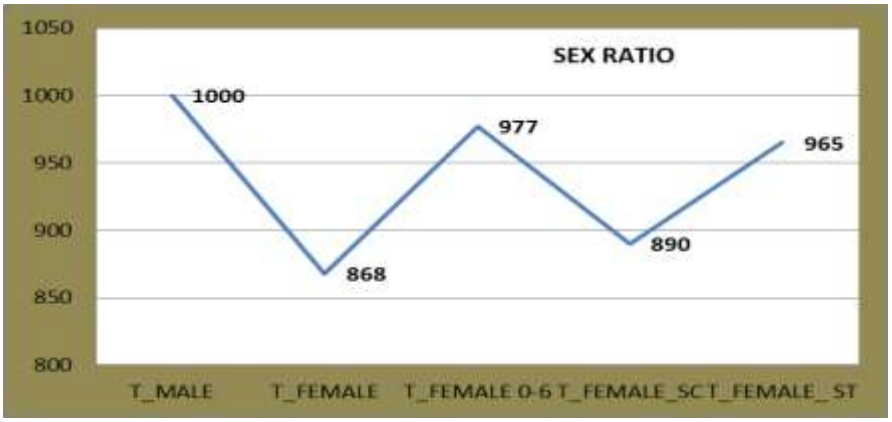
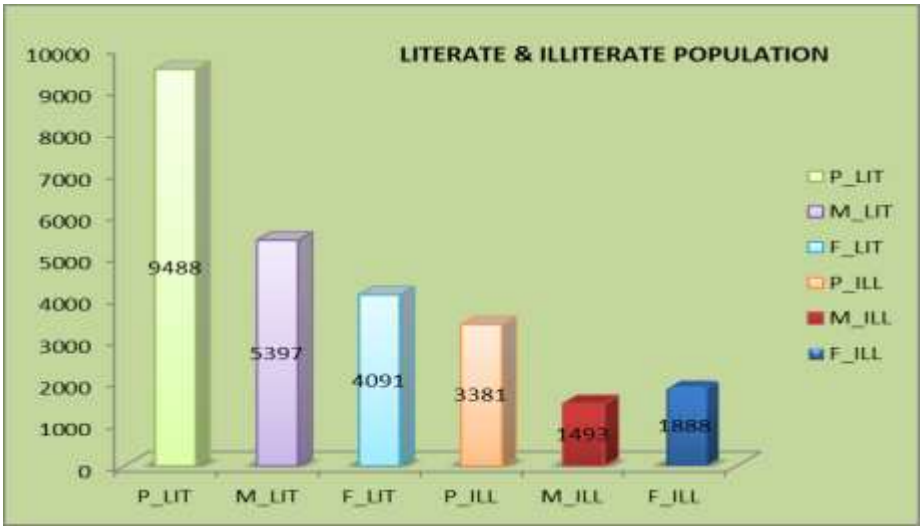


FIGURE 3.15: LITERATE & ILLITERATE POPULATION IN THE STUDY AREA



3.16.2.2 Economic Attributes

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work-Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work involves not actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise.

The employment pattern of worker and Main worker of the study area is described below and presented in table 3.26 & 3.27 As well as in Fig.3.16 and Fig 3.17.

TABLE 3.26: EMPLOYMENT PATTERN

S. No	Village Name	MAIN WORK_P	MARG WORK_P	NON_ WORK_P
Sub District Umrangso, District Dima Hasao				
1	Dithur	60	0	198
2	Lamklam	29	11	76
3	Umrangso	55	3	60
4	Lang Juri Arda	27	24	43
5	Choto Larpheng	68	2	186
6	Langlut (H)	25	1	38
7	Tungkjang	18	0	39
8	Krungring Arda	38	53	51
9	Larphing	38	14	71
10	Umrangso (TC)	3317	186	6873
11	Lanalut	25	1	38
12	Choto Longklam	29	11	76
13	New Umrangso	28	6	75
14	Umrangso (Umrangso	128	2	312

	19 Km.)			
15	Sikilangso	179	1	174
16	Mangadi Hower	34	56	90
Total		**4098**	**371**	**8400**

Source Primary Census Abstract 2011, Sub District Umrangso, District Dima Hasao.

TABLE 3.27: MAIN WORKER EMPLOYMENT PATTERN

S. No	Village Name	MAIN _CL_P	MAIN _AL_P	MAIN _HH_P	MAIN _OT_P
Sub district Umrangso, District Dima Hasao					
1	Dithur	56	1	0	3
2	Lamklam	29	0	0	0
3	Umrangso	0	0	0	55
4	Lang Juri Arda	20	4	0	3
5	Choto Larpheng	61	3	0	4
6	Langlut (H)	24	0	0	1
7	Tungkjang	18	0	0	0
8	Krungring Arda	38	0	0	0
9	Larphing	34	0	0	4
10	Umrangso (TC)	270	64	25	2958
11	Lanalut	24	0	0	1
12	Choto Longklam	29	0	0	0
13	New Umrangso	25	0	0	3
14	Umrangso (Umrangso 19 Km.)	77	8	0	43
15	Sikilangso	169	0	0	10
16	Mangadi Hower	33	0	0	1
Total		**907**	**80**	**25**	**3086**

Source Primary census abstract 2011, Sub district Umrangso, District Dima Hasao

FIGURE 3.16: EMPLOYMENT PATTERN IN THE STUDY AREA

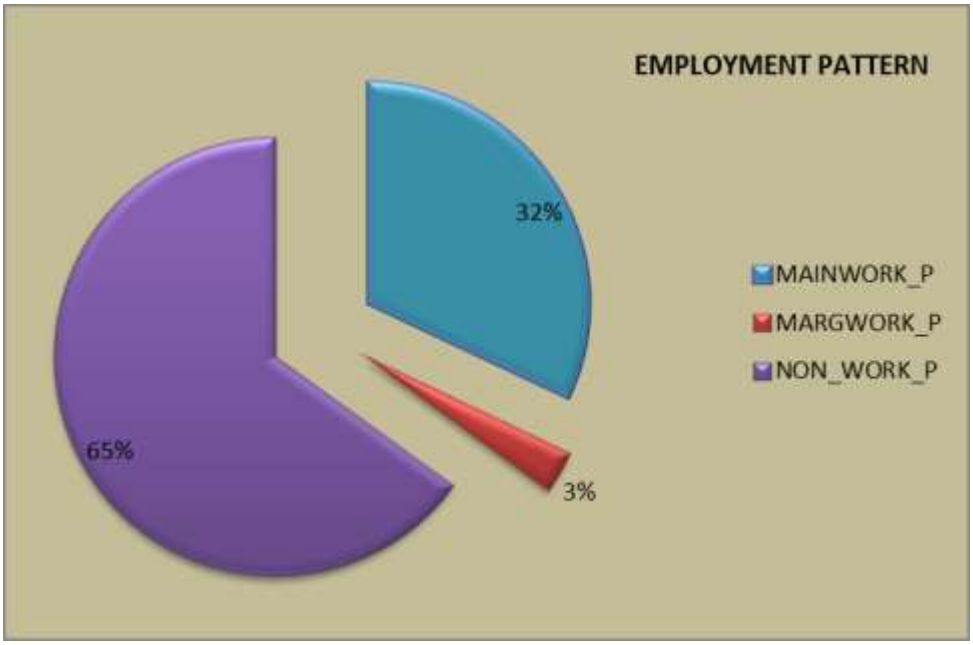
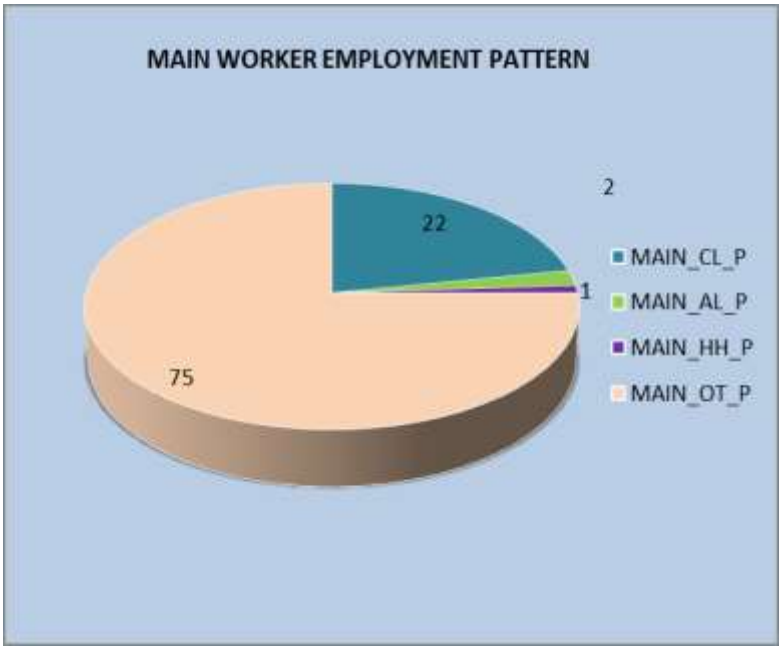


FIGURE 3.17: MAIN WORKER EMPLOYMENT PATTERN IN THE STUDY AREA



Employment pattern details

- Main worker population is 4098(32%), 1521(8%) comes under marginal worker category and 371(3%) belong to non-workers category.
- Main other workers are 3086 (75%). and main cultivators workers are 907(22%)
- There are 80(2%) and 25(1%) workers as agriculture and house hold industry worker

3.17 SOCIO-ECONOMIC SURVEY

3.17.1 Sampling Method

A judgmental and purposive sampling method was used for choosing respondents of various sections of the society i.e. Sarpanch, adult males and females, teachers, medical practitioners, businesspersons, agriculture laborers, fishermen, unemployed group etc. Judgmental and purposive sampling method includes the right cases from the total population that helps to fulfill the purpose of research needs.

Data Collection Method

Data collection is a term used to describe a process of preparing and collecting data, for example, as part of a process improvement or similar project. The purpose of data collection is to obtain information to keep on record, to make decisions about important issues, to pass information on to others. Primarily, data are collected to provide information regarding a specific topic. Data collection usually takes place early on in an improvement project, and is often formalized through a data collection plan which often contains the following activity.

Field Survey and Observations

Field research involves the collection of primary data or information that is new. This is collected through surveys and questionnaires that are made out

specifically for a purpose Observations can be conducted on nearly any subject matter and the kinds of observations will do depend on survey question.

Interview Method

Interview is verbal questioning. Surveys are also conducted through interviews. Interviews consist of asking questions, listening to individuals and recording their responses. Structured interview method is used to collect data regarding the awareness and opinion from the sample selected of the various socio- economic sections of the community. The questionnaire mainly highlights the parameters of primary needs.

Socio-economic survey was conducted in six villages within the study area located in all directions with reference to the project site.

The respondents were asked for their awareness/opinion about the project and their opinion about the impacts of the project, which is an important aspect of socio-economic environment, viz. job opportunities, education, health care, transportation facility and economic status.

The salient observations recorded during survey in the study area:

According to survey done in the study area, survey observation as per below:

- In the study area main occupation of villagers is agricultural work, labour work and small business
- Most of the houses are in semi pakka form.
- Most of the villages have access to pakka road. Transportation facilities are quite enough in the study area.
- Farmers are depend on mainly monsoon for agricultural activity, Paddy is main crop of the study area
- Communication facility is good with mobile network and post office facility

- All villages are well electrified and used for all purposes
- Main language in study area is Assamese as well as Hindi is widely spoken by population
- Mainly firewood is used by villagers for cooking purpose. Other sources are LPG, kerosene etc.
- Sanitation facility is not in good condition, only 25% population have sanitation facility
- Main source of drinking water is hand pump and well etc.

3.17.2 Awareness and Opinion

Awareness is the state or ability to perceive, to feel, or to be conscious of events, objects or sensory patterns. In general, an opinion is a subjective belief, and is the result of emotion or interpretation of facts. An opinion may be supported by an argument, although people may draw opposing opinions from the same set of facts. For assessing the awareness and opinion about the project activity socio-economic survey was conducted in the sampling villages. The salient observations drawn through survey are described below:

- The respondents from almost all the villages are aware about the project activity.
- Some of the respondents have very good opinion about the project and they opined that due to proposed project activity, quality of life of the villages will improve
- Respondent have suggested minimizing the environmental pollution during and after project activity
- Respondents asked to give employment to local people
- Villagers asked better infrastructure facility as well as medical facility

========**********========

CHAPTER – IV
ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

4.1 INTRODUCTION

Any human activity in any environment produces impact, modifying it to a status which is considered adverse of beneficial according to the damage or improvement it brings about in physical, chemical and biological status of air, water, land including biota and in socio-cultural life styles and economy of the populace it affects. Depending on the nature of activities and existing status, the impacts are assessed for their importance. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management Plan for counting or minimizing adverse impacts.

Effects of this mining project on each of the environmental parameters are detailed below in accordance with the parameter of environment likely to be affected.

- Topography and Drainage
- Climate
- Air environment
- Noise levels
- Hydrological conditions
- Water Quality
- Ecology
- Land environment
- Soil
- Socio-economic environment
- Cultural and Heritage environment

Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those which can be attributed directly to the project. On the other hand indirect are induced and typically include the associated investments and change patterns of social and economic by the proposed actions.

4.2 TOPOGRAPHY & DRAINAGE

4.2.1 Topography

Topography of the surrounding area will remain unchanged. While that of mining lease area will change due to mining, excavation, dumping etc.

4.2.2 Drainage

Drainage pattern of the area is dendritic. The Amrang nallah cuts across the lease area and flows SW to NE. Very little water remains in the nallah during eight months period of the year, however the nallah remains very active during monsoon.

The Amrang Nallah cuts across the lease area and flows SW to NE. Very little water remains in the nallah during eight months period of the year, however the nallah remains very active during monsoon. The drainage pattern due to proposed mining will not be disturbed within core (lease area) as well as buffer zone.

4.3 IMPACT ON CLIMATE

4.3.1 Temperature

The temperature pattern is a regional behavior and is not likely to be affected by the mining activity over a small area. Some local effect may be perceived due to mining, afforestation and creation of water voids in the lease area.

4.3.2 Rainfall

The trend of rainfall, as studied and discussed in last chapter, forms part of a regional pattern, not dependent on the relatively small area of mining activity. The mining operation , therefore, is not likely to have any adverse impact on rainfall pattern.

4.3.3 Wind Speed

The wind speed in any area is dependent upon local topography and generation of elevation and depression of pressure changes in the region. The controlling factors for the pressure changes lie much beyond the control of small area under mining operations. Thus, no adverse impact on the regional wind speed is anticipated due to the mining operations.

4.3.4 Humidity

The pattern of relative humidity depends mainly on the rainfall, wind, temperature and other weather phenomenon that regional in behavior. The mining operation is not likely to have any impact on the relative humidity in the surrounding.

4.4 IMPACT ON AIR ENVIRONMENT

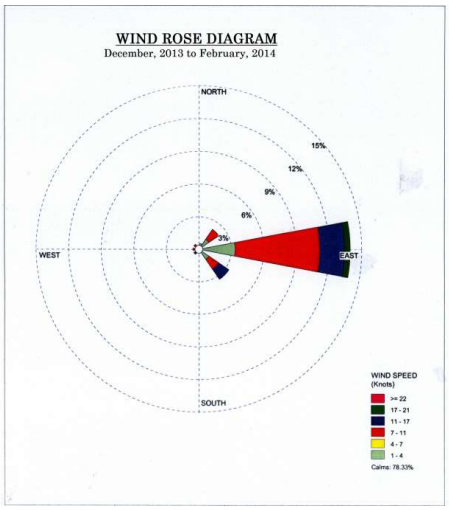
As explained in the previous chapter, the ambient air quality monitoring results show that all the parameters such as PM_{10}, SO_2, NO_x and are within the limits prescribed by CPCB for "Industrial and Mixed use" areas as well as areas meant for "Residential and Rural" areas.

The major contribution of air pollution is by opencast mining, such as excavation, loading and transportation etc. which will lead to momentary rise in the suspended particulate matter (PM_{10}). The dust liberated in mining and other related operations is injurious to heath if inhaled in sufficient quantity. As such there will be no noticeable impact on air quality.

The impact of the expansion on the air quality has been predicated using Fugitive Dust Model (FDM), which is a computerized air quality model specifically designed for computing concentration and deposition impacts from fugitive dust sources. The sources may be point, line or area sources. The model has not been designed to compute the impacts of buoyant point sources, thus it contains no plume rise algorithm. The model is generally based on the well-known Gaussian Plume formulation for computing concentrations, but the model has been specifically adapted to incorporate an improved gradient transfer deposition algorithm. Emissions for each source are apportioned by the user into a series of particle size classes. A gravitational setting velocity and a deposition velocity are calculated by FDM for each class. Concentration and deposition are computed at all user selectable receptor location and the result are summarized.

A perusal of below table shows that the pollutant concentrations in the ambient air will remain well below the National Ambient Air Quality Standard prescribed by CPCB. The incremental impact of transportation of mineral on CO shall be to the tune below 1 mg/m^3 at peak hours.

FIGURE 4.1: WIND ROSE DIAGRAM



CONCENTRATION OF PM_{10} DUE TO EMISSIONS FROM MINING ACTIVITIES (1 km)

4.5 IMPACT ON NOISE LEVEL

The exposures to excessive noise levels can lead to:

- Prevention of sleep, insomnia and fatigue.
- Decrease in speech reception, communication, distraction and diminished concentration thus adversely affecting job performance efficiency.
- Chronic psychological disturbance including impaired hearing.
- Irreparable cardiovascular, respiratory and neuralgic damages in certain extreme cases.

The area in general represents calm surroundings. There is no heavy traffic, industry or noisy habitation in the area. With the increase in scale of mining operations, deployment of machinery, blasting operation and men and noise levels are expected to increase.

4.6 IMPACT ON WATER QUALITY

4.6.1 Surface water quality

The opencast mining operation usually causes water pollution. The sources of pollution generally are:

- Wash off from dumps
- Pumping of mine water into surface water bodies
- Soil Erosion

The waste dump will be properly fenced to prevent wash off. The area comprises part of the regional drainage system of the Kopili river valley in its northern higher reaches. As the mining lease is in the southerly slopping hilly terrain, there is hardly any perennial water source in the area. However, many seasonal watercourses cutting across the hilly terrain carry the heavy surface water flow during creating deep gullies and gorges in their course.

The Amrang nallah joins Langyen nallah, a tributary of the Kopili River, in the southeastern side. Thus the micro drainage of the area is controlled by the Langyen nallah while macro drainage is a part of the Kopili River master basin.

The rainwater shall be coursed into the mine by developing suitable drainage system and accumulated in the mined out pit. The water collected in the pit, after settling of the suspensions, shall be used for afforestation & mine spraying. Further, as the water collected in the sump is not likely to have any dissolved harmful elements, the same can be supplied to the surrounding agriculture land for irrigation purposes.

4.6.2 GROUND WATER QUALITY

Ground water pollution can take place only if dumps and stockpiles contain harmful chemical substances that get leached by precipitation of water and percolate to the ground water table. In that case any nearby source of ground water can be rendered unfit for drinking purpose or industrial use.

Though the area is in a high rainfall region, most of the precipitation constitute "run off' with very meager scope of infiltration. Therefore ground water is not available in the hilly terrain of lease area.

The ground water is encountered at the depth of 60 m to 80 m below the ground level in the plain area and there is no indication of ground water up to the depth of 11 m during the course of drilling. Hence, there is no adverse impact of mining on the ground water quality. Besides this the sources of ground water i.e. wells etc. are very less in number and mainly the surface water is utilized for drinking and other purposes. There are few walls at a distance of more than 2 Km. from site.

There are only one prominent nallah in the area. The Amrang nallah (passing through the mining lease) and the Langyen nallah within the buffer zone. Sufficient virgin barrier zones with the mine working will be left as protection for the Amrang nallah within mining lease. So these nallah will not be contaminated from surface rain-wash from the working mine.

The over burden dumps will be properly located and protected by boundary wall with garland drain surrounding it so that rain wash material will be arrested. Only de-silted water will flows into nallah.
This is not the case with this mine, as mineral or soil does not contain any harmful ingredients that could leach down to the water table. Thus the mine workings shall not affect the ground water quality.

4.7 IMPACT ON FLORA

4.7.1 Flora in Buffer Zone

No forest within core zone. The area covered under vegetation in the buffer zone has scanty vegetation comprising of shrubs and bushes. The buffer zone at present has sparse growth of trees of common variety.

As the mining activities will be confined to core zone only, no adverse impact is foreseen on the flora of the forest area.

4.7.2 Flora in Core Zone

Excavation in the mining area and construction of roads, offices etc. does not affect the flora in the area where these operations are carried out. Plantation being carried out in the mine and surrounding areas will, over a period of time, upgrade the flora.

4.8 IMPACT ON FAUNA

The adverse impacts on fauna are mainly due to :

- Human Activity
- Noise
- Land Degradation
- Deforestation

The impact on the fauna of the buffer zone due to the mining activity will be marginal. As there are very few trees / shrubs in the area, deforestation will not be significant factor in impact on fauna.

Fauna in the core zone is minimal, as most of the area is either waste land. Even so, by restricting mining at any time to small areas, impact on fauna will be kept to the minimum. Moreover, due to small activity of the past two decades with machinery has already pushed out whatever minor fauna was available in this desolate land. However, progressive plantation activity being undertaken will over a period of time create conditions favourable for fauna.

4.9 IMPACT ON LAND ENVIRONMENT

4.9.1 Land use in buffer zone

No adverse impact is anticipated on land use of buffer zone due to the mining operations, as all the related activities are confined to the core zone.

4.9.2 Land use in core zone

The land use of the area will undergo considerable change as arising from:

- Extension of the excavations
- Establishment of facilities in the area

- Revenue agricultural land (part) will be converted to mining purposes, if any.

Land use of core zone changes anticipated during the end of lease period are indicated and given in below table.

TABLE 4.1: LAND USE PLAN FOR PRE- OPERATIONAL, OPERATIONAL & POST -OPERATIONAL PHASES (IN HECT.)

S. No.	Description	Existing	At the end of 5th year	At the end of lease period
1	Pits	6.390	26.040	90.720***
2	Waste Dump	3.190	6.200	10.000*
3	Road & Building	2.138	3.010	4.000
4	Plantation	5.180	15.180	27.800**
5	Agriculture land	--	--	--
6	Mineral stack	--	--	--
7	Remaining Land	183.102	149.570	67.480
	Total area	**200.00**	**200.00**	**200.00**

**About 10 hect area will be planted on waste dump area.*

***About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office).*

**** About 56.820 hect area will be used as a water reservoir.*

Total 37.80 hect area will be planted at the end of lease period.

A perusal to above table shows that 11.718 hect. area is disturbed at present, which shall progressively increase to 104.72 hect. area by the end of lease period due to the proposed mining operations. The mine position at the end of lease period stage wise shown in the conceptual plan. The progressive increase in mining area will lead not only to land degradation but also visual pollution if appropriate control measures are not adopted. The mitigating measures already undertaken and proposed are given under environmental management plan.

4.10 IMPACT ON SOIL

Top soil is present in the southern side of the lease area and is very less (i.e. 0.15mtr to 0.30mtr). Scanty sub-soil is present in cracks and fissures. Naturally, it is fertile black cotton soil/clayey soil. Efforts shall be made to recover the sub-soil from the cracks and fissures, it shall be scrapped in separate slice and shall be kept preserved as stacks under tarpaulin cover and utilizes for plantation work. The quantity assessment of top soil is very difficult as the exact thickness is not possible to measure.

4.11 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

4.11.1 Human Settlement

The villages and their inhabitants in the buffer zone will not be disturbed from their settlements due to the mining operations.

There is no inhabitation within the lease area. Therefore neither villages nor any part of village or any hamlet will be disturbed during the entire life of the mine. As the mining operations will not disturb or relocate any village or settlement, no adverse impact is anticipated on any human settlement.

4.11.2 EMPLOYMENT

The area is considered as industrially backward. The population in general do not have opportunities of earning from employment. The only employment to depend on is agriculture, which is seasonal. In the absence of any high employment potential activities, the people are economically backward. The mining operations are providing employment to 36 persons.

The various indirect employment opportunities have also been generated. Several persons of the neighboring villages have been benefited with

contract works, employment through contractors, running of jeeps, trucks, tractors and buses on hire, running canteens, different kind of shops and transport related business avenues.

4.11.3 ECONOMIC STATUS

The whole part of the lease area is govt. waste land and owned by AMDC for mining. Since no any private land fall in lease area, so no any compensation is required to be done for the acquired land. As the mining commences it will provide a lot of job opportunities to the nearby villagers.

4.11.4 AGRICULTURE

The agricultural activities are seen in the areas where there is sufficient soil cover. The buffer zone will remain undisturbed and no adverse impact is envisaged.

4.11.5 SENSITIVE TARGETS

There are no places of Tourist, religious & Historical importance in core zone of 10-km radius. Therefore, no adverse impact are anticipated.

4.12 STRUCTURED ENVIRONMENT MANAGEMENT & ACTION PLAN

The company has endeavored the mitigation measures of potential impact and aspects of operation.

TABLE 4.2: ENVIRONMENT MANAGEMENT MATRIX

Environmental Setting & baseline	Aspect of Operation	Potential impacts	Mitigation measures	Monitoring programmed
1. Air	1. Ore handling	Fugitive Emissions & Noise	Effective water sprinklers	AAQM
	2.Transportation	Fugitive Emissions & Noise	Effective water sprinklers	AAQM

The Regional emissions well within norms	--	--	--	--
2. Water	1. Ore excavation	1. Contamination	Provision of reducing turbidity & SS	Water testing
Existing water quality is potable		2. Altered hydrologic regime	Provision of rain water harvesting	

The better efficient water sprinkling system will be worked. Green belt planning will be made effective so that the air emissions are restricted within lease area. The noise and vibrations will be controlled by effective planning i.e. provision of breaking ground vibrations, thick green cover near habituated area. The ground water harvesting program will be carried out in nearby area and village.

=====********======

CHAPTER – V
ANALYSIS OF ALTERNATIVES
(TECHNOLOGY AND SITE)

Umrangshu Limestone mine will produce Limestone for feeding to different industries. Analysis of alternatives based on site and technology are given below:-

5.1 SITE ALTERNATIVES

It is an existing mining lease. Mining industry is site specific. The mine has to be located where the mineral exists in sufficient quantity to be economically extracted. So, no alternatives can be chosen. The selected site has the following advantages:

1. The project site is a Govt. wasteland.
2. The area chosen for mining activities is not having habitation of any kind.
3. Availability of labour from nearby villages.
4. No endangered species around the mine site.

5.2 TECHNOLOGY ALTERNATIVES

The mineral deposit is located on surface & can be mined by mechanized open cast method of mining economically. The mining will be carried out by opencast method. At present status of mining, underground method of mining is not feasible. Taking into consideration shape and nature of deposit and the targeted production the mine is being worked by mechanized method of mining.

========**********========

CHAPTER – VI
ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Success of any environmental management programme depends upon the efficiency of the organizational set up responsible for implementation of the programme. Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programme and take, if required, necessary mid-term corrective measures. Work zone environmental quality is also important to ensure compliance with safety measures.

6.2 PROPOSED SET UP

An environmental cell for the mine will be formed. The organization will be headed by a General Manager (mine) and managed by Chief Executive Officer and supported by an Environmental Officer.

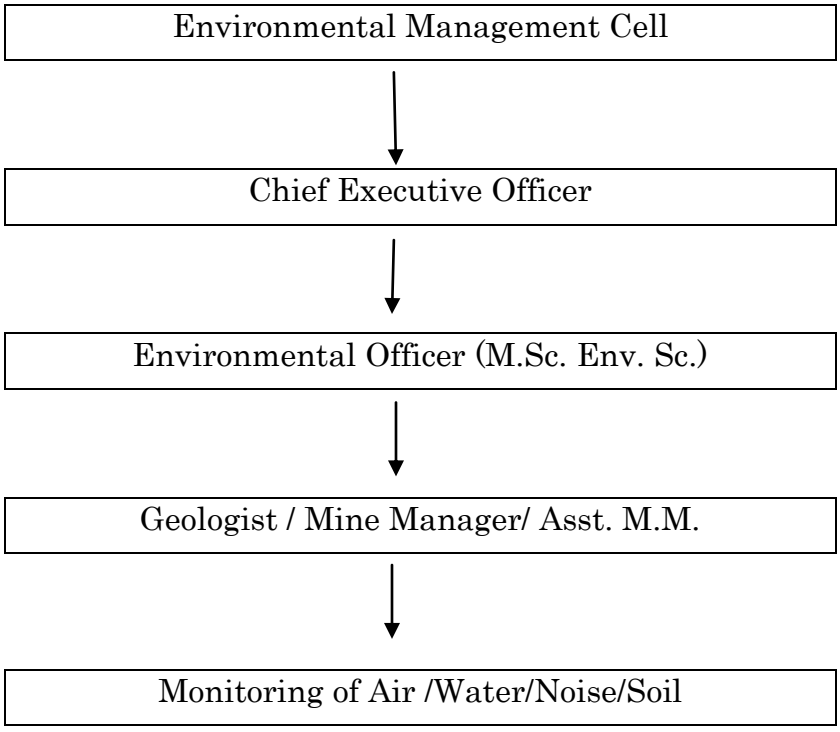
The said team will be responsible for:

1. Collecting water, air, soil & Noise Samples of work zone monitoring for air pollutants.
2. Analyzing the water, soil and air samples.
3. Implementing the control and protective measures.
4. Coordinating the environment related activities within the project as well as with outside agencies.
5. Collecting statistics on health of workers and population of surroundings villages.
6. Green belt development etc.
7. Monitoring and evaluating the progress of implementation of environmental management programme.

6.3 ENVIRONMENT MANAGEMENT CELL

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will comply as per condition for this Environmental management team is constituted.

FIGURE 6.1: ENVIRONMENTAL MANAGEMENT CELL



6.4 ENVIRONMENTAL POLICY:

The management of the company is very conscious to minimize the existing pollution load in the ML area. Apart from having an EMP, a permanent organizational set up will be charged for task of ensuring its effective implementation.

This Company will undertake to monitor the environmental pollution levels by measuring ambient air quality, water and effluent quality, noise levels etc., by appointing external agencies. The company proposes to continue the monitoring in future also to ensure that the pollution is limited to allowable values and to take corrective action if required.

In case the monitored results of environmental pollution are found to exceed the allowable values, the Environmental Management Cell will suggest remedial action and get these suggestions implemented through the concerned departments.

The Environmental Management Cell will also co-ordinate all the related activities such as collection of statistics of health of workers and population of the region, a forestation and green belt development.

M/s. AMDC is committed to providing a quality service in a manner that ensure a safe and healthy workplace for employees and minimize potential impact on the environment. They will operate in compliance with all relevant environmental legislation and strive to use pollution prevention and environmental best practices.

The Company will:-

- Integrate the consideration of environmental concerns and impact in to all of our decision making and activities.
- Promote environmental awareness among employees and encourage them to work in an environmentally responsible manner.
- Trained, educate and inform to employees about environmental issues that may affect their work.
- Where required by legislation or where significant health, safety or environmental hazards exist, develop and maintain appropriate emergency and spill response programme.
- Strive to continually improve environmental performance and minimize the social impact and damage of activities by periodic review of environmental policy in light of current and planned future activities.
- For maintenance & repair or pollution control device, maintenance crew shall be taken from private agency.

- Massive plantation shall be done on contract from outside agencies.

6.5 MONITORING SCHEDULE AND PARAMETERS

To evaluate the effectiveness of environmental management programme, regular monitoring of the important environment parameters will be taken up. The schedule, duration and parameters to be monitored are shown in table:

TABLE 6.1: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

Particulars	Monitoring Frequencies	Duration of Station	Important Monitoring Parameters
Surface water / Ground water Sampling	Once in a year	Grab	pH, SS, TDS, Iron, Hardness, Alkalinity, Chlorides, Nitrates, Sulphate & Fluorides
Ambient air quality monitoring	Twice in a year.	24 hr.	PM10, SO2 and NOx
Noise Monitoring	Twice in a year.	8 hr.	Level in dB(A) and dB(C)
Soil Sampling	Once in a year	Grab	PH, Conductivity, Sulphate, Nitrate, Phosphates, Alkalinity & texture.

6.6 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 6.2: COST OF ENVIRONMENTAL PROTECTION MEASURES

(Investment and recurring cost Rs. Lakh)

S. No	Particulars	Capital cost	Recurring cost / annum
1.	Pollution Control	5.00	1.00
2.	Pollution Monitoring	5.00	1.50
3.	Plantation on Barren Area	10.00	3.00
4.	Occupation Health	3.00	0.75
5.	Miscellaneous (Fencing, Garland Drains etc.)	5.00	1.00
	Total	**28.00**	**7.25**

Total investment on environmental improvement works existing and envisaged Rs. 28.00 lakhs and recurring expenditure during the stage of production is Rs. 7.25 lakhs per year.

========**********========

CHAPTER – VII
ADDITIONAL STUDIES: DISASTER MANAGEMENT PLAN

7.1 INTRODUCTION

All types of industries face certain types of hazards which can disrupt normal activities abruptly and to disaster like fires, inundation, failure of machinery, explosion, to name a few. Similarly, limestone mines also have impending dangers or risk which need be addressed for which a disaster management plan has been formulated with an aim of taking precautionary steps to avert disasters and also to take such action after the disaster which limits the damage to the minimum.

Nevertheless, the following natural/industrial problems may be encountered during the mining operation.

1. Inundation- filling of the mine pit due to excessive rains.
2. Slope failures at the mine faces or stacks.
3. Accident due to storage of explosive and blasting.
4. Accident due to fire.

As per proposal made under the mining plan, during proposed working period the area will be developed by means of mechanized opencast mining method with adoption of drilling and blasting. Exploitation and transportation of minerals are to be carried out by Mechanical means with the use of JCB for loading of overburden. Bench height is maintained at 6.0 m. Maximum depth of working is 11 m. Ground Water table is at 20 - 25 m below the surface depending upon the relief of areas. Water table will not be touched during processed working. No high risk accidents like landslides, subsidence flood etc. have been apprehended.

But possibility of accidental disaster is also not ruled out. Therefore, all the statutory precautions should be taken for quick evacuation as per the Mines Act 1952, the Mines Rules 1955, MMR-1961 and MCDR-1988.

7.2 POSSIBLE DISASTERS TOGETHER WITH CORRECTIVE AND REMEDIAL MEASURES

7.2.1 INUNDATION

There is no perennial river on the surface of the Lease area only seasonal Nallah like Amrang nallah are flowing in the lease area and it's depend only on good monsoon rains. The possibility of the mine getting inundated due to water from the river is remote. In case, at any time in the future such an event occurs, the water will be allowed to stand and naturally percolate into the ground. In case, there is any need to empty out any particular pit for working, then pumps will be used to pump out the water.

It is anticipated that ground water seepage in the mine is not possible because at the end of lease period of the mine, the maximum depth of the mine floor will be 304 mRL from the ground level, which is above the ground water table in the workable area. In another case during possibility accumulation of water, preventive & management measures shall be planned as per Reg.127 of MMR 1961.The water can be pumped out using diesel operated pumps from the pits that requires to be worked. The pumped out water will be passed through a settlement tank for settling of suspended matter before releasing into the nearby natural drain.

7.2.2 DISASTERS DUE TO FAILURE OF SLOPES

The rocks are blasted to win the mineral causing cracks and opening in natural binding. Such loose rocks may fall at any time causing damage to human life and machinery. The only remedy to the affect to such situation is to dress the

blasted part. All necessary precaution will be taken as per REG.115 (1) of MMR 1961 to avoid any disaster.

7.2.3 POSSIBLE DANGERS DUE TO STORAGE OF EXPLOSIVES IN THE MAGAZINE

The explosive will be slurry explosive which will be used as booster and the main explosive will be ANFO mixture (Ammonium Nitrate and Fuel Oil Mixture). Ammonium Nitrate is one of the principal ingredient used in manufacturing of explosives though normally not classified as an explosive, being relatively insensitive.

Required quantity of explosive will be obtained from the dealer who supplies at mine side through his approved explosive van. A magazine in the lease area is already constructed for storage of explosive.
All precautions as per MMR 1961 will be observed.

7.2.4 DISASTER DUE TO FIRE

No surface fire is anticipated in the mining operation. In case of forest, fire may result due to dry leaves and wood in vegetated part and result in a disaster. In the area under reference, there is no such situation and there is no danger of forests fire. No oil, grease, canvas or other inflammable material will be stored in mine except in a fire-proof receptacle.

7.3 CARE AND MAINTENANCE DURING TEMPORARY DISCONTINANCE

Mining lease is a continuous working mine. At the time of temporary discontinuance of mine, notice (as per Rule 24 of MCDR, 1988 & Reg.6 of MMR, 1961) will be sent to IBM and mines Safety authorities. Notice will be accompanied as per Rule 24 of MCDR, 1988, vide, Form no.D-1.All precautionary steps will be taken into account in respect of care and maintenance.

In case of any temporary discontinuance due to court order or due to statutory requirement or any other unforeseen circumstance following measures for care and maintenance and monitoring of status shall be taken.

- Notice of temporary discontinuance of work in mine shall be given to the Controller General, Controller of Mine and the Regional Controller, IBM and DGMS Officials under Rule 24 of MCDR 1988 and Reg. 6 of MMR 1961 respectively.
- All the mining machinery shall be shifted to a safe place.
- Entrance to the mines or part of the mines to be discontinued shall be fenced off as per DGMS Circular and security Guards shall be posted for the safety and, to restrict any unauthorized entry to the area.
- Competent persons shall inspect the area regularly.
- Air, water and other environmental monitoring shall be carried out.
- Care and upkeep of plantation done shall be carried out on regular basis.
- Measures of care, maintenance and monitoring of status of unplanned, discontinued mining operations expected to re-open in future.
- All rules and regulations shall be followed in case of any temporary discontinuance of mine.

No temporary discontinuance is anticipated during the closure plan period.

Protection of the pits:

The pit area of the lease will be protected by fence as per DGMS circular all around the open pit with caution board displaying the danger in local language.

Protection of area:

There will be protected by displaying a board at the entry with caption like "Entry in the premises without permission is strictly prohibited" in local language.

Maintenance and monitoring:

The area will be monitored every week by competent person and if maintenance is needed will be done as per requirement.

- All the mining machinery shall be shifted to a safe place.
- Care and upkeep of plantation done shall be carried out on regular basis.
- All rules and regulations shall be followed in case of any temporary discontinuance of mine.

7.4 SOCIAL IMPACT ASSESSMENT, R&R ACTION PLAN

There will be the positive impact on the villagers of the nearby villages in the form of employment. There is no human settlement in the lease area. Thus there is no impact on the human settlement and thus no R & R plan is required.

7.5 DISASTER PREVENTION MEASURES

In order to take care of above hazard / disasters the following control measures have been envisaged :

- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.
- Provision of high capacity pumps for pumping out water from the mining pit.
- Entry of unauthorized persons will be prohibited.
- Firefighting and first aid provision shall be kept in the mines office complex and mining area.
- Safety equipment such as safety boots, helmets, goggles etc. will be made available to the employees and regular checked for their use.
- Training and refresher courses for all the employees working in the mine.
- Working of mine as per approved plan and regularly updating the mine plans.

- Regular cleaning of mine faces.
- Regular maintenance and testing of all mining equipment as per manufacture's guidelines.
- Suppression of dust on the haulage roads.
- Increasing the awareness of safe practices through competitions, posters and other similar drive.

As a precautionary measures before onset of monsoon, garland drain will be maintained to divert water from outside the mining area. The rainwater thus diverted is coursed to natural nallahs or collected in the sumps. This helps to control the inflow of water from the virgin areas into the mine workings. The floors of different benches are gently sloped so that working remain water free.

========**********========

CHAPTER – VIII
PROJECT BENEFIT

8.1 INTRODUCTION

This is a proposal for the production of 4,44,500 TPA Limestone from New Umrangshu Limestone Area (Lease area 200.00 ha) at Village – New Umrangshu, Taluka - Umrangshu, District –Dima Hasao (Assam), by M/s Assam Mineral Development Corporation Limited.

8.2 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

The lease area falls under government waste land and mining will be carried out in the area. The mining activity will generate a lot of socioeconomic benefits to the people of the area. There will be generation of employment to the local people as well as their earning will also be increased. Additional facilities such as medical, educational and transportation will be made available to the local population. There will be positive impact on population by way of employment, housing, education, medical and transportation facilities, economic status, health and agriculture. Literacy rate may go up. Local people may be taken into confidence.

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

There will be mining activities in this region. Though there is local population available but due to increase in demand or increase in mining activity, there is possibility of migration of labour from the surrounding areas. For this reason there will be increase in the human settlement in the area. Due to increased revenue earnings in the area there will be development of infrastructural facilities such as transport, road, housing, schools as well as hospitals. Due to improved earning there will be improvement in the entertainment facilities and marketing facilities with the improvement in social status.

8.4 HEALTH & SAFETY

- Proper health & safety measures will be taken while mining.
- All safety measures like use of safety appliances, safety awards, posters, slogans related to safety etc. Safety equipment's shall be provided to the workers like helmets, safety boots, ear plug, safety belts, dust masks etc.
- Periodical health checkup of the employees shall be done.
- First Aid organization in mines including training and retraining of First Aid shall be done.
- Periodical training programme to inform the employees about their task, associated risk and safe working practices will be undertaken. Training will also include information on accident prevention, proper control and maintenance of equipment and safe material handling practices.
- Provision of rest shelters for mine workers with amenities like drinking water etc.
- Green belt in and around the mining area will be developed to attenuate noise and dust impacts.

8.5 EMPLOYMENT POTENTIAL

In the mine number of skilled and unskilled local workers will be employed. The project will generate direct and indirect employment. The employment potential due to the proposed project is given as under.

TABLE 8.1: EMPLOYMENT POTENTIAL

S. No.	Particulars	Number
1.	**Managerial and Supervisory personnel**	
	(i) Mines Manager (As per MMR,1961)	1
	(ii) Mining Engineer (As per MCDR, 1988)	1
	(iii) Mining Geologist(As per MCDR, 1988)	1
	(iv) Mining Mate/Supervisor	2
	(v) Blaster	1
	Total	**6**
2.	**Skilled:**	
	(i) Excavator operator	4
	(ii) Tipper operator	12

	(ii) Drill m/c operator	4
	(iv) Driver Dozer	1
	(v) Driver Water Tanker	1
	(vi) Driver Jeep	1
	Total	**23**
3.	**Semi- skilled:**	
	(i) Helpers	4
	(ii) Clerk-cum-store keeper	1
	Total	**5**
4.	**Un-Skilled:**	2
	Total	**36**

8.6 CONCLUSION

The project will generate a fair amount of direct, indirect and induced employment in the study region. The local economy will receive a boost due to employee spending and services generated by Applicant M/s Assam Mineral Development Corporation Ltd.

The overall effect will improve buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities housing and acquisition of consumer durable. This is envisaged as a major positive benefit.

========**********========

CHAPTER – IX
ENVIRONMENT MANAGEMENT PLAN

9.1 INTRODUCTION

The environmental impact assessment presented in previous chapter is based on the control measures. It is concluded that the mining activities having substantial, but reversible impact on environment and the suggestive measures should be taken so as to minimize the impacts.

Environmental management plan details the environmental quality control measures which are proposed for this project to achieve the production of 4,44,500 TPA of Limestone (ROM) by complying with the stipulated standard limit specified by state pollution control board and CPCB.

Environment Management Plan, which is to be implemented in the project has detailed under the following heads:

- Land Reclamation
- Air Environment
- Water Environment
- Noise Environment
- Solid waste Management
- Biological Environment including Plantation Development
- Implementation of EMP and monitoring Programme

The environmental management plan has been developed with a view to bring down the level of impacts as discussed in the last chapter within limits. In each of the areas of impact, measures have to be taken to reduce potentially significant adverse impacts and where these are beneficial in nature, such impacts are to be enhanced/augmented so that the overall

adverse impacts are reduced to as lowest level as possible. Measures to be taken for each of the impact areas are detailed in the following Para:

9.2 LAND RECLAMATION

Land degradation is one of the major adverse impact of opencast & other miscellaneous activities related to mining and any effort to control adverse impacts would be incomplete without appropriate land reclamation strategy.

9.2.1 Post Mining Land Use

The leasehold area is Govt. waste land. The area proposed for mining has thin layer of top soil cover. Soil encountered, if any, will be stacked at earmarked site and ultimately used for plantation purposes. The surrounding area will not have any adverse impact on soil environment so no control measures are required.

In the operational phase, mining excavation will remain confined on flat ground portion and at the end of plan year; about 26.04 hectare are will be covered under mining. At the end of plan period about 15.18 hectare area will plantation along the lease boundary and barren land etc.

The excavated area will be protected by suitable parapet wall. It is only at the end of lease period of the mine when the limestone from the mineralized zone/ vein will completely be exhausted, then it will be 56.82 hect. area will be used as a water storage for accumulation of water. This water will then be utilized for local consumption and in agriculture.

Though the lease area granted for a mine is in the immediate possession of the mine operator, necessary step to keep the area under disturbance at any stage of mining operations to the minimum shall be taken. This

shall be achieved by ensuring reclamation of the excavated area concurrently with the mining activities by reducing the gap, between the first damage (due to mining activities) and the first repair (reclamation), to the minimum.

TABLE 9.1: LAND USE PATTERN AT THE END OF LEASE PERIOD (IN HECT.)

POST MINING LAND USE OF CORE ZONE WITH ENV. MANAGEMNET			
S. No.	**Activity**	**Area In Ha.**	**% of Total**
1	Pits	90.720***	45.36
2	Waste Dump	10.000*	5.00
3	Road & Building	4.000	2.00
4	Plantation	27.800**	13.90
5	Agriculture land	--	--
6	Mineral stack	--	--
7	Remaining Land	67.480	33.74
	Total area	**200.00**	**100.00**

Total 37.80 hect area will be planted at the end of lease period.

At the end of lease period, *About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area will be developed as green belt.

Land Reclamation Strategy

The mining and related operations are planned to be carried out in only about 90.72 hectare out of the total lease area of 200 hectare up to the lease period. The reclamation strategy about 56.82 hect. partly excavated area will be used as rain water storage.

The mine position at end of plan period is showing in layout plan as well as in conceptual plan. As can be seen from the above plates, the reclamation area increases in subsequent stages. The green belt and other undisturbed areas forming part of the green belt are planted systematically as a continued activity from present and completed by the end of lease period. The cumulative break-up of disturbed, afforested and reclaimed lands stages wise is given in below table.

TABLE 9.2: RECLAIMED LAND IN DIFFERENT STAGES (IN HECT.)

Land: Stage Wise use reclamation Area (Ha.)						
S. No.	Year	Disturbed	Afforestation	Reclaimed/Rehabilitated		
				Afforestation on mined out benches	Afforestation on waste dump	Water reservoir
1.	Present	11.718	5.18	--	--	--
2.	5th Year	35.250	15.18	--	--	--
3.	End of Life	94.72	27.80**	4.5	10.00*	56.82***

**About 10 hect area will be planted on waste dump area.*

***About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office).*

**** About 56.820 hect area will be used as a water reservoir.*

Total 37.80 hect area will be planted at the end of lease period.

9.3 AIR POLLUTION CONTROL MEASURES

The future mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. However, the following measures would be adopted to mitigate the PM_{10} levels in ambient air.

Mitigative measures suggested for air pollution control are based on the baseline ambient air quality monitoring data. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality should be monitored on a regular basis to check it vis-a-vis the standards prescribed by CPCB and in case of non-compliance; appropriate mitigative measures shall be adopted.

Measures to Prevent Generation & Dispersal of Dust

Dust particles that are normally generated during various mining operations when become airborne lead to increase in PM_{10} level in the ambient air. Another source of dust generation is the transport of material by vehicle. Adequate control measures are being taken during mining operations as well as drilling, blasting, transportation of minerals. Dust suppression by water spraying is adopted on the roads. Maintenance of transported vehicles and haulage road on regular basis. Regular water spraying on haulage roads during transportation of limestone and waste by water sprinklers.

Measures to Control Pollution due to the Airborne Dust

In addition to the control measures taken during mining and transport operations, following steps are being adopted to prevent air pollution due to airborne dust.

- Trees would be planted along the lease boundary.
- Reclamation and afforestation of mined out area as per schedule with minimum gap between excavation and reclamation to fix the dust and prevent its getting airborne.
- Dust mask will be provided to the workers engaged at dust generation points like excavations, loading, drilling and unloading points.
- Sprinkler arrangement will be used regularly to sprinkle water on the haul road as well as loading points.

- Dense green belts will be developed around the dust generation points. Trees would be planted on both sides of roads used for transportation to arrest dust.
- Afforestation around the mine to filter out the dust and preventing it from reaching the residential areas.
- Dust extractors will be provided in drilling machines to suppress air borne dust. Wherever possible wet drilling will be done.
- Air monitoring will be done once in six months.
- Workers engaged at dusty zones will be provided masks.

9.4 NOISE POLLUTION CONTROL MEASURES

The noise level monitoring carried out in the area has indicated that the present noise levels near the lease boundary are generally within limits. The deployment of various machines for excavation, transport and other auxiliary operations will increase the noise levels but will be naturally attenuated within lease area itself. Additional measures shall be taken to further reduce the noise levels.

Measures to Control Pollution due to the Noise

The following control measures are being taken to keep the ambient noise levels well within limits:

Mitigate the noise level following control measures will be adopted: -

1. All the machineries including transport vehicles are properly maintained to minimize generation of noise. Adequate silencers in the machineries will be provided to reduce generation of noise.
2. Periodical monitoring of noise will be done.
3. Sharp bits will be used for drilling.
4. Regular and proper maintenance of noise generating machinery.

5. Plantation in mining area will – also reduce propagation of noise outside the core zone.
6. Green belt should be provided at the lease periphery, within the lease area along the roads and all around the working areas, to screen the noise.
7. Drilling with sharp bits also minimizes the noise.
8. Earplugs will be provided to the workers.

Measures to protect workers from high noise levels & vibration control measures

The following measures will be taken to protect the workers from exposure to higher noise levels:

* Provision of protective devices like ear muffs, ear plugs, etc.
* Reducing the exposure time of workers to the higher noise levels by job rotation.

General precaution for blasting will be taken up as following:-

The drilling and blasting will be done during mining, therefore noise level are proposed to be controlled by using sharp bits, wet drilling and use of explosives with right oxygen balance.

The following precautions are being taken to minimize ground vibration and fly rocks which may be damaged due to vibrations.

1. Blasting is being done by competent persons in the supervision of Mine's Manager.
2. Not more than 10 holes are blasted at a time.
3. Stemming length is kept more than one third of the hole, it helps in reduction of ground vibrations.
4. Before drilling and blasting, the face is cleared with rock which may be source of fly rock.
5. The blast holes are drilled slightly inclined towards the free face. This reduces noise, vibration and fly rocks.

9.5 WATER POLLUTION CONTROL MEASURES

9.51 Surface Water

Since the major cause of surface water pollution during opencast mining activities is the wash off from freshly excavated areas, the programme to prevent water pollution shall focus on controlling wash off from these areas. Adequate control measures have been taken to check, not only the wash off from the freshly excavated areas and soil erosion.

The garland drains shall be made to carry away rainwater of the catchments area surrounding the working to the natural nallah. The drains shall be limed with stone masonry and shall be of adequate size to carry the storm water without overflow.

Other measures are :

- Toe walls shall be provided to prevent wash off and sliding of material from mine excavated areas.
- A water gradient of about 1 in 200 shall be kept at every bench towards inside of the bench to prevent formation of gully in the bench shape causing soil erosion.

9.5.2 Ground Water

There is no source (tube well/dug well) of ground water in the lease area. In the study area water sample, which was collected and analysis and all the parameters are with in drinking water standard prescribed by BIS. Limestone is non-toxic and no chemical treatment of mine water is required. Periodically water quality monitoring will be carried out and report will be submitted to concerned authorities. There would not be any adverse effect on the ground water quality. The mineral formation do not contain any harmful element, which could percolate into the ground and pollute the ground water. Hence, no control measures are required.

There would not be any adverse impact on the ground water quality due to mining. The mineral formation do not contain any harmful element, which could percolate into the ground and pollute the ground water. Hence, no control measures are required.

However, regular monitoring of water levels and quality in the existing wells in the vicinity would be carried out both with reference to area spread and times intervals to study the hydrodynamics of the strata. If found necessary, additional observation wells would be sunk for monitoring the water levels and quality around the mine.

9.5.3 Water Conservation Measures

The ground water table in this region fluctuates between 20 and 25 mts. from the surface. At the end of lease period, about 56.820 hect area will be used as a water reservoir. It will arrest environmental pollution, erosion and upgrade the scenic beauty of the area. Proper fencing and slope will be maintained.

9.6 CONTROL MEASURES OF ECOLOGICAL FACTOR

The area is mostly rocky with poor density of vegetation. However, all possible steps will be taken to prevent pollution on air, water and soil of the area; plantation will be carried out around the lease to arrest the dust at source. The greenery will improve faunal environment of the area at the same time it will help in preventing environment pollution. This will help in reducing adverse impact on indigenous plant species found in the area.

No forest land in the lease area. It is entirely a Govt. waste land. No endangered species found in the lease area, so no adverse impact on the flora and fauna. Excavation in the lease area does not affect the flora in the area where these operations are carried out. Since there is no endangered species of

flora & fauna observed in core zone as well as in study area, so no adverse impacts on the flora & fauna, therefore measures are not required.

9.7 STABILISATION & VEGETATION OF DUMPS

The overburden consists of shale and sandstone. The year-wise accretions of overburden are given below:

TABLE 9.3: WASTE GENERATION DURING PLAN PERIOD

Year	Waste	
	In-situ volume	Broken rock volume
I	109870	142831
II	70150	91195
III	99910	129883
IV	106390	138307
V	95480	124124
Total	**481800**	**626340**

b) Land Chosen for Disposal of waste:

The waste generated will be stored in the lease area, as shown on the plan. Area covered by the waste dump will be 6.2 ha. by the end of plan period and about 10.0 hectares by the end of lease period.

c) The Manner of Disposal and Configuration:

The area covered by the waste dump will be 6.2 ha. by the end of plan period. The height of dump will be 30m. Terraces of 6.0 m height shall be formed for stability of the dump. A stone wall of 3.0m height and 2.0 m width shall be constructed on sloping face of the dump surface, to prevent rolling of stones along the slope. During five year period about 495 m of stone wall is proposed to be constructed, out of which 300 m shall be constructed before commencement of dumping. A garland drain of about 600 m shall be constructed all around the dump to arrest the wash off from the dump.

Waste generated during plan period and afterwards will be stored at the proposed site. A stone parapet wall will be constructed all around the waste dump. The wall will prevent any roll out of stones from dump. A garland drain will also be constructed all around the dump. This drain will arrest any wash out from the dump reaching the natural drainage system. There is no proposal for backfilling.

Post mining land use will be in the form of plantation over the benches and dumps. Dumps will be terraced and plantation done over terraces. Dump slope shall be stabilised with grass. Closing benches of the pit will also be levelled and plantation done over them. The abandoned pit will be fenced & plantation will be done all around the ultimate pit.

The waste generated will be stored in the south – eastern corner of the lease area, as shown on the plan. Area covered by the waste dump will be 6.20 hectares by the end of plan period and about 10.00 hectares up to end of lease period.

The waste shall be dumped in the south – eastern corner of the lease area. Terraces of 6 height shall be formed for stability of the dump. A stone wall of 1.5 height and 1.0 m width shall be constructed on sloping face of the dump surface, to prevent rolling of stones along the slope. During five year period about 824 m of stone wall is proposed to be constructed. A garland drain of about 868 m shall be constructed all around the dump to arrest the wash off from the dump. By the end of lease period dump size will be 10.00 hectares with 50 m height.

9.8 TREATMENT & DISPOSAL OF WATER FROM MINE

There is no proposal of beneficiation plant for processing of limestone, so no effluent will be generated. The collected rain water will be used in agriculture purpose, dust suppression and green belt.

9.9 SOIL CONSERVATION MEASURES

There are patches of thin layer of soil over mineralized area whose quantity assessment is very difficult, however during mining soil will be removed in advance. Efforts shall be made to recover the sub-soil from the cracks and fissures, it shall be scrapped in separate slice and shall be kept preserved as stacks under tarpaulin cover and utilizes for plantation work.

9.9.1 Stacking of top soil

Top soil is present in the southern side of the lease area and is very less (i.e. 0.15mtr to 0.30mtr). Scanty sub-soil is present in cracks and fissures. Naturally, it is fertile black cotton soil/clayey soil. Efforts shall be made to recover the sub-soil from the cracks and fissures, it shall be scrapped in separate slice and shall be kept preserved as stacks under tarpaulin cover and utilizes for plantation work. The quantity assessment of top soil is very difficult as the exact thickness is not possible to measure.

9.10 PROGRAMME OF AFFORESTATION

The main aim of plantation of mined out areas is to control dust/noise in the area, and to protect land from erosion and provide an aesthetic landscape. Keeping the conceptual plan at abandoned stage in mine the stage wise plantation will be done.

Total 37.80 hectare are will be covered by the plantation. About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect

along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office). About 56.820 hect area will be used as a water reservoir. It will arrest environmental pollution, erosion and upgrade the scenic beauty of the area. Planting and sowing operations are followed up with adequate post plantation care, which includes replacement of casualties.

TABLE 9.4: STAGE WISE PLANTATION PROGRAMME

Year	Peripheral		Dump		Barren area		Mined out benches		Along nallah		Total	
	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees
Existing	--	--	--	--	5.18	5180	--	--	--	--	5.18	5180
I	1	1000	--	--	--	--	--	--	1	1000	2.0	2000
II	1	1000	--	--	--	--	--	--	1	1000	2.0	2000
III	1	1000	--	--	--	--	--	--	1	1000	2.0	2000
IV	1	1000	--	--	--	--	--	--	1	1000	2.0	2000
V	0.918	918	--	--	--	--	--	--	1.082	1082	2.0	2000
Operational Phase	**4.918**	**4918**	--	--	**5.18**	**5180**	--	--	**5.082**	**5082**	**15.18**	**15180**
End of Lease Period	--	--	10	10000	0.32	320	4.5	4500	7.80	7800	22.62	22620
Total	**4.918**	**4918**	**10**	**10000**	**5.50**	**5500**	**4.50**	**4500**	**12.882**	**12882**	**37.80**	**37800**

TABLE 9.5: SCHEDULE OF PLANTATION

Year Stage	Afforestation in Hectare						Remarks
	Peripheral	Dump area	Barren Land	Mined out benches	Along the nallah	No. of trees	
Present	--	--	5.18	--	--	5180	-
Operational Phase	4.918	--	5.18	--	5.082	15180	Green belt; Afforestation along the lease boundary
End of Lease Period	4.918	10.00	5.5	4.5	7.8	22620	Green belt; Afforestation on peripheral of lease boundary,

							on backfilled area & on mined out benches.

The Company has proposes 2000 plants per year to be planted along lease boundary & on barren area. In the operational phase, 15.18 hectare will be covered by the plantation. A number of species will be planted suiting to this area of climate conditions. The afforested area will be encircled by a boundary of local thorny bushes to protect it from cattle's and regular watering thrice a week (except monsoon) and manuring as required will be done.

9.10.1 Plantation Development

The main aim of plantation of mine areas is to control dust/noise in the area, and to protect land from erosion and provide an aesthetic landscape. Keeping the up to the plan period in mine the stage wise plantation will be done.

- Plantation is an important sink of air pollutants including noise. Green cover in mining area not only helps in reducing pollution level, but also improves the aesthetic and beneficially influence the microclimate of the surrounding.
- It also attracts the animals to re-colonize the area when the mine is abandoned. However green belt may be developed with plant species suitable to the area.
- The species, selected for plantation should have rapid growth, evergreen, large crown volume and small/pendulous leave with smooth surface. In this river bed mining project plantation will be developed along the approach roads and sides of river bank. Thick plantation will work as a pollutant arrestor, reduces floods as well as avoids the situation of erosion of soil during monsoon season. For the selection of plantation species, will be discussed with Forest Department.

Total 37.80 hectare are will be covered by the plantation. It will arrest environmental pollution, erosion and upgrade the scenic beauty of the area. Planting and sowing operations are followed up with adequate Post plantation care, which includes replacement of casualties.

TABLE 9.6: STAGE WISE PLANTATION PROGRAMME

Year	Along Lease Boundary		On Barren Land		Along the nallah		Total	
	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees	Area (Hect.)	Trees
Existing	--	--	5.18	5180	--	--	5.18	5180
I	1.0	1000	--	--	1.0	1000	2.0	2000
II	1.0	1000	--	--	1.0	1000	2.0	2000
III	1.0	1000	--	--	1.0	1000	2.0	2000
IV	1.0	1000	--	--	1.0	1000	2.0	2000
V	0.418	918	--	--	1.082	1082	2.0	2000
Total	**4.918**	**4918**	**5.18**	**5180**	**5.082**	**5082**	**15.18**	**1518**

Total plantation 15.18 hectares area will be covered in the operational phase.

Afforestation will be done under the supervision of experienced horticulturists and guidance of local forest authorities. Planting and sowing operations are followed up with adequate post plantation care, which includes replacement of casualties. Weeding, soil working, manuring, watering, protection from grazing etc. The list of species that have been successfully grown under similar site conditions and being planted.

Planting Methodology

Trees

The plantation shall be done in pits. Pits of about 50-cm diameter shall be dug in grid of 3m x 3m up to a depth of 0.5 m. The pits shall be refilled with topsoil after planting the samplings. The samplings of healthy, nursery

raised, seedlings in polythene containers shall be transported in baskets. Planting shall be done after first monsoon showers.

The level of the soil shall be about 10 cm above the general ground level. The soil around the plant shall be pressed to form a low trough. About 25 gm of chemical fertilizer shall be added in ring of 25-cm radius around the plant. Watering shall be continued after plantation if any dry spell follows. Cleaning and weeding shall be done twice during first and once during following season. Planted area shall be inspected and mortality rate ensured for each species. The dead and dying plants shall be replaced by fresh seedlings.

Shrubs

Small pits of 30 cm x 30 cm would be dug before the rains. Soon after the rains set in, surplus plants from the adjoining areas would be dug out along with roots and earth around them and transported to site carefully. The shoots of shrubs would first be trimmed with garden scissors at a height of about 45 cm from the ground level, leaving only few leaves(in the lower portion), to minimize water loss due to transpiration from leaves. The shrub will be planted in the pits and refilled with soil mixed with 3 kg of farmyard manure.

The planting spacing shall be 1.5 m x 1.5 m. Weeding will generally not be needed.

Nursery

Success of Afforestation measures at site will depend on investigation of soil, selection of suitable species to be grown and a good planting stock. Afforestation will be carried out in accordance with an elaborate timetable to be drawn up for sowing and plantation depending upon the afforestation requirements and species to be planted. The relevant

works for the success of reclamation and afforestation activities will be carried out after consultation with people of forest department.

Protection of Plantation Sites

The reclaimed and afforested areas have to be protected from cattle menace, human interference, soil erosion, plant diseases, etc. Check bunds, masonry chutes, protected drains, etc. will be constructed wherever required to control and regulate the water flow to prevent soil erosion and washing away of nutrients. Plants will be protected from diseases by the application of proper pesticides. Soil workings, manuring etc. will be done whenever necessary. Plants will be protected from cattle menace and human interference by providing fencing and proper watch and ward.

9.10.2 General Guidelines for Plantation Development

- Trees growing upto 5m or more in height will be planted around the vicinity of lease periphery.
- Trees will be planted along roadsides, to arrest auto – exhaust and noise pollution, and in such a way that there is no direct line of sight to the working site when viewed from a point outside the foliage perimeter.
- Since tree trunks are normally devoid of foliage (upto 3mt.), it will be appropriate to have shrubbery in form of such trees to give coverage to trunk portion of these trees.
- Fast growing trees with thick perennial foliage will be grown, as it will take many years for other trees to grow to their full height.

In order to facilitate the proper growth of vegetation, limited measures involving preparation of seedbed with suitable amount of fertilizers and treatment with mulches will be taken.

Vegetation cover generally helps in:

- Stabilizing erodible slopes to minimize pollution.

- Control of dust.
- Enhancement of aesthetic value.
- Maximizing evpo-transpiration, which helps minimizing run off.
- Reducing noise.

For re-vegetation, the plants and saplings suitable for the existing soils and site condition may consider. It is recommended to plant fast growing local plant species, which can adapt to the local climate.
This has to be done in consultation with local Government Horticulturist.

9.11 MEASURES FOR PROTECTING HISTORICAL MONUMENTS AND REHABILITATION

No human settlement is within the mining lease and there is no historical monument. Therefore, no mitigation measure is to be taken.

9.12 MEASURES TO IMPROVE SOCIO ECONOMIC CONDITIONS

The overall impact of Umrangshu limestone Mines will be on the socio-economics of the area has been a very positive one, in that not only it has generated considerable employment for local population but it has also given a good boost to the general economy of the area. Creation of several hundred comparatively well paid jobs in the area has boosted household employment, as also general trade, in the tertiary sector. The Mine will also boost trade in the supply of spares, in engineering jobs on contract, as well as in civil works.

There will be over all positive effect on social life on the local people, as they will get job opportunity, transport and medical facilities so the mining activities will benefit them directly or indirectly.

1. Limestone production and employment opportunities.

2. Reduction in the migration of jobless laborers from native place to other distant places.
3. Interaction of local people with outsides, and improvement in communication, which will enhance their present status of knowledge and confidence.

9.12.1 Employment

The mining operations will employ about total 36 persons. Preference will be given to the local population while inducting any manpower. The future mining activity would provide indirect employment to a large number of local population in activities like planting and watering of trees for green belt development and reclamation of mined out areas for which the requirement will increase over a period of time.

9.12.2 Business Promotion

While off-loading the jobs to outside parties' preference will be given to the local people.

The animal husbandry, which is already well established in the area will get a further boost as the demand of milk, meat etc. will increase due to influx of population related to the mining activities. It will improve the economic conditions of the people and will enable them to improve their livestock quality through improved animal husbandry practices.

9.12.3 Communication & transport

Communication facilities will be created such as approach roads, telephone, mobile services and provide transportation by jeep & mini bus to reach nearby post offices and amenities like schools, hospitals, market centers etc. which will be benefit the local population.

9.13 CORPORATE SOCIAL RESPONSIBILITIES

i. All the workers have been employed from nearby villages.

ii. The company will take interest for the welfare amenities scheme in the area with the help of local people; scholarship will be given to the students getting highest marks in District level/State level exams.

iii. All other facilities like medical help for the children & women/widow etc., medical camps in nearby area.

iv. Computer facilities will be provided to the school by the association.

9.14 OCCUPATIONAL SAFETY & HEALTH

The medical histories of all employees will be maintained as per mines rules, 1955 chapter – IV-A1. Thereafter, the employees will be subjected to medical examination on annual basis. The above tests keep upgrading the database of medical history of the employees.

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health in limestone mine are fugitive dust and noise. Safety of employee during mining operation and maintenance of mining equipment will be taken care as per Mines Act. To avoid any adverse effect on the health of workers due to dust, heat, noise and vibration sufficient measures have been provided in the mining project.

Safety of employee during mining operation and maintenance of mining equipment will be taken care as per MMR 1961 & MCDR 1988. To avoid any adverse effect on the health of workers due to dust, heat, noise and vibration sufficient measures have been provided in the mining project. These include:

- Provision of rest shelters for mine workers with amenities like drinking water, toilets etc.
- Provision of personal protection devices to the workers.

- Rotation of workers exposed to noisy areas.
- Dust suppression on haul road.
- First-aid facilities in the mining area.

Additionally, the health status of workers in the mine shall be regularly monitored under an occupational surveillance programme. Under this programme, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum Examination
- Detailed Routine Blood and Urine examination

The medical histories of all employees are maintained in a standard format. Thereafter, the employees are subjected to medical examination on annual basis. The above tests keep upgrading the database of medical history of the employees.

9.15 TRAINING & HUMAN RESOURCES DEVELOPMENT

Though stress shall be on appointing qualified and experienced personal in various disciplines, it shall also be ensured that they are adequately trained for the jobs expected of them. For this basic training shall be given to raw and new appointees, whereas refresher training shall be given to others keeping in view provisions of Mines Vocational Training Rules 1966.

The training of mine personnel will be conducted regularly with respect to environmental protection. Training facilities are envisaged in the mine

site. Specialized courses will be arranged for afforestation, re-vegetation, reclamation etc. in various Institutes and organizations.

Training and human resource development is not a single time function but a continuous requirement to up-date and improve the skills of employees. Hence, in addition to whatever statutory training is required, the lessee looks forward to continue the process by way of participative trained of the personnel in various workshops, seminars training courses organized by manufactures /professional agencies.

9.16 ENVIRONMENTAL MANAGEMENT CELL

Apart from having an EMP, it is also necessary to have a permanent organizational set up charged with the task of ensuring its effective implementation.

1. For maintenance & repair or pollution control device, maintenance crew shall be taken from private agency.
2. Massive plantation shall be done on contract from outside agencies.

The Company will undertake to monitor the environmental pollution levels by measuring ambient air quality, water and effluent quality, noise levels etc., by appointing external agencies. The Company will ensure that the pollution is limited to allowable values and to take corrective action if required.

In case the monitored results of environmental pollution are found to exceed the allowable values, the Environmental Management Cell will suggest remedial action and get these suggestions implemented through the concerned departments.

The Environmental Management Cell will also co-ordinate all the related activities such as collection of statistics of health of workers and population of the region, afforestation and green belt development.

9.16.1 Aesthetic Environment

The plantation of a number of various species in the proposed area for plantation will improve the aesthetic environment over this area.

========**********========

CHAPTER – X
SUMMARY & CONCLUSION

10.1 INTRODUCTION

Success of any environmental management programme depends upon the efficiency of the organizational set up responsible for the implementation of the programme. Regular monitoring of the various environmental parameters is also necessary to evaluate the effectiveness of the management programme so that necessary corrective measures can be taken in case there are some drawback in the proposed programme. Since environmental quality parameters at work zone are important for maintaining safety the monitoring work forms part of safety measures also.

10.2 AVAILABILITY OF FUNDS FOR ENVIRONMENT PROTECTION MEASURES

10.2.1 Funds for Green Belt Protection

The management of Umrangshu Limestone Area is very conscious to minimize the existing pollution load in the lease area. A thick canopy cover of green belt is being developed as discussed in the earlier chapters. Over 2000 numbers of trees/year on barren land will be planted for environmental protection measures. A recurring amount of Rs. 3.0 lacs will be spent every year.

10.2.2 Funds for Dust Suppression

Water is spread around the mining area through pipes laid down on tankers to control the dust suppression. An amount of Rs. 1.0 lac will be spent every year on dust suppression measures.

10.3 DETAILS OF THE PROJECT

TABLE 10.1: PROJECT DETAILS

Particulars	Details
Mine	New Umrangshu Limestone Mine
Village	Umrangshu
Taluka	Umrangshu
District	Dima Hasao
State	Assam
Latitude	25°31'17.27" :: 25°32'40.56" N
Longitude	92°47'54.36" :: 92°47'26.39" E
PROJECT DETAILS	
Area of the Mine	200 ha
Manpower (proposed)	36 persons
Water	12.0 KLD
Green Belt/ Plantation Development (proposed)	37.80 ha.
Capital Cost for EMP	28.0 lac
Annual Recurring Cost from EMP	7.25 lac
Capital Cost of the Project	260.0 lac

10.4 IMPLEMENTATION SCHEDULE

The implementation of these mitigation measures, it is important to monitor various environmental parameters so as to ensure proper working of all the environmental of control measures. This section presents the monitoring schedule and infrastructural requirement for environmental protection given in below table.

TABLE 10.2: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

Particulars	Monitoring Frequencies	Duration of Station	Important Monitoring Parameters
Surface water / Ground water Sampling	Once in a year	Grab	pH, SS, TDS, Iron, Hardness, Alkalinity, Chlorides, Nitrates, Sulphate & Fluorides
Ambient air quality monitoring	Twice in a year.	24 hr.	PM10, SO2 and NOx
Noise Monitoring	Twice in a year.	8 hr.	Level in dB(A) and dB(C)
Soil Sampling	Once in a year	Grab	PH, Conductivity, Sulphate, Nitrate, Phosphates, Alkalinity & texture.

10.5 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.3: COST OF ENVIRONMENTAL PROTECTION MEASURES

(Investment and recurring cost Rs. Lakh)

S. No	Particulars	Capital cost	Recurring cost / annum
1.	Pollution Control	5.00	1.00
2.	Pollution Monitoring	5.00	1.50
3.	Plantation on Barren Area	10.00	3.00
4.	Occupation Health	3.00	0.75
5.	Miscellaneous (Fencing, Garland Drains etc.)	5.00	1.00
	Total	**28.00**	**7.25**

Total investment on environmental improvement works existing and envisaged Rs. 28.00 lakhs and recurring expenditure during the stage of production is Rs. 7.25 lakhs per year.

10.6 GREENBELT DEVELOPMENT

The Company has planned to develop 37.80 ha. (About 10 hect area will be planted on waste dump area. About 27.80 hect area will be planted (about 4.918 hect area along lease boundary, 4.5 hect on mined out benches, 12.882 hect along nallah, 1.5 hect near the magazine site, 2.77 hect along road side, 1.23 hect near the office) area under greenbelt/ plantation at the end of lease period of mine. This will help in reducing the spread of pollutants and will also be effective in attenuating noise levels.

10.7 RECOMMENDATION

M/s UDAIPUR MIN-TECH PVT. LTD. survey reveals that the management will be providing continual improvement of Environment. The air environment and other emissions will be regularly sprinkled with water. The management will provide ear muffs and helmets to the workers in the mine and stress on its utilization. The regular medical check-up of workers is to be carried out. Green belt development is to be stressed and workers must be motivated for plantation care.

The general environmental awareness will be given to the local workers. Regular maintenance of vehicle will be carried out. Slogans of Environment, health & safety will be recommended for display.

The management must keenly celebrate the importance of World Environment Day to create awareness amongst the workers. Conservation of soil and water must be emphasized not only at works but also at their own place. With implementation of Environment management plan and providing continual improvement the mine may be accorded environmental clearance.

========**********========

CHAPTER – XI

CONSULTANTS ENGAGED

(RQP/UDP/354/2009/B)

The consultant engaged for the preparation of the EIA/EMP of the project is **M/s Udaipur Min-Tech Pvt. Ltd**. The information about the company with address is as follows:

INTRODUCTION:

Realizing the need for multi-disciplinary and pragmatic approach to mine development and mine environment management, a few dedicated Mining engineers & Geo-scientists with decades of practical experience started M/s Udaipur Min-Tech Pvt. Ltd. company as a consultancy organization in 1994 registered as company with the Registrar of Companies, Rajasthan and got recognized (RQP/UDP/354/2009/B) from Indian Bureau of Mines, Ministry of Mines, Govt. of India and ISO 9001 Company and accreditation by NABET "A" category for open cast mines. Today it has grown not only to handle anything in mining of non-fuel minerals but ready to face any challenging environmental assignment in the field of mining industry and modification of varied industries and environmental clearance of diverse industries.

M/s Udaipur Min-Tech Pvt. Ltd. provides services in the field of environmental impact assessment and management for all types of industries(Chemical, Power Stations, Infrastructure projects, Soda ash, Cement & Mines), risk analysis, disaster management, environmental health and safety, socio-economic studies and mine planning.

OUR SERVICES:

We provide wide range of services. These includes:-

At Mining Services:-

----Evolution of Mineral property and feasibility studies.

----Preparation of Mining Plan, Scheme of Mining with Mine Closure Plan (Progressive & Final) as per MCR 60, MCDR 88 & GCDR 1999.

---- Up gradation & Processing of Non-Metallic Minerals.

----EIA / EMP report

At Environmental Services:

----- Monitoring of ambient air quality, Stack emissions, Work zone air quality, Source monitoring and Control.

----- Monitoring of water, Waste water, and Pollution source identification and control process.

----- Monitoring of Soil quality, Noise level, Solid waste or Sludge quality.

-----Environmental audit, Industrial risk assessment and risk management and hazardous waste management.

ACHIEVEMENTS:-**Udaipur Min-Tech Pvt. Ltd.(UMT) in a short period after its inception has prepared more than 750 Mining Plan and Scheme of mining with Progressive Mine Closure/Final Mine Closure Plan of various minerals in Rajasthan, Gujarat, Himachal Pradesh, Assam & M.P. and more than 750 of them have already approved from IBM-Udaipur/Dehradun/Ajmer/Nagpur, Deptt. Of Mines & Geology-Rajasthan, Deptt. Of Geology & Mining –Gandhinagar (Gujarat).**

UMT has conducted Mine Surveys, Mine Planning, EIA/EMP for Limestone area for Cement & Soda Ash industry, Laterite, Iron ore, Marble, Granite, Soapstone, Mica, Quartz & Feldspar, Asbestos, Wollastonite, Calcite, China Clay, Red Ochre etc. in states of Rajasthan, Gujarat, Himachal Pradesh, Assam, Goa& M.P.

UMT has prepared during year 2000-01 to 2010-11, more than 150 EIA/EMP report of mineral Soapstone, China Clay, Red ochre, Laterite, Silica Sand, Quartz& Feldspar, Dolomite, Limestone(Cement as well as Soda Ash) & Granite for Ministry of Environmental & Forestry and 100 of them have Already secured approval & Environmental clearance.

THE CORE TEAM:

The key persons of team are:

1) Mr. S. S. BIST – M.Sc. (Geology), M.Tech. (Applied Geology) & PG Diploma in Environment & Ecology, RQP (IBM), MMGI, FGSI etc. having 20 years professional experience of survey and geological mapping, prospecting & mine planning for various non-metallic/metallic minerals, preparation of pre-feasibility& feasibility report, preparation of Mining plan/Scheme of Mining with PMCP/FMCP, Preparation of EIA/EMP report and mining of Granite, Marbles etc.

2) Mr. B. L. MOD- Diploma in Mining and AMIE(Mining) with First Class Mine Manager Certificate of competency (Unrestricted), Certified Mine Surveyor's Certificate of competency (Unrestricted), RQP(IBM), MMGI, C. Engg. MIE, MMEA, having 45 years working experience in field of mining viz underground as well as opencast mine of various metallic and non-metallic mineral in India as well as abroad. Preparation of Mining plan/Scheme of Mining with PMCP/FMCP, preparation of EIA/EMP report.

3) Mr. S. K. MOHTA – Diploma in Mining with First Class Mine Manager Certificate having 45 years working experience in field of mining viz underground as well as opencast mine of various metallic and non-metallic mineral in India as well as abroad

4) Mr. S. N. SHARMA-B.E in Mining with First Class Mine Manager Certificate, PG Diploma in Marketing Management, RQP(IBM) Nagpur, Maharashtra having 31 years working experience in field of mining viz. underground as well as open cast mine of various metallic and nonmetallic mineral in India. Preparation of Mining Plan/ Scheme of Mining with PMCP/FMCP, Preparation of EIA/EMP report of Mining project.

5)Mr. U. C. SHARMA- M.E in Environmental Engineering, B.E in Civil Engineering, MBA in H.R, having 20 years' experience in field of Civil Environment Engineer. Preparation of EIA/EMP report of Mining Project.

6) Mr. N. S. NARUKA- M. Phil. (Environment Management), M.Sc. (Environment Science), Lead Auditor for (ISO14001:2004) EMS, and Diploma in Industrial Safety, having over 10 years of work experience in the Environmental Impact Assessment & Analysis with report writing. Evaluation and preparation of EIA's of Mining project for environmental clearance.

7) Dr. SHALINI GUPTA -M.Sc. (Ecology and Environment Science), Ph.D. (Chemistry), Diploma in Industrial Safety. MoEF& NABL approved Environment Chemist, Approved FAE in AP,WP, SHW & AQ, Trained Internal Auditor as per ISO/IEC-17025-2006 & Train QMS Auditor having over 18 years of work experience in the Environment field.

8.) Dr. DIPANWITA BHAKAT –Ph.D. (Environmental Science), M. Tech. & M.Sc. (Environmental Science), is having over 2 years of teaching experience in Environmental Science.

Besides, our team of Professionals is given below :

1	Ashok Kumar Pardesi	Diploma in Mining & Certified Surveyor.
2	Rashmi Shrimali	M. Sc.(Chemistry)
3	Navneet Sharma	M.Sc. (Geology)
4	Jitendra Singh Sankhala	B.E.(Mining)
5	Rajveer Singh	M.Sc.(Remote Sensing & GIS)
6	Kamlesh Kumar	M.Sc. (Environment Science)
7	Kamod Kanwar Rathore	M.Sc. (Environment Science)
8	Kailash Meena	M.A. (Geography), Diploma in RS & GIS.

9	Rahul Deshmukh	MSW & BSW (Social Works)
10	Sameer Deshpande	M.Sc.(Botany)
11	Ramesh Vishwakarma	M. Sc.(Geology)
12	Nirupama Jain	M. Sc.(Geology)
13	Ashima Jain	B. Tech. (Mining Engineering)
14	Madhuri Dubey	B. Tech. (Mining Engineering)
15	Mohammed Afzal	M. Sc. (Env. Science & Biotechnology)
16	Naveen Kumar Meena	M.A. (Political Science)
17	Lakshmi Lal Meghwal	Diploma in Draftsman & Certified Surveyor.
18	Harish Kumar Pardesi	Drafts man & AutoCAD Master.
19	Praveen Koted	Computer Operator & AutoCAD Master.
20	Madan Lal Dangi	Computer Operator & AutoCAD Master.
21	Anil Damor	Computer Operator & AutoCAD Master.
22	Lokesh Menaria	Computer Operator & AutoCAD Master.
23	Nirmal Menaria	Computer Operator & AutoCAD Master

CONTACT PERSON - S. S. BIST

206 "APEKSHA COMPLEX"

HIRAN MAGRI, SECTOR-11

UDAIPUR – 313002 (RAJ.)- INDIA

PHONE - +91-294-2489672(OFF), MOBILE - +9194141 67672

e mail : ssbist@udrmintech.com

Visit us at: www.udrmintech.com