

**=EXECUTIVE SUMMARY (ENGLISH & HINDI)
=RAPID ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENTAL MANAGEMENT PLAN
OF**

**BHIMGODA MINE
MINERAL – LIMESTONE
AREA – 8.50 HECT. (ML - 94/2003)
NEAR VILLAGE – KAMROO
TEHSIL – PONTA SAHIB & DIST. – SIRMOUR (H.P.)**

**CATEGORY “A”.
THE INTER STATE BOUNDARY OF UK & H.P. FALL WITHIN BUFFER
ZONE**

PURPOSE

***Renewal of Lease**

**** Proposed Limestone Production = 60000 tones/annum**

APPLICANT

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CONTENTS

CHAPTER NO.	PARTICULAR	PAGE NO.
I	HIGHLIGHTS OF THE MINES	14
II	PROJECT DESCRIPTION	20
III	EXISTING ENVIRONMENTAL SCENARIO	40
IV	IDENTIFICATION OF IMPACTS	75
V	ENVIRONMENT MANAGEMENT PLAN	89
VI	CONCLUSION	109
VII	CONSULTANT ENGANGED	112

INDEX

Sr. No.	PARTICULAR	PAGE NO.
CHAPTER – I		
HIGHLIGHTS OF THE MINES		
1.1	INTRODUCTION	14-18
1.2	PROJECT SETTING	
1.3	BACK GROUND OF THE PROMOTERS	
1.4	REASON FOR PREPARING ENVIRONMENTAL MANAGEMENT PLAN	
1.5	OBJECTIVES OF ENVIORNMENTAL MANAGEMENT PLAN	
1.6	LOCATION & COMMUNICATION	
1.7	MARKET POTENTIAL	
1.8	ENVIRONMENTAL IMPACT ASSESSMENT REPORT	
CHAPTER – II		
PROJECT DESCRIPTION		
2.1	REGIONAL GEOLOGY	19-39
2.2	EXPLORATION	
2.3	MINING PROCESS	
2.4	YEAR WISE DEVELOPMENT FOR THE ENSURING FIVE YEAR PERIOD	
2.5	PRODUCTION PLAN FOR NEXT FIVE YEARS	
2.6	PROPOSED RATE OF PRODUCTION & LIFE OF MINE	
2.7	EXTENT OF MECHANISATION	
2.8	USE OF MINERALS	
2.9	UTILITIES & PROPOSED SITE FACILITIES	
2.10	SITE FACILITIES (EXIST & PROPOSED)	
CHAPTER – III		
EXISTING ENVIRONMENTAL SCENARIO AND THE BASELINE DATA		
3.1	INTRODUCTION	40-74
3.2	STUDY AREA AT A GLANCE	
3.3	TOPOGRAPHY	
3.4	CLIMATIC CONDITION	
3.5	PHYSIOGRAPHY	
3.6	HUMAN SETTLEMENT	
3.7	HYDROLOGICAL ASPECT	

3.8	ATMOSPHERIC CONDITION	
3.9	NOISE ENVIRONMENT	
3.10	SOIL	
3.11	BIOLOGICAL ASPECTS	
3.12	LAND ENVIRONMENT	
3.13	WATER ENVIRONMENT	
3.14	SOCIO – ECONOMIC ENVIRONMENT	
3.15	AMENITIES	
CHAPTER – IV		
INDENTIFICATION OF IMPACTS		
4.0	INTRODUCTION	75-88
4.1	TOPOGRAPHY & DRAINAGE	
4.2	IMPACT ON CLIMATE	
4.3	IMPACT ON AIR ENVIRONMENT	
4.4	IMPACT ON NOISE LEVEL	
4.5	IMPACT ON HYDROLOGICAL CONDITION	
4.6	IMPACT ON WATER QUALITY	
4.7	IMPACT ON FLORA	
4.8	IMPACT ON FAUNA	
4.9	IMPACT ON LAND ENVIRONMENT	
4.10	IMAPCT ON SOIL	
4.11	IMPACT ON SOCIO-ECONOMIC ENVIRONMENT	
4.12	STRUCTURED ENVIRONMENT MANAGEMENT AND ACTION PLAN	
CHAPTER –V		
ENVIRONMENT MANAGEMENT PLAN		
5.0	INTRODUCTION	89-108
5.1	LAND RECLAMATION	
5.2	AIR POLLUTION CONTROL MEASURES	
5.3	NOISE POLLUTION CONTROL MEASURES	
5.4	GROUND VIBRATION CONTROL MEASURES	
5.5	WATER POLLUTION CONTROL MEASURES	
5.6	MEASURES TO IMPROVE SOCIAL –ECONOMIC CONDITION	
5.7	ENVIRONMENTAL MONITORING	

5.8	OCCUPATIONAL SAFETY & HEALTH	
5.9	DISASTER MANAGEMENT PLAN	
5.10	ENVIRONMENT MANAGEMENT CELL	
CHAPTER – VI		
CONCLUSION		
6.0	INTRODUCTION	109-111
6.1	AVAILABILITY OF FUNDS FOR ENVIRONMENTAL PROTECTION MEASURES	
6.2	IMPLEMENTATION SCHEDULE	
6.3	BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT	
6.4	RECOMMENDATION	
CHAPTER – VII		
7.0	CONSULTANTS ENGAGED	112-114

LIST OF TABLES

TABLE NO.	PARTICULAR	PAGE NO.
1.1	YEARWISE PRODUCTION	15
2.1	REGIONAL STRATIGRAPHIC SEQUENCE	20
2.2	LOCAL GEOLOGY	21
2.3	CHEMICAL ANALYSIS	23
2.4(A)	DOLOMITE LIMESTONE RESERVES PROVED	25
2.4(B)	DOLOMITE LIMESTONE RESERVES PROBABLE	25
2.4(C)	DOLOMITE LIMESTONE RESERVES POSSIBLE	25
2.5(A)	LIMESTONE RESERVES PROVED	26
2.5(B)	LIMESTONE RESERVES PROBABLE	26
2.5(C)	LIMESTONE RESERVES POSSIBLE	26
2.6	GEOLOGICAL RESERVES	27
2.7	RESERVES AS PER UNFC	27
2.8	RECOVERABLE RESERVE	27
2.9	MINEABLE RESERVE	28
2.10(A)	GRADE OF LIMESTONE	29
2.10(B)	GRADE OF LIMESTONE	30
2.11	DEVELOPMENT ACTIVITY	31
2.12(A)	1 ST YEAR PRODUCTION PLAN	33
2.12(B)	2 ST YEAR PRODUCTION PLAN	33
2.12(C)	3 ST YEAR PRODUCTION PLAN	33
2.12(D)	4 ST YEAR PRODUCTION PLAN	34
2.12(E)	5 ST YEAR PRODUCTION PLAN	34
2.13	TYPES OF MACHINERY AND EQUIPMENT REQUIRED	35
2.14	CHEMICAL ANALYSIS OF LIMESTONE	36
2.15	PEAK WATER REQUIREMENT	37
2.16(A)	LABOUR HIGHLY SKILLED	37
2.16(B)	LABOUR- SKILLED, SEMI – SKILLED & UN SKILLED	38
3.1	MEAN TEMPERATURE & RELATIVE HUMIDITY RECORDS FROM NAHAN (DISTRICT HEADQUARTER)	48
3.2	WIND SPEED & RAINFALL	48
3.3	TEMPERATURE RECORDS AND RELATIVE HUMIDITY AT MINE SITE	48
3.4	LOCATION OF AMBIENT AIR MONITORING STATIONS	49
3.5	PROCEDURE FOR DETERMINING VARIOUS AIR QUALITY PARAMETERS	50
3.6	AMBIENT AIR QUALITY (LEVEL- SPM)	51
3.7	AMBIENT AIR QUALITY (LEVEL- RPM)	52
3.8	AMBIENT AIR QUALITY (LEVEL –SO ₂)	53
3.9	AMBIENT AIR QUALITY (LEVEL- NO _x)	54
3.10	COMPARISON OF AIR MONITORING RESULT	55
3.11(A)	LOCATIONS OF NOISE MONITORING STATIONS	56
3.11(B)	NOISE LEVEL WITHIN THE STUDY AREA	57
3.12	TRAFFIC DENSITY	58
3.13(A)	LOCATIONS OF SOIL QUALITY MONITORING STATIONS	58
3.13(B)	SOIL SAMPLE ANALYSIS	59
3.14	FOREST WITHIN 10 KM RADIUS	61

3.15	FLORA IN THE STUDY AREA	62
3.16	FAUNA IN THE STUDY AREA	65
3.17	AGRICULTURE YIELD IN THE STUDY AREA	67
3.18(A)	LAND USE PATTERN-EXISTING	68
3.18(B)	LAND USE PATTERN-AT THE END OF LEASE PERIOD	68
3.18(C)	STAGE WISE LAND USE PATTERN	69
3.19(A)	LOCATION OF WATER SAMPLING STATIONS	70
3.19 (B)	WATER QUALITY ANALYSIS	70
3.20	POPULATION & LITERACY PATTERN	72
3.21	OCCUPATIONAL PATTERN OF STUDY AREA	72
4.1	PREDICTED INCREMENTAL GROUND LEVEL CONCENTRATION	78
4.2	NOISE GENERATED BY DIFFERENT MACHINERY	79
4.3	FREE NOISE ATTENUATION WITH DISTANCE	79
4.4	PERMISSIBLE EXPOSURE INCASES OF CONTINUOUS NOISE	80
4.4.1	AMBIENT AIR QUALITY STANDARD IN RESPECT OF NOISE	81
4.5	LAND USE STATUS	85
4.6	ENVIRONMENT MANAGEMENT MATRIX	87
5.1	RECLAIMED LAND IN DIFFERENT STAGES	91
5.2	LAND USE AT THE END OF LEASE PERIOD	92
5.3	SCHEDULE OF PLANTATION	94
5.4	PLANTATION SPECIES	95
6.1	MONITORING SCHEDULEE FOR ENVIRONMENTAL PARAMETERS	110
6.2	COST OF ENVIRONMENTAL PROTECTION MESURES	110

LIST OF FIGURES

FIG NO.	PARTICULAR	PAGE NO.
3.1	TOPOGRAPHY MAP OF THE STUDY AREA	42
3.2	DRAINABLE PATTERN OF THE STUDY AREA	44
3.3	SAMPLING LOCATION MAP	49
3.3 A	CONTOUR MAP OF THE STUDY AREA	49
3.4-3.6	WIND ROSE FOR STATION AT BHIMGODA MINE OF MONTH OF NOV.2009, DEC.2009 & JAN. 2010.	56

LIST OF PLATES

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

LIST OF ANNEXURES

ANNEXURE NO.	PARTICULAR
I	AUTHENTICATED LIST OF FLORA & FAUNA

POINT TO BE CLARIFIED TO THE MINISTRY OF ENVIRONMENT & FOREST AS PER THE APPROVED TOR FOR BHIMGODA LIMESTONE MINE OF SMT. SATYA TOMAR, TEHSIL – PONTA SAHIB , DIST – SIRMOUR (H.P.), LEASE AREA – 08.5 HECT.

Sl. No. as per MoEF	Description as per MoEF	Covered in EIA as per details
i.	Year-wise production details since 1994 onwards & clearly stating the highest production achieved in any one year prior to 1994. It may be categorically informed whether there had been any increase in production after the EIA Notification, 1994 coming into force w.r.t. the highest production achieved prior to 1994.	Year-wise production details since 1994 onwards with highest production achieved in any one year prior to 1994 is given in Table No.1.1 on Page No.15
ii	A note on the present status of the mine, how and when it was closed and restarted should also be given. A copy of the order of the State Govt., if any, in this regard should also be given.	At present mine is working. It was closed in Feb – April 2008 & 05 May – 01 Nov 2009 due to some litigation.
iii.	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.	Refer Page No. 40 to 74 in Chapter No. III of EIA report. Generation of waste will be max. of 60,000 tonnes per year. During the next five year period, the quantity of waste generated will be about 22500 tonnes. No backfilling is proposed.
iv.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and national park, wildlife corridor, water bodies, human settlements and other ecological features.	Refer Page No. 40-74 in Chapter No. III of EIA report.
v.	Land use plan of the mine lease area should be prepared to encompass pre operational, operational & post operational phases.	Refer Table no.3.18(C) Page No.69 in Chapter No. III of EIA report.
vi.	Details of the land for OB dump outside the mine lease, if any should be given. It should inter alia include extent of land area, distance of mine lease, its land use, R&R issues, if any should be given.	About 1.80 hect. outside the lease area is proposed for waste dump which will be converted into plantation up to the end of lease period. There are no R&R issues regarding land use.
vii.	Location of National parks, Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant reserves (existing as well as proposed), if any within 10 km of the mine lease should be clearly indicated. Necessary clearance, if any, copy furnished. A location map duly authenticated by Chief Wildlife Warden should also be provided in this regard. Necessary clearance, if any, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above should be obtained from the State Wildlife Department/ Chief	Not required as no National parks, Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant reserves. Protected forest exists outside the lease area. Total 15 reserve forest exists within 10 kms radius given in Table -3.14. on Page no. 61

	Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.	
viii.	A detailed biological study for the project[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 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 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.	Plz. Refer Page No. 40– 74 in Chapter No. III of EIA report. Authenticated list of flora & fauna is annexed as Annexure No. I
ix	Mining method i.e. bench height formation and advancement of mine, stage-wise should be discussed in the EIA report.	Opencast manual method is used for mining. Minimum 6m width and 6m height of bench are maintained. Detail given on page no. 35 of Chapter-II.
x	Steps proposed to prevent land slide should also be given in the EIA.	The rocks are usually hard & are likely to remain stable & it will not slide .To check minor debris slides, stabilization of the slopes will be done at regular intervals.
xi.	Impact of change of land use particularly agriculture land & gaucher/ grazing land if any.	No change in landuse as no agriculture land & gaucher / grazing land exists within the lease area.
xii.	R&R plan / compensation details for the project affected people. While preparing the R&R plan, the National Rehabilitation & Resettlement Policy should be kept in view.	R&R plan/compensation not proposed as there is no displacement of peoples.
xiii.	Collection of one season (non-monsoon) primary baseline data on ambient air quality, water quality, noise level, soil and flora and fauna. Site-specific meteorological data should also be collected. The location of the monitoring stations should be justified. Date wise collected baseline AAQ data should form part of EIA and EMP report.	Details given on Page-49 to 57 of chapter-III. Locations of the monitoring stations are taken as per the prevailing wind direction during the study period. Prevailing wind direction is given on in Fig. No. 3.3 Page no. 49
xiv.	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 into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be	The details of the air quality modeling and GLC contours are given in the respective Fig. No.3.3 & 3.3 A on page no.49 Wind rose for three month Viz: April 09, May 09 & June 09 in Fig 3.4 on Page No. 56 of EIA report.

	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.	
xv.	The water requirement for the project, its availability and source to be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should also be indicated.	Total 6 KLD water will be required which Bagandhar, Kofota and Tatarika which is within 5.00 km from lease area. Plz Refer Page No.36, chapter -II of EIA report for detailed water balance.
xvi.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.	Not Required as water will be made available from outside the lease area .
xvii.	Details of water conservation measures proposed to be adopted in the project.	This project consumes the minimum possible fresh water for its drinking (0.50 KLD) purpose. Total consumption will be 6 KLD which will be brought from Bagandhar, Kofota and Tatarika which is within 5.00 km from lease area. During monsoon, the rain water will get collected in the mine pit and it will be used for mining purpose. It shall not be pumped and disposed.
xviii.	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.	No impact on surface as well as ground water because no waste water will be discharged due to mining and mining will be restricted above ground water.
xix.	Based on actual monitored data, it may clearly be shown whether working will intersect ground water. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed hydro geological study should be undertaken and report furnished.	The ground water table(1500 mRL), which is 366 m depth from lower point (1866 mRL) and will be not encountered as ultimate working point will be 1930 and 1880 mRL from top level(2042 mRL). Plz. Refer Conceptual plan, plate no.5.
xx.	Details of first order stream, if any passing through lease area & modification/diversion proposed, if any and the impact of the same on the hydrology should be brought out.	No first order stream is passing through the lease area.
xxi.	Details of rainwater harvesting proposed, if any, in the project to be provided.	At the end of mining operations a sizeable area will remain a void, which will be developed into a number of reservoirs for Rainwater Harvesting, which will have a positive impact on the ground water scenario. Plz. Refer Page No. 81 in Chapter No. IV of EIA report.
xxii.	Information on site elevation, working depth, groundwater table should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	The ground water table(1500 mRL), which is 366 m depth from lower point (1866 mRL) and will be not encountered as ultimate working point will be 1930 and 1880 mRL from top

		level(2042 mRL). Schematic diagram showing site elevation, working depth, groundwater table given on page no. 82 Chapter No. IV of EIA report.
xxiii.	Quantity of solid waste generation to be estimated & details for its disposal and management be provided. Details of backfilling proposed, if any, should also be given. It may be clearly indicated that out of the total waste generation during the mine life, the quantity to be backfilled & the quantity to be disposed off in the form of external dump (No. of dumps, their height, terraces etc.).	Generation of waste will be maximum of 60,000 tonnes per year. During the next five year period, the quantity of waste generated will be about 22500 tonnes. No backfilling is proposed. Waste dump area 1.80 hect. is outside the lease area.
xxiv.	The reclamation plan, post mine land use and progressive greenbelt development plan shall be prepared in tabular form (prescribed format) and submitted.	Plz. Refer Table No.5.1 & 5.2, Page No. 91 & 92 in Chapter No. V of EIA report.
xxv.	Impact on local transport infrastructure due to the project. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) and whether it is capable of handling the increased load. Arrangement for improving the infrastructure, if contemplated including action to be taken by other agencies such as State Government, if any, should be covered.	Not much impact on local transport. Increase in traffic density is negligible and capable of handling and increased load. State govt. conduct traffic census regularly and take action accordingly. However monitoring of traffic density is given on Page No. 57-58 of EIA report & Fig. 3.3.
xxvi.	Details of the infrastructure facilities to be provided for the mine workers.	Office cum store exists near the mine site. It is well equipped with first aid box, safety equipments like helmets, safety boot & belt given on page no.102 in chapter V of EIA report.
xxvii.	Conceptual post mine land use and Reclamation & Rehabilitation of mined out area (with plans and with adequate number of sections).	Conceptual post mine land use and reclamation and rehabilitation of mined out area given in Table no.5.1 & 5.2 on Page113 respectively and shown in Conceptual Plan with sections, as Plate-5
xxviii.	Phase-wise plan of greenbelt development, plantation & compensatory afforestation clearly indicating the area to be covered under plantation & the species to be planted.	Details given on Table 5.1, 5.3 & 5.4, Page-91, 94 & 95 respectively.
xxix.	Occupational health impact of the project. Details of pre-placement medical examination & periodical medical examination schedules should be incorporated in the EMP.	No negative impact on health is anticipated due to this mining project. Occupational Surveillance Programme will be regularly conducted to monitor health of workers & health camps will be organized for the surrounding villagers from time to time.
xxx.	Measures of socio economic influence to the local community proposed to be provided by project proponent. As far as possible,	The project proponent will look after the peripheral area for development & help in providing rural employment. Village

	quantitative dimension to be given.	Bhimgoda will be adopted for social welfare & about 5 lac amount will be spent for development of the local villagers viz: - Construction of school room, playground - Handpump etc. Detail is given on Page No. 86.
xxxii.	Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia also include the impact due to change of land use, due to loss of agricultural land and grazing land, if any, besides other impacts of the projects. The EMP specifically address the issues of dust handling and management.	Since mining is proposed in Private Land so no such negative impact is anticipated. Details given on Page -89 to 108.
xxxiii.	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same.	Yet to be conducted.
xxxiiii.	Any litigation pending against the project and /or any direction /order passed by any Court of Law against the project, if so, details thereof.	There is no litigation pending against the project.
xxxiv.	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	Capital Cost – 10.00 lac Recurring cost– 0.50 lac/annum EMP Recurring Cost – 3.50 lac

DISCLOSURE OF THE CONSULTANT :

1.	EIA CARRIED OUT BY	M/S UDAIPUR MIN-TECH PVT. LTD.
2.	MINING PLAN	SH. R. S. SINGH, B.E. in Mining Engg., A.I.S.M. RQP No. RQP/DDN/101/96A
3.	EIA COORDINATION	SH. S. S. BIST, M.SC.(GEO.),M.TECH(APPLIED GEO.) PG DIPLOMA IN ENV. & ECO.,RQP(IBM)
4.	EIA REPORT	MS MAMTA JHA, M.SC.(ENV. SCIENCE) MR. D.S. RATHORE, M.SC.(ENV. SCIENCE)
5.	SAMPLING & ANALYSIS OF ENVIRONMENT PARAMETERS	M/S SAN ENVIROTECH PVT. LTD. AHEMDABAD(LAB APPROVED UNDER EPA 1986)

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CHAPTER – I

HIGHLIGHTS OF THE MINE

1.1 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.

1.2 PROJECT SETTING

Originally, the lease was granted for a period of 20 years from 07.04.1984 to 06.04.2004 over an area of 8.50 Hect. The lease was further renewed over an area of 8.50 Hect. for next 20 years on dated 15.03.2005 for period 07.04.2004 to 06.04.2024.

As per New EIA Notification Dated 14th Sept. 2006, Environmental Clearance is required at the time of renewal of mining lease & enhancement of production where in the area is 5.00 hect & above .

Therefore lessee has submitted application (Form-I) for prior environmental clearance(EC) under renewal of mining lease to MoEF, New Delhi on dated 07.02.2008 and MoEF, New Delhi release TOR, vide order no. J-11015/77/2008-IA.II(M) dated 23rd September, 2008 for preparation of an Environment Impact Assessment (EIA) Report in respect of the project.

1.3 BACK – GROUND OF THE PROMOTERS

The project, Bhimgoda Limestone Mine is promoted by Smt. Satya Tomar who is well qualified and has an excellent knowledge of mining and mineral trading for more than 25 years.

1.4 REASON FOR PREPARING ENVIRONMENTAL MANAGEMENT PLAN

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 so 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 Environmental Impact Assessment Notification, 2006.

Year – wise production details since 1994 onwards and clearly stating the highest production achieved in any one year prior to 1994 given in tabular form as below.

**TABLE 1.1
YEARWISE PRODUCTION**

YEAR	LIMESTONE (IN TONNES)
1994-95	3507.80
1995-96	7653.30
1996-97	47366.00
1997-98	62347.80
1998-99	73654.40
1999-2000	68860.70
2000-01	65225.80
2001-02	71796.40
2002-03	52172.80
2003-04	49885.50
2004-05	45834.60
2005-06	53527.32
2006-07	40874.00
2007-08	34729.60

1.5 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 prepare a proper rehabilitation package for those affected.
- * 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.

1.6 LOCATION AND COMMUNICATION

1.6.1 Location

The lease area is situated near village- Kamroo, Tehsil- Paonta Sahib, District- Sirmour (H.P.). The mining lease is located about 39 Km. from Paonta Sahib and 1.5 Km. from Tilordhar. The District Headquarter Nahan is about 89 Km far from mine area. Mine is situated between latitude 30° 36' 37" to 30° 36' 49":: longitude 77° 40' 38" to 77° 40' 54".

The area is covered in Survey of India Toposheet no. 53 F/10.

1.6.2 Communication

Road link

Mining lease area is about 1.5 km from PWD road at Tilordhar. There is private road from the lease area to Tilordhar. The lease area is approachable by tar road from Paonta Sahib to Sataun – Shillai route. The distance of Paonta Sahib to Sataun is 21 Km & from Sataun to lease area is 17 Km & total 38 Km from Paonta Sahib. The town Sataun, which is the nearest population center from the lease area, is connected with other important towns and cities through a good network of roads with regular public transport services.

Rail link

The mine area is not conveniently accessible from rail and the Nearest Railway station is Dehradun at distance of 90 km. from lease area.

Air link

The nearest airport facilities is available in Jollygrant which is about 98 Kms far from mine.

1.6.3 Basic Amenities

Power

The mine will work in one shift (i.e. general shift) only, so no lighting arrangement will be required. At present, there is no electric supply. However guard for office will be provided with gas petromax lamps & torches.

Amenities

The nearest police station at Rajban, tehsil headquarter is at Paonta Sahib at a distance of 38 kms & Dist. headquarter at Nahan, which is about 89 Kms from mine.

The Controlling office of Deptt. of Mines is at Nahan, which is 89 Kms from mine.

Nearest Post Office with telephone facility is in village Satoun which is 17 kms from the lease area.

No water supply system exists in the area. Drinking water and water for other purpose is brought from water spring outside the lease area. Drinking water stored in clean covered earthen pots and kept near working faces.

1.7 MARKET POTENTIAL

The limestone exploited from the mine is suitable for cement, chemical, sugar industry and for limekiln.

1.8 ENVIRONMENTAL IMPACT ASSESSMENT REPORT

M/s Udaipur Min – Tech Pvt. Ltd. was assigned the job of conduction of rapid EIA/EMP report of the proposed Bhimgoda Limestone Mine near village Kamroo, Tehsil – Paonta Sahib in Sirmour Dist, owned by Smt. Satya Tomar, At & Post– Paonta Sahib, Dist – Sirmour (HP).

The study was conducted within 10 Km radius from the proposed mine as centre. The base line data collection involves the data of air quality, water 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 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.

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CHAPTER – II

PROJECT DESCRIPTION

(The information incorporated in this Chapter regarding mining is taken from Approved Mining Plan).

2.1 REGIONAL GEOLOGY

i) Topography & Drainage :-

The lease area is situated in Bagandhar mining area. The area under reference is marked by topography which is rugged and mountainous with highest point at 2042 mRL and 1866 mRL lowest. The lease area is marked in the south-eastern slope of the NE-SW trading Bhingoda ridge. Rectangle shape of lease area stretch between Grid line E 00 – E 500 and N 00 – N 400. A dry khala flows through the lease hold area and it originate from 1970 mRL near the crossing point of Grid line E 300 and N 200. There is an another small dry khala towards south outside of lease area, it flows approximately west to east direction. Aforesaid two khalas collect the rain water from lease area and drain its water through Shamahal ka khala into Tons river. The area exhibits typical Limestone surface features such as elephant skin weathering, caves and cavities. Soil thickness, which is scattered at places, is less than 15 cms avg. weathering imparts white chalky look to the rocks rendering the horizon identifiable from a distance.

ii) Regional Geology and Local Geology :-

REGIONAL GEOLOGY:

Regionally the area under reference belongs to the main part of the lesser Himalayas and falls in the North-West edge of the Niglidhar range. Earlier the Krol belt was first investigated by H.B. Meddicot in 1864, J.B. Andrews in 1934 and West in 1939. Subsequent contribution has been made by Pandey and Kedar Narain (1967), Ranga Rao (1968) and Valdiya (1970). The rocks belonging to Krol series, in order of their supreme position is given below.

It falls in the Infra Krol and Krol series of Pre carboniferous age. The krol formation in this region is underlain by the mandhali, Chandpur, Nagthat, Blaini and Infra Krol formations and overlain by the Tal formation. The Krol formation is divided into five litho stratigraphic Krol E, Krol D, Krol C, Krol B and Krol A. J. B. Auden (1934) classified the Krol Formation into six units on the basis of distinct lithology, as given below:

TABLE : 2.1
REGIONAL GEOLOGICAL SET UP OF THE AREA

	Lithology
Tals	Upper Tal Lower Tal
Krol E	Grey Limestone, Dolomitic Sandy Limestone & Shale in upper part.
Krol D	Compact grey, Dirty white and pinkish limestone certain bands are highly siliceous and shows elephant skin weathering.
Krol C	Dark grey to black thinly jointed limestone with thin ferruginous stained calcareous shale white, dirty white to greyish at places, crushed crystalline limestone.
Krol B	Crushed puckered, red, green and bleached shale bands and lenses Of grey and dirty white massive dolomitic limestone
Krol A	Thinly bedded compact greyish calcareous shale, ferruginous stained, crushed carbonaceous shale.
Krol Sand Stone	--Ortho-quartzite's, unconsolidated sands etc.

Structure of the krol Belt in this region is broadly represented by thrust – bound synclines of Krol rocks resting over a Jaunsar – shimla state foundation. Tectonic set up is marked by two northwards dipping major thrust and the Krol thrust. Along Nahan thrust the rocks of Nahan formations are overlain by Subathus. The Subathu rocks are in turn overlain by krol sequence along the Krol thrust. Auden (1934, 1937) considered the Krol belt as an allochthon transported along Krol – Tons thrust plane.

2.1.2 LOCAL GEOLOGY

The area forms the main part of the lesser Himalayas and falls on the North Western ridge of the Niglidhar range. It forms a part of the Krol belt and rock formation belonging to Krol B, Krol C & Krol D stage of Krol group. The geological data has been collected from the existing mine workings and area exposed by cuttings done for road construction and the adjacent mine faces. The sequence of various mapable litho-units is given as under:

**TABLE : 2.2
LOCAL GEOLOGY**

Dolerite Dyke	
Silt Stone, Shale	
Limestone	High Grade Limestone
	Medium Grade Limestone
	Low Grade Limestone
	Dolomitic Limestone(Siliceous)
Krol thrust	

Structure :

In the south-eastern part of lease area there is a fault with NW side being the down throw side. The general strike of the formation is along N 65° E – S 65° W to N 72° E – S 72° W direction. The dip at angle varying from 32° to 36° towards North-West. The shale band dips towards north at an angle of about 32°.

Control of Mineralization :

Limestone mineralization is occurring between dolomite limestone on hanging wall side and red shale on foothill side.

Effects of weathering:

The effect of weathering is not very prominent, except for the formation of joint planes. The spaces between these joint planes are mostly filled with clay and soils.

Nature of wall rocks:

The Limestone is exposed on the surface underlain by dolomite.

Physical and chemical characteristic of limestone:

Two grades of limestone containing limestone and dolomitic limestone are available within the lease-hold area. Physically, i) Limestone occurs in mine is dark grey to black in colour, hard compact and massive. It gives sulphurous smell on hitting with hammer and also gives effervescence when treated with acid. ii) The Dolomitic Limestone is gray to dirty white and massive. Its hard and medium grained, certain bands are highly siliceous and show elephant skin weathering. Details chemical analysis of Dolomitic Limestone & all three grade of limestone are given in para 3.2.4.

2.2 EXPLORATION

2.2.1 Topographic Survey :

These consisted of topographic survey over the entire area of mining lease. The lease area has been subjected to manual mining breaking up part of the area into manual quarries. Spot levels have been marked on the lease area as well as quarry floor and along the bench tops. All other available surface features plotted on the map prepared on scale of 1:1000. The topographic map so prepared is presented as plate no.3(Surface Plan).

2.2.2 Geological Mapping :

Geological mapping was undertaken on a scale of 1:1000 using the topographic map as described above. Within the limited confines of the mining lease and its immediate surrounding the litho-types present are the limestone belonging to the Krol Formation . All the limestone outcrops within the lease area have been properly marked and plotted. Attitude of the (dip & strike) have been marked wherever discernible.

The geological plan & geological sections have been prepared on scale of 1:1000 with the topographic details as the during year 2005-06 and updated on Nov. 2008. The map so prepared are presented as Plate No.4A & 4B.

Exploration and mining: Exploration and mining in the lease area since 1984 cover entire mineralized zone. There are number of old pits/Query covering a total area of about 1.5 hectare and are located between 2000mRL to 1880 mRL. Two old road are also in lease area. Present working of limestone exists within grids E100 - E200 and N100 – N200 at 1934 mRL to 1942mRL.

For the purpose of planning they are divided in two blocks A and B namely. The block A is from boundary line AB to section line dd' and block B is from section line dd' to boundary line CD. There are two benches at level 1906 mRL and 1924 nRL., in Block A, the present working is going on at 1934 mRL. In block B the material exploitation have been done in unsystematic manner by local people, which is at present closed. Since few months back, the lessee has started to work mining herself.

2.2.4 Sampling & Analysis:

Samples were collected from working pit and out crops. The detailed analysis was done by private agency as given below:

TABLE 2.3
CHEMICAL ANALYSIS

Chemical Constituent %	Limestone	Dolomitic Limestone
LOI	44.01	44.58
CaO	51.87	39
MgO	3.25	8.25
R ₂ O ₃	0.6	1.05
Insoluble	0.48	0..28

2.2 ESTIMATION OF RESERVES

The following facts and assumptions are taken in to account while calculating the reserves. UNFC guide lines have been observed.

- (a) Cross-sectional method of estimation of reserves has been adopted for calculation of reserves.
- b) Eight cross sections from a-a' to h-h' at regular interval of 50 meters have been plotted in N – S direction. However in case of end sections the influence length has been taken upto the lease boundary.
- c) The reserves in the proved category have been taken upto the lowest exposure (on lease boundary) of the limestone under UNFC guide lines by drawing a line parallel to base line.
- d) The average bulk density of Limestone is considered as 2.5.
- e) Mineable reserves based on (proved+probable reserves) have been taken as 95% for limestone and 90% for dolomitic limestone of the total geological reserves.
- f) The Probable and Possible reserves have been calculated to a further depth of 10 meters each below proved reserves considering geological set up and the limestone exposures in the adjoining areas.
- g) 5%(for limestone) and 10%(for dolomitic limestone) allowance has been given for voids, gangue, cracks & joints accounting error which may occur within the deposit.
- h) Recoverable reserves have been taken as 95%(for limestone) and 90%(for dolomitic limestone) of geological reserves and UNFC guide lines followed.
- i) The mineral appears to be uniformly distributed in the deposit therefore no variation has been considered in the configuration and lithological sequence.

Geological reserves and grade:

On the basis of the facts and assumptions as described above, the proved, probable and possible reserves of Limestone have been calculated as given in Table below. A reduction of 5% has been made from the geological reserves on account of gangue/ waste material, voids and other geological factors; another 5% wastage has been considered due to unrecoverable fines and mining

losses. A summary of the geological reserves and recoverable reserves taken as 95%(for limestone) and 90%(for dolomitic limestone) of geological reserves is given hereunder in table.

Table – 2.4(A)
Detail Category Reserve
Dolomite Limestone
Proved

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	65	1188	77220	2.5	193050	173745
b – b'	50	2470	123500	2.5	308750	277875
c – c'	50	4906	245300	2.5	613250	551925
d – d'	50	11287	564350	2.5	1410875	1269787
e – e'	50	5050	252500	2.5	631250	568125
f – f'	50	1180	59000	2.5	147500	132750
g – g'	50	2750	13750	2.5	343750	309375
h – h'	52	2194	114088	2.5	285220	256698
Total					3933645	3540280

Table – 2.4(B)
Dolomite Limestone
Probable

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	-	-	-	-	-	-
b – b'	-	-	-	-	-	-
c – c'	50	35	1750	2.5	4375	3937
d – d'	50	400	20000	2.5	50000	45000
e – e'	50	350	17500	2.5	43750	39375
f – f'	-	-	-	-	-	-
g – g'	-	-	-	-	-	-
h – h'	-	-	-	-	-	-
Total					98125	88312

Table – 2.4(C)
Dolomite Limestone
Possible

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	-	-	-	-	-	-

b – b'	-	-	-	-	-	-
c – c'	-	-	-	-	-	-
d – d'	50	300	15000	2.5	37500	33750
e – e'	50	350	17500	2.5	43750	39375
f – f'		-	-	-	-	-
g – g'	-	-	-	-	-	-
h – h'	-	-	-	-	-	-
Total					81250	73125

Table – 2.5(A)
Limestone (Proved)

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	80	7310	584800	2.5	1462000	1315800
b – b'	50	6655	332750	2.5	831875	1748687
c – c'	50	5950	297500	2.5	743750	669375
d – d'	50	7165	358250	2.5	895625	806062
e – e'	50	10669	533450	2.5	1333625	1200262
f – f'	50	12956	647800	2.5	1619500	1457550
g – g'	50	12624	631200	2.5	1578000	1420200
h – h'	80	18295	1463600	2.5	3659000	3293100
Total					12123375	10911037

Table – 2.5(B)
Limestone (Proable)

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	80	1630	130400	2.5	32600	29340
b – b'	50	1800	90000	2.5	225000	202500
c – c'	50	1860	93000	2.5	232500	209250
d – d'	50	1550	77500	2.5	193750	174375
e – e'	50	1770	88500	2.5	221250	199125
f – f'	50	1500	75000	2.5	187500	168750
g – g'	50	1480	74000	2.5	185000	166500
h – h'	80	1320	105600	2.5	264000	237600
Total					1541600	1387440

Table – 2.5(C)
Limestone (Possible)

Section line	Influence in meter	Area in Sq.m	Volume cu.m	Bulk Density	Quantity (Tonnes)	Recoverable Reserve (Tonnes)
a – a'	80	1550	124000	2.5	290625	261562

b – b'	50	1750	87500	2.5	218750	196875
c – c'	50	1900	95000	2.5	237500	213750
d – d'	50	1650	82500	2.5	206250	185625
e – e'	50	1770	88500	2.5	221250	199125
f – f'	50	1450	72500	2.5	181250	163125
g – g'	50	1420	71000	2.5	177500	159750
h – h'	80	1250	100000	2.5	250000	225000
Total					1783125	1604812

**TABLE 2.6
GEOLOGICAL RESERVES**

Category	Proved	Probable	Possible	Total
Dolomitic Limestone	3933645	98125	1250	4033020
Limestone	12123375	1541600	783125	14448100

Source : Approved Mining Plan

Figures in tonnes

Total reserves of all types of limestone of all category = 18481120 tonnes

**TABLE 2.7
RESERVES AS PER UNFC CLASSIFICATION IS GIVEN BELOW**

UNFC CODE	Recoverable Reserve(in tonnes)
111	14451317
122	1475752
Total	15927069

Source: Approved Mining Plan

**TABLE 2.8
Recoverable Reserves**

Taken as 90% (for dolomitic limestone) and 95%(for limestone) of geological reserves under UNFC Guidelines.

Category	Dolomitic Limestone (In tonnes)	Limestone (In tonnes)
Proved	3540280	10911037
Probable	88312	1387440
Possible	73125	1604812
Total	3701717	13903289

Source: Approved Mining Plan

Figures in tonnes

Total Mineable Reserves

The minable reserves have been calculated bench wise. The area between two successive benches have been averaged out and multiplied by bench height i.e. 6m for calculating volume. Volume obtained has been multiplied by the

bulk density (2.5) to calculate quantity in tones. The recovery factor is 90% of the excavation of dolomitic limestone and 95% in case of limestone (See Table No.-3). The materials constituting the remaining 10% in case of dolomite limestone and 5% in case of limestone will be treated as mineral waste and mining losses.

Table -2.9

Bench (in mRL)	Minerable Reserve (in situ)		Recoverable Reserve	
	Dolomitic Limestone (in Tonnes)	Limestone (in Tonnes)	Dolomitic Limestone (in Tonnes)	Limestone (in Tonnes)
2036	7338	-	6604.20	-
2030	10050	-	9045	-
2024	33000	-	29700	-
2018	37000	-	33300	-
2012	39000	-	35100	-
2006	42000	-	37800	-
2000	153000	-	137700	-
1994	142500	-	128250	-
1988	133875	297115	120487.50	282259.25
1982	129000	13770	116100	13081.50
1976	129000	76500	116100	72675.00
1970	144600	77670	130140	73786.50
1964	129000	149073	116100	141619.35
1958	113400	202100	102060	191995.00
1952	57750	680174	51975	646165.00
1946	47250	297562	42525	282683.90
1940	23625	284825	21262.50	365583.75
1934	-	315525	-	299748.75
1928	-	41775	-	391186.25
1922	-	425625	-	404343.75
1916	-	422250	-	401137.50
1910	-	446100	-	423795.00
1904	-	431775	-	410186.25
1898	-	329475	-	313001.25
1892	-	369150	-	350692.50
1886	-	340275	-	323261.25
1880	-	328725	-	312288.75
Total	1371388	5999464	1234249.20	5699490.80

Grade

Surface exposures and past mining over the last 25 years show two types of Limestone available in the deposit viz. Limestone and Dolomitic Limestone.

During the mining process it has been observed that the grade of limestone is almost similar in each of the pits. The limestone samples were tested at the consumer end on behalf of the suppliers and accepted for grade and quality. The top layer are Dolomitic limestone which is locally known as “Bhatta”

To obtain best values for the product, hand sorting at the mines and loading point is resorted to segregate the mineral into waste, “Bhatta” grade, sugar grade and chemical grade material. The chemical industry does not accept much variation and has narrow range of specifications, CaCO₃ content less than 90% is not acceptable. Therefore second stage hand sorting will be done while loading from stock yard at Satoun.

End Use Grade

The chemical analysis of Limestone required for industries suiting the mineral produced at this mine are given in the table below :

TABLE 2.10(A)
GRADE OF LIMESTONE

Industries	CaCo3	MgO
“Bhatta” (Lime grade)	< 80%	> 5%
Sugar Industry	90 – 92 %	> 5%
Chemical grade	96 – 98 %	≤1%

The Limestone of this mine will fit into sugar industry grade and chemical grade considering the chemical content of the mineral. Some quantities which are crystalline and whitish in color may find use in making marble chips used for flooring and other decorative works which fetch much higher prices. IBM has fixed threshold values of Limestone to be considered as rejects for Northern states as given below:

TABLE 2.10(B)
GRADE OF LIMESTONE

CaO	34%(Min)
MgO	4%(Max)
SiO ₂	18%(Max)
Alkalis	0.5%(Max)

Therefore, Limestone conforming to above specifications shall be considered as reject and used for constructing retaining walls, parapet walls, check dams etc.

MINEABLE RESERVES OF THE MINE.

The mineable reserves have been calculated bench wise from the ultimate pit plan drawn at an ultimate pit angle of 45° i.e. by developing the benches of 6m x 6m. The reserves calculated in the mineable category have been calculated after leaving a minimum boundary pillar of 7.5 m all along the lease boundary & mining waste (10%). Benches have been marked after fresh geological survey and mineable reserves have been calculated after. The reserves comes out to be as follows.

Total Geological Reserves (all grades) = 18481120 tonnes

Total Mineable Reserves

Dolomitic Limestone = 1371388 tonnes

Limestone = 5999464 tonnes

Total Recoverable Reserves

Dolomitic Limestone (90%) = 1234249.20 Tonnes

Limestone (95%) = 5699490.80 Tonnes

2.3 MINING PROCESS : (Refer Plate No.3)

Extraction of Limestone is proposed to be carried out by Opencast manual method with the help of drilling and blasting. Minimum 6 m width and height 6m shall be maintained. The mining shall be done from top at 2041mRL to downward by making the top bench at 2006 mRL. The orientation of benches will be East to West direction. Jack hammer will be used to drill

blast holes about 1.5 meter depth and will be blasted by BEL-MX 90%, ordinary fuse and plain, detenor. The blasted material will be sorted and loaded into trucks manually and transported to stack yard at Satoun. For development of mine Bulldozer will be hired for certained period as required. The top soil will be kept separately on benches to be utilized for plantation. The waste generated will be dumped in dump yard, which is near boundary pillar B.

The benches will be opened through a box cut. This box cut advances all around. The ultimate slope of pit will be kept at 45°. The side of excavation shall be adequately benches shaped and secured as to prevent danger from fall of sides as per Regulation 106 of the Metalliferous Mines Regulations 1961.

2.4 YEAR WISE DEVELOPMENT FOR THE ENSURING FIVE YEAR PERIOD.

Mining operations have been going on in the deposit for almost 25 years now.

Quantum of development and tonnage and grade of production expected as in table below:

TABLE 2.11
Development Activity

Sr. No.	Activity	Year				
		1 st	2 nd	3 rd	4 th	5 th
1.	Check dam of size 10 x 1.5 x 1.5	2 No.	1 No.	1 No.	1 No.	1 No.
2.	Parapet wall of size 1m x 1m	100m	100m	100m	-	-
3.	Retaining wall of size 1.5m x 1m steel wire crate filled with stone boulder for dump yard	50m	50m	50m	50m	-
4.	Toe wall 1m x 1m (dry stone masonry)	-	50m	-	50m	-
5.	Garland drain size 0.6 x 0.7m	-	60m	-	-	40m
6.	Drainage 0.5 x 0.5m	200m	200m	200m	200m	200m
7.	Road constructaion 1960mRL to 2024 mRL	300m	300m	-	-	-

Production details of 5 year

1 st	- 54756 Tonnes
2 nd	- 60018 Tonnes
3 rd	- 60015 Tonnes
4 th	- 60110 Tonnes
5 th	- 60000 Tonnes

Development work

1. Check dams: 10 x 1.5 x1.5 (steel wire crate) at dry khalla below dump yard.
2. Garland drain of size: 0.6 x 0.75 constructed in eastern and western side of dump yard. 60+40m length during 2nd and 3rd year.
3. Drainage on benches and on boundary CD, AB and road to divert rain water, size : 0.5 x 0.5.
4. Parapet wall 300m length of stone masonry, size 1m x 1m along road benches.
5. Toe wall: (dry stone masonry) at dump yard 200m length 100m size 1m x1m.
6. Retaining wall; around dump yard 200m length 1.5m x 0.1m of wire filled with stone.

Development in Waste :

Since there is no overburden in the limestone deposit, the waste shall be basically dolomitic limestone rejects and some limestone fines, which cannot be loaded into the dump trucks. Considering all the factors in practical mining about 5% waste will be generated in excavation of limestone and 10% waste will be generated in excavation of dolomitic limestone. Therefore, yearly generation of waste will be maximum of 60,000 tonnes per year. During the next five year period, the quantity of waste generated will be about 22500 tonnes. Part of these waste or rejects shall be utilized in construction of retaining wall, parapet wall, parapet and check dams.

2.5 PRODUCTION PLAN FOR NEXT FIVE YEARS

Mine workings are open cast. Mining will be carried out in different bench within main pit as per the proposed following production schedule.

TABLE 2.12(A)
1st YEAR PRODUCTION PLAN

Period	Name	Level (in mRL)		Opening reserves in tones	Exploitation (in tones)	Closing balance (in tones)
		From	To			
1 ST Year	Incidental ROM by road Dolomitic L/S	-	-	-	18000	-
	Limestone	1940	1934	299748	5985	293763
	Limestone	1934	1928	391186	17100	374086
	Limestone	1922	1916	401137	13680	387457
	Total				54765	

TABLE 2.12(B)
2nd YEAR PRODUCTION PLAN

Period	Name	Level (in mRL)		Opening reserves in tones	Exploitation (in tones)	Closing balance (in tones)
		From	To			
2 nd Year	Road construction 1982mRL to 2024mRL 300m Dolomitic L/S	-	-	-	18000	-
	Dolomitic L/S	2042	2036	6604	6470	134
	Dolomitic L/S	2036	2030	9045	8775	270
	Dolomitic L/S	1970	1964	116100	5400	110700
	Limestone	1934	1928	391186	13253	377933
	Limestone	1910	1904	410186	8120	402066
	Total				60018	

TABLE 2.12(C)
3rd YEAR PRODUCTION PLAN

Period	Name	Level (in mRL)		Opening reserves in tones	Exploitation (in tones)	Closing balance (in tones)
		From	To			
	By Road construction	-	-	-	1000	-

3rd Year	Incidental ROM of Dolomitic L/S					
	Dolomitic L/S	2030	2024	29700	12690	17010
	Dolomitic L/S	2018	2012	35100	8000	27100
	Dolomitic L/S	2012	2006	37000	8875	28125
	Limestone	1976	1970	737865	9025	647615
	Limestone	1970	1964	110700	9025	101675
	Limestone	1964	1958	191995	5700	186295
	Limestone	1958	1952	646165	5700	540465
Total				60015		

TABLE 2.12(D)
4th YEAR PRODUCTION PLAN

Period	Name	Level (in mRL)		Opening reserves in tones	Exploitation (in tones)	Closing balance (in tones)
		From	To			
4 th Year	Dolomitic L/S	2042	2036	134	134	-
	Dolomitic L/S	2036	2030	270	270	-
	Dolomitic L/S	2030	2024	17010	675	16335
	Dolomitic L/S	2024	2018	33300	20025	13275
	Dolomitic L/S	2018	2012	35100	5060	30040
	Dolomitic L/S	2012	2006	32800	5060	32740
	Dolomitic L/S	2006	2000	137700	8460	129240
	Limestone	1964	1958	186295	9025	177270
	Limestone	1952	1946	282683	5700	276983
	Limestone	1946	1940	365583	5700	359883
Total				60110		

TABLE 2.12(E)
5th YEAR PRODUCTION PLAN

Period	Name	Level (in mRL)		Opening reserves in tones	Exploitation (in tones)	Closing balance (in tones)
		From	To			
5 th Year	Dolomitic L/S	2024	2016	13275	12375	900
	Dolomitic L/S	2006	2000	129240	9450	119790
	Limestone	1958	1952	676165	17457	658708
	Limestone	1940	1934	293763	8550	285213
	Limestone	1916	1910	423795	12160	411635
Total				59992		

2.6 PROPOSED RATE OF PRODUCTION & LIFE OF MINE

Proposed Rate of Production :

During the next five year period of mine working, the proposed rate of production will be 60000 tonnes per annum. Since the leasehold area is already under operation, the mine is fully developed to meet the targeted production of 60000 tonnes per annum.

The mining work will be carried on 270 days in the year i.e. average 25 working days in a month during day light hours only, barring the period of heavy monsoon rains. The mine will have a life of 115 years at proposed rate of production.

Life Of Mine :

1. Mineable reserves (including limestone)	=	6900000 tones
2. Mineral to be mined in next five years	=	3,00,000 tones
3. Remaining reserves at the end of plan period	=	6600000 tones
4. Rate of production per year	=	60000 tones
5. Life of mine at the end of plan period	=	110 years
6. Total life of the mine	=	115 years.

2.7 EXTENT OF MECHANISATION

Manual mining is carried out by opencast method. Only compressors and jackhammers are used for drilling. Proposed production in mining plan period is 60000 tons per annum. The machinery required to meet out the proposed production will be guided by the yearly production.

TABLE 2.13
TYPES OF MACHINERY AND EQUIPMENT REQUIRED

Sr. No.	Name	Capacity	Number
1.	Air Compressor	300-350 cf/m	Two
2.	Jack Hammer (holeman)	20 kg	Four
3.	Drill Rod	0.5m., 1.5., 2m.	Ten
4.	4 x4 Wheel Truck	10 Ton	Ten

In addition to above a bulldozer is needed on the basis of as and when required.

2.8 USE OF MINERALS

The limestone exploited from the mine is suitable for cement, chemical, sugar industry and for limekiln. Its suitability has been established by ascertaining chemical characteristics of mineral and past experience in the market.

The chemical analysis of limestone required for various industries as given below:

**TABLE 2.14
CHEMICAL ANALYSIS OF LIMESTONE**

Industries	CaCO ₃	MgO
“Bhatta” (Lime grade)	< 80%	> 5%
Sugar Industry	90 – 92 %	> 5%
Chemical grade	96 – 98 %	≤1%

I.B.M. has fixed threshold values of limestone to be considered as rejects:

CaO	-	34%(Min.)
MgO	-	04%(Max.)
SiO ₂	-	18%(Max.)
Alkalis	-	0.5%Max.)

2.9 UTILITIES AND PROPOSED SITE FACILITIES

a) Power Supply:

No electric power supply is available at mine site. In future if electricity will require for lighting purpose then lessee will apply and get connection.

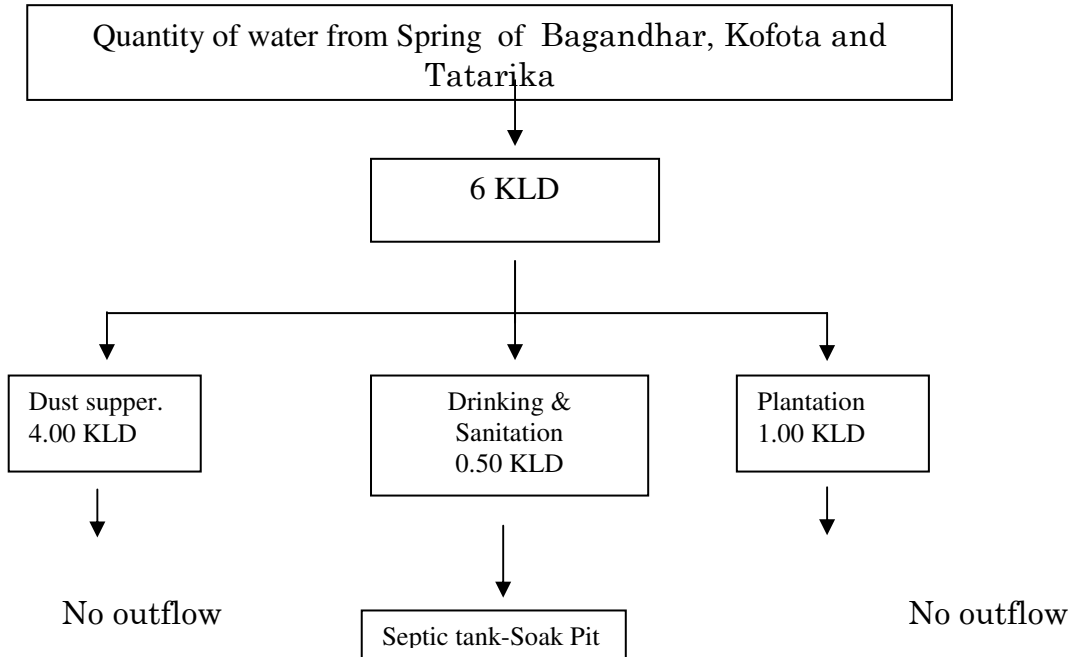
b) Water :

The mine has a peak water requirement of 6 KLD. Water requirement is made available from spring from Bagandhar, Kofota and Tatarika which is within 5.00 KM in lease area. The break-up of water consumption is given in Table –2.14 below :

**TABLE 2.15
PEAK WATER REQUIREMENT**

Purpose	Peak demand
Drinking and Sanitation	0.50 KLD
For Green Belt	1.00 KLD
Dust Suppression	4.50 KLD
Total	6.00 KLD

SCHEMATIC WATER BALANCE DIAGRAM



c) Man Power

Following persons will be employed as full time or part time employees when the mine will be at the desired level of production.

**TABLE 2.16(A)
LABOUR HIGHLY SKILLED**

Sr. no.	Designation	No.
1.	Mining Engineer(Degree holder under Rule 42 of MCDR 88	01
2.	Mines Manager(2 nd Class certificate under Reg. 34 of MMR 1961)	01
3.	Mine foreman(Certificate of competency)	01
4.	Mining Mate(Certificate of competency)	02
5.	Plantation & general Supervisor- Trained in plantation work	01
	Total	06

LABOUR – SKILLED, SEMI – SKILLED & UN SKILLED PROPOSED TO BE EMPLOYED .

The requirement of labour, Munshi, office clerk, machine and equipment operators such as compressor operator, drilling operator, dumper driver etc shall be as following:

TABLE 2.16(B)

Compressor Operators	2	Skilled
Magazine incharge	1	
Attendance clerk cum store keeper	1	
Loading supervisor	2	Semi-skilled
Compressor and driller helper	4	Un-skilled
Miners and loaders	50	
Afforestation crew	4	
Watchmen	1	
Total	65	

Thus 71 persons will get direct employment in mine. About 20 persons will get indirect employment (Truck driver, helper, canteen workers etc)

The service of following person/agency should be retained on part time basis.

1. Environment Consultancy Agency
2. Consulting Mining Engineer for Planting.
3. Mine Surveyor.
4. Geologist.

2.10 SITE FACILITIES (EXIST OR PROPOSED)

i) Office :

The Mine office is proposed to be construct near mine at suitable place, where all the records concerning mining operation shall be kept in proper manner.

ii) Workshop :

The mine is not proposed to be fully mechanized, hence there will be no need for separate workshop. However wheel mounted Compressor, dumpers & drill machines will continued to be serviced at Sataun. It is

proposed that few spanners & wrenches at kept at the mine office to attend an emergency.

iii) Power supply :

The mine will work in one shift(i.e. general shift) only, so no lighting arrangement will be required. At present , there is no electric supply. However office complex and watch and ward shall be provided Gas Petromax lamps and torches.

iv) Water supply :

No water supply system exists in the area. Clean and hygienic drinking water shall be arrange to provide at convenient accessible points in container as per MMR. Quantity of drinking water shall be 2 liters per person employed per day.

v) Rest Shelter :

There will be provision of rest shelter to take rest for workers as per specification given in MMR 61.

vi) Blasting Shelter :

Blasting shelter shall be provided to take shelter during blasting. It will be as per specification given in MMR 61 and circulars issued by safety department.

vii) Protective Equipments :

Helmet, Safety boots, Safety belt shall be provided to workers and stock of these item shall kept and maintained as per MMR 61.

The hutments for labors does not require as most of labors working at mine reside nearby villages.

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CHAPTER – III

EXISTING ENVIRONMENT SCENARIO AND THE BASE LINE DATA

3.1 INTRODUCTION

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 8.50 Hect. The buffer zone comprises a 10 km fringe around the core area.

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

3.1.1 Aspect Studied

As per the gazette notification dated 27th Jan. 1994 & 14th Sept. 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 Nov. '09, Dec. '09 & Jan. '2010.

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

Topography, Physiographic, Hydrological aspects, Atmospheric condition, Biological environment, Land use, Cropping pattern & Socioeconomic aspects.

3.1.2 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 Paonta Sahib Tehsil of Sirmour (HP) Dist. within 10 km. radius from the mine as center.

1. General Particulars :-

i) Latitude (N)	30° 36' 37"	:	30° 36' 49"
Longitude (E)	77° 40' 38"	:	77° 40' 54"
ii) Study area (10 Km. radius)	:		31415 Hect.
iii) Populations	:		1,42,197
iv) District H.Q.	:		Nahan

2. Demography :-

i) Total Population			
a) Male	:		75,974
b) Female	:		66,223
ii) Literates			
a) Male	:		35,277
b) Female	:		22,647
iii) No. of Household	:		19,600
iv) No. of Villages	:		129

3. Land use Pattern :-

i) Forest Land	:		9603 Hect.
ii) Irrigated land	:		412 Hect.

- iii) Unirrigated land : 514 Hect.
- iv) Culturable waste land : 766 Hect.
- v) Area not available for cultivation : 20120 Hect.

4. Climatology (Paonta Sahib-Tehsil, Nov. 2009 to Jan.10) :-

- i) Total Rain (Nov. 2009 – Jan. 2010) : 22.4 mm
- ii) Mean monthly maximum temp. : 22.6°C
- iii) Mean monthly minimum temp. : 5.8°C
- iv) Relative humidity : Max. – 94%, Min. – 44%.

3.3 TOPOGRAPHY

Existing Conditions

The lease area is situated in Bagandhar mining area at highest between 2042 mRL and 1866 mRL. The lease area is marked in the south – eastern slope of the NE-SW trading Bhingoda ridge. Rectangle shape of lease area stretch between Grid line E 00 – E 500 and N 00 – N 400.

A dry khala flows through the lease hold area and it originate from 1970 mRL near the crossing point of Grid line E 300 and N 200. There is an another small dry khala towards south outside of lease area, it flows approximately west to east direction. Aforesaid two khalas collect the rain water from lease area and drain its water through Shamahal ka khala into Tons river. The area exhibits typical Limestone surface features such as elephant skin weathering, caves and cavities. Soil thickness, which is scattered at places, is less than 15 cms avg. weathering imparts white chalky look to the rocks rendering the horizon identifiable from a distance. The nearest villages are Baldhwa (295), Kamroo (6600), & Minal Bag (330). These villages are outside of the lease area. The topography of the study area is shown in **Fig 3.1**.

3.4 CLIMATIC CONDITION

The climate is sub – tropical interspersed between cold weather, hot weather and southwest monsoon. The cold weather commences in November and continues till the end of February, which is characterized by cloudless days and very cold nights with much fog and dew. May and June are usually the hottest months. During monsoon period (June to September) the weather remains humid. Once the pollutants are discharged in the atmosphere, the meteorological factors play an important role in transport dispersion and diffusion with the environment. Since, these factors show wide fluctuations with time, it was felt necessary and desirable as part of this EIA study, to collect meteorological data at nearest available at Tehsil head quarter Paonta Sahib and is presented in Table 3.1.

The southwest monsoon sets in by the second half of the June and withdrawal takes place in October. June to September months are main rainy months though it continues till October. Cyclones and sudden storms may occur during May – June. In the post monsoon, a few thunderstorms occur, especially in October. Thereafter, the weather clears up and pleasant weather prevails throughout the valley. Precipitation occurs for some days during December and January. Rainfall is highly variable in the region due to its rugged topography and its geographical position. The rainfall generally increases up to the valleys from southwest to northwest and decreases beyond the highest range over the northern part of the region. The percentage contribution of rainfall is less than the southern parts, perhaps due to decreasing influence of the monsoon. After April, the rainfall gradually increases till June and thereafter sharply during July and August. It decreases rapidly after the withdrawal of southwest monsoon in September. The precipitation occurs during pre-monsoon months is mostly associated with thunderstorms and constitute 11% of the annual rainfall. Nearly 76% of the total rainfall is received during the five monsoon months from June to October. Rainfall during winter months constitutes 13% of total rainfall. The

weighted annual average rainfall based on available stations in study area Bhimgoda is 1386 mm.

The daily maximum temperature during April to June varies from 24.6 to 28.2°C and shows moderate summer in the region. The highest temperature recorded is 30.6°C in the month of June and lowest 14.3°C during Apr. month. The daily maximum temperature during July to September varies from 24.1 to 28.2°C and shows very little variation in temperature during monsoon season. The highest temperature recorded is 28.9°C in the month of July and lowest 15°C during September month. During October to January, temperature varies from 25.4°C to 4.2°C.

The relative humidity of the area varies from 42 to 94%. The month of May is considered to be having the lowest humidity whereas the maximum humidity is observed during the month of August.

3.5 PHYSIOGRAPHY

3.5.1 Relief

The lease area has mountainous topography with minimum and maximum elevation of the leasehold area, above mean sea level, are 2042 mRL and 1866 mRL respectively.

3.5.2 Drainage

A dry khala flows through the lease hold area and it originate from 1970 mRL near the crossing point of Grid line E 300 and N 200. There is an another small dry khala towards south outside of lease area, it flows approximately west to east direction. Aforesaid two khalas collect the rain water from lease area and drain its water through Shamahal ka khala into Tons river. No water source exists within the lease area and there is no any water body or spring inside lease area. **Fig.- 3.2.**

3.5.3 Vegetation

As indicated earlier there is no forest area within the applied area. No Ag. field exist within the lease area. However small agricultural fields in steps on hill slopes and along Khala (nallah), exist in surrounding, where the land is fertile.

The crop grows are generally maize, ginger, wheat, kulth, chilies, potatoes etc. Farmers of this area are generally taking two crops in a year as under :-

AGRICULTURAL YIELD IN STUDY AREA (10 KM RADIUS FROM MINE SITE)

Sl. No.	Crop	Month of Sowing	Month of Harvesting	% of Cropping Area	Yield kg per ha
1.	Maize	May-June	Sept.-Oct.	40%	1800 to 2500
2.	Mash	June-July	Sept.-Oct.	5%	800 to 1000
3.	Ginger	May-June	Dec.-Jan.	15%	10000 to 12000
4.	Turmeric	May-June	Dec.-Jan.	5%	10000 to 13000
5.	Calocasia	May-June	Nov.-Dec.	5%	110000 to 13000
6.	Kulth	May-July	Sept.-Oct.	2%	800 to 900
7.	Wheat	Oct.-Dec.	Apr.-May	80%	1800 to 2500

3.6 HUMAN SETTLEMENT

There is no human settlement within the lease area. The nearest village existing outside of the lease area is Kamroo which is 0.50 Km away towards south west of the lease area. Dwelling houses in the village are far away from the proposed working area. Total 129 villages with 19,600 household within the study area with population of 1,42,197. The population density in the area is 0.22 hect. /person. (Refer Fig 3.1)

3.7 HYDROLOGICAL ASPECTS

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. The different parameters of surface water as well as ground water also analyzed at different sites.

3.7.1 Introduction

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

3.7.2 Hydrogeology

The trellis drainage pattern is normally developed in the hillside slopes and usually aligned along the strike of the rock formation. The softer rocks like phyllitic slates exhibit such drainage. The trellis drainage pattern is well developed in the terraces & lower most reaches of the valley.

The majority of the area possesses a dendritic to sub-dendritic drainage containing irregular branching of the smaller tributaries. The closeness of these small branches is depending on the permeability of the underlying rocks and the amount and nature of precipitation. It is the most common drainage pattern of hillside slopes of the study area.

The radial drainage pattern is a characteristic feature of the high altitudinal zone specially the summit surfaces. Lithologically, these areas are constituted by the resistant and impervious rocks with steep slopes. The sub-parallel drainage pattern comprises a series of streams, which run approximately parallel to each other. They are evolved in areas of uniformly dipping rocks.

The major river in the study area is antecedent in nature. The sinuosity, braiding and meandering in the river course is generally noticed, although at some places, they are straight and narrow. Due to increase of drainage area and the discharge, the river valley becomes wider in downstream side with generally flattened gradient.

3.7.3 Ground Water Condition

The ground water table (1500 mRL) which is 366 m. depth from lower point (1866 mRL) and will be not encountered as ultimate working point will be 1930 and 1880 mRL from top level (2042 mRL).

3.8 ATMOSPHERIC CONDITION

Atmospheric conditions include micro 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 locating a monitoring station at the mine. The monitored data is supplemented with meteorological data collected at Poanta Sahib (Tehsil H.Q.). 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.

3.8.1 Meteorology

3.8.1.1 Introduction

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 station (Poanta Sahib-Sirmour) to the study area is located at 38 Km. from mine site. Meteorological information available for this station is temperature, humidity, rainfall, wind speed and wind direction.

3.8.1.2 Meteorological Data's from Poanta Sahib (Tehsil H.Q.)

The data recorded at Poanta Station for the study period Nov. 2009 to Jan. 2010 are summarized in table 3.1 and table 3.2.

TABLE – 3.1
MEAN TEMPERATURE AND RELATIVE HUMIDITY RECORDS
FROM THE NAHAN (SIRMOUR) IMD STATION

Month	Temperature(°C)				Relative Humidity(%)			
	Monthly		Mean Monthly		8.30 AM		17.30 PM	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Nov.,09	25.4	8.2	22.6	7.2	91	47	85	28
Dec.,09	21.7	4.2	19.5	5.8	92	44	80	24
Jan.,10	19.0	5.0	17.5	6.5	94	56	88	35

TABLE – 3.2
WIND SPEED AND RAINFALL

Month	Wind Speed (Km./Hr.)				Total Rainfall (mm)
	8.30		17.30		
	Max.	Min.	Max.	Min.	
Nov.,09	12.5	1.5	8.5	0.4	13.4
Dec.,09	11.8	2.0	9.8	0.5	0.4
Jan.,10	14.0	5.0	16	0.8	8.6

3.8.1.3 Micro Meteorology At Site

Micro meteorology data's viz. temperature and relative humidity were recorded at site during the study period which are summarized in the table 3.3

TABLE – 3.3
TEMPERATURE RECORDS AND RELATIVE HUMIDITY AT MINE SITE

Month	Temp.(°C)		Humidity (%)		Rainfall In mm	Prominent wind direction /wind speed(Km./Hr.)
	Min.	Max.	Min.	Max.		
Nov.,09	7.8	24.2	44	92	15.2	W-SW-SE, 08-15
Dec.,09	4.1	22.5	45	62	1.5	SW-SE, 4- 8
Jan.,10	5.5	18.4	42	80	10.7	SW-SE, 6-10

3.8.1.4 Ambient Air Quality

To establish the ambient air quality the studies were carried out during winter season of the year 2009-10.

a. Ambient Air Sampling

Ambient air quality sampling was carried out with the help of High Volume air Sampler and Respirable Dust Sampler. The data generated by M/s San Envirotech Pvt. Ltd. for ambient air quality status

within 10 km. radius of the existing mine has been compiled along with micrometeorological conditions for particulars season.

b. Location of Ambient Air Sampling Stations

Five sampling stations were established around the core zone within 10 km radius to study the present air quality. The locations are given in Table 3.4 and they are marked in Fig. 3.3.

**TABLE 3.4
LOCATION OF AMBIENT AIR MONITORING STATIONS**

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
A1	Mine – Site	Core zone	--
A2	Ghurwa Village	2.0	North – West
A3	Kamroo Village	1.5	South - West
A4	Khajar Village	1.75	West
A5	Salna Village	1.0	South
A6	Ratmatti Village	2.25	North - East

c. Sampling Schedule

Eight hourly samples were collected from each station round the clock, twice a week for continuous three month (Nov. 09, Dec. 09 & Jan. 10).

d. Air quality parameter

The following parameters were analyzed for each sample

- Suspended particulate matter (SPM)
- Sulphur dioxide (SO₂)
- Oxides of nitrogen (No_x)
- Respirable particulate matter (RPM)
- Carbon Monoxide (CO)

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 Table 3.5.

TABLE 3.5
PROCEDURE FOR DETERMINING VARIOUS AIR QUALITY
PARAMETERS

Parameters	Testing Procedure
SPM	Gravimetric method using high volume air samplers IS:5182(Part IV)1973
NO _x	Absorption in dil. NaOH and then estimated calorimetrically with sulphanilamide and N(I-Nephthyle) 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)
RPM	Respirable Particulate Matter Sampling and analysis
CO	By Electronic CO detector

The detailed results of ambient air quality are given in table 3.6 to 3.10.

TABLE – 3.6
Ambient Air Quality
(SPM 24-hr Concentration in ug/cum)

Station ►		Mine site	Ghurwa	Kamroo	Khajar	Salna	Ratmatti
Sample No.▼	Date	A1	A2	A3	A4	A5	A6
1	1-2/11/09	142	136	121	86	70	51
2	5-6/11/09	140	137	121	123	100	42
3	8-9/11/09	140	136	109	100	85	58
4	11-12/11/09	135	132	111	99	73	59
5	15-16/11/09	95	83	75	66	52	52
6	20-21/11/09	136	134	117	99	73	65
7	24-25/11/09	83	73	65	55	49	63
8	28-29/11/09	130	125	95	86	52	78
9	1-2/12/09	141	144	131	118	96	74
10	5-6/12/09	126	119	96	80	64	87
11	8-9/12/09	132	126	108	82	74	71
12	11-12/12/09	145	134	124	111	93	75
13	15-16/12/09	132	130	115	101	82	72
14	20-21/12/09	144	135	121	111	95	88
15	24-25/12/09	142	132	110	96	83	74
16	27-28/12/09	129	128	112	102	82	78
17	5-6/1/10	148	141	128	111	92	87
18	8-9/1/10	146	136	115	95	76	73
19	11-12/1/10	141	139	121	102	84	86
20	16-17/1/10	140	125	100	85	68	78
21	18-19/1/10	103	102	86	75	65	62
22	21-22/1/10	62	58	45	34	29	43
23	25-26/1/10	122	124	98	85	74	48
24	29-30/1/10	133	131	111	90	71	52
	Minimum	62	58	45	34	29	43
	Maximum	148	144	131	123	100	88
	Average	129	123	106	91	74	67
	98%	145	141	128	121	98	86

TABLE – 3.7
Ambient Air Quality
(RPM 24-hr Concentration in ug/cum)

Station ►		Mine site	Ghurwa	Kamroo	Khajar	Salna	Ratmatti
Sample No. ▼	Date	A1	A2	A3	A4	A5	A6
1	1-2/11/09	42	39	26	20	12	27
2	5-6/11/09	44	37	30	28	14	34
3	8-9/11/09	40	34	26	21	26	32
4	11-12/11/09	34	39	29	21	17	33
5	15-16/11/09	39	32	29	22	18	35
6	20-21/11/09	36	23	18	15	14	32
7	24-25/11/09	37	24	21	16	12	31
8	28-29/11/09	27	24	19	15	20	32
9	1-2/12/09	29	13	14	12	15	29
10	5-6/12/09	29	12	17	15	11	21
11	8-9/12/09	38	25	21	18	17	27
12	11-12/12/09	36	23	22	19	13	20
13	15-16/12/09	43	35	35	28	20	14
14	20-21/12/09	45	32	31	25	19	13
15	24-25/12/09	42	34	31	25	12	25
16	27-28/12/09	47	47	41	33	16	22
17	5-6/1/10	32	24	20	15	14	21
18	8-9/1/10	38	26	20	17	11	25
19	11-12/1/10	42	32	28	23	11	36
20	16-17/1/10	34	21	20	18	10	22
21	18-19/1/10	47	34	30	26	13	29
22	21-22/1/10	49	38	36	29	24	31
23	25-26/1/10	33	23	20	15	11	36
24	29-30/1/10	46	35	29	20	13	32
	Minimum	27	12	14	12	11	13
	Maximum	49	47	41	33	26	36
	Average	39	29	26	21	15	27
	98%	48	46	40	32	25	35

TABLE – 3.8
Ambient Air Quality
(SO_x 24-hr Concentration in ug/cum)

Station ►		Mine site	Ghurwa	Kamroo	Khajar	Salna	Ratmatti
Sample No. ▼	Date	A1	A2	A3	A4	A5	A6
1	1-2/11/09	11	11	10	8	05	15
2	5-6/11/09	13	12	9	8	05	16
3	8-9/11/09	14	11	16	13	14	17
4	11-12/11/09	11	14	10	8	06	13
5	15-16/11/09	19	09	8	7	07	11
6	20-21/11/09	18	12	9	7	06	12
7	24-25/11/09	20	10	8	7	04	11
8	28-29/11/09	15	15	10	9	05	17
9	1-2/12/09	19	12	10	7	03	12
10	5-6/12/09	14	17	12	11	07	17
11	8-9/12/09	18	15	12	10	05	14
12	11-12/12/09	19	17	9	8	08	16
13	15-16/12/09	14	13	9	7	05	09
14	20-21/12/09	18	18	12	10	07	10
15	24-25/12/09	14	14	11	10	04	11
16	27-28/12/09	18	18	9	8	07	11
17	5-6/1/10	19	15	10	8	04	12
18	8-9/1/10	14	10	9	8	07	14
19	11-12/1/10	19	17	11	9	08	13
20	16-17/1/10	19	14	10	9	08	12
21	18-19/1/10	16	18	11	9	07	14
22	21-22/1/10	19	15	12	11	05	14
23	25-26/1/10	14	09	12	10	08	16
24	29-30/1/10	24	17	12	11	05	13
	Minimum	11	09	8	7	03	09
	Maximum	24	18	16	13	14	17
	Average	17	14	10	9	06	13
	98%	24	18	16	13	14	17

TABLE – 3.9
Ambient Air Quality
(NO_x 24-hr Concentration in ug/cum)

Station ►		Mine site	Ghurwa	Kamroo	Khajar	Salna	Ratmatti
Sample No. ▼	Date	A1	A2	A3	A4	A5	A6
1	1-2/11/09	24	12	13	10	09	11
2	5-6/11/09	12	13	13	10	09	12
3	8-9/11/09	25	19	16	11	13	11
4	11-12/11/09	22	12	15	12	14	13
5	15-16/11/09	26	13	15	12	08	14
6	20-21/11/09	12	19	13	11	07	18
7	24-25/11/09	16	17	12	11	08	16
8	28-29/11/09	13	19	11	8	07	18
9	1-2/12/09	16	18	10	9	08	17
10	5-6/12/09	15	07	8	7	08	18
11	8-9/12/09	07	09	7	5	04	16
12	11-12/12/09	11	15	9	10	09	15
13	15-16/12/09	15	14	10	9	06	17
14	20-21/12/09	14	17	10	8	06	14
15	24-25/12/09	13	15	12	11	16	18
16	27-28/12/09	26	12	15	13	16	14
17	5-6/1/10	25	21	19	16	18	17
18	8-9/1/10	23	23	19	15	15	25
19	11-12/1/10	27	14	16	14	18	17
20	16-17/1/10	23	12	17	15	16	14
21	18-19/1/10	14	15	17	14	15	13
22	21-22/1/10	12	13	13	11	07	14
23	25-26/1/10	14	17	13	10	08	12
24	29-30/1/10	13	14	12	10	06	16
	Minimum	07	07	7	5	04	11
	Maximum	27	23	19	16	18	20
	Average	17	15	13	11	10	15
	98%	26	23	19	16	18	20

The observed range of various parameters recorded, have been compared with the National Ambient Quality Standards laid down by the Central Pollution Control Board and given be Table 3.10.

TABLE – 3.10
(Comparison of Air Monitoring Results)

Parameters	A1 Mine site	A2 Ghurwa	A3 Kamroo	A4 Khajar	A5 Salna	A6 Ratmatti	NA AQ S*	
							Ind. & Mixed use	Res. & Rural use
SPM Concentration								
Minimum	62	58	45	34	29	43	500	200
Maximum	148	144	131	123	100	88		
Average	129	123	106	91	74	67		
98% tile	145	141	128	121	98	86		
RPM Concentration								
Minimum	27	12	14	12	11	13	150	100
Maximum	49	47	41	33	26	36		
Average	39	29	26	21	15	27		
98% tile	48	46	40	32	25	35		
SO ₂ Concentration								
Minimum	11	09	8	7	03	09	120	80
Maximum	24	18	16	13	14	17		
Average	17	14	10	9	06	13		
98% tile	24	18	16	13	14	17		
NO _x Concentration								
Minimum	07	07	7	5	04	11	120	80
Maximum	27	23	19	16	18	20		
Average	17	15	13	11	10	15		
98% tile	26	23	19	16	18	20		
CO Concentration								
The CO readings were less than 1 ppm for most part of the sampling period. The CO level was recorded as 1 ppm for the villages in the morning and evening hours.							5000	2000

* NAAQS – National Ambient Air Quality Standards. 24-hr concentration in ug/m³.

A perusal of Tables 3.10 shows that SPM, RPM, CO, NO_x & SO₂ are well within limits prescribed for areas meant for “Residential and Rural Use.”

3.8.2 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 representative of wind speed in an specified direction with its arms representing sixteen direction, each arm gives a clear frequency distribution of wind speed.

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

Fig 3.4 to 3.6 gives a clear view of wind rose for three month viz. Nov. 09 to Jan. 2010 each representing a wind speed per month.

3.9 NOISE ENVIRONMENT

3.9.1 Noise Analysis within the study area

The noise analysis within the study area was recorded using 4-20, sound level meter. The analysis reveals that the noise's well within the permissible range. The location of Noise level monitoring is presented in Table 3.11 (A) & the levels recorded are as stated in Table 3.11 (B).

**TABLE 3.11(A)
LOCATION OF NOISE MONITORING STATIONS**

Station Code.	Station Name	Location with respect to Site	
		Distance (Km)	Direction
N1	Mine – Site	Core zone	--
N2	Ghurwa Village	1.5	North – West
N3	Kamroo Village	1.00	South - West
N4	Khajar Village	0.75	West
N5	Salna Village	0.75	South
N6	Ratmatti Village	2.25	North - East

TABLE 3.11(B)
NOISE LEVEL WITHIN THE STUDY AREA

(Unit – dBA)

S. No.	Name	Month	Noise Level (Morning)	Noise Level (Evening)
			09.30 am – 10.30am	5.30pm-6.30pm
N1	Mine Site	Nov. '09	55.0	42.9
		Dec. '09	50.3	41.7
		Jan. '10	56.3	47.0
N2	Ghurwa Village	Nov. '09	49.9	42.0
		Dec. '09	52.5	42.0
		Jan. '10	51.2	42.5
N3	Kamroo Village	Nov. '09	46.8	39.5
		Dec. '09	47.7	40.6
		Jan. '10	50.5	42.8
N4	Khajar Village	Nov. '09	44.6	38.5
		Dec. '09	42.7	36.8
		Jan. '10	40.6	35.9
N5	Salna Village	Nov. '09	41.6	33.5
		Dec. '09	39.9	34.1
		Jan. '10	41.0	33.4
N 6	Ratmatti Village	Nov. '09	49.9	39.7
		Dec. '09	44.3	38.1
		Jan. '10	46.0	37.7

3.9.2 Traffic density

Traffic density measurements were performed at one location at village Kamroo, (Sataun – Shillai – Paonta Sahib State Highway) Location of these stations are marked on the map in **Fig.3.3**. The monitoring was performed in Dec., 2009.

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 summary in Table 3.12.

**TABLE 3.12
TRAFFIC DENSITY**

Traffic vehicle	No. of vehicles per day at Kamroo on Satoun – Shillai – Paonta Sahib State Highway
H.M.V.	54
L.M.V.	65
2/3 wheelers	82
Grand Total	201

3.10 SOIL

The soil in the area in general is quite shallow gravelly impregnated with weathered fragments of parent rock and have developed under unique environment of natural forest vegetation. Surface layer of soil up to 15-20 cm is of reddish brown to yellowish brown color, loamy with loose and un-decomposed organic matter where as depth ranging from 15-50 cm is rich in humus content. The slope soil is composed of silt and good for vegetation / cultivation. Rock has been weathering due to heavy rainfall. The clay soil is found on river terrace due to aggradation process in river bed and thus good for paddy cultivation. The soils of upper Giri Catchments in very steep mountains are either Typic udorthents or Lithic udorthents and shallow coarse loamy soil deep brown to very dark grayish. The soil samples have been collected from five locations for assessment of soil quality in project area. The location of Soil samples is presented in Table 3.13(A) & the results of soil sample analyzed in table 3.13 (B) and depicted in **Fig 3.3**

**TABLE – 3.13(A)
LOCATION OF SOIL QUALITY MONITORING STATIONS**

Station Code.	Station Name	Description	Location with respect to Site	
			Distance (Km)	Direction
S1	Ghurwa Village	Ag. Land	1.5	North – West
S2	Kamroo Village	Ag. Land	1.00	South - West
S3	Khajar Village	Ag. Land	0.75	West
S4	Salna Village	Ag. Land	0.75	South

TABLE – 3.13(B)
SOIL SAMPLE ANALYSIS

S. No	Parameters	Unit	Ghurwa S1	Kamroo S2	Khajar S3	Salna S4
1.	Color		Brown	Reddish Brown	Brown	Yellowish Brown
2.	pH value		6.7	6.3	6.5	6.7
3.	Size distribution					
	a) Sand	%	66.0	69.0	66.0	54.0
	b) Clay	%	13.0	13.0	12.0	21.0
	c) Silt	%	21.0	18.0	22.0	25.0
4.	Soil texture	-	Coarse loamy sand	Loamy sand	Loamy sand	Clay loam
5.	Bulk density	Gm/cm ³	1.21	1.23	1.22	1.48
6.	Conductivity	Micro-mhos/cm	83	103	110	121
7.	Potassium as K	mg/100g	1.0	0.8	1.1	.9
8.	Nitrogen	mg/100g	1.4	1.3	1.3	1.7
9.	Phosphorus as P ₂ O ₅	mg/100g	1.2	0.8	1.1	0.9
10.	SAR		1.5	1.5	1.6	1.8

3.10.1 Remarks

The results of soil sample analyzed during winter period (Nov. 2009) are presented in Table 3.13(B) for physical and chemical parameters. The result of soil analysis shows that it is slightly acidic in nature having pH values from 6.3 to 6.7. The soil texture varies from coarse sandy loam to clay loam having predominantly Sand. The Sodium absorption ratio (SAR) varies from 1.5 to 1.8. The micronutrients have been found in all the samples.

3.11 BIOLOGICAL ASPECTS

3.11.1 Scope and Limitations

Plant and animal communities are indicators of the environment. They respond not only to one environmental factor but also to an interacting group of factors. These communities influence and react sensitively to change in the balance of environmental stresses. Depletion of biodiversity is mainly due to intense anthropogenic pressure owing to **“Population Explosion”** mainly for expansion of agriculture, over exploitation of forests

for day to day needs, over grazing and illicit felling, shifting cultivation, development activities like, irrigation, construction of hydro-electric dams, road construction including mining activities, all leading to dysgenic selection. Rational use of the resources is therefore, quite important in the management of biodiversity, the habitat, species and gene pools prevalent in an area, because once it is lost, it becomes an uphill task to reverse the process. Therefore, a detailed knowledge of the diversity of the area definitely helps in managing the area properly following suitable practices.

The study was conducted in the project area to assess all possible consequences on the biological environment. Floral and faunal surveys conducted for assessing the biological diversity and its status over a period of time that forms an integral part of Impact Assessment Techniques. The present study is highlighting the various issues pertaining to floristic diversity and the faunal wealth including Ethno-botany and Silviculture issues in the submergence area and also the area beyond the limit of the submergence. Accordingly, for Environmental Impact Assessment (EIA) studies, the total area has been sub-divided into the following areas;

- Influence area - Area under 10 km radius (core as well buffer zone)
- Existing wildlife sanctuary

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment.

3.11.2 Forest, Flora & Fauna

3.11.2.0 Forest

The forest of study area is within radius of 10 Sq km. from the centre of the lease area constitute about 31 % of the total area. The forest of the

district falls under the northern tropical dry deciduous type of forest according to champion's & Seth classification.

**TABLE NO. – 3.14
FOREST WITHIN 10 KM RADIUS**

S.No.	Name and Type of the forest	Direction	Distance in Km.
1.	Nigali Reserved Forest	S-E	6.0
2.	Salag Reserved Forest	S	5.0
3.	Kandela Reserved Forest	S	5.0
4.	Jangle Reserved Forest	SSW	08.5
5.	Rajban Reserved Forest	SSW	9.5
6.	Sataun Reserved Forest	SW	6.0
7.	Magli Reserved Forest	SW	9.0
8.	Mania Reserved Forest	WWS	7.0
9.	Gabhar Reserved Forest	WWS	8.0
10.	Sakhauli Reserved Forest	W	7.0
11.	Shilla Reserved Forest	NW	3.0
12.	Khajuri Reserved Forest	NE	3.0
13.	Balikoti Reserved Forest	NE	5.0
14.	Pobhar Reserved Forest	E	5.0
15.	Kalsi Reserved Forest	SE	9.0

3.11.2.1 Flora

Nature has nourished life since its existence and from the very beginning; life sustained itself on the available resources. However, human beings have always utilized major part of these natural resources than any other organism on this planet. In a country like India, where population spearheaded with low economic status and small land- holdings, poses a very high pressure on the natural resources and the situation further worsens in the hilly region of the country where terrain and inaccessibility becomes the major constraint which then force the people to utilize only the extract whatever is accessible in the vicinity of their dwellings.

Plants provide us readymade food, medicines for ailment, fodder and forage for our domestic animals, fuel wood for burning, flowers for aesthetics and celebration, raw materials for many industries, timber for construction and many more useful items.

The natural vegetation follows a climatic altitudinal zonation. In the altitude range of 1200-1800m, as in Paonta Sahib Tehsil, the vegetation is tropical and sub-tropical in character. 'Sal' is the main species of the broad leaved hill forest. Some patches on the hill slopes are clad in dense forests which are 'reserved'. The dominant tree species is Sal, as a timber tree, Sal is extremely valuable as the wood being strong, elastic and durable. Favoring the growth of Agava (Banskeora). On several slopes facing the quarry, the trees are completely absent and only grass cover is seen. Though most of the forests have been reserved but small patches particularly in the valley bottom and along the lower slopes have been terraced into cultivated fields.

The plantation in the study area mostly consists of some ornament species and avenue and fruit trees. The important species of plants found in the area are:-

TABLE-3.15
FLORA IN THE STUDY AREA(Core & Buffer zone)

S.No	Botanical Name	Common Name	Core zone (mine area)	Buffer zone (10 km radius)
1.	<i>Shorea robusta</i>	Sal	√	√
2.	<i>Quercus incone</i>	Oak		√
3.	<i>Alnus glutinoa</i>	Alder		√
4.	<i>Albizzia Lebbek</i>	Seris		√
5.	<i>Dalbergia sissoo</i>	Shisham		√
6.	<i>Adina cordifolia</i>	Holdu		√
7.	<i>Bachanania lotifolia</i>	Bhilova		√
8.	<i>Condia dichotoma</i>	Lassora		√
9.	<i>Terminate tomentos</i>	Asin		√

10.	<i>Callistemon viminalis</i>	Bottlebrush	√	√
11.	<i>Azardirecta indica</i>	Neem	√	√
12.	<i>Bauhinia variegata</i>	Kachnar	√	√
13.	<i>Bombax ceiba</i>	Semal		√
14.	<i>Anogeissus latifolia</i>	Chhal		√
15.	<i>Eucalyptus tereticornis</i>	Eucalyptus	√	√
16.	<i>Litsea glutinosa</i>	Chandna		√
17.	<i>Ficus glomerata</i>	Gular	√	√
18.	<i>Ficus religiosa</i>	Pipal	√	√
19.	<i>Syzygium cumini</i>	Jamun		√
20.	<i>Cedrela toona</i>	Red cedar		√
21.	<i>Cassia fistula</i>	Amaltas	√	√
22.	<i>Nyctanthes arbor-tristis</i>	Harsingar	√	√

IT IS MARKED THAT IN SOME PATCHES, THE HILL SLOPES ARE CLAD WITH DENSE FOREST. THE SLOPES ESPECIALLY IN LIMESTONE BEARING HORIZONS ARE BARE OF VEGETATION. THE FOLLOWING CROPS ARE GROWN IN THE AREA:

<i>Triticum eestivum</i>	:	(wheat)
<i>Oxyza saliva</i>	:	(paddy)
<i>Brassico comoistris</i>	:	(mustard)
<i>Seamays</i>	:	(corn)
<i>Sacchorum officinorim</i>	:	(sugar cane)

The vegetables grown in the terraces are:

<i>Brassica oleraces</i>	:	(Cabbage)
<i>Solaunum melongena</i>	:	(Brinjal)
<i>Capsicum annuum</i>	:	(Chilli)
<i>Chaseolus vulgoris</i>	:	(Bean)
<i>Lucoopersicum esculentum</i>	:	(Tomato)
<i>Spinacea oleracea</i>	:	(Palak)
<i>Solanum tuberosum</i>	:	(Potato)
<i>Zingber officinale</i>	:	(Ginger)

3.11.2.2 Fauna

Survey was carried out in 10 km radius of the mine site. The area is observed favorable habitat for many species of birds and other animals.

Due to lush green ambience and diversified forest lying along and across the riverbed and around wildlife sanctuary, the area is equally important for butterfly diversity. Butterflies form important part of the food chain components for the birds, reptiles, spiders and other predatory insects making them inevitable part of present ecosystem. Butterflies being an environmental indicator are sensitive to changes in the habitat, atmosphere, temperature and weather conditions. Some common mammals are the most charismatic of all the fauna especially around Renuka Lake known to human beings. The area along river Giri was explored and evaluated in the present study to record the habitat conditions of the aquatic faunal species also. A total 16 fish species were observed. Out of these, two species i.e. *Tor putitora* and *Schizothorax richardsonii* are migratory in nature and are economically important.

DUE TO RICH FOREST COVER, MANY FAUNA IS EXPECTED TO BE FOUND IN THIS AREA. THE WILD LIVES PRESENT IN THE STUDY AREA ARE MAINLY MONKEY, LANGOOR, JACKAL, RABBITS, DEER, FOX, BEAR ETC. AMONG DOMESTIC ANIMALS: COW, BUFFALOES, MULES, HENS, DOGS, GOATS, OXEN, CATS ARE COMMON. MULES ARE USED TO CARRY LOADS ON MOUNTAIN TRACK.

Wild Animals : Considerably more common in study area, owing to presence of hills and forests.

Presently:

- Deer of many species including harin (*Antelope crevicapra*), spotted deer (*axis maculates* – H. Cheetal), Barking deer (*Muntiacus muntijakay* – H. Kakar). Of the Antelopes: The Indian Black-buck (*Antelope cervicapra* – Kalvita) has become rare, the neelgai (*Boselaphus tragocamelus*) is found in the river

basins and small forests of the north. The Khargosh (*Lepus nigricolis*) is noticed throughout the area.

- Also seen are Newala (mongoose), wild dogs, fox, wild cats, lakarbagha (Hyaena), monkey, langur, and sehi.

Wild Birds :

The resident birds include peafowl; black and grey partridge, sand grouse and jungle fowl, while the migrants include snipe, quail and varieties of waterfowl visit the area in large numbers in winter. The birds of the southern study area are kalij, bater, lawa, lamurgi, kala tittar, safed tittar, dhaner and harial. Also are mor, ullu or owl, koel or cuckoo, cheel or kite, jungli kawwa or crow, tota or parrot, nilkanth..

Snakes :

In the study area, snakes are found but non-poisonous outnumber poisonous snakes such as cobra, krait and viper. Ajar (python) is comparatively harmless but attains enormous size. It is found only near waterfall area, but not very common.

Aquatic Fauna:

The major fishes available in Giri river are Trout, Mahseer, Nemacheilus spp., Barilus Spp., Schizothoracids, Crossocheilus spp., Glyptothorax spp. Etc.

The Table below gives prevailing common fauna in the study area.

**TABLE –3.16
FAUNA IN STUDY AREA**

S.No	Zoological Name	Common Name	The Wild Life (Protection) Act, 1972
1.	<i>Macaus rhesus</i>	Rhesus Monkey	Schedule-II
2.	<i>Felis chaos</i>	Jungle Cat	Schedule-II
3.	<i>Herpests edwardii</i>	Mongoose	Schedule-IV
4.	<i>Cervus unicolous</i>	Sambhar	Schedule-III

5.	Sanicoloides fulvicata	Indian Robin	Schedule-IV
6.	Cuculus micropterue	Common Hawkcucker	Schedule-IV
7.	Passer domesticus	House Sparrow	Schedule-IV
8.	Corvus splendens	House Crow	Schedule -V
9.	Acridotheriis tristicus	Common Myna	Schedule -IV
10.	Herpestes spp.	Newala (mongoose)	Schedule - II
11.	Vulpes bengalensis	Fox	Schedule - II
12.	Hyaena hyaena	Lakarbaggaha (Hyaena)	Schedule - III
13.	Macaca mulatta	Monkey	Schedule - II
14.	Presbytis entellus	Langur	Schedule - II
15.	Muntiacus murrjak	Barking deer	Schedule - III
16.	Antelope cervicapra	Black-buck	Schedule - I
17.	Boselaphus tragocamelus	Neelgai	Schedule - III
18.	Lepus nigricolis	Rabbit	Schedule - IV
19.	Senenarctos thibetanus	Bear	Schedule - II
20.	Canis aureus	Jackal	Schedule - II
21.	Pavo cristatus	Peacock	Schedule - I
22.	Strigidae spp.	Owl	Schedule - IV
23.	Endybnamys scolopacea	Koel	Schedule - IV
24.	Haliaeetus leucogaster	Cheel	Schedule - I
25.	Psittacula Krameri	Parrot	Schedule - IV
26.	Naja naja	Cobra	Schedule - II
27.	Viper ruselli	Viper.	Schedule - II
28.	Python spp.	Ajgar	Schedule - I
29.	Bunoarus carruleus	Krait	Schedule - IV

In addition to this Snakes, Lizards, Monkeys, Wild Pig, Neel Gai are seen in the area. **In core zone Rabbit, Lizards and Snakes are found commonly.**

3.12 LAND ENVIRONMENT

3.12.1 Land use of Study Area (Buffer Zone)

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

- i. Forest
- ii. Irrigated land
- iii. Unirrigated and
- iv. Culturable waste and
- v. Area not available for cultivation

The land under forest is in one, which has a forest cover on it. Irrigated land is the agricultural land which has irrigation facility either by surface or lift irrigation. Unirrigated land is also agricultural land, which do not have any irrigation facility and include flow land. The agricultural activity in these lands is mostly dependent upon monsoon. The category of culturable waste land is one which includes open land, area under pasture and grazing, etc.

Finally, the area not available for cultivation includes and not covered by above four categories, i.e. mostly, the area covered by hills, valleys, structures, roads etc.

The land use of study area is given as under:-

i)	Forest Land	:	9603 Hect.
ii)	Irrigated land	:	412 Hect.
iii)	Unirrigated land	:	514 Hect.
iv)	Culturable waste land	:	766 Hect.
v)	Area not available for cultivation:		20120 Hect.

3.12.1.1 Agricultural Yield of the Study Area

Agricultural practice is the main source of income of the study area. The major crops grown are Wheat, Maize, Ginger, Potato & Chillies etc. Crop wise yield grown around the study area is given in Table 3.17.

TABLE -3.17
AGRICULTURAL YIELD IN STUDY AREA
(10 KM RADIUS FROM MINE SITE)

Sl. No.	Crop	Month of Sowing	Month of Harvesting	% of Cropping Area	Yield kg per ha
1.	Maize	May-June	Sept.-Oct.	40%	1800 to 2500
2.	Mash	June-July	Sept.-Oct.	5%	800 to 1000
3.	Ginger	May-June	Dec.-Jan.	15%	10000 to 12000
4.	Turmeric	May-June	Dec.-Jan.	5%	10000 to 13000
5.	Calocasia	May-June	Nov.-Dec.	5%	110000 to 13000
6.	Kulth	May-July	Sept.-Oct.	2%	800 to 900
7.	Wheat	Oct.-Dec.	Apr.-May	80%	1800 to 2500

3.12.2 Land use of Lease area (Core Zone)

The lease area of 8.50 hect. has mountainous topography with minimum and maximum elevation of the leasehold area, above mean sea level are 2042 mRL and 1866 mRL respectively. No Ag. field exist within the lease area. No forest land is involved in the core zone. The summarized details of the type of and covered in the lease area is indicated in Table 3.20(A), (B) & (C).

TABLE – 3.18(A)
LAND USE PATTERN-EXISTING

Particulars	Forest	Agriculture	Grazing	Waste Land	Total
Pit / Quarries	-	-	-	2.56	2.56
Waste Dump*	-	-	-	-	-
Mineral Stack	-	-	-	-	-
Infrastructure	-	-	-	-	-
Road	-	-	-	0.67	0.67
Plantation	-	-	-	0.20	0.20
Remaining Land	-	-	-	5.07	5.07
Total	Nil	Nil	Nil	8.50	8.50

**Dump area 0.38 hect. is outside the lease area. All fig. in Hect.*

The area of influence of mining up to end of lease period (06.04.2024) within the lease area as given below:

TABLE – 3.18(B)
LAND USE PATTERN-AT THE END OF LEASE PERIOD

Particulars	Forest	Agriculture	Grazing	Waste Land	Total
Pit / Quarries	-	-	-	4.44	4.44
Waste Dump*	-	-	-	-	-
Infrastructure	-	-	-	-	-
Road	-	-	-	0.20	0.20
Plantation	-	-	-	2.10	2.10
Remaining Land	-	-	-	1.76	1.76
Area back filled if any	-	-	-	-	-
Total	Nil	Nil	Nil	8.50	8.50

**Dump area 0.58 hect. is outside the lease area. All fig. in Hect.*

TABLE – 3.18(C)
STAGE WISE LAND USE PATTERN

Land Use	Present	5 th Year	End of Lease Period
Excavated	2.56	3.90	4.44**
Water voids	-	-	-
External dumps*	-	-	-
Plantation	0.20	2.10	2.10
Road	0.67	0.71	0.20
Waste land	5.07	1.79	1.76
Total	8.50	8.50	8.50

All fig. in Hect.

* 1.80 hect. dump area (out side lease area) will be planted before expiry of lease period.

** Include 2.71 hect. plantation on mined out benches.

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 Water Quality

The Catchment of river Giri is characterized by many spring fed river / hill torrents upstream of the project. The altitudinal gradient of the drainage basin from higher reaches to mine site shows elevation difference from 3626 m to 630 m(buffer zone). The water is not polluted and bears a lot of dissolved oxygen in it. The natural treatment of the water current takes places for a considerable length from the place of origin as the ultraviolet radiation due to sun is quite high in the upper reaches. In addition to this water of the river is not exposed to sewerage in general although, some sewerage during monsoon is brought by different streams passing through the inhabitation, during high flood season. The area is free of industrial pollutants as the industrial base is none existent. In view of the above the water environment of the Giri basin is benign.

3.13.1.1 Water Quality Assessment

In the present context the water quality analysis was carried out at various places as mentioned in Table below covering sections of Khajiyani Ka Khala, Kalhon Ka Khala, Nera Nadi, Giri River, Tons River and a ground water sample in Kamroo to have a holistic view of water quality. The details of water quality sites are given in Table 3.19(A) & results in Table 3.19(B) & location shown in Fig 3.3. The samples were collected during winter (Nov. 2009).

**TABLE – 3.19(A)
LOCATION OF VARIOUS WATER SAMPLE STATIONS**

Station Code.	Station Name	Description	Location with respect to Site	
			Distance (Km)	Direction
SW1	Khajiyani Ka Khala	Surface water	0.50	W
SW2	Kalhon Ka Khala	Surface water	2.00	SW
SW3	Nera Nadi	Surface water	3.50	N
SW4	Tons River	Surface water	6.00	SE
SW5	Giri River	Surface water	7.50	SW
GW1	Hand pump in Kamroo Vill.	Ground water	2.00	SW

Samples from surface /ground water sources were collected by adopting grab sampling method. The sample was filled into a sampling bottle. The physico-chemical quality of water samples were characterized by adopting the relevant parts of IS:3025, “Standard Methods for Water Analysis” and the methods prescribed under IS:10500.

**TABLE - 3.19(B)
WATER QUALITY ANALYSIS**

Sl. NO.	PARAMETERS	SAMPLE NO.					
		SW1	SW2	SW3	SW4	SW5	GW1
Physical Parameters							
1.	pH	8.12	8.10	8.20	7.70	8.20	7.55
2.	Temperature, °C	18.5	17.5	17.0	19.0	18.0	19.5
3.	Dissolved Oxygen, mg/l	7.50	7.45	7.60	7.10	7.35	6.45
4.	Conductivity, mg/l	419	384	349	310	335	505
5.	Total Suspended Solids, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
Chemical Parameters							
6.	Alkalinity, mg/l	160	165	160	145	150	145

7.	Total Hardness (as CaCO ₃)mg/l	199	164	172	170	178	242
8.	Calcium hardness as CaCO ₃ , mg/l	125	113	136	140	142	186
9.	Magnesium Hardness as CaCO ₃ , mg/l	67	53	33	24	31	75
10.	Biological Oxygen Demand, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
11.	Chemical Oxygen Demand, mg/l	3	3	3	BDL	3	BDL
12.	Nitrate(as NO ₃) mg/l	0.82	0.77	BDL	BDL	BDL	1.6
13.	Phosphate, mg/l	0.35	0.27	0.17	BDL	0.16	0.17
14.	Chloride, mg/l	9	8	4	4	3	11
15.	Sulphates, mg/l	31	34	36	39	32	96
16.	Sodium, mg/l	12	13	9	BDL	11	09
17.	Potassium, mg/l	1.8	2	2	BDL	2	2
Bacteriological Parameters							
18.	MPN	19	16	21	13	16	BDL
19.	Total Coliform	110	95	110	50	85	BDL

BDL – Below Detection Limit, MPN- Most Probable Number.

As stated above river Giri, a tributary of Yamuna River passes buffer zone of mining lease area. It is joined by many seasonal / perennial streams of various dimensions both from north and south directions. Requirement of water in the area is mostly met from surface water sources through Giri River and several springs. Drinking water is arranged from several springs existing in the area and for irrigation purposes, villagers mainly depend on Giri River, several springs and rain water.

The surface water as well as ground water quality studies of the area indicate that water is not affected by the limestone mining. The total dissolved solids & hardness of water are bit high which can be due to the geological formations & terrain characteristics.

3.14 SOCIO-ECONOMIC ENVIRONMENT

3.14.1 POPULATION AND LITERACY

There are 129 villages in the study area having a total population as per 2001 census of 1,42,197 forming 19600 households at an average of 7.0 persons per household. The total break-up of household, population and literacy is given in Table 3.20.

**TABLE - 3.20
POPULATION AND LITERACY PATTERN**

House holds	Population			Literates	
	Total	Male	Female	Male	Female
19600	142197	75974	66223	35277	22647

The literacy studies reveal the following:

- * In the study area about 41% of the total population is literate.

3.14.2 OCCUPATIONAL PATTERN

The occupational pattern of the population of the area has been studied . About 51.20% of the population is non-workers. Marginal workers form about 12.75% of the population. Main workers form 36.05% of the population. A summary of the occupational pattern of the study area is given in Table 3.21

**TABLE - 3.21
OCCUPATIONAL PATTERN OF STUDY AREA**

Main Workers 47200	Marginal Workers 16693	Non-workers 67036
-----------------------	---------------------------	----------------------

The cultivators and agricultural laborers account for approximately 68.62% of total main workers and approximately 12.75% are marginal workers of the total population. These figures indicate that agriculture is the main occupation.

The average family size in the study area is about 7 person/ household. As main workers constitute about 36% of the total population, it is therefore concluded that, on an average, at least one person in each household has full time employment.

3.14.3 INDUSTRIES IN THE VICINITY

No big industry like Cement, Chemical, Sugar, Paper & Power project industries located within buffer zone. Few mineral based Grinding units exist within the buffer zone.

3.15 AMENITIES

The existing amenities in village of study area already given in previous para. The village in close vicinity of the mine are well connected to Dehradun which is the closest railway station at a distance of 83 km from the lease area.

The basic amenities available in the area are described below:

3.15.1 Educational Facilities

In the study area, consisting of 129 village as per census of 2001, the total numbers of educational institutions in various categories are 90. Out of these 90 institutions there are 78 primary schools, 12 matriculation, 1 higher secondary schools, 1 Industrial school & 1 graduate college. There is no village without even a primary school.

3.15.2 Medical

As per 2001 census, Medical and health care facilities in the study area include 1 Allopathic hospital, 1 Ayurvedic hospital & 1 dispensary each of Allopathic, Ayurvedic & Homeopathic. 2 maternity and child welfare homes, 2 maternity homes, 1 child welfare centre, 1 health centre, 1 primary health centre, 18 primary sub-centre, 3 primary welfare centre, 1 nursing home, 15 registered private medical doctors, 25 community health workers & 2 medical health centre.

3.15.3 Electricity

Electricity for all purpose is available in all villages of study area.

3.15.4 Drinking water

All the villages in the study area have water supply for domestic purposes. The source of water supply in most of the village is spring water. No water supply system exists in the area. Water demand of 4.50 KLD for dust suppression , 0.50 KLD for drinking & Sanitation and 1.00 KLD for green belt will be met from spring water from Bagandhar, Kofota and Tatarika which is within 5.00 km from lease area.

3.15.5 Transport

The main mode for transportation is by road. A network of both paved(Pucca) and unpaved(kuchcha) roads exist in the study area, Both are suitably interconnected.

All the villages in the study area have either kuchcha or pucca approach roads. More than 50% of the villages have pucca approach roads. Private jeeps and private bus services share the major responsibility of the transport in the study area. Number of buses, private and state govt. are operating on State highway. The existing local transport facility is, however, not sufficient.

3.15.6 Post and Telegraph

Post office facility , telegraph office and telephone, FAX, STD,ISD etc is located in village Kamroo at a distance less than 3 km. Telegraph and telephone facilities do not exist in most of the village in the study area. The communication facility in the village is poor.

3.15.7 Place of Historical or Archaeological Interest

No such place of Historical or Archaeological importance exists near lease area or within buffer zone.

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CHAPTER – IV IDENTIFICATION OF IMPACTS

4.0 INTRODUCTION

Any human activity in any environment produces impact, modifying it to a status which is considered adverse or 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.

- Climate
- Air environment
- Land environment
- Ecology
- Water environment
- Noise levels
- 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 indirect or induced and typically include the associated investments and change patterns of social and economic by the proposed actions.

4.1 TOPOGRAPHY & DRAINAGE

4.1.1 TOPOGRAPHY

The lease area is situated in Bagandhar mining area at highest between 2042 mRL and 1866 mRL. The lease area is marked in the south-eastern slope of the NE-SW trading Bhimgoda ridge. Rectangle shape of lease area stretch between Grid line E 00 – E 500 and N 00 – N 400.

4.1.2 DRAINAGE

A dry khala flows through the lease hold area and it originate from 1970 mRL near the crossing point of Grid line E 300 and N 200. There is an another small dry khala towards south outside of lease area, it flows approximately west to east direction. Aforesaid two khalas collect the rain water from lease area and drain its water through Shamahal ka khala into Tons river. No water source exists within the lease area and there is no any water body or spring inside lease area.

4.2 IMPACTS ON CLIMATE

4.2.1 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 voids in the lease area.

4.2.2 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.

4.2.3 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. However, some local ground level changes may take place due to the buildings, green belt developed around the mine, etc.

4.2.4 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.

4.3 IMPACT ON AIR ENVIRONMENT

As explained in the previous chapter, the ambient air quality monitoring results show that all the parameters such as SPM, SO₂, NO_x and CO are within the limits prescribed by CPCB for “Industrial and Mixed use” areas as well as areas meant for “Residential and Rural” areas. This scenario is with the expansion already in place.

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 (SPM). The dust liberated in mining and other related operations is injurious to health 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 predicted 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 in Table 4.1 .

TABLE 4.1
PREDICTED INCREMENTAL GROUND LEVEL CONCENTRATION

RANK	RECEPTOR	X- CORDINATE	Y- CORDINATE	ENDING HOUR	CONCENTRATION $\mu\text{g}/\text{m}^3$	DEPOSITION $\mu\text{g}/\text{m}^3$
1	116	10500.0	11250.0	888C	11.8137	0.2069
2	116	10500.0	11250.0	408C	11.7091	0.2088
3	116	10500.0	11250.0	1416C	11.6970	0.2122
4	116	10500.0	11250.0	1056C	11.6362	0.2113
5	116	10500.0	11250.0	624C	11.4253	0.2117
6	116	10500.0	11250.0	1128C	10.9101	0.1992
7	116	10500.0	11250.0	912C	10.8954	0.1949
8	116	10500.0	11250.0	1608C	10.8310	0.1905
9	116	10500.0	11250.0	1152C	10.6633	0.1972
10	116	10500.0	11250.0	1824C	10.6401	0.2093

A perusal of above 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 $1 \text{ mg}/\text{m}^3$ at peak hours.

4.4 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 is general represents calm surroundings. There is no heavy traffic, industry or noisy habitation in the area except the existing mine. The other major industry like minerals grinding plants is far away. With the increase in scale of mining operations, deployment of machinery, blasting operation and men and noise levels are expected to increase. The noise levels for different equipment in this mine are given in Table 4.2.

TABLE 4.2
Noise Generated by Different Machinery

S. No.	Equipment	Noise Level dBA
1.	Tractor compressor	85-95
2.	Dump Trucks	90-100

The impact of noise intensities at varying distances, derived mathematically by Spherical Propagation modeling for free attenuation due to distance only, are given in Table 4.3

TABLE 4.3
Free Noise Attenuation with Distance

Noise Level at Source F dBA	Distance in m	Noise Level at Receptor dBA
95	100	47
95	200	41
95	300	37
95	400	35
90	100	42
90	200	36
90	300	32
90	400	30

From the above we find that if there noise source of 95,95 and 90 dBA, each at 400m from a receptor, converge at the receptor, their components would be 35,35 and 30 dBA respectively.

With the resultant value being less than the ambient noise levels, there is no likelihood of excess addition of noise, from the mine operation, on the surrounding background noise level.

As derived above and due to the fact that there are no human settlement within 400m, no impact of noise on habitation is likely. The same is brought out by the noise measurements carried out which indicate that the noise levels in the vicinity are within limits.

Through the source would likely cause noise pollution, but since it is continuous the considerable impact will be in. However the noise levels in the working environment are compared with standards prescribed by occupational safety and health administration (OSHA-USA)& CPCB-NEW DEHLI, the acceptable limits are presented in table 4.4 & 4.4.1.

TABLE - 4.4
PERMISSIBLE EXPOSURE IN CASES OF CONTINUOUS NOISE (GOD)

S.No	Total time of Exposure (Continuous or a number of short term exposures) per day in Hours.	Sound Pressure (dBA)	Remarks
1	8	90	1. No. exposure in excess of 115 dBA is to be permitted. 2. For any period of exposure falling in between any figure as indicated in column 1, the permissible sound pressure level is to be determined by extrapolation on a proportionate scale.
2	6	92	
3	4	95	
4	3	97	
5	2	100	
6	1½	102	
7	1	105	
8	¾	107	
9	½	110	
10	¼	115	

TABLE – 4.4.1
AMBIENT AIR QUALITY STANDARD IN RESPECT OF NOISE

Area Code	Category of Area	Limits in dB(A) Leq	
		Day time	Night time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence zone	50	40

In this mine no person is exposed to very high noise levels of noise continuously during works. Those working close to noise generating equipment have been provided with earplugs.

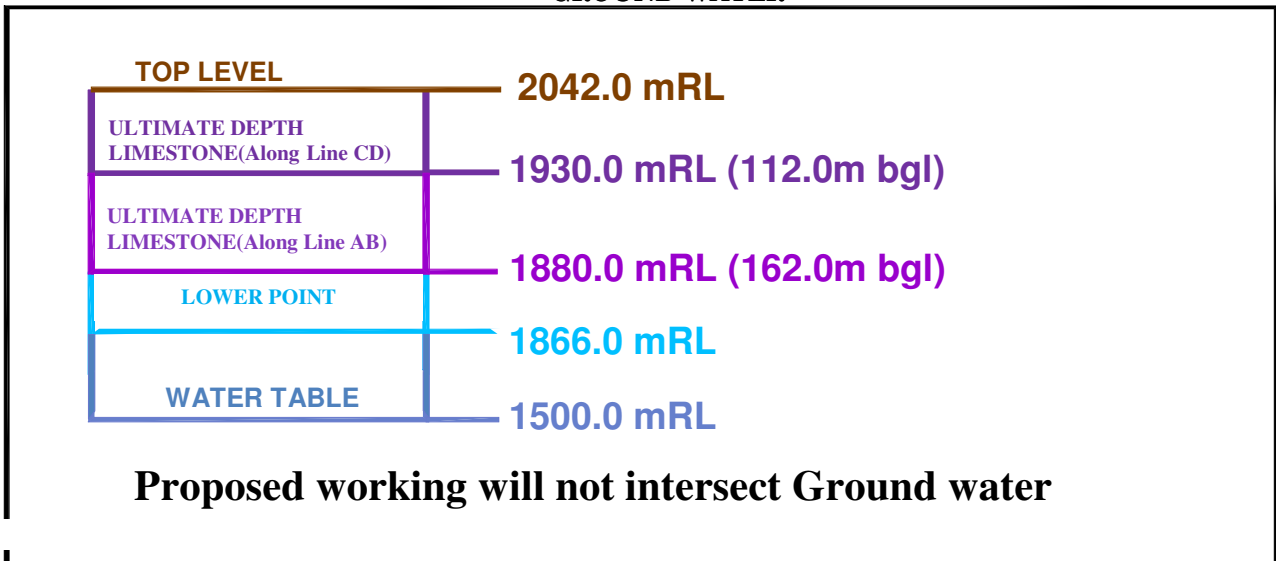
4.5 IMPACT ON HYDROLOGICAL CONDITIONS

In the study area limestone formation is most potential for surface / ground water. The flow of surface / ground water is following the trend of topography, which is in the south and south-west direction.

It is apprehended that mining activity causes lowering of water table in the area. The area being mountainous, ground water is at depth & water is not touched. The clean mining will have nil to marginal impact.

The mining activities shall be kept above the water table so that no de-watering of mining is required. The ground water table (1500mRL) which is 366 m depth from lower point (1866 mRL) and will be not encountered as ultimate working point will be 1930 and 1880 mRL from top level(2042 mRL). Thus the mine operation will not affect the hydrological conditions of the area. At the end of mining operations a sizeable area will be remain a void, which will be developed into a number of reservoirs for Rainwater Harvesting, which will have a positive impact on the ground water scenario.

SCHEMATIC REPRESENTATION OF SITE ELEVATION, WORKING DEPTH & GROUND WATER



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 dump
- Pumping of mine water into surface water bodies
- Soil Erosion

The mining area lies on hilly land having rocky exposure and has no soil cover, therefore storage of soil is not required. However if some soil is encountered in small patches during mining, then it will be recovered carefully and used for plantation purpose.

There is proposal for external waste dump. There is proposal of utilization of waste material in construction of parapet walls, retaining walls & check dams (about 50 % of total waste). The rest of waste material will be stacked at land, which is out side the lease area own by lessee for waste dump stack.

A wire-crated wall of 1.5mx1.5m will be constructed at the toe of the waste dump to prevent any pollution of surface water. Further to prevent wash

off ,two side walls of 2m x 2.5m shall be constructed and grass shall be grown on the dump slope after the dumping is completed. Proper channelization of rainwater shall be done to avoid wash.

The mine workings shall be kept free of water by mining above the water table. 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.

During the mining operations it is planned to develop garland system for preventing uncontrolled flow of rainwater into the mine. The garland drains shall also form part of the water harvesting structures. The diversions from garland drain to the natural drainage system shall be well planned with proper construction to avoid soil erosion and shall have check dams for settling the suspended solids.

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.

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

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 unirrigated agricultural land or 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 favorable 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 present mining operations, as all the related activities are confined to the core zone.

4.9.2 LAND USE IN CORE ZONE (Refer Plate No.3 & 4)

The land use of the area undergoes 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.

TABLE : 4.5
LAND USE STATUS

Description	Pre-Operational Phase	Operational Phase	Post- Operational Phase
Pit / Quarries	2.56	4.44	Nil
Waste Dump	--	--	Nil
Mineral Stack	--	--	Nil
Road & Building	0.67	0.20	Nil
Reclaimed & Plantation	--	--	1.49
Plantation	0.20	2.10	2.10
Water Voids	--	--	4.91
Remaining land	5.07	1.76	0.00
Total	8.50	8.50	8.50

A perusal to table 4.5 shows that 2.56 hect. area is disturbed at present, which will increase to 4.44 hect. area by the end of lease period due to the proposed mining operations.

4.10 IMPACT ON SOIL

Practically, no soil cover is available on the mineralized zone. The conservation of top soil is not required as it is not available in proposed mining area. The impact on soil in the lease area will be negligible.

4.11 IMPACT ON SOIO-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 71 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

There are some people who are engaged in trading of limestone. Therefore due to mining of limestone the per capita income of local people have been improved.

The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such

as medical facilities, conveyance, free education, drinking water supply etc.

The job/business opportunities has improved the economic condition of the persons. They are in a position to utilize this money for purchase of tractors, trucks, jeeps, etc. which may be put into use for business purposes. Part of money has also been utilized in starting of some business as per person's skills.

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 as well as buffer zone of 10-km radius. Therefore, no adverse impact are anticipated.

4.12 STRUCTURED ENVIRONMENT MANAGEMENT & ACTION PLAN

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

**TABLE – 4.6
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.

The management has planned to spend an additional Rs.0.90 lakhs every year on EAP's and provide continual improvement in the area.

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CHAPTER – V

ENVIRONMENT MANAGEMENT PLAN

5.0 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.

The environmental management plan has been developed with a view to bring down the levels 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 low level as possible. Measures to be taken for each of the impact areas are detailed in the following paras:

5.1. LAND RECLAMATION

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

5.1.1 POST MINING LAND USE

In the Himalayan region degradation of scenic beauty caused by mining and waste disposal etc. is an important aspect of reclamation. Creation of green belts appears to be the only way of concealing the ugly scars. The disturbed ecology of the area need to be put back in a better state than original.

It is proposed to reclaim the degraded area by vegetation so as to support forestry and improve upon the existing ecological status. The benches may be reclaimed by plantation of ornamental and other type of trees and local shrubs. Provision of small water tank at lower reduce level will enhance the beauty of area. The vegetation of herbs on benches may provide the

economic upliftment for the poor people. Back filling of pits after recovery of limestone is not required because the mining of limestone is limited to modification of slope. The benches developed on slope will be filled with soil and plantation shall be done over it.

The first step in a successful reclamation programme is to decide the post reclamation land use. The end land use of the mine is controlled by the following factors :

- As it is not feasible to bring the mine pits to ground level it is not found useful to convert it into agricultural land use.
- As there is plenty of land available elsewhere for residential use it is not found useful to convert it into residential area.
- The surrounding areas have very low vegetation discouraging fauna habitats, hence a flora and fauna habitat would be useful.

In view of the above, it would be appropriate to convert the mine into a recreation cum green belt area. The land reclamation shall be planned and carried out to the above aim.

5.1.2 LAND RECLAMATION STRATEGY

The mining and related operations are planned to be carried out in only about 5.40 hect. out of the total lease area of 8.50 hect. The reclamation strategy includes programme of rehabilitating abandoned benches in way of plantations.

The disturbed area at five year stages have been calculated and given in Table 4.5. The disturbed area includes area under active mining, plantation, under structures, roads etc.

The reclamation plan shall include working of three areas :

- Inside mine
- Roads, structures etc.

Besides plantation areas, the free slopes will be kept benched with height of individual terrace up to 6.0 m. The width of individual terrace will be kept minimum 6 m at the final stage. The excavated area shall be covered by spreading a layer of soil on the floor and planting suitable grasses, shrubs and trees.

The mine position at different stages of the mine are showing at 5 yearly intervals in layout plan (**plate no. 03**). The ultimate mine closure position is showing in conceptual plan (**plate no.04**). 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. Thus reclamation activities overlap with the afforestation activities forming a continuous activity. The cumulative break-up of disturbed, afforested and reclaimed lands stages wise is given in Table 5.1.

TABLE – 5.1
RECLAIMED LAND IN DIFFERENT STAGES (IN HECT.)

Land : Stage Wise use reclamation Area(Ha.)					
S. No	Year	Disturbed	Afforested	Reclaimed/Rehabilitated	
				Afforested on mined out benches & dump	Water reservoir/voids
1.	Present	2.56	0.20	--	Nil
2.	End of plan period	3.90	2.10	--	Nil
3.	End of lease period (06.04.2024)	4.44	2.10	2.71	1.73

NOTE :- 1.80 hect. Dump area (outside lease area) will be planted before expire of lease period.

TABLE -5.2
LAND USE PATTERN-AT THE END OF LEASE PERIOD

Particulars	Forest	Agriculture	Grazing	Waste Land	Total
Pit / Quarries	-	-	-	4.44	4.44
Waste Dump*	-	-	-	-	-
Infrastructure	-	-	-	-	-
Road	-	-	-	0.20	0.20
Plantation	-	-	-	2.10	2.10
Remaining Land	-	-	-	1.76	1.76
Area back filled if any	-	-	-	-	-
Total	Nil	Nil	Nil	8.50	8.50

*Dump area 1.80 hect. is outside the lease area.

All fig. in Hect.

The green belt and other undisturbed areas being planted systematically will be completed before end of mining.

5.1.3 SOIL CONSERVATION MEASURES

There is no soil over mineralized area, however during mining if soil will encountered, then following control measures to prevent soil erosion and wash off of mines from freshly excavated benches are being adopted.

- Garland drains to be provided around the excavations shall be prevent storm water from catchments area coming in contact with freshly excavated areas.
- The benches provided with water gradient against the general slopes to decrease the speed of storm water and prevent its uncontrolled descent.
- Special local stone paved chutes and channels shall be provided, wherever required, to allow controlled descent of water.
- Final slopes of benches will be planted with grass, shrubs and trees to prevent soil erosion.
- Toe walls will be provided at the toe of benches along the dump area.

5.1.4 STACKING OF TOP SOIL

The mineral is exposed right on surface with no soil cover therefore removal top soil will be not required during mining.

However, if soil will encounter during mining, will be immediately use for plantation in mine, rehabilitation / reclamation of worked out benches and bench floors. No stacking of soil has been done. In the future the soil shall be used simultaneously for rehabilitation / reclamation of worked out benches and bench floor.

In the mined out area the reclamation operations will be resorted to simultaneously with mining activity. In the process whatever soil generated shall be utilized fully and not required to be stored.

5.1.5 STABILISATION AND VEGETATION OF MINED AREAS

The mined out area is planned to be reclaimed simultaneously during mining operations. A part of the area will be kept under preparation for reclamation while previously prepared area will be reclaimed. The slope of the final benches will be provided with contour trenches to facilitate plantation.

The benches available for reclamation will be provided with bunds of about 1m height at the edge of each bench. The floors will then be covered with a layer of soil followed by plantation of grass and shrubs. In case of the small trenches (terraces), bunds of about 0.58-m height shall be provided at the edge of each terrace. Then a layer of soil shall spread over the terraces and the area made ready for planting bushes and shrubs.

The plantation of grasses and shrub initially will help in binding the loose soil be growing ground floor and also in raising the fertility of the planted area, thus creating favorable conditions for growing of trees.

The roads constructed during mining operation to the benches shall be kept in good condition during the reclamation period till the mine is fully rehabilitated and abandoned. This will enable in transport of material required for plantation such as plant saplings, manure, water etc. by trucks. The water bodies provided as part of the reclamation plan shall act as water reservoirs.

5.1.6 PLANTATION

The main aim of plantation of mined out areas is to stabilize the land, to protect it from erosion and provide an aesthetic landscape.

Keeping the master plan at abandoned stage in mine the stage wise plantation shall be done. Schedule of plantation in ML area, in addition to that already planted shall be carried out as given in Table 5.3.

**TABLE – 5.3
SCHEDULE OF PLANTATION**

YEAR STAGE	AREA IN HECT.	NO. OF TREES	REMARKS
Present	0.20	200	Green belt; Afforestation of barren areas, mined out bench & dump.
End of 5 th Year	2.10	2100	Green belt; Afforestation of barren areas, mined out bench & dump.
End of Lease period	2.10	2100	Green belt; Afforestation of barren areas, mined out bench & dump.

Afforestation is being 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 are given in Table –5.4.

**TABLE – 5.4
PLANTATION SPECIES**

S. No.	SPECIES SCIENTIFIC NAME	LOCAL NAME	S. No	SPECIES SCIENTIFIC NAME	LOCAL NAME
1	<i>Shorea robusta</i>	Sal	2	<i>Azardirecta indica</i>	Neem
3	<i>Quercus incone</i>	Oak	4	<i>Bauhinia variegata</i>	Kachnar
5	<i>Alnus glutinoa</i>	Alder	6	<i>Bombax ceiba</i>	Semal
7	<i>Albizzia Lebbek</i>	Seris	8	<i>Anogeissus latifolia</i>	Chhal
9	<i>Dalbergia sissoo</i>	Shisham	10	<i>Eucalyptus tereticornis</i>	Eucalyptus
11	<i>Adina cordifolia</i>	Holdu	12	<i>Litsea glutinosa</i>	Chandna
13	<i>Bachanania lotifolia</i>	Bhilova	14	<i>Ficus glomerata</i>	Gular
15	<i>Condia dichotoma</i>	Lassora	16	<i>Ficus religiosa</i>	Pipal
17	<i>Terminate tomentos</i>	Asin	18	<i>Syzygium cumini</i>	Jamun
19	<i>Callistemon viminalis</i>	Bottlebrush	20	<i>Cedrela toona</i>	Red cedar

5.1.7 PLANTING METHODOLOGY

5.1.7.1 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.

The method adopted for fruit trees would be same as given above. Manure, chemical fertilizer and insecticide would be used more liberally i.e. twice as much as for other trees. The frequency of weeding and cleaning would also be increased to three in the first year and two in the second year.

5.1.7.2 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.

5.1.8 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 deptt.

5.1.9 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.

5.2 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 SPM levels in ambient air.

5.2.1 MEASURES TO PREVENT GENERATION AND DISPERSAL OF DUST

Dust particles that are normally generated during various mining operations when become airborne lead to increase in SPM level in the ambient air. Another source of dust generation is the transport of material by dumpers. Adequate control measures are being taken during mining operations as well as transportation of Minerals. Dust suppression by water spraying is adopted on the haul roads.

5.2.2 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.

- Dense green belts are being 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.

- 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 provided to the workers engaged at dust generation points like excavations, loading and unloading points.

5.3 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 various machines for excavation, transport and other auxiliary operations have increased the noise levels but are naturally attenuated within lease area itself. Additional measures are being taken to further reduce the noise levels.

5.3.1 MEASURES TO REDUCE AMBIENT NOISE LEVELS

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

- * A thick tree belt is being developed around the periphery of the mine to attenuate the noise levels.
- * Trees would be planted on both sides of roads being used for transport of men and material.
- * Proper maintenance of noise generating machinery including the transport vehicles.
- * Provision of silencers to reduce the engine noise of machines.

5.3.2 MEASURES TO PROTECT WORKERS FROM HIGH NOISE LEVELS & VIBRATION CONTROL MEASURES

The following measures are being 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.

5.4 GROUND VIBRATION CONTROL MEASURES

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.

5.5 WATER POLLUTION CONTROL MEASURES

5.5.1 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, but also uncontrolled flow of mine water (during monsoon) into these nallahs.

A garland drain shall be made to carry away rainwater of the catchments area surrounding the working to the natural nallahs. The drain shall be lined 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.

5.5.2 GROUND WATER

There would not be any adverse 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.

However, regular monitoring of quality in the existing hand pump/tube wells in the vicinity would be carried out both with reference to area spread and times intervals to study the hydrodynamics of the strata.

5.6 MEASURES TO IMPROVE SOCIO-ECONOMIC CONDITIONS

The overall impact of Bhimgoda Limestone Mine 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. The Mine has also boosted trade in the supply of spares, in engineering jobs on contract, as well as in civil works.

5.6.1 EMPLOYMENT

The mining operations are regularly employing about 71 persons. Preference is 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.

5.6.2 COMMUNICATION & TRANSPORT

Communication facilities will be created such as approach roads, telephone, post offices and amenities like dispensaries, shops etc. which will benefit the local population.

5.7 ENVIRONMENTAL MONITORING

The monitoring of pollutants in the mine is being carried out as follows :

- Air monitoring
- Water monitoring
- Noise monitoring
- Soil testing

A private agency will be takes care of all the monitoring needs of the mine.

5.7.1 AIR MONITORING

Works zone ambient air monitoring in mine area is conducted once in a quarter from the following operations :

- Excavations
- Loading
- Transportation(Haul road)

Ambient air monitoring in the surrounding areas is carried out quarterly at four locations surrounding the lease area. The sampling and analysis is carried out as per relevant statutory specifications. The analysis results of air monitoring are kept as record and submitted to the statutory authorities from time to time.

5.7.2 WATER MONITORING

The water samples of hand pump / tube wells etc. in and around the mining area are tested at quarterly intervals. The analysis is carried out as per relevant specifications.

5.7.3 NOISE

Noise measurement of mine equipment is done once in quarter. In case of overhauling of major equipment noise measurement is taken before and after overhaul. The workplace and surrounding noise levels are monitoring every quarter months.

5.7.4 SOIL SAMPLING

Soil samples are tested before and after plantation of the areas on regular basis.

5.8 OCCUPATIONAL SAFETY AND HEALTH

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. 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 subject to medical examination

on annual basis. The above tests keep upgrading the database of medical history of the employees.

5.9 DISASTER MANAGEMENT PLAN

5.9.1 GENERAL

The complete mining operation is carried out under the management control and direction of qualified Mines Manager. The Directorate General Of Mines Safety(DGMS), Dhanbad have issued a number of standing orders, model standing orders and circulars to be followed by the mine managements in case of disaster, if any.

However, following natural/industrial hazards may occur during normal operation.

- Filling up of mine pit due to flood / excessive rains
- Slope failures at the mine faces
- Accident due to heavy mining equipment
- Land slide.

5.9.2 MINE INUNDATION

5.9.2.1 Causes of inundation

Inundation in opencast mine is broadly caused due to the following reasons:

Water Table

The natural ground water table become a source of inundation when the working cut across the water table. The severity of inundation depends on :

- The structure and size of the water table reservoir; and
- Permeability and the structure of the formation which is being excavated.

Adjoining Water Sources

In this case inundation is caused when the barrier in between the working and adjoining water sources such as reservoirs, ponds, rivers, etc. gets breached or when impermeable barriers are removed.

Rainfall

The inundation problem due to rainfall is directly related to the surface area under excavation, its topographical position relative to adjoining area and the intensity of the rainfall.

5.9.2.2 Assessment of inundation

Water Table

The ground water table(1500 mRL), which is 366 m depth from lower point (1866 mRL) and will be not encountered as ultimate working point will be 1930 and 1880 mRL from top level(2042 mRL). The inundation problem is not likely to occur even in the last working bench, as the water table will not be penetrated.

Adjoining Water Sources

There is no large storage of water in or adjoining the mine area and the mining operations are not likely to go close to any surface water body at any point of time. Hence no inundation due to flow of water from any adjoining water body is anticipated.

Rainfall

The precipitation occurs during pre-monsoon months is mostly associated with thunderstorms and constitute 11% of the annual rainfall. Nearly 76% of the total rainfall is received during the five monsoon months from June to October. Rainfall during winter months constitutes 13% of total rainfall. The weighted annual average rainfall based on available stations in study area is about 1386 mm.

Taking into consideration the topography of the area, no accumulation of rainwater is envisaged at the working faces and mining activities are not likely to be affected by accumulated water. Moreover, the drainage system to be developed, for collecting water in the sump for consumption in the project, shall effectively control any sudden inrush of rainwater.

5.9.3 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 check dam, parapet wall etc.
- Stabilization of Mined Slopes : Open cast mining will leave behind slopes of 35° to 50° with intermediate benches at various levels, which are usually convex, straight or concave type depending on the deposition of the limestone deposit. The rocks are usually hard but the closely spaced jointing makes them friable and brittle at some places. This process of disintegration is further accentuated by weathering. Such type of slopes will not show any sign of failure by major landslides. To check minor debris slides, stabilization of these slopes will be done at regular intervals.
- Stabilization of Overburden Dump :The mining area does comprise rejects in the form of overburden soil and waste rock. The rejects will be stacked in the dump yards in a systematic manner. The dumps will be provided with required slope. Trees will be planted on the dumps to prevent soil erosion.
- Stabilization of Nallah Courses: There are no major nallah courses at the proposed mine area. The control of excess runoff water during monsoon has to be given priority to check the soil and erosion. During rains, numerous gullies will form in the mine area, especially in loosely stacked areas. During heavy

rain, these gullies connected to stream move further by head ward erosion and if gullies are not plugged at initial stage, these go on widening and deepening resulting in massive soil erosion. Therefore, vegetation check dams would be constructed for plugging these gullies. The design of these check dams will allow safe passage to runoff water.

- Entry of unauthorized persons will be prohibited.
- Fire fighting 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 is developed to diver 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.

5.9.4 TRAINING AND 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 update 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.

5.10 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 RESPECTIVE PLANT SECTION.
2. MASSIVE PLANTATION SHALL BE GOT DONE ON CONTRACT FROM OUTSIDE AGENCIES.

The lessee 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, afforestation and green belt development.

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CHAPTER – VI

CONCLUSION

6.0 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.

6.1 AVAILABILITY OF FUNDS FOR ENVIRONMENT PROTECTION MEASURES

6.1.1 Funds for Green Belt Protection

The management of Bhimgoda Limestone Mine 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 2100 numbers of trees will be planted in five years for environmental protection measures. A recurring amount of Rs. 10,000 will be spent every year.

6.1.2 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. 15,000 is spent every year on dust suppression measures.

6.2 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 control measures. This section presents the monitoring schedule and infrastructural requirement for environmental protection in Table no. 6.1, as given below:

MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS**TABLE NO. 6.1**

Particulars	Monitoring Frequencies	Duration of Station	Important Monitoring Parameters
Surface water / Tube well	Once in a Year	Grab	pH, SS, TDS, Iron, Hardness, Alkalinity Chlorides, Nitrates Sulphate & Flourides
Ambient air monitoring	Once in a Quarter.	24 hr.	SPM, SO _x and NO _x
Noise Pollution	Once in a Quarter.	-	Level in dB(A) and dB(C)
Working environment	Once in a Quarter.	-	PH, Conductivity, Sulphate, Nitrate, Phosphates, Alkalinity & texture.

6.3 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

The Table 6.2 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)**

Sl. No.	Particulars	Capital cost	Recurring cost / annum
1.	Pollution control	1,00,000	10,000
2.	Pollution monitoring	50,000	10,000
3.	Green belt on virgin area	50,000	10,000
4.	Occupational health	50,000	10,000
5.	Dump management	50,000	5,000
6.	Miscellaneous(check dam, garland drain, stone wall)	50,000	5,000
	TOTAL	3,50,000	50,000

Total investment on environmental improvement works existing and envisaged is Rs. 3.50 lakhs and recurring expenditure during the stage of production is Rs. 50,000 Rs. per year.

6.4 RECOMMENDATION

M/s Udaipur Min –Tech Pvt. Ltd. survey reveals that the management is providing continual improvement of Environment. The air environment and other emissions are regularly sprinkled with water. The management has provided 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 is given to the local workers. Regular maintenance of vehicle is carried out. Slogans of Environment, health & safety are recommended for display.

The verbal interactions with neighboring villagers reveals that due to sever drought conditions from last four years the ground water level has fallen down. Hence significantly no impact is there due to mining activity. However, the mine is operative since many years, but no significant problems are reported by the villagers. 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.

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CHAPTER – VII
CONSULTANTS ENGAGED
(RQP/UDP/354/2009/B)

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

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, 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 :-

M/s Udaipur Min-Tech Pvt. Ltd. in a short period after its establishment has prepared more than 500 Mining Plan and Scheme with Progressive Mine Closure/Final Plan of various minerals in Rajasthan, Gujarat, Himchal Pardesh & M.P. and more than 450 of them have already approved from IBM-Udaipur/Dehradoon/Ajmer/ Nagpur, Deptt. Of Mines & Geology-Rajasthan, Deptt. Of Geology & Mining -Gandhinagar(Gujarat).

UMT has prepared during year 2004-05 to 2009-10, more than 75 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 40 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 17 years professional experience of survey and geological mapping, prospecting & mine planning for various non metallic minerals and mining of Granite, Marbles etc.

2) **Dr. H.S. YADAV** – M.Sc. (Geology), Ph.D, RQP (IBM) etc. & having more than 20 years of professional experience in Mining of Granite & Marbles .

3) **Mr. MANOJ NANDWANA** – M.Sc. (Geology), M.Tech. (Applied Geology) & RQP(IBM), etc. having 15 years professional experience of survey and geological mapping, prospecting & mine planning for various non metallic minerals and working as resource person for Granite and Marbles blocks and areas.

Besides, our team of Professionals is given below :

1	Ashok Kumar Pardesi	Diploma in Mining & Certified Surveyor.
2	Neelima Sharma	M.Sc. (Geology), M.Tech. (Applied Geology)
3	Mamta Jha	M.Sc. (Environment Science)
4	Devendra Singh Rathore	M.Sc. (Environment Science)
5	Lakshmi Lal Meghwal	Diploma in Draftsman & AutoCAD Master .
6	Harish Kumar Pardesi	Drafts man & AutoCAD Master.
7	Prem Prakash Prajapat	Diploma in Drafts man & Surveyor
8	Praveen Koted	Computer Operator & AutoCAD Master.

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