ENVIRONMENTAL IMPACT ASSESSMENT

FOR
THE EXPANSION OF SINDESAR KHURD LEAD-ZINC UNDERGROUND MINE FROM 4.5 MILLION TPA TO 6.0 MILLION TPA ORE PRODUCTION (ROM BASIS) AND BENEFICIATION FROM 5.0 MILLION TPA TO 6.5 MILLION TPA, LOCATED AT SINDESAR KHURD VILLAGE, RELMAGRA TEHSIL, RAJSAMAND DISTRICT, RAJASTHAN (ML NO.07/95)

FINAL REPORT

Environmental Consultant:

Vimta
Driven by Quality. Inspired by Science.

Vimta Labs Limited
142, IDA, Phase-II, Cherlapally,
Hyderabad–500 051, Telangana State
www.vimta.com, env@vimta.com

NABET
(Approved Consultant)

Project Proponent :

Hindustan Zinc Limited
Sindesar Khurd Mine
Rajamand District, Rajasthan

November, 2017

PREFACE

Hindustan Zinc Limited
Sindesar Khurd Mine,
Relmagra Tehsil, Rajamand District, Rajasthan

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For and on behalf of VIMTA Labs Limited

Approved by : **M. Janardhan**

Signed : 

Position : **Head & Vice President (Env)**

Date : 23rd November, 2017

The report has been prepared inline with the prescribed TORs issued vide letter No. J-11015/7/2017-IA.II (M) dated 3rd April 2017, issued by MoEF & CC, New Delhi.

This report has been prepared by **Vimta Labs Limited** with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Hindustan Zinc Limited (HZL) intends to enhance Lead and Zinc ore production and beneficiation capacities from the Expansion of Sindesar Khurd mine from 4.5 million TPA to 6.0 million TPA Ore Production (ROM basis) and Beneficiation from 5.0 million TPA to 6.5 million TPA, located at Sindesar Khurd Village, Relmagra Tehsil, Rajamand District,Rajasthan.

As per Environment Impact Assessment (EIA) notification dated 14th September 2006, the proposed expansion project falls under 'Category A' and requires public consultation to be conducted before approaching Ministry of Environment, Forest and Climate Change, New Delhi for Environmental Clearance (EC).

The EIA report has been prepared based on the Terms of Reference (TOR) approved by MoEF&CC and on primary data collected during 1st March 2017–31st May 2017 representing pre-monsoon season, 2017.

1.2 Environmental Setting

The study area covers 10 km radius around the proposed mine lease area. The environmental setting of the proposed expansion mine site is as follows:

- The proposed expansion mine lease area Latitude and Longitude values

A-24°59′ 32.470″N, 74° 08′23.22″ E
B-25°00′ 58.980″N, 74° 08′25.28″ E
C-25°00′ 51.570″N, 74° 08′51.03″ E
G-25°00′ 23.940″N, 74° 08′51.27″ E
H-25°00′ 20.940″N, 74° 08′59.51″ E
I-25°00′ 01.470″N, 74° 09′00.77″ E
J-25°00′ 01.000″N, 74° 08′48.29″ E
K-24°59′ 27.350″N, 74° 08′42.02″ E

- The mine is approachable from Rajpura Dariba by nearest airport, Dabok (Udaipur) at (47.0 km, SSW) and nearest railway station is Fathenagar about (19.4 km, SSW) on Chittorgarh-Udaipur broad gauge railway line and 4 Lane State Highway (SH-9).

- Banas river is (4.4 Km, N), Site elevation is about 510-546 m above MSL;

- Present land use is industrial activity;

- There are no ecological sensitive areas/ protected areas as per Wild Life Protection Act 1972 within 10 km radius.

The study area map is shown in **Figure-1.1.**

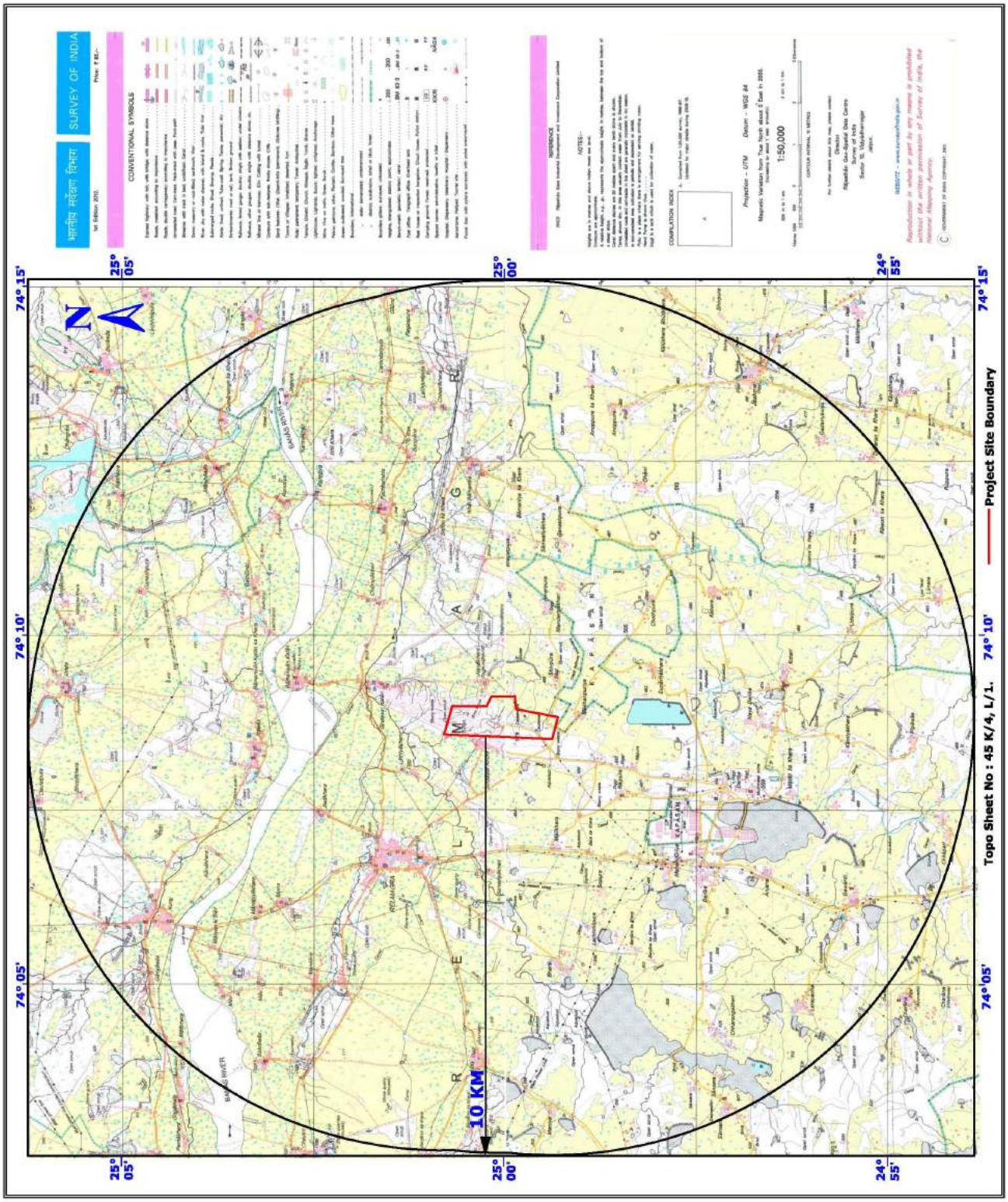


FIGURE-1.1
STUDY AREA MAP OF 10 KM RADIUS

1.3 Project Description

The present capacity is 4.5 MTPA of ore production. The proposed enhancement is intended for raising ore production capacity from 4.5 MTPA to 6 .0 MTPA and Beneficiation from 5.0 MTPA to 6.5 MTPA. The present Blast Hole Stoping method is proposed to be continued with its variants for raising the ore production capacity.

1.3.1 Salient Features of Lead Zinc Ore Mine

The salient features of Lead Zinc ore mine are given below in **Table-1.1**.

TABLE-1.1
SALIENT FEATURES OF LEAD ZINC ORE MINE

Sr. No.	Description	Existing	Proposed
1	Mine lease No., Area & Validity	ML-7/95, 199.84 ha, valid till 19.03.2049	ML-7/95, 199.84 ha, valid till 19.03.2049
2	Reserves & Resources	106.88 million tons 4.52 % Zn, 2.70% Pb (As on 01.04.2016)	122.79 million tons 3.99 % Zn, 2.36% Pb (As on 01.04.2017)
3	Capacity –Mining	4.5 MTPA	6.0 MTPA
4	Capacity- Beneficiation	5.0 MTPA	6.5 MTPA
5	Mode of Entry	Ramp & Shaft	
6	Methods of Mining	Blast hole Stopping with backfilling	
7	Land Requirement	125.52 ha	125.52 ha
8	Power Requirement	40 MW	46 MW
9	Power Source	Captive Generation & AVVNL	
10	Water requirement	14000 m^3/day (STP-Udaipur & Matrikundia Dam)	16000 m^3/day (STP-Udaipur & Matrikundia Dam)
11	Manpower	1500	1800
12	Project Cost (Rs.)	2980	1051 Crores
13	Environment Protection Cost (Rs.)	183.5	100

1.4 Baseline Environmental Status

The baseline data monitoring studies have been carried out for three months representing covering Pre-monsoon (Summer) season 2017 (1st March 2017 to 31st May 2017). The details are as follows:

1.4.1 Land Use

As per Satellite Imagery, the Built-up Land is 8.5%, Crop Land is about 62.6%, Water Body is 6.8% and remaining land is either area waste land. There are no wildlife sanctuary, national park and migratory routes of fauna within study area.

1.4.2 Soil Quality

For the nine soil sample under consideration the pH ranges between 7.4 to 8.5 indicating soils are slight to moderately alkaline. The EC of nine soil samples is

between 83.4 to 386 µs/cm and are below the limits to be called as saline and hence the soils are normal for crop growth. The available nitrogen in the nine samples as per analysis ranges between 7.8 to 60.6 kg / ha showing low nitrogen content for crop growth. The phosphorus content of soil of nine samples ranges between 15.8 to 70.3 kg/ha and falls under low to sufficient category for crop growth. The Potassium content of nine soil samples ranges between 124.6 to 191.4 kg/ha and is very low to low for crop growth.

As per analysis of soils data and field observation the land can be classified as class III land i.e. Good soils on plain to gentle slopes subject to water erosion, as per land capability classification (USDA) i.e. good land for sustained agriculture.

1.4.3 Meteorology

Temperature ranged from 21.3^{0}C to 43.1^{0}C and the relative humidity recorded in the range of 28.1% to 53.2%. Climate represents dry arid conditions. Predominant wind direction is South West with wind speeds ranging from 1-19 kmph.

1.4.4 Ambient Air Quality

Eleven ambient air quality monitoring stations were selected in and around project site. The minimum and maximum values of PM_{10} and $PM_{2.5}$ were observed in the range of 33.6 µg/m^3 to 105.6 µg/m^3 and 21.4 – 47.3 µg/m^3 respectively. Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards.

1.4.5 Water Quality

The baseline water quality status in the region is established by analysing samples at 11 locations consisting of eight ground water samples and three surface water samples. The ground and surface water samples were analysed and found that ground water quality is well within the drinking water quality limits and surface water has been found to be suitable for drinking after the conventional treatment followed by disinfection.

1.4.6 Noise Levels

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. Noise monitoring results reveal ambient noise levels in all the locations are well within the limits as per CPCB Ambient noise standards.

1.4.7 Ecological Environment

Primary survey carried-out with respect to flora in the study area revealed about 41 species of plants, of which 14 species comprise of trees, 5 shrub species and 22 species of herbs including climbers and grass. About 24 species of birds, 8 species of mammals, 4 species of reptiles, 1 species of amphibians and 6 species of insects were reported from this region. Among the life-forms recorded herbs

recorded highest species diversity and density in outer buffer layer compared to inner buffer layer. As per records of state forest department and Ministry of Environment, Forests and Climate Change, there are no protected areas and also wildlife corridors in 10 km radius from mine lease area boundary.

1.4.8 Social Environment

The study area (10-km radius) area has a total population of 91563 according to 2011 census. Total male population is about 50.26 % and total female population is around 49.74%. The average literacy rate 61.46% in the region.

1.5 Anticipated Environmental Impacts

1.5.1 Topography

The proposed expansion is an underground mining operation. The changes in the topography and landscape for excavation of mining stopes, storage of overburden, storage of ore and construction of buildings for office and machineries have already been completed for the present operations. However, some excavation for approach, mill expansion and road construction shall be done in existing land with some levelling. The existing facilities are adequate for the proposed expansion project thus not making perceptible impact on the topography and the landscape.

1.5.2 Land Use

The impacts on land use due to the mining activities are limited to the acquired leasehold area. Presently in the lease area of 199.8425 ha, 125.5 ha land has already been acquired for the proposed expansion would be within the premises only.

No land degradation would take place on account of underground mining operations.

1.5.3 Solid Waste

The waste coming out of mines is being utilized and also proposed to be utilized for height raising, filling of stope voids.

Tailing from Beneficiation Plant

The tailings are impounded separately in a dam. Water contained in the tailing slurry is reclaimed from the tailing dam and same is being used in process zero discharge is maintained at tailing dam. Proper management of tailing disposal not only reduces fresh water input to the mill but also protects the environment from contamination due to slurry / water.

1.5.4 Air Quality

The emissions from lead and zinc mining activity depend on the intensity of ore extraction operations, mode of transportation and processing / beneficiation.

Ore loading activities, waste dumping and vehicular movement are the sources to air pollution on the surface. Drilling, blasting and crushing will be confined to underground. However, two crushing system in mine have been planned at surface. Further, the crushers in beneficiation plant are provided with dust extraction/suppressions with outlets connected to stacks which are regularly monitored also 3 nos of continuous online monitoring systems (CAAQMS) have been installed for regular ambient air quality monitoring.

Excavation of ore by drilling, blasting is carried out underground. Wet drilling is being used to suppress dust generation. Similarly, water spraying is carried out to ensure sufficient moisture in the ore transported to the surface. This minimizes any fugitive dust generation and hence impact on ambient air quality from the underground mining activity is not expected to be significant.

1.5.5 Noise Levels and Ground Vibrations

The main noise generating sources are compressors, crusher house, Ball mills, and floatation cells. Installation of ventilation fans is designed in such a manner to control the noise levels and also they are placed at isolated locations in the mine area to avoid noise pollution in the surrounding.

The noise levels and vibration induced by blasting are attenuated due to depth of the mine below ground. With the proposed expansion, the mine development will occur faster into deeper levels that shall further reduce the noise and vibration impact on the surface. Blasting is carried as per the recommendations of the CIMFR, Dhanbad and every blasting is monitored for vibration as per the DGMS rules and is found well within the permissible limits.

1.5.6 Water Quality

Water from tailing dam is being recycled/ reused for the beneficiation purposes and the same will be continued.

An additional 2,000 m^3/d of water is required for proposed expansion, in addition to approved 14,000 m^3/d water requirement for 4.5 MTPA mining & 5.0 MTPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant & Matrikundia dam. Zero discharge is being maintained. Mine dewatering due to intersection will also be consumed in the process.

1.5.7 Flora and Fauna

There are no forest blocks in the study area within 10-km radius from the mine lease boundary. Nor there any sanctuaries or national parks in 10 km radius of the mine lease area.

The schedule I species of the study area represented by avian species such as Peafowl, Indian Grey Hornbill, White Eye buzzard and Black Shouldered Kite, along with Indian monitor lizard, Indian flap shell turtle along with Indian Leopard which are listed in the Indian Wildlife (Protected) Act, 1972.

Whereas the rest of remaining fauna in the study area represented by respective schedules such as II, III, IV and V of the Indian Wildlife (Protection) Act, 1972.

Incidentally there is no presence of endangered botanical flora in the study area, as per the records of Botanical Survey of India.

1.6 Environnent Management Plan

1.6.1 Air Pollution Management

Sindesar Khurd mines being underground mine, the source of air pollution is not significant. The only possible sources of pollution are due to handling, storage, transportation & crushing ore above ground and due to plying of vehicles in the mine premises and transportation of concentrate to smelters. Transportation of extracted ore from mines to beneficiation plant is through conveyors/trucks. Dedicated fleet of trucks are deployed and maintained to ensure minimum impact due to vehicular movement.

Presently, ambient air quality monitoring is being carried out five (5) locations considering the predominant wind direction and in consultation with RSPCB. Same will be continued for the expansion. Online Ambient Air Quality monitoring have been installed in 3 locations in core zone for continuous monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO.

1.6.2 Noise Pollution Management

The following control measures are being adopted to keep the ambient noise levels well below the limits:

- Majority of mining activities shall be restricted to underground only.
- Proposed primary crusher will be installed in 1000m depth in underground.
- Compressors are installed in isolated building.
- Ventilation fans are provided with dampeners.
- DG sets having acoustic enclosure will be installed.
- All vehicles and machineries used have noise emissions within permissible limits through regular maintenance.
- Regular monitoring of noise level of mining & milling equipment.
- PPEs (Ear plug & Ear Muff) are provided.

HZL will adopt the following control measures to obviate/minimize the impact of vibration:

- Blast design parameters have been decided based on extensive studies carried out by CIMFR who are also involved in validation/ analysis & monitoring on regular basis.
- Regular vibrating monitoring at surface on fixed stations by standard seismographs.
- Determination of predictor equation.
- Total charge and Maximum Charge per delay (MCPD) for each stope is decided

based on its location derived from predictor equation.

- Use of Non electric/electronic detonator.
- Quality drilling and charge per delay optimized as per design.
- Ground vibrations are kept within statutory limits.

1.6.3 Water Pollution Management

Water will be required for various mining activities like drilling, vehicle maintenance, dust suppression, wet grinding of ore, greenbelt development and domestic consumption. Water requirement is 14000 KLD for existing operations. Additional requirement will be 2000 KLD making total water requirement after capacity enhancement to 16000 KLD. To reduce the fresh water consumption, pumped out water from mine sumps shall be recycled and utilized in appropriate industrial applications, used in dust suppression and in beneficiation plant. Water reclaimed from tailing dam will be re used in process.

1.6.4 Greenbelt Development

Suitable greenbelt has been already developed around the mine site to improve the aesthetic of the area to attenuate the noise levels and to reduce the impact of dust generated due to vehicular movement and other operations.

1.6.5 Traffic Management

Due to proposed expansion in the Mine & Mill production, traffic will be increased marginally. As the road condition is very good as per IRC Guidelines, so post expansion will have minimal impact on the current traffic as most of the traffic will be restricted between SK mine and Dariba complex and to the tailing dam to some extent.

1.6.6 Solid Waste Management

In the proposed expansion of S K Mine, no additional waste will be dumped on the surface beyond the already approved waste quantity and no additional waste dump is envisaged. The increased waste generated will be disposed off into the underground voids and height rising of tailing dam.

1.7 Environmental Monitoring Programme

Regular environmental monitoring is conducted in and around project area as per stipulated guidelines by State Pollution Control Board norms, Central pollution Control Board, New Delhi and as per conditions stipulated in environmental clearance. An amount of Rs. 100 crores have been allotted for cost towards pollution control.

1.8 Risk Assessment and Disaster Management Studies

The mining operations at Sindesar Khurd mines are fairly mechanized. In underground mining operations, hazardous situation may arise leading to

accidents. In the Metalliferrous Mines Regulations (1961), possibility of occurrence of hazards and the mitigation measures are spelt out in detail. Accident or hazardous situation may arise due to occurrence of any one of the following causes:

- Outbreak of fire;
- An influx of noxious gases;
- An erruption of water or inundation;
- Premature collapse of any part of workings;
- An accident due to the explosives;
- A fracture or breakage of any essential part of winding system;
- Bursting of any equipment at high pressure; and
- Air blast.

Proper precautions and remedial measures will be taken to prevent the occurrence of the above mentioned causes.

1.9 Conclusion

The proposed expansion project will have minimum impacts on the local environment, with proper mitigation measures and effective implementation of the environment management technologies and measures as suggested in the EIA/EMP report and as recommended by MoEF&CC, CPCB and SPCB. The negative impacts will be minimized to a great extent by judicious implementation of EMP.

The proposed underground expansion would immensely influence the economic aspect of the society around the project and also the state and the nation through increased revenues. About 300 nos (direct and indirect) would get direct or indirect employment in the operations and maintenance of the project.

In addition to the direct and indirect employment opportunity, HZL is already, through the CSR initiatives, providing various skills development opportunity through vocational training that would enable people become self-employed or entrepreneurs. Self help group activities is also implemented to empower rural women and make them self sufficient. Assistance being provided to the village population for access to banking facility has helped further increase the access to cheaper funds and financial facilities. Various health camps are being organized with distribution of essential medicines to improve the basic health of the village population in the vicinity of the project site. Educational material, uniform and scholarship incentives are being distributed to the village school children to motivate them.The project proponent kept 3.0% of the total cost of the project based on local needs.

The present production capacities of Zinc in India are sufficient to meet the domestic requirements. However, the demand for zinc in India is expected to grow at a rate of 8%which makes it viable for the expansion of the zinc production capacities. Further the deficit in international market during the upcoming years provides opportunity for export.

This will improve the social and economic environment in the vicinity and also meets the raw material requirements of the expanded capacities of the company's existing plants. Besides meeting the Company's requirement of its own smelters, the mining and processing of both these minerals (Lead and Zinc) are vital for the development of our country at large.

Thus, in view of considerable benefits from the project, the proposed project is beneficial to the region as well as to the nation.

Chapter-1
Introduction

1.0 INTRODUCTION

Hindustan Zinc Limited (HZL) is Asia's largest non-ferrous metal producer of Zinc and Lead and its Head office is at Udaipur, Rajasthan. HZL is world's second largest integrated producer of Zinc with a global share of approximately 6.2%. HZL has its operations in exploration, mining, ore processing, smelting and refining of Zinc, Lead, and Silver. It is also a major producer of sulphuric acid, as a byproduct of lead-zinc metal processing. HZL also has interest in wind and thermal power generation.

The Sindesar Khurd deposit is located at 6 km NNE of Rajpura Dariba mines in Relmagra tehsil of district Rajsamand, Rajasthan.

Mining lease was granted on 11.06.1998 and executed on 20.03.1999 for a period of 30 years which was subsequently extended for additional 20 years by Government of Rajasthan under the amendment of rule 8A of MMDR 1957 on letter vide no. M.E-II/Raj/CC-Major/ML 7/1995/5308 dated 26.11.2015, from office of Mining Engineer Division-II Rajsamand. Copy is enclosed as **Annexure-IA**. The IBM approved mine plan letter is enclosed as **Annexure-IB.** Authenticated past production details from DMG and Rider agreement are given in **Annexure-IC** and **Annexure-ID** respectively**.** The lease is now valid up to 20.03.2049.

Environment Clearance was granted by MoEF&CC for 3.75 million TPA ore production & 4.25 million TPA ore beneficiation for Sindesar Khurd underground mine vide letter no. J-11015/10/2014-IA.II (M) dated 15-01-2016**,** and amended from 3.75 million TPA to 4.5 million TPA ore production & 4.25 million TPA to 5.0 million TPA ore beneficiation vide letter no. J-11015/10/2014.IA.II(M) dated 21-12-2016 under clause 7 (ii) of EIA Notification, 2006.

The proposed expansion of mine is from 4.5 to 6.0 million TPA of Lead-Zinc Ore Production (ROM basis) and Lead- Zinc ore Beneficiation from 5.0 to 6.5 million TPA from Sindesar Khurd mine & other mines.

1.1 Purpose of the Report

As per Environment Impact Assessment Notification dated 14th September 2006, new projects or activities, or the expansion or modernization of existing projects proposed in any part of India shall obtain prior environmental clearance from Ministry of Environment, Forest and Climate Change (MoEF & CC) or State Environment Impact Assessment Authority (SEIAA)/SEAC.

HZL has obtained Terms of Reference (TOR) for EIA studies vide letter no. F. No. J-11015/7/2017-IA.II(M), dated 03rd April 2017.

In compliance to the TOR condition-48 (mines) and -49 (beneficiation plant) , the EIA report prepared based on the approved TOR along with executive summary in Hindi and English was made available to the public for the purpose of public hearing. Public hearing for the proposed expansion project was conducted by Rajasthan State Pollution Control Board on 1st November 2017 in the presence of Additional Collector and Additional Magistrate as per the Environment Impact

Assessment Notification dated 14th September 2006. Based on the proceedings of the public hearing, the EIA report has been upgraded and submitted for the Environmental Clearance to the Ministry of Environment and Forests, New Delhi.

A copy of the TOR letter **(Annexure-IIA)**, along with its compliance to the conditions is enclosed as **Annexure-IIB**. The certified Environmental Compliance of the existing plant is given in **Annexure-III.**

1.2 Identification of Project and Project Proponent

1.2.1 Identification of the Project Proponent

Hindustan Zinc Ltd. is one of the largest Lead-Zinc integrated producer & a leading producer of silver with more than 60 years of experience in Mining & Smelting. Reserves & Resources of about 404.4 MT as on 31st March 2017 sufficient for more than 25 years of mine life. Environment Clearance Capacities-Ore Production-16.55 MTPA, Zinc metal- 11.25 lakh TPA, Lead metal-2.20 lakh TPA, Silver- 772 TPA. Captive Thermal Power generation 474 MW, Waste heat power 35 MW & Wind power 274 MW and 16.2 MW solar power plant. Clean Development Mechanism (CDM) projects on waste heat recovery & wind power have an annual Certified Emission Reduction potential of over 5,83,685 TPA of CO_2. Total Exchequer to Government during 2016-17 was Rs.17760 Crores, including Royalty, taxes and divident. HZL has established Sewage Treatment Plant at Udaipur under PPP model to treat 20 MLD sewage and utilize treated water in its operations. With the success of Phase-1,MOU has been signed with Udaipur Smart City Ltd for another 40 MLD on 25th June 2017.Vision to enhance the quality of life and economic well being of the communities around its operations, mainly SAKHI, MARYADA, KHUSHI campaigns, reaching over 5 lakh people spread over 184 villages across Rajasthan.

1.2.2 Need for Project & its Importance to the Region

Global zinc & lead consumption is expected to grow steadily by 4-5% per annum in coming years which needs to be met by higher mine & smelter output. Closure of some mines like Lisheen, Century, Brunswick etc and demand growth creating need for around 4 MTPA of additional zinc production by 2020. As India is one of the fastest growing economies in the World, adequate support from metal sector is essential to support & sustain infrastructure development & growth. Galvanized iron products play key role in infrastructure development and therefore the requirement of Zinc metal is essential. Lead requirement in batteries is increasing with Automobile Industry expansion & power back up. Proposed expansion project shall augment the supply of Zinc to the domestic market for Industrial growth. The proposed expansion will generate additional direct employment of approximately 300 manpower. In addition to this, there is ample opportunity for increase in indirect employment due to mining related activities like transport, workshop, garages and other services. Skill development & training programs to make local youth employable shall continue for development of community. Additional exchequer to Government will be around Rs.311 Crores. per annum.

Zinc is a very versatile non-ferrous metal. Zinc's different applications rank it as the 4th most common metal in use after iron, aluminum and copper.

Global Zinc consumption is forecast to grow at a compound average annual rate of 2.4 % p.a. over the period 2016-2021. Global Zinc consumption is projected to grow to 20 Mt in 2035 representing average annual increase of 0.28 Mt.

Consumption growth sets a requirement for extra raw material supply to smelters (concentrate and secondary materials) of 0.28 Mt/a Zn. Whilst some of extra mine capacity will come from expansions and mine extensions of existing producers, the majority will be from new mines. HZL's largest producer Rampura Agucha open pit mine is in closure stage, so by mining this deposit, HZL will provide the country with increased revenue earnings. This will also transform the region's economy.

1.2.3 Demand-Supply Gap

In the aftermath of the financial crisis of 2008-2009, the Indian economy lost momentum. Growth in industrial production slowed from an average of 7.9% during 2000-2008 to 3.9% over the period 2010-2015.

TABLE-1.1
DOMESTIC REFINED ZINC SUPPLY & DEMAND (KT ZN)

Year	2016	2017	2018	2019	2020	2025
Demand (kt)	699	844	833	828	824	827
Supply (kt)	643	838	811	849	837	837

Source: Wood Mackenzie Long Term Outlook

1.2.4 Import Vs Indigenous Production

The present production capacities of Zinc in India are sufficient to meet the domestic requirements. However, the demand for Zinc in India is expected to grow at a 7.1% which makes it viable for the expansion of the Zinc production capacities. Further the deficit in international market during the upcoming years provides opportunity for export.

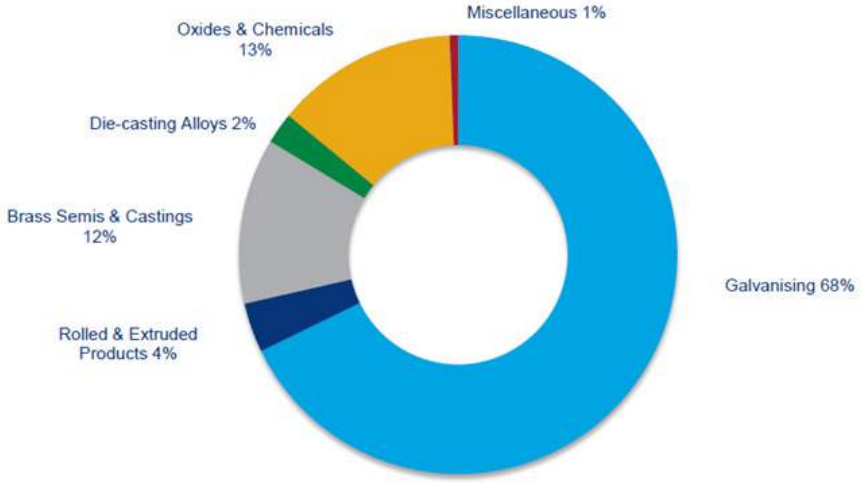
1.2.5 Export Possibility

Indian exports majorly catered to South East Asian and African nations. In India, since Hindustan Zinc is the largest producer of primary zinc, export of zinc is highly feasible and shall bring value addition.

1.2.6 Domestic/Export Market

Zinc having found primary application in galvanization, a range of galvanized products are produced to meet various Industrial and consumer demands. Galvanized sheets (corrugated and plain), galvanized pipes, galvanized structure, galvanized sheet, galvanized wires are used for various applications. Galvanizing Segment accounts for 68% share of the overall zinc demand in India while Non-Galvanizing accounts for 32% share. Among the major customer segments, Galvanized Sheets accounts for major share of the Zinc consumption followed by structure and Alloys. The following chart explains the demand for Zinc in India and its segment wise break-up India has the potential for exporting Zinc profitably as global Zinc demand continues to be high & driven mainly by galvanizing sector in

the emerging of Asia and Africa. The reported increase in Chinese manufacturing activities and US automotive sales along with emerging signs of stability in Europe's manufacturing and services sector are expected to support Zinc demand.



1.3 Brief Description of the Project

1.3.1 Nature of the Project

As per the Environment Impact Assessment (EIA) Notification dated 14th September 2006, the proposed expansion can be classified as **'Category A' project under '1(a)' mining of minerals & 2 (b) mineral beneficiation**, which requires Environmental Clearance (EC) from MoEF & CC, New Delhi.

1.3.2 Size of the Project

The Sindesar Khurd Lead-Zinc deposit extends over an area of 199.8425 ha out of which 125.52 ha is acquired with an estimated geological reserves of 122.79 MT containing 2.36% Pb, 3.99% Zn. The expansion of Sindesar Khurd Lead-Zinc underground mine will be from 4.5 million TPA to 6.0 million TPA Ore Production (ROM basis) and Beneficiation from 5.0 million TPA to 6.5 million TPA.

1.3.3 Location of the Project

The project site is located at Sindesar Khurd village, Relmagra tehsil, Rajamand district, Rajasthan. The index map of the project site is shown in **Figure-1.1**. Similarly, the study area showing topographical features within 10 km radius from the project site boundary and Google image are shown in **Figure-1.2** and **Figure-1.3** respectively. The Surface Infrastructure and Mine Beneficiation photographs are given in **Figure-1.4** and **Figure-1.5** respectively.

1.3.3.1 Cost of the Project

The estimated cost of the proposed expansion project is Rs. 1051 Crores. The anticipated capital expenditure for the pollution control measures is Rs. 100 Crores with a recurring budget of Rs. 12 Crores.

1.3.3.2 Environmental Setting of the Project Site

The details of environmental setting of the project site are given in **Table-1.2**.

TABLE-1.2
ENVIRONMENTAL SETTING OF THE PROJECT SITE

Sr. No.	Particulars	Details
1	Project Location	Sindesar Khurd Mine, Sindesar Khurd village, Relmagra tehsil, Rajsamand district, Rajasthan
2	Latitude Longitude	**A-**24°59′ 32.470″N, 74° 08′23.22″ E **B-**25°00′ 58.980″N, 74° 08′25.28″ E **C-**25°00′ 51.570″N, 74° 08′51.03″ E **G-**25°00′ 23.940″N, 74° 08′51.27″ E **H-**25°00′ 20.940″N, 74° 08′59.51″ E **I-**25°00′ 01.470″N, 74° 09′00.77″ E **J-**25°00′ 01.000″N, 74° 08′48.29″ E **K-**24°59′ 27.350″N, 74° 08′42.02″ E
3	Elevation above MSL	510 m to 546 m
4	Toposheet No	45 L/1, and 45 K/4
5	Climatic conditions (IMD Dabok (Udaipur))	Annual maximum temp: 47.0°C Annual minimum temp: 2.0°C Annual total rainfall: 550 mm Annual predominant wind direction: NW, W
6	Site-specific Climatic Conditions (Pre Monsoon season-2017)	Maximum temp: 43.1^{0}C Minimum temp: 21.3^{0}C Total rainfall: 3.2 mm Predominant wind direction: SW
7	Nearest Highway	NH-162A is within (2.7 km, W) radius from Lease area Udaipur –Chittorgarh 4 Lane : (16.2 km, S)
8	Nearest Railhead	Bhupalsagar (16.8 km, SSE) Fathenagar (19.4 km, SSW)
9	Nearest Railway Line	Udaipur –Chittorgarh Broad Guage (19.4 km, SSW)
10	Nearest Airport	Dabok-Udaipur (47.0 km, SSW)
11	Other Historical /Religious places	Matrikundia (17 km, ENE)
12	Defence installations	Udaipur Cantonment Area (63 km, SW)
13	Ecologically sensitive zones, including National Park, Wildlife Sanctuary, Elephant / Tiger Reserve (existing as well as proposed), Migratory routes etc.	None within 10 km
14	Protected/Reserve Forests	None within 10 km
15	Nearest Village	Sindesar Khurd (0.1 km, W)
16	Villages within 1 Km radius	Sindesar Khurd (0.1 km, W), Ragunathpuram (0.3 km, E)
17	Nearest Town	Relmagra, (3.0 km, NW)
18	Nearest City	Rajsamand, 26.0 km, W)
19	Nearest tourist place	Nathdwara (33.0 km, WSW)
20	List of Industries	Rajpura Dariba Mines (4.5 km, S) Dariba Smelting Complex (3.2 km, SSW)
21	Sesmicity	Seismic Zone –II
22	Nearest IMD Station	Dabok, Udaipur (47.0 km, SSW)
23	Nearest River	Banas-approx (4.4 km, North)
24	Nearest lake/ponds	Rajsamand Lake(25 km, WNW)
25	Nearest Port	Kandla Port(456 km, SW)

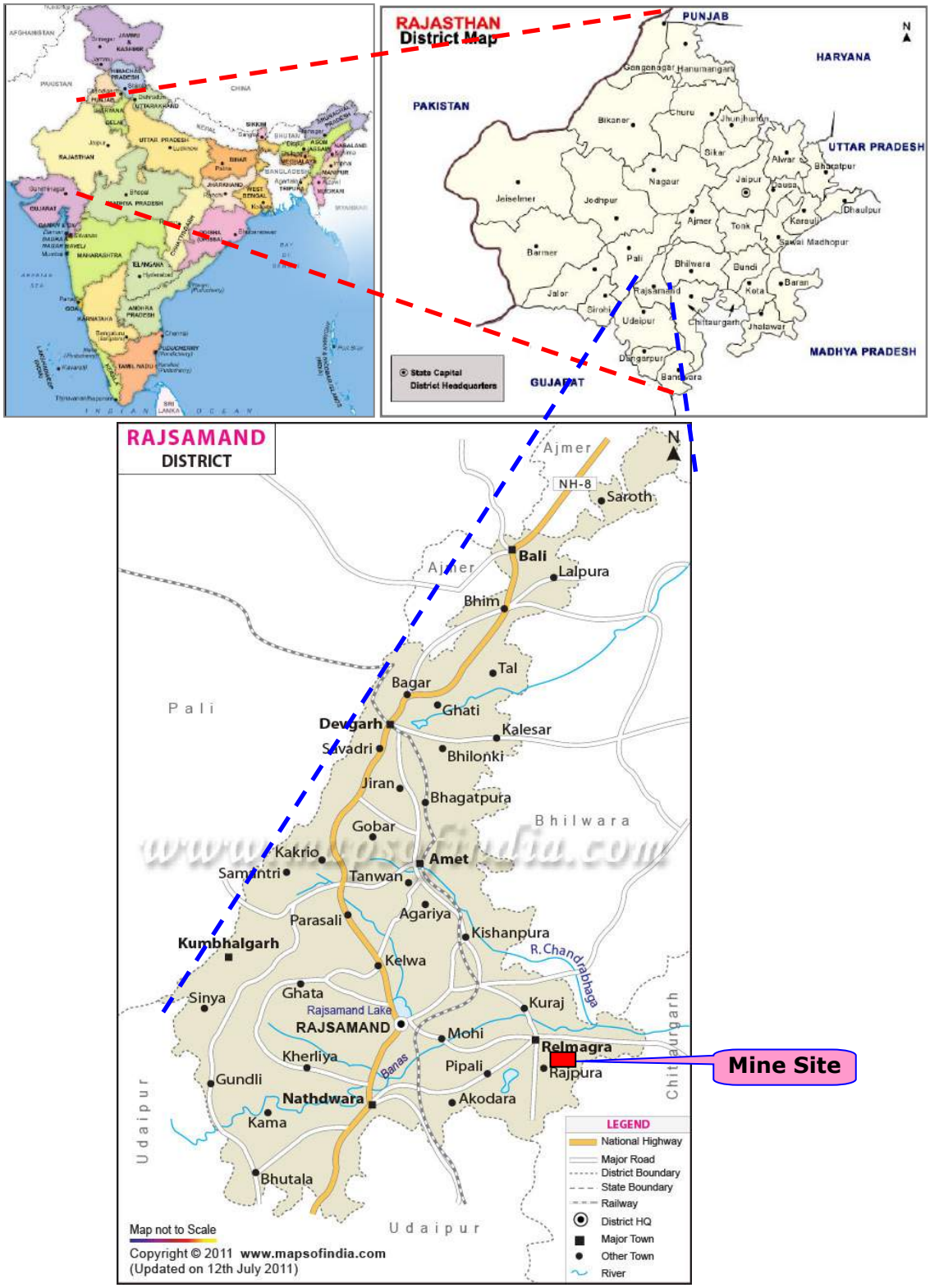


FIGURE-1.1
INDEX MAP SHOWING THE PROJECT SITE

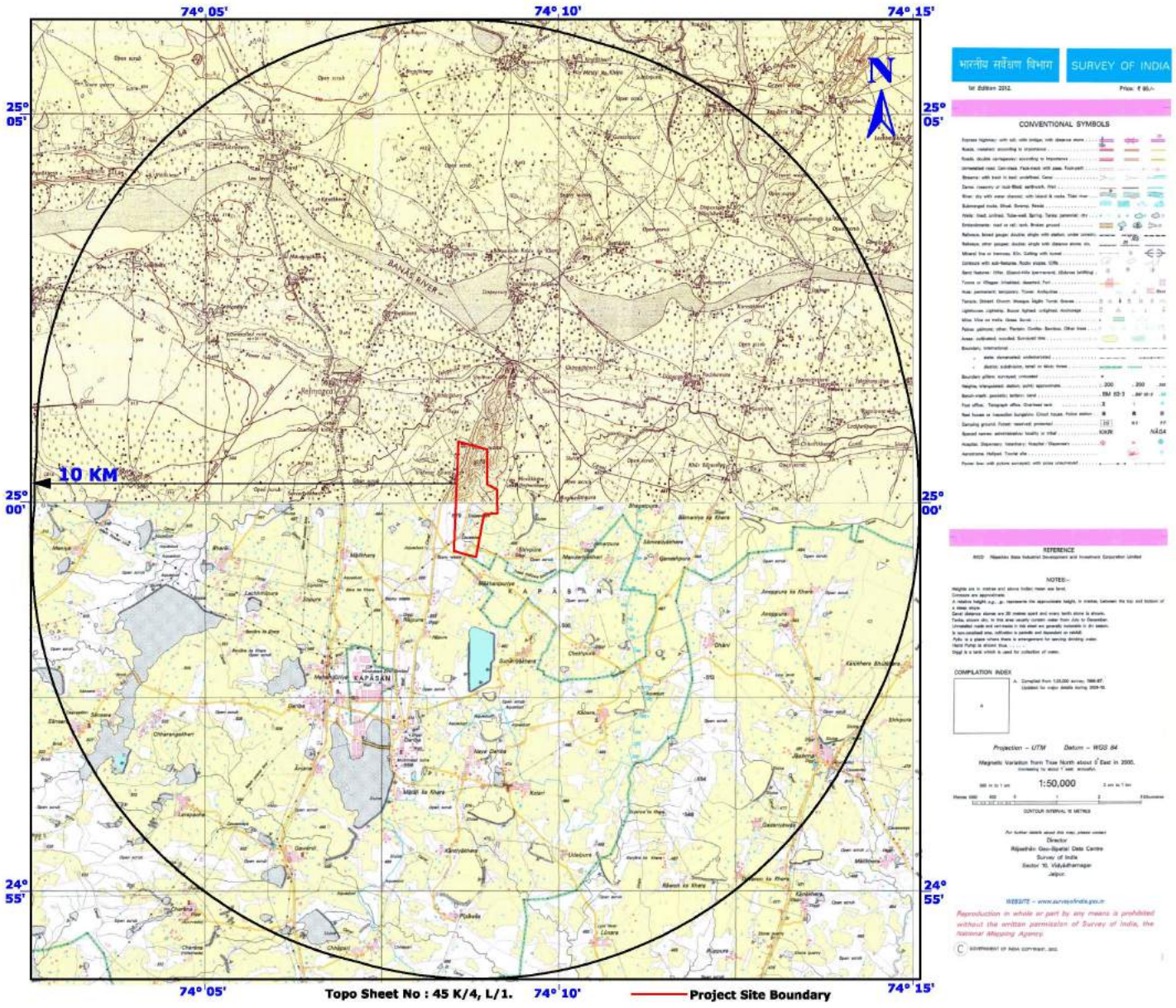
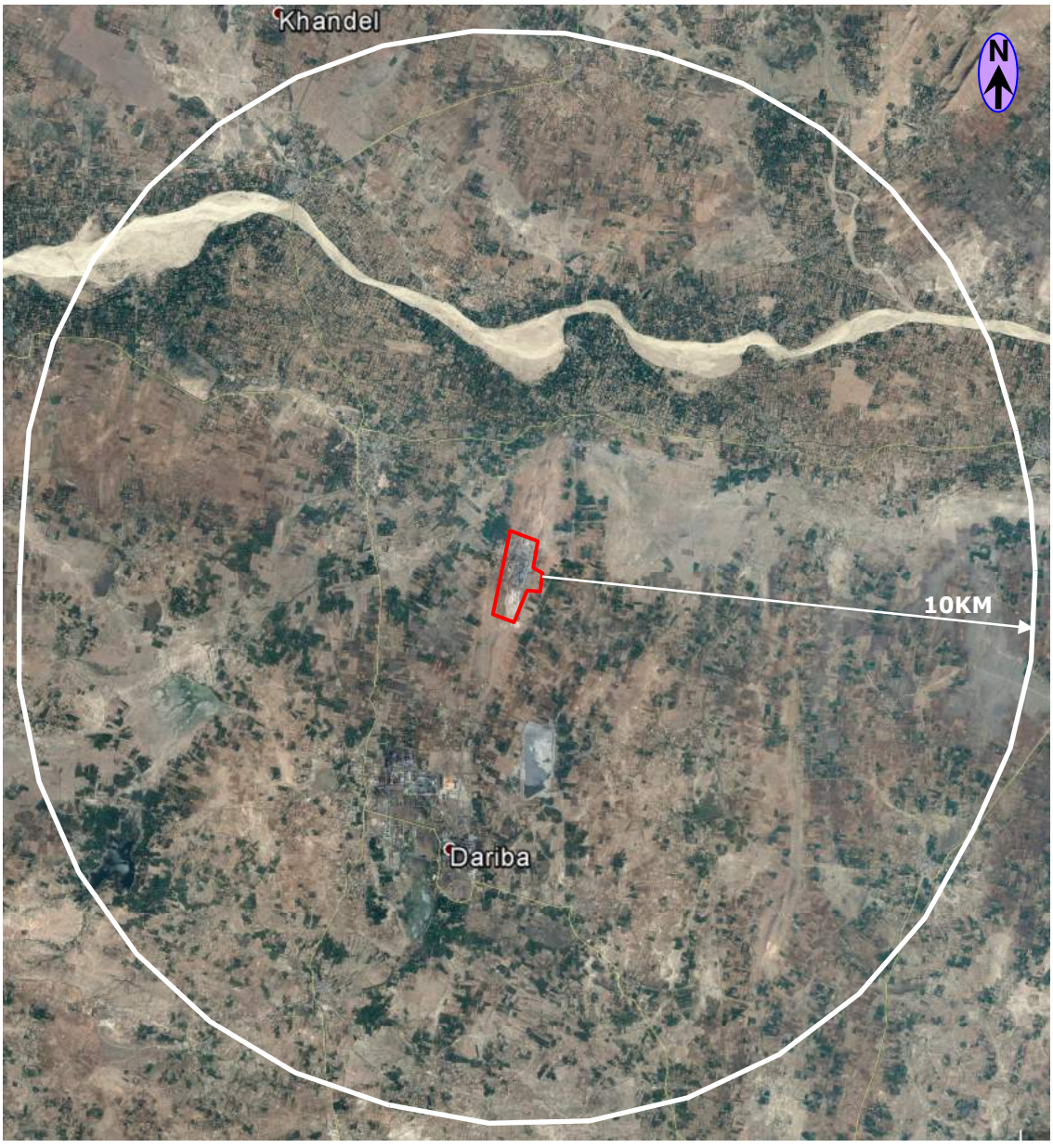


FIGURE-1.2
STUDY AREA MAP OF THE PROJECT (10 KM RADIUS)



LEGEND

Mine Site Area

FIGURE-1.3
GOOGLE MAP OF THE PROJECT (10 KM RADIUS)

FIGURE-1.4
SURFACE INFRASTUCTURE SITE PHOTOS

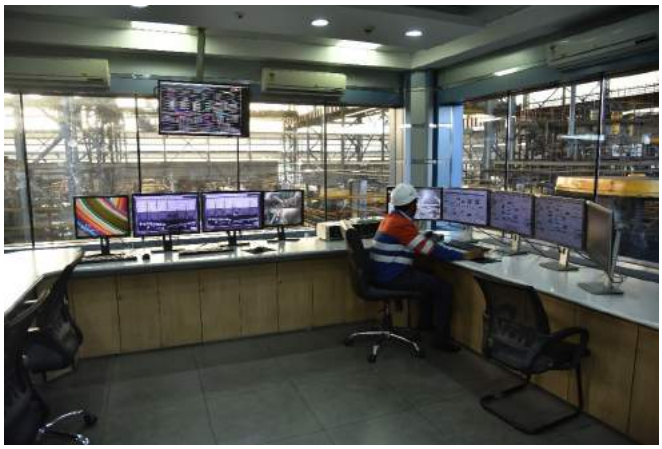


FIGURE-1.5
MINE & BENEFICIATION PLANT SITE PHOTOS

1.4 Scope of the Study

With a view to assess the environmental impacts arising due to the proposed expansion, M/s. HZL engaged M/s. Vimta Labs Limited, Hyderabad to prepare EIA report for various environmental components including air, noise, water, soil and biological components along with parameters of human interest, which may be affected and to suggest mitigation measures for the adverse impacts.

Environmental baseline monitoring has been carried out during pre monsoon (summer) season 1st March 2017 to 31st May 2017 and the same has been used to identify potential significant impacts. Modeling exercises have been carried out to predict and evaluate the cumulative impacts due to this proposed expansion project.

1.4.1 Study Area for EIA

The study area for the EIA study is covered within 10 km from the project site boundary.

1.4.2 Details of the Study

The scope of study broadly includes:

- To conduct literature review and to collect data relevant to the study area;
- To undertake environmental monitoring so as to establish the baseline environmental status of the study area;
- To identify various existing pollution loads due to various activities in the ambient levels;
- To predict incremental levels of pollutants in the study area due to the proposed expansion project activities;
- To evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies;
- To prepare an EMP outlining the measures for improving the environmental quality and scope for environmentally sustainable development; and
- To identify critical environmental attributes required to be monitored.

1.4.3 Methodology of the Study

Reconnaissance survey was conducted by the consultants along with concerned officials and sampling locations were identified on the basis of:

- Predominant wind directions in the study area as recorded by India Meteorological Department (IMD) at Dabok, Udaipur;
- Existing topography, location of surface water bodies like ponds, canals and rivers and along with drainage pattern;
- Location of villages, towns and sensitive areas;
- Areas which represent baseline conditions; and
- Collection, collation and analysis of baseline data for various environmental attributes.

Detailed field studies have been carried out during pre monsoon season (1st March 2017 to 31st May 2017) covering a period of 3 months to determine existing conditions of various environmental attributes. The monitoring details are outlined in **Table-1.3**.

TABLE-1.3
ENVIRONMENTAL ATTRIBUTES AND FREQUENCY OF MONITORING

Sr. No	Environmental Component	Sampling Locations	Sampling Parameters	Total Sampling Period	Sampling Frequency
1	Meteorology	One central location	Temperature, wind speed, wind direction, relative humidity, rainfall	3 months	Continuous hourly recording
2	Ambient air quality	9 Locations	PM_{10}, $PM_{2.5}$, SO_2, NO_2, Ozone, CO, NH_3, C_6H_6, BaP, As, Ni, Pb and Hg	Two consecutive days per week for 3 months	24 hourly samples for PM_{10}, $PM_{2.5}$, SO_2 NO_x, NH_3, C_6H_6,, BaP, As, Ni and Pb; three 8 hourly samples per day for CO and O_3
3	Water quality	8 Ground water and 3 Surface water locations	As per drinking water standards IS: 10500, 2012	Grab sampling	Once during study period
4	Noise	8 Locations	Sound pressure levels	Continuously for 24 hours	Once during study period
5	Soil	9 Locations	Soil profile, Chemical constituents	Composite sample	Once during study period
6	Ecology	Existing ecological resources within study area	Flora and fauna	Field observations and secondary sources	Once in study period
7	Demography and Socio-economic aspects	Total study area	Demographic profile	Based on district census handbook (2011)	
8	Land use	Total study area	Trend of land use change for different categories	Remote sensing data	
9	Geology	-	Geological history	Data collected from secondary sources	
10	Hydrogeology	-	Drainage area and pattern, nature of streams, Aquifer characteristics, Recharge and Discharge rates	Based on data collected from primary study carried out.	

The applicable environmental standards for the project are given in **Annexure-IV**. The methodology of monitoring and analysis is given in **Annexure-V**.

Chapter-2
Project Description

2.0 PROJECT DESCRIPTION

2.1 Project Profile

The present capacity of the mine is 4.5 million TPA of ore production. The proposed enhancement is intended for raising ore production capacity from 4.5 million TPA to 6 .0 million TPA and Beneficiation capacity from 5.0 million TPA to 6.5 million TPA.

2.2 Type of Project

The proposed project is a mechanized underground Lead-Zinc mining & beneficiation brownfield expansion project.

2.3 Location of the Project

The mine is approachable from Rajpura Dariba by nearest airport, Dabok (Udaipur) at (47.0 km, SSW) and nearest railway station is Fathenagar about (19.4 km, SSW) on Chittorgarh-Udaipur broad gauge railway line and 4 Lane State Highway (SH-9).

The deposit forms a part of Rajpura –Dariba Bethumni metallogenic belt. The concealed at a depth below 120 m from the general surface profile. Mining Lease is demarcated on part plan of Survey of India Toposheet No 45 L/1 and 45 K/4. It lies between Latitudes: $24^0$59'N and $25^0$01'N and Longitudes:$74^0$09'E and $74^0$10'E on Survey of India toposheet No. 45 L/1 and 45 K/4.

2.3.1 Topography and Drainage

The topography of the area is marked by a NNE-SSW trending quartzite ridge with highest elevation of 567 mRL. This elevation is flanked on either side by gently undulating surface having an average elevation of 500 mRL.

The watershed and drainage pattern reveals that there are two watersheds in the lease area. The North and West are drained by the non-perennial Banas, which flows about 4.4 km north of the lease boundary and in the extreme southern area its drain by Berach River. As there are series of hills running from the centre of the area, the drainage is mostly from centre towards East and West and drainage density is very poor.

2.4 Geology

2.4.1 Regional Geology

Dariba Bethumni metallogenic belt comprises an assemblage of medium to high-grade metamorphic equivalents of orthoquartzites, carbonates and carbonaceous facies rocks belonging to Bhilwara Super Group (3.5-2.5 Ga) and extends for about 19 km in north-south direction. This cover sequence is underlain by basement rocks (gneisses and schists) of Mangalwar Complex.

The geology of the area is mainly composed of thin alluvial cover, belonging to Sub-Recent to Recent period of Quaternary era underlain by Rajpura –Dariba group of Bhilwara Super Group of Archaeans. The Dariba-Bethumni metallogenic belt comprises of an assemblage of medium to high grade metamorphic equivalents of ortho-quartzites, carbonates, and carbonaceous facies flanked by meta-argillites belonging to Bhilwara Super group of Archaean age. The Regional Geology is shown in **Figure-2.1**.

Structure

The structure of the belt is as an isoclinal fold (GSI, 1990) having syn formal closure at Dariba in south and anti formal closure at Bethumni in north. The syn formal closure exhibits steep plunge (55°-60°) towards ENE and the anti formal closure shows shallow plunge (15°-20°) towards NE.

The rocks have suffered at least three phases of deformation. The earliest folds (F1) are preserved in the form of recumbent folds with N30°E-S30°W axial trend. Another set of appressed isoclinals F1 folds are represented by intrafolial folds with moderate plunge towards NNE to ENE. The last deformation F3 is represented by broad and open warps resulting in culminations and depressions.

The regional trend of the formations veers from N-S between Dariba and Rajpura in the south, to N15°E-S15°W between Sindesar Khurd and Sindesar Kalan in the middle and finally to N50°E-S50°W around Bethumni in the north. The rocks generally show moderate to steep dips towards E/SE.

Mineralization

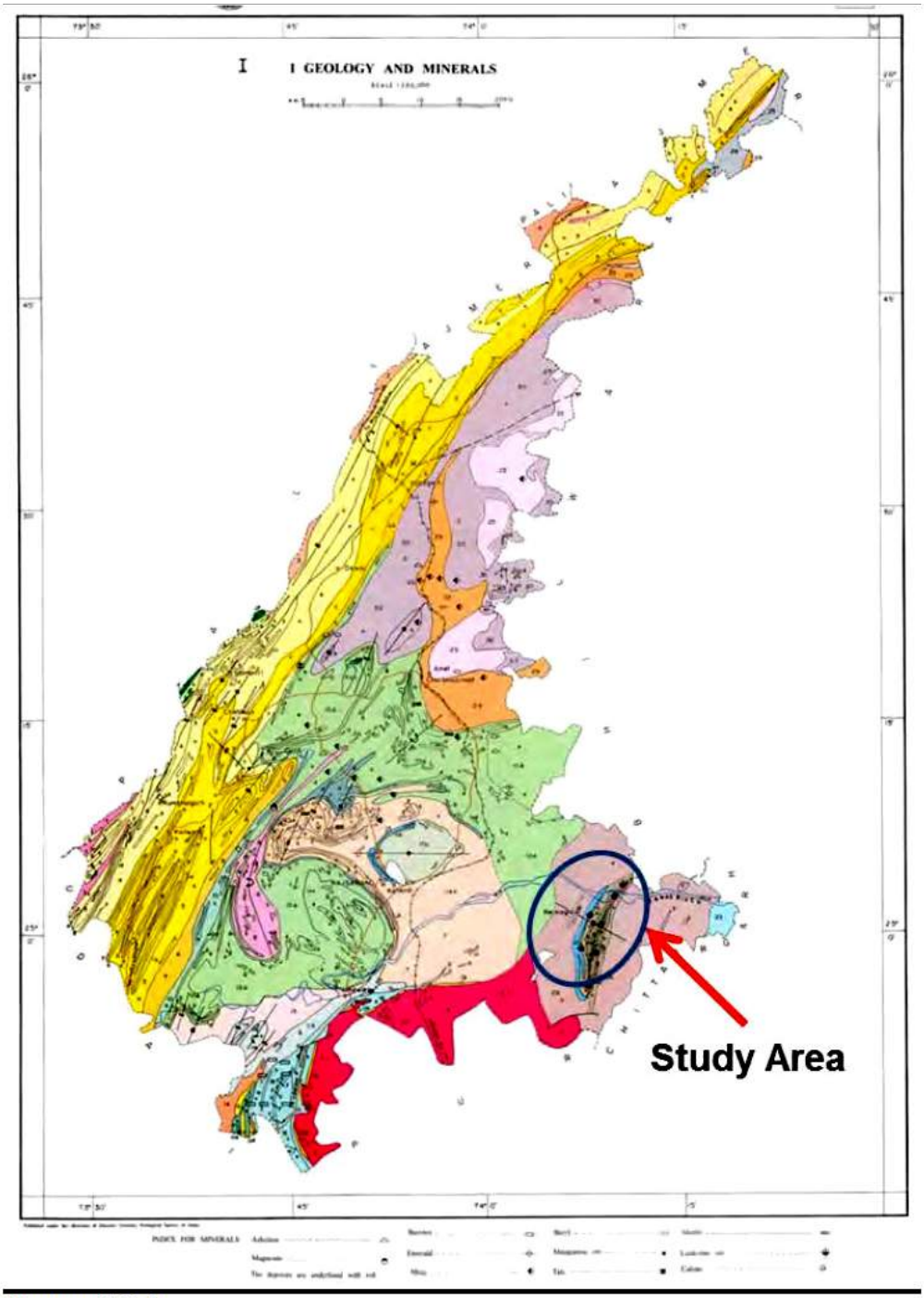
Base metal deposits of various sizes and grades occur throughout the belt in calc-silicate bearing dolomite and graphite mica schist horizons, the latter in general containing low grade disseminated sulphide of large volumes. At the south end of the belt in particular, contains multi-metallic sulpho- salt association. Mineralization exhibits lithological, stratigraphic and structural controls and occurs in the form of fracture-filling veins, stringers and disseminations forming tabular to lenticular ore bodies.

Metamorphism

The assemblage of metamorphic minerals suggests that the area has undergone medium to high grade regional metamorphism up to amphibolite facies. The geology of the area is summarized in following **Table-2.1.**

TABLE-2.1
SUMMARIZED GEOLOGICAL SUCCESSION

Era	Age	Super Group	Group/Formations	Rock Types
Quaternary	Sub-Recent to Recent	Fluvial & Colluvium	Alluvium	Sand, Silt, Clays, Gravel etc
Unconformity				
Intrusive				Pegmatites, Quartz Venis
		Bhilwara super group	Rajpura-/Dariba group	Dolomitic marble, Graphitic, Kyaniteschists, Quartziters
Achaeans			Mangalwar Complex	Migmatite, gneiss, mica, schists, quartzites
			Banded gneissic Complex	Gneisses, schist,etc



Source: GSoI

FIGURE-2.1
REGIONAL GEOLOGICAL MAP (GSI) OF DARIBA-BETHUMNI MINERALISED BELT

2.4.2 Local Geology

2.4.2.1 Deposit Geology

Sindesar Khurd deposit is located in the central part of the eastern limb of the major Dariba-Bethumni synformal fold. The best exposed rock unit in the area is interbanded mica – schist / chert/ quartzite and forms a prominent NNE-SSW trending ridge. The economic concentrations of lead-zinc-silver mineralization are hosted by calc-silicate bearing dolomite and graphite mica schist. The host rock is completely concealed 100 m below the above unit.

Graphite mica schist and calcareous quartz biotite schist, exposed further east of the area are intersected in the drill holes and mine developments.

Rock Characterisation

The rock types of the area from footwall to hanging wall are as follows:

- Calcareous quartz biotite schist;
- Calc-silicate bearing dolomite with lead – zinc mineralization;
- Carbonaceous mica schist (mineralized); and
- Garnet quartz mica schist with chert/ quartzite intercalation.

Structure

Sindesar Khurd deposit is located in the central part of the eastern limb of the major Dariba-Bethunmi synformal fold. To decipher the local structural setting and it's bearing on the correlation of the concealed calc-silicate bearing dolomite host, litho-structural mapping of a part the Sindesar Khurd ridge covering the deposit area was carried out and integrated with the geological maps of GSI for the adjoining areas. The general trend of the quartzite/quartz mica schist bands is in NNE-SSW direction. At places, some quartzite bands showing recumbent digitations are exposed for more than 200 m across strike.

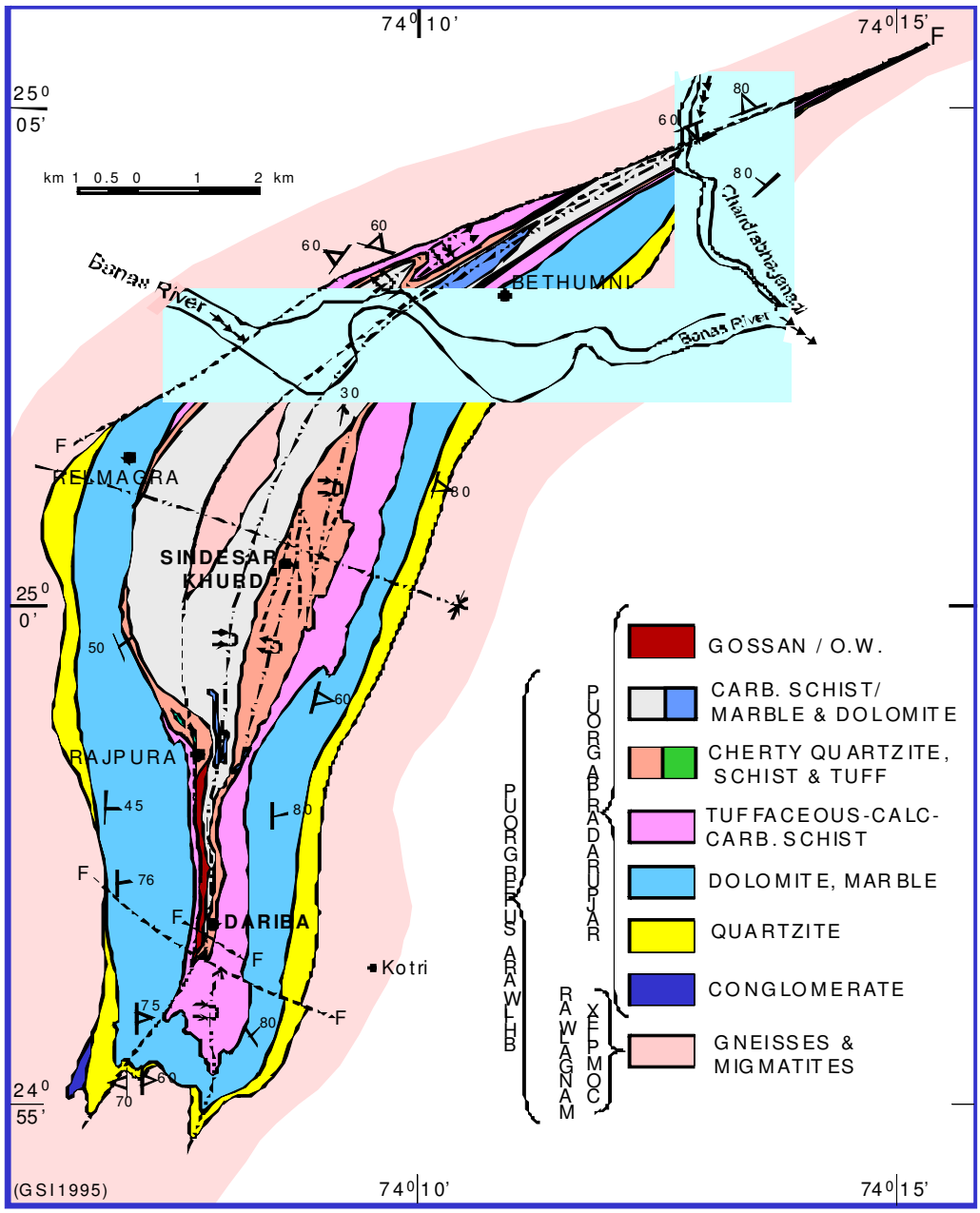


FIGURE-2.2
DEPOSIT GEOLOGY

Folds

Minor folds are rarely observed in the area. Bedding, foliation data and lineation data define isoclinals to open, asymmetric fold geometry with a gentle plunge of 5°- 18° towards N0°-15°E. This fold system is represented by chert/quartzite bands and the earlier schistosity (S1).The youngest folds are open and upright along E-W axes and are exhibited as broad warps in the map pattern of chert bands.

Joints

Joints are most commonly observed in chert /quartzite bands. There are four sets of joints. The rock formations have been affected by minor faults and shears. These are mostly 3-4 m long, rarely extending upto 7-8 m. The brecciated and shattered zones associated with these range in width from a few centimetres to about 2.5 m. These zones in chert/quartzite bands are characterized by shattered and fragmented pieces cemented by silica and ferruginous materials. Displacements due to faulting are of the order of few meters only. Faults and shears are aligned at high angles to the strike of the formations.

Ore Body and its Behaviour

The upper limit of mineralization varies 100 m (between 6775N-8200N) and 350 m and even deeper (further South of 6775N) from surface. The ore bodies dip west to steep east. The ore body lies close to the contact of quartz mica schist envelope with dolomite/graphite mica schist.

The general strike of the ore body is N10°E to N15°E while dips vary from 45° to 60° towards west and in deeper levels steep easterly. Pinching and swelling is also observed in the ore body.

Average width of the ore body is about 30 m. There is remarkable variation in width of ore body both along strike and dip. The ore body is open at a depth of 1100 m from surface and appears to be pinching near 0 mRL (between 7025N-7425N) while in S-extension the ore body is following a downward and southward trend along plunge with steep easterly dips and open in depth. The ore body plan and ore body section are shown in **Figure-2.3** and **Figure-2.4.**

Mineralization

The principal ore forming minerals are Sphalerite (ZnS) and Galena (PbS). Pyrrhotite (Fe1-xS) is most abundant and ubiquitous gangue while pyrite (FeS) and Arsenopyrite (FeAsS) are rare. The ex-solved silver is associated with Galena. The rock forming minerals are calcite, dolomite, quartz, mica, garnet, tremolite, argillaceous and carbonaceous materials.

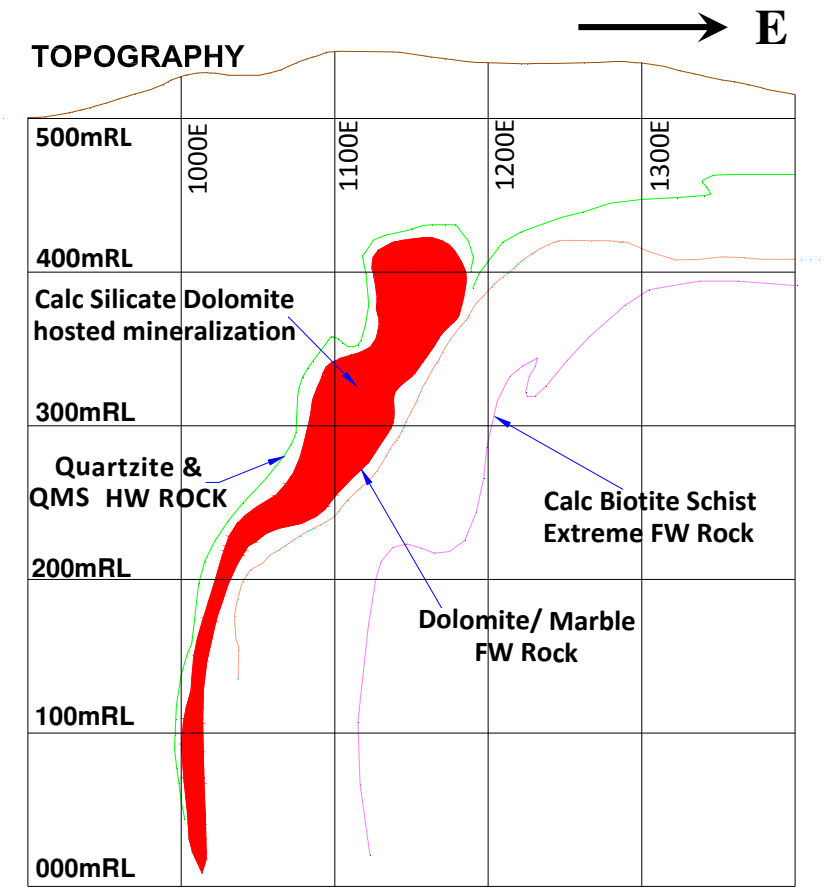


FIGURE-2.3
ORE-BODY PLAN

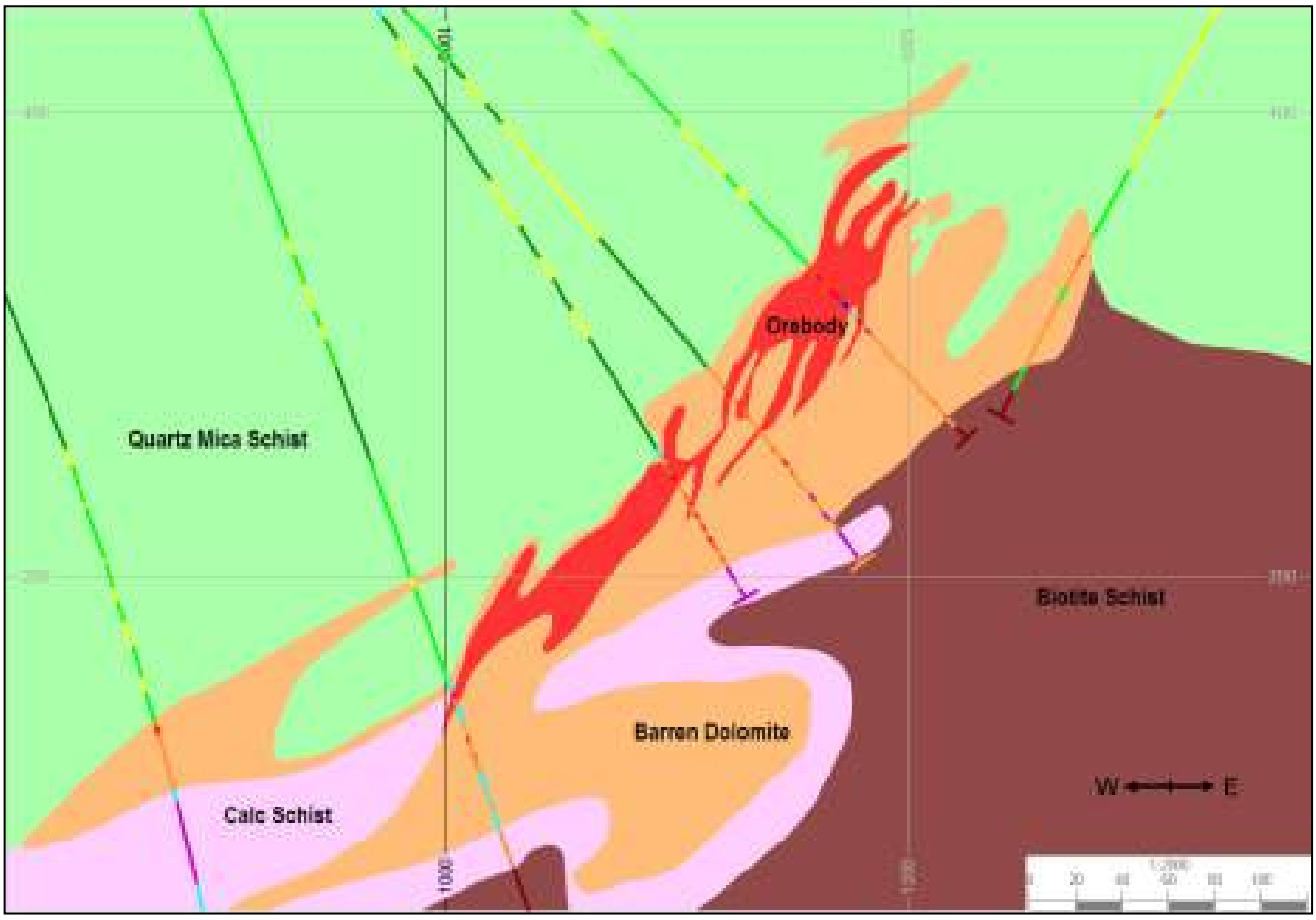


FIGURE-2.4
ORE-BODY SECTION

2.5 Size of Proposed Operation

The project has been planned to produce 6.0 million TPA Lead-Zinc Ore production & 6.5 million TPA Lead – Zinc ore treatment (including 0.5 million TPA from Bamnia Kalan mine & other mines). The salient features of the proposed enhancement project are given in **Table-2.2**.

TABLE-2.2
SALIENT FEATURES OF THE PROJECT

Sr. No.	Description	Existing	Proposed
1	Mine lease No., Area & Validity	ML-7/95, 199.84 ha, valid till 19.03.2049	ML-7/95, 199.84 ha, valid till 19.03.2049
2	Reserves & Resources	106.88 million tons 4.52 % Zn, 2.70% Pb (As on 01.04.2016)	122.79 million tons 3.99 % Zn, 2.36% Pb (As on 01.04.2017)
3	Capacity –Mining	4.5 million TPA	6.0 million TPA
4	Capacity- Beneficiation	5.0 million TPA	6.5 million TPA
5	Mode of Entry	Ramp & Shaft	
6	Methods of Mining	Blast hole Stopping with backfilling	
7	Land Requirement	125.52 ha	125.52 ha
8	Power Requirement	40 MW	46 MW
9	Power Source	Captive Generation & Ajmer Vidyut Vitran Nigam Ltd (AVVNL)	
10	Water requirement	14000 m^3/day (STP-Udaipur & Matrikundia Dam)	16000 m^3/day (STP-Udaipur & Matrikundia Dam)
11	Manpower	1500 persons	1800 persons
12	Project Cost (Rs.)	2980 Crores	1051 Crores
13	Environment Protection Cost (Rs.)	183.5	100

2.5.1 Production Details

The production in Sindesar Khurd mine has begun in the year 2005-2006 and the details of production till date are presented in **Table-2.3**.

TABLE-2.3
YEAR-WISE ORE PRODUCTION

All the values are given in Million Tonnes

Year	EC Sanctioned	Actual	Excess Production
2005-06	0.3	0.0066	Nil
2006-07	0.3	0.060	Nil
2007-08	0.3	0.295	Nil
2008-09	0.3	0.299	Nil
2009-10	2.0	0.444	Nil
2010-11	2.0	0.654	Nil
2011-12	2.0	1.303	Nil
2012-13	2.0	1.585	Nil
2013-14	2.0	1.723	Nil
2014-15	2.0	1.910	Nil
2015-16	3.75	2.969	Nil
2016-17	4.5	3.664	Nil
2017-18 (till Oct-17)	4.5	2.410	Nil

2.6 Exploration

2.6.1 Surface Exploration

The preliminary surface exploration of the deposit was carried out by GSI followed by Hindustan Zinc Limited. From surface GSI and HZL drilled 9267 m (200 m spacing) & 6542 m (100 m spacing) respectively for 900m strike length.

Further, during 1998-2000, GSI carried out exploratory drilling in the south extension. Two holes intersected high grade mineralization (+10% Pb+ Zn and high silver) at greater depth. Following these result, HZL planned detailed exploration in this area.

The surface exploration by HZL has been going on since 2006 in Sindesar Khurd in south extension. The area covers a strike length of 2500 m from the southern and northern limit of present Sindesar Khurd Mine. Till 31st December 2016 a total of 190207 m drilling by surface exploration has been conducted in 434 boreholes. From the borehole data along with the GSI, it is deciphered that mineralization is open in depth and current ore reserves / resources are liable to be enhanced.

The total surface exploration carried out till 31st December 2016 is 2,05,321 m in 473 holes by HZL, MECL and GSI. In future surface exploration drilling will be carried out in order to increase the exploration density to upgrade the ore resources to reserves category. Also it is planned to carry out further exploration in any new lens occurring within the lease.

2.6.2 Underground Exploration

With development of underground levels between 425 to -5 mRL subsurface exploration is being done by diamond drilling for precise delineation of ore body and correct reserves/ resource estimation. Close spaced drilling on 25 m followed by 15 m spacing (where required) is done for stoping operation in underground. Detailed underground exploration drilling is done once the approach development is reached up to the stope/ block to define the ore body geometry precisely and hence for stope planning and extraction in lower mining block. Geological information of mineralization, lithology and structure is also being collected from underground excavations.

2.7 Reserves and Resources as per UNFC Classification

2.7.1 Geological Reserves & Resources

Based on exploration drilling from surface and underground the ore reserves and resource computed on 01-04-2017 stands at 122.79 million tonnes with 2.36% Pb & 3.99% Zn. The status of category wise and level wise ore reserves and resource is given **Table-2.4.**

TABLE-2.4
STATUS OF RESERVES & RESOURCES AS ON 01-04-2017

Category	Mt	pb(%)	Zn(%)	Ag (ppm)
Proved Mineral Reserve (111)	10.04	2.75	4.27	159
Probable Mineral Reserve (121 and 122)	25.53	2.95	4.21	172
Measured Mineral Resource (221)	3.77	2.91	5.19	159
Indicated Mineral Resource (222)	13.60	3.13	4.34	162
Inferred Minerals Resources (333)	69.84	1.91	3.73	86
Total (R&R)	**122.79**	**2.36**	**3.99**	**121**

Source: Mining Plan

2.8 Mining

2.8.1 *Underground Mining*

Mine is currently having nine openings with two ramps, six ventilation raises & an incline.

North Ramp: 5.5 m width & 5.0 m height, gradient: 1 in 7 and excavated up to 15 mRL. North Ramp is connected to SKA2 Ramp at 300 mRL through an intermediate ramp. This ramp provides the main access to SKA2 block and also acts as fresh air intake to the block. SKA2 ramp is developed up to 150 mRL.

South Ramp: 5.5 m width & 5.0 m height, gradient: 1 in 7 and excavated up to 17 mRL. At 495 mRL in South ramp, a dedicated ramp is driven for SKA6 lens to 350 mRL at gradient 1 in 7 connecting both levels; 400 mRL and 350 mRL.

Incline: 30^0 Incline of (3.0 m width x 2.2 m height section) up to 286 mRL in about centre of mine strike.

Intakes: There are 5 fresh air intakes to mine:

1. North Ramp
2. South Ramp
3. Incline
4. Central ventilation raise 2 (CVR-2) at 6776.8 N from Surface to 170 mRL and 170 mRL to 65 mRL with staggered raises
5. SKA-8 Raise at 7000N from Surface to 375 mRL

Exhaust Raises: There are 4 exhaust air intakes to mine:

1. North Ventilation Raise (NVR) at 7425N extended from surface to 15 mRL in stages with 200 cu.m/Sec capacity.

2. Central Ventilation Raise-1 (CVR-1) at 6795 N extended from Surface to 15mRL in stages with 100 cu.m/Sec capacity.

3. South Ventilation Raise (SVR) at 6525 N Driven from Surface to 180 mRL and extended up to 30 mRL with 200 cu.m/Sec capacity.

4. SKA2 Raise at 7500N from Surface to 350 mRL and extended in stages upto 160 mRL level of SKA2 lens, installed with exhaust fan of 650 kW with 163 cu.m/Sec capacity. The surface layout existing & proposed are shown in **Figure-2.5.**

2.8.2 Methods of Mining

Currently the mine is being worked out between 425-15 mRL levels. It is divided into blocks i.e. 425-300 mRL, 290-215 mRL, 195-160 mRL, 130-15 mRL levels in main lens with crown pillars in between. Auxiliary lens, SKA2 between 325-215 mRL & SKA6 between 400-350 is also in operation. Block 425-300 mRL is mined out with blast hole open stoping method with rib pillars and backfilled. Block 290-215 mRL, 195-160 mRL & 130-15 mRL is being mined with blast hole stoping method with post filling in primary-secondary sequence to maximize ore recovery.

In the blast hole mining method, slot is opened at the widest portion of ore body and rings are retreated towards the end of the stope. The muck is then withdrawn at extraction level through LHDs and then directly loaded in to mine trucks for hauling through ramps from underground to surface stock yard. From stock yard, ore is fed to the primary crusher using surface dumpers through haul road after sizing with hydraulic breakers.

The mine development activity in the past three years has been mainly carried out for preparation of stoping panels of block 425-15 mRL and the infrastructure development for block l30 mRL to-55 mRL level. The ore production has been from stoping operation and from ore development in 425-300 mRL, 290-215 mRL, 195-160 mRL & 130-15 mRL mining block. The methods of mining are shown in **Figure-2.6** and mining Longitudinal Vertical section are shown in **Figure-2.7.**

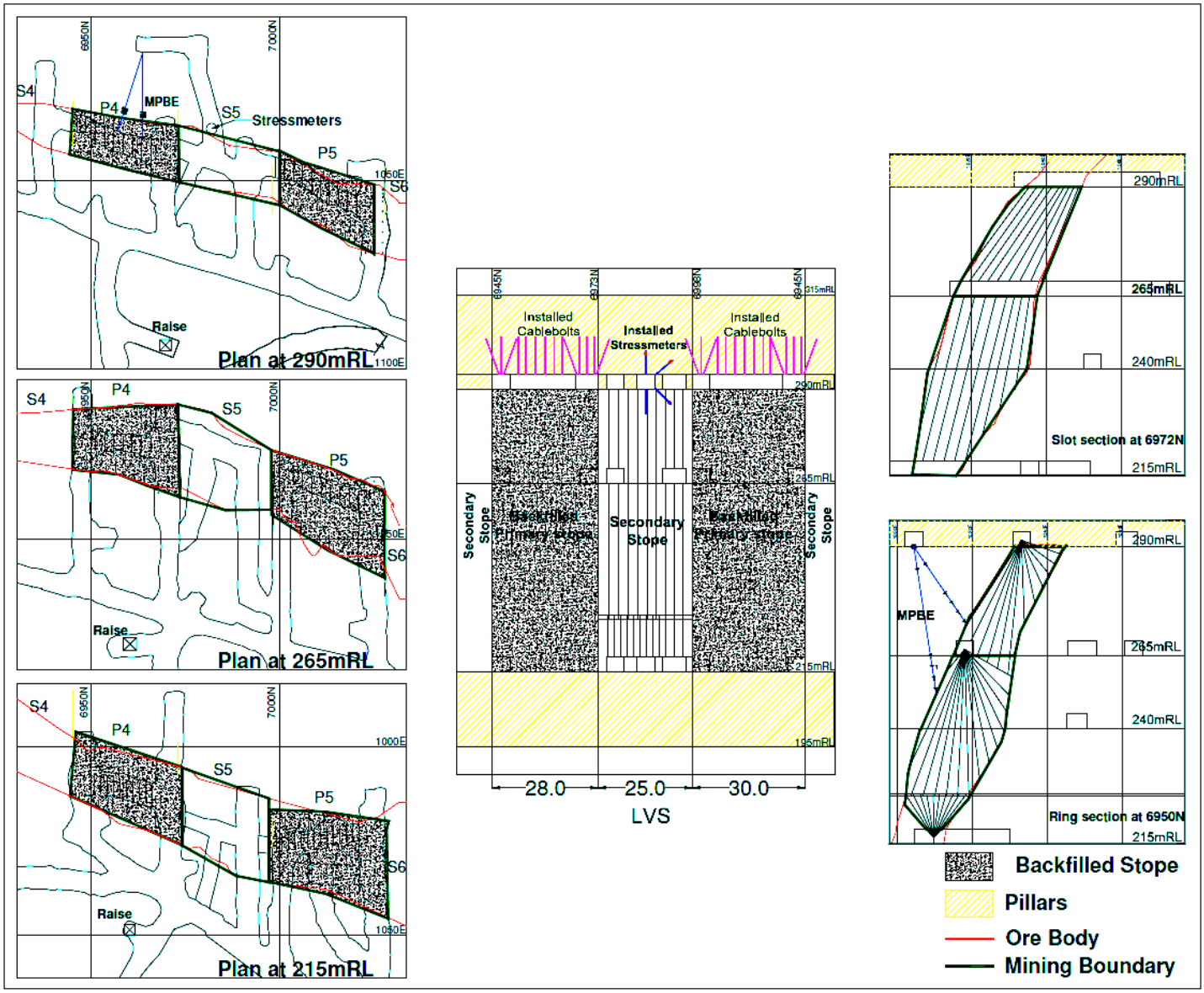


FIGURE-2.5
METHODS OF MINING

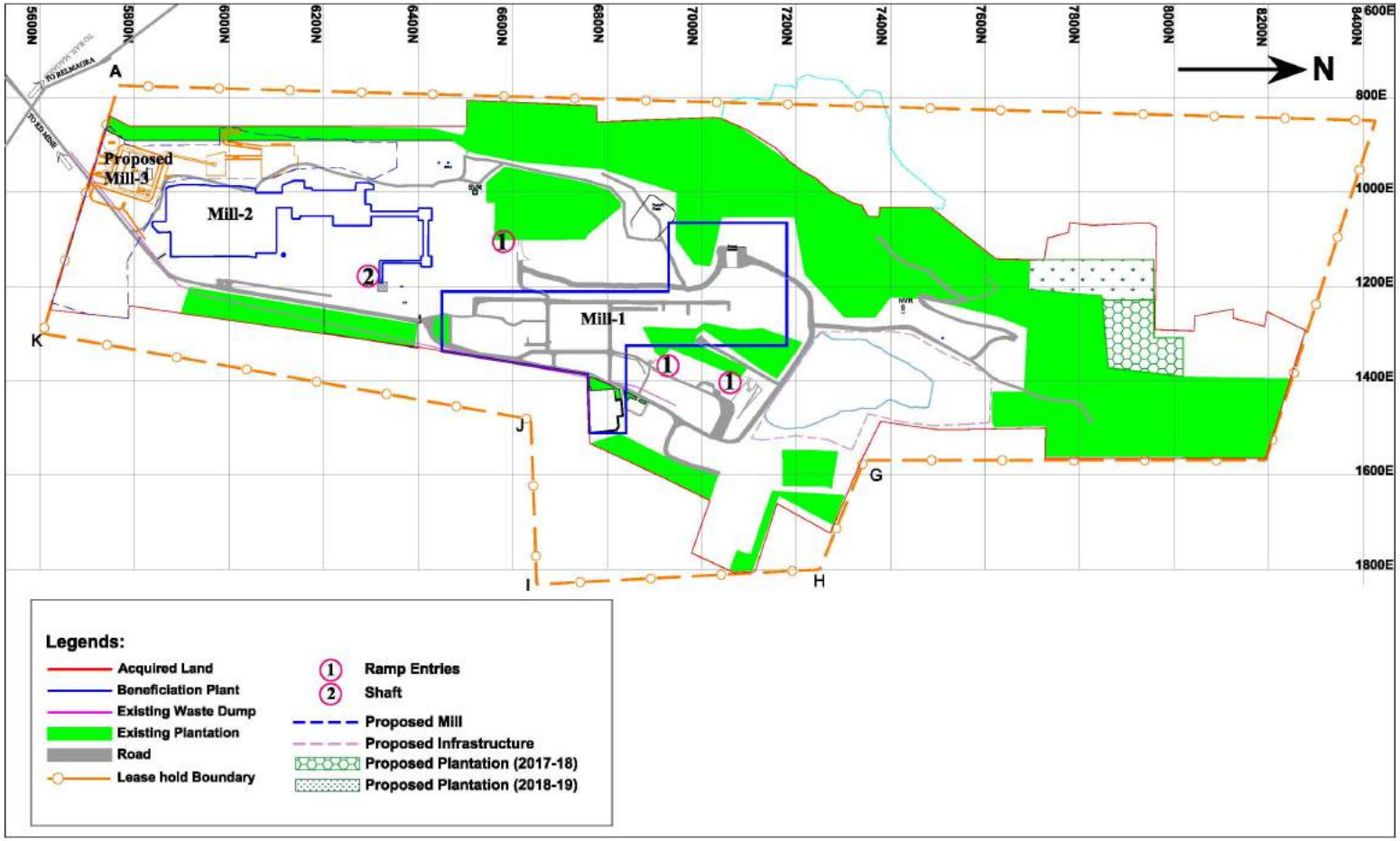


FIGURE-2.6
SURFACE LAYOUT –EXISTING & PROPOSED

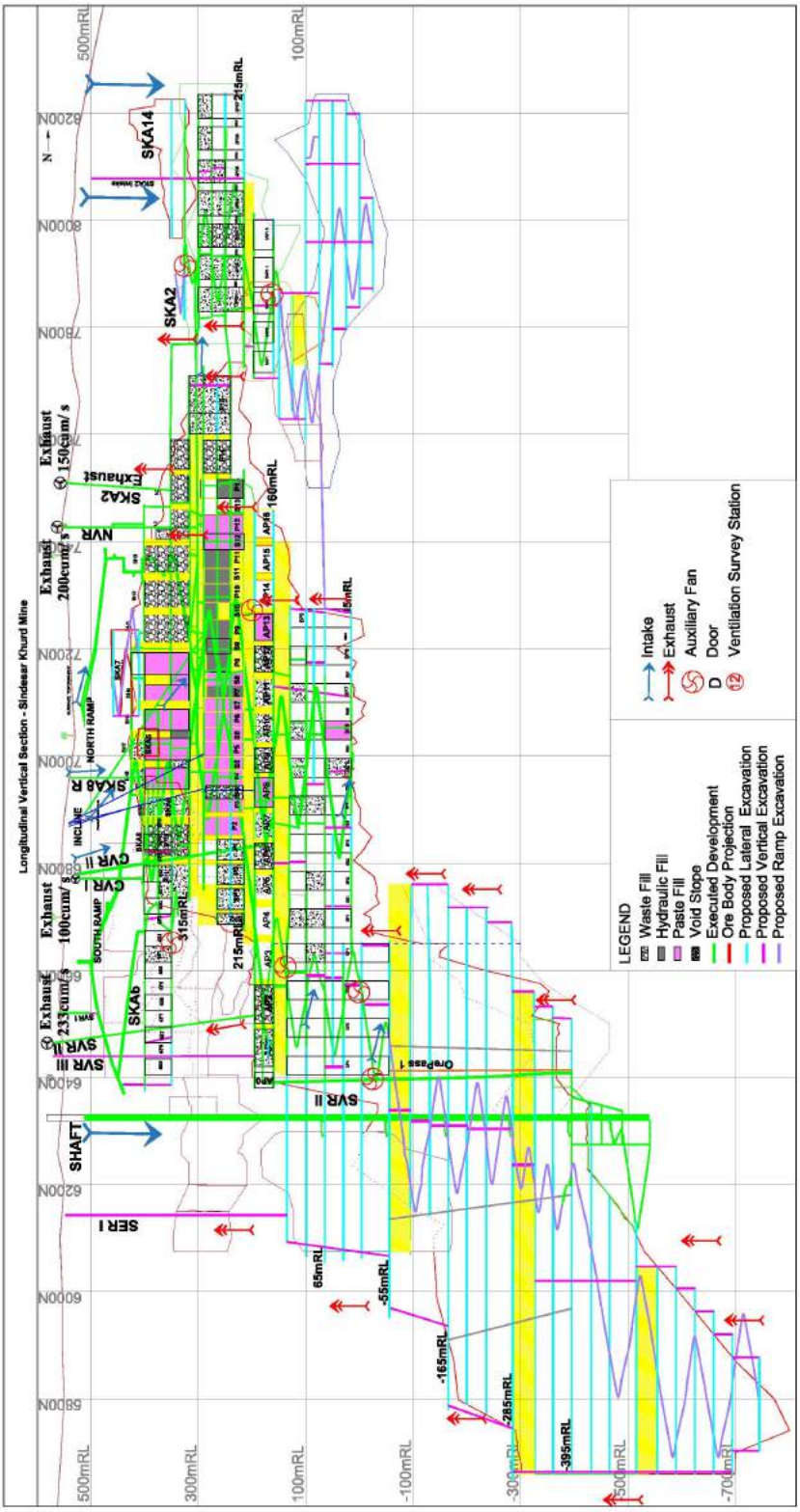


FIGURE-2.7
LVS SHOWING VENTILATION CIRCUIT OF SK MINE

2.8.3 Conceptual Mine Plan

It is proposed to enhance the ore production capacity of the mine from present production rate to 6.0 million TPA by developing current & new mining blocks and the required infrastructure.

The proposed enhancement in ore production capacity as well for sustenance, it is proposed to further develop & extract ore from 425-315 mRL block, 290-215m RL block, 195-160 mRL block, 130-15 mRL,130 to-55 mRL, SKA5, SKA2, SKA6, SKA14, SK11 and other areas/lenses. It is planned to expand the mine laterally in upper mining block and develop the lower mining blocks for further mine production.

Tentative further mining blocks are shown as below:

a) B Block (l30 mRL to 15 mRL)
b) C block (130 to -55 mRL)
c) D Block (-95 to -285 mRL)
d) SKA2 Block (300 to 100 mRL)
e) SKA6 Block(400 to 275 mRL)
f) SKA8 Block (400 to 350 mRL)
g) SKA14 Block (425 to 300 mRL)
h) SKA11 block (160 to -50 mRL)
i) Other areas/lenses as identified.

Mining will be done using trackless operations up to -55 mRL level using 2 declines for hauling. Mining below this level will be done using shaft hoisting system as the depth of hoisting will be increasing and service ramp will be available for the movement of machineries & services.

Lower blocks will also be brought into the production after developing them. Raises will be extended to lower levels as the access is available for extending raises for ventilation. Ramps will be further developed to lower levels for hauling as well as material movement to the lower block. Shaft will also be commissioned to haul the ore from lower block. Auxiliary lenses will be mined as the mining commences in the levels approximate to them. Mining of Sill/Crown pillar will be planned after due consideration studies of local & regional stability. Post filling will be done in all primary/ secondary stopes to enhance ore recovery keeping in view of mineral conservation.

2.8.4 Production Shaft

Shaft is provided both with skip and cage for personnel, material, ore and waste hoisting. The central coordinate of the shaft is 6325 N 1200 E, with net diameter of 7.5 m and depth of 1051.5 m.

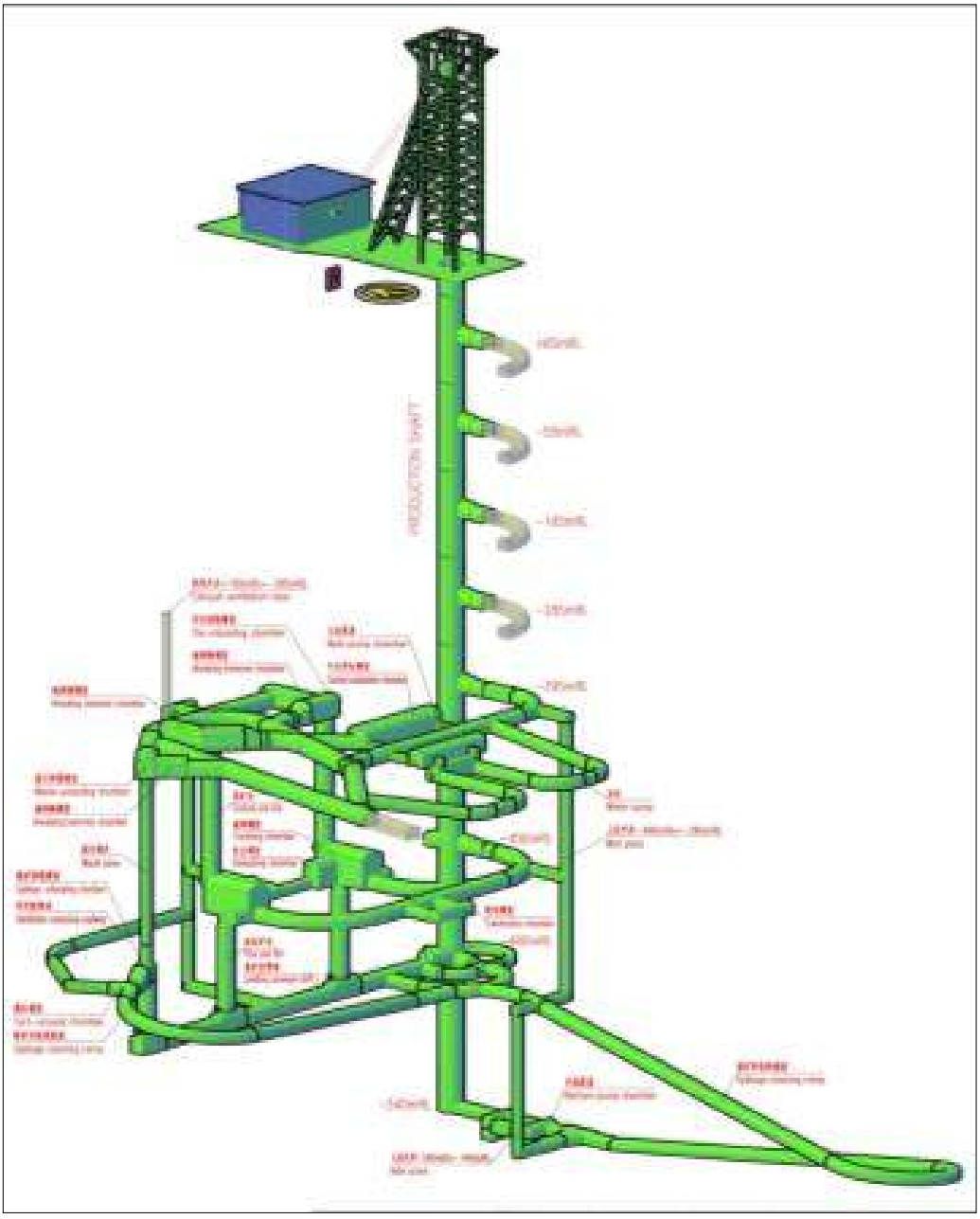


FIGURE-2.8
PRODUCTION SHAFT

TABLE-2.5
SALIENT FEATURES OF PRODUCTION SHAFT

Description	Particulars
Hosting Capacity	3.75 million TPA
Location	Center of ore body
Finished diameter	7.5 m
Ultimate hosting depth	1051.5 m
Guide type	Fixed Guide
Winders	Ground mounted koepe Winder
Shaft Configuration	Underground crusher 2 skip's (19 m^3 each) & 1 cage and counterweight
Station	8 Stations
Storage Siols	3 nos (2 ore & 1 waste) each of 4 hour hoisting
Services in Shaft	Power, Communication, Optical fiber, Control Cables and 2 dewatering columns, 1 drinking water line, 1 service water

Source: Prefeasibility Report

2.8.5 Development

Currently the mine is being worked out by levels 425, 400, 375, 350, 315, 300, 290, 265, 240, 215, 195, 160, 130, 100, 65, 30, 15, -5 mRL levels in main lens & 300, 275, 250, 215, l97mRL in SKA2 lens and 400,350 mRL in SKA6 lens. Footwall drives are developed in all these levels and are well connected either any two or more of accesses. Accesses include incline, north ramp, south ramp and man passes at respective levels. 350 mRL, 315 mRL, 215 mRL, 160 mRL, 100 mRL, 65 RL, 15 RL,-55 mRL levels are main extraction levels.

Development sizes at extraction levels are 5.5 m x 5.0 m while 4.7 m x 4.0 m for all other lateral developments. Ramps are excavated with the dimension of 5.5 m x 5.0 m.

2.8.6 Drilling & Blasting

In each stoping panel the slot is opened by drilling down holes from sub level to extraction & then main level to sub level and blasting in vertical lifts of 3 m to 3.5 m from extraction level in stages. The drop raising technique is used for making a slot raise, which is then widened to the full width of ore body by blasting slot rings into raise. After opening of the slot, the stope is extracted by blasting the blast hole rings drilled against this slot. The trough is also opened simultaneously. Each ring from the drill drives is blasted in two or three stages to minimize blast vibrations. Blasting of rings in lower level is kept approximately 6 m advance from upper level.

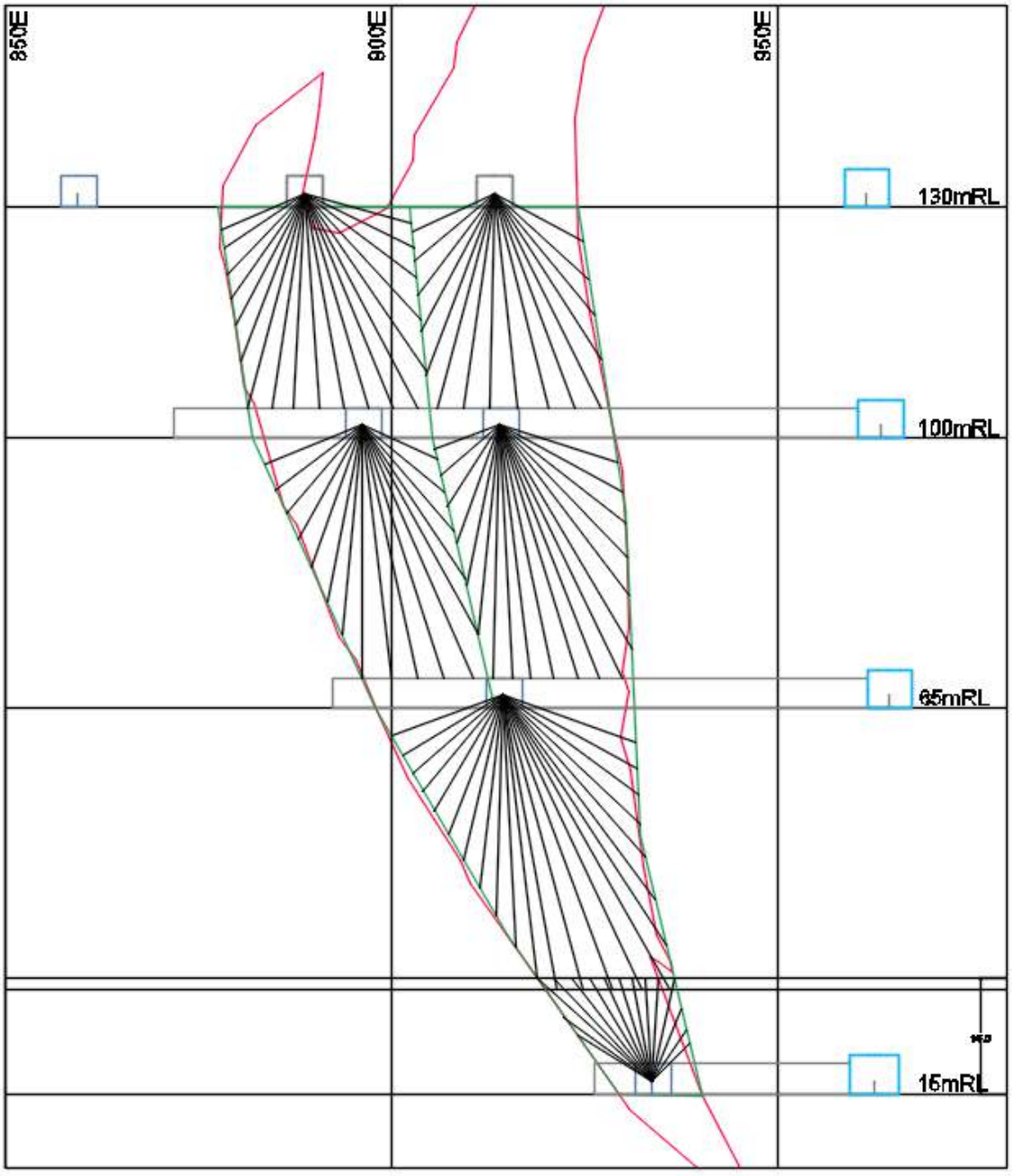


FIGURE-2.9
STOPE DRILLING PATTERN

2.8.7 Selection of Mining Equipments and Size

The proposed type and number of machinery for SK Lead Zinc Project are shown in **Table-2.6.** However, final selection of mining equipment and size may be subjected to some changes on account of variation in ore body, Rock Mechanics consideration affecting Stope dimensions and approval of the Statuary authorities.

TABLE-2.6
DETAILS OF MACHINERIES

Sr. No	Particulars	Capacity
1	Low Profile Dump Truck	65t/63t/60t/50t/30t/20t payload
2	Load Haul Dumper	25t/21t/17t/10t/7t payload
3	Drill Jumbo	32-45 mm Ø holes
4	Electro Hydraulic Drill	64-102 mm Ø holes
5	ITH Production Drills	102-165 mm Ø holes
6	Main Ventilation fans	100-233 cum/sec
7	Pumps	50-100 cum/hr
8	Skip Winder	4400 KW (30t Payload)
9	Cage Winder	800kw (80 persons capacity)
10	Road Grader	Maintaining haul roads
11	Rock Bolter	32-38 mm
12	Mobile Carrier Exploration Rig	38 mm
13	V30 slot Raising Drill Rig	115 mm-760 mm
14	Charmec	For mechanized charging
15	Scaler	For loose scaling
16	Personnel Carrier	16 & 32 persons
17	Lifting Equipment	3000 kg
18	Light Motor Vehicles	5 persons
19	Explosive carriers	3.9 t
20	Water Sprinkler	3.0 cum
21	Compressors	1000 cfm-2500 cfm
22	Underground Crusher	2 Nos

2.8.8 Backfilling

Paste fill plant of 240 cum/hr capacity (77%-79% solids) for back filling mine voids. It is a fully automated & first of its kind plant in India. Maximum use of tailings as filling material for faster turn around of stopes & improved working conditions. Paste filling also improves the regional ground stability, mining recoveries and minimizes land & environmental footprints.

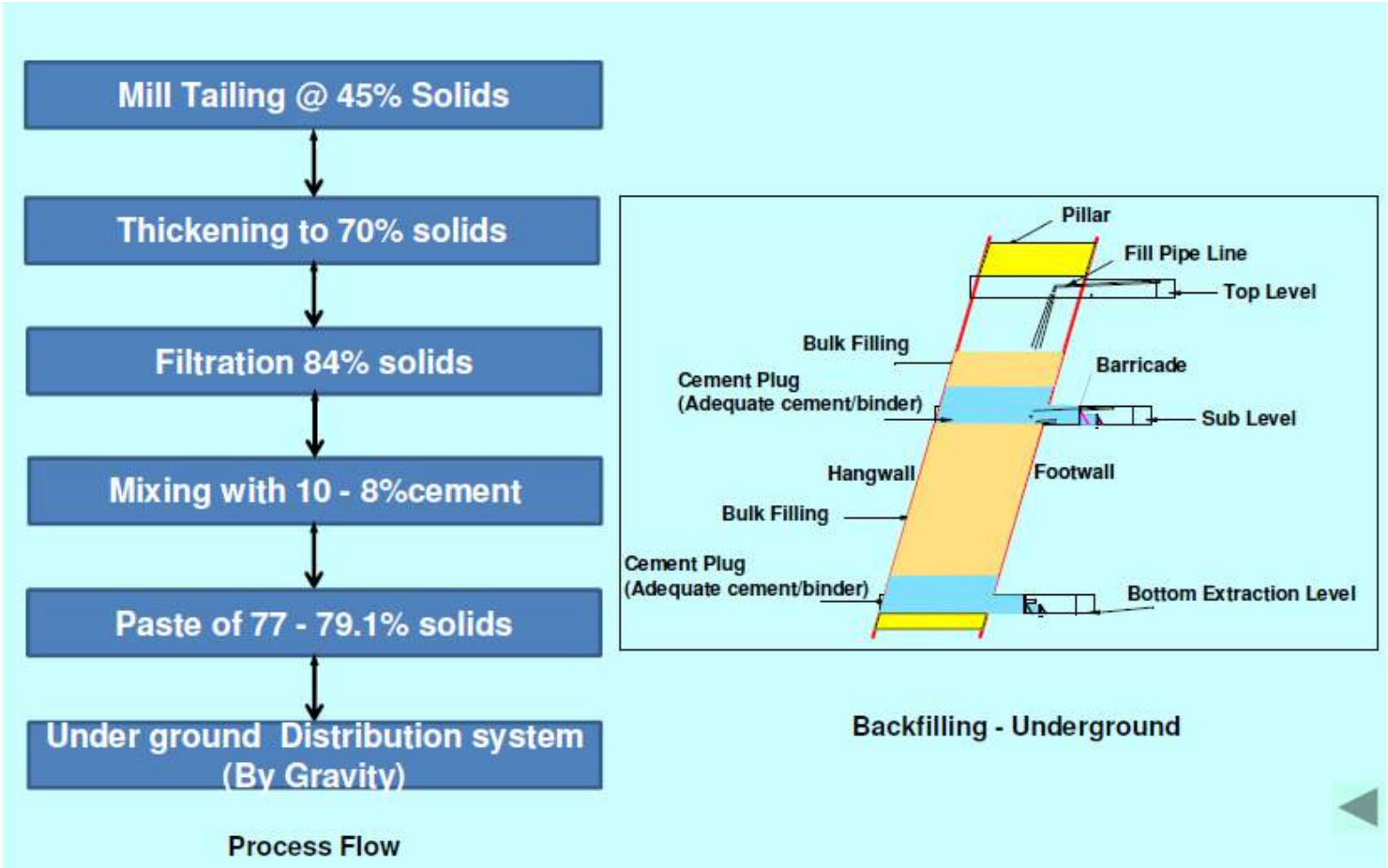


FIGURE-2.10
BACKFILLING

2.8.9 Mine Reclamation

2.8.9.1 *Underground Mines*

The estimated life of the mine is 30 years, based on updated geological reserves and proposed production capacity of 6.0 million TPA. No closure of mine is anticipated at this stage. The existing and proposed mining operation under S.K. Mining Lease will be done through underground mining method. The mine voids will be back filled by cemented rock fill, hydraulic filling using cemented tailing or cemented paste fill from mill tailings. The backfilling process is a cyclic and continuous process. At the end of the conceptual mining period, all mined out areas will be back filled.

2.8.9.2 *Broken up Surface Area*

Broken up surface area under non-forest Government land are utilized for construction of various mine related infrastructure like mine office, beneficiation plant, shaft, waste dump, loading station etc.

At the end of life of mine, entire infrastructure, plant and machineries will be dismantled. Buildings will be kept for community use in consultation with local administration and community. Entire waste dump will be rehabilitated through stabilization and plantation. Other degraded surface areas will be utilized for plantation.

2.8.10 Pre Operational, Operational, and Post Mining Land use

The details of Pre Operational, Operational and Post Operational land use of mine is presented in **Table 2.7.** The post mining land use map is given in **Figure No2.11.**

TABLE 2.7
LAND USE FOR PRE OPERATIONAL, OPERATIONAL, AND POST OPERATIONAL

Sr. No.	Land Use	Pre Operational (ha)	Operational (ha)		Post Operation (ha)
			Existing	Post Expansion	
1	Irrigated agricultural land	20.6	20.6	20.6	20.6
2	Un-irrigated agricultural land	18.4	18.4	18.4	18.4
3	Grazing land	6.5	6.5	6.5	6.5
4	Settlement	5.5	5.5	5.5	5.5
5	Barren land-(Govt.)	148.84	23.32	0	0
6	Industrial/ Mining Use	0	79.52	98.84	33.84
7	Green Belt	0	46	50	115
8	Forest land	0	0	0	0
9	Water-bodies	0	0	0	0
10	Protected areas (Sanctuaries, National Parks, migrated routes of faunna etc.)	0	0	0	0
Total		**199.84**	**199.84**	**199.84**	**199.84**

Source: Mining Plan

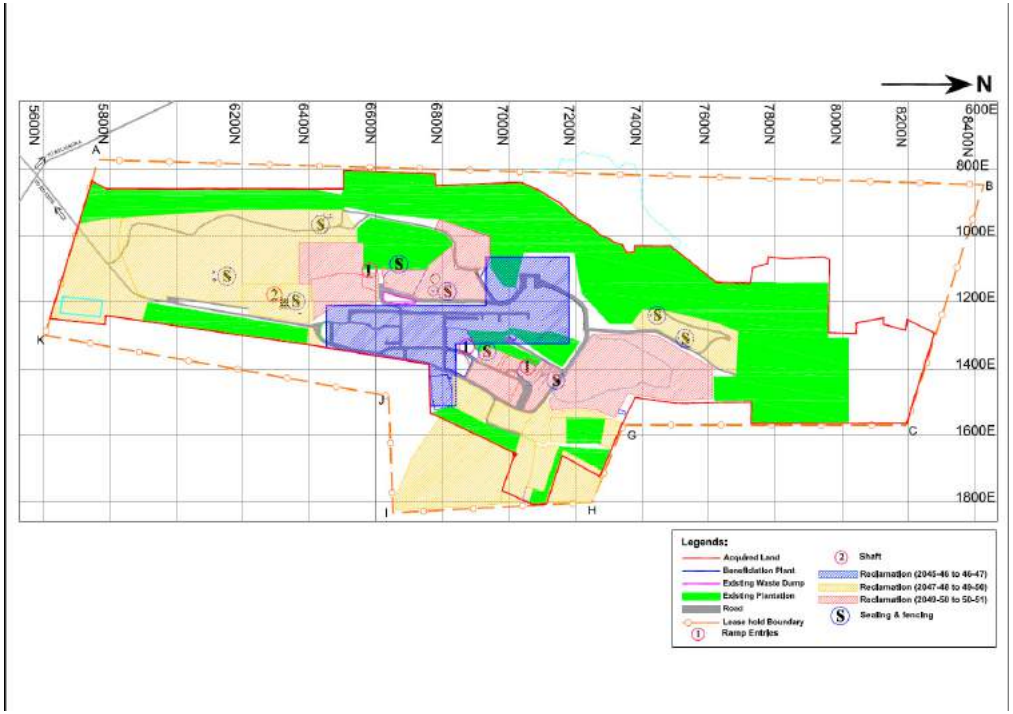


FIGURE-2.11
POST MINING LAND USE MAP

2.9 Mine Ventilation

A detailed study of ventilation requirement of future expanded mine to determine fan and airways sizes have been carried out with the following assumptions:

- Population of major mining equipment;
- Air requirement for diesel emission dilution;
- Use of 30t/50t/60t/63t diesel LPDT; and
- Use of 7t/10t/17t/21t diesel LHD.

Currently the mine is ventilated through North Ventilation Raise (NVR) at 7425N and South Ventilation Raise (SVR) at 6525N as main exhaust raises where the main ventilation fan of 630 kW of the capacity 200m^3/ sec and with ventilation fan of 1500 kW of the capacity 233 m^3/ sec respectively. Central ventilation raise at 6770N is also equipped with 100 m^3/sec each to supplement the mine ventilation. Main levels 400, 350, 315, 290, 265, 240, 215, 195, 160 mRL are connected with NVR and 135, 100 mRL, 65 mRL are connected with SVR & partially ventilated by NVR and CVR facilitates SKA6 and main levels 375, 290, 265 and 215 mRL. SKA2 lens is being ventilated through a 630 kW fan with capacity of 150 m^3/ sec. South Ventilation Raise-2 & South extreme raise will be raise bored from surface to 135 mRL and will be equipped with 1500 kW fans respectively to facilitate lower blocks.

South ramp, North ramp & an incline and two raise bored raises (surface to underground) acts as intake airway for mine. The air is routed through these entries. Auxiliary fans are installed on development headings to provide ventilation on blind faces. Air is routed through regulators, doors and stoppings at different locations as per requirement.

Adequacy of Ventilation: At the full production rate, maximum total primary air requirement has been estimated to be approximately 1000 m^3/sec. At present the incline, ramps and raises from surface are the main intake of fresh air for the mine. The ventilation raises at 7425N is equipped with a fan of 200 m^3/sec capacity and the ventilation raise at 6525N is equipped with a fan of 233 m^3/sec serves as main exhaust systems. At main levels air control gates have been installed for proper and effective ventilation.

To augment the mine ventilation an additional raise 6525N South ventilation raise-2 of 3.5 m diameter at southern extremity of ore body from surface to 135mRL level. In the existing 425-300 mRL block, NVR is duplicated to reduce friction losses. When the mine is fully developed, the SER (South Extension Raise), NVR & SVR and SVR-1 will be main exhaust raises and CVR, ramps, shaft etc will work as main intake for the mine. High capacity exhaust fans will be installed on the top of these raises. The combined capacity of all these fans will be about 1000m^3/sec. These raises will be developed along with the development of mine to cater the ventilation requirement of the mine. During mine development auxiliary ventilation system will be used. Additional auxiliary ventilators are provided at the working faces for adequate supply of air in all parts of the mine and prevention of noxious gases produced and excessive rise of temperature or humidity to ensure required ventilation of the mine.

2.10 Mineral Beneficiation

SK Mine has an Environment Clearance for 4. 5 million TPA ore production & 5.0 million TPA ore beneficiation the concentrate produced will be sent for metallurgical treatment at captive smelters for recovering final metal. The detail of process of beneficiation plants has been given in further paragraphs.

The plant includes following sub-sections:

a. Crushing & screening section;
b. Grinding section;
c. Lead flotation section;
d. Zinc flotation & regrinding section;
e. Lead & zinc concentrate thickening & filtration section;
f. Reagent preparation section;
g. Tailing Thickener, dewatering & disposal; and
h. Tailing Disposal & Back Filling Section.

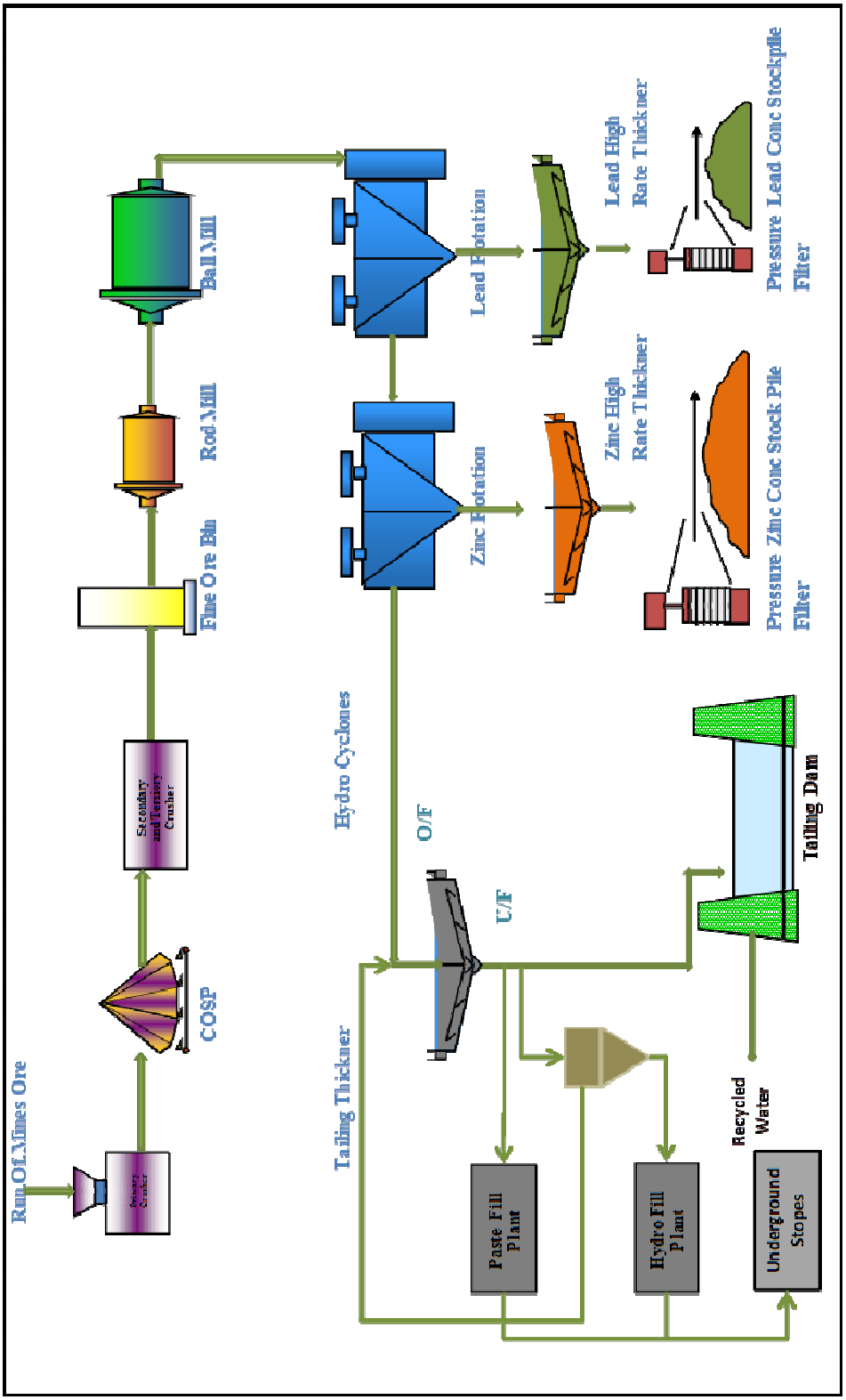


FIGURE-2.12
BENEFICIATION PLANT PROCESS FLOW

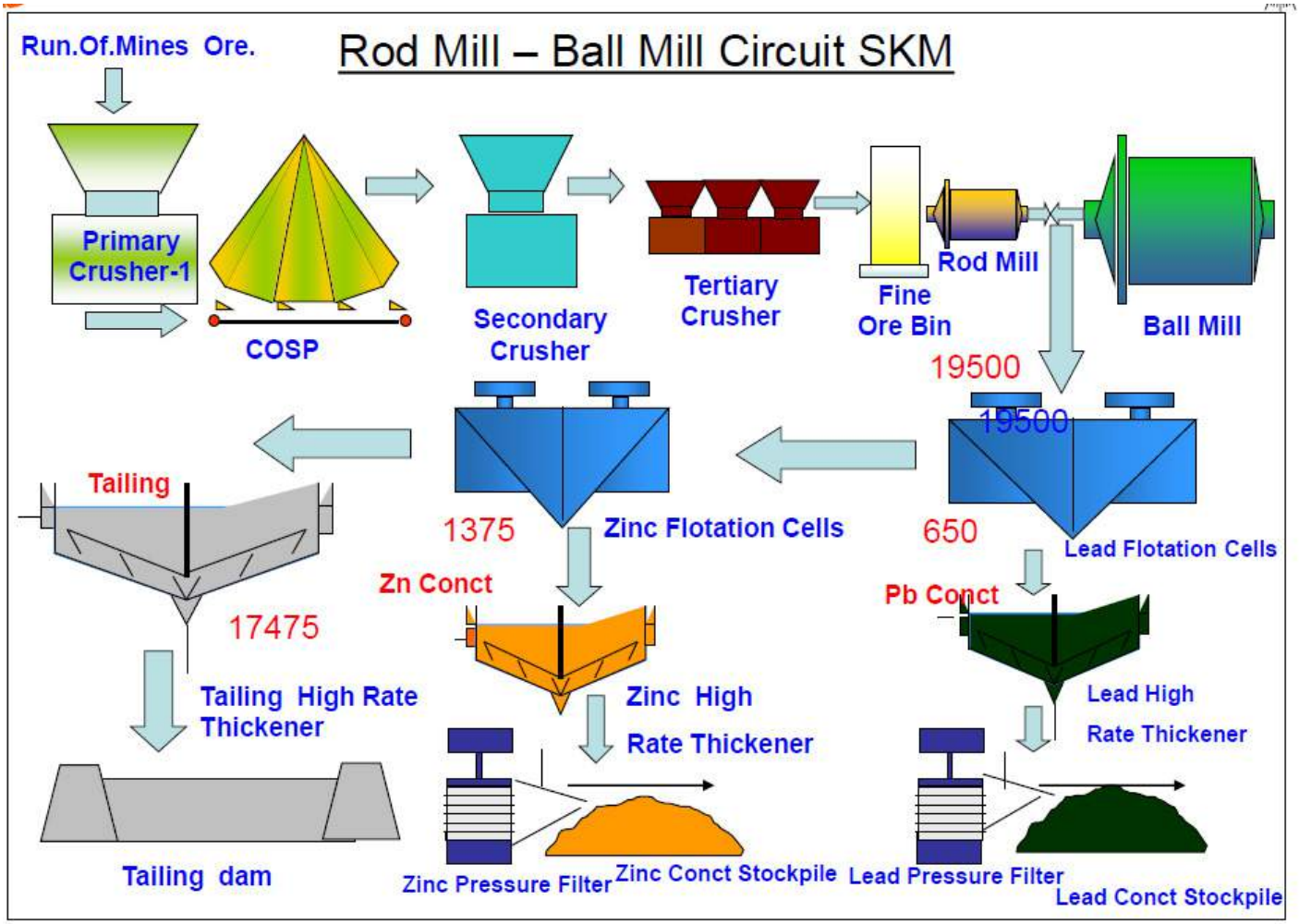


FIGURE-2.13
MATERIAL BALANCE

a. Crushing & Screening Section

There is at present one primary crusher (gyratory) on surface. It is proposed to install two more primary crushers (Jaw crushers) in underground to crush the ore for shaft hoisting. The crushed ore from underground will be hoisted through shaft. The existing primary gyratory crusher will be fed by the ore hauled through existing declines and ore of other mine while proposed primary jaw crushers will be fed with the ore mined from depth more than 500 m from surface.

The primary jaw crusher installed at underground will reduce ROM ore to approximately -l5Omm size. Crushed ore will then be transported to crushed ore bin and then to shaft loading system from where it will be hoisted though shaft and dumped over coarse ore stockpile at surface. Primary gyratory crusher installed at surface will reduce ROM ore to approximately -l5Omm size. Crushed ore will then be transported to Coarse Ore Stockpile. The coarse ore stockpile at surface will then transfer crushed ore to secondary crusher of new beneficiation plant through series of conveyor/trucks Under size of secondary crushing plant will be stocked into Fine Ore Bin (FOB) in grinding section while the oversize will be routed to tertiary crusher for re-crushing. Dust suppression system will be installed for dust free operation at all types of crushers.

b. Grinding Section

The fine ore of P80 20 mm size is fed from FOB from where it is extracted by belt feeders and fed to the Rod mills by belt feeder's conveyors. The mill feed conveyor will be provided with a belt weigher to measure the ore treatment. 1st stage grinding carried out in a Rod mill in open circuit & 2nd stage grinding carried out in a Ball mill in closed circuit with hydro cyclone classification system. The rod mill and ball mill product discharge in a common sump and pumped to the cyclone cluster from where underflow return to ball mill and the overflow from cyclone cluster constitute feed to the flotation circuit. A trash screen installed between grinding & froth flotation (ahead of lead conditioner) shall remove the unwanted trash material coming with ore.Screen undersize shall go to lead flotation circuit while the oversize(tarsh) is discarded at Trash bin During operation, process parameters shall be adjusted to produce an MOG of 80% passing 63 micron.

Control of Cyclone overflow particle size through PSI

PSI will measure the 80% passing size of cyclones o/f which is ideally be 63 micron. If PSI detects that the cyclone of 80% passing is above 63 micron i.e. coarser grind size, it will increase the water and reduce speed of belt feeder below FOB to reduce rod mill feed. Vice versa, if PSI detects that the cyclone of 80% passing is finer than 63 micron, it will decrease water and increase the speed of belt feeder below FOB to lower the feed in rod mill.

c. Lead Flotation Section

The lead flotation stream comprise of conditioning, roughing, scavenging and 3-stages of cleaning.

The hydro cyclones overflow through trash screen from the grinding shall be conditioned with reagents in a conditioner. This conditioner also gets feed in form of lead scavenger concentrate & lead 1st cleaner tails. The combined flow shall be subjected to flotation in lead rougher scavenger bank. The rougher concentrate is being cleaned in 3 stages of lead cleaners. The lead rougher concentrate fed to the 1st cleaner cells. The concentrate from the 1st cleaner shall be pumped to the 2nd stage flotation cells and the concentrate from the 2nd stage cleaners shall be fed to the 3rd cleaner flotation cells. The 3rd stage cleaner concentrate is the final lead concentrate.

d. Zinc Flotation & Regrinding Section

The Zinc flotation section treating lead scavenger tails from the lead flotation circuit shall comprise of conditioning, roughing, scavenging, 3 stages of cleaning and regrinding. The lead scavenger tails along with the reground Zinc scavenger concentrate and Zinc Cleaner-1 tailings shall be conditioned with reagents in two stages of conditioning and subjected to flotation in Zinc rougher-scavenger banks of cells. The zinc rougher concentrate fed to the 1st cleaner cells~ The concentrate from the 1st cleaner pumped to the 2nd stage flotation cells and the concentrate from the 2nd stage cleaners fed to the 3rd cleaner flotation cells. The 3rd stage cleaner concentrate shall be the final zinc concentrate.

e. Lead & Zinc Concentrate Thickening & Filtration Section

Lead and zinc concentrates shall be sent to their respective high rate thickeners installed each for lead concentrate & zinc concentrate generated from the plant.

The underflow of Lead and Zinc thickeners shall be pumped to their respective holding tanks.

Overflow from lead thickener collected in suitable tank which will have at least one partition to take out sediment lead in overflow coming from lead high rate thickener. The partition has suitable drain arrangement with drain valve from where the deposited lead shall be collected from time to time. The lead thickener overflow pump shall discharge to main process water tank i.e. tailing thickener overflow (o/f) tank. Main process water pump gives discharge to grinding & lead flotation circuit area.

Overflow from zinc thickener collected in suitable tanks which will have at least two partitions to take out sediment zinc in overflow coming from zinc high rate thickener. The partitions have suitable drain arrangement with drain valve from where the deposited zinc collected from time to time. The zinc thickener overflow pump gives discharge to zinc circuit in floatation area.

There is suitable flocculent system for both thickeners for faster settling of slurry.

f. Reagent Preparation Section

Reagents Zinc Sulphate ($ZnSO_4$) Sodium Isopropyl Xenthates (SIPX), Sodium Cyanide (NaCN) Copper Sulphate ($CuSO_4$), Methyl isobutyl carbinol (MIBC),

Nigrosine and lime are used in the main process plant. The reagent system comprise of preparation tank, storage tank & day tank. There are agitators in the preparation & storage tanks. For all reagents being supplied from day tanks, there are two pumps (1 operational + 1 standby). MIBC does not require preparation. All reagents are added at required points at the required dosages in the flotation circuits by use of flow meter and control valve in closed loop. There are suitable metering types dosing pumps 164 for control of MIBC flow. Lime slurry prepared in ground level sump pump and transferred to holding tank after suitable classification in cyclones to take out grits. From the holding tank, the lime solution transferred to the lime distribution tanks. From this distribution tank, lime pumped through a ring main with return line to the respective addition points.

g. Tailing Dewatering & Disposal

Tailing dewatering & disposal section comprise of tailing thickener, neutralization tank, pumping of tailing to lined tailing pond/dam and reclaimed water pumping. There are three tailing disposal lines each capable of handling the tailing generated from beneficiation plant. The two tailing lines are in operation while one in standby mode.

Water is being reclaimed from tailing pond and pumped back to process water tank (i.e. tailing thickener overflow tank). Makeup water is fed from the 2000-m^3 reservoir to process water tank by gravity and zinc thickener overflow tank.

h. Tailing Disposal, Hydraulic Filling & Paste Filling

Currently, the fine tails from beneficiation plant is being pumped to existing lined tailing dam of Rajpura- Dariba Mine whereas classified tails are backfilled in underground stopes after mixing with cement from existing hydraulic fill plant. There is paste fill to augment the backfilling capacity and to utilize fine tailings in backfilling in order to maximize ore recovery and overall stability of underground mines It is planned to increase the tailing dam height in sequential manner which will meet the tailing disposal requirement till mine life. It is also proposed to utilize 50% of the tailings in the stope backfill. Tailing generated from existing 5 million TPA plant & proposed 1.5 million TPA plant shall have suitable connection with existing hydraulic fill plant & existing paste fill plant & upcoming paste fill plant.

Hydro Fill: Tailings from floatation stream is be fed to hydro cyclones, where classification takes place and fine size overflow fed to HRT tailing thickener, after recovery of water the underflow of tailing thickener is withdrawn at 45-50% solids and sent to tailing dam by pumping in tailing lines. The recovered water will be recycled and used in plant to maintain zero discharge. The Coarser cyclone under flow is being collected in Fill Storage Tank and after cement addition (5 %) and mixing at around 60% solids pumped in bore hole for mine back fill, the required fill strength is 400-500 kpa.

Paste Fill: The plant tailing generated shall be pumped to paste thickener. The underflow of paste thickener will be fed to the disc filters. The filter cake along

with cement will be fed to the mixer unit and paste will be produced. The paste fed to underground reticulation system in mined out slopes. Paste fill is typically placed with a cement binder at a slump of 150 to 180 mm to minimize water requirement and achieve required strength at an early date. The paste fill plant process circuit consists of dewatering of the tails slurry in a conventional thickener to 50 to 60% by weight. The product is further dewatered in a disc filtration plant to produce a wet filter cake comprising of 80-85% solids. Batches of this filter cake are then mixed in a high intensity shear mixture with water and cement as required to make a consistent paste product of around 80% solids For average stope width of 20-25 m, the required fill strength is 1100 kpa after 28 days. To achieve the proposed design strength the cement varies from 8 % (for stopes) & 10 % (for plug). This plant is also has emergency power backup (2x 500 KVA Capacity) to take care of emergencies. The list of major equipment details are given in **Table-2.8.**

TABLE-2.8
LIST OF MAJOR EQUIPMENTS

Sr. No	Particulars	Approved Equipments as per EC of 5.0 Million TPA	Addition
1	Primary Crusher	3	0
	Secondary Crusher	2	1
	Tertiary Crusher	4	2
2	Rod Mill	4	2
3	Ball Mill	4	2
4	Flotation Streams	4	2
5	Pressure Filter	8	4
6	Air Blower	5	2
7	Air Compressor	12	5
8	Thickeners	6	3

Source: Mining Plan

Raw Material

Reagents Zinc Sulphate, Sodium !so Propyl Xanthate, Sodium Cyanide, Copper Sulphate, Methyl Iso Butyl Carbinol and shall be used in the flotation process.

The Reagent categorize in three category based on their application in flotation Zinc Sulphate acts as depressant for Zinc in Lead Flotation. Sodium cyanide acts as depressant for pyrites (FeS2) Sodium iso Propyl Xanthate act as collector for lead and zinc, Methyl Iso Butyl Carbinol act as frother (surface modifier) to impart stability to froth, Copper Sulphate act as activator in zinc. The reagent pumping system will comprise of preparation tank, storage tank and day tank. There will be agitators in the preparation and storage tanks.

The required solution strengths for all of the reagents will be prepared in preparation tanks by addition of fresh water.

The main raw materials used for the project will be different chemicals and cement. The quantities of Chemicals in terms of grams per ton of ore treatment are as follows:

Chemical	**Gram Per ton**
Copper Sulphate	350
Zinc Sulphate	150
Sodium Isopropyl Xenthates	60
MIBC	50
Sodium Cyanide	10
Nigrosine	25

All the raw material will be arranged indigenously and transported by road. The Run of Mine will be transported to beneficiation plant by dumpers and conveyor. The concentrate will be transported to own smelters by covered trucks/ dumpers.

2.11 Resource Requirement for the Project

2.11.1 Land

Out of the total mining lease area of 199.8425 ha, 125.5 ha land has already been acquired for the present mine and proposed expansion would be within the premises only. Land use breakup of the mining lease & beneficiation plant has been presented in **Table-2.9.**

TABLE-2.9
LAND USE BREAK UP

Sr. No.	**Particulars**	**Actual Use (ha)**	**Total Proposed (ha)**
1	Beneficiation Plant	20.00	26.00
2	Ore Stock Yard	10.00	15.00
3	Concentrate Yard	4.00	5.00
4	Waste Dump	8.00	8.00
5	Utilities	12.00	15.00
6	Plantation Area	46.00	50.00
7	Remaining Area	25.52	6.52
	TOTAL	**125.52**	**125.52**

Source: Mining Plan

2.11.2 Water Availability & its Sources

Water from tailing dam is being recycled/ reused for the beneficiation purposes and the same will be continued. The water allocation letter is enclosed **Annexure-VIII.**

An additional 2,000 m^3/d of water is required for proposed expansion, in addition to approved 14,000 m^3/d water requirement for 4.5 million TPA mining & 5.0 million TPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant & Matrikundia dam. Zero discharge is being maintained. Mine dewatering due to intersection will also be consumed in the process. The water balance diagram shown in **Figure-2.14 (A) and (B).**

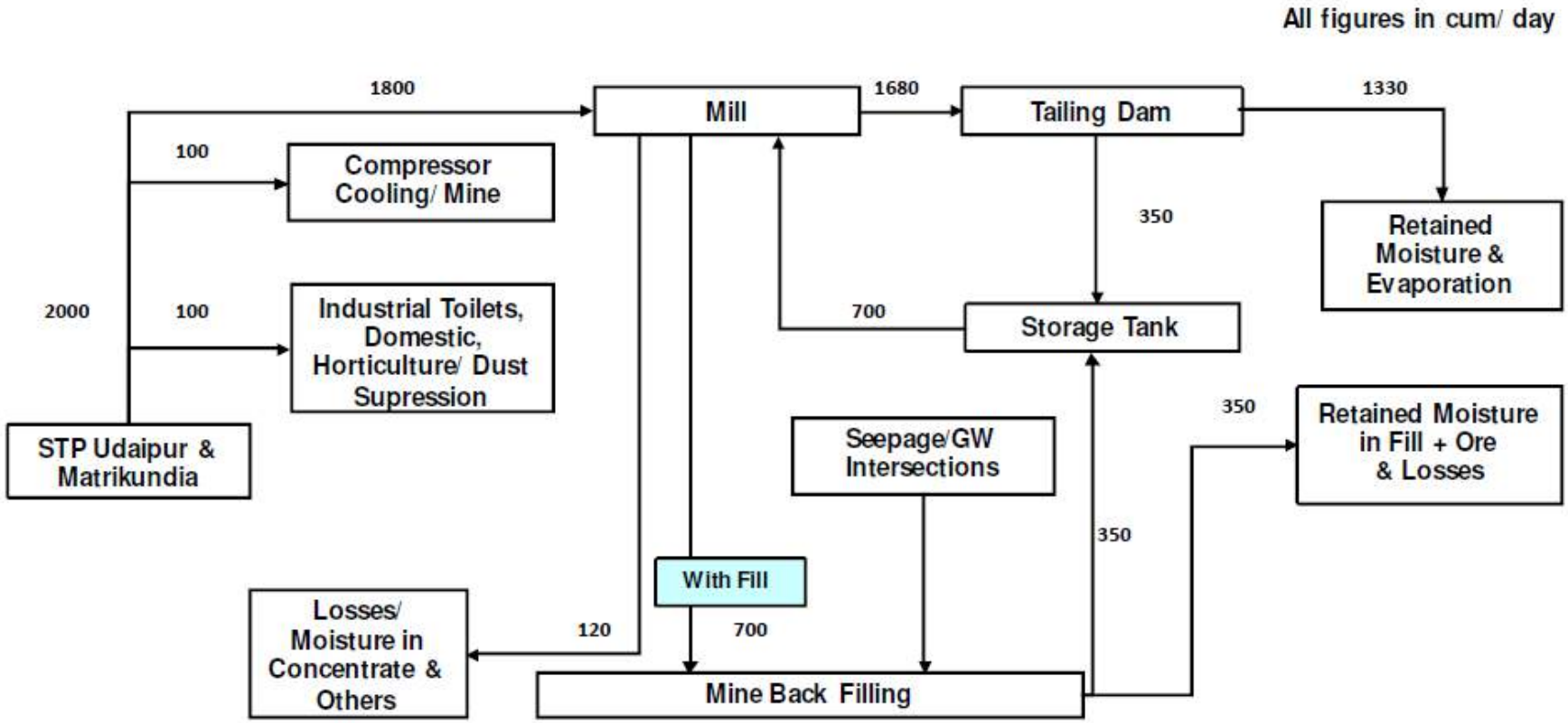


FIGURE-2.14 (A)
WATER BALANCE DIAGRAM AFTER EXPANSION

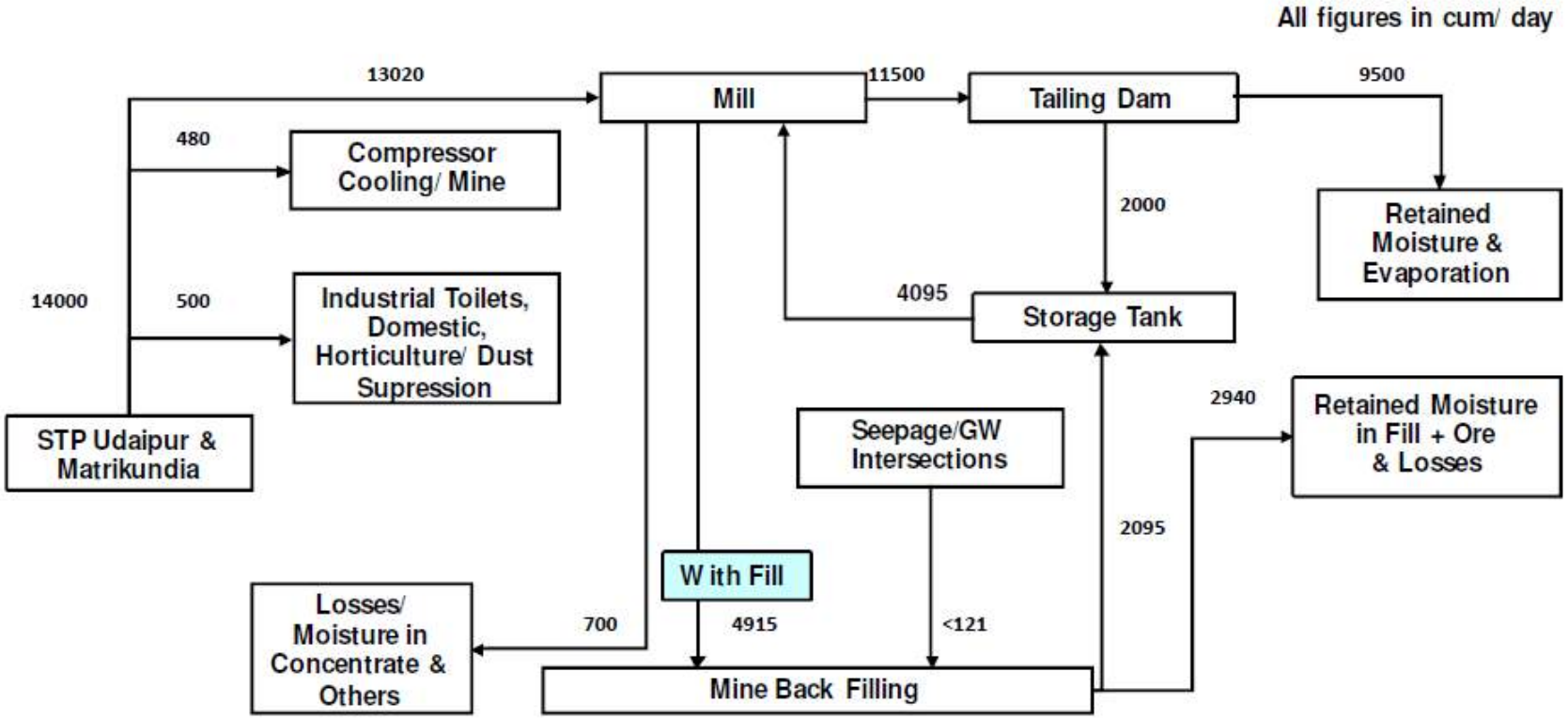


FIGURE-2.14 (B)
WATER BALANCE DIAGRAM PRESENT

2.11.3 Power Availability & its Sources

For this proposed expansion power requirement is 6 MW which will be met through existing source of captive generation & AVVNL (totals 46 MW).

2.11.4 Emergency Power

DG set of 5.0 MW capacity having acoustic enclosures for emergency power is proposed as a part of 6.0 million TPA mining & 6.5 million TPA ore treatment plant.

2.11.5 *Manpower Requirement*

The proposed expansion will provide employment opportunity for about 300 persons in addition to existing to 1500 person. The proposed expansion will also provide ample opportunity for increase in indirect employment due to mining related activities like transport, small workshops, garages, and due to development of local area.

2.11.6 Proposed Infrastructure

Industrial Area

New industrial/mining area is envisaged for construction of new beneficiation and paste fill plant.

Residential Area

New 64 houses/flat will be added in existing township at HZL smelter.

Connectivity

Existing 7.5 m bitumen road from SK Mine to Dariba of 6.0 km is sufficient to cater the need, However widening of existing road is envisaged.

Drinking Water Management

The drinking water facilities are being developed viz. pumping station and line from Rajpura Dariba Mine to SK Mine and construction of overhead tank of 500 cum with distribution network. Potable water is being made available for all the employees.

2.12 Sources of Pollution

Virtually all the mining methods for any ore/mineral produce some irreversible impacts. These produce changes in the landscape due to development dumps and to some extent excavation. The environmental impacts due to mining, in general, could be broadly classified into the following categories:

- Air Pollution;
- Despoliation of Land;

- Water Pollution;
- Noise Pollution; and
- Solid Waste Disposal.

2.12.1 Air Pollution

Mining operations contribute towards air pollution in two ways i.e. addition of gaseous pollutants to the atmosphere and emission of dust particles. The gaseous pollutants include NO_x, SO_2 and hydrocarbons etc. The gaseous air pollutants are emitted from operation of earth moving equipment (which are mostly run on diesel) and blasting operations.

SPM/dust particles are emitted during drilling, blasting, excavation, loading and unloading of the ore handling of rock waste in waste dump area, hauling and crushing and stockpiling etc.

The proposed expansion mine is an underground mine and the activities like blasting will be carried out below ground.

The dust and gaseous emissions will be let out from the Main Ventilation Raise of the mine. The gaseous emissions generated due to blasting will be instantaneous in nature. The other sources will be operation of mining machinery like Drilling machines and material transportation through haulage using suitable dumper trucks. Most part of the dust generated will be contained (by means of wet drilling & water spraying) within the mine itself and only finer particles may escape from the mine. Hence, the quantum of dust coming from mining activities will be very less. The loading, unloading of ore and disposal of waste rock will be the sources of pollution on the surface.

Various mitigation measures are proposed in the mining:

- All drilling machines in the mine shall be operated with wet drilling system.
- Water sprinkling arrangement shall be made at the loading location to make the ore wet before loading, thereby reducing dust emission during loading operations.
- The production of blast fumes containing noxious gases are reduced by the following methods:

  - proper mixing of Ammonium nitrate with fuel oil in prescribed ratio to ensure complete detonation;
  - use of adequate booster/primer; and
  - proper stemming of the blast holes.

2.12.2 Despoliation of Land

Large-scale excavations are the basic causes of land despoliation. However, in proposed expansion of underground mining limited portion will be excavated on the ground surface to facilitate entry to the ore body. The other excavation will be carried out below the ground and minimum surface area will be disturbed. The waste generated from the mine development shall be transported and dumped separately to waste dump area.

The greenbelt will be developed on the non-moving waste dumps, which will improve the stability of the dump and aesthetics of the area.

2.12.3 Water Pollution

Domestic wastewater from the mine premises shall be treated in a sewage treatment plant, from where it shall be used in greenbelt development, dust suppression and drilling operations.

Mine water generated in the mining activity will be suitably treated for suspended solids and reused to the maximum extent in wet drilling operations, dust suppression in underground and in sprinkling on surface roads for dust suppression. Hence no wastewater would be let out from the mine.

The tailing from existing beneficiation plants is being pumped to the existing lined tailing dam. It is proposed to continue the same and the capacity of lined tailing dam is sufficient till the mine life as the tailings generated are utilized in filling the underground mine voids.

2.12.4 Noise and Vibrations

- ***Noise Pollution***

The proposed expansion of mining activity involves use of compressors, drill machines, dumpers, loaders, excavators and ventilation fans. The source noise levels of these equipments are in the range of 80 to 90 dB(A).

Following mitigation measures shall be taken:

- Silencers shall be provided for stationary machinery like compressors, DG set, etc,;
- Noise insulation shall be provided to the equipments like DG sets and enclosures wherever required for reducing the noise emission;
- Transport and mining machineries maintenance shall be undertaken periodically to reduce vibration induced noise generations during movement of vehicles;
- Workers shall be provided with noise protective ear plugs/ muffs and its usage shall be ensured; and
- Greenbelt in and around the mine area to intercept and deflect noise transmission.

- ***Blast Induced Vibrations***

Blasting contributes to noise pollution and vibration. The intensity of the vibration and noise depends upon the maximum charge per delay during blasting. Blasting causes ground vibrations that travel through the ground in the form of energy waves away from the blast or point of initiation of the charge. In the proposed mining, the production blasting will be carried out at least 50 m below the ground level. Hence, the noise and vibration due to mining will be at minimal level within the prescribed limits of DGMS.

2.12.5 Solid Waste Generation

The waste coming out of mines will be utilized for height raising, stabilization of tailing dam & some quantity will be used for leveling work whereas the balance quantity will dump for filling of stope voids. Presently at all the mines, dumping of waste in stope voids is being practiced.

Solid Mine Waste

In overall mine life the details of waste generation is shown as under:

- Total waste generation over mine life 74,00,000 cum
- Waste disposal planned in underground voids 36,00,000cum
- Waste to be utilized in construction of tailing dam 33,00,000cum
- Total waste to be disposed externally 5,00,000cum
- Surface area earmarked for waste dump 8.0ha
- Area occupied of existing waste dump 4.2ha
- Avg.dump height at present 16.0m
- Height of Lift 6 lift of 10m
- Garland drain around the waste dump along with pond for collection of rainwater
- Plantation will be done on inactive waste dump

Presently, there is one waste dump of 4.2 ha in the mine area. With the proposed expansion, it is required to increase the capacity of current waste dump.The salient features of the existing and proposed waste dumps are given in **Table-2.10.**

TABLE-2.10
SALIENT FEATURES OF EXISTING AND PROPOSED WASTE DUMPS

Details	Waste Dump		
	Existing	Additional	Total
No. of waste dump	1		
Area of waste dump (in ha.)	4.2	3.8	8
Capacity (in million cum)	0.74	1.15	1.89
Avg. Dump height (in m)	16	44	60
No. of benches	4	2	6
Bench height (in m)	10		
Highest level (in mRL)	536	570	570

2.12.5.1 Tailing Generation and Disposal

The tailing from existing beneficiation plant is being pumped to tailing dam of Rajpura- Dariba Mine. It is proposed to continue the same and the capacity of tailing dam is sufficient till mine life. A summary of tailing dam availability between 2013-14 to 2045-46 has been given in **Table-2.11.**

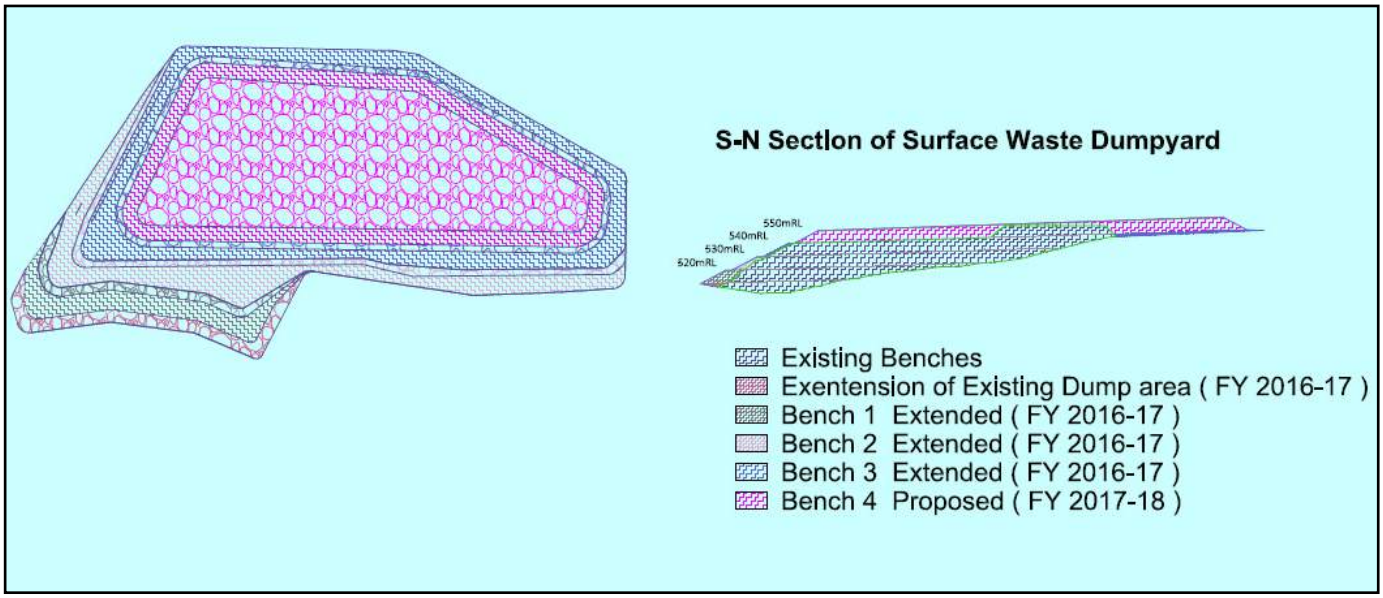


FIGURE-2.15
PLAN AND SECTION OF EXISTING AND PROPOSED WASTE DUMP

- Technical feasibility of further raising scheme of tailing dam at Rajpura-Dariba Mine, where the tailings from SKM are also being disposed-off was conducted by IISc, Bangalore.
- The detailed slope stability analysis of IISc, Bangalore clearly indicates that the U/S method of raising on the pond side and D/S method of raising on the toe side where land is available is feasible with the suggested features of the dyke. All the factor of safety (FS) arrived for all the stages of construction up to a maximum RL of 514.0m (recommended net height of dam is 34m) satisfy the minimum safety factors stipulated in the IS code 7894-1975.
- Tailing dam provided with impervious lining and slopes will be maintained regularly to avoid any contamination in the ground water.

TABLE-2.11
TAILING DAM SUMMARY (2013-14 TO 2045-46)

Sr. No	Particulars	Quantity
1	Production from SK Mine	853 Lakh Mt
2	Production from RD Mine	205 Lakh Mt
3	Production from Other Mine	83 Lakh Mt
4	Total Production	1142 Lakh Mt
5	Concentrate Production	137 Lakh Mt
6	Tailings Generation	1005 Lakh Mt
7	Filling	667 Lakh Mt
8	Tailings to Dam	338 Lakh Mt
9	Final Height	517 mRL
10	Net Height	34.0 m
11	Total Capacity of Tailing Dam	213 Lakh m^3
12	Tailings volume up to 2045-46	211 Lakh m^3
	Balance capacity as on 31.03.2046	2 Lakh m^3

The tailing dam is spread over an area of about 82 hectares. The embankment of dam is earthen in nature. Liner system is provided to prevent any leaching into soil and ground water. In the vicinity of tailing dam a collection pond, a sump and a collection well have been made to collect filtered water. This water along with that collected in the pond is re-circulated to the plant for re-utilization. The project site has installed 6 number of Piezo meter around the tailing dam to check the water level and groundwater quality. The piezo meter locations around the tailing dam shown in **Figure-2.16.**

After completion of the project, tailings in tailing dam will be covered by addition of soil on top with compaction providing coir mat and vegetation with plantation of various species to avoid contamination of tailings with air. Necessary drains network with collection pit will be ensured to collect water from tailing dam and recycling of the same in process to avoid contamination of storm water during rainy season.

2.12.6 Green Belt Development

Time bound Green Belt action plan is already incurred as a part of 4.5 million TPA Mine & 5.0 million TPA Beneficiation Plant project. As there is no increase in the current ML area so no new area is proposed for Green belt for this expansion project. However, so far 46 ha of green belt has been developed and remaining 4 ha is proposed to be developed in 2017-18 and 2018-19 @ 2 ha per year. Gap filling plantation, plantation on inactive dumps, will be carried out in future.

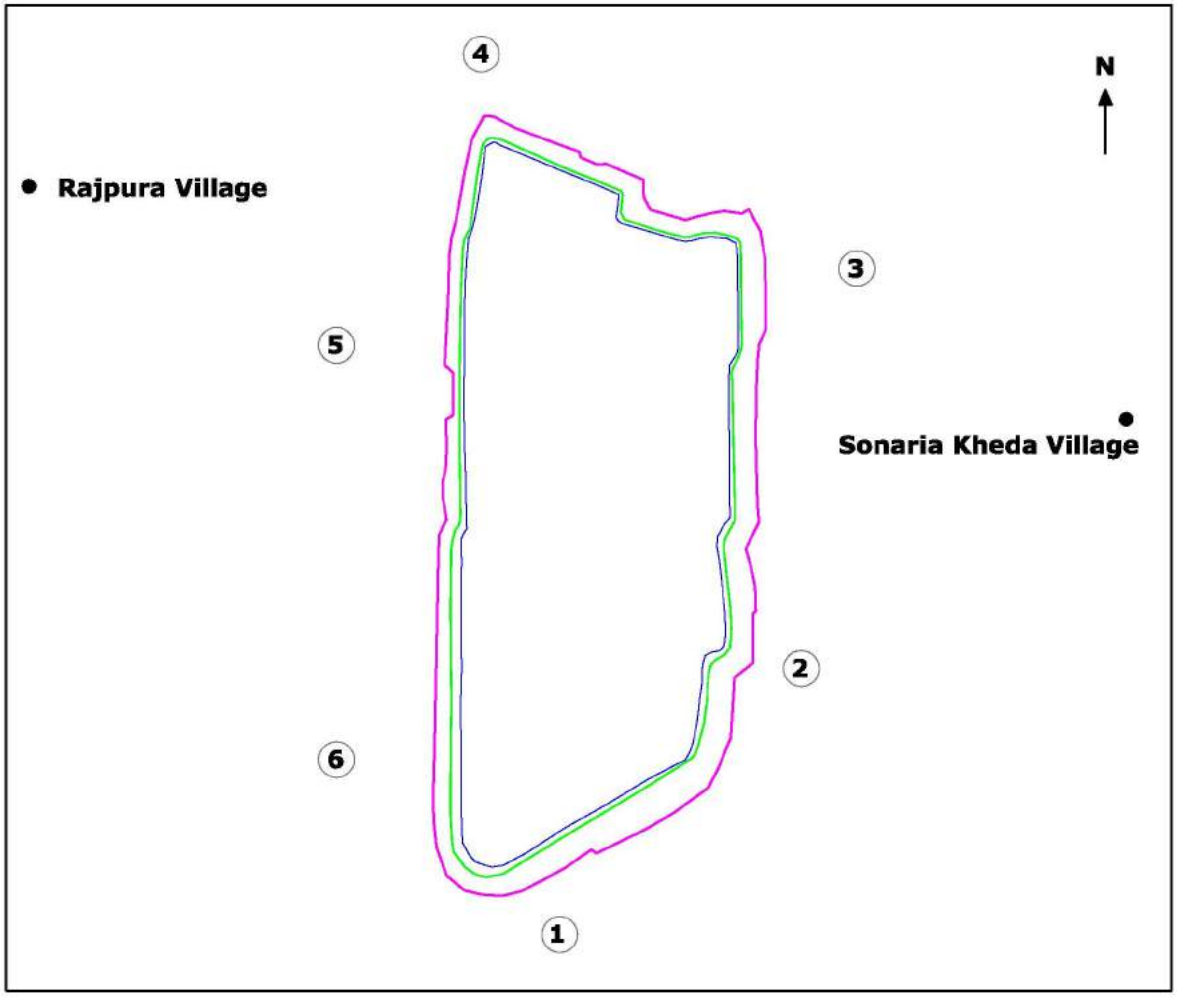


FIGURE-2.16
PIEZO METER LOCATIONS AROUND THE TAILING DAM

Chapter-3
Baseline Environmental Status

3.0 BASELINE ENVIRONMENTAL STATUS

3.1 Introduction

This chapter illustrates the description of the existing environmental status of the study area with reference to the prominent environmental attributes. The study area covers the area falling within 10 km radius around the proposed expansion project site.

The existing environmental setting is considered to adjudge the baseline environmental conditions, which are described with respect to climate, hydro-geological aspects, atmospheric conditions, water quality, soil quality, vegetation pattern, ecology, socio-economic profiles of people and land use. The objective of this section is to define the present environmental status which would help in assessing the environmental impacts due to the proposed expansion mining project.

This report incorporates the baseline data monitored during pre-monsoon season 1st March to 31st May 2017. Secondary data was collected from various Government and Semi-Government organizations.

3.2 Geology and Hydrogeology

3.2.1 Physiography of Banas river basin

The buffer zone of Sindesar Khurd base metal deposit falls in the catchment area of Banas river. Banas river originates in the eastern slopes of the Aravali ranges near Kumbhalgarh and after flowing eastwards for about 512 km through districts of Rajsamand, Chittorgarh, Bhilwara, Tonk, and Sawai Madhopur meets Chambal river near Rameshar village in Sawai Madhopur district. The Banas river basin covers an area of 47,052 km^2. Banas river after originating in the eastern slopes of Aravali ranges and traveling through Rajsamanddistrict enters Chittorgarh district near Rashmi. Banas River, within Rajsamand district is joined from left by Chandrabhaga river near village Gangas.

Banas river is an ephemeral river and flows in direct response to rainfall and goes dry during summer months. It is an influent river, recharging ground water all along its course before it meets Chambal river. Banas river has limited flow till mid-December and afterward remains dry till monsoon.

Physiography of the lease area is characterized by almost flat country with isolated few low ridges. The mineralized zone is about 2.5 km away from the Banas River in southern direction and there are no faults traversing the mineralized zone and the river.

3.2.2 Drainage Pattern

There is a well-defined drainage system having dendritic drainage pattern in the buffer zone**.** Major part of drainage has been harnessed by constructing minor irrigation projects, tanks and anicuts. Whatever runoff is produced by the average

annual rainfall of 606 mm in the buffer zone, major part goes as surface runoff after meeting the evapo-transpiration losses and a part percolates to the zone of saturation.

The lease area is drained by Banas river in the northern part of the buffer zone while the southern part forms the catchment area of Berach river. Almost all the streams have been harnessed by village tanks within the buffer zone while the major stream meets Bhopalsagar dam, just outside the buffer zone in south. The drainage divide passes near Rajpura villages in east–west direction. The drainage map of the buffer zone is shown in **Figure-3.2.1.**

- *Drainage Pattern in Lease Area*

The drainage pattern of the lease area is shown in **Figure-3.2.2,** where four streams of first order originate near the eastern border of the lease area. The catchment areas of these streams originating inside the lease area is small and these streams carry limited surface runoff during the rains. These first order streams will continue to flow uninterrupted as underground mining will be carried out.

3.2.3 Geology

- *Regional Geology*

Dariba Bethumni metallogenic belt comprises an assemblage of medium to high-grade metamorphic equivalents of orthoquartzites, carbonates and carbonaceous facies rocks belonging to Bhilwara Super Group (3.5-2.5Ga) and extends for about 19 km in north-south direction. This cover sequence is underlain by basement rocks (gneisses and schists) of Mangalwar Complex.

The geology of the area is mainly composed of thin alluvial cover, belonging to Sub-Recent to Recent period of Quaternary era underlain by Rajpura–Dariba group of Bhilwara Super Group of Achaeans. The Dariba-Bethumni metallogenic belt comprises of an assemblage of medium to high grade metamorphic equivalents of ortho-quartzites, carbonates, and carbonaceous facies flanked by meta-argillites belonging to Bhilwara Super group of Achaean age. The Summarized Geological Succession is given in **Table-3.2.1.**

TABLE-3.2.1
SUMMARIZED GEOLOGICAL SUCCESSION

Era	Age	Super Group	Group/Formations	Rock Types
Quaternary	Sub-Recent to Recent	Fluvial & Colluvium	Alluvium	Sand, Silt, Clays, Gravel etc
Unconformity				
Intrusive				Pegmatites, Quartz Venis
		Bhilwara super group	Rajpura-/Dariba group	Dolomitic marble, Graphitic, Kyaniteschists, Quartziters
Achaeans			Mangalwar Complex	Migmatite, gneiss, mica, schists, quartzites
			Banded gneissic Complex	Gneisses, schist,etc

Source: Mining Plan

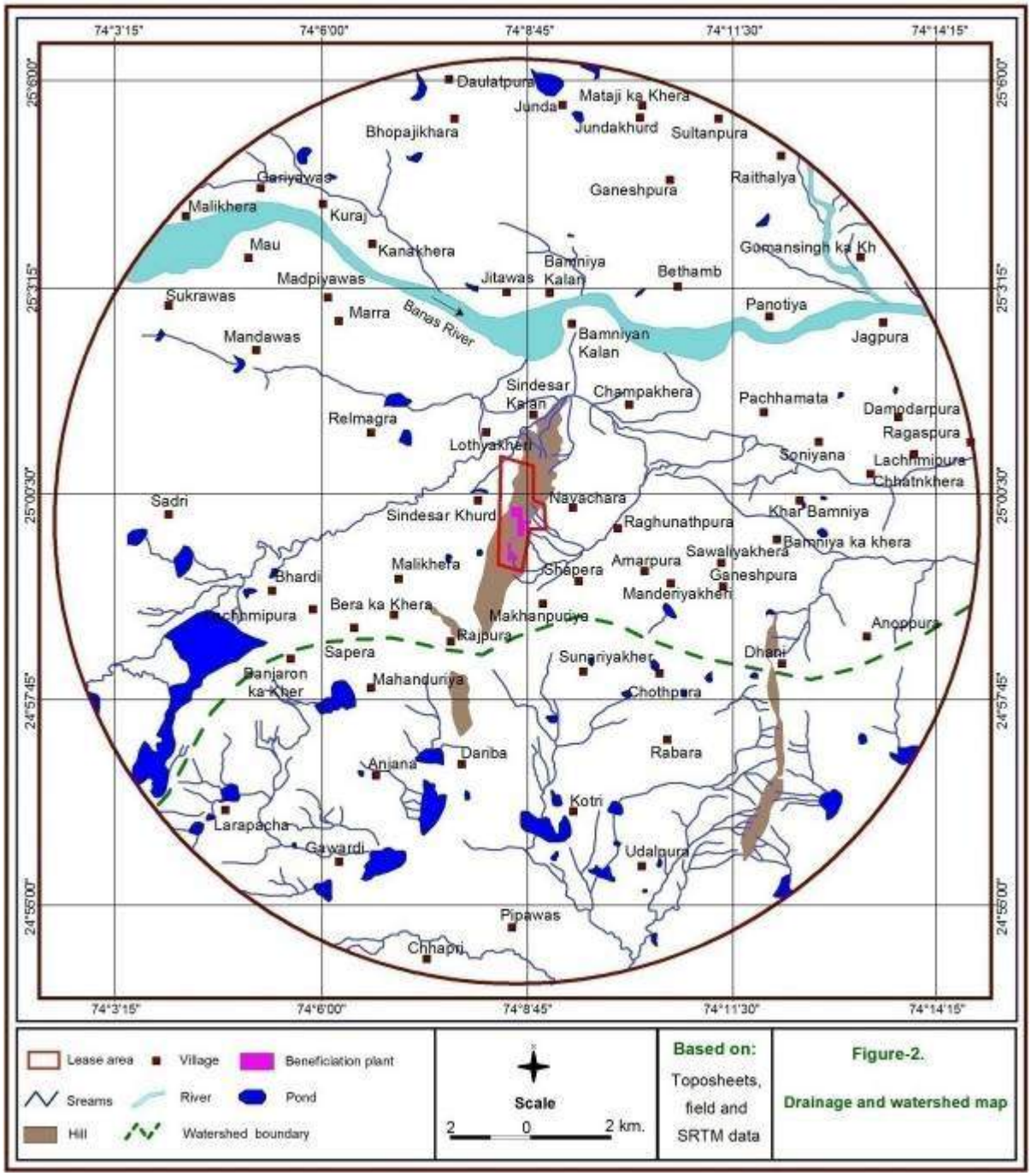


FIGURE-3.2.1
DRAINAGE MAP OF BUFFER ZONE

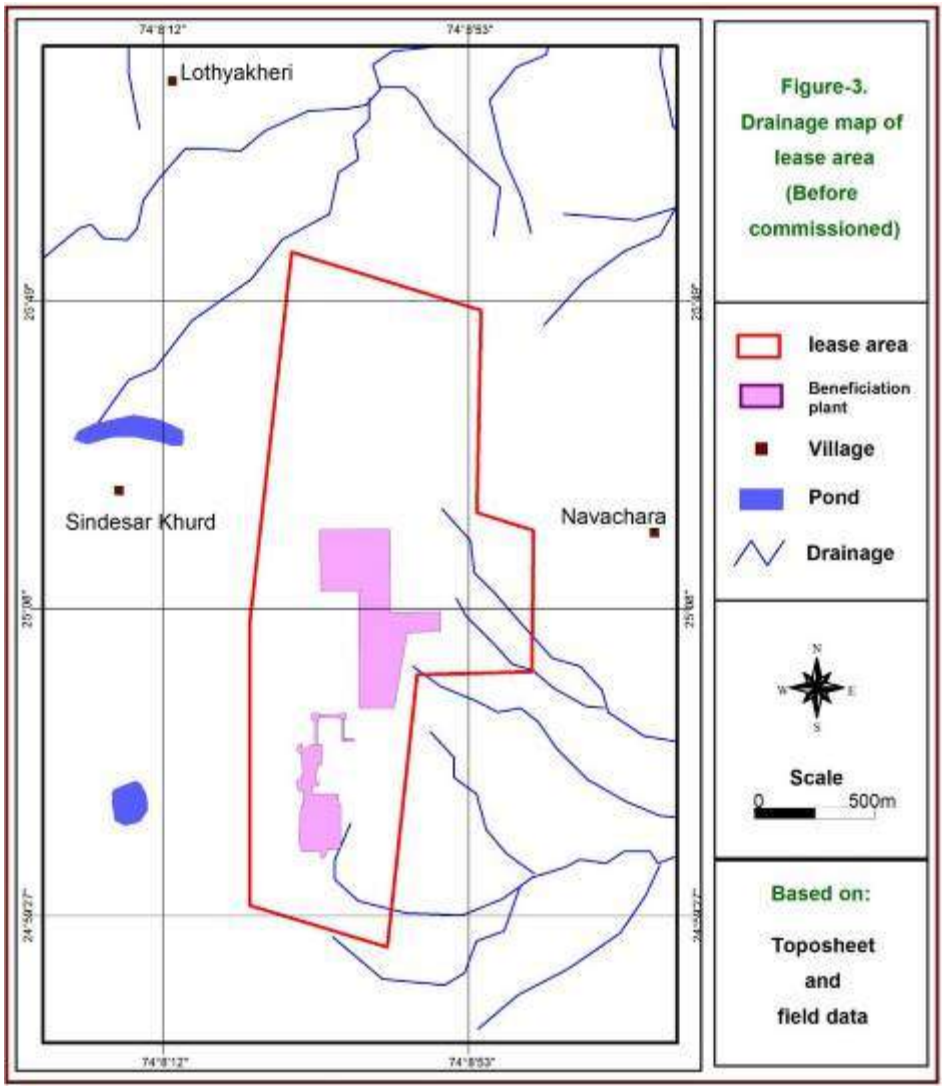


FIGURE-3.2.2
DRAINAGE MAP OF LEASE AREA

- *Local Geology*

Sindesar Khurd deposit is located in the central part of the eastern limb of the major Dariba-Bethumni synformal fold. The best exposed rock unit in the area is interbanded mica–schist/chert/quartzite and forms a prominent NNE-SSW trending ridge. The economic concentrations of lead-zinc-silver mineralization are hosted by calc-silicate bearing dolomite and graphite mica schist. The host rock is completely concealed 100 m below the above unit.

Graphite mica schist and calcareous quartz biotite schist, exposed further east of the area are intersected in the drill holes and mine developments.

3.2.4 Hydrogeology

Mica schist is the main rock exposed in the buffer zones. Mica schist is intruded by pegmatite and quartz veins. The general strike of the rocks is NNE-SSW to NE-SW with steep dips towards east. The detailed hydrogeology report is prepared by Hydro-Geosurvey Consultants Pvt. Ltd. Jodhpur (HCPL) and is enclosed in **Annexure-X**. The hydrogeological map of the study area is shown in **Figure-3.2.3.**

- *Nature of Occurrence of Ground Water*

Ground water occurs under water table conditions and is transmitted through fractures, joints and foliations. Mica schistis impervious in nature and have developed secondary porosity only due to joints and fractures. There is very limited thickness of weathered zone and generally lies above the zone of saturation.

The depth to water in crystalline metamorphics in core zone, during post monsoon period ranges from 10 m to 12 m below the land surface. It is shallow near the river courses, surface water reservoirs and ponds while it is deeper in the area away from these sources. The depth to water ranges from 15 m to 20 m below the land surface during pre-monsoon period in lease area. The depth to water in buffer zone ranges from 3 m to 12 m during post monsoon period and 5 m to 23 m during pre-monsoon period. The fluctuations due to rainfall and ground water withdrawal are significant as the rocks have very low fracture porosity and hydraulic conductivity.

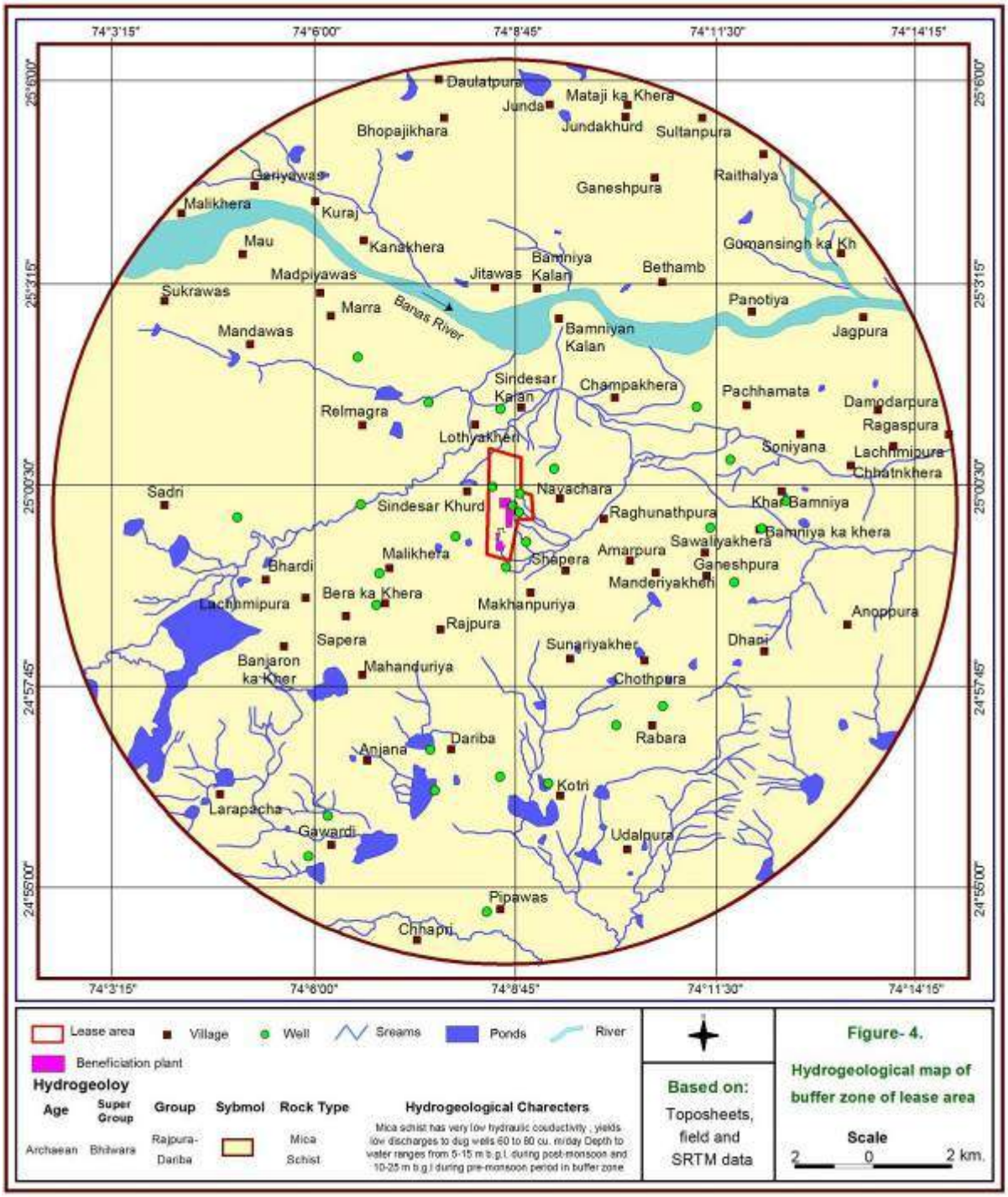


FIGURE-3.2.3
HYDROGEOLOGICAL MAP OF BUFFER ZONE OF LEASE AREA

- *Movement of Ground Water*

Ground water movement is controlled mainly by the hydraulic conductivity of the crystalline metamorphics and hydraulic gradient. The ground water movement mainly takes place through the fractures and foliations of the crystallines.

A review of the topography and drainage pattern of the buffer zone reveals that there is a drainage divide passing in the central part of the buffer zone demarcating two water sheds, Banas river water shed forms a major part of the buffer zone covering northern part while a small area in the southern area of the buffer zone belongs to Berach river water shed. The ground water flow, which follows in general the surface topography has flow in two directions. The main ground water flow direction is towards the north east and towards Banas river while the southern part has ground water flow direction in southern direction.

The hydraulic gradient of ground water flow on the western side of the hill is towards Banas river with value of 2.26 m/km while in the eastern side is 5.72 m/km. The lower hydraulic gradient in the western part of Banas river water shed is due to ground water flow mainly through alluvial zone while in the eastern part, it is through mica schist which has lower hydraulic conductivity. The hydraulic gradient in the southern part is 7.05 m/km towards the south indicating ground water flow through metamorphic with very low hydraulic conductivity.

- *Nature of Hydraulic Conductivity*

As the principal aquifer of the area is mica schist in Sindesar area, the hydraulic conductivity is mainly developed due to fractures and foliations.

The hydraulic conductivity is very low. The depth of productive hydraulic conductivity has been observed up to maximum depth of 110 m in the metamorphics, beyond which there are hardly any secondary openings, making the metamorphics completely barren. Bore wells, drilled deeper than 110 m did not release any additional discharge. It is therefore expected that in the underground mine also, the main aquifer zone from the depth of 10 m to 110 m from the general ground water will contribute the major component of inflow of ground water.

3.2.5 Present Status of Ground Water Development of the Area

The Central Ground Water Board (CGWB) in association with state ground water organization carry out estimation of dynamic ground water reserves of every taluka/tehsil of the state by monitoring the water levels in key wells during pre and post monsoon periods every year along with estimation of ground water draft. Based on these two figures, the stage of ground water development is computed as under:

$$\text{Stage of ground water development (\%)} = \frac{\text{Annual ground water draft} \times 100}{\text{Long term ground water recharge}}$$

The present study reveals that against the total ground water recharge of 25.11 mcm, including recharge from return flow of irrigation water, the ground water discharge is 25.34 mcm indicating the status of ground water development of buffer zone as 100.92%. The buffer zone therefore appears in Over-exploited category. Similarly, against nil ground water discharge and the core zone receives ground water recharge of 0.106 mcm in mine lease area and 0.0032 mcm in beneficiation plant indicating present status of ground water development as 0.0%. The core zone falls in the safe category.

CGWB report is published once in two years and last report has been released in July, 2014 for the dynamic ground water reserves as on 31.03.2011. This report places all the talukas/ tehils in different categories like safe, semi-critical, critical and over-exploited depending on the status of ground water development and long term water level trend. This report shows that the status of ground water development of Relmagra block and Rajsamand district is more than 100% and there is a long term decline of water levels. CGWB therefore has placed Relmagra block and Rajsamand district under over-exploited category. The findings of this study for the buffer zone matches with the assessment done by the CGWB for Relmagra block, although the findings of the CGWB are for the assessment year 2011.

3.3 Land Use Studies

Studies on land use aspects of eco-system plays an important role in identifying sensitive issues and taking appropriate actions by maintaining 'Ecological Homeostasis' for development of the region.

3.3.1 Objectives

The objectives of land use studies are:

- To determine the existing land use pattern in the study area;
- To analyze the impacts on land use in the study area; and
- To give recommendations for optimizing the future land use pattern vis-à-vis proposed project in the study area and its associated impacts.

3.3.2 Methodology

The methodology adopted for preparation of land use/ land cover thematic map is monoscopic visual interpretation of geocoded scenes of IRS-P6 satellite LISS-IV and field observations taken. The various steps involved in the study are preparatory field work, field survey and post field work.

Also, literature review of various secondary sources such as District Census Handbooks, regional maps regarding topography, zoning settlement, industry, forest etc. were taken. The data was collected from various sources like District Census Handbook, Revenue records, state and central government offices and Survey of India (SOI) Toposheets and also through primary field surveys.

3.3.3 Land Use/Land Cover Classification System

The present land use/land cover maps were prepared based on the classification system of National standards. For explanation of each of the land use category the details as given in **Table-3.3.1** were considered.

TABLE-3.3.1
LAND USE/LAND COVER CLASSIFICATION SYSTEM

Sr. No.	Level-1	Level-2
1	Built-up Land	Town/cities
		Villages
		Institution/Industry/Godown etc
		Plotted Area/Layout
2	Agriculture Land	Crop Land
		Plantations
		Fallow
3	Forest	Evergreen/Semi evergreen
		Deciduous
		Forest Plantation
4	Wastelands	Rocky/Stony Waste
		Land with /without scrubs
		Saline/sandy & Marshy/swampy
5	Water Bodies	River/Stream
		Lake/Reservoir/Tanks
6	Others	Orchard/Other Plantation
		Shifting cultivation
		Salt Pans, Snow covered/Glacial
		Barren/Vacant Land

3.3.3.1 Pre-field Interpretation of Satellite Data

The False Color Composite (FCC) of IRS RS-2 LISS-IV FX satellite data at 1:50,000 scale procured on 28th February, 2017 is used for pre-field interpretation work. Taking the help of topo-sheets, geology, geomorphology and by using the image elements the features are identified and the boundaries delineated roughly. Each feature is identified on image by their image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of land cover and land use, physiography and erosion was formulated. The sample areas for field check are selected covering all the physiographic, land use/land cover feature cum image characteristics.

- *Ground Truth Collection*

Both topo-sheets and imagery were taken for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as possible to observe the broad land use features and to adjust the sample areas according to field conditions. Detailed field observations and investigations were carried out and noted the land use features on the imagery.

- *Post Field Work*

The base maps of the study area were prepared, with the help of Survey of India Topo-sheets. Preliminary interpreted land use and the land cover features boundaries from IRS RS-2. False Colour Composite were modified in light of field information and the final thematic details were transferred onto the base maps. The final interpreted and classified thematic map was cartographed. The cartographic map was colored with standard colour coding and detailed description of feature with standard symbols. All the classes noted and marked by the standard legend on the map.

3.3.3.2 Final Output

The final output would be the land use/land cover map on 1:50,000 scale, numerals were given different colour code for each category as shown in map. Area estimation of all features of land use/land cover categories was noted.

3.3.3.3 Observations

The following are the main interpreted land use/land cover classes of the study area and their respective areas are given in hectares in **Table-3.3.2** for the year 2017**.** The thematic map and land use pattern within 10 km radius based on IRS RS-2 for 28th February, 2017 are shown in **Figure-3.3.1** and **Figure-3.3.2** respectively.

TABLE-3.3.2
LANDUSE BREAKUP BASED ON IRS RS-2 DATA–28th FEBRUARY 2017

Sr. No.	Landuse	Area (sq. Km)	%
1	**BUILT- UP LAND**		
	A. Settlement	18.55	5.3
	B. Industrial area	11.20	3.2
2	**WATERBODIES**		
	A. Tank / River etc.	23.80	6.8
3	**CROP LAND**		
	A. Single crop	99.75	28.5
	B. Double crop	115.35	34.1
4	**WASTELANDS**		
	A. Land with scrub	32.55	9.3
	B. Land without scrub	16.10	4.6
	C. Stony waste area	14.70	4.2
	D. Mining area	10.15	2.9
	E. Ash pond	03.85	1.1
	Total	**346**	**100**

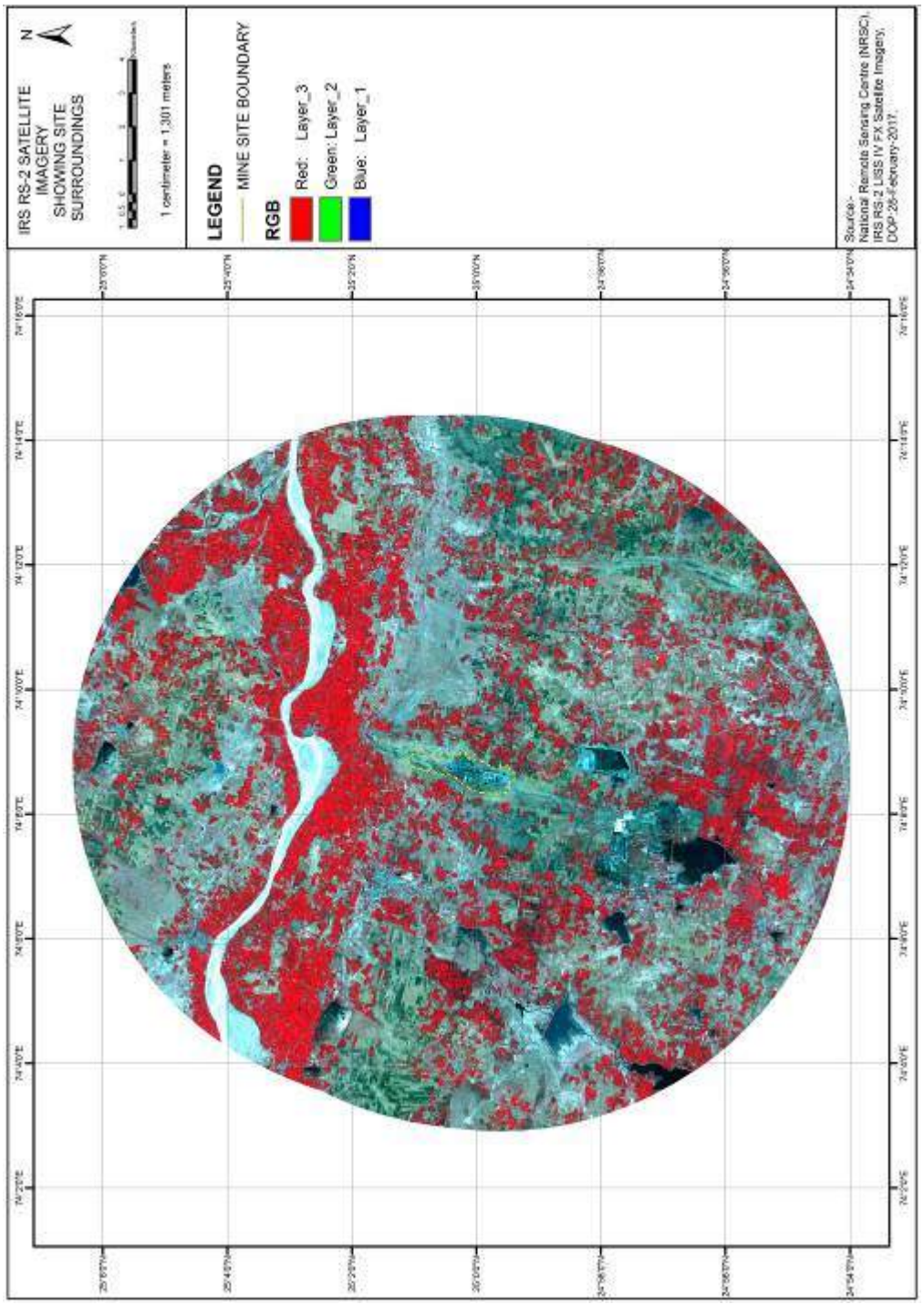


FIGURE-3.3.1
SATELLITE IMAGERY OF STUDY AREA (IRS RS-2 LISS IV FX)

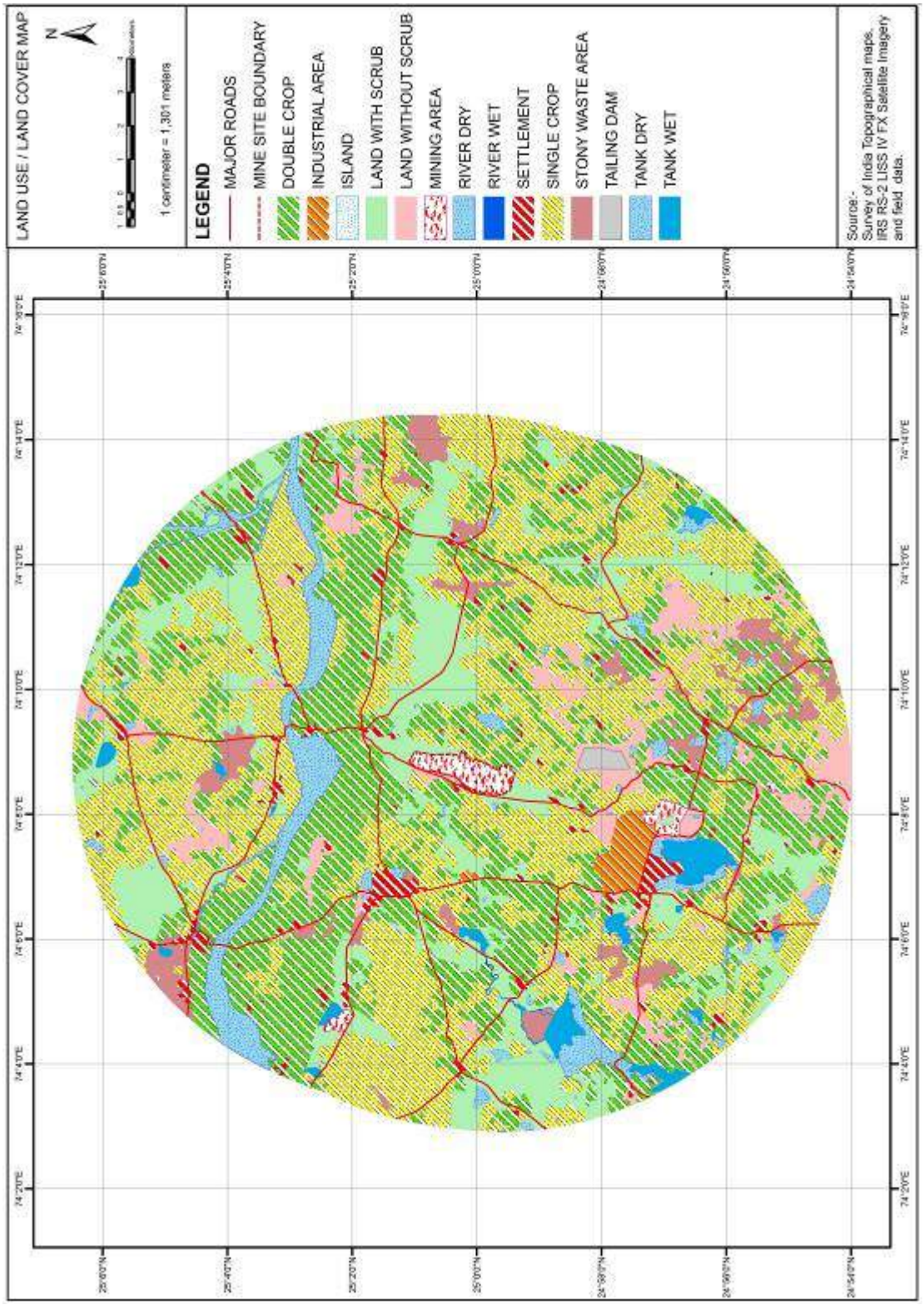


FIGURE-3.3.2
LAND USE PATTERN BASED ON SATELLITE IMAGERY

3.4 Soil Characteristics

The present study of the soil profile establishes the baseline characteristics and this will help in future identification of the incremental concentrations if any, due to the operation of the mining project. The physical, chemical and heavy metal concentrations were determined. The samples were collected by using a post hole soil auger up to a depth of 30 cm as per standard soil sampling procedure. A total of **nine** samples within the study area were collected and analyzed. The details of the soil sampling locations are given in **Table-3.4.1** and are shown in **Figure-3.4.1.** The sampling has been carried out once in the study period and soil sampling photographs are shown in **Figure-3.4.2.**

TABLE-3.4.1
DETAILS OF SOIL SAMPLING LOCATIONS

Location Code	Location	Distance from ML Boundary	Direction from ML Boundary
S1	Mine lease area	-	-
S2	Bamaniya Kalan	4.6	N
S3	Raghunath pura	0.4	E
S4	Amarpura	2.2	ESE
S5	Shivpura	1.0	SE
S6	Chothpura	3.6	SE
S7	Rajpura	2.0	SSW
S8	Malikhera	2.5	WSW
S9	Relmagra	3.0	NW

The sampling locations have been identified with the following objectives:

- To determine the baseline soil characteristics of the study area;
- To determine the impact of industrialization on soil characteristics; and
- To determine the impact on soils more importantly from agricultural productivity point of view.

The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The methodology adopted for each parameter is described in **Table-3.4.2**

TABLE-3.4.2
ANALYTICAL TECHNIQUES FOR SOIL ANALYSIS

Parameter	Method (ASTM Number)
Grain size distribution	Sieve analysis (D 422 – 63)
Textural classification	Chart developed by Public Roads Administration
Bulk density	Sand replacement, core cutter
Sodium absorption ratio	Flame photometric (D 1428-82)
pH	pH meter (D 1293-84)
Electrical conductivity	Conductivity meter (D 1125-82)
Nitrogen	Kjeldahl distillation (D 3590-84)

Parameter	Method (ASTM Number)
Phosphorus	Molybdenum blue, colourimetric (D 515-82)
Potassium	Flame photometric (D 1428-82)
Iron	AAS (D 1068-84)
Zinc	AAS (D 1691-84)
Boron	Surcumin, colourimetric (D 3082-79)
Chlorides	Argentometric (D 512-81 Rev 85)

3.4.1 Baseline Soil Status

The results and standard classification are given in **Table-3.4.3 and Table-3.4.4.** The evaluation of initial soil quality based on the above characters is done and presented as below:

Physical characters

The physical characters include bulk density, grain size distribution (textural analysis), porosity, infiltration rate, water holding capacity.

Grain Size Distribution

Texture indicates relative proportion of various sizes of primary soil particles such as sand, silt and clay present in the soil. Based on their quantities present in the soil sample and using the textural classification diagram. The textural classes of nine soil samples are clay loam, silty clay & clay (fine texture.) Bulk density values confirm the textural class.

Bulk Density

In case of bulk density, total soil space (space occupied by solid and pore spaces combined) are taken in to consideration. Thus bulk density is defined as the mass (weight) of a unit volume of a dry soil. This volume would, off course include both solids and pores. Soil texture, soil structure and organic matter content are the factors influencing the bulk density of a soil. Bulk density, besides being an interesting and significant physical characteristic, is very important as a basis for certain computations. The bulk density of the mine soil sample under consideration ranges between 0.9 to 1.1 gm/cc, and confirms the fine texture of the soils of the area under study.

Porosity

The pore space of a soil is the space occupied by air and water and is expressed as percent pore space. The amount of this pore space is determined by structural conditions, that is by inter- related influence of texture, compactness and aggregation. Porosity is also related to aeration and retention and movement of water in the soil. The porosity of nine soil sample ranges between 4.5 to 11.6 % in accordance to the texture of soil, and considered good for air and water movement in the soil for crops.

Permeability

Permeability is the entry of fluid from one medium to another. In soil – water relationship, it means entry of water from air in to soil. Permeability rate is defined as maximum rate at which a soil in a given condition can absorb rain or irrigation water as it comes at soil surface, permeability rate is the rate of water entry in to the soil when flow is non-divergent. It is a surface and sub surface character, and is expressed as mm/sec or cm/hr. Permeability of nine samples under study were inferred from texture and classified as moderate to very slow for agriculture and conservation, indicating moderate to good availability of moisture to cops after rain or irrigation.

Water Holding Capacity (WHC)

Water holding capacity of soil is the maximum amount of moisture, a dry soil is capable of holding, under given standard condition. If the moisture content is increased further, percolation results. WHC is of great value to practical agriculture, since it provides a simple means to determine moisture content. WHC required for good crop growth is 35 to 70%. The WHC of the nine soil samples were inferred from texture between 19.1 to 57.1 % indicating somewhat frequent water application for growing crops.

Chemical Characters

The parameters considered for chemical analysis are: soil reaction (pH), electrical conductivity (EC), Cation Exchange Capacity (CEC) Cations, like calcium, magnesium, sodium and potassium, water soluble sulphates and chlorides, sodium adsorption ratio (SAR), macro nutrients like available nitrogen, total organic carbon, organic matter available phosphorus, available potassium micro nutrients like iron zinc, manganese and boron. Heavy metals like chromium, lead, nickel, arsenic, mercury and cadmium.

Soil Reaction (pH)

The nutritional importance of pH is illustrated, thus hydrogen ion concentration has influence not only on, solubility of nutrients, but also upon facility with which these nutrients are absorbed by plants, even already in soil solution for e.g. Fe,Mn and Zn become less available as pH rises from 4.5 to 7 to 8. At pH 6.5 to 7.0 utilization of nitrate and ammonia nitrogen becomes more available. In case of phosphorus it becomes less available to plant as pH increases above 8.5, due to its fixation in exchange complex of soil. For the nine soil sample under consideration the pH ranges between 7.40 to 8.49 indicating soils are slight to moderately alkaline.

Electrical Conductivity (EC)

The salt content of the soils are estimated by EC measurements, and is useful to designate soils as normal or sodic (saline). Electrical conductivity is expressed as µmhos/cm at 25^0C, µsmhos/ cm or mmhos /cm or sm/cm. The EC of nine soil

samples is between 83.4 to 386 µs/cm and are below the limits to be called as saline and hence the soils are normal for crop growth.

Organic Carbon / Organic Matter(%)

Although accounting for only a small part of the total soil mass in mineral soils, organic matter influences physical, chemical, and biological activities in the soil. Organic matter in the soil is plant and animal residue which serves as a reserve for many essential nutrients, especially nitrogen. Determination of organic matter helps to estimate the nitrogen which will be released by bacterial activity for the next season depending on the conditions, soil aeration, pH, type of organic material, and other factors. The nine soil samples under consideration contain 0.04 to 0.33% organic carbons and 0.07 to 0.57 % organic matter, OM is calculated from organic carbon estimation.

Available Nitrogen (N)

Nitrogen is a part of all living cells and is a necessary part of all proteins, enzymes and metabolic processes involved in the synthesis and transfer of energy. Nitrogen is a part of chlorophyll, the green pigment of the plant that is responsible for photosynthesis. Helps plants with rapid growth, increasing seed and fruit production and improving the quality of leaf and forage crops. The available nitrogen in the nine samples as per analysis ranges between 7.8 to 60.6 kg / ha .

Available Phosphorus (P)

Like nitrogen, phosphorus (P) is an essential part of the process of photosynthesis. Involved in the formation of all oils, sugars, starches, etc. Helps with the transformation of solar energy into chemical energy; proper plant maturation; withstanding stress. Effects rapid growth. Encourages blooming and root growth. The phosphorus content of soil of nine samples ranges between 15.8 to 70.3 kg/ha.

Available Potassium (K)

Potassium is absorbed by plants in larger amounts than any other mineral element except nitrogen and, in some cases, calcium. Helps in the building of protein, photosynthesis, fruit quality and reduction of diseases. The Potassium content of nine soil samples ranges between 124.6 to 191.4 kg/ha.

Cation Exchange Capacity (CEC)

The total amount of exchangeable cations that a soil can retain is designated as cation exchange capacity (CEC) and usually expressed as me/100 gm of soil. Determination of amount of cations present in soil is useful, because CEC influences the availability of adsorbed cations to both higher plants and soil microorganisms. Thus CEC is directly related to fertility of soils. The CEC of the mine samples ranges between 17.7 to 28.4 me / 100gm soil. A soil with low CEC indicates low fertility and soils with high CEC indicates high fertility. Nine soil

samples are clayey having high percentage of clay, hence CEC in turn is medium to high and fertility is also medium to high.

Exchangeable Calcium (Ca++)

Calcium, an essential part of plant cell wall structure, provides for normal transport and retention of other elements as well as strength in the plant. It is also thought to counteract the effect of alkali salts and organic acids within a plant and soil acidity. The exchangeable calcium content of nine soil samples ranges between 11.0 to 21.8 me/100gm soil, and having high base saturation percentage. (ranging from 65 % to 75%). For normal crop growth a base saturation percent of soils more than 50% is required.

Exchangeable Magnesium (Mg++)

Magnesium is part of the chlorophyll in all green plants and essential for photosynthesis. It also helps activate many plant enzymes needed for growth. The magnesium content of the nine soil samples ranges between 4.0 to 10.1 me /100 gm soil, which is further adding to base saturation.

Exchangeable Sodium (Na+)

Though sodium is not an essential plant nutrient, but it has some role in potassium nutrition. Sodium also has a role in affecting the pH of soils; Sodium present above a certain limit makes soil alkaline which affect soil physical condition, and fixing of available phosphorus. In the nine samples sodium ranges between 0.08 to 1.37 me/100gm soil, which is below the content(i.e. ESP is below 15%) at which soil show, saline alkali or alkaline properties, hence no adverse effect on soils.

Sodium Adsorption Ratio (SAR)

Sodium adsorption ratio is ratio of Na+ to under root of Ca + +Mg++ by 2. SAR values of soil solution along with EC and pH helps in diagnosing soils as normal, saline, saline-alkali or alkali. The nine soil samples show SAR values between 0.04 to 0.55 and indicate that soils are normal. (SAR values below 13).

Iron (Fe)

Iron is essential for crop and other plants for chlorophyll formation iron deficiency likely occurs in soils with high pH, poor aeration, excessive phosphorus,or low organic matter. It may be produced also by an imbalance of Mo, Cu, and Mn. Inplants, the deficiency shows up as a pale green leaf color (chlorosis) with sharp distinction between green veins and yellow inter-venial tissues. The iron content of nine samples ranges between1.51 to 3.87 % and is low. Thus may cause problem of iron deficiency.

Aluminum (Al)

Exchangeable Aluminum (Al) is not present in a plant available form in soils with a pH above 5.5 and therefore tests for extractable aluminum need only be done on distinctly acid soils. In soils with a pH range of 4.5 - 5.5 are those most likely to be affected by aluminum toxicity. In the nine samples the total Aluminum ranges between 1.42 to 5.17 % which is low.

Manganese (Mn)

Mn is an important plant micro nutrient and is required by plants in second greater quantity compared to iron, like any other element, it can have limiting factor on plant growth, if it is deficient or toxic in plant tissue. Manganese is used in plants as major contribution to various biological systems, including photo synthesis, respiration and nitrogen assimilation. Mn content in the nine samples ranges between 275.5 to 624.9 mg/kg.

Zinc (Zn)

Zn deficiency most often is present in sandy soils with neutral or alkaline pH, or with low organic matter. Total zinc may be high but the availability depends on other factors. In the present Nine samples Zinc content ranges between 52.4 to 156.8 mg/kg or ppm.

Boron (B)

Boron (B) is a very narrow range between deficiency and toxicity in boron. Deficiencies are more often when organic matter is low and dry weather slows the decomposition. Uptake of boron is reduced at pH level higher than 7.0 Plant toxicity symptoms manifest as leaf tip and marginal chlorosis. Boron toxicity occurs in dry areas and is generally associated with irrigation water. In the nine samples of the project the boron content ranges between 13.9 to 31.2 mg/kg.

Water-Soluble Sulphates as SO_4

This test measures readily available sulphur in the form of dissolved plus absorbed sulphate. Sulphur testing is important where low sulphur or sulphur-free fertilizers are used, such as high analysis NPK fertilizers. Retention of sulphate sulphur by the soil is related to its phosphate retention, with high leaching losses of sulphate being associated with low phosphate retention soils. This should also be taken into account when considering sulphur fertilizer options. In the nine samples the water soluble sulphate as SO_4 ranges between 7.9 to 39.2 mg/kg.

Water Soluble Chlorides as Cl

The Cl^-anion does not form complexes readily, and shows little affinity (or specificity) in its adsorption to soil components. Thus, Cl^- movement within the soil is largely determined by water flows. Chlorine is an essential micronutrient for higher plants. It is present mainly as Cl^-. Chloride is a major osmotically active solute in the vacuole and is involved in both turgor- and osmo regulation.

In the cytoplasm it may regulate the activities of key enzymes. In addition, Cl^-also acts as a counter anion and Cl^- fluxes are implicated in the stabilization of membrane potential, regulation of intracellular pH gradients and electrical excitability. In the nine samples the water soluble chloride ranges between 88.6 to 184.6 mg/kg and is excessive.

Heavy Metals

Soils may become contaminated by the accumulation of heavy metals and metalloids through emissions from the rapidly expanding industrial areas, mine tailings, disposal of high metal wastes, leaded gasoline and paints, land application of fertilizers, animal manures, sewage sludge, pesticides, wastewater irrigation, coal combustion residues, spillage of petrochemicals, and atmospheric deposition. Heavy metals constitute an ill-defined group of inorganic chemical hazards, and those most commonly found at contaminated sites are lead (Pb), chromium (Cr), arsenic (As), zinc (Zn), cadmium (Cd), mercury (Hg), and nickel (Ni) Soils are the major sink for heavy metals released into the environment by aforementioned anthropogenic activities and unlike organic contaminants which are oxidized to carbon (IV) oxide by microbial action, most metals do not undergo microbial or chemical degradation and their total concentration in soils persists for a long time after their introduction Changes in their chemical forms (speciation) and bioavailability are, however, possible. The presence of toxic metals in soil can severely inhibit the biodegradation of organic contaminants [Heavy metal contamination of soil may pose risks and hazards to humans and the ecosystem through: direct ingestion or contact with contaminated soil, the food chain (soil-plant-human or soil-plant-animal-human), drinking of contaminated ground water, reduction in food quality (safety and marketability) via phyto-toxicity, reduction in land usability for agricultural production causing food insecurity, and land tenure problems.

Chromium (Cr)

Chromium mobility depends on sorption characteristics of the soil, including clay content, iron oxide content, and the amount of organic matter present. Chromium can be transported by surface runoff to surface waters in its soluble or precipitated form. Soluble and un-adsorbed chromium complexes can leach from soil into groundwater. The leachability of Cr (VI) increases as soil pH increases. Most of Cr released into natural waters is particle associated, however, and is ultimately deposited into the sediment. In the nine samples the chromium ranges between 37.2 to72.9 mg/kg and is within normal limits.

Lead (Pb)

Lead (Pb) Typical mean Pb concentration for surface soils worldwide averages 32 mg/kg and ranges from 10 to 67mg/kg. The most serious source of exposure to soil lead is through direct ingestion of contaminated soil or dust. In general, plants do not absorb or accumulate lead. However, in soils testing high in lead, it is possible for some lead to be taken up. Studies have shown that lead does not readily accumulate in the fruiting parts of vegetable and fruit crops (e.g., corn, beans, squash, tomatoes, strawberries, and apples). Higher concentrations are

more likely to be found in leafy vegetables (e.g., lettuce) and on the surface of root crops (e.g., carrots). Since plants do not take up large quantities of soil lead, the lead levels in soil considered safe for plants will be much higher than soil lead levels where eating of soil is a concern (pica). Generally, it has been considered safe to use garden produce grown in soils with total lead levels less than 300 ppm. The risk of lead poisoning through the food chain increases as the soil lead level rises above this concentration. Even at soil levels above 300 ppm, most of the risk is from lead contaminated soil or dust deposits on the plants rather than from uptake of lead by the plant. In the nine samples the Lead ranges between 14.6 to 28.3 mg/kg and within permissible limit.

Nickel (Ni)

Nickel is an element that occurs in the environment only at very low levels and is essential in small doses, but it can be dangerous when the maximum tolerable amounts are exceeded. It usually takes a long time for nickel to be removed from air. The larger part of all Ni compounds that are released to the environment will adsorb to sediment or soil particles and become immobile as a result. In acidic soils, however, Ni becomes more mobile and often leaches down to the adjacent groundwater. In the nine soil samples, the nickel content is below the limit i.e. 25.8 to 54.2 mg/kg.

Arsenic (As)

Arsenate can adsorb or co precipitates with metal sulfides and has a high affinity for other sulfur compounds. Elemental arsenic and arsine, AsH3, may be present under extreme reducing conditions. Biotransformation (via methylation) of arsenic creates methylated derivatives of arsine. As compounds adsorb strongly to soils and are therefore transported only over short distances in groundwater and surface water. In the nine samples the arsenic values are <0.1 mg/kg and within permissible limit.

Mercury (Hg)

Sorption to soils, sediments, and humic materials is an important mechanism for the removal of Hg from solution. Sorption is pH dependent and increases as pH increases. Mercury may also be removed from solution by co-precipitation with sulphides. Under anaerobic conditions, both organic and inorganic forms of Hg may be converted to alkylated forms by microbial activity, such as by sulfur-reducing bacteria. Elemental mercury may also be formed under anaerobic conditions by demethylation of methyl mercury, or by reduction of Hg (II). Acidic conditions (pH < 4) also favor the formation of methyl mercury, whereas higher pH values favor precipitation of HgS(s). In the nine samples the mercury content is <0.1mg/kg and within permissible limit.

Cadmium (Cd)

The application of agricultural inputs such as fertilizers, pesticides, and biosolids (sewage sludge), the disposal of industrial wastes or the deposition of atmospheric contaminants increases the total concentration of Cd in soils, and the

bioavailability of this Cd determines whether plant Cd uptake occurs to a significant degree. Cadmium is very bio-persistent but has few toxicological properties and, once absorbed by an organism, remains resident for many years. The nine samples contain cadmium between <0.1 to to 3.7 mg/kg and within permissible limits.

Comments: From the interpretation of field data, physical and chemical data it can be concluded that:

As per the physical data soils are fine texture, having low bulk density, imperatively high water holding capacity, and slow permeability. As per physical characters soils are rated as moderate to good for agriculture.

As per chemical characters soil reaction (pH) soils are slight to moderately alkaline and electrical conductivity (EC) is non saline (normal).

Organic matter is very low to low. Macro nutrient like nitrogen is low and phosphorus is low to sufficient, potassium is very low to low, calcium, magnesium are high and base saturation is high. Sodium is below the limit to make soil saline or sodic or alkali.

Micro-nutrients, Mn (high may be toxic), Zn (sufficient to some what high), and B (sufficient), Fe (low) Al (low), SO_4 (low to high) and Cl are high to very high.

Cation exchange capacity is moderate to high indicating good fertility. Exchangeable Ca is high with high base saturation, Ex K is low, Ex Na is also low not indicating any alkalinity. Sodium adsorption ratio indicates the soils are normal.

The soils of the area are lithosols on slope and some inceptisols as per topography. Texturally it varies from silty clay loam, silty clay and clay, grayish in colour.

Thus as per analysis of soils data and field observation the land can be classified as class III land i.e. Good soils on plain to gentle slopes subject to water erosion, as per land capability classification (USDA) i.e. good land for sustained agriculture.

TABLE-3.4.3
SOIL ANALYSIS RESULTS

Sr. No.	Parameters	UOM	S1	S2	S3	S4	S5
	Physical Properties						
1	Texture	---	Clay	Clay	Silty Clay	Silty Clay	Clay
A	Sand	%	22	26	11	12	23
B	Silt	%	13	11	48	46	13
C	Clay	%	65	63	41	42	64
2	Bulk Density	g/cc	1.1	0.9	1.2	1.1	1.0
3	Permeability	cm/hr	124.3	169.4	186.4	1510	450.2
4	Water holding capacity(WHC)	%	20.0	29.2	19.1	39.1	32.6
5	Porosity	%	4.5	6.6	5.9	10.4	7.1
	Chemical Properties						
6	pH (1:5 Aq. extraction)	---	8.25	8.43	8.31	8.36	8.35
7	Conductivity (1:5 Aq. extraction)	µS/cm	129	153.6	121.6	142.9	136.5
8	Cation Exchange Capacity	(meq/100gm)	19.3	19.2	17.7	25.5	22.9
9	Exchangeable Calcium as Ca	(meq/100gm)	13.4	12.5	11.0	16.9	18.0
10	Exchangeable Magnesium as Mg	(meq/100gm)	5.5	6.1	6.0	10.1	4.6
11	Exchangeable Potassium as K	(meq/100gm)	0.21	0.23	0.17	0.26	0.23
12	Exchangeable Sodium as Na	(meq/100gm)	0.08	0.41	0.44	1.18	0.10
13	Sodium Absorption Ratio (SAR)	---	0.04	0.19	0.21	0.45	0.04
14	Available Nitrogen as N	Kg/ha	60.6	16.9	25.0	37.5	13.4
15	Available Phosphorus as P	Kg/ha	25.2	62.8	58.4	70.3	47.0
16	Available Potassium as K	Kg/ha	141.5	124.6	125.0	165.1	140.5
17	Organic Carbon	%	0.33	0.11	0.12	0.25	0.08
18	Organic Matter	%	0.57	0.19	0.22	0.43	0.14
19	Water soluble Chlorides as Cl	mg/kg	106.3	154.7	152.6	160.5	88.6
20	Water soluble Sulphates as SO_4	mg/kg	23.1	25.8	31.0	39.2	9.3
21	Aluminum	%	1.42	1.50	2.02	3.30	2.29
22	Total Iron	%	1.51	1.89	2.61	2.52	2.11
23	Manganese	mg/kg/or ppm	275.5	347.2	535.3	520.6	378.2
24	Boron	mg/kg/or ppm	27.5	29.5	13.9	21.5	21.7
25	Zinc	mg/kg/or ppm	142.1	89.7	124.2	77.4	87.4
26	Total Chromium as Cr	mg/kg/or ppm	54.1	51.2	54.0	43.5	55.4
27	Lead as Pb	mg/kg/or ppm	19.1	22.7	14.6	22.5	24.4
28	Nickel as Ni	mg/kg/or ppm	41.3	34.2	54.2	53.5	44.8
29	Arsenic as As	mg/kg/or ppm	<0.1	<0.1	<0.1	<0.1	<0.1
30	Mercury as Hg	mg/kg/or ppm	<0.01	<0.01	<0.01	<0.01	<0.01
31	Cadmium as Cd	mg/kg/or ppm	1.1	1.2	2.5	0.5	0.7

Method of Testing: As per SSSA/Soil Analysis by M.L. Jackson/USEPA

TABLE-3.4.3 (CONTD....)
SOIL ANALYSIS RESULTS

Sr. No.	Parameters	UOM	S6	S7	S8	S9
	Physical Properties					
1	Texture	---	Silty Clay	Silty Clay	Clay	Clay Loam
A	Sand	%	9	8	25	7
B	Silt	%	50	49	9	61
C	Clay	%	41	43	66	32
2	Bulk Density	g/cc	0.9	1.1	1.0	1.1
3	Peremeability	cm/hr	1108	1339	1475	1715
4	Water Holding Capacity	%	37.1	46.2	57.1	51.3
5	Porosity	%	7.9	11.6	8.7	10.4
	Chemical Properties					
6	pH (1:5 Aq. extraction)	---	8.46	7.40	8.21	8.49
7	Conductivity (1:5 Aq. extraction)	µS/cm	386.0	83.4	118.6	141.7
8	Cation Exchange Capacity	(meq/100gm)	24.7	15.8	28.4	27.0
9	Exchangeable Calcium as Ca	(meq/100gm)	18.9	11.4	21.8	20.3
10	Exchangeable Magnesium as Mg	(meq/100gm)	4.5	4.0	6.0	5.0
11	Exchangeable Potassium as K	(meq/100gm)	0.30	0.30	0.32	0.28
12	Exchangeable Sodium as Na	(meq/100gm)	0.88	0.07	0.25	1.37
13	Sodium Absorption Ratio (SAR)	---	0.36	0.04	0.10	0.55
14	Available Nitrogen as N	Kg/ha	8.6	7.8	15.9	52.5
15	Available Phosphorus as P	Kg/ha	15.8	47.2	51.2	37.0
16	Available Potassium as K	Kg/ha	165.2	191.4	186.8	174.4
17	Organic Carbon	%	0.06	0.04	0.33	0.31
18	Organic Matter	%	0.1	0.07	0.56	0.54
19	Water soluble Chlorides as Cl	mg/kg	159.2	88.7	161.4	184.6
20	Water soluble Sulphates as SO_4	mg/kg	7.9	13.7	12.6	15.4
21	Aluminum	%	1.87	2.93	2.56	5.17
22	Total Iron	%	1.79	2.96	2.47	3.87
23	Manganese	mg/kg/or ppm	303.5	624.0	582.0	610.3
24	Boron	mg/kg/or ppm	31.2	18.3	22.4	24.8
25	Zinc	mg/kg/or ppm	52.4	156.8	92.8	124.2
26	Total Chromium as Cr	mg/kg/or ppm	37.2	44.8	57.5	72.9
27	Lead as Pb	mg/kg/or ppm	28.3	27.1	21.3	16.2
28	Nickel as Ni	mg/kg/or ppm	32.1	52.2	48.7	25.8
29	Arsenic as As	mg/kg/or ppm	<0.1	<0.1	<0.1	<0.1
30	Mercury as Hg	mg/kg/or ppm	<0.01	<0.01	<0.01	<0.01
31	Cadmium as Cd	mg/kg/or ppm	0.2	3.7	<0.1	1.2

Method of Testing: As per SSSA/Soil Analysis by M.L. Jackson/USEPA

TABLE-3.4.4
STANDARD SOIL CLASSIFICATION

Sr. No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.00 Moderately acidic 6.01-6.50 Slightly acidic 6.51-7.30 Neutral 7.31-7.80 Slightly alkaline 7.81-8.50 Moderately alkaline 8.51-9.00 Strongly alkaline >9.00 Very strongly alkaline
2	Salinity Electrical Conductivity (ppm) (1 ppm =640 µS/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 Harmful to crops (sensitive to salts)
3	Organic Carbon	Upto 0.20: Very less 0.21-0.40: Less 0.41-0.50: Medium, 0.51-0.80: On an avg. sufficient 0.81-1.00: Sufficient >1.00 : More than sufficient
4	Nitrogen (Kg/ha)	Up to 50 Very less 51-100 Less 101-150 Good 151-300 Better >300 Sufficient
5	Phosphorus (Kg/ha)	Upto 15 Very less 16-30 Less 31-50 Medium, 51-65 On an avg. sufficient 66-80 Sufficient >80 More than sufficient
6	Potash (Kg/ha)	0 -120 Very less 120-180 Less 181-240 Medium 241-300 Average 301-360 Better >360 More than sufficient

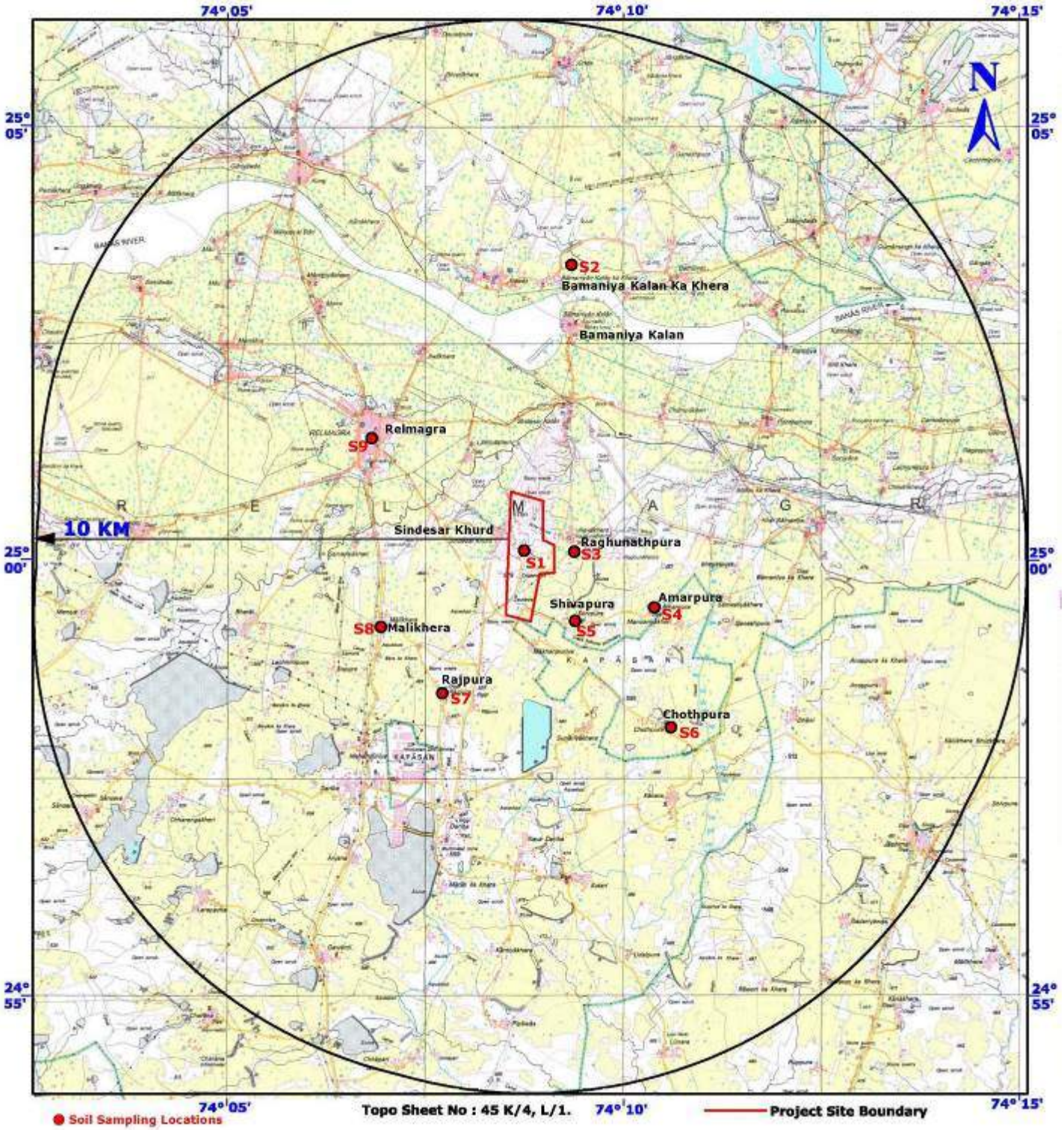


FIGURE-3.4.1
SOIL SAMPLING LOCATIONS

FIGURE-3.4.2
SOIL SAMPLING PHOTOGRAPHS

3.5 Meteorology

The meteorological data recorded during the monitoring period is very useful for proper interpretation of the baseline information as well as for input prediction models for air quality dispersion. Historical data on meteorological parameters will also play an important role in identifying the general meteorological regime of the region.

The year may broadly be divided into four seasons:

- Winter season : December to February
- Pre-monsoon season : March to May
- Monsoon season : June to September
- Post-monsoon season : October to November

On-site monitoring was undertaken for various meteorological variables in order to generate the site-specific data. The meteorological station was installed at a height of 10 m and data was recorded every hour continuously from 1st March to 31st May 2017 representing pre-monsoon season. The generated data are then compared with the meteorological data generated by nearest India Meteorological Department (IMD) station located at Udaipur (Dabok). The available meteorological data of IMD, Udaipur (Dabok) station was collected and analyzed.

3.5.1 Meteorological Data Generated at Site

The meteorological parameters were recorded on hourly basis during the study period and comprises of wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover. The maximum, minimum and average values for all the parameters except wind speed and direction are presented in **Table-3.5.1**.

TABLE-3.5.1
SUMMARY OF THE METEOROLOGICAL DATA GENERATED AT SITE

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Cloud Cover (Oktas)
	Max	Min	Max	Min		
March 2017	37.2	21.3	45.7	28.1	0	1/8
April 2017	41.4	24.5	47.1	29.2	0	1/8
May 2017	43.1	29.2	53.2	34.6	3.2	2/8
Range	**21.3 – 43.1**		**28.1 – 53.2**		**3.2**	**--**

3.5.1.1 Site Wind Rose – Pre Monsoon Season

Predominantly winds were from SW direction for 14.8% of the total time. The second predominant wind direction was from W direction 10.2%. In the NW direction, the winds were observed for 9.2%. In other directions, the percentage frequencies observed as NNW (6.9%), WSW (6.5%), SSE (6.4%), WNW (5.7%), SSW (5.4%), N (2.9%), S (2.6%), NE (1.9%), SE (1.8%), ESE (1.7%), E (1.2%), NNE (1.4%), ENE (1.1%), and calm conditions prevailed for 20.3% of the time. The site specific wind rose for the pre-monsoon season is shown in **Figure-3.5.1.**

3.5.2 Secondary Data Collected from IMD Udaipur (Dabok)

Secondary information on meteorological conditions has been collected from the nearest IMD station at Udaipur. The available meteorological data of IMD, Udaipur has been collected for the period 1999-2009 and analyzed.

IMD data from Udaipur has been collected for pressure, temperature, relative humidity, rainfall, evaporation, wind speed and direction. The data at IMD is usually measured twice a day viz., at 08:30 and 17:30 hours.

3.5.2.1 Meteorological Data Recorded at IMD, Udaipur (Dabok)

The data collected from IMD includes wind speed, wind direction, temperature, relative humidity, atmospheric pressure; rainfall and cloud cover over a period of 10 years from the year 1999 to 2009. The monthly maximum, minimum and average values are collected for all the parameters except wind speed and direction. All these parameters are recorded twice a day viz., at 08:30 and 17:30 hours. The collected data is given in **Table-3.5.2** and **Figure-3.5.2(A) to Figure-3.5.2(C)**.

TABLE-3.5.2
CLIMATOLOGICAL DATA STATION: IMD, UDAIPUR (DABOK)

Month (1999-2009)	Atmospheric Pressure (mb)		Temperature (^{0}C)		Relative Humidity (%)		Rainfall (mm)
	0830	1730	Max	Min	0830	1730	
January	958.3	955.1	28.6	2.7	65	38	7.0
February	956.7	953.6	32.1	4.2	57	31	2.6
March	954.8	951.3	37.0	8.7	45	27	9.6
April	952.0	948.2	40.4	14.7	37	25	3.0
May	948.6	945.1	42.3	19.4	42	28	8.6
June	944.8	941.7	41.2	21.6	65	50	85.2
July	943.7	941.4	35.7	22.1	79	70	195.4
August	945.2	943.1	33.8	20.8	82	75	177.3
September	949.7	947.0	35.7	18.3	76	65	117.0
October	954.6	951.6	36.2	12.9	62	42	18.5
November	957.4	954.4	33.3	7.8	60	43	9.7
December	958.7	955.7	28.7	3.6	66	43	2.3
Annual	**941.4**	**955.7**	**42.3**	**2.7**	**25**	**82**	**636.2**

3.5.2.2 Wind Speed/Direction

The wind roses for the study period representing pre-monsoon and monsoon, post-monsoon and winter seasons along with annual wind rose are shown in **Figure-3.5.2 (A), Figure-3.5.2 (B), Figure-3.5.2 (C)** respectively and presented in **Table-3.5.3**.

TABLE-3.5.3
SUMMARY OF WIND PATTERN– IMD UDAIPUR (DABOK)

Season	First Predominant Winds		Second Predominant Winds		Calm Condition	
	0830	1730	0830	1730	0830	1730
Winter	NW (13.6)	NE (14.0)	NNW (8.6)	E (11.3)	37.5	17.4
Pre-Monsoon	NW (14.3)	SW (16.6)	W (11.6)	W(12.3)	30.2	7.8
Monsoon	SW (19.2)	SW (21.2)	W (11)	W (13)	21.6	13.0
Post Monsoon	NW (10.7)	NE (9.7)	NNW (8.2)	NNW (7.1)	37.6	30.1
Annual	NW (14.3)	SW (11.8)	W (7.8)	W (9.5)	28.3	17.9

Note: Figures indicates % of time wind blows

3.5.3 Comparison of Primary and Secondary Data

The India Meteorological Department (IMD) records the data two times a day viz., 08:30 hr and 17:30 hr while the site specific data has been recorded at an hourly interval. On comparison of site specific data generated for study period vis-à-vis the IMD data, slight variations were observed. The following observations are brought out:

- The temperature was recorded on site when compared vis-à-vis the IMD data, slight variations was found. The minimum and maximum temperatures recorded at site during study period was 21.3°C – 43.1°C and the same at IMD was observed to be 8.7°C – 42.3°C;

- The Relative Humidity was observed to range from 28.1 – 53.2% during the study period at the site, whereas according to IMD Udaipur the Relative Humidity was observed to be in the range of 25-45% during the same season.

- No major deviations of site specific met data as compared with regional IMD met data.

- The deviations can be attributed to the distance from IMD station and also on the difference in elevation between two stations.

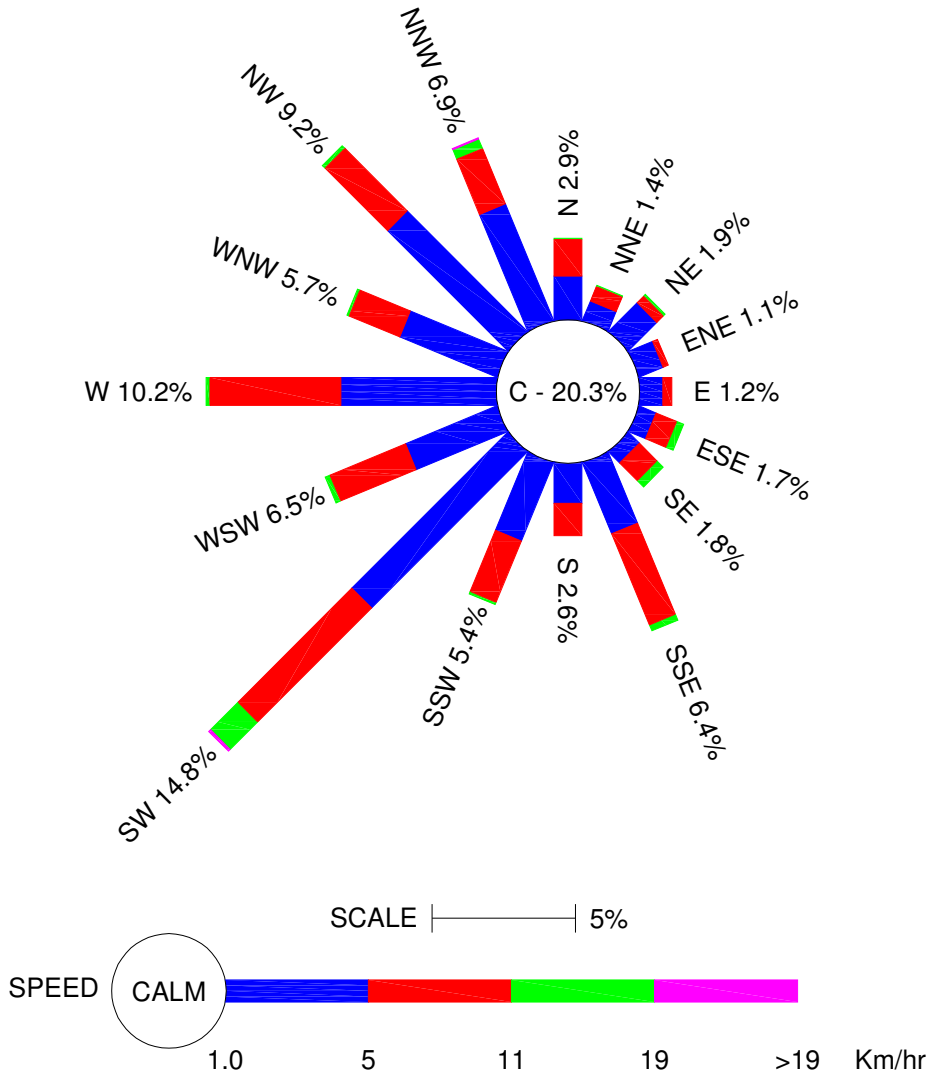


FIGURE-3.5.1
SITE-SPECIFIC WIND ROSE (PRE-MONSOON SEASON)

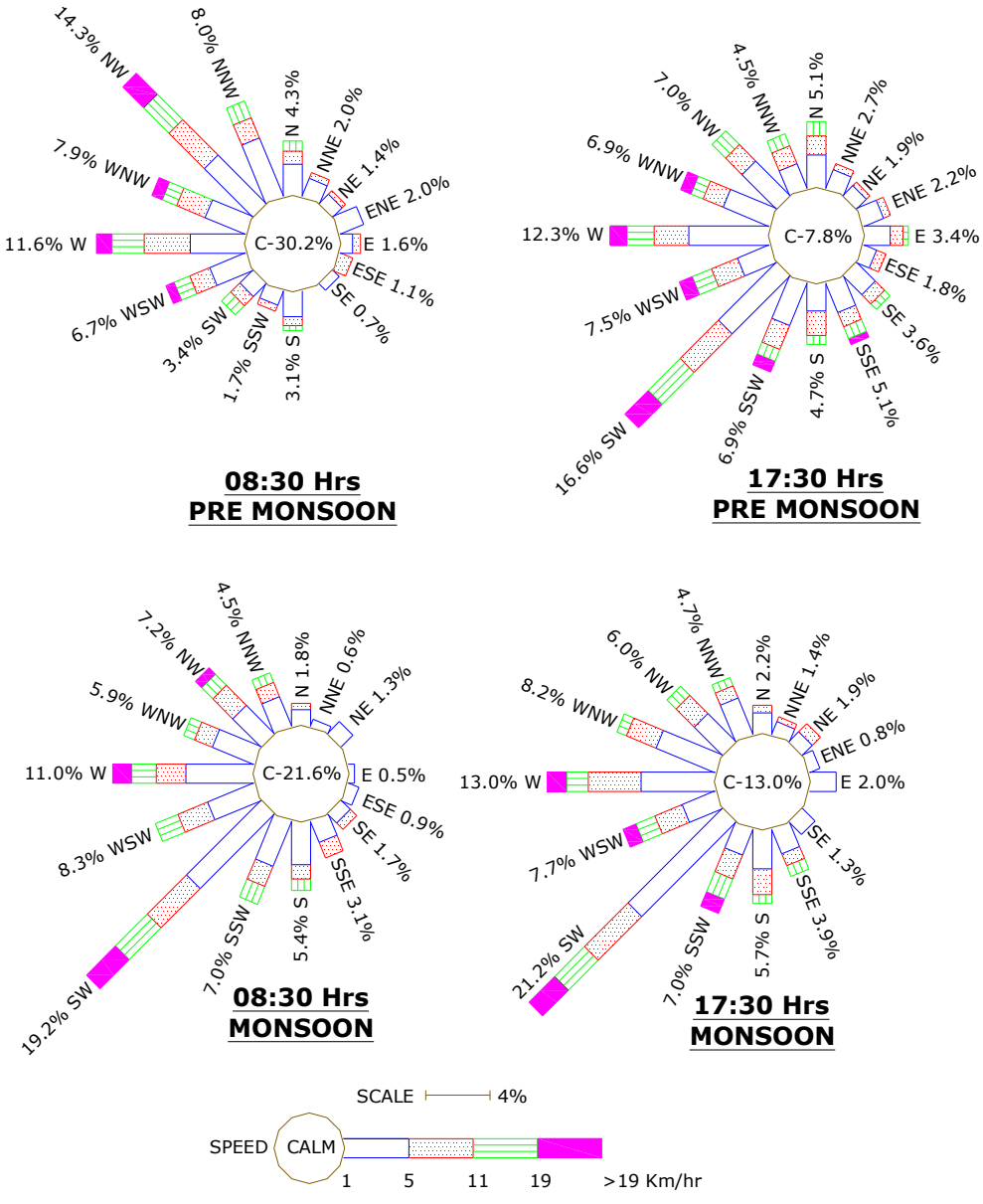


FIGURE-3.5.2 (A)
SEASONAL WINDROSES - IMD – UDAIPUR
PRE-MONSOON AND MONSOON

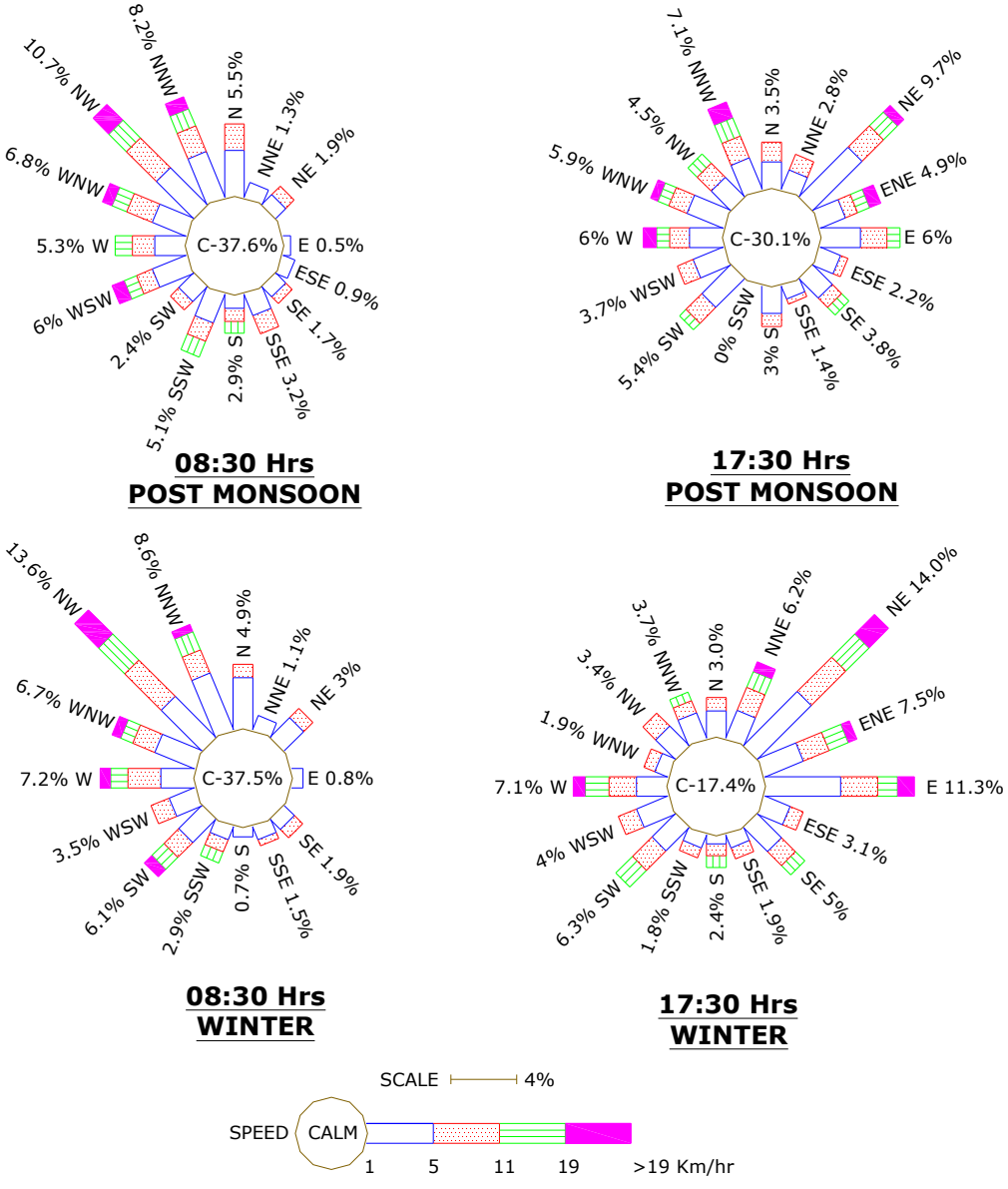
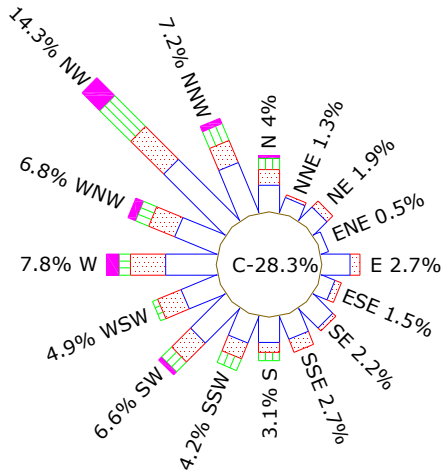
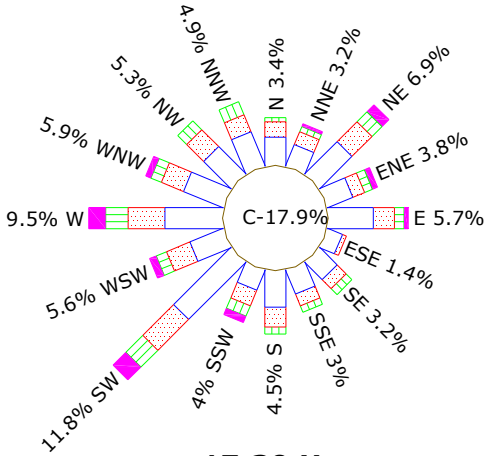


FIGURE-3.5.2(B)
SEASONAL WINDROSES - IMD –UDAIPUR
POST-MONSOON AND WINTER



08:30 Hrs
ANNUAL



17:30 Hrs
ANNUAL

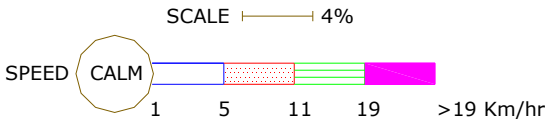


FIGURE-3.5.2 (C)
SEASONAL WINDROSES - IMD UDAIPUR
ANNUAL WINDROSE

3.6 Ambient Air Quality

The ambient air quality with respect to the study zone of 10 km radius around the proposed expansion project area forms the baseline information. The prime objective of the baseline air quality study is to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed expansion project. The study area represents mostly rural/residential environment.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling.

3.6.1 Methodology Adopted for Air Quality Survey

- ***Selection of Sampling Locations***

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality monitoring network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status;
- Representatives of likely impact areas/receptors of pollution; and
- Environmentally sensitive area.

Ambient Air Quality Monitoring (AAQM) stations were set up at nine locations with due consideration to the above mentioned points. **Table-3.6.1** gives the details of environmental setting around each monitoring station. The locations of the selected stations with reference to the proposed expansion project are given in the same table and depicted in **Figure-3.6.1.** The ambient air quality monitoring photographs are shown in **Figure-3.6.2.**

- ***Frequency and Parameters for Sampling***

Ambient air quality monitoring was carried out at a frequency of two days per week for three months at each location covering pre monsoon season (March to May 2017). The baseline data of air environment was monitored for parameters mentioned below:

- Particulate Matter (PM_{10});
- Particulate Matter ($PM_{2.5}$)
- Sulphur Dioxide (SO_2);
- Nitrogen Dioxides (NO_2);
- Carbon Monoxide (CO);
- Ozone (O_3);
- Ammonia (NH_3);
- Benzene (C_6H_6);
- Benzo(a) pyrene (BaP);
- Arsenic (As);
- Nickel (Ni); and
- Lead (Pb).

TABLE-3.6.1
DETAILS OF AMBIENT AIR QUALITY MONITORING

Station Code	Name of the Station	Distance (km)	Direction	Enviranmental Settings
AAQ1	Mine lease area	--	--	-
AAQ2	Sarvariya Khari	3.2	W	Up wind
AAQ3	Relmagra	3.0	NW	Cross wind
AAQ4	Bamnia Kalan	3.8	N	Cross wind
AAQ5	Champakheri	3.2	NE	Down wind
AAQ6	Raghunathpura	0.5	E	Down wind
AAQ7	Amarpura	2.2	SE	Cross wind
AAQ8	Malikhera	2.5	WSW	Cross wind
AAQ9	Kantiyakhera	7.0	SSE	Cross wind

- ***Duration of Sampling***

The sampling duration for PM_{10}, $PM_{2.5}$, SO_2 and NOx are twenty four hourly continuous samples per day and CO, O_3 is sampled for 8 hours continuous thrice a day for twice a week for the study period. This is to allow a comparison with the present revised standards mentioned in the latest Gazette notification of the Central Pollution Control Board (CPCB) (November, 2009).

3.6.2 Presentation of Primary Data

Various statistical parameters like 98^{th} percentile, average, maximum and minimum values have been computed from the observed raw data for all the AAQ monitoring stations. The results of monitoring carried out are presented in **Annexure-VI.** The summary of these results representing pre mosoon season are given in **Table-3.6.2** and their characterization is give in **Table-3.6.3.** These are compared with the standards prescribed by Central Pollution Control Board (CPCB).

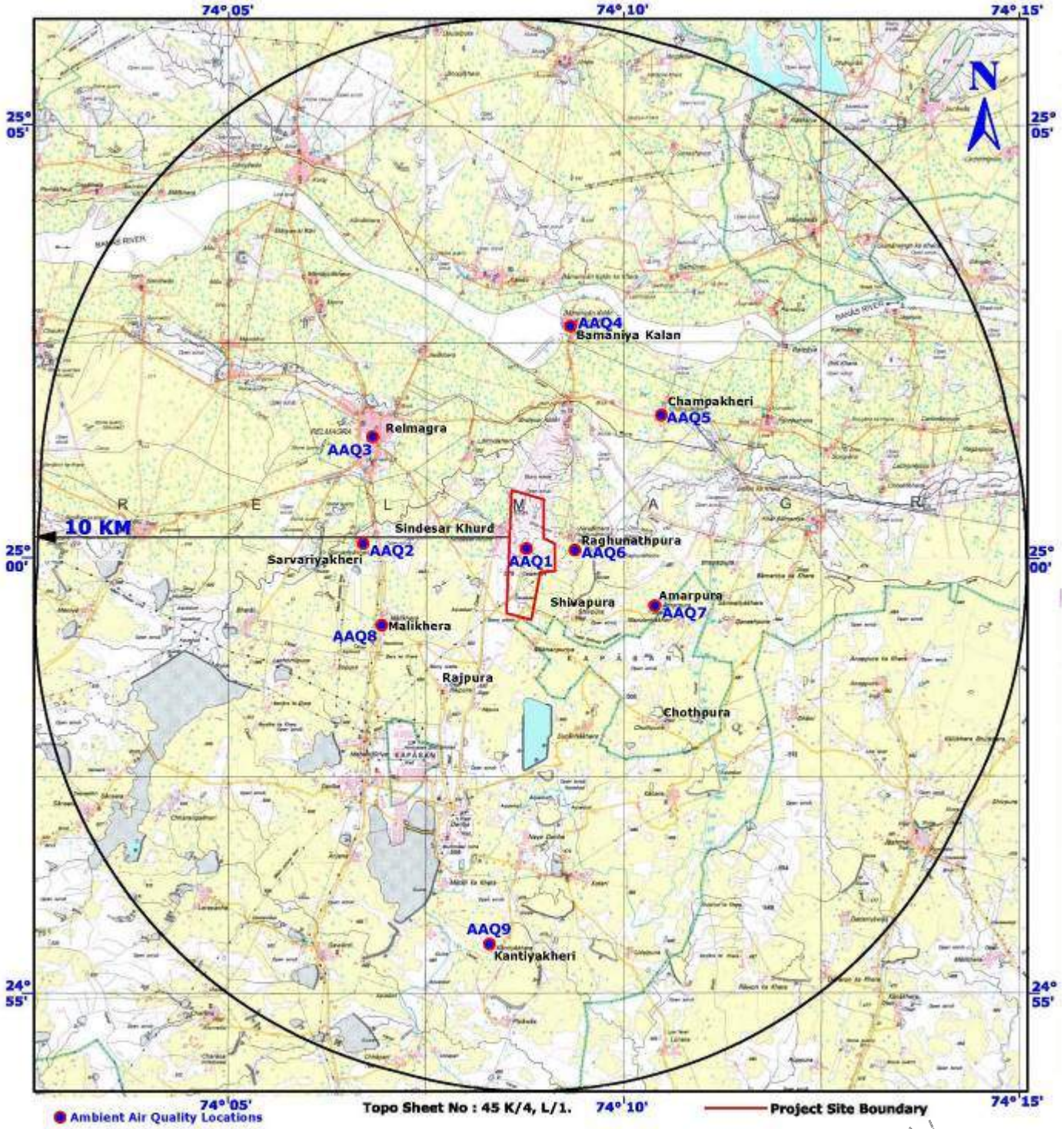


FIGURE-3.6.1
AIR QUALITY SAMPLING LOCATIONS

FIGURE-3.6.2
AMBIENT AIR QUALITY SAMPLING PHOTOS

TABLE-3.6.2
SUMMARY OF AMBIENT AIR QUALITY LEVELS

Sr. No.	Location	PM_{10} (µg/m³)				$PM_{2.5}$ (µg/m³)				SO_2 (µg/m³)			
		Min	Max	Avg	98%	Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Mine lease area	86.7	105.6	95.6	103.5	34.2	47.3	42.7	46.8	12.1	16.4	14.8	16.2
AAQ2	Sarvariya Khari	54.6	62.9	58.3	62.5	27.1	37.8	34.4	37.5	10.1	13.3	11.5	12.9
AAQ3	Relmagra	59.5	70.5	64.9	69.8	29.1	36.2	32.9	36.1	10.4	14.9	12.5	14.5
AAQ4	Bamnia Kalan	50.7	59.4	54.4	58.9	23.1	31.2	28.2	31.0	10.8	14.2	12.8	14.0
AAQ5	Champakheri	41.7	52.1	46.3	51.7	21.4	29.8	26.1	28.8	11.2	14.3	13.1	14.2
AAQ6	Raghunathpura	46.8	57.4	52.2	57.0	21.5	29.2	26.4	29.1	10.4	12.8	11.4	12.6
AAQ7	Amarpura	41.8	54.9	49.5	53.9	21.4	27.1	24.9	26.9	10.5	15.2	12.3	15.1
AAQ8	Malikhera	48.1	60.6	55.1	60.0	21.9	30.6	27.7	30.4	9.9	13.2	11.6	13.1
AAQ9	Kantiyakhera	33.6	49.4	42.3	48.6	22.4	27.5	25.4	27.2	9.8	14.1	12.3	14.0
Range		**33.6-105.6**				**21.4-47.3**				**9.8-16.4**			
NAAQ Standards		**100**				**60**				**80**			

Sr No.	Location	NOx (µg/m³)				CO (µg/m³)				O_3 (µg/m³)			
		Min	Max	Avg	98%	Min	Max	Avg	98%	Min	Max	Avg	98%
AAQ1	Mine lease area	15.2	18.4	17.1	18.2	296	435	351	432	5.5	9.2	7.4	9.0
AAQ2	Sarvariya Khari	12.5	15.4	13.6	15.2	182	321	239	318	3.5	7.2	5.4	7.1
AAQ3	Relmagra	12.1	16.3	14.7	16.3	225	364	282	361	4.9	8.6	6.8	8.4
AAQ4	Bamnia Kalan	11.8	15.9	14.3	15.7	215	354	272	351	4.4	8.1	6.3	7.9
AAQ5	Champakheri	12.4	16.9	14.0	16.2	207	346	263	343	4.1	7.8	6.0	7.6
AAQ6	Raghunathpura	11.6	15.9	13.3	15.5	200	332	258	329	4.2	7.9	6.1	7.7
AAQ7	Amarpura	12.8	17.2	15.2	17.2	145	284	212	281	3.9	7.6	5.8	7.4
AAQ8	Malikhera	13.5	17.3	15.4	17.2	183	315	237	311	4.5	8.2	6.4	8.0
AAQ9	Kantiyakhera	11.9	16.7	14.7	16.6	142	274	196	271	3.6	7.3	5.5	7.1
Range		**11.6-18.4**				**142 – 435**				**3.5 – 9.2**			
NAAQ Standards		**80**				**2000**				**100 (8 hrs)**			

Sr No.	*Location*	Ammonia (µg/m³)		Benzene (µg/m³)		B(a)P (ng/m³)	
		Min	Max	Min	Max	Min	Max
AAQ1	Mine lease area	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ2	Sarvariya Khari	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ3	Relmagra	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ4	Bamnia Kalan	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ5	Champakheri	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ6	Raghunathpura	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ7	Amarpura	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ8	Malikhera	<20	<20	<0.01	<0.01	<0.01	<0.01
AAQ9	Kantiyakhera	<20	<20	<0.01	<0.01	<0.01	<0.01
Range		**<20**		**< 0.01**		**<0.01**	
NAAQ Standards		**400**		**5**		**1**	

Location Code	Sampling Locations	C_6H_6 (µg/m³)				Pb (µg/m³)				As (ng/m³)				Ni (ng/m³)			
		Min	Max	Avg	98th %tile	Min	Max	Avg	98th %tile	Min	Max	Avg	98th %tile	Min	Max	Avg	98th %tile
AAQ1	Mine lease area	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	0.18	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	3.8	2	2.4
AAQ2	Sarvariya Khari	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	0.03	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	3	2	2.9
AAQ3	Relmagra	<0.01	<0.01	<0.01	<0.01	<0.01	0.39	0.15	0.39	<0.1	<0.1	<0.1	<0.1	<0.1	3.8	1.8	2.1
AAQ4	Bamnia Kalan	<0.01	<0.01	<0.01	<0.01	<0.01	0.18	0.06	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	4.5	2.7	3.4
AAQ5	Champakheri	<0.01	<0.01	<0.01	<0.01	<0.01	0.18	0.16	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	2.5	2	2.1
AAQ6	Raghunathpura	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.11	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	2.8	1.6	2.1
AAQ7	Amarpura	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.04	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	3.8	2.1	3.2
AAQ8	Malikhera	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.03	0.04	<0.1	<0.1	<0.1	<0.1	<0.1	3.9	2	3.4
AAQ9	Kantiyakhera	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.02	0.03	<0.1	<0.1	<0.1	<0.1	<0.1	3.2	1.8	2.1
Range		**<0.01**				**<0.001-0.50**				**<0.1**				**<0.1-4.5**			
NAAQ Limit		**5.0**				**1.0**				**6.0**				**20**			

TABLE-3.6.3
CHEMICAL CHARACTERISATION OF RSPM

Sr. No	Components	AAQ-1 (Units: µg/m³) Mine Lease Area		AAQ-2 (Units: µg/m³) Sarvariya Khari Village		AAQ-3 (Units: µg/m³) Relmagra Village		AAQ-4 (Units: µg/m³) Bamnia Kalan Village	
		Min	Max	Min	Max	Min	Max	Min	Max
1	Free Silica	0.82	0.98	0.62	0.72	0.55	0.86	0.64	0.72
2	Aluminium	2.1	3.4	2.1	2.7	1.5	4.2	1.4	2.1
3	Calcium	8.6	8.9	4.2	5.1	7.9	8.2	6.2	6.9
4	Sodium	3.8	6.3	3.2	4.2	4.2	5.9	3.1	4.9
5	Potassium	4.6	6.5	1.9	3.2	3.2	6.1	2.2	5.4
6	Magnesium	2.2	3.9	1.6	2.4	1.6	3.2	1.1	2.2
7	Lead	0.21	0.42	0.19	0.29	0.17	0.27	0.19	0.34
8	Zinc	5.2	9.2	2.9	4.5	3.1	11.2	2.7	6.7
9	Vanadium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.02
10	Iron	0.76	1.2	0.72	0.9	0.72	0.7	0.8	0.95
11	Manganese	4.8	5.2	3.1	3.9	3.3	3.6	2.2	3.9
12	Boran	9.4	10.2	6.2	7.1	7.2	7.4	4.9	7.8
13	Cadmium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.20
14	Copper	0.11	0.45	0.09	0.39	0.08	0.37	0.09	0.39

Sr. No	Components	AAQ-1 (Units: µg/m³)		AAQ-2 (Units: µg/m³)		AAQ-3 (Units: µg/m³)		AAQ-4 (Units: µg/m³)	
		Mine Lease Area		Sarvariya Khari Village		Relmagra Village		Bamnia Kalan Village	
		Min	Max	Min	Max	Min	Max	Min	Max
15	Nickel	0.03	0.06	0.02	0.04	0.03	0.05	0.02	0.04
16	Cobalt	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
18	Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
19	Sulphur	2.2	2.2	1.1	1.5	1.2	1.1	1.1	1.3
20	Phosphorus	11.2	8.4	6.8	6.2	11.2	7.9	9.9	5.2
21	Chlorides	9.2	6.0	5.4	5.0	8.6	4.5	8.2	4.7
22	Chromium	0.03	0.05	0.02	0.04	0.03	0.03	0.04	0.05

TABLE-3.6.3 (Contd....)
CHEMICAL CHARACTERISATION OF RSPM

Sr. No.	Components	AAQ-5 (Units: µg/m³) Champakheri Village		AAQ-6 (Units: µg/m³) Raghunathpura Village		AAQ-7 (Units: µg/m³) Amarpura Village		AAQ-8 (Units: µg/m³) Malikhera Village		AAQ-9 (Units: µg/m³) Kantiyakhera Village	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	Free Silica	0.64	0.95	0.66	0.96	0.56	0.79	0.51	0.86	0.52	0.83
2	Aluminium	2.6	3.1	2.8	3.3	1.7	1.9	1.4	1.9	1.3	2.4
3	Calcium	2.5	2.7	6.8	7.0	5.3	5.6	5.4	5.7	4.8	5.1
4	Sodium	3.5	6.0	2.8	4.3	3.1	5.2	3.5	5.5	2.6	4.2
5	Potassium	1.9	3.2	2.1	3.8	2.6	4.5	2.6	4.2	2.2	4.3
6	Magnesium	1.2	1.9	1.2	1.9	1.4	1.9	1.8	1.9	1.4	1.9
7	Lead	0.17	0.36	0.18	0.34	0.17	0.31	0.12	0.21	0.12	0.27
8	Zinc	2.7	3.9	2.9	6.7	3.3	5.9	3.2	4.5	3.0	4.2
9	Vanadium	<0.001	<0.001	<0.001	0.04	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10	Iron	0.82	0.93	0.85	0.93	0.76	0.86	0.71	0.82	0.58	0.68
11	Manganese	3.3	3.9	3.5	4.3	3.3	3.4	3.2	3.3	2.7	2.9
12	Boran	3.5	6.9	5.7	6.9	5.2	6.9	5.0	6.4	5.5	6.1
13	Cadmium	<0.001	<0.001	<0.001	0.05	<0.001	0.02	<0.001	0.03	<0.001	0.05
14	Copper	0.07	0.41	0.09	0.44	0.12	0.35	0.05	0.39	0.06	0.29
15	Nickel	0.03	0.05	0.04	0.07	0.07	0.02	0.04	0.06	0.03	0.05
16	Cobalt	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
18	Arsenic	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	0.04
19	Sulphur	0.95	0.99	0.97	1.3	1.1	1.4	1.02	1.6	0.82	0.99
20	Phosphorus	7.6	5.1	5.6	6.8	5.6	6.2	6.6	7.1	6.1	6.3
21	Chlorides	5.1	6.8	4.9	7.1	4.9	5.8	5.9	5.9	4.2	5.5
22	Chromium	0.05	0.06	0.03	0.05	0.03	0.05	0.03	0.04	0.04	0.05

- ***Summary of Observations***

PM_{10}

Out of all the locations, PM_{10} ranges between 33.6 µg/m³ to 105.6 µg/m³. The maximum concentration for particulate matter (PM_{10}) was recorded at Mine lease area (AAQ1) and the minimum concentration is recorded at Kantiyakhera (AAQ9) during the study period. The high concentration can be attributed to the dry open places and typical dry summer climate in the region.

$PM_{2.5}$

$PM_{2.5}$ ranges between 21.4 µg/m³ to 47.3 µg/m³. Maximum concentration for Particulate Matter ($PM_{2.5}$) was observed as 47.3 µg/m³ recorded at Mine lease area (AAQ1) with the minimum concentration observed as 21.4 µg/m³ recorded at Champakheri and Amarpura (AAQ5 & 7) during the study period. At all the ambient air quality locations the $PM_{2.5}$ levels recorded are within the prescribed standards for Residential and Industrial areas. This could be attributed to very low urbanization and thus low traffic density that contributes largely to $PM_{2.5}$ and also absence of any major air polluting industry in the study region.

SO_2

In the all locations the SO_2 concentration ranges from 9.8 µg/m³ to 16.4 µg/m³ Maximum concentration for Sulphur dioxide (SO_2) was recorded at Mine lease area

(AAQ1) and the minimum concentration of 9.8 μg/m^3 was recorded at Kantiyakhera (AAQ9) during the study period.

NO_x

Out of the all locations the NO_x concentration ranges from 11.6 μg/m^3 to 18.4 μg/m^3. The maximum concentration for Oxides of Nitrogen (NO_x) was observed as 18.4 μg/m^3 recorded at mine lease area (AAQ1) and the minimum concentration of 11.6 μg/m^3 was recorded at Raghunathpura (AAQ6) during the study period.

CO

Out of the all locations the CO concentration ranges from 142 μg/m^3 to 435 μg/m^3. From all the locations the maximum concentration for Carbon Monoxide (CO) was observed as 435 μg/m^3 recorded at Mine lease area (AAQ1) and the minimum concentration observed of 142 μg/m^3 recorded at Kantiyakhera (AAQ9) during the study period.

The other parameters such as Lead (Pb), Arsenic (As), Nickel (Ni), Ammonia (NH_3), Benzo(a)Pyrene (BaP) and Benzene (C_6H_6) were found to be within the detectable limit.

Dust Fall

The dust fall in the study area was observed to be in the range of 267 - 352 mg/m^2/day at all the AAQ locations and the details of results are presented in **Table-3.6.4**.

TABLE-3.6.4
DUST FALL RATE

Sr. No.	Location	Dust fall Concentration (mg/m^2/day)
1	Mine Lease Area	352
2	Sarvariya Kheri	281
3	Relmagra	348
4	Bamnia Kalan	285
5	Champakheri	287
6	Raghunathpura	289
7	Amarpura	267
8	Malikhera	308
9	Navakhera	315
	Range	**267-352**

3.7 Water Quality

Selected water quality parameters of ground water and surface water resources within 10 km radius of the study area has been studied for assessing the water environment and evaluate anticipated impact of the proposed expansion project. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water quality characteristics for critical parameters; and
- Predict the impact of water quality due to the proposed project and related activities.

Surface water sources and groundwater sources covering 10 km radial distance were examined for physico-chemical, heavy metals and bacteriological parameters.

The samples were collected and analysed once during the study period. The samples were analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

3.7.1 Water Sampling Locations

In the study area, three surface and eight ground water samples were collected during the study period. These samples were taken as grab samples and were analyzed for various parameters to compare with the standards. The water sampling locations are listed below in **Table-3.7.1** and are depicted in **Figure-3.7.1**. The water sampling photographs are shown in **Figure-3.7.2.** The results of monitoring of surface and ground samples carried out for the study are presented in **Table-3.7.2** and **Table 3.7.3.**

TABLE-3.7.1
DETAILS OF WATER SAMPLING LOCATIONS

Sr. No.	Code	Location	Distance (Km)	Direction
Surface Water				
1	SW 1	Banas river	3.1	N
2	SW 2	Raghunathpura Tank	0.7	ESE
3	SW 3	Bharai dam	6.1	WSW
Ground Water				
1	GW 1	Sindesar Khurd	0.1	W
2	GW 2	Bamnia Kalan	3.8	N
3	GW 3	Raghunathpura	0.5	E
4	GW 4	Amarpura	2.2	ESE
5	GW 5	Rajpura	2.0	SSW
6	GW 6	Mahenduria	4.2	SW
7	GW 7	Relmagra	3.0	NW
8	GW 8	Sunariyan Khera	2.5	SSE

3.7.2 Presentation of Results

- ***Surface Water Quality***

The results for the surface water samples analysed are presented in **Table 3.7.2**. The total surface water samples are selected three locations only one surface water is available other two surface water locations are dry during the monitoring period.

- The results of surface water sample analysis indicate that the pH value was observed to be 8.09, which are well within the specified standards of 6.5 to 8.5.
- Electrical conductivity of surface water sample was observed to be 435 µS/cm.
- The dissolved oxygen was observed to be 6.2 mg/l.
- The total hardness was found to be 107.1 mg/l is well within the standards.
- The chloride concentration was observed to be 65.6 mg/l and the Sulphate was found to be 15.5 mg/l. Both the parameters are well within the prescribed limits.
- Fluoride content was found to be 0.4 mg/l which is within the standard limits.
- Cyanides and phenolic compounds found to be below detection limits.
- Bacteriological studies revealed that the total coliform count is measured 182 MPN/100 ml which are to be in between 10 MPN/100 ml as per the specified standard limits.

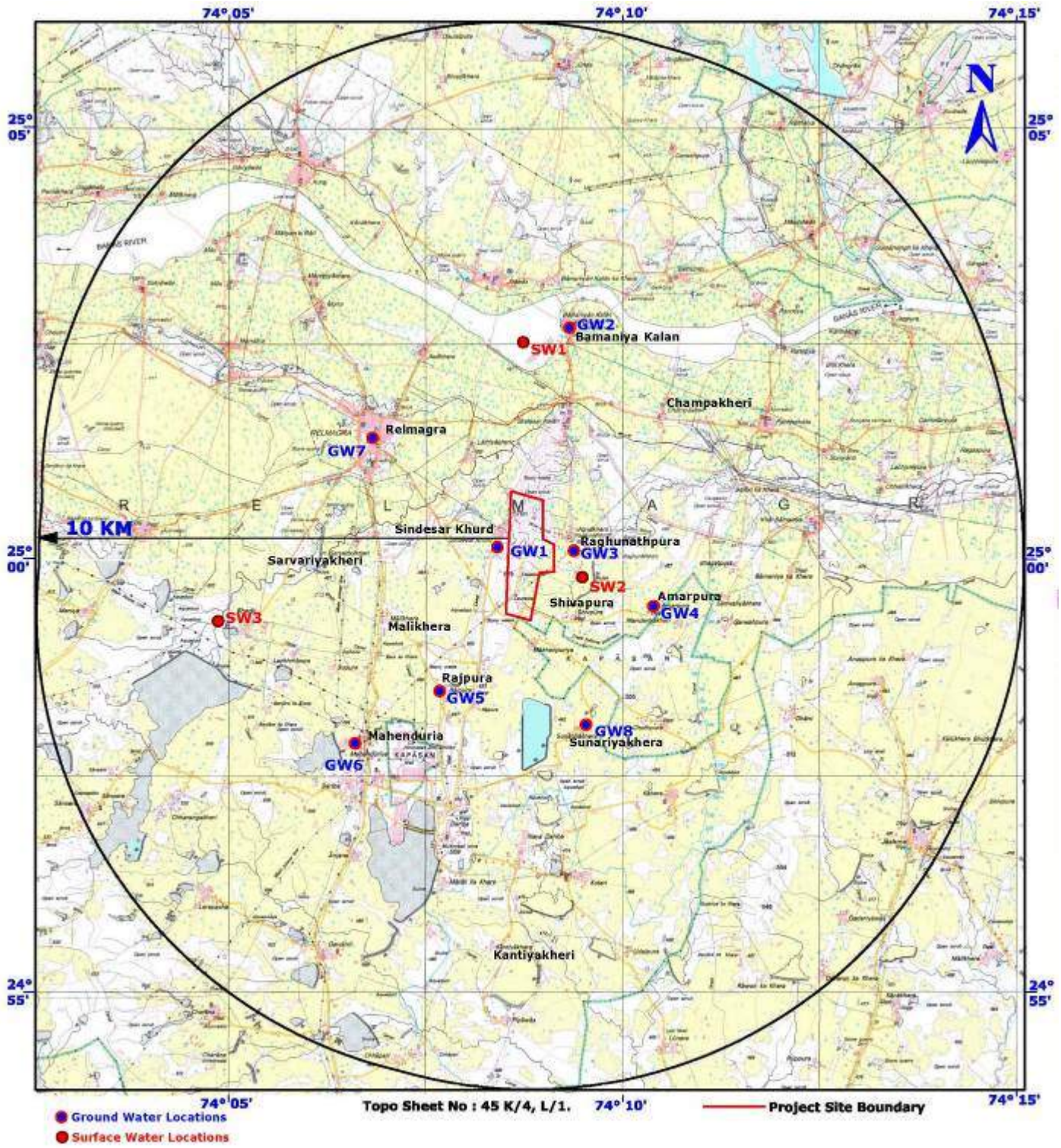


FIGURE-3.7.1
WATER SAMPLING LOCATIONS

FIGURE-3.7.2
WATER SAMPLING PHOTOS

TABLE-3.7.2
SURFACE WATER QUALITY

Sr.No.	Parameters	Units	SW1	SW2	SW3
1	Ph	-	8.09	Dry	Dry
2	Colour	Hazen	2		
3	Conductivity	µS/cm	435		
4	Total dissolved solids	mg/l	275		
5	Dissolved oxygen	mg/l	6.2		
6	BOD	mg/l	<3		
7	COD	mg/l	<5		
8	Total hardness as $CaCO_3$	mg/l	107.1		
9	Total Alkalinity as $CaCO_3$	Mg/l	103.0		
10	Calcium as Ca	mg/l	22.4		
11	Magnesium as Mg	mg/l	12.5		
12	Chlorides as Cl	mg/l	65.6		
13	Residual free chlorine	Mg/l	<0.2		
14	Phosphates as PO_4	Mg/l	0.56		
15	Sulphates as SO_4	mg/l	15.5		
16	Fluorides as F	mg/l	0.4		
17	Nitrates as NO_3	mg/l	0.5		
18	Sodium as Na	mg/l	47.4		
19	Potassium as K	mg/l	5.2		
20	Total Boran as B	Mg/l	<0.01		
21	Phenolic compounds	mg/l	<0.02		
22	Cyanides as CN	mg/l	<0.001		
23	Oil and Grease	Mg/l	<1.0		
24	Cadmium as Cd	mg/l	<0.003		
25	Arsenic as As	mg/l	<0.01		
26	Copper as Cu	mg/l	<0.01		
27	Lead as Pb	mg/l	<0.01		
28	Iron as Fe	mg/l	0.06		
29	Chromium as Cr^{+6}	mg/l	<0.05		
30	Selenium as Se	mg/l	<0.01		
31	Zinc as Zn	mg/l	0.03		
32	Aluminium as Al	Mg/l	<0.01		
33	Mercury as Hg	Mg/l	<0.001		
34	SAR	-	1.99		
35	Insecticides	Mg/l	Absent		
36	Anionic detergents as MBAS	Mg/l	<0.2		
37	Total coliforms	MPN/100 ml	182		

TABLE-3.7.3
GROUND WATER QUALITY

Parameters	Unit	IS:10500 Limits	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
pH	-	6.5-8.5	6.88	6.90	7.08	7.06	7.07	7.08	7.27	7.09
Colour	Hazen	5(15)	2	2	3	2	3	2	3	4
Taste	-	Agreeable	Ag	Ag	Ag	Ag	Ag	Ag	Ag	Ag
Odour	-	Agreeable	Ag	Ag	Ag	Ag	Ag	Ag	Ag	Ag
Conductivity	µS/cm	$	1818	1634	1691	1609	1857	1498	1676	2840
Turbidity	NTU	1(5)	1	2	2	1	2	1	2	2
TDS	Mg/l	500(2000)	1125	1038	1065	1032	1198	945	1065	1860
Total Hardness as Caco3	mg/l	200(600)	475.2	467.5	468.8	439.3	519.0	456.3	401.0	576
Total Alkalinity	mg/l	200(600)	372	332	340	326	388	335	355	112
Calcium as Ca^{2+}	mg/l	75(200)	111.5	133.2	80.0	96.3	116.8	109.2	82.1	76.0
Magnesium as Mg^{2+}	mg/l	30(100)	47.6	32.5	65.1	48.2	55.2	44.5	47.6	96.5
Residual Chlorine	mg/l	0.2 Min	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Boron	mg/l	0.5(1)	0.27	0.12	0.20	<0.01	<0.01	0.14	0.35	0.49
Chloride as Cl	mg/l	250(1000)	309.7	242.2	280.4	260.3	285.1	189.6	240.6	306
Sulfates as $So4^{2-}$	mg/l	200(400)	90.0	125.0	100.5	92.7	123.1	119.9	131.4	380
Fluoride as F	mg/l	1.0(1.5)	0.9	1.1	0.8	1.3	0.8	1.2	1.3	1.3
Nitrates as No3	mg/l	45(NR)	0.4	0.3	0.9	0.6	0.4	0.7	0.6	2.9
Sodium as Na	mg/l	$	195.8	157.0	170.2	162.4	182.5	128.9	192.4	366
Potassium as K	mg/l	$	6.5	5.5	5.3	3.5	5.8	4.4	14.1	8.2
Phenenolic Compounds	mg/l	0.001(0.002)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanides as CN-	mg/l	0.05(NR)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Anionic Detergents	mg/l	0.2(1.0)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Mineral Oil	mg/l	0.5(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium as Cd	mg/l	0.003(NR)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic as As	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper as Cu	mg/l	0.05(1.5)	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Lead as Pb	mg/l	0.1(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese as Mn	mg/l	0.1(0.3)	0.05	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Iron as Fe	mg/l	0.3(NR)	0.05	0.04	0.03	0.02	0.02	0.12	0.02	0.06
Chromium as Cr^{+6}	mg/l	0.05(NR)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium as Se	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn	mg/l	5.0(15)	1.72	0.14	1.54	0.37	0.32	0.24	3.07	3.81
Aluminium as Al	mg/l	0.03(0.2)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	mg/l	0.001(NR)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
E.Coli	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Total Coliforms	MPN/ 100ml	10	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

†: Limits in parenthesis are permissible limits in absence of alternate source;
$: Limits not specified; NR: No relaxation specified;
UO: Un-objectionable; Ag: Agreeable.

- ***Ground Water Quality***

The results for the ground water samples analysed are presented in **Table 3.7.3.**

- The analysis results of ground water samples showed the pH in range of 6.8-7.2 which are with the specified standard limits of 6.5 to 8.5.

- Colour and turbidity of the samples ranged from 2-4 Hazens and 1-2 NTU respectively.

- Electrical conductivity of the samples ranged from 1498-2840 µS/cm. The maximum value was observed at Sunariyan Khara (GW8), and where as the minimum value was observed at Mahenduria (GW6).

- The total hardness of the samples ranged from 401.0-576.0 mg/l. The maximum value was observed in Sunariyan Khara (GW8) and whereas the minimum value observed at Relmagra (GW7).The Total Hardness values are above the permissible limits at all locations.

- Calcium and magnesium concentrations ranged from 76.0-133.2 mg/l and 32.5-96.5 mg/l respectively.

- The total dissolved solids of the samples ranged from 945-1860 mg/l. The maximum TDS was observed at Sunariyan Khara (GW8), and where as the minimum value observed at Mahenduria (GW6) location. The TDS values are within the stipulated 2000 mg/l.

- Range of chlorides and sulphates concentrations at all the locations 189.6-309.7 mg/l and 90.0–380 mg/l respectively.

- Fluoride concentrations are ranging in between 0.8–1.3 mg/l and are found to be within the permissible limits.

- Similarly, nitrates are also found to be ranging in between 0.3–2.9 mg/l.

- Iron concentrations in ground waters varied from 0.02-0.06 mg/l. Zinc levels varied from 0.14 mg/l to 3.81 mg/l respectively.

- Aluminium concentration in ground water is <0.01 mg/l which are within the limits stipulated.

All other metal concentrations are observed to be below detectable limits.

- Bacteriological studies revealed the absence of E.coli in ground water samples. The Total Coliform counts is nil in all the samples against the standard limit of 10 MPN/100 ml.

Based on the above results it is evident that all of the parameters in ground water fairly meet the desirable standard limits of IS: 10500.

3.8 Noise Level Survey

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound which is composed of many frequency components of various types of loudness distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common and universally accepted scale is the A weighted Scale which is measured as dB (A). This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of a human ear.

The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;

- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and

- The location of the noise source, with respect to noise sensitive landuse, which determines the loudness and period of exposure.

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise. The environmental impact assessment of noise from the existing mine, construction activity, and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise levels, and assess the impact of the total noise generated by the mine operations around it.

3.8.1 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Noise at different noise generating sources has been identified based on the activities in the village area, ambient noise due to traffic and the noise at sensitive areas like hospitals and schools.

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. The noise levels at each location were recorded for 24 hours. The environment setting of each noise monitoring location is given in **Table-3.8.1** and depicted in **Figure-3.8.1**.

TABLE-3.8.1
DETAILS OF NOISE MONITORING LOCATIONS

Station Code	Name of the Station	Distance (km)	Direction	Category of Area
N1	Mine lease area	-	-	Industrial
N2	Bamnia Kalan	3.8	N	Residential
N3	Raghunathpura	0.5	E	Residential
N4	Shivpura	1.0	SE	Residential
N5	Chotpura	3.6	SE	Residential
N6	Rajpura	2.0	SSW	Residential
N7	Malikhera	2.5	WSW	Residential
N8	Relmagra	3.0	NW	Commercial Area

3.8.2 Method of Monitoring

Sound Pressure Level (SPL) measurements were measured at all locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at all the locations covered in 10 km radius of the study area.

3.8.3 Presentation of Results

The statistical analysis is done for measured noise levels at ***eight*** locations during pre-monsoon season. The parameters are analyzed for L_{day}, L_{night}, and L_{dn}. These results are tabulated in **Table-3.8.2.**

TABLE-3.8.2
NOISE LEVELS IN THE STUDY AREA

Code	Location	L10	L50	L90	Leq	Lday	Lnight	Ldn
N1	Mine lease area	49.9	46.2	42.6	47.1	47.7	44.5	51.5
N2	Bamnia Kalan	48.2	44.3	40.5	45.3	46.3	42.4	49.6
N3	Raghunathpura	41.8	38.2	34.5	39.1	39.6	36.5	43.5
N4	Shivpura	44.8	41.0	37.5	41.9	42.5	39.5	46.5
N5	Sunariya Khera	43.2	39.4	35.9	40.3	40.9	37.9	44.9
N6	Rajpura	41.1	37.3	33.8	38.2	39.1	35.9	42.9
N7	Malikhera	49.2	45.6	41.9	46.5	47.0	43.9	50.9
N8	Relmagra	59.8	56.0	52.5	56.9	57.8	54.6	61.6

Area Code	Ambient Noise Standards		
	Category of Area	Noise Levels dB (A) Leq (Limits)	
		Day time	Night time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

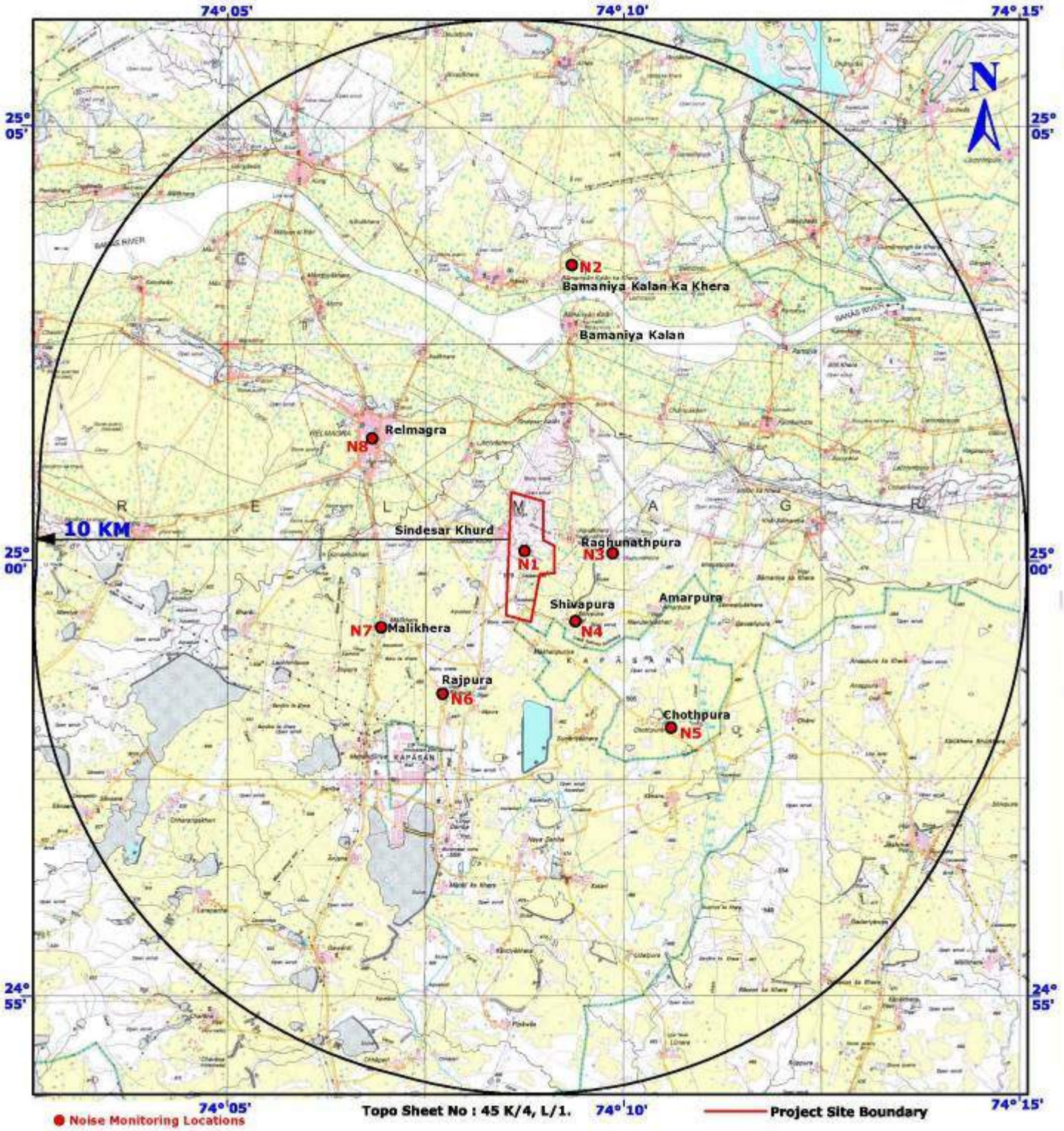


FIGURE-3.8.1
NOISE MONITORING LOCATIONS

3.8.4 Observation of Results

a) Day Time Noise Levels (L_{day})

The daytime (L_{day}) noise levels at all the locations are observed to be in the range of 39.1 dB (A) to 57.8 dB (A). The maximum noise level of 57.8 dB (A) was observed at Relmagra (N8) and the minimum noise level of 39.1 dB (A) was observed at Rajpura (N6). It is observed that the day time noise levels are in accordance to the prescribed limit of 55 dB (A) for Residential areas.

b) Night Time Noise Levels (L_{night})

The night time (L_{night}) noise levels at all the locations were observed to be in the range of 37.9 dB (A) to 54.6 dB (A). The maximum noise level of 54.6 dB (A) was observed at Relmagra (N8). The minimum noise level of 37.9 dB (A) was observed at Sunariya Khera (N5). It has been found that the night time noise levels are in accordance with prescribed limit of 45 dB (A) for Residential areas.

3.9 Flora and Fauna Studies

3.9.1 Introduction

Ecological evaluation aims at developing and applying methodologies to assess the relevance of an area for nature conservation. As such, it is to support the assessment of the impact of a proposed development by providing guidance on how to describe the ecological features within the area affected, how to value them, and how to predict the value losses caused by the development. The evaluation of the ecological significance of an area can be undertaken from different perspectives and consequently with different objectives. One of such perspectives focuses on the conservation of the biological diversity or biodiversity. Among the human activities that pose the highest threat to the conservation of biodiversity are the developmental projects in particular. Such projects represent artificial elements that cut through the landscape and interfere with the natural habitat and its conditions by emissions that may be solid, liquid and or gaseous. This in turn influences the abundance and distribution of plant and animal species, i.e., the biodiversity of the areas impacted.

Most of the background data needs to be acquired from the governmental agencies or the scientific literature. This information is typically complemented by field visit, site surveys and sample collection. The description of the actual ecological assessment provided by the ecological baseline study serves to set a reference for the subsequent impact analysis. Moreover, it helps decision-makers and EIA reviewers to become familiar with the environmental features and the needs of the study area.

3.9.2 Objectives of the Study

The present study was undertaken with the following objectives to assess both terrestrial and aquatic habitats of the study area:

- To assess the nature and distribution of vegetation in and around the proposed expansion project site;
- To assess the Flora and fauna in the study area;
- To understand the ecology of the water bodies;
- To ascertain the migratory routes of fauna, presence of breeding grounds and sensitive habitats in the study area, if any;
- To assess the presence of protected areas in the study area;
- To review the information from secondary sources and discuss the issues of concern with the relevant authority and stakeholders; and
- Impact prediction based on primary and secondary data sources to formulate mitigation measures.

3.9.3 Methodology

To achieve the above objectives a detailed study of the area was undertaken with mine site as its centre. The different methods adopted were as follows:

- Generation of primary data by undertaking systematic ecological studies in the study area;
- Primary data collection for flora through random sampling method for trees, shrubs and herbs from the selected locations to know the vegetation cover qualitatively;
- To spot the fauna in the study area and also to identify the fauna by secondary indicators such as pugmarks, scats, fecal pellets, calls and other signs;
- For ecological information, the secondary sources such as local officials, villagers and other stakeholders were interviewed; and
- Sourcing secondary data with respect to the study area from published literature.

The list of terrestrial and aquatic sampling locations in the study area is presented in **Table-3.9.1** and shown in **Figure-3.9.1.**

TABLE-3.9.1
LIST OF ECOLOGICAL SAMPLING LOCATIONS

Code	Name of the Location	Distance from Project site (Sq.Km)	Direction w.r.t. Project site
Terrestrial Ecological Locations			
TE-1	Mine site	------	-------
TE-2	Raghunathpura	2.3	E
TE-3	Bamnia Kalan	5.2	N
TE-4	Mahenduria	5.0	WSW
TE-5	Kantiyakhera	7.4	SSE
Aquatic Ecological Locations			
AE-1	Banas river	2.7	N
AE-2	Raghunathpura tank	2.1	E

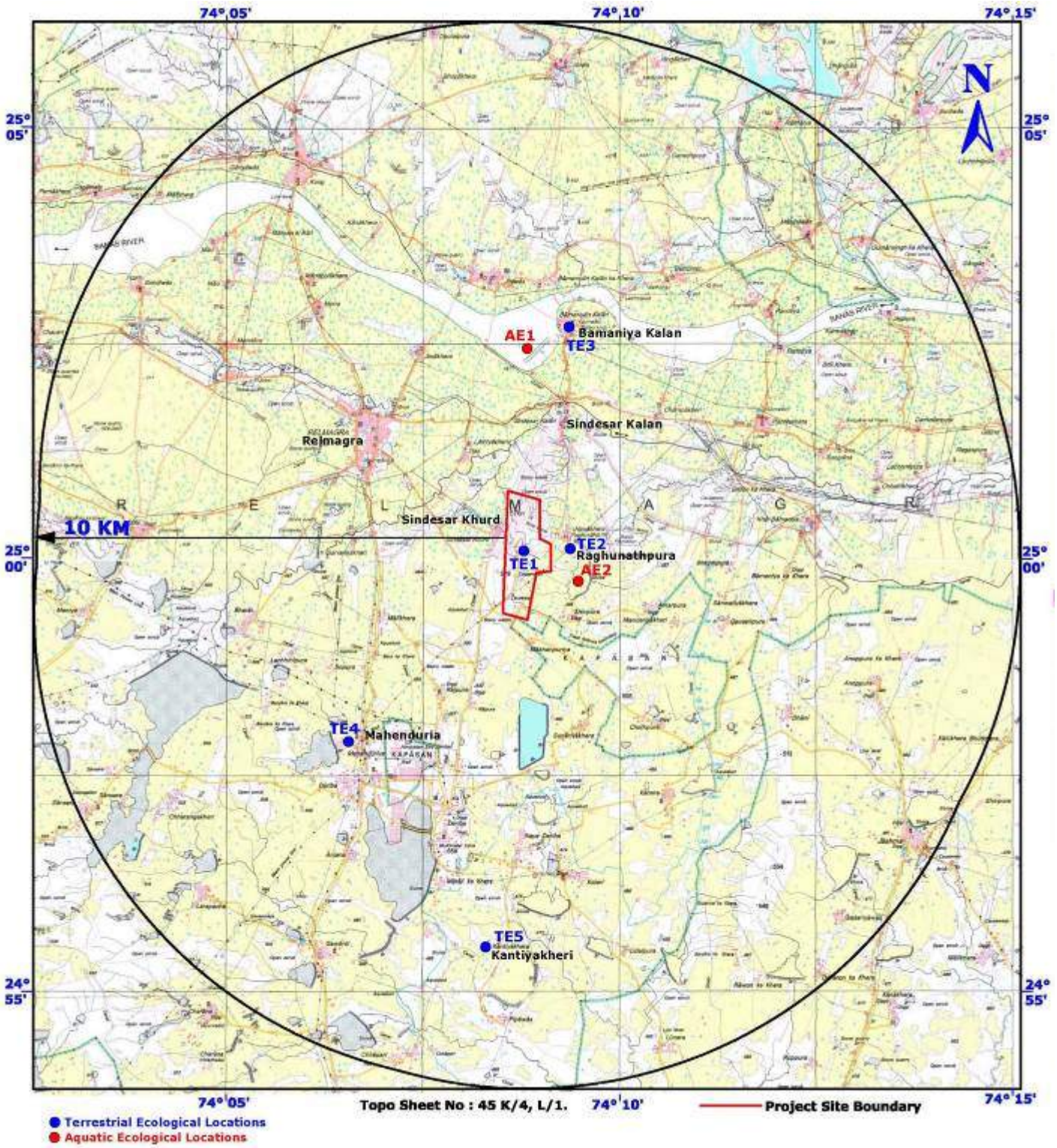


FIGURE-3.9.1
ECOLOGICAL SAMPLING LOCATIONS

3.9.4 Floristic Diversity Analysis

The sampling stations were selected to carry to ecological monitoring. Trees and shrubs were sampled by taking quadrats of 10 m X 10 m. Their girths at 1.37 metres from the ground were recorded. For better understanding of plant diversity, the Shannon Wiener index of diversity was enumerated. The index considers two important characters of vegetation, *i.e.* floristic richness and proportional abundance of the species. Diversity index increases with the floral spectra (more species means that more wide species diversity) which show the undisturbed scenario of ecosystem.

The index is given as:

H' = - sum (Pi ln Pi)

Where Pi = Proportional abundance of the I^{th} (individual) species

H'= Shannon-Weaver diversity index

Diversity of the sampling locations in the study area is calculated using 10 m X 10 m quadrats, and are listed in the **Table-3.9.2.**

TABLE-3.9.2
TERRESTRIAL SAMPLING ANALYSIS

Sr.No	Terrestrial Ecological Locations	Shannon Wieners Diversity Index
1	Mine Site	1.45
2	Raghunathpura	2.02
3	Bamnia Kalan	2.15
4	Mahenduria	2.36
5	Kantiyakhera	2.45

3.9.5 Fauna Diversity Analysis

The faunal diversity of the study area was observed based on line transect methods and also based on observation of calls of the birds, and signs of pug marks, feacal pellets found in the study area.

3.9.6 Forest Blocks in Study Area & Protected Areas.

There are no forest blocks in the study area of 10-km radius from the mine lease boundary. Further, there any sanctuaries or national parks in 10 km radius of the mine lease area. The forest authentication latter and sanctuaries and wild life conservation plant is given in **Annexure-IX.** The authenticated letter regarding Aravali Hills is given in **Annexure-XIII.**

3.9.7 Flora of the Core Area-Mine Lease Area

The plants commonly occurring in the core area are, *Azadiractha indica, Prosopis cineraria*, and shrubs like *Lantana camara, Calotropis gigantea*, list observed are presented in the **Table-3.9.3**.

TABLE-3.9.3
LIST OF PLANT SPECIES RECORDED IN MINE LEASE AREA- CORE ZONE

Trees			
1	*Dalbergia sissoo*	Mimosaceae	Sissoo
2	*Pongamia pinnata*	Fabaceae	Karanj
3	*Cassia siamea*	Caesalpinaceae	Kassod tree
4	*Cassia fistula*	Caesalpinaceae	Amaltas/Indian Laburnum
5	*Azadirachta indica*	Meliaceae	Neem
6	*Pithecellobium dulce*	Fabaceae	Jangli-Jalebi/Vilayati Imli
7	*Prosopis cineraria*	Mimosaceae	Khejri
Shrubs			
8	*Lantana camara*	Verbenaceae	Lantana
9	*Calotropis procera*	Ascelpiadiaceae	Arkha
Grasses			
10	*Cenchurus ciliaris*	Poaceae	Anjan, dhaman
11	*Apluda mutica*	Poaceae	Ponai
12	*Chloris dolichosta*	Poaceae	Bamna
13	*Dichanthium annulatum*	Poaceae	Jaunerea
14	*Sachharum spontanseum*	Poaceae	Kans, khas
15	*Aristida adscensionsis*	Poaceae	Grass
16	*Cyperus aristatus*	Cyperaceae	Guinea rush
17	*Eragrostis tenella*	Poaceae	Bharbhuri
19	*Setaria glauca*	Cyperaceae	Bandra
20	*Cyperus rotundus*	Cyperaceae	Nagar Motha
	Endangered Species	**No endangered species reported/recorded as per Botanical survey of India records**	

3.9.8 Fauna of the Core Zone-Mine Lease Area

The list of fauna recorded in core area is presented in **Table-3.9.4.**

TABLE-3.9.4
LIST OF FAUNA RECORDED IN MINE LEASE AREA-CORE ZONE

Sr. No.	Technical Name	English Name	Conservation status as per Wild Life protection Act (1972)
Aves			
1	*Acridotheres tristicus*	Common myna	Sch-IV
2	*Alcedo athis*	Common kingfisher	Sch-IV
3	*Bubulcus ibis*	Cattle Egret	Sch-IV
4	*Caprimulgus asiaticus*	Common Indian jar	Sch-IV
5	*Centropus sinensis*	Crow Pheasant	Sch-IV
6	*Cinnyris lotensis*	Loten's sunbird	Sch-IV
7	*Columba livia*	Blue-Rock Pigeon	Sch-V
8	*Coracias benghalensis*	Indian Roller	Sch-IV
9	*Corvus splendens*	House Crow	Sch-V

Sr. No.	Technical Name	English Name	Conservation status as per Wild Life protection Act (1972)
10	*Egretta garzetta*	Little Egret	Sch-IV
11	*Tyto alba*	Barn Owl	Sch-IV
12	*Merops orientalis*	Common Greeen Bee Eater	Sch-IV
13	*Apus affinis*	Common House Swift	Sch-IV
14	*Nectarina asiatica*	Purple Sunbird	Sch-IV
15	*Passer domesticus*	House Sparrow	Sch-IV
16	*Ploceus phillipinus*	Baya Weaver Bird	Sch-IV
17	*Temenunchus pagodarum*	Brahminy Myna	Sch-IV
18	*Turdoides striatus*	White Headed Babbler	Sch-IV
Reptiles			
1	*Calotes versicolor*	Common garden lizard	Sch-IV
2	*Naja naja*	Indian cobra	Sch-II
Amphibians			
1	*Rana trigrina*	Asian Bull frog	Sch-IV
Insects & Butterflies			
1	*Papilo demoleus*	Lemon Butterfly	Sch-IV
2	*Graphium agamemnos*	Tailed jay Butterfly	Sch-IV
3	*Papilo polymnstor*	Blue mormon Butterfly	Sch-IV
4	*Junonia atlites*	Grey pansey	Sch-IV
5	*Juninia almana*	Peacock pansey	Sch-IV
6	*Apis dorsata*	Wild Honey Bee	-
Mammals			
1	*Lepus nigricollis*	Indian Black Napped Hare	Sch-IV
2	*Sus scrofa*	Wild Boar	Sch-III
3	*Herpestes edwardsi*	Common Mongoose	Sch-II

3.9.9 Flora (Buffer Zone) in the 10 km Radius

The list of flora present in the buffer zone is listed in **Table-3.9.5.**

TABLE-3.9.5
LIST OF PLANT SPECIES RECORDED IN THE BUFFER ZONE-10 KM RADIUS

Sr. No	Technical Name	Family	Local Name
Trees			
1	*Acacia nilotica*	Mimosaceae	Babul
2	*Albizia lebbeck*	Mimosaceae	Siris
3	*Albizia odorattissima*	Mimosaceae	Kala siris
4	*Albizia procera*	Mimosaceae	Safed siris
5	*Azadirachta indica*	Meliaceae	Neem
6	*Bauhinia variegata*	Caesalpinaceae	Kachnar
7	*Bauhinia purpurea*	Caesalpinaceae	Khariwal
8	*Butea monosperma*	Caesalpinaceae	Palash
9	*Eucalyptus* sp	Myrtaceae	Niligiri/Eucalyptus
10	*Delonix regia*	Caesalpinaceae	Gulmohar
11	*Leucena leucocephala*	Mimosaceae	Subabul
12	*Prosopis cineraria*	Mimosaceae	Khejri
13	*Adenanthera pavonia*	Fabaceae	Rakthrohida
14	*Prosopis juliflora*	Mimosaceae	Vilayati Babul
Shrubs			
15	*Abutilon indicum*	Malvaceae	Kanghi/Atibala
16	*Croton bonplandinum*	Euphorbiaceae	Croton

Sr. No	Technical Name	Family	Local Name
Trees			
17	*Hibiscus rosa-sinsensis*	Malvaceae	Jasut/Hibiscus
18	*Lantana camara*	Verbenaceae	Lantana/ Raimui
19	*Lawsonia inermis*	Lythraceae	Mehendi
Herbs			
20	*Tephrosia purpurea*	Fabaceae	Sarphunkha
21	*Tribulus terrestris*	Zygophyllaceae	Gokhru
22	*Tridax procumbens*	Compositae	Mexican daisy
23	*Vernonia cinreria*	Compositae	Daudotpala
Grasses			
24	*Cenchurus ciliaris*	Poaceae	Anjan, dhaman
25	*Apluda mutica*	Poaceae	Ponai
26	*Cyndon dactylon*	Poaceae	Bermuda grass
27	*Dichanthium annulatum*	Poaceae	Jaunerea
28	*Inperata cylendrica*	Poaceae	Dharba, dabh
29	*Sachharum spontanseum*	Poaceae	Kans, khas
30	*Themeda quadrivalvis*	Poaceae	Kapur ghas
31	*Cyperus rotundus*	Cyperaceae	Nagar Motha
32	*Setaria glauca*	Cyperaceae	Bandra
33	*Heteropogon contortus*	Poaceae	Khad grass
Agricultural Crops			
34	*Hordium vulgare*	Poaceae	Jai/Barley
35	*Sorghum vulgare*	Poaceae	Jowar/Sorghum
36	*Triticum* species	Poaceae	Wheat/Gehu
37	*Zea mays*	Poaceae	Maize
38	*Oryza sativa*	Poaceae	Paddy/Rice/Chawal
39	*Pennisetum typhoideum*	Poaceae	Bajra/Raadi/Bakri
Macrophytes –Aquatic Plants			
40	*Ipomea aquatica*	Convolvulaceae	Morning Glory
41	*Eichornia crassipes*	Pontederiaceae	Water Hyacinth
Endemic Species		**No endemic species recorded/reported as per Botanical survey of India records**	
Endangered Species		**No endangered species reported/recorded as per Botanical survey of India records**	

3.9.10 Fauna (Buffer Zone)

The observed species of fauna of the buffer zone in the study area are listed in **Table-3.9.6.**

TABLE-3.9.6
FAUNA OF THE BUFFER ZONE

Sr. No.	Technical Name	English Name	Conservation status as per Wild Life protection Act (1972)
Aves			
1	*Acridotheres tristicus*	Common myna	Sch-IV
2	*Alcedo atthis*	Common Kingfisher	Sch-IV
3	*Bubulcus ibis*	Cattle Egret	Sch-IV
4	*Caprimulgus asiaticus*	Common Indian jar	Sch-IV
5	*Centropus sinensis*	Crow Pheasent	Sch-IV
6	*Cinnyris lotensis*	Loten's sunbird	Sch-IV
7	*Corvus splendens*	House Crow	Sch-V
8	*Columba livia*	Blue Rock Pigeon	Sch-V
9	*Coracias benghalensis*	Indian Roller	Sch-IV
10	*Egretta garzetta*	Little Egret	Sch-IV

Sr. No.	Technical Name	English Name	Conservation status as per Wild Life protection Act (1972)
11	*Tyto alba*	Barn Owl	Sch-IV
12	*Pyconotus cafer*	Red Vented Bulbul	Sch-IV
13	*Merops orientalis*	Common Green Bee Eater	Sch-IV
14	*Apus affinis*	Common House Swift	Sch-IV
15	*Nectarina asiatica*	Purple Sunbird	Sch-IV
16	*Passer domesticus*	Common House Sparrow	Sch-IV
17	*Ploceus phillipines*	Baya Weaver	Sch-IV
18	*Temenuchus pagodarum*	Brahminy Myna	Sch- IV
19	*Turdoides striatus*	White headed Babler	Sch- IV
20	*Pavo cristatus*	Indian Peafowl	Sch-I
21	*Ocyceros birostris*	Indian Grey Hornbill	Sch-I
22	*Butastur teesa*	White Eye Buzzard	Sch-I
23	*Elanus caeruleus*	Black Shouldered Kite	Sch-I
24	*Fulica atra*	Common Coot	Sch-IV
Reptiles			
1	*Calotes versicolor*	Common Garden Lizard	Sch-IV
2	*Naja naja*	Indian cobra	Sch-II
3	*Varanus benghalensis*	Indian Monitor Lizard	Sch-I
4	*Lissemys punctata*	Indian Flapshell turtle	Sch-I
Amphibians			
1	*Rana trigrina*	Asian Bull frog	Sch-IV
Insects			
1	*Papilo demoleus*	Lemon Butterfly	Sch-IV
2	*Graphium agamemnos*	Tailed jay Butterfly	Sch-IV
3	*Papilo polymnstor*	Blue mormon Butterfly	Sch-IV
4	*Junonia atlites*	Grey pansey Butterfly	Sch-IV
5	*Juninia almana*	Peacock pansey Butterfly	Sch-IV
6	*Apis dorsata*	Wild Honey Bee	-
Mammals			
1	*Lepus nigricollis*	Indian Black Napped Hare	Sch-IV
2	*Sus scrofa*	Wild Boar	Sch-III
3	*Herpestes edwarsdsii*	Common Mongoose	Sch-II
4	*Canis aureus*	Jackal	Sch-II
5	*Macaca radiata*	Bonnet Maccaque	Sch-II
6	*Vulpes bengalensis*	Indian Fox	Sch-II
7	*Bosephalus tragocamelus*	Blue Bull /Nilgai	Sch-III
8	*Panthera pardus*	Indian Leopard	Sch-I

3.9.11 Fresh Water Ecosystem and Phytoplankton and Zooplankton and Macrophytes

The impact of pollution on aquatic ecosystem manifests itself first on the biotic aquatic communities. The species composition of aquatic organisms in natural communities is directly influenced by ambient water quality. The responses of plants to pollutants, when measured quantitatively give an insight about the conditions of existing aquatic ecosystem. The biological species specific for a particular environmental conditions are the best indicators of environmental quality. This includes different biological species such as phytoplankton and zooplankton.

***Phytoplankton*:** Phytoplankton forms the basis of food chain in any aquatic water body. The diversity and abundance of phytoplankton mainly depends on the region, type of water body, either lentic or lotic, the nutrient flux in the system and the sunlight available for photosynthesis. These factors together form the dynamics of phytoplankton productivity over the seasons. The phytoplankton of a given water body determines the zooplankton populations and the fish productivity of the ecosystem.

***Zooplankton*:** The zooplanktons of the aquatic water body are the primary consumers and also in cases secondary producers which play an important role for the fisheries of that system. Listed in the **Table-3.9.7.**

TABLE-3.9.7
LIST OF OBSERVED PHYTOPLANKTON AND ZOOPLANKTON

Sr.No	Phytoplankton	Zooplankton
1	*Actinastrum* sp	*Daphnia* sp
2	*Coelatrum* sp	Tadpole larva
3	*Synedra ulna*	*Anopheles* larva
4	*Gomphonema* sp	-
5	*Navicula gracilis*	-
6	*Nostoc* sp	-
7	*Anabena* sp	-

- *Phytoplankton and Zooplankton in Study Area*

Phytoplankton group were evaluated from the samples that were represented by 7 of phytoplankton species such as *Anabena, Navicula* sp in the study area.

About 3 species of the zooplankton such as*, Daphnia,* along with the larvae of Tadpole larvae and mosquito larvae–Anopheles are found in the study area in the aquatic sampling locations at Banas river and at Raghunathpura Tank in the 10 km radius of the study area.

3.9.12 Macrophytes & Aquatic Plants

The following macrophytes are found in the study area such as, *Eichornia crassipes* and *Ipomea aquatica* (Morning glory), listed in the **Table-3.9.8.**

TABLE-3.9.8
MACROPHYTES

Sr.No	Macrophytes	Common Name	Family
1	*Ipomea aquatica*	Morning Glory	Convolvulaceae
2	*Eichornia crassipes*	Water Hyacinth	Pontederiaceae

3.9.13 Fishes Observed in the Study Area

The following of the fish species were found in the study area of 10 km radius, listed in **Table-3.9.9.**

TABLE-3.9.9
LIST OF FISHES IN THE STUDY AREA

Sr. No.	Scientific Name	Local Name
1	*Catla catla*	Indian Carp
2	*Labeo rohita*	Rohu
3	*Cyprinus caprio*	Common carp

3.9.14 Conclusion

The schedule species of the study area represented by avian species such as Peafowl, Indian Grey Hornbill, White Eye buzzard and Black Kite, along with Indian monitor lizard and Indian flap shell turtle listed in the Indian Wildlife (Protection), Act, 1972 along with Indian Leopard which are found in the study area and comprising of Leopard which is listed in the Schedule of the Indian Wildlife (Protection) Act, 1972.

The rest of other fauna are represented by Schedules of II, Schedule-III, Schedule-I and Schedule-V of the Indian Wildlife (Protection), Act, 1972.

Incidentally there is no presence of endangered botanical flora in the study area, as per the records of Botanical Survey of India.

3.10 Demography and Socio-Economics

The demographic and socio- economic conditions prevailing in the 10 km radius of the the proposed expansion of Sindesar khurd Lead- Zinc underground mine from 4.5 million TPA to 6.0 Million TPA Ore production (ROM basis) and beneficiation from 5.0 million TPA to 6.5 million TPA in Sindesar Khurd village Relmagara tehsil, Rajsamand, Kapasan tehsil in Chittaurgarh district, Sahara tehsil in Bhilwara districtin of Rajasthan" is analyzed. The socio-economic data forms the basis for developing a suitable enterprise social responsibility plan to address the needs of the population.

The project proponent is committed to take up the socio-economic development initiatives not only to minimize the negative impact on the population and also improve the socio-economic status of population living in 10 km radius of the mine as its sustained effort as part of corporate social responsibility.

3.10.1 Methodology Adopted for the Study

The methodology adopted for the study mainly includes primary survey, review of published secondary data (District Census Statistical Handbooks- 2011, 2001 and Primary Census Abstract of Census-2011) with respect to population, density, household size, sex ratio, social stratification, literacy rate, occupational structure for 10 km radius study area.

3.10.2 Review of Demographic and Socio-Economic Profile-2011

The village wise demographic data of 64 villages are falling within 10 km radius of

the project site as per the 2011 census is given in **Annexure-VII**. The salient features of the demographic and socio-economic conditions are analyzed and described in the following sections.

3.10.3 Demography

Distribution of Population

As per 2011 census the study area consisted of 91563 persons inhabited in study area. The distribution of population in the study area is shown in **Table-3.10.1.**

TABLE-3.10.1
DISTRIBUTION OF POPULATION

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
No. of Households	1800	6436	10852	19088
Male Population	4438	15271	26308	46017
Female Population	4391	15080	26075	45546
Total Population	8829	30351	52383	91563
Male Population (0-6 years)	705	2085	3737	6527
Female Population (0-6 years)	607	2012	3300	5919
Total Population (0-6 years)	1312	4097	7037	12446
% of 0-6 years population	14.86	13.50	13.43	13.59
Average Household Size	4.91	4.72	4.83	4.80
% of males to the total population	50.27	50.31	50.22	50.26
% of females to the total population	49.73	49.69	49.78	49.74
Sex Ratio (no of females per 1000 males)	989	987	991	990
Child Sex Ratio (no of females per 1000 males (0-6 years))	861	965	883	907
Density	203	416	259	258

Source: Census of India -2011

- **Average Household Size**

The study area has a household size of 4.80 as per 2011 census, this is mainly due to population control measures, health awareness programs.

Population Density

The density of population reveals that the study area has an overall density of 258 persons per km^2 (PP km^2) as per 2011 census reports. The density of population in the study area comparatively reported more than the density of state (Rajasthan 200).

Sex Ratio

The configuration of male and female indicates that the males constitute to about 50.26% and females to 49.74% of the total population as per 2011 census records. The study area on an average has 990 females per 1000 males as per 2011 census reports. In comparison to the state rural sex ratio (Rajasthan rural 933) the study area has recorded more sex ratio.

Child Sex Ratio

The study area child sex ratio is 907 females for 1000 males in the study area. In comparison to Rajasthan child sex ratio (Rajasthan 888) is more in the study area.

3.10.4 Social Structure

In the study area, as per 2011 census, 17.66% of the population belongs to Scheduled Castes (SC) and 8.60 % to Scheduled Tribes (ST). Overall the data of social stratification reveals that the SC and ST % to population is more than 26%, The SC and ST community are marginalized and they are at considered at low level of social strata and calls for a special attention in corporate social responsibility Plan for improving their socio-economic status apart from preservation and protection of their art, culture and traditional rights of livelihood.

The distribution of population by social structure is shown in **Table-3.10.2**.

TABLE-3.10.2
DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Schedule caste population	1861	4477	9832	16170
Schedule Tribes population	898	3108	3871	7877
Schedule caste (SC) population % to the total population	21.08	14.75	18.77	17.66
Schedule Tribes (ST) population % to the total population	10.17	10.24	7.39	8.60
Total SC and ST population	2759	7585	13703	24047
% To the total SC and ST population	31.25	24.99	26.16	26.26
OBC & General Population to the Population	6070	22766	38680	67516
% of OBC & General Population to the Population	68.75	75.01	73.84	73.74
Total population	8829	30351	52383	91563

Source: Census of India -2011

3.10.5 Literacy Levels

The data of study area reveals that literacy rate of 61.46% as per 2011 census, which is found to be less than the state of literacy (Rajasthan 66.1%). The distribution of literate and literacy rate in the study area is given in **Table-3.10.3.**

TABLE-3.10.3
DISTRIBUTION OF LITERATE AND LITERACY RATES

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Male Population	4438	15271	26308	46017
Female Population	4391	15080	26075	45546
Total Population	8829	30351	52383	91563
Male Population (0-6 years)	705	2085	3737	6527
Female Population (0-6 years)	607	2012	3300	5919

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total Population (0-6 years)	1312	4097	7037	12446
Total Population above 7 years	7517	26254	45346	79117
Male literates (7+ years)	2795	9990	17962	30747
Female literates (7+ Years)	1505	5497	10879	17881
Total literates (7+ Years)	4300	15487	28841	48628
Male literacy rate (%) to the total literates	65.00	64.51	62.28	63.23
Female literacy rate (%) to the total literates	35.00	35.49	37.72	36.77
Average Male Literacy to the total population (%)	37.18	38.05	39.61	38.86
Average female Literacy to the total population (%)	20.02	20.94	23.99	22.60
Total Literacy rate (%) to the total population	57.20	58.99	63.60	61.46

Source: Census of India -2011

The percentage of male literates to the total literates of the study area works out to be 63.23%. The percentage of female literates to the total literates, which is an important indicator for social change, is observed to be 36.77% in the study area as per 2011 census records.

3.10.6 Occupational Structure

The occupational structure of residents of work participation rate in the study area is studied with reference to main workers, marginal workers and non-workers. The main workers include 10 categories of workers defined by the Census Department consisting of cultivators, agricultural laborers, those engaged in live-stock, forestry, fishing, mining and quarrying; manufacturing, processing and repairs in household industry; and other than household industry, construction, trade and commerce, transport and communication and other services.

The marginal workers are those workers engaged in some work for a period of less than six months during the reference year prior to the census survey. The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars, vagrants etc.; institutional inmates or all other non-workers who do not fall under the above categories.

As Per 2011 Census Total work participation in the project study areas is 49.08% and the non-workers constitute 50.92% of the total population respectively. The female non workers to the total non-workers are 58.61% and male non- workers are 41.39%. In comparison to the state rural work participation rate (Rajasthan work participation rate rural 43.6%), the study area has recorded more work participation rate. The main workers to the total workers are 79.43% and the marginal workers constitute to 20.57% to the total workers. The occupational structure of the study area is shown in **Table-3.10.4**.

TABLE-3.10.4
OCCUPATIONAL STRUCTURE

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total Population	8829	30351	52383	91563
Total workers	4697	15335	24911	44943
Total main workers	3721	12735	19244	35700
Total Marginal workers	976	2600	5667	9243
Total Non-workers	4132	15016	27472	46620
Non Workers Male	1809	6291	11197	19297
Non Workers Female	2323	8725	16275	27323
Work participation rate (%)	53.20	50.53	47.56	49.08
% of main workers to total workers	79.22	83.05	77.25	79.43
% of marginal workers to total workers	20.78	16.95	22.75	20.57
% of non-workers to total population	46.80	49.47	52.44	50.92
% of Male Non Workers to the total Non-workers	43.78	41.90	40.76	41.39
% of Female Non Workers to the total Non-workers	56.22	58.10	59.24	58.61

Source: Census of India -2011

3.11 Traffic Density Survey

The traffic studies have been conducted to know the prevailing traffic volumes on the roads in the study area. It is essential to consider these details for assessing the anticipated future traffic volumes as a part of overall impacts assessment for the project.

The variations of traffic densities depend upon the working days and time and also vary in day and night times. In order to assess the prevailing traffic volumes on the roads, the survey was conducted during normal working days of the week by avoiding local holidays or abnormal situations to reflect the true picture of the traffic densities. The traffic study was conducted at two locations for 24 hours.

3.11.1 Selection of Sampling Location

The traffic density study was conducted at Dariba to S K Mines, Dariba to Fathenagar

3.11.2 Methodology

3.11.2.1 Vehicular Count

The vehicles plying in both the directions were counted continuously for 24 hours at two locations. The vehicles were counted every hour and recorded under respective category. The maximum traffic count in an hour is termed as peak hour traffic. The vehicles were categorized under various heads like trucks/tankers, buses, multi axles, cars, 2/3 wheelers, cycles.

3.11.2.2 Categorization of Traffic

The engine driven vehicles were categorized into various heads viz. light motor vehicles (LMV) as two wheelers (scooters, motor cycles etc.), three wheelers (auto rickshaws, 3-wheel tempo etc.), medium motor vehicles (cars, jeeps),

tractors (6 wheelers), minibuses and mini trucks (8 wheelers); heavy motor vehicles such as buses, trucks and tankers (10 wheelers).

3.11.3 Results and Discussion

The summary of daily traffic count for the location was monitored during the study period is summarized in **Table-3.11.1** and % of composition of the vehicles are given in the **Table-3.11.2.**

It was observed that the 2/3 wheelers, cars/jeeps and trucks/buses forms the major volume of the traffic. The total traffic PCU of this road is minimal.

3.11.3.1 Presentation of Results

The present level of traffic has been converted to Passenger Car Units (PCU) at all location as per the conversion factors stipulated by Indian Road Congress (IRC). The Passenger Car Unit (PCU) recorded at the selected traffic locations about 6112 PCU.

TABLE-3.11.1
TRAFFIC DENSITY (VEHICLES/DAY)

Code	Location	Two Wheelers Scooter/Bikes	3 Wheeler Auto Rickshaw	Four Wheeler Car/Jeep	Six wheeler Buses/ Truck	Heavy Vehicles	Total
T1	Dariba to SK Mines (to and fro)	1455	53	649	85	275	2517
T2	Dariba to Fathenagar (to and fro)	2385	80	954	123	358	3900
	Total No.of Vehicles	**3840**	**133**	**1603**	**208**	**633**	**6417**
	Total PCU'S	**1920**	**66**	**1603**	**624**	**1899**	**6112**

Note: PCU rating: (2/3 wheelers: 0.5, Car/Jeep: 1.0, Tractor: 3.0, Buses: 3.0, Trucks/HMV: 3.0)

TABLE–3.11.2
COMPOSITION OF EXISTING TRAFFIC VOLUME

Code	Total Vehicles	No. of Vehicles			% Composition		
		LMV	MMV	HMV	LMV	MMV	HMV
T1	2517	1508	649	360	59.9	25.7	14.4
T2	3900	2465	954	481	63.2	24.5	12.3

Note: LMV-Light Motor Vehicles (scooter, motorcycle & auto rickshaw etc.)
MMV-Medium Motor Vehicles (car, jeep, tractor, mini bus, mini trucks)
HMV-Heavy Motor Vehicles (bus, trucks and tankers)

Chapter-4
Anticipated Environmental Impacts and Mitigation Measures

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Introduction

This chapter provides a brief overview of the potential impacts on various environmental components due to the proposed expansion of underground mining operations and allied activities, which could cause significant environmental impacts.

The proposed expansion underground mining operations involve drilling, blasting, ore loading, and transportation. Some of the impacts that are related to underground mining and allied activities are with respect to:

- Topography and landscape;
- Drainage system;
- Climate;
- Land use pattern;
- Soil quality;
- Air quality;
- Water quality;
- Noise and vibration;
- Subsidence;
- Flora & fauna; and
- Socio economics.

The impact on all these areas due to the proposed expansion of underground excavation for coming years, has been assessed and given in following sections.

4.2 Impact Due to Proposed Mining Operations

4.2.1 Impact on Topography and Landscape

The proposed expansion is an underground mining operation and beneficiation plant. The changes in the topography and landscape for excavation of mining stopes, storage of waste dump, storage of ore and construction of buildings for office and machineries have already been completed for the present operations. However, some excavation for approach, mill expansion and road construction shall be done in existing land with some levelling. The existing facilities are adequate for the proposed expansion project thus not making perceptible impact on the topography and the landscape. No subsidence movement has been envisaged and shall not be reason for change in topography of the mining area during the course of future operations.

4.2.2 Impact on Climate

No effect on the local climate is anticipated as this is an expansion of underground mining and beneficiation plant . Rather, substantial improvement in local climate is expected after implementation or massive plantation scheme that has already commenced at the project area and will further continue during operation. No significant impact on overall climate of this region due to mining is

expected as mining activities are limited to a very small area compared to the study area. No perceptible change is expected in local temperatures owing to mining operations as all the activities are being carried underground.

4.2.3 Impact on Land use

Out of the acquired area, currently 125.52 ha land is under use. As all the activities related to the project will be restricted to the core zone, the impact on buffer zone will be negligible. The land use of the ML are is given in **Table-4.1**.

TABLE-4.1
LAND USE OF THE MINING LEASE AREA

Sr. No.	Particulars	Actual use (ha)	Total Proposed (ha)
1	Beneficiation Plant	20.00	26.00
2	Ore Stock Yard	10.00	15.00
3	Concentrate Yard	4.00	5.00
4	Waste Dump	8.00	8.00
5	Utilities	12.00	15.00
6	Plantation Area	46.00	50.00
7	Remaining Area	25.52	6.52
	TOTAL	**125.52**	**125.52**

4.2.4 Impact on Soil

Sindesar Khurd mining operations are underground and there is no removal of top soil. The tailing from existing beneficiation plants is being pumped to the existing lined tailing dam. It is proposed to continue the same and the capacity of lined tailing dam is sufficient till the mine life as the tailings generated are utilized in filling the underground mine voids.

However, on account of increased scale of operation, there will be increased vehicular traffic for storing, handling and transportation of mined ore & concentrate. Generation of particulate emissions and the tail pipe emissions from transport vehicles is therefore, of primary concern in this project. However, the transportation of material outside the mine lease boundary shall be done by covered trucks to ensure minimal air borne dust emission.

The proposed greenbelt plantation in the mine lease area will act as an effective barrier for control of dust.

4.2.5 Impact on Air Quality

The emissions from lead and zinc mining activity depend on the intensity of ore extraction operations, mode of transportation and processing / beneficiation.

Vehicular movement is the source to impact the ambient air pollution levels.

Other fugitive dust entrainment impacts of inside the mine zone area will be controlled by carrying out of wet drilling methods and continuous water spraying to

ensure sufficient moisture in surface soil in the mine area, and the ore transported route. This could minimize any fugitive dust generation and hence impact on ambient air quality from the underground mining activity is not expected to be significant.

Model simulations have been carried out to evaluate particulate matter and gaseous pollutants likely to be contributed by the proposed project. For the short-term simulations, the concentrations were estimated to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions.

Further, most of the dust produced during blasting will settle down underground, and get diluted by ventilating air before being exhausted. The dust settled underground will be sufficiently wetted to prevent from getting air borne.

In the secondary crushing operations at beneficiation plant, moist ore with 3-4% moisture is fed to control emission of dust. Further, the crushers and screens houses in beneficiation plant are provided with dust extraction with outlets connected to stacks which are regularly monitored.

The beneficiation process practiced at Sindesar Khurd is a wet process and also the equipment used are operated electrically, hence no significant particulate or gaseous emissions are observed.

About 8% moisture is retained in the final product. Hence, dust emissions are controlled during handling and transportation and there are no significant particulate emissions.

The surface of the existing tailing dam is kept wet due to continuous discharge of tailings mixed with water.

4.2.5.1 Impact on Air Quality due to Additional traffic

There will be an increase in traffic for ore transport of about 1.5 MTPA for beneficiation plant. Impact assessment has been estimated for ore transportation of vehicles used about 30 per day by road, and further using trucks about 32 per day for transportation of waste generated during the mining activity. That transportation route distance is about 7 km.

4.2.5.2 Traffic Density Survey

The traffic study details were discussed in the previous Chapter i.e. Chapter-3 in Section-3.11.

4.2.5.3 Adequacy of Existing Road Network in Study Area

As part of the expansion, it is estimated that the truck capacity would be 30 tones per each. The estimated peak traffic in terms of PCUs, when compared to the stipulated standards by IRC for traffic capacity of the roads, it can be observed

that the existing road network is adequate. The IRC recommendations on traffic capacity are presented below in **Table-4.2.**

TABLE-4.2
RECOMMENDATIONS ON CAPACITY-IRC

Sr.No	Category of road	Maximum PCU/day
1	Two lane roads (7 m) with earthen shoulders	15,000
2	4- lane highway with earthen shoulders	35,000

Existing 7.5 m bitumen roads from SK mine to Dariba of 6.0 km is sufficient to cater the need. However, widening and strengtheningof existing road is envisaged.

4.2.5.4 Air Quality Modeling

For prediction of maximum Ground Level Concentrations (GLC's), the air dispersion modeling software (AERMOD version 9.4) was used. AERMOD is steady state advanced Gaussian plume model that simulates air quality and deposition fields upto 50 km radius. AERMOD is approved by USEPA and is widely used software. It is an advanced version of Industrial Source Complex (ISCST3) model, utilizes similar input and output structure to ISCST3 sharing many of the same features, as well as offering additional features. The model is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases and multiple sources including point, area, flare, line and volume sources.

Dispersion modeling using AERMOD requires hourly meteorological data. Site specific data is used for executing modeling studies. The site specific meteorological data is processed using AERMET processor.

- Model Set-up

The model set-up details are presented in **Table-4.3** below:

TABLE-4.3
MODEL SET-UP

Sr. No.	Parameter	Details
1	Model Name	AERMOD (Version 9.4)
2	Model Type	Steady state Gaussian Plume Air Dispersion model
3	Topography	Rural, Flat
4	Averaging Time	24 hours
5	Source Type	Line sources
6	Boundary Limits	10 km X 10 km
7	Co-ordinate System	Uniform Cartesian Grid
8	Receptor Height	1.5 m
9	Anemometer	10 m
10	Surface meteorological data	Site Specific data processed by AERMET
11	Upper air Data	Upper air Estimator using AERMET processor

- **Model Input Data**

The parameters considered for prediction of GLCs are PM_{10}, $PM_{2.5}$, CO and NO_2. A study area within a radius of 10 km around the project site has been taken into consideration to compute the ground level concentrations (GLC) of the said air pollutants. The line sources are taken according to state highway to the project site. The emission rates as inputs to the line source model are calculated based on "Emission factor development for Indian Vehicles", a project executed by Automative Research Association of India, Pune, 2008. The Emission factors to calculate the vehicle exhausts' emissions for model input from vehicle transportation activity are given in **Table-4.4**.

TABLE-4.4
EMISSION FACTORS FOR EXIT GAS EMISSION OF VEHICLES

Pollutant	ARAI EF for HCV, g/kmvt
PM_{10}	1.24
$PM_{2.5}$	1.24
CO	6.0
NO_2	9.3

Further to the emission factors of PM_{10} and $PM_{2.5}$ in the above table, the vehicle movement resuspended road the ambient particulate matter levels using the USEPA emission factor estimation method (USEPA, 2000).

- **Presentation of Results**

The model predicted maximum PM_{10}, $PM_{2.5}$, CO and NO_2 concentrations from additional vehicular traffic, and the resultant concentrations after the implementation of the proposed project are given in **Table-4.5** and isopleths showing the incremental concentrations are shown in **Figure-4.1(A) to Figure-4.1(D).**

TABLE-4.5
PREDICTED PEAK HOURLY AIR POLLUTION DUE TO ADDITIONAL TRAFFIC

Sr. No.	Parameter	Model Predictions ($\mu g/m^3$)	Baseline Maximum AAQ Data along Transportation Route, ($\mu g/m^3$)	Resultant Concentration ($\mu g/m^3$)
1	PM_{10}	2.87	105.6	108.47
2	$PM_{2.5}$	0.28	47.3	47.58
3	CO	0.12	435	435.12
4	NO_2	0.19	18.4	18.59

It can be observed from model outputs that the maximum incremental concentrations of PM_{10}, $PM_{2.5}$, CO and NOx due to the additional traffic load would be about 2.87 $\mu g/m^3$, 0.28 $\mu g/m^3$, 0.12 $\mu g/m^3$ and 0.19 $\mu g/m^3$ respectively and likely to occur along centre of the transportation road and further the predicted pollution concentration levels are found to be decreased when move away from road. The resultant ambient PM_{10} is found to be exceeding the NAAQ standards (100 $\mu g/m^3$), which is coming within the mine boundary. Further, $PM_{2.5}$, CO and NOx concentrations are likely to be low when compared with the NAAQ standards for $PM_{2.5}$ (60 $\mu g/m^3$), CO (2000 $\mu g/m^3$).

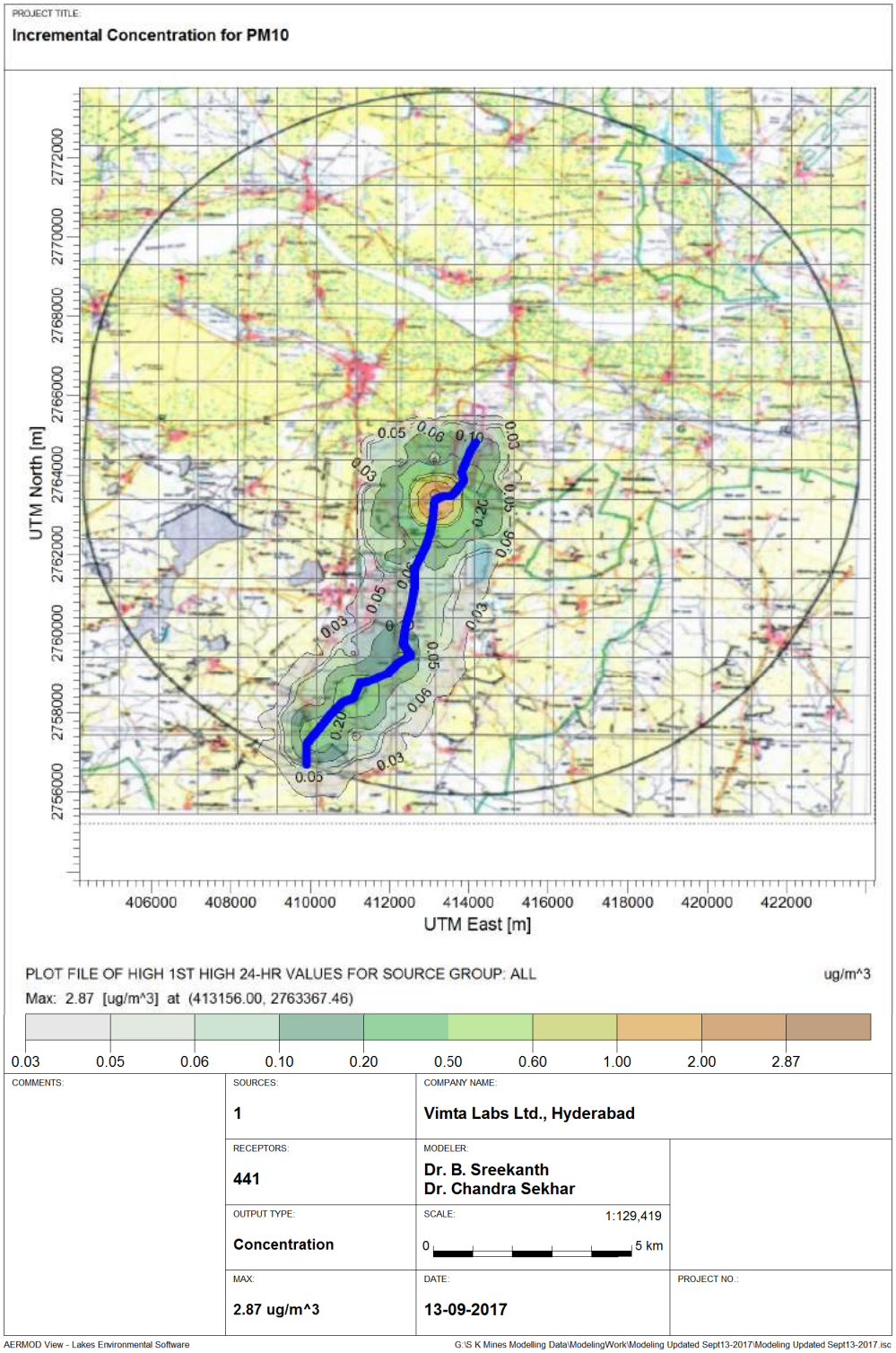


FIGURE-4.1(A)
ISOPLETH SHOWING INCREMENTAL CONCENTRATIONS FOR PM_{10}

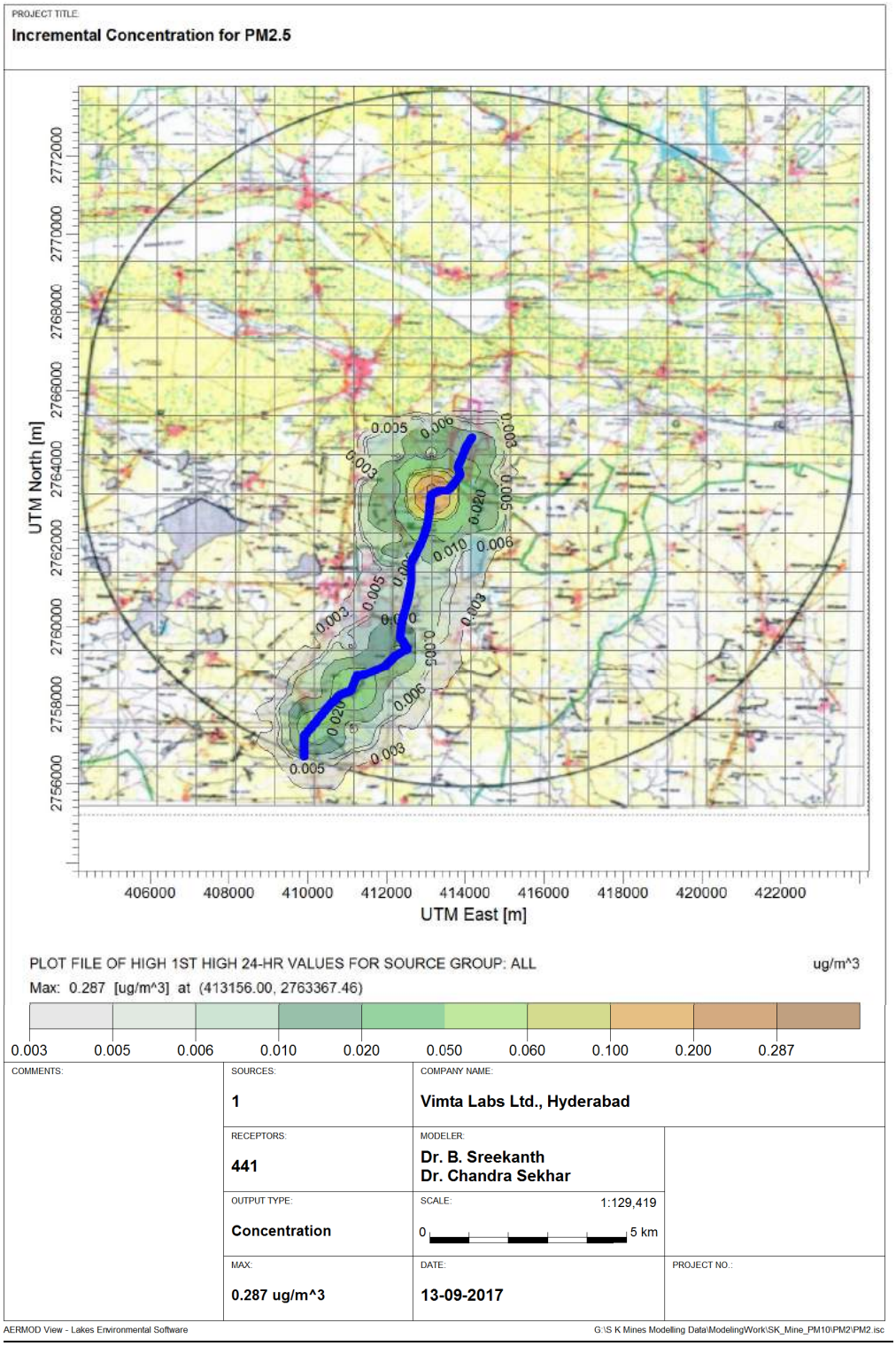


FIGURE-4.1(B)
ISOPLETH SHOWING INCREMENTAL CONCENTRATIONS FOR $PM_{2.5}$

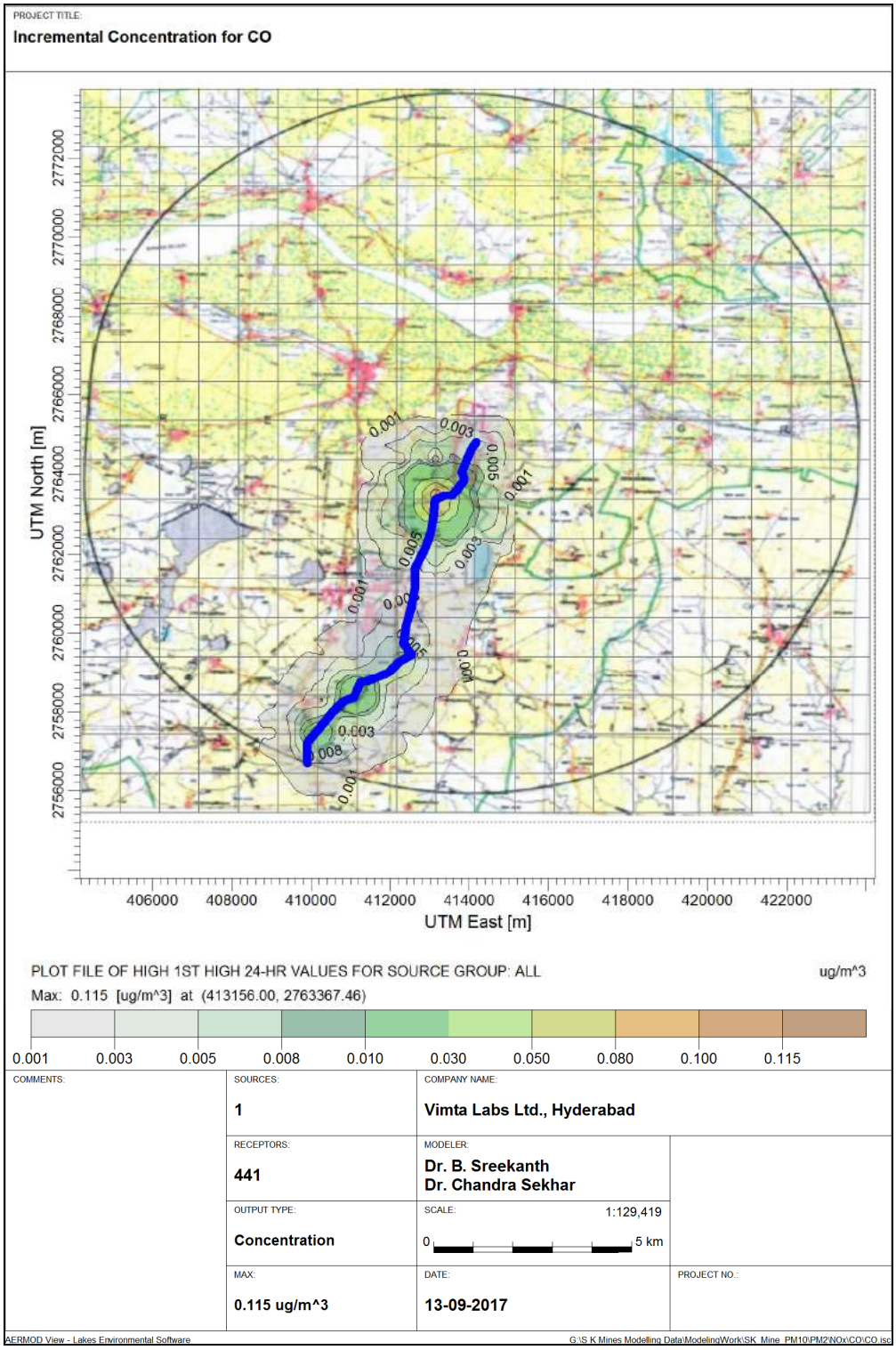


FIGURE-4.1(C)
ISOPLETH SHOWING INCREMENTAL CONCENTRATIONS FOR CO

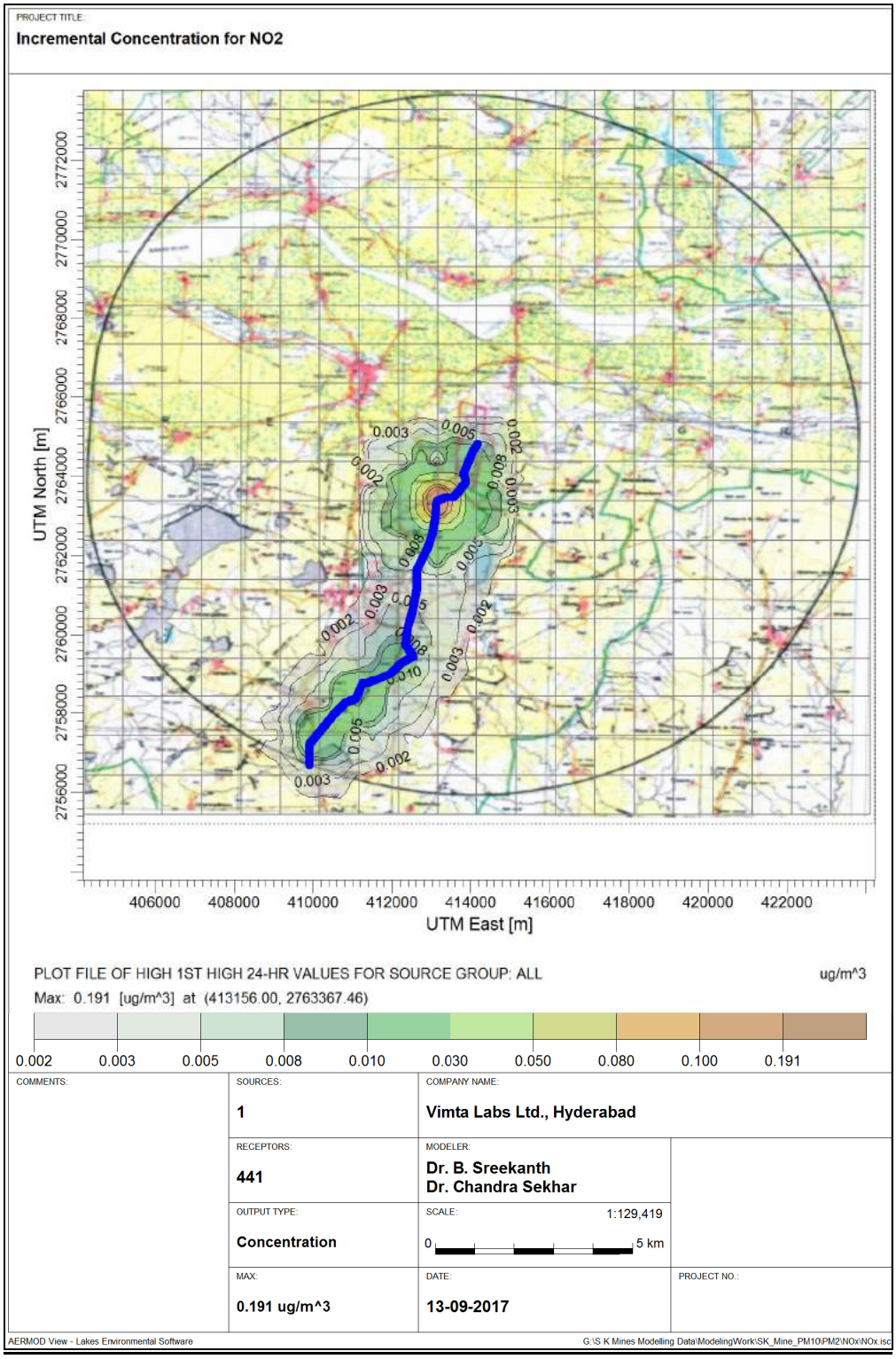


FIGURE-4.1(D)
ISOPLETH SHOWING INCREMENTAL CONCENTRATIONS FOR NO_2

4.2.6 Impact on Water Quality

4.2.6.1 Impacts of Mining on Drainage

As the underground mining is being carried out, the surface drainage is not going to be disturbed. The four first order streams which originate within the lease area on the eastern and southern slopes of the hill will continue to flow without getting disturbed by the underground mining or any surface activity. So, the surface drainage will take its natural course in the lease area. River Banas which crosses the buffer area in its northern side from village Jitawas to Panotia is flowing without being disturbed by the mining activity. In the lease area, there are few village roads and the village houses which are not affecting the surface drainage which is controlled by streamlets.

4.2.6.2 Impact of Mining on Surface Water

It has been indicated that Sindesar Khurd mine is being worked on zero discharge concept and surface water is not allowed to leave the boundary wall of the mine. All the rain water falling on dumps, paved and mine roads etc is being collected in the pond within the mine area and is gainfully utilized for dust suppression and green land development.

It is therefore apparent that there is no impact of mining on the surface water regime. The surface water is not going to be pumped or utilized anywhere in the lease area for any purpose. Whatever surface runoff develops in the lease area by rainfall is allowed to join the natural drainage system as it was prior to mining activity.

4.2.6.3 Impact of Mining on Ground Water

The environment department of HZL at Sindesar Khurd is regularly monitoring the water quality of mine water and open wells. Water samples are being collected from open wells and bore wells surrounding the working mine at Sindesar Khurd are being regularly monitored and have shown the absence of heavy metals or below the prescribed limits. The information pertaining to the water levels and water quality is being regularly submitted to the concerned authorities. So far, no adverse impact has been noticed.

4.2.6.4 Estimation of Inflow during each year of the five years and at Conceptual Stage

Based on the findings of the modelling inflow has been estimated by considering four seasons. Although, the mining is being carried out at such depth that effect of monsoon is not observed and at the conceptual stage, there is hardly any fracture porosity that metamorphic have no ground water and all upper mined out area has been back filled by cementation thereby with no inflow from upper mined out area. **Table-4.6** shows the net average ground water inflow in m^3/day for each year of the five years of the mining scheme. It is observed that maximum average inflow is 143.40 m^3/day during the year 2019-20 while it is average minimum during the 2021-22 when excavation is minimum and upper

mined out area had been back filled by cementation. So, the average inflow of ground water during five years period will be 110.15 m^3/day or 110 m^3/day. Inflow in the mine at the conceptual stage will be only 22.18 m^3/day as the mine will achieve the depth of -695 mRL having no fracture porosity due to overlying weight of about over 1100 m of rock above it and major part will be back filled by cementation.

TABLE-4.6
ESTIMATION OF GROUND WATER INFLOW IN THE MINE

Time	Level	60th day (m^3/day) Monsoon period	180th day (m^3/day) Post-monsoon	300th day (m^3/day) Winter	365th day (m^3/day) post Pre-Monsoon	Net average ground water inflow in the mine in m^3/day
2017-18	425-400 400-350 350-325 325-315 300-290 290-250 250-215 195-160 130-100 100-15 15-(-55)	158.12	133.61	121.71	111.04	**131.12**
2018-19	400-350 350-325 325-315 315-300 300-290 290-250 195-160 140-130 130-100 100-15 15-(-55)	172.13	146.67	132.91	120.50	**143.05**
2019-20	400-350 350-325 325-315 315-300 300-290 290-250 140-130 130-100 100-15 15-(-55) (-85)-(-230)	174.05	145.78	133.62	120.16	**143.40**
2020-21	400-350 350-325 325-315 315-300 300-290 290-250 140-130 130-100 100-15 15-(-55)	142.46	117.05	102.19	91.75	**113.36**

Time	Level	60th day (m^3/day) Monsoon period	180th day (m^3/day) Post-monsoon	300th day (m^3/day) Winter	365th day (m^3/day) post Pre-Monsoon	Net average ground water inflow in the mine in m^3/day
	(-85)-(-230)					
2021-22	350-325 15-(-55) (-55)-(-85) (-85)-(-265)	24.38	20.55	18.44	15.88	**19.81**
Average of annual inflow during five years						**110.15**
Conceptual	(-460)-(-515) (-555)-(-695)	28.90	24.07	18.99	16.76	**22.18**

4.2.6.5 Gainful Utilization of Mine Discharge

Having estimated that the ground water inflow in the mine will range from 19.81 m^3/day (2021-22) to 143.40 m^3/day, during the year 2019-20 and 22.18 m^3/day at the conceptual stage, mine discharge pumped from the mine will be desilted in a water reservoir and pumped back in the mine for mining activity. If any surplus mine discharge is available, it is supplied to beneficiation plant where the major part of water requirement will be obtained from the dam through pipe line. So, no mine output will be discharged either within the lease area or outside it.

4.2.6.6 Impacts of Beneficiation Plant on Drainage

The beneficiation plant is located on the western side and is mostly in the plain area where there is no natural drainage.

4.2.6.7 Impact of Beneficiation Plant on Surface Water

There are already two units of beneficiation plant in operation in the mining lease area having total beneficiation capacity of 5 MTPA and third unit of the 1.5 MTPA is to be developed. After the beneficiation, the tailings are being discharged in the tailing pond which is in use having HDPE lining at depth so that the tailing water does not percolate and join surface or ground water. The additional tailings of 1.5 MTPA beneficiation plant will also added in it.

It has been indicated that Sindesar Khurd mine is being worked on zero discharge concept and surface water is not allowed to leave the boundary wall of the mine. All the rain water falling on dumps, paved and mine roads etc is being collected in the pond within the mine area and is gainfully utilized for dust suppression and green land development after treatment.

4.2.6.8 Impact of Beneficiation Plant on Ground Water

At present, the quality of ground water within the lease area, where a beneficiation plant of 5 MTPA capacity is operation along with underground mining and its dumps, has been studied by collecting 10 ground water samples within the lease area and just outside. A review of the chemical analysis reveals that ground water within the lease area and just side has not been contaminated by the pollutants which are likely to be released from the plant/mine area.

4.2.7 Rainwater Harvesting

4.2.7.1 Need for Rain Water Harvesting for Buffer Zone of Sindesar Khurd Mine

Knowing that the present the status of ground water development of Relmagra block and Rajsamand district is more than the long term ground water recharge and accordingly has been declared as anover-exploited area, HZL realizing its national obligation proposes to utilize the surface runoff of the buffer zone of Sindesar Khurd mine by percolation tanks. Recharge of the buffer zone by way of percolation tanks, which has been declared as over-exploited zone by CGWB, will help in arresting the long term trend of declining of water table.

4.2.7.2 Basic Requirement for Artificial Ground Water Recharge Project

There are two basic requirements for taking up any artificial ground water recharge project and these are:

a) Availability of non-committed surplus monsoon runoff; and

b) Identification of suitable hydrogeological environment and sites for creating sub-surface reservoir through cost effective artificial recharge techniques.

While considering these two aspects in special reference to buffer zone of Sindesar Khurd mine, it is observed that there is a definite availability of surplus runoff in the buffer zone during monsoon months which has been harvested by villagers by constructing village tanks for livestock use.

Another important aspect is to evaluate the storage potential of sub-surface reservoir having maximum unsaturated zone and maximum specific yield during the period when water is available for recharge. Artificial ground water recharge cannot be undertaken where water level is within 3 m below the land surface during the monsoon period. Fortunately, the water table in the buffer zone ranges from 6 metres to 10 m during post monsoon period so on an average, about 3 m to 5 m of unsaturated zone comprising of alluvium and weathered schist is available which can be recharged.

Keeping these considerations in view, surface runoff of the buffer has been utilized by deepening the villager thereby storing more water for ground water recharge which is getting percolated faster with the removal of clays deposited in the past in the bottom of the tank bed.

4.2.7.3 Surface Runoff Utilization

After reviewing the area around the mines and nearby villages, nine existing village tanks have been identified which have more catchment yield than the present water storage capacity of village tanks and deepened to accommodate major part of the surface runoff available. The percolation tanks are mainly for ground water recharge and are not be used for any water withdrawal except the normal evaporation or used by stray cattle. So the entire accumulated water will have no other escape other than to percolate and join the ground water storage.

The villagers will appreciate the program of deepening of their existing village tanks as the water storage capacity of their village tanks has been increased, keeping the same evaporation loss thereby retaining water during summer for their cattle. The location of existing village tanks proposed for deepening to function as percolation tanks in the buffer zone of the mine is shown in **Figure-4.2.**

4.2.7.4 Percolation Tank near Village Sarwariya Kheri

An existing tank near village Sarwariya Kheri (N 24°59'57.5'', E 74°06'37.0'') is proposed for recharging the ground water basin and function as percolation tank **(Photoplate-1).** During the post–monsoon period, the tank develops the maximum water storage capacity of 22,500 m^3 with water column of 1.5 m in an area of 150 m x 100 m. The catchment area of the tank has been determined as 24 hectares which has provide 75,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 2.0 m. The additional storage capacity of this tank of 150 m x 100 m, which has been deepened up to average depth of 2.0 m has been increased by 30,000 m^3.

$$150 \times 100 \times 2.0 = 30{,}000\ m^3$$

As the tank, had the additional water storage capacity of 30,000 m^3 which is being received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional water storage capacity of 15,000 m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 15,000 m^3 is getting lost as evaporation, by stray cattle and general use by the villagers. There is an unsaturated zone, about 7 m thick during post-monsoon period, a part of which is getting recharged from this percolation tank.

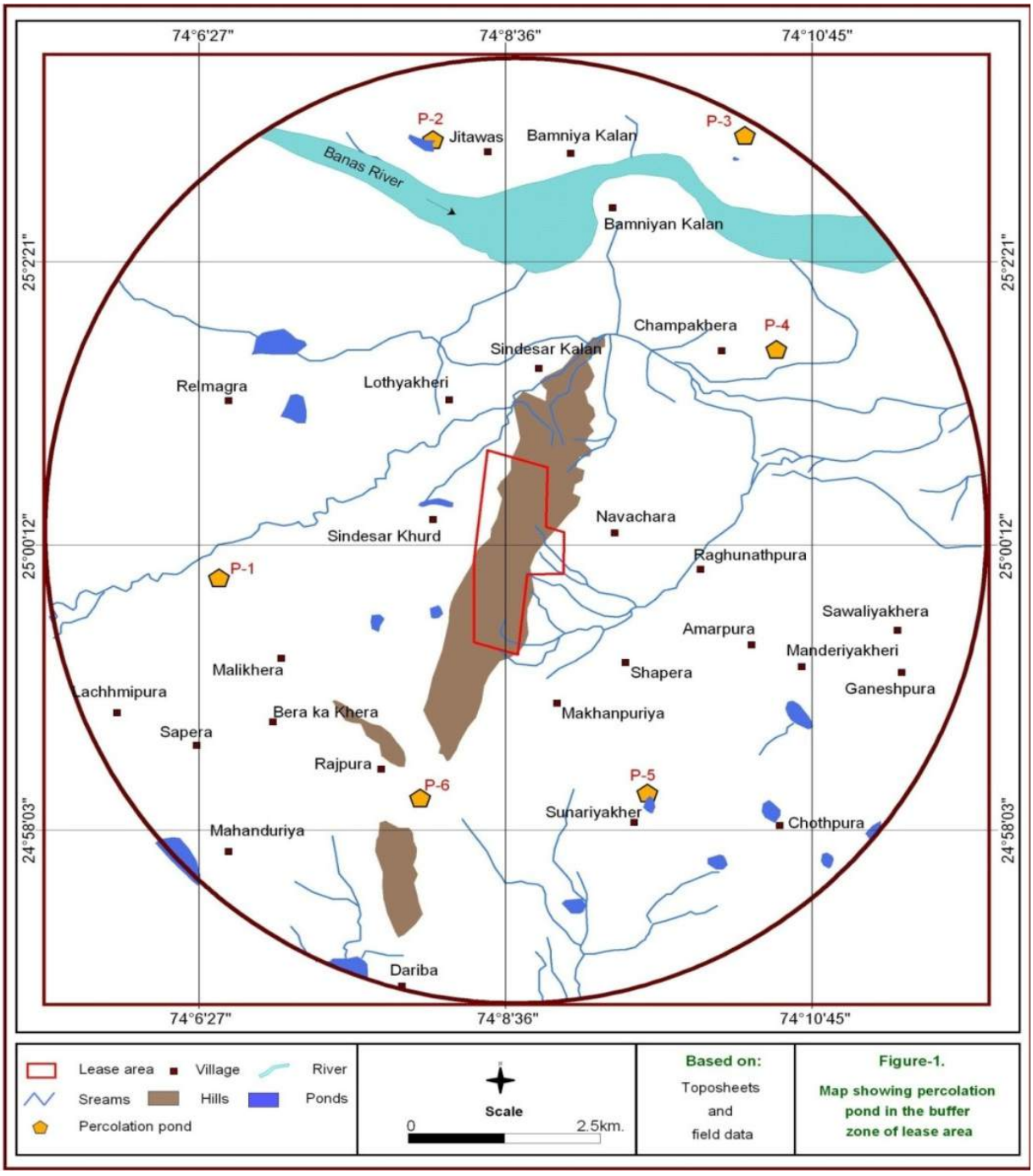


FIGURE-4.2
LOCATION OF EXISTING VILLAGE TANKS PROPOSED FOR DEEPENING TO FUNCTION AS PERCOLATION TANKS IN THE BUFFER ZONE OF THE MINE

PHOTOPLATE-1
PROPOSED PERCOLATION TANK-1 NEAR VILLAGE SARWARIYA KHERI

4.2.7.5 Proposed percolation tank near village Jitawas

An existing tank near village Jitawas (N 25°03'16.5'', E 74°08'06.5'') has been identified for recharging the ground water basin and is functioning as percolation tank **(Photoplate-2).** At present, the tank has storage capacity of 37,500 m^3 with water column of 1.0 m in 250 m x 150 m area. The catchment area of the tank has been determined as 43 ha which is getting 1,33,929 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 m. The additional storage capacity of this tank of 250 m x 150 m, has been increased by 56,250 m^3 by deepening up to average depth of 1.5 m.

$$250 \times 150 \times 1.5 = 56{,}250\ m^3$$

As the tank, has additional water storage capacity of 56,250 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity 28,125 m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is being lost as evaporation and consumed by stray cattle etc.

PHOTOPLATE-2
PROPOSED PERCOLATION TANK-2 NEAR VILLAGE JITAWAS

4.2.7.6 Proposed Percolation Tank near Village Bethumbi

An existing tank near village Bethumbi (N 25°03'18.5'', E 74°10'17.0'') has been identified and deepened so as to function as percolation tank **(Photoplate-3).** At present, the tank has storage capacity of 24,000 m^3 with water column of 1.5 m in an area of 160 m x 100 m. The catchment area of the tank has been determined as 26 hectares which is getting 80,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 2.0 m. The additional storage capacity of this tank of 160 m x 100 m, has been developed by 32,000 m^3.

$$160 \times 100 \times 2.0 = 32{,}000\ m^3$$

As the tank, has now the additional water storage capacity of 32,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity, 16,000 m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is lost as evaporation and consumed by stray cattle. There is an unsaturated zone, about 10.0 m thick during post -monsoon period a part of which would is getting recharged from this tank.

PHOTOPLATE-3
PROPOSED PERCOLATION TANK-3 NEAR VILLAGE BETHUMBI

4.2.7.7 Proposed Percolation Tank near Village Champakheri

An existing tank near village Champakheri (N 25°01'41.4'', E 74°10'31.0'') has been identified and deepened for recharging the ground water basin and function as percolation tank **(Photoplate-4).** At present, the tank has storage capacity of 10,000 m^3 with water column of 1.0 m in 100 m x 100 m. The catchment area of the tank has been determined as 12 hectares which is providing 35,714 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 m. The additional storage capacity of this tank of 100 m x 100 m, by deepening it to average depth of 1.5 m is 15,000 m^3.

$$100 \times 100 \times 1.5 = 15{,}000\ m^3$$

As the tank, has developed the additional water storage capacity of 15,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity is getting recharged, 7,500 m^3 as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is lost either due to evaporation or consumed by stray cattle. There is an unsaturated zone, about 10.0 m thick during post-monsoon period of which 7 m is being recharged from this tank, as upper 3 m of unsaturated zone can be not recharged which will otherwise create soil salinity and alkalinisation. A part of 7 m of unsaturated zone gets recharged by this percolation tank.

PHOTOPLATE-4
PROPOSED PERCOLATION TANK-4 NEAR VILLAGE CHAMPAKHERI

4.2.7.8 Proposed Percolation Tank-5 near Village Sonariyakhera

An existing tank near village Sonariya khera (N 24°58'19.9'', E 74°09'36.0'') has been identified and deepened for recharging the ground water basin and function as percolation tank **(Photoplate-5).** At present, the tank has storage capacity of 8,000 m^3 with water column of 1.0 m in 100 m x 80 m. The catchment area of the tank has been determined as 9 hectares which provides 28,571 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 m. The additional storage capacity of this tank of 100 m x 80 m, has been created by deepening it up to average depth of 1.5 m.

$$100 \times 80 \times 1.5 = 12{,}000\ m^3$$

The additional water storage capacity of 12, 000 m^3 which is being received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity, 6,000 m^3 is getting recharged as the tank bottom has an alluvial zone followed by weathered mica schist. The balance quantity of water is being lost either as an evaporation or used by stray cattle.

PHOTOPLATE-5
PROPOSED PERCOLATION TANK-5 NEAR VILLAGE SONARIYA KHERA

4.2.7.9 Proposed Percolation Tank-6 near Village Rajpura

An existing tank near village Rajpura (N 24°58'17.7'', E 74°08'01.0'') has been identified and deepened for recharging the ground water basin and functions as percolation tank **(Photoplate-6).** At present, the tank has storage capacity of 15,000 m^3 with water column of 1.5 m in 100 m x 100 m. The catchment area of the tank has been determined as 16 ha which provides 50,000 m^3 of water as surface runoff, taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streamlets. The storage capacity of the existing tank has been increased by deepening the tank by 2.0 m. The additional water storage capacity of this tank of 100 m x 100 m after deepening up to average depth of 2.0 m has become 20,000 m^3.

$$100 \times 100 \times 2.0 = 20{,}000\ m^3$$

With additional water storage capacity of 20,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity, 10,000 m^3 is getting recharged as the tank bottom has an alluvial zone followed by weathered mica schist. The balance quantity of water is lost either as an evaporation or by stray cattle.

PHOTOPLATE-6
PROPOSED PERCOLATION TANK-6 NEAR VILLAGE RAJPURA

4.2.7.10 Total Rainwater Harvested

With the proposed program of deepening of nine existing village tanks by storing the available catchment yield, the ground water basin of the buffer zone is being recharged by 2,77,575 m^3/year. The details of ground water recharge of each village tank by deepening are given in **Table-4.7.**

TABLE-4.7
DETAILS OF GROUND WATER RECHARGE OF EACH VILLAGE TANK

Sr. No.	Name of the Village	Water Recharge
1	Percolation tank near village Sarwariya kheri	15,000 m^3
2	Percolation tank near village Jitawas	28,125 m^3
3	Percolation tank near village Bethumbi	16,000 m^3
4	Percolation tank near village Champakhera	7,500 m^3
5	Percolation tank near village Sonariyakhera	6,000 m^3
6	Percolation tank near village Rajpura	10,000 m^3
7	Percolation tank near village Menduria	105036 m^3
8	Percolation tank near village Charana	5500 m^3
9	Percolation tank near village Shashera	3500 m^3
	Total	**2,77,575 m^3**

4.2.7.11 Rainwater Harvesting System of Beneficiation Plant & Water Conservation

Artificial ground water recharge cannot be undertaken where water level is within 3 m below the land surface during the monsoon period. Fortunately, the water table in the industrial area zone ranges from 10 m to 12 m during post monsoon period so on an average, about 7 to 9 m of unsaturated zone comprising of alluvium and weathered schist is available which can be recharged.

Keeping these considerations in view, the availability of water from rain water from different buildings and industrial sheds have been calculated and is proposed to be recharged through recharge trenches as there is a permeable zone from surface to the water table comprising alluvium and weathered schist.

4.2.7.12 Existing Storm Water Drainage System in the Acquired Area

Out of 199.8425 ha of the total lease area, HZL has acquired 125.52 ha of the land for the Sindesar Khurd mine which is now having different buildings, industrial sheds, paved roads and open area for plantation. Three buildings like MCC & switch gear building, Canteen and Administrative block (Main office building) are having RCC flat roof top and have been provided with PVC drain pipes which take water to a cemented drain which on an average is about 1.5 m deep and 0.5 m in width At places, depending on the slope and gradient required, the drain size ranges to some extent. All these cemented drains also get the water from paved roads and from the industrial sheds where drain pipes have not been provided and roof top rain water falls on the paved roads and joins the network of cemented drains. The bottom of the drains is cemented and carry water to the plantation area is shown in **Figure-4.3.**

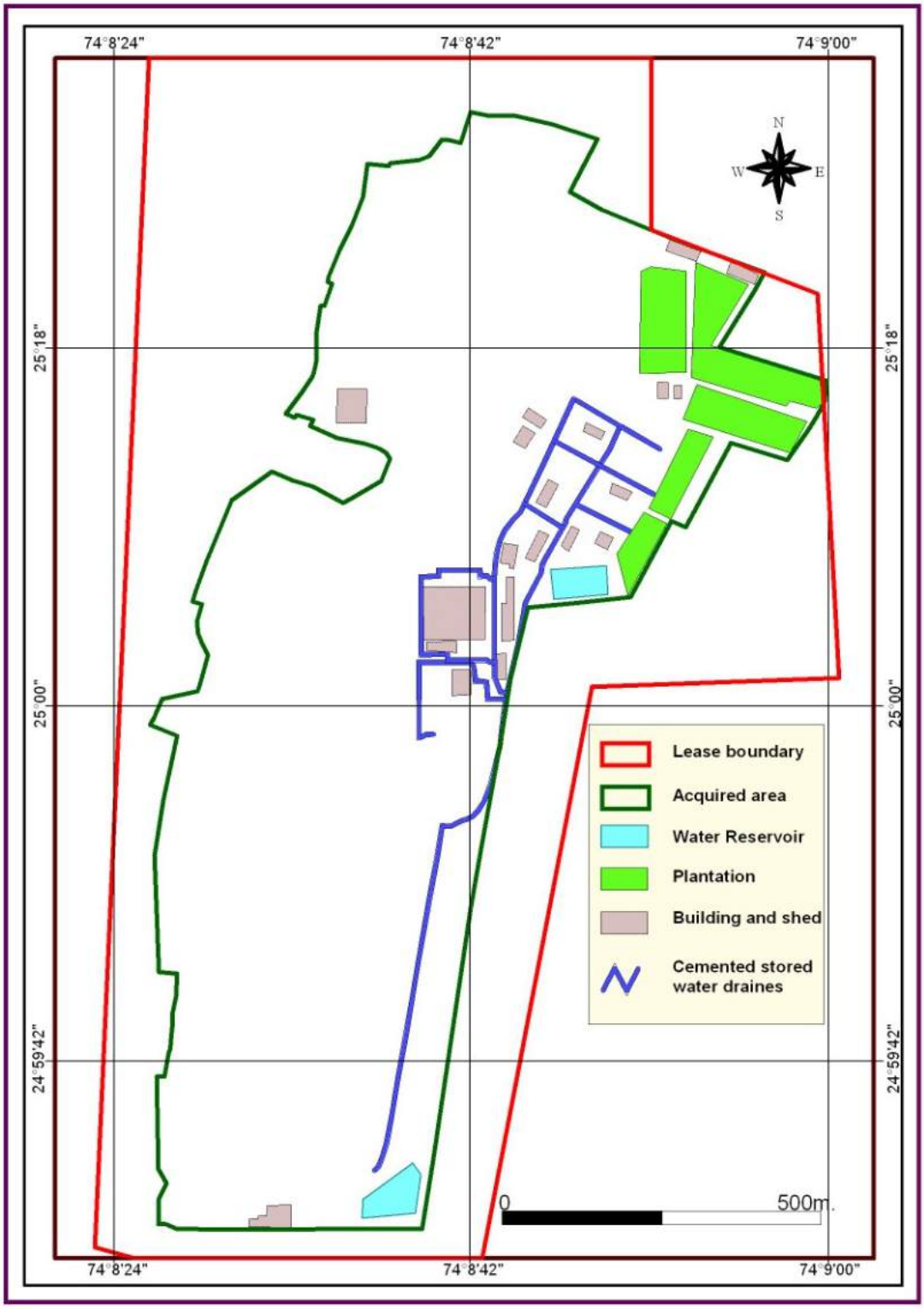


FIGURE-4.3
ACQUIRED AREA AND THE EXISTING STORM WATER CEMENTED DRAINS MAP OF SK MINE

At present, the acquired area has not been provided with any ground water recharge structures except that rain water falling on the roof tops of different buildings and industrial sheds and on the paved roads gets collected in the cement drains which is ultimately taken to the plantation area developed in the north eastern part of the mine which is also the low lying area. The plantation covers about 5.28 ha and a part of water which is received gets percolated to ground water table as ground water recharge and the rest is consumed by the plantation and lost by evaporation and evapo-transpiration.

PHOTOPLATE-7
CEMENTED STORM WATER DRAIN DISCHARGING WATER IN THE PLANTATION AREA

4.2.7.13 Proposed Artificial Ground Water Recharge Program

It is proposed that all the cemented drains, already constructed as storm water drains may be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table which lies at the depth of 10 to 12 m below the land surface during the post-monsoon period. These drains will work as recharge trench having unlined bottom which may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. The total length of the cemented drains, which have so far been constructed is about 2500 m till it joins the plantation area. It is also proposed that efforts may be made so that water flowing through the recharge trench may get longer time to stay in the trench and major part of water gets percolated to join ground water table.

Accordingly, it is proposed, at every length of 25 m, a cemented wall of 0.6 m in height may be constructed in the trench having width of 30 cm so that water gets collected in its upstream side and accumulated water gets more time to percolate. The rest of the depth of about 0.90 m of the trench will remain empty and water will flow through it and also over the 0.3 m barrier wall. The coarse sand and gravel can be obtained from Banas river, which is flowing at distance of about 4 km from the SK mine by screening the river bed sand. The existing cemented storm water drains will function as most cost-effective ground water recharge structure once its cemented bottom is removed and it is filled by filter media and also by 60 cm height of cemented barrier at every distance of 25 m all along the length 2500 m of the drain.

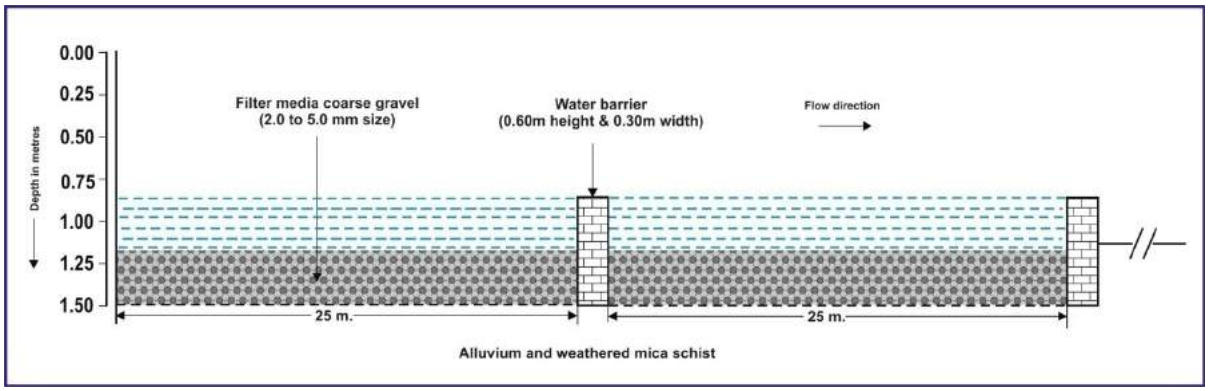


FIGURE-4.4
SECTION AND WATER FLOW DIRECTION IN RECHARGE TRENCH

The availability of roof top rain water from different buildings provided with PVC drain pipes and taking water to recharge trench is discussed as under.

Roof Top Rain Water Utilization from RCC Flat Roof Buildings

MCC & Switch Gear Building

There is a MCC & Switch gear building having RCC flat roof top area of 2128 m^2. The entire roof top rain water is being collected by PVC drain pipes and is taken to the cemented drain constructed on the other side of the road. Now the existing cemented drain when converted in to recharge trench having unlined the bottom and filled with filter media of 30 cm thick layer (Approx. 1.0 ft.) will function as ground water recharge structure as shown in **Figure-4.5.**

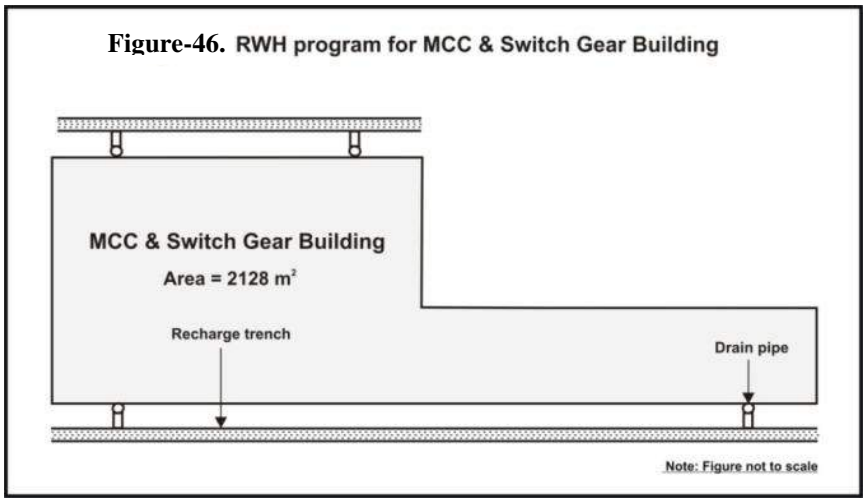


FIGURE-4.5
RHW PROGRAM FOR MCC & SWITCH GEAR BUILDING

The availability of roof top water and the peak runoff from the roof top of MCC & Switch gear building 2028 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for cemented flat roof and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area. As the recharge trench is 2500 metres in length till it joins the plantation area, the major part of the water in the trench will get recharged and only limited quantity of water will join the plantation area when there is excessive rain fall during the day.

Availability of roof top rain water	2128 x 0.85 x 0.606 = 1096 m^3
Peak availability of water during one hour	2128 x 0.85 x 0.045 = 81 m^3

Canteen Building

There is a Canteen Building having total roof top area of 690 m^2. All the roof top rain water is being collected through PVC drain pipes in the cemented drain constructed in front and back of the building which is proposed to be converted in to recharge trench and filled with filter media as shown in **Figure-4.6.**

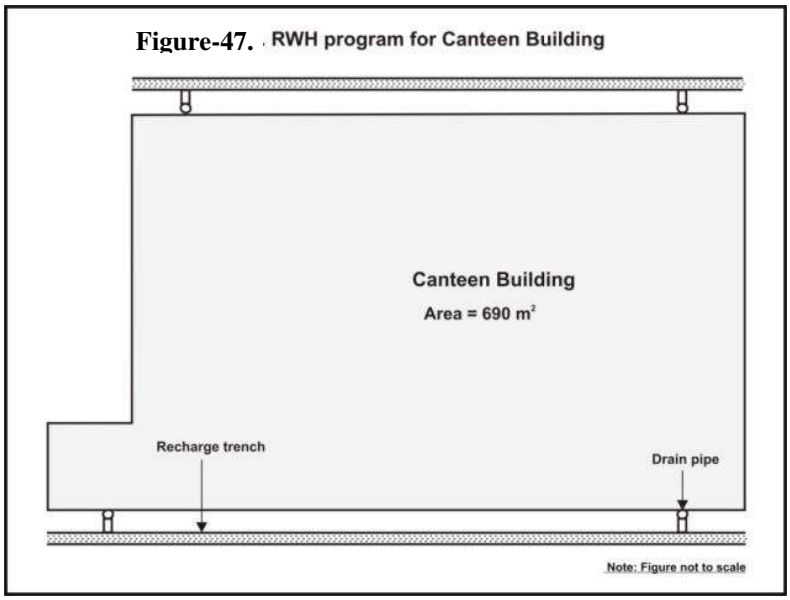


FIGURE-4.6
RHW PROGRAM FOR CANTEEN BUILDING

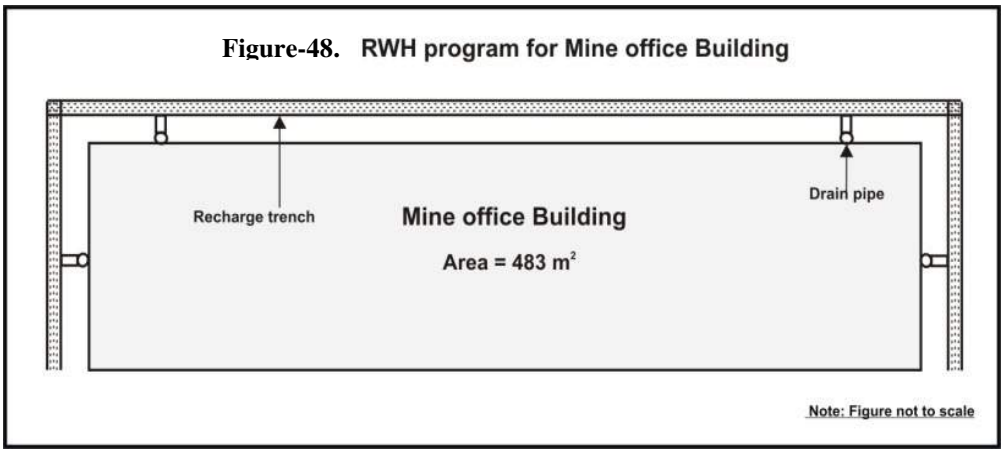
The availability of roof top water and the peak runoff from the roof top of the canteen building total roof top area (RCC SLAB) of 690 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for RCC flat roof top area and rainfall intensity which is about 45 mm/hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 690 x 0.85 x 0.606 = 355 m^3

Peak availability of water during one hour 690 x 0.85 x 0.045 = 26 m^3

Mine Office Building

There is a mine office building having total flat roof top area of 483 m^2. All the roof top rain water is being collected through drain pipes in the cemented drain constructed in front and sides of the building which is now proposed to be converted in to recharge trench and filled with filter media as shown in **Figure-4.7.**



FIGUR E-4.7
RHW PROGRAM FOR MINE OFFICE BUILDING

The availability of roof top water and the peak runoff from the roof top of the Mine Office Building total roof top area (RCC SLAB) of 483m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for RCC flat roof top area and rainfall intensity which is about 45 mm/hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 483 x 0.85 x 0.606 = 249 m^3

Peak availability of water during one hour 483 x 0.85 x 0.045 = 18 m^3

Roof top rain water utilization from industrial sheds (Beneficiation plant) having corrugated colour sheets

Two Wheeler parking Shed

There is a two wheeler parking shed having total roof top area of corrugated colour PVC sheets of 2211 m^2. All the roof top rain water falls on the paved /cemented roads and gets collected in cemented storm water drain which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. and 0.6 m height of cemented wall with width of 15 cm to act as water barrier so that additional water gets stored which will get percolated thereby recharging more drain water **Figure-4.8.**

Figure-49. RWH program for Two Wheeler Parking Shed

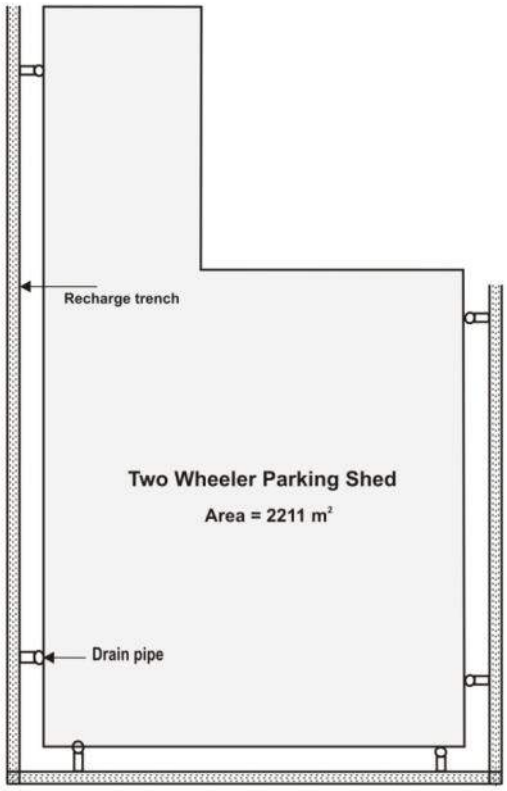


FIGURE-4.8
RHW PROGRAM FOR TWO WHEELER PARKING SHED

The availability of roof top water and the peak runoff from the roof top of the Two wheeler parking shed having total roof top area (Color coated sheet) of 2211 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 2211 x 0.90 x 0.606 = 1206 m^3

Peak availability of water during one hour 2211 x 0.90 x 0.045 = 90 m^3

Secondary Crusher House Building Shed

There is a secondary crusher house building shed having total roof top area (Color coated sheet) of 980 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.9.**

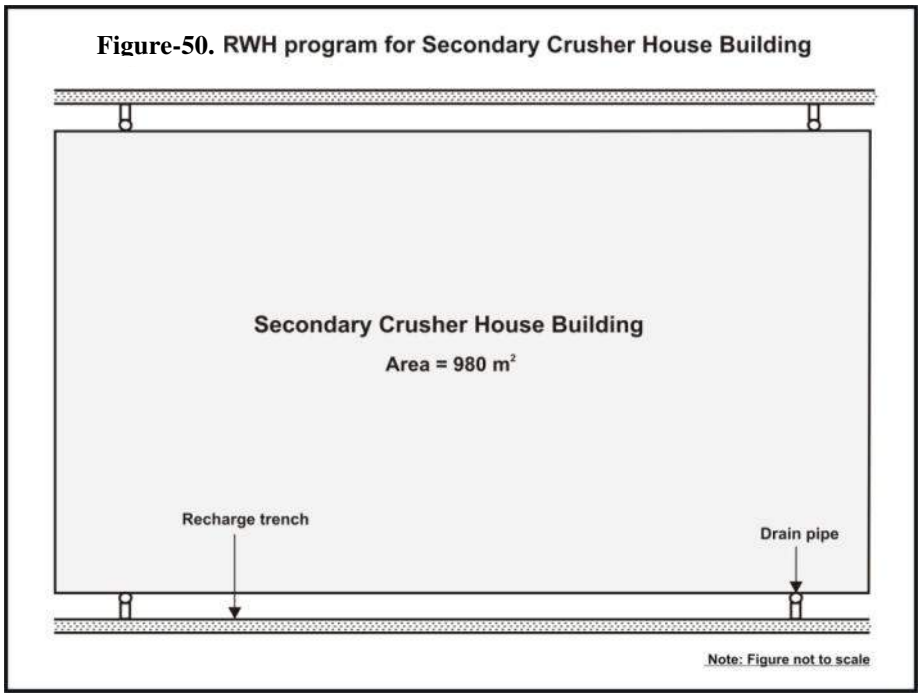


FIGURE-4.9
RHW PROGRAM FOR SECONDARY CRUSHER HOUSE BUILDING

The availability of roof top water and the peak runoff from the roof top of the secondary crusher house building shed having total roof top area (Color coated sheet) of 980 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 980 x 0.90 x 0.606 = 534 m^3

Peak availability of water during one hour 980 x 0.90 x 0.045 = 40 m^3

Reagent Building shed

There is a reagent building shed having total roof top area (Color coated sheet) of 864 m^2. All the roof top rain water already collected in storm water drains and now to may be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.10.**

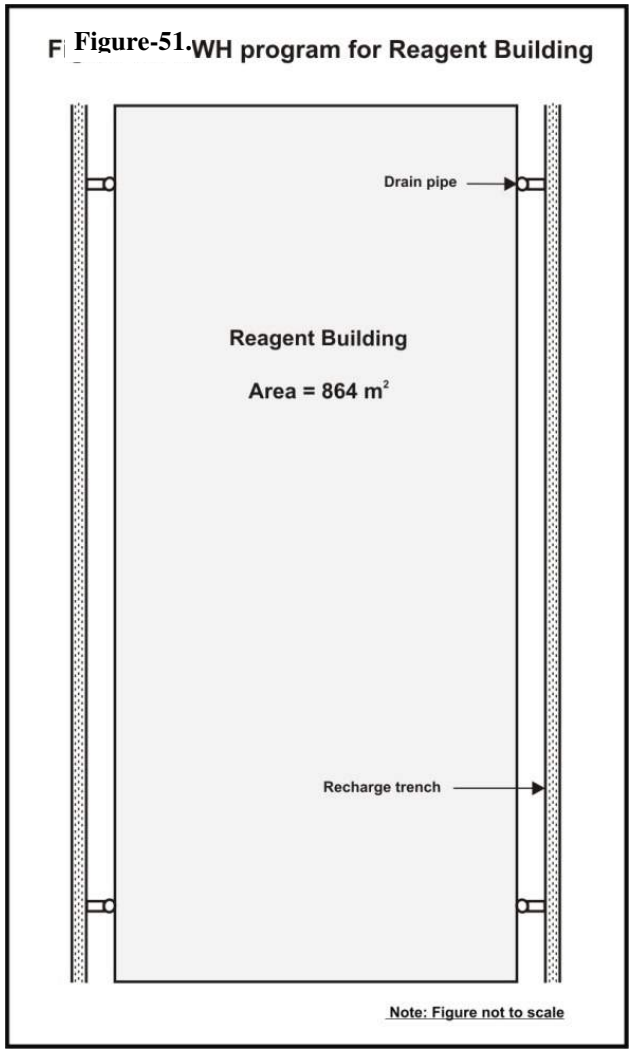


FIGURE-4.10
RHW PROGRAM FOR REAGENT BUILDING

The availability of roof top water and the peak runoff from the roof top of the reagent building shed having total roof top area (Color coated sheet) of 864 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 864 x 0.90 x 0.606 = 471 m^3

Peak availability of water during one hour 864 x 0.90 x 0.045 = 35 m^3

Filter House Shed

There is a filter house shed having total roof top area (Color coated sheet) of 759 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.11.**

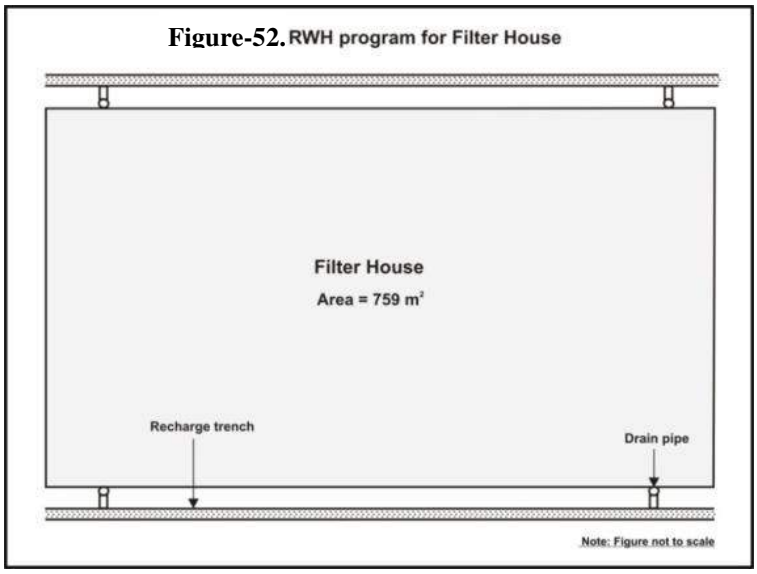


FIGURE-4.11
RHW PROGRAM FOR FILTER HOUSE

The availability of roof top water and the peak runoff from the roof top of the filter house shed having total roof top area (Color coated sheet) of 759 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 759 x 0.90 x 0.606 = 414 m^3

Peak availability of water during one hour 759 x 0.90 x 0.045 = 31 m^3

Allocation Facility Building (South Ramp)

There is an allocation facility building (South Ramp) having total roof top area (Color coated sheet) of 697 m^2. All the roof top rain falls on the paved road and gets collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.12.**

Figure-53. RWH program for Allocation Facility Building (South Ramp)

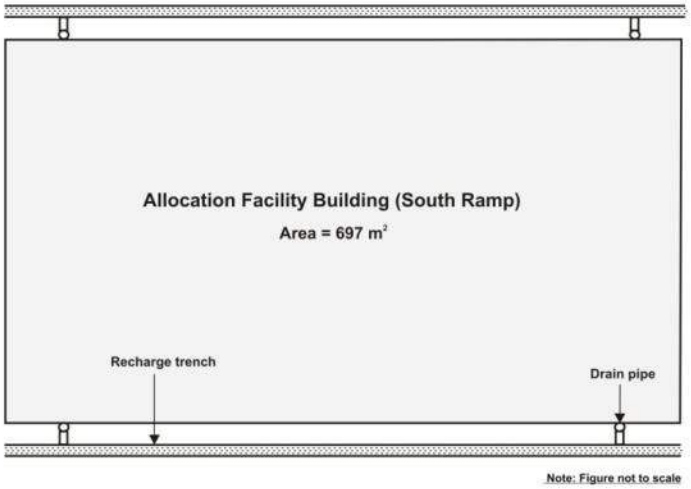


FIGURE-4.12
RHW PROGRAM FOR ALLOCATION FACILITY BUILDING (SOUTH RAMP)

The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 697 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 697 x 0.90 x 0.606 = 380 m^3

Peak availability of water during one hour 697 x 0.90 x 0.045 = 28 m^3

Allocation Facility Building (North Ramp)

There is an allocation facility building (North Ramp) having total roof top area (Color coated sheet) of 689 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through

them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.13.**

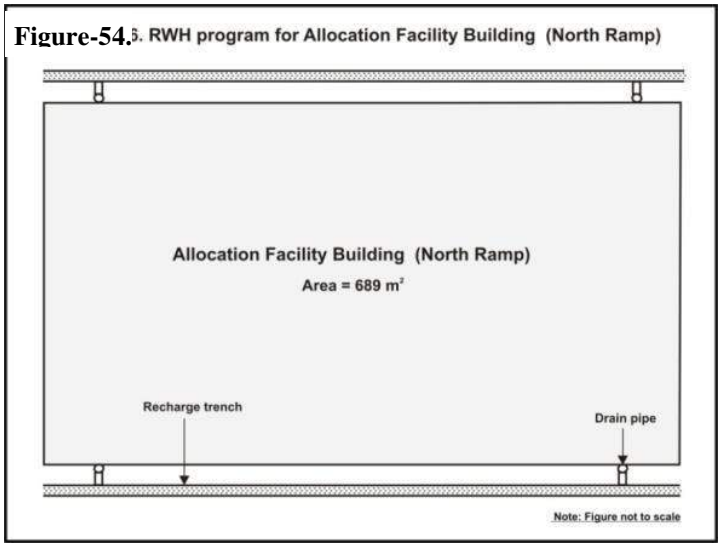


FIGURE-4.13
RHW PROGRAM FOR ALLOCATION FACILITY BUILDING (NORTH RAMP)

The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 689 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water — 689 x 0.90 x 0.606 = 376 m^3

Peak availability of water during one hour — 689 x 0.90 x 0.045 = 28 m^3

Core Shed (Geology)

There is a coal shed having total roof top area (Color coated sheet) of 680 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.14.**

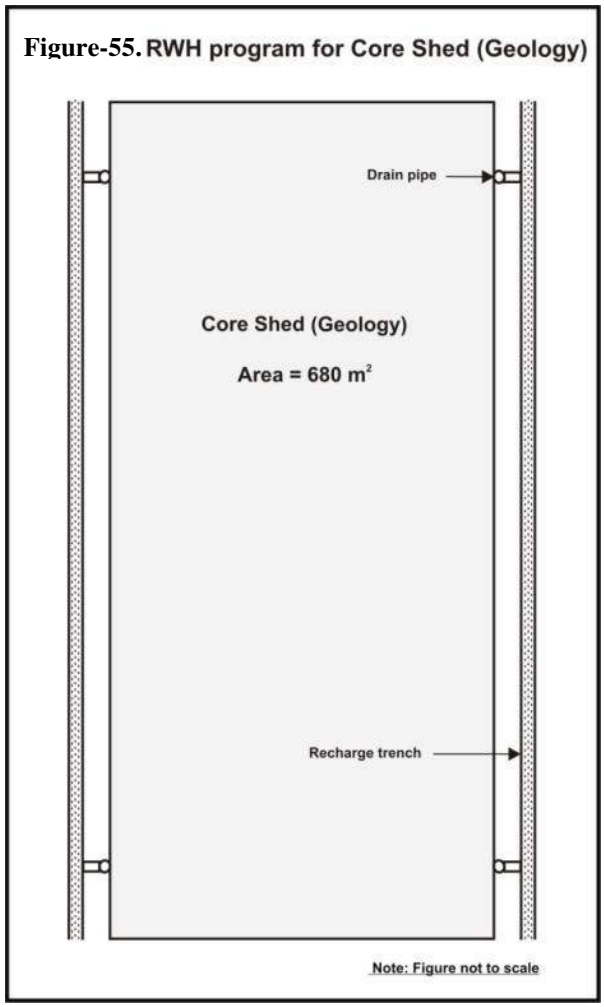


FIGURE-4.14
RHW PROGRAM FOR CORE SHED (GEOLOGY)

The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 680 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 680 x 0.90 x 0.606 = 371 m^3

Peak availability of water during one hour 680 x 0.90 x 0.045 = 27 m^3

Core Shed (Exploration)

There is a core shed having total roof top area (Color coated sheet) of 680 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the

cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.15.**

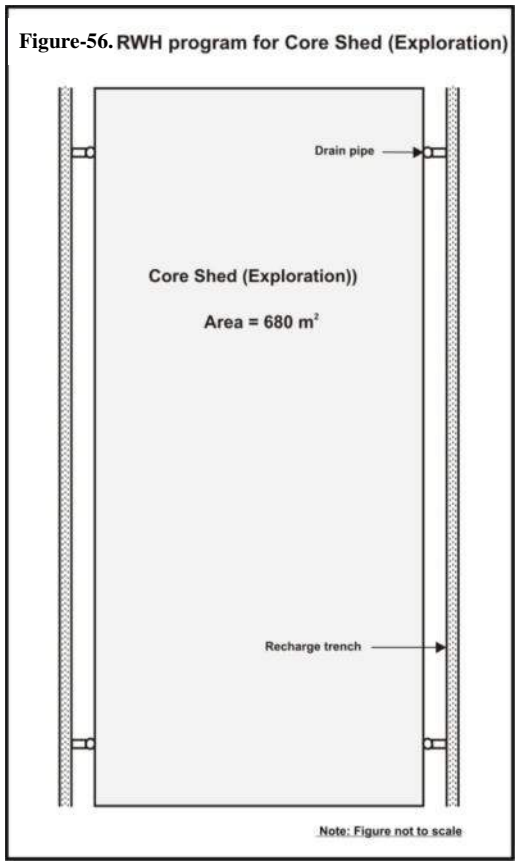


FIGURE-4.15
RHW PROGRAM FOR CORE SHED (EXPLORATION)

The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 680 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 680 x 0.90 x 0.606 = 371 m^3

Peak availability of water during one hour 680 x 0.90 x 0.045 = 27 m^3

Central Store

There is a central store shed having total roof top area (Color coated sheet) of 567 m^2. All the roof top rain water falls on the paved road and is collected in

storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.16.**

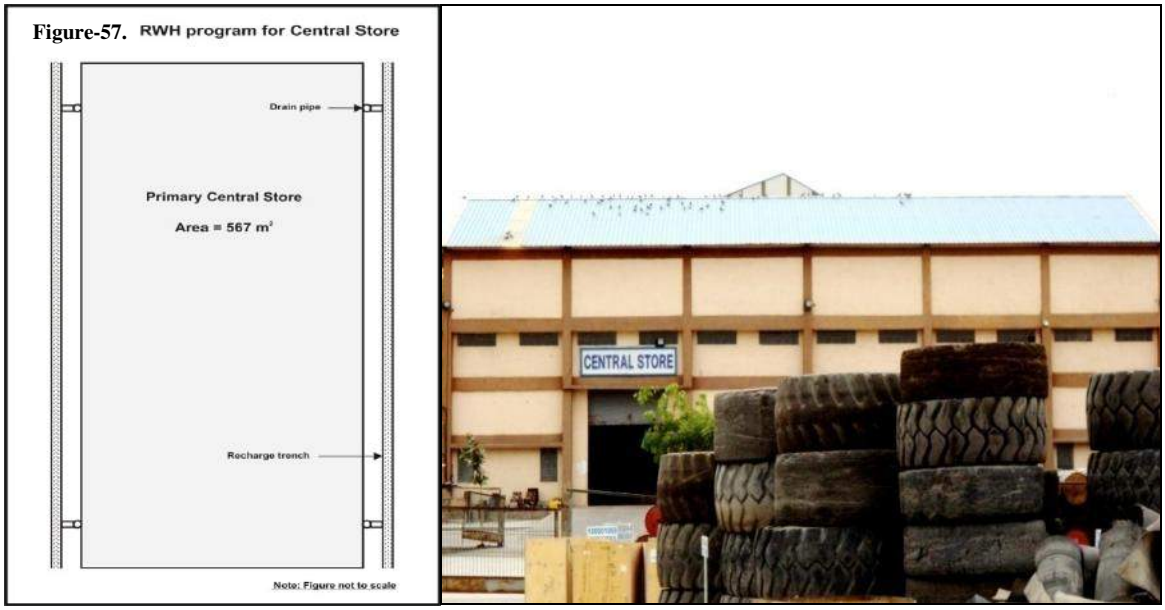


FIGURE-4.16
RHW PROGRAM FOR CENTER STORE

The availability of roof top water and the peak runoff from the roof top of the central store having total roof top area (Color coated sheet) of 567 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water 567 x 0.90 x 0.606 = 309 m^3

Peak availability of water during one hour 567 x 0.90 x 0.045 = 23 m^3

Primary Crusher House Building

There is a primary crusher house building shed having total roof top area (Color coated sheet) of 504 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-4.17.**

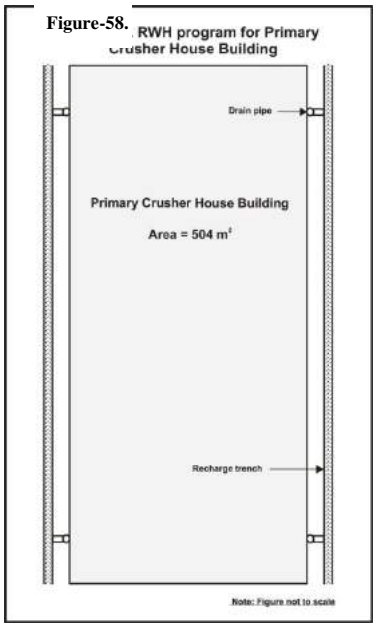


FIGURE-4.17
RHW PROGRAM FOR PRIMARY CRUSHER HOUSE BUILDING

The availability of roof top water and the peak runoff from the roof top of the primary crusher house building having total roof top area (Color coated sheet) of 504 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	504 x 0.90 x 0.606 = 275 m^3
Peak availability of water during one hour	504 x 0.90 x 0.045 = 20 m^3

Surface runoff utilization from roads and paved area through recharge trenches

The paved area and black topped tar roads in the plant area cover an area of 23,500 m^2. The surface runoff from paved roads gets collected in cemented drains, 0.5 m in width and 1.0 m in depth on either sides **(Figure-4.18)**. The water in recharge trench will gradually percolate to the the zone of saturation. The bottom of the recharge trench will remain naked and filled with filter media.

The availability of water from paved area and roads has been estimated as under, taking annual average rainfall as 606 mm, 0.65 as runoff coefficient for black top roads and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of rain water from paved are and roads	23,500 x 0.65 x 0.606 = 9257 m^3
Peak availability of water during one hour	23,500 x 0.65 x 0.045= 687 m^3

Figure-59. Recharge system for road and paved area

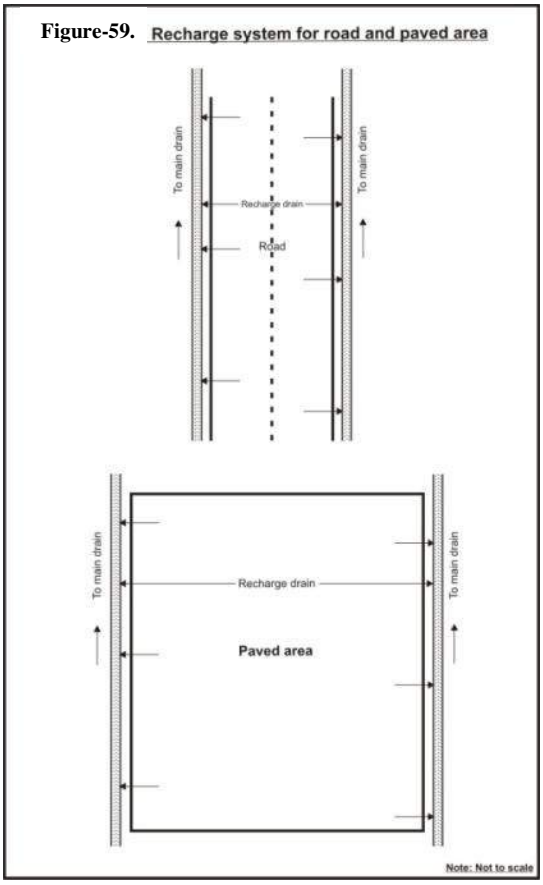
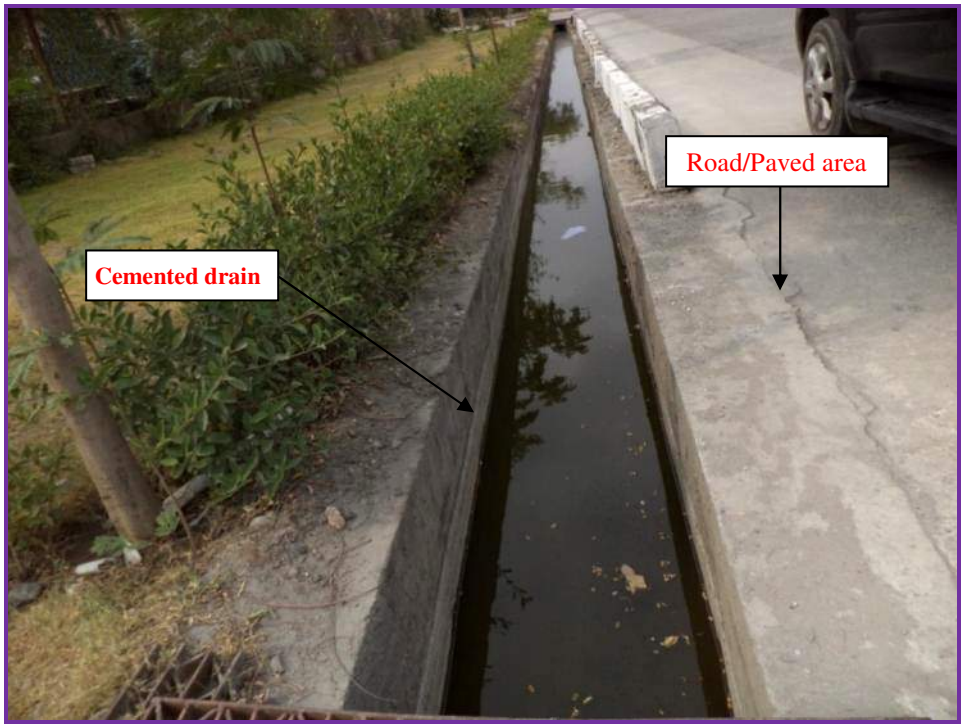


FIGURE-4.18
REACHARGE SYSTEM FOR ROAD AND PAVED AREA



Total Rainwater Harvested and Ground Water Recharged through Recharge Trenches

All the roof top rain water from RCC flat topped buildings, industrial sheds having corrugated colour PVC sheets and paved roads which used to get collected in the storm water cemented drains will now be recharged through recharge trenches when the bottom of the drains will be broken along with barrier wall of 0.6 m in height at interval of 25 metres in the trench and filled with filter media. It has been calculated that total rain water harvested from all sources will be 7832 m^3 during a normal rainfall year. As the total length of the recharge trench is 2500 m and the water will remain in the trench for longer period due to 0.6 m high barriers at every 25 metres, it expected that almost 50% of the harvested water will be recharged. The recharge trench has the capacity to store major part of the water rained in one hour period and only small part will reach the plantation area for its growth. It will only when the rainfall is more than 100 mm/day the surplus water will reach the plantation area. The details of rain water harvested and recharged are shown in the **Table-4.8.**

TABLE-4.8
DETAILS OF RAIN WATER HARVESTING FROM ROOF TOPS AND PAVED AREA IN THE RECHARGE DRAIN AND CONSEQUENT GROUND WATER RECHARGE

Sr. No.	Recharge Structures	Total Rain Water Harvested in m^3	Ground Water Recharge in m^3 50% of the Harvested Water
Building having RCC flat rooftop			
1	MCC & Switch Gear Building	1096	548
2	Canteen Building	355	178
3	Mine Office Building	249	125
Building having corrugated sheet industrial sheds			
4	Two wheeler parking shed	1206	603
5	Secondary Crusher House Building	534	267
6	Reagent Building	471	236
7	Filter house shed	414	207
8	Allocation Facility Building (South Ramp)	380	190
9	Allocation Facility Building (North Ramp)	376	188
10	Core Shed (Geology)	371	186
11	Core Shed (Exploration)	371	186
12	Central Store	309	155
13	Primary Crusher House Building	275	138
Surface runoff utilization			
14	Paved roads	9257	4629
	Grand Total	**15664**	**7832**

4.2.8 Impact on Noise Levels and Ground Vibrations

With the increase in production levels there will be proportionate increase in mining operations, deployment of machinery, drilling and blasting for mine development, excavation and transportation of ore and men that are expected to generate noise. Since almost all the mining activities will take place below ground, except the Ore and OB handling on the surface, the noise levels due to drilling, blasting, crushing and operation of mining equipment will be confined to underground only and attenuated due to the depth of the operation.

The only noise generating sources situated above ground are the compressors / fans for ventilation, crusher house, ball mills. Installation of ventilation fans is designed in such a manner to control the noise levels and also they are placed at isolated locations in the mine area to avoid noise pollution in the surrounding.

The noise levels and vibration induced by blasting will be attenuated due to depth of the mine below ground. With the proposed expansion, the mine development will occur faster into deeper levels that shall further reduce the noise and vibration impact on the surface. Blasting is carried as per the recommendations of the CIMFR, Dhanbad and every blasting is monitored for vibration as per the DGMS rules and are found well within the permissible limits.

4.2.8.1 Mathematical Model for Sound Wave Propagation During Operation

The main noise generating sources are compressors, crusher house, Ball mills, and floatation cells. The noise levels at the source for these units will be in the range of 80-90 dB(A). As the existing beneficiation is being operational and progressively increased upto 5.0 MTPA and will be expanded to 6.5 MTPA by enhancing capacities of various equipments. The details of noise generating sources are presented in **Table-4.9** and these are considered as input to the noise model.

TABLE-4.9
DESIGNED NOISE LEVELS FROM THE BENEFICIATION PLANT

Sr. No.	Sources	Noise Level in dB(A)
1	Ball mill	85
2	Flotation stream of 5000 TPD	85
3	Rotary vacuum drum filter	85
4	Ball mill starter	85

4.2.8.2 Impact of Noise Levels

The predicted noise levels at the plant boundaries are estimated through computer based mathematical model.

The predicted noise levels at the boundary due to various beneficiation activities are found ranging in between 40 to 46 dB(A). The increment noise levels will be around <40 dB(A) at the plant boundary. It is seen from the simulation results that the incremental noise levels will be well within the CPCB standards. The incremental noise levels due to proposed project operation are shown in **Figure-4.19**.

4.2.9 Impact on Subsidence

The deposit is concealed about 100m below the ground of the area and the ore is being mined out by underground mining. Hence, there is no significant effect of mining activity on the environment. There is no degradation and subsidence is anticipated since the hanging and footwall are quite component and the RMR is "good to fair".

4.2.10 Impact on Flora and Fauna and Aquatic Ecology

Mechanical and physical disturbance associated with mining activities whether it is created by blasting and digging of soil and rock, transportation of materials or processing of ore, can create dust problems. Dust is generated throughout the whole life of mine. A lot of dust particles get suspended in the air and potentially affect the surrounding vegetation. Dust effects can be chemical and/or physical in nature. Chemically active dust, such as highly alkaline limestone dust or a highly acidic dust, can affect the pH of the soil and the plant surfaces and thus become toxic to the plant. If the dust, however, is not chemically active, the effects may be physical in nature, for example leaf surface abrasion or blocking of the plants' stomata. Increase in dust may also result in restricted plant growth, less regeneration and degradation of sensitive vegetation.

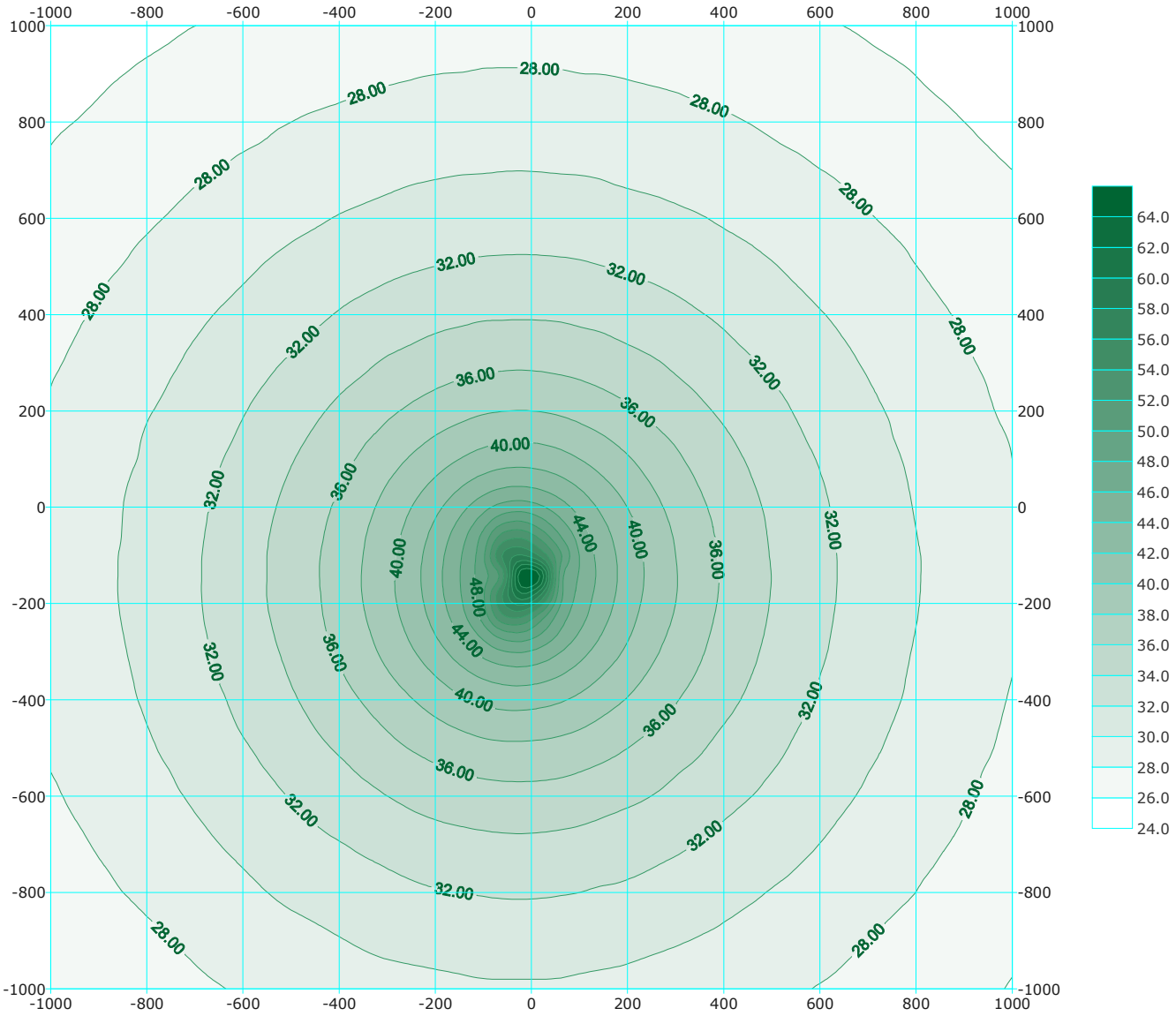


FIGURE-4.19
INCREMENTAL NOISE LEVELS FOR PROPOSED PROJECT

4.2.10.1 Impacts on Fauna

Furthermore, the core project area and the adjoining areas share similar habitat and thus mining will not eliminate habitat of any species permanently. Restricting of the noise levels up to 75 db will aid reducing the impacts of noise.

4.2.10.2 Impacts on Water bodies

Due to the implementation of the state of the art technology methods, there will be zero discharge of the effluents in to the water bodies. No water bodies in the existing 10 km radius are impacted due to the zero discharge of the mining activity on the aquatic bodies.

4.2.11 Impact on Socio-Economic Aspects

The area is backward and people in the area migrate to other places in search of job opportunities. The proposed expansion mine will provide direct and indirect job opportunities for about 300 persons, which will help to raise the standard of living of the people.

4.2.11.1 Socio-Economic Development

Based on the requirement of the people in the area the development activities needs to be taken up. The basic requirement of the community needs to be strengthened by extending health care, educational facilities developed in the township to the community, providing drinking water to the villages affected, building/strengthening of existing roads in the area.

HZL will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

The proposed expansion mine will provide direct and indirect job opportunities for about 300 persons.

The proposed expansion project may create opportunities for indirect employment in the field of vehicle hiring, labors, trading of construction material, carpenters etc.

The project proponent prepared detailed R&R plan of Rs 148 crores the same will get approved from district collector / Rajasthan state government.

4.2.11.2 Measure to Improve Socio-Economic Conditions of the Region

Corporate Social Responsibility (CSR) is an integral part of HZL's business which is accorded as much importance as a business project. HZL's sharp focus on CSR and long term objective are evident from the fact that it has a full-fledged CSR team of 150 functionaries including qualified professionals and subject matter specialists. The team is rendering the services for the upliftment of under privileged rural masses in the operational villages. CSR initiatives have been

prioritized on local needs, which focus on Health, Education, Sustainable Livelihood, Social Mobilization, Infrastructure Development, Water Harvesting, Agriculture, women empowerment, Animal Husbandry and Environment Conservation.

HZL is impacting the lives of more than 91,563 families in 64 operational villages in the neighborhood of its business locations through various CSR initiatives. It's Sustainable development initiatives have been continuously impacting the lives of more than 5,00,000 population.

Several sustainable development projects are being implemented in the operational villages and these have now become "Role Model" and are successfully being replicated in other nearby villages. The projects have brought about a qualitative change in the lives of community residing in the operational villages. More importantly the projects have enabled them to improve their living standard through various socio-economic development interventions.

- **Focus Area Wise CSR Initiatives: Impact and Outcome**

Sk mines have successfully touched the lives of around 30,000 people, living in 64 villages in and around operating unit through our concerted intervention in the areas of health, education, sustainable livelihood, women empowerment, infrastructure development and environmental conservation with focus on sustainable development and overall well-being of the communities.

- **Medical and Health Camps**

SK Mines are delivering health services to poor masses through regular Medical Camps, Surgical Camps, BMD Camps, Dental, Eye Camps& free of cost medical facilities to poor and needy people at Unit Hospital.

- **Education**

An ambitious Computer Education Programmes launched in 50 Govt Schools of Rajsamand District on Public Private Partnership Model benefiting more than 10000 students, mostly rural students. The program has brought about remarkable changes in the Computer literacy scenario of Rajsamand district. Under this program total 250 computers along with related accessories and furniture were provided to schools.

Sterlite Bal Chetna Anganwadi Project (SBCA) was launched to bring about qualitative changes in the Anganwadi services. Under This program 100 Anganwadi are adopted by HZL with the aim to make them as Model Anganwadi with improved facilities of nutritious food, play way method teaching, proper institutional infrastructure and strict monitoring.

Model Child Welfare Centres are running in 6 operational villages where pre-nursery education facilities are provided through play way methods and provisions of nutritious foods and health check-ups.

- **Sustainable Livelihood**

Sustainable Livelihood opportunities to poor masses are created through Farm based & non farm based activities. Under non farm based activities job oriented vocational trainings is imparted to unemployed rural youths in different trades. These trainings are both residential and non residential where rigorous training is given by competent resource persons with balanced thrust on theoretical and practical aspect. Most striking features of these trainings are their linkage with employment and post training job placement. These training are conducted in collaboration with SANKALP, RMoL and Jatan Sansthan etc. Most popular trades are- Computer, Corporate Sales and Marketing, Hotel Management and Hospitality, Retail Management, Electrician etc.

- **Infrastructure Development**

Equal thrust is paid on developing basic infrastructure in operational villages. Infrastructure development activities like construction of link and approach roads, CC road, additional Class rooms, Kitchen sheds, Boundary walls, drainage system, culvert and water tank etc are made. Here our focus is to dovetailing mobilizing resources from different Govt Schemes.

- **Social Mobilizations**

Communities are mobilized against different social evils through Social Awareness Programs. These awareness programs are conducted using folk songs and dance and disseminating the messages for eradication of social issues and evils like child marriage, Mritu Bhoj, advocacy of widow remarriage, HIV/AIDS etc.

Safe Drinking water is ensured to nearby 5 villages through pipe line and through water Tanker etc. in the wake of fluoride contamination in the ground water.

- **Environmental Conservation**

Tree plantation activities are carried out in Schools, barren land and other areas to develop greenery. Community is sensitized to adopt rain water harvesting practices etc.





- **Agriculture and Animal Husbandry**

For improving the income level of Farmers regular farmer's trainings on best Agri practices is conducted and Agri-inputs and micro irrigation devices are provided among needy and progressive farmers. Regular Veterinary Camps are conducted in nearby villages besides 100% Cattle vaccination drive is started in collaboration with Agriculture & Animal Husbandry Deptt. The CSR expenditure details from 2014 to 2017 are shown in **Table 4.10.**

TABLE 4.10
CSR EXPENDITURE (2014- 2017)

Sr. No.	Focus Area	Activity	Expenditure in Lakhs (Total)
1	Health & sanitation	Mobile rural medical camps, free medical facilities provided at company run hospitals, disease specific camps, ayurved camp, family planning camps, disability camps, eye camps, dental camps, blood donation camps, sanitation projects.	180.86
2	Education	Child welfare centers, computer training, teachers training, providing aids to schools, nfe, english medium schools run by company, remedial classes for board students, anganwadi centers, adult education, promotion of girls for higher education	460.64
3	Sustainable development	Vocational training to rural youth, jumbo drill training to 20 rural youths, skill based training to shg women, shgs formation and strengthening, women empowerment etc.	73.13
4	Social mobilization &	Drinking water to villagers of sindesar	172.48

Sr. No.	Focus Area	Activity	Expenditure in Lakhs (Total)
	water supply	khurd, rajpura, sunaria khera & mataji ka khera. Overhead tank construction, pipeline extension, ro plant, water coolers, rural sports, social awareness programmes etc.	
5	Infrastructure development	Construction of link roads, village road for sindesar khurd and rajpura villages. Const. Of culverts, additional class rooms, kitchens, boundary wall and solar street lights, cc road & drainage, community hall, bus station, mewar club, stadium etc.	1561.54
6	Agriculture & animal husbandry	Farmers training, micro irrigation program, improved agriculture-horticulture, orchard development, rainwater harvesting, environment conservation, tree plantation. Artificial insemination, veterinary camps and mass vaccination programme	128.8
7	Environment management	Plantation works in schools, road side	45.86
	Grand total		**2623.31**

4.2.12 Occupational Health Impacts

Source of Impact

The expansion of underground mining operations will require execution of various activities such as mine development, stoping operations, backfilling etc at an increased rate and deployment of mining and other support equipment in underground will also increase. The major risks associated with mining operations involve Fall of Ground, Underground fires, traffic management of equipment etc.

The operation of expanded beneficiation plant will be carried out in similar manner as being done with existing 5.0 MTPA beneficiation plant. The major risk associated with beneficiation operations involve Working at height, working in confined spaces, working with Power infrastructures etc.

4.2.12.1 Dust Emission Impacts

Respiratory illness is anticipated from underground mining

Mitigation Measures

- Employing only wet drilling;
- Persons working in dusty area are provided with PPEs like helmets, dust masks, ear muff/ plugs etc;
- Regular water sprinkling on-in haul roads & other working areas;
- Using suitable pressure and sharp bits are ensured in drilling operation;

- Water spraying arrangement is ensured while mucking; and
- No person is allowed to re-enter the faces unless sufficient time has been given for clearance of dust and smoke.

4.2.12.2 Noise

Noise Induced Hearing Loss (NIHL), annoyance, fatigue, hypertension are the impacts excepted from noise sources.

Mitigation Measures

- *Engineering measures like shielding, replacement with better technology and proper maintenance;*
- *All persons employed at site are provided with ear muffs/ ear plugs;*
- *Rotation of man power if required; and*
- *Vehicles deployed at site will be regularly checked in accordance with the noise limits prescribed for different type of vehicles in EPA, 1986.*

4.2.12.3 Poor Ventilation

Poor ventilation at underground mine poses health hazards in underground mining:

Mitigation Measures

- *Adequate ventilation is maintained in undeground as per DGMS guidelines; and*
- *Auxiliary ventilation is provided at development faces.*

4.2.12.4 Poor Illumination

Poor illumination at work place will produce eye strains and affect eye sight from the underground mining.

Mitigation Measures

- *Adequate illumination is maintained as per DGMS guidelines;*

4.2.12.5 Blasting and Associated Activities

Safety risk associated with handling of explosives and blasting activities from the underground mining.
Mitigation Measures

- *Explosives are handled as per guidelines of DGMS & PESO; and*
- *All blasting activities are carried out as per the DGMS guidelines and CIMFR study recommendations.*

4.2.13.6 Traffic in Underground

Risk of collision, Toppling impacts are excepted from the underground mine

Mitigation Measures

- *Equipments are operated in accordance with the well laid traffic rules.*
- *Only authorised persons operate the equipments..*
- *Declines & levels are maintained in good condition.*
- *Leaky feeder communication & rear view cameras in equipment are available to prevent collision.*

4.2.13.7 Safety Risk Associated with Surface Traffic

Risk of accidents due to poorly trained or inexperienced industrial vehicle drivers. Accidental risks due to haphazard traffic movement at site of the main impacts from surface traffic.

4.2.13.8 Underground Fire

Mobile equipment fire, stationery equipment fire are the expected fire happening incidents

Mitigation Measures

- *All the working are connected with second outlet, Fresh Air Base/ Refuge chamber;*
- *Well laid emergency response plan is enforced at site;*
- *Mock drills and regular checks are carried out to check the effectiveness of emergency response plan periodically;*
- *All mobile equipments are equipped with Auto fire suppression system as well as manual fire extinguishers;*
- *Stationery equipment, substations, pump stations are provided with sufficient number of fire extinguishers;*
- *Rescue Trained persons form the integral part of the operations team;*
- *Separate ambulance to handle underground emergencies; and*
- *Well established first-aid room.*

4.2.13.9 Safety Risk Associated with Failure of Machineries/Equipment:

Machinery failure and accidents from the mining machinery.

- *All underground equipment are maintained by OEMs;*
- *Moving parts are suitably guarded with enclosures;*
- *PPEs & proper tools are provided to all employees working at site for safeguarding;*
- *Reporting of all incidents immediately; and*
- *Awareness about learning from any incident is propagated to all employees.*

4.2.12.10 Safety Risks Pertaining to Fuel and Hazardous Chemical Storage

Spillage of HSD may catch fire and cause potential risk to the workers from the chemical storage area:

- *Handling of HSD is done as per the provisions of PESO;*
- *Protective devices are being provided to workers involved in hazardous chemical handling;*
- *Material Safety Data Sheet (MSDS) for hazardous chemicals are being maintained and followed;*
- *Strict prohibition of smoking in fuel and hazardous chemical storage area;*
- *Eye wash and emergency shower system is provided in hazardous chemical storage area;*
- *Signage in hazardous and risky areas;*
- *Sufficient number of fire extinguishers are provided at fuel storage area, mine offices, electrical substations and other strategic locations; and*
- *Emergency Response Plan being followed.*

4.3 Environment Management Plan

The Management Action Plan aims at reducing the impacts through source reduction or to the extent possible, with the available and affordable technology, followed by treatment measures before they are released to environment.

It is to be appreciated that mining process is to a certain extent, an inevitable destructive process, but the hazards are within measurable limits, and can be ameliorated to a significant extent.

4.3.1 Air Quality Management

Air quality of the proposed expansion of the mine and beneficiation facility may lead to increase in the air pollution due to dust from drilling & blasting operations, Dust from crushing activities, fugitive dust during loading & unloading and transport of ore and concentrate, Release of vehicular exhaust.

To mitigate the same following measures shall continue to be adopted in the proposed expansion project.

- Drilling & blasting activities are confined to the underground; wet drilling is being done; regular water spraying on haul roads;
- Water is sprayed before loading of blasted materials;
- Additional primary crusher for the proposed expansion project will be placed underground;
- Concentrate is transported in tarpaulin covered trucks;
- High efficiency dust collection & water sprinkling system is provided for controlling fugitive emissions from crushing, conveyor system, haulage roads, transfer points etc.;
- Vehicular emissions is maintained as per standard;
- PPEs are provided;
- Majority of mining activities shall be restricted to underground only;

- Ventilation fans are provided with dampeners;
- PUC certification is being ensured for vehicles;
- Regular NO_X and CO monitoring;
- Monitoring of ambient air by CAAQMS; and
- Monitoring of Ambient Air Quality by third party approved by MoEF& CC laboratory

4.3.2 Water Quality Management

Water will be required for various mining activities like drilling, vehicle maintenance, dust suppression, greenbelt development and domestic consumption.

Water from tailing dam is being recycled/ reused for the beneficiation purposes and the same will be continued.

The drinking water facilities is being developed viz. pumping station and line from the Rajpura Dariba mine to S K mine and construction of overhead tank of 500 cum with distribution network. Potable water is being made available for all the employees.

An additional 2,000 m^3/d of water is required for proposed expansion, in addition to approved 14,000 m^3/d water requirement for 4.5 MTPA mining & 5.0 MTPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant & Matrikundia dam.

Mine water generated in the mining activity is suitably treated and reused in wet drilling operations, dust suppression in underground operation and in sprinkling on surface roads for dust suppression. . Zero discharge is being maintained. Mine dewatering due to intersection will also be consumed in the process. There is no process effluent at the current beneficiation plant and no effluent is envisaged with further increased capacity. Storm water generated is allowed to flow naturally ensuring no contamination to it.

Proposed expansion of the mine and beneficiation facility may lead to increase in the water pollution due to seepage of contaminants from oil & grease storage & chemical storage may impact on water quality and contamination through surface runoff.

- Recycling of tailing dam water in process through close circuit system;
- Beneficiation plant is operated at higher %solids to reduce water losses;
- Compressors types are changed from reciprocating to screw compressor so as to avoid cooling tower;
- Oil traps system is provided for the waste water generated from vehicle washing/ maintenance and treated water will be utilized for dust suppression and plantation use;
- The surface runoff is collected through garland drain to the settling pit and reused;
- Drip irrigation is being used for plantation purpose;
- Paste filling in underground for better water recovery;

- Zero discharge is maintained and proposed to continue the same; and
- Sewage treatment plant is available.

4.3.3 Noise and Vibration

The major surface sources of noise are ore handling operation, crushing, compressors, ventilation fans, DG sets, vehicular movement and beneficiation plant may have impact on ambient noise level.

Rise in ambient noise level may result in noise induced hearing loss, annoyance & irritation, sleep depriveness.

To mitigate the same following measures shall continue to be adopted in the proposed expansion also:

1. Majority of mining activities shall be restricted to underground only;
2. Proposed primary crusher will be installed in 1000 m depth in underground.
3. Compressors are installed in isolated building;
4. Ventilation fans are provided with dampeners;
5. DG sets having acoustic enclosure will be installed;
6. All vehicles and machineries used have noise emissions within permissible limits through regular maintenance;
7. Regular monitoring of noise level of mining & milling equipment; and
8. PPEs (Ear plug & Ear Muff) are provided.

HZL will adopt the following control measures to obviate/minimize the impact of vibration:

- Blast design parameters have been decided based on extensive studies carried out by CMIFR, who are also involved in validation/ analysis & monitoring on regular basis.
- Regular vibration monitoring at surface on fixed stations by standard seismographs.
- Determination of predictor equation.
- Total charge and Maximum Charge per delay (MCPD) for each stope is decided based on its location derived from predictor equation.
- Use of Non electric/electronic detonator.
- Quality drilling and charge per delay optimized as per design.
- Ground vibrations are kept within statutory limits.

4.3.4 Traffic Management

Due to proposed expansion in the Mine & Mill production, traffic will be increased marginally. As the road condition is very good as per IRC Guidelines, so post expansion will have minimal impact on the current traffic as most of the traffic will be restricted between SK mine and Dariba complex and to the tailing dam to some extent.

4.3.5 Solid Waste Management

In the proposed expansion of S K Mine, no additional waste will be dumped on the surface beyond the already approved waste quantity and no additional waste dump is envisaged. The increased waste generated will be disposed off into the underground voids.

4.3.6 Greenbelt Development

4.3.6.1 Objective

The main objective of the green belt is to provide a barrier between the plant and the surrounding areas. The green belt helps to capture the fugitive emissions and to attenuate the noise generated in the plant apart from improving the aesthetics of the plant site. In order to control the industrial pollutants, dense tree plantations are necessary.

As the sedimentation pattern of the pollutants, ambient and ground level concentration of pollutants are usually determined by the direction and speed of prevailing wind and vertical and horizontal thermal gradients prevailing in the area, the belt of plantations has been designed accordingly.

Geometry of planting of tree is more important in order to have effective wind break by the plantation.

Greenbelt is thus a set of rows of trees planted in such a way that they form an effective barrier between the plant and the surroundings.

4.3.6.2 Plant Species for Greenbelt

While selecting the plant species for the proposed green belt, the following points has been taken care into consideration:

- Fast growing type;
- Thick canopy cover;
- Perennially green;
- Preferably of native origin; and
- Large leaf area index.

4.3.6.3 Recommended Species in the Greenbelt Area

The recommended species for the greenbelt development are given in **Table-4.11.**

TABLE-4.11
LIST OF SPECIES SHOWING HIGH AIR POLLUTION TOLERANCE INDEX (APTI)

Sr. No	Scientific Name	Common Name	Family	Air Pollution Tolerance Index levels
1	*Azadirachta indica*	Neem	Meliaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
2	*Annona squamosa*	Sitaphal	Annonaceae	Fruit bearing tree
4	*Mangifera indica*	Aam/Mango	Anacardiaceae	Fruit bearing tree
5	*Zizyphus mauritiana*	Ber	Rhamnaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
6	*Syzygium cumini*	Jamun	Myrtaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
7	*Bauhinia variegata*	Kanchnar	Caesalpinaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
8	*Bauhinia purpurea*	Orchid Tree	Caesalpinaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
9	*Dalbergia sissoo*	Sisoo, Shisham	Fabaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
10	*Butea monosperma*	Palash/Dhaak	Fabaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
11	*Prosopis cineraria*	Khejri	Mimosaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
12	*Cassia fistula*	Amaltas/ Indian Laburnum	Caesalpinaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
13	*Pongamia pinnata*	Karanj/Pungai/Indian Beech Tree	Fabaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
14	*Melia dubia*	Malai Vembu/Malabar Teak	Meliaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise
15	*Adenanthera pavonina*	Rakta-rohida/Red Bead Tree	Fabaceae	For controlling Suspended Particulate Matter (SPM), $S0_2$, NOx and Noise

*Source: CPCB guidelines March 2000 for greenbelt development

All the above mentioned species are growing species, ideal for undertaking greenbelt plantations. The choosing of the species should be ratified by the Horticulturist of the project site and local forest department.

Planting comprises of mixed species of the plants which are planted at distance of 2 X 2 m for maintaining 2500 trees per ha.

TABLE-4.12 (A)
GREEN BELT DEVELOPMENT PLAN

Sr. No.	Particulars	Existing	Proposed	Total
1	Acquired Area (ha)	125.52		
2	Area under plantation (ha)	46	4	50
3	No. of Plants	70,000	6,000	76000
4	% Area	33.59%		
5	**Major Plant species**	**Fruit Trees:** Ber (*Ziziphus mauritiana*), Jamun (*Syzygium cumini*), Mango (*Magnifera indica*), Sitafal (*Annona squamosa*), Amrood (*Psidium guajava*) **Native Species:** Neem (*Azadirachta indica*), Kachnar (*Bauhinia variegata*), Shisham (*Dabergia sissoo*), Dhaak (*Butea monosperma*),Amaltas (*Cassia fistula*),Bauhnia (*Bauhinia purpurea*) etc		

TABLE-4.12 (B)
GREEN BELT DEVELOPMENT PLAN

Sr. No.	Particulars	2017-18	2018-19	2019-20	2020-21	2021-22
1	No. of Plants	3000	3000	3000	3000	3000
2	Area to be covered in plantation (ha)	2	2	Gap filling		
3	Total Area (ha)	48	50			

NEAR BENFICATION PLANT

BEHIND MILL HOUSE

ACCESS ROAD TO MINE

NEAR CORE SHED

FIGURE-4.20 (A)
EXISTING GREEN BELT PHOTOS

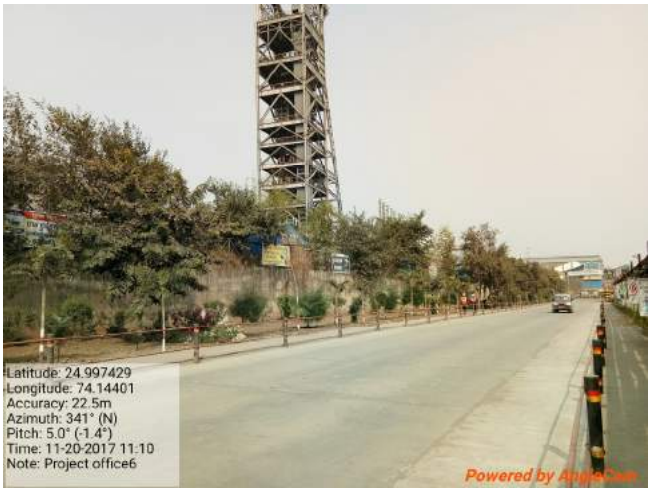
MB OFFICE EAST

MB OFFICE EAST 2

MB OFFICE EAST 4

HARD ROCK

FIGURE-4.20 (B)
EXISTING GREEN BELT PHOTOS



PROJECT OFFICE 6

CORESHED 1

PASTEFILL 7

FIGURE-4.20 (C)
EXISTING GREEN BELT PHOTOS

4.3.7 Occupational Health Measures

Details of Initial Medical Examination (IME) and Periodical Medical Examination (PME) & Schedule are shown as under. The health report (Audiometry, Lung functions) PME 2017, Eardrums study report and health survey report July 2015 are given **Annexure-XIV.**

- IME is carried out during recruitment and PME is carried out every year

  Detailed Physical checkup in IME & PME of a person includes:

  - ✓ Height, Weight, Vision, Color- Vision, Blood Pressure, squint, nystagmus etc;
  - ✓ Complete cardiac evaluation and neurological assessment to ascertain any heart and brain disease;
  - ✓ Checked for the presence of hernia, hydrocele & varicocele;
  - ✓ Gastrointestinal evaluation is done;
  - ✓ Locomotor system is evaluated for any deformities; and
  - ✓ Special Investigations: Audiometry, Spirometry, ECG, X Ray Chest.

I. Clinical Chemistry:
- ✓ Blood group, Blood counts, Urine checkup;
- ✓ Blood sugar- for diabetes;
- ✓ Urea & creatinine- for kidney disease;
- ✓ Cholesterol and Lipid Profile- for dyslipidemia;
- ✓ Stool- for Ova and cyst in case of food handlers;
- ✓ Sputum- for AFB for food handlers;
- ✓ Further specialized tests: Blood lead;
- ✓ ECHO and TMT where felt necessary for cardiac evaluation;
- ✓ Vision checkup once a year for operators and drivers;
- ✓ Blood counts for persons working with ionizing radiations (in mill on nucleonic devices for online monitoring of grade etc.); and
- ✓ All the requirements laid down by DGMS are followed.

4.3.8 Specialized Tests in IME & PME

All the people recruited for the industrial work are screened and examined for:

Silicosis: Chest Skiagram and lung functions are done.
Vibration sense: Tuning fork test is done
Vision Check: Distance and Colour Vision is checked for every employee.
Hearing Loss: Audiometry is done of every employee and workmen.
Lead in blood: Blood lead is measured once every year of all the persons.

TABLE-4.13
IME & PME COMPLIANCE (2010-2016)

Year	IME	PME
2010	159	60
2011	417	70
2012	451	84
2013	700	110
2014	270	135
2015	417	375
2016	1040	551

TABLE-4.14
BLOOD LEAD STUDY CONDUCTED IN JULY 2015

Blood Lead Study conducted in July 2015								
Blood Lead Value	Male Villagers		Female Villagers		SKM Workers		SKM Executives	
	Avg. Value	Number	Avg. Value	Number	Avg. Value	Number	Avg. Value	Number
<10 µg/dL	7.0	42	6.0	42	7.0	92	6.6	34
11-20 µg/dL	12.0	12	13.0	12	14.0	60	14.3	16
21-30 µg/dL	0.0	0	0.0	0	23.0	4	0.0	0
31-40 µg/dL	0.0	0	0.0	0	0.0	0	0.0	0
>41 µg/dL	0.0	0	0.0	0	0.0	0	0.0	0

TABLE-4.15
BLOOD LEAD STUDY CONDUCTED IN APR-MAY 2015

Blood Lead Study conducted in Apr-May 2016								
Blood Lead Value	Male Villagers		Female Villagers		SKM Workers		SKM Executives	
	Avg. Value	Number	Avg. Value	Number	Avg. Value	Number	Avg. Value	Number
<10 µg/dL	4.4	14	4.9	11	4.54	153	5.8	53
11-20 µg/dL	0.0	0	0	0	14.38	13	16	1
21-30 µg/dL	0.0	0	0.0	0	0.0	0	0.0	0
31-40 µg/dL	0.0	0	0.0	0	0.0	0	0.0	0
>41 µg/dL	0.0	0	0.0	0	0.0	0	0.0	0

- No Health effects are expected as values of Blood Lead are within permissible levels i.e. 40µg/dL (as per WHO).
- For population not exposed to mining is less than 20 µg/dL.
- Statistically, there is no significant difference of lead levels between villagers and working population.
- Blood Lead in Mother's Milk was taken in OH Study conducted in July 2015
- The Lead value in the milk sample was 4µg/dL which is within permissible range as per WHO standards.

4.3.9 Mine Safety - Subsidence Control

- Collaboration with CSIR-CIMFR, Dhanbad & AMC, Australia;
- Studies & Design Considerations;
- Intact surface cap of 130 m of quartzite/ quartz mica schist;
- Determination of Geotechnical and physico-mechanical properties;
- Insitu stress gradient determined upto 1000 m depth;
- Stable stope geometry designs based on Geo tech studies and Insitu pillars of designed thickness;
- Empirical method & Non-linear numerical modeling with FLAC-3D for LOM design has confirmed that no mining induced surface subsidence;
- Surface crown pillar has a FoS greater than 1.5 therefore, surface cap rock will be long term stable;
- Operations;
- Backfilling of stope voids with cemented paste/hydraulic fill;
- Reinforcement of crown pillar using cable bolts;
- Monitoring & Control;
- Hangwall movement monitoring with Multi Point Bore Hole Extensometers;
- Stress monitoring with Uniaxial Borehole Stressmeters in pillars; and
- Subsidence monitoring above stoping area at designated locations.

Chapter-5

Analysis of Alternative Technology and Site

5.0 ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE

5.1 Site Alternatives under Consideration

The Sindesar Khurd deposit is located 6 km NNE of Rajpura Dariba Mines in Relmagra Tehsil of Dist Rajsamand, Rajasthan. Sindesar Khurd deposit extends over a lease area of 199.8425 ha with estimated in-situ ore Reserves &Resources of 122.79 million tons with grades of 2.36% Zinc and 3.99% Lead. The present proposal is for expansion of Lead – Zinc underground mine from 4.5 million TPA to 6.0 million TPA ore production and beneficiation from 5.0 million TPA to 6.5 million TPA underground Mine. The proposed expansion will not require any acquisition of additional lease area. Thus, no alternate site is applicable since it is an underground mining brown field expansion.

5.2 Analysis of Alternative Technology

Mining:-

The deposit is concealed 100m below the surface and thus amenable to underground mining only. The deposit is shallow seated and hence initial feasibility study was carried out for mode of entry and mining method. Due to shallow depth of deposit and low cost of production with decline mining by trackless operations, it was decided to open North decline/ramp for ore production with secondary access via incline. Further, with expansion of mining operation, south decline/ramp was developed to add to ore production capacity. Presently, the mining is done by blast hole stopping and for the proposes expansion same methodology will be used Stoping is done by blast hole stoping method. In the blasthole mining method, slot is opened at the widest portion of ore body and rings are retreated towards the end of the stope. The muck is then withdrawn at extraction level through LHDs and then directly loaded in to mine trucks for hauling through ramps from underground to surface stock yard. From stock yard, ore is fed to the primary crusher using surface dumpers through haul road after sizing with hydraulic breakers. Mining will be done using trackless operations upto -55mRL level using both declines for hauling. Mining below this level will be done using shaft hoisting system as the depth of hoisting will be increasing and service ramp will be available for the movement of machineries & services. Ramps will be further developed to lower levels for hauling as well as material movement to the lower block. Shaft will also be commissioned to haul the ore from lower block. Auxiliary lenses will be mined as the mining commences in the levels approximate to them. Mining of Sill/Crown pillar will be planned after due consideration studies of local & regional stability. Post filling will be done in all primary/ secondary stopes to enhance ore recovery keeping in view of mineral conservation.

Blast Hole Stoping Method (BHS)

In blast hole stopping method, the strike length of mining block is divided into 30-55m stope and intervening vertical rib pillars of 10-20 m or in primary-secondary sequence. Stope and pillar dimensions are as per the recommendations of CIMFR, Dhanbad based upon geotechnical modeling.

Stopes are being mined using EHS drilling (64mm) for trough drilling at extraction level and DTH/ITH (115mm)/ EHS drill machines (102/89mm) holes for down drilling from upper level. Blasting is done against a slot raise. For preparation of slot at each level in the mining block, a cross cut is developed first across the strike of the ore in full width of the ore body from footwall to hanging wall and later stripped to 6m width. A raise is opened from lower level to drill level by drop raising technique. Subsequently parallel holes are blasted against this raise for making a slot over the width of ore body. This slot provides free face for subsequent blasting of drill rings. After the stopes are mined out, stopes are back filled and thereafter secondary stopes / rib pillars are mined out, in cases mining is feasible.

a.Benefits of stoping method compared with the conventional sub-level stoping methods are:

1. Reduction in quantum of developments, drilling cost and explosive cost;
2. Overall reduction in the cost of mining;
3. Reduction of manpower and
4. Reduction in stopes preparation time.

Thus, the company is already suing the best technology thus no alternative technology is required.

b. Beneficiation Plant:-

Salient features of Beneficiation Plant

- A highly automated and instrumented process control has been envisaged in the beneficiation plant.
- On-line Stream Analysis System for measurement of elements concentration in slurries to control metal losses.
- Advanced Process Control operating system is designed to optimize, stabilize and control individual unit operations as well as the entire plant for optimum metal recovery.
- Froth Camera System makes use of machine vision technologies to measure the speed of the froth.
- Particle Size Analyzer is a sizing system installed in grinding circuit for mineral slurries. It takes automatic samples from streams and measures their particle size distribution for liberation of minerals.
- Magnetic Pro flot system for fine particle recovery in zinc flotation.
- Any drive will be in running condition if all the start permissive conditions are simultaneously fulfilled.

Currently, the tails from plant is being pumped to exiting tailing dam of Rajpura-Dariba mine through pipelines. It is also proposed to utilize 65% of the tailings in the stope backfill.

5.3 Alternate Sites Considered

No alternate site was considered since it is an brown field underground expansion of existing underground mining project.

5.4 No Project Scenario

The scenario of no project was also considered and in the absence of the project, it will be difficult for HZL to cater to the current demand of Zinc and Lead. Thus, considering the closeness and the substantial availability of ore deposits at the project site, this is the best possible option for the project as well as for expansion of the site

Chapter-6
Environment Monitoring Programme

6.0 ENVIRONMENTAL MONOTORING PROGRAMME

Introduction

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigation steps in time to safeguard the environment. Monitoring is as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring.

Usually, as in the case of the study, an impact assessment study is carried over short period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality.

6.1 Environmental Monitoring and Reporting Procedure

Monitoring shall confirm that commitments made are being met. This includes direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for the purpose of comparing against statutory or corporate standards, consent limits or targets. Monitoring will include measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators for Air, Water, Noise, Soil and Plantation.

HZL Sindesar Khurd mine has presently engaged third party services of MoEF & CC approved environmental laboratory for carrying out environment monitoring of the operations and the buffer areas. The same arrangement shall continue post expansion also. Online Ambient Air Quality monitoring have been installed in 3 locations in core zone for continuous monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO. The continuous AAQ monitoring photographs is given in **Figure-6.1.**

6.1.1 Objectives of Monitoring

The objectives of environmental post-project monitoring are to:

- Verify effectiveness of planning decisions;
- Measure effectiveness of operational procedures;
- Confirm statutory and corporate compliance;
- Identify unexpected changes.

Near Main Gate – SE Direction

Near Paste fill Plant – W (Upstream)

Analyzer

Near Core Shed N-E direction

Display Board at Main Gate

FIGURE-6.1
ONLINE AAQ MONITORING PHOTOGRAPHS

6.2 Monitoring Schedule

In order to depict the present environmental scenario, various environmental factors were classified and analyzed by reputed 3rd party consultants, which were engaged by the company to monitor these factors.

The environmental monitoring for the mining operations will be conducted for the following parameters:

Ambient air Quality monitoring

Presently, ambient air quality monitoring is being carried out five (5) locations considering the predominant wind direction and in consultation with RSPCB. Same will be continued for the expansion. Online Ambient Air Quality monitoring have been installed in 3 locations in core zone for continuous monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO.

Water Monitoring

Groundwater samples is being collected at 5 locations quarterly ~~i~~n a season and analyzed as per IS-10500, 2012. In addition, the water from mine pit sump, STP inlet and outlet being collected once in a month and analyzed as per RSPCB listed parameters.

The impact of mining operations on ground water level is being monitored. The levels are being monitored quarterly and its impacts assessed and reported annually to CGWA.

Noise Level

Noise measurement of mine equipment is being done once in a season. In case of overhauling of major equipment noise measurements shall be done before and after overhaul.

The environmental monitoring program to be implemented is given in **Table-6.1.**

TABLE-6.1
MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	**Air Pollution and Meteorology**				
	A	Ambient Air Quality Monitoring			
	1	Continuous Ambient Air Quality monitoring @ 3 locations in core zone	Continuous	Continuous	PM_{10}, $PM_{2.5}$, SO_2, NOx and CO
	2	5 locations inside & outside mines	monthly	24 hr	PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO
	3	Crusher Stack Monitoring	monthly	1 hr	PM
2	**Water and Wastewater Quality**				
	A	Industrial/Domestic			
	1	Sewage Treatment Plant	Once in a	Grab sample	pH, BOD, COD, TSS, TDS

Sr. No.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
			month		
	B	Water quality in the study area			
	1	Ground Water quality 5 locations	monthly	Grab	As per IS: 10500,2012
	2	Peizometer wells	monthly	Grab	As per IS: 10500, 2012
	3	3 drinking water	monthly	Grab	As per IS: 10500, 2012
3	**Ambient Noise Levels**				
	1	5 Locations around mine lease areas	Quarterly	24 hr continuous with one hr interval	Noise levels in dB(A)
4	Soil Monitoring				
	1	4 Locations around M.L area	Half yearly	Composite Sampling	Heavy metals (Zn, Pb. Cd etc)
	2	Siltation in Pond	Half yearly	Composite Sampling	Heavy metals (Zn, Pb. Cd etc)
	3	Aquatic life/invertebrates in nearby ponds	Annual	Composite Sampling	Heavy metals (Zn, Pb. Cd etc)
	4	Flora , Crops, Vegetables	Annual	Composite Sampling	Heavy metals (Zn, Pb. Cd etc)

Blast vibration and Subsidence Monitoring

Blasting studies has been conducted by CIMFR, Dhanbad and has recommended the quantity and method of blasting to be adopted for safe mining. The explosives charge and initiation of blasting is carried as per the recommendations of the study. Further, regular monitoring of blast induced vibration is being carried at 300 m away from the blast site or the nearest habitat and the measurements are used as inputs for explosives charge and method of blasting.

To monitor the subsidence movement, a study has been completed by CIMFR, Dhanbad on the present reference surface levels and the recommendation for the installation of reference poles for monitoring the Subsidence movement. Once recommended, the reference polls shall be installed and periodically monitored. This monitoring of subsidence movement shall be in addition to preventive measurements and also vibration monitoring carried every blast.

Occupational Health Monitoring

The mine workers health monitoring is very important to identify any occupational health impacts arising out of the operations and the environmental conditions. All workers undergo a pre-employment medical health checkup at the time of joining and undergo periodic health checkup yearly and records maintained up to 15 years after separation from service or 40 years, whichever is later.

6.3 Infrastructure for Monitoring of Environmental Protection Measures

HZL is monitoring AAQ at five locations for PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO for undertaking monthly monitoring of the same. Further, 5 nos. of Piezometers wells have been constructed to monitor the fluctuation in ground water levels to be monitored every quarter.

Online Ambient Air Quality monitoring have been installed in 3 locations in core zone for continuous monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO.HZL has engaged SPCB/MOEF&CC approved laboratory as 3rd party consultants for carrying out regular monitoring of environmental parameters. Same arrangements shall be continued.

6.4 Reporting Schedules of the Monitoring Data

It is proposed that reporting of environmental performance with reference to the EMP shall be undertaken.

The environmental monitoring cell shall co-ordinate all monitoring programmes at site and data thus generated shall be regularly furnished to the regulatory agencies.

The frequency of reporting quarterly basis to RSPCB and on six monthly basis to Regional office of MoEF&CC and CPCB. The Environmental statements shall be prepared for the entire year of operations and regularly submitted to regulatory authorities.

Chapter-7
Additional Studies

7.0 ADDITIONAL STUDIES

This chapter describes the public consultation for the proposed project, Risk Assessment, Disaster Management Plan, and health status of community.

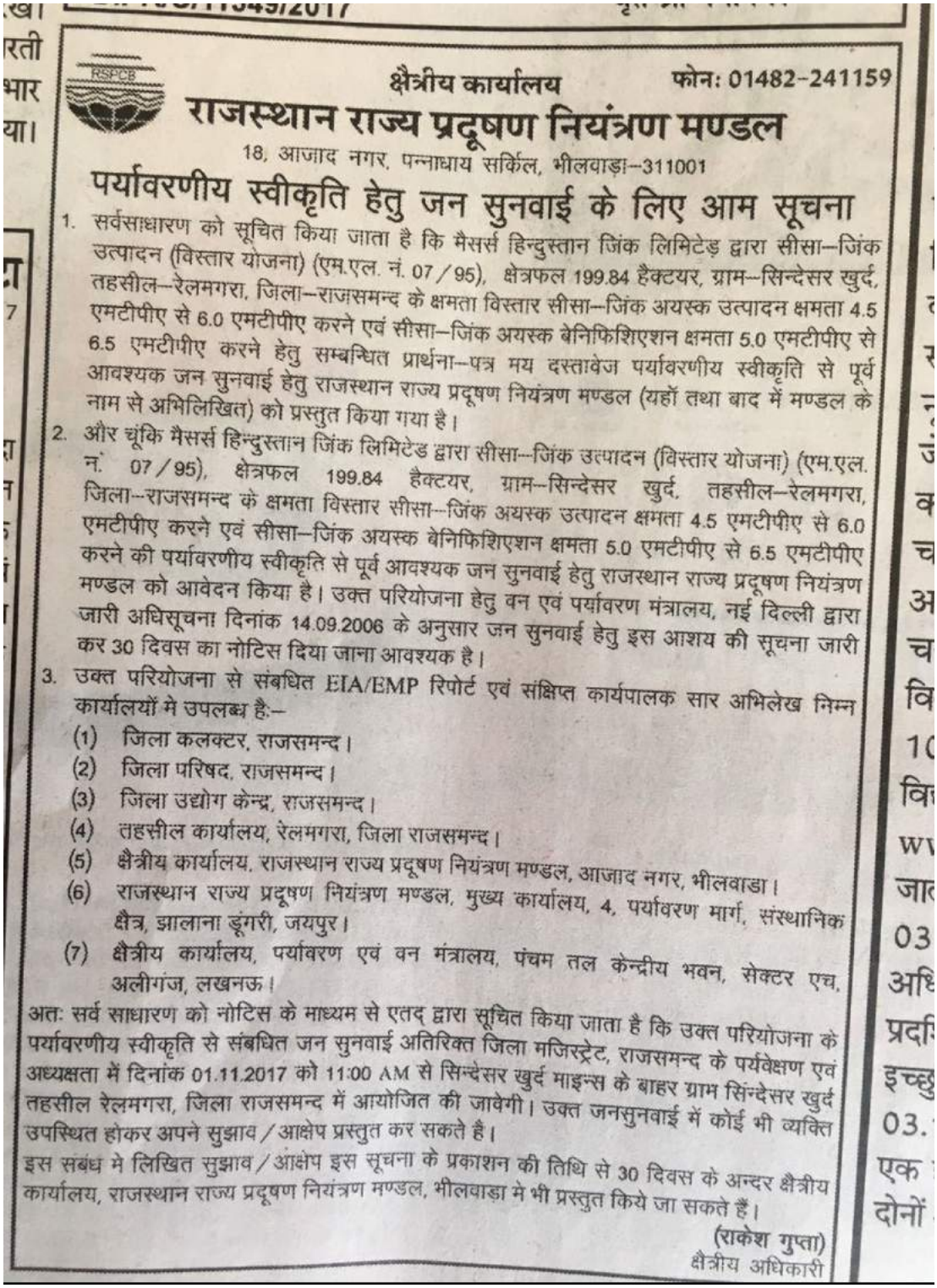
7.1 Public Consultation

In accordance with the notification S.O. 1533 dated: 14.09.2006 of Ministry of Environment, Forest and Climate Change, Government of India, New Delhi, Public hearing was held in the presence of villagers at Mine premises, Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand(Rajasthan) on 01.11.2017, at 11.00 am regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production(ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.5 Million TPA, of M/S Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand(Rajasthan) (ML No.07/95) as per Letter no.P.40(7)(43) GA/Env./PH//2017/943 dated 22.09.2017 of Hon'ble District Collector, Dist-Rajsamand(Rajasthan) and Letter no. RPCB/RO Bhil./Raj./1171-72 dated 25.09.2017 of Regional Office, Rajasthan Pollution Control Board, Bhilwara, Rajasthan. Public general notification regarding the above said environmental public hearing was published on 29.09.2017 in "Rajasthan Patrika " and "Times of India" paper advertisements and the public hearing photographs are given in **Figure-7.1** and **Figure-7.2** respectively**.**

The EIA report along with Executive Summary in English and Hindi were displayed/submitted and made available at the following places:

- Office of District Collector, Rajasthan;
- District Panchayat Office;
- Regional Office, RSPCB;
- District Industry Centre;
- Chief Conservator of Forests;
- Regional Office, Ministry of Environment and Forests; and Village Sarpanch Offices of respective villages in 10-km radius

The details of public hearing conducted by the Rajasthan State Pollution control board were obtained and incorporated in the subsequent section. The minutes of meeting of public hearing are provided in **Annexure-XI**. The public hearing action plan is given in **Table-7.1**



क्षैत्रीय कार्यालय फोन: 01482-241159

राजस्थान राज्य प्रदूषण नियंत्रण मण्डल

18, आजाद नगर, पन्नाधाय सर्किल, भीलवाड़ा–311001

पर्यावरणीय स्वीकृति हेतु जन सुनवाई के लिए आम सूचना

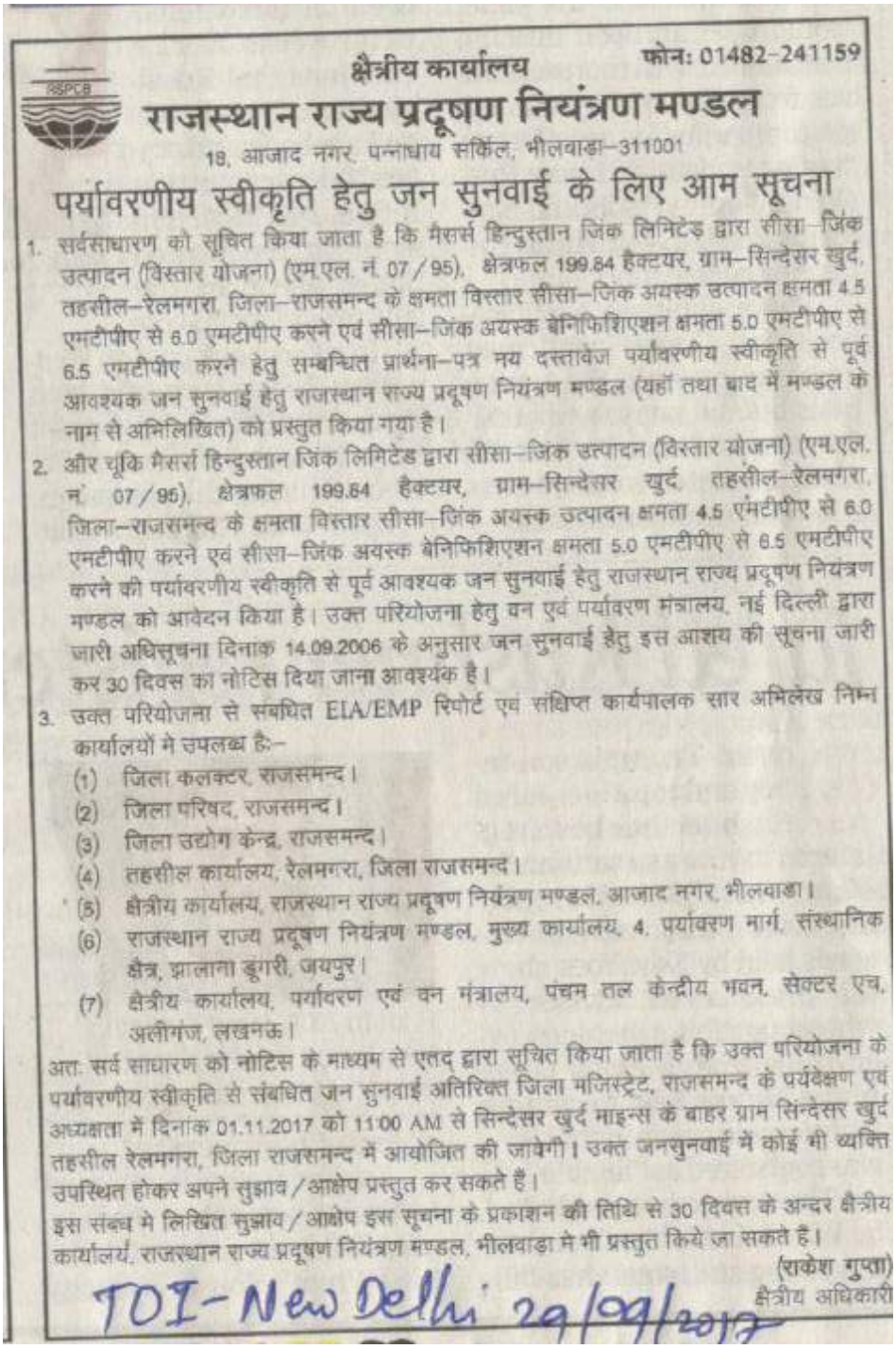
1. सर्वसाधारण को सूचित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने हेतु सम्बन्धित प्रार्थना–पत्र मय दस्तावेज पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल (यहाँ तथा बाद में मण्डल के नाम से अभिलिखित) को प्रस्तुत किया गया है।
2. और चूंकि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने की पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल को आवेदन किया है। उक्त परियोजना हेतु वन एवं पर्यावरण मंत्रालय, नई दिल्ली द्वारा जारी अधिसूचना दिनांक 14.09.2006 के अनुसार जन सुनवाई हेतु इस आशय की सूचना जारी कर 30 दिवस का नोटिस दिया जाना आवश्यक है।
3. उक्त परियोजना से संबधित EIA/EMP रिपोर्ट एवं संक्षिप्त कार्यपालक सार अभिलेख निम्न कार्यालयों मे उपलब्ध है:–
   (1) जिला कलक्टर, राजसमन्द।
   (2) जिला परिषद, राजसमन्द।
   (3) जिला उद्योग केन्द्र, राजसमन्द।
   (4) तहसील कार्यालय, रेलमगरा, जिला राजसमन्द।
   (5) क्षैत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, आजाद नगर, भीलवाडा।
   (6) राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, मुख्य कार्यालय, 4, पर्यावरण मार्ग, संस्थानिक क्षैत्र, झालाना डूंगरी, जयपुर।
   (7) क्षैत्रीय कार्यालय, पर्यावरण एवं वन मंत्रालय, पंचम तल केन्द्रीय भवन, सेक्टर एच, अलीगंज, लखनऊ।

अतः सर्व साधारण को नोटिस के माध्यम से एतद् द्वारा सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति से संबधित जन सुनवाई अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द के पर्यवेक्षण एवं अध्यक्षता में दिनांक 01.11.2017 को 11:00 AM से सिन्देसर खुर्द माइन्स के बाहर ग्राम सिंन्देसर खुर्द तहसील रेलमगरा, जिला राजसमन्द में आयोजित की जावेगी। उक्त जनसुनवाई में कोई भी व्यक्ति उपस्थित होकर अपने सुझाव/आक्षेप प्रस्तुत कर सकते है।

इस संबंध मे लिखित सुझाव/आक्षेप इस सूचना के प्रकाशन की तिथि से 30 दिवस के अन्दर क्षैत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाडा मे भी प्रस्तुत किये जा सकते हैं।

(राकेश गुप्ता)
क्षैत्रीय अधिकारी

FIGURE-7.1 (A)
PAPER ADVERTISEMENT



क्षेत्रीय कार्यालय फोन: 01482-241159

RSPCB

राजस्थान राज्य प्रदूषण नियंत्रण मण्डल

18, आजाद नगर, पन्नाधाय सर्किल, भीलवाड़ा–311001

पर्यावरणीय स्वीकृति हेतु जन सुनवाई के लिए आम सूचना

1. सर्वसाधारण को सूचित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने हेतु सम्बन्धित प्रार्थना–पत्र मय दस्तावेज पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल (यहाँ तथा बाद में मण्डल के नाम से अभिलिखित) को प्रस्तुत किया गया है।
2. और चूंकि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने की पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल को आवेदन किया है। उक्त परियोजना हेतु वन एवं पर्यावरण मंत्रालय, नई दिल्ली द्वारा जारी अधिसूचना दिनांक 14.09.2006 के अनुसार जन सुनवाई हेतु इस आशय की सूचना जारी कर 30 दिवस का नोटिस दिया जाना आवश्यक है।
3. उक्त परियोजना से संबधित EIA/EMP रिपोर्ट एवं संक्षिप्त कार्यपालक सार अभिलेख निम्न कार्यालयों मे उपलब्ध है:–
   (1) जिला कलक्टर, राजसमन्द।
   (2) जिला परिषद, राजसमन्द।
   (3) जिला उद्योग केन्द्र, राजसमन्द।
   (4) तहसील कार्यालय, रेलमगरा, जिला राजसमन्द।
   (5) क्षेत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, आजाद नगर, भीलवाड़ा।
   (6) राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, मुख्य कार्यालय, 4, पर्यावरण मार्ग, संस्थानिक क्षेत्र, झालाना डूंगरी, जयपुर।
   (7) क्षेत्रीय कार्यालय, पर्यावरण एवं वन मंत्रालय, पंचम तल केन्द्रीय भवन, सेक्टर एच, अलीगंज, लखनऊ।

अतः सर्व साधारण को नोटिस के माध्यम से एतद द्वारा सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति से संबधित जन सुनवाई अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द के पर्यवेक्षण एवं अध्यक्षता में दिनांक 01.11.2017 को 11:00 AM से सिन्देसर खुर्द माइन्स के बाहर ग्राम सिन्देसर खुर्द तहसील रेलमगरा, जिला राजसमन्द में आयोजित की जायेगी। उक्त जनसुनवाई में कोई भी व्यक्ति उपस्थित होकर अपने सुझाव/आक्षेप प्रस्तुत कर सकते हैं।

इस संबध मे लिखित सुझाव/आक्षेप इस सूचना के प्रकाशन की तिथि से 30 दिवस के अन्दर क्षेत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाड़ा मे भी प्रस्तुत किये जा सकते है।

(राकेश गुप्ता)
क्षेत्रीय अधिकारी

TOI-New Delhi 29/09/2017

FIGURE-7.1 (B)
PAPER ADVERTISEMENT

FIGURE-7.2 (A)
PUBLIC HEARING PHOTOGRAPHS

FIGURE-7.2 (B)
PUBLIC HEARING PHOTOGRAPHS

TABLE-7.1
PUBLIC HEARING ACTION PLAN

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
1	Shri Naval Singh Ranawat, Member - Panchayat Samiti	There was good crop of sugarcane from the agricultural fields of the region in 1965 and there used to be running of a Bhopalsagar Sugar mill very well and it was a very prosperous and happy region. But, gradually sugarcane crop vanished due to shortage of water in the region. Since there was adequate water availability in the region and the people depend on agriculture, nobody was willing to work in Hindustan Zinc Limited, which was established in this region. Now the situation is that the water is gradually exhausted and also plants and trees are reduced and there is a reduction in flora which has resulted in imbalance in the environmental condition of the region. Hindustan Zinc is not planting trees in the region in tune with their quantity of production being made from here. Hindustan Zinc is only one source for employment in the region and they should provide adequate employment to the people of the region. Besides, they should also do a lot of developmental works under CSR activities. They should develop Village Panchayat Dariba as a model village panchayat. People from Rajasthan should visit this and appreciate and see how Hindustan Zinc has developed this village panchayat. Similarly Hindustan Zinc should also open a hospital in the region with all modern and sophisticated equipment and facilities so that the people of this region need not go Rajsamand and Udaipur for medical treatment.	To increase the water level in the surrounding of mine area, HZL has done deepening by removing silt from 9 nearby ponds to increase the capacity to store/recharge rain water during monsoon. Employment is provided by giving priority to youths from surrounding villages and The same will be continued in future. Presently 70% employees are from Rajsamand District and 80% from Rajasthan. Phase wise plantation has been done in mine area and also planned in future. More than 15000 nos. of fruit bearing plant saplings have been planted in surrounding villages. Afforestation program will be implemented in consultation with local village panchayats/ state forest/ PWD department officials in the surrounding areas. Various developmental initiatives	Rs. 50 Crore by 2019-20 in CSR activities.

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
			have been taken in past and are under progress in the area of Health & Hygiene, Education, Skill development & Self-Employment, Drinking water, Sports, Infrastructure, Agriculture & Animal Husbandry and Environment Management etc. for development of nearby villages.	
2	Shri Narulal Gadari, Village- Sunariya Kheda	Due to Hindustan Zinc, people of our village and the people of surrounding areas are getting employment which brought happiness among the people of the region. He said that Hindustan Zinc should provide employment for the unemployed youth in the surrounding areas in future also.	Employment is provided by giving priority to youths from surrounding villages and The same will be continued in future. Presently 70% employees are from Rajsamand District and 80% from Rajasthan.	
3	Shri Ambalal Gadari, Ward member, village Panchayat—Sindesar Khurd	There is a lot of environmental pollution due to blasting activities in Sindesar Khurd and no hearing is taking place in this regard. Hindustan Zinc is not taking any efforts to stop this. He further said that Hindustan Zinc should provide employment to the people of 10km radius of mining area. He said that we don't have any objection for increasing production by Hindustan Zinc, but at the same time they should also do developmental activities in the region. The hill behind this tent is being broken should be stopped henceforth rather make it flat area. Village may be shifted elsewhere, but compensation should be given fully.	Vibrations due to blasting are being kept under permissible limits prescribed by DGMS. For Employment Priority is being given to nearby villagers. R&R Plan for village shifting have been made. Same will be executed after necessary discussion and approvals from statutory authorities.	
4	Shri Sankarlal Jat, Ex-Sarpanch, Village Panchayat Dhaneriya	Village-Dariba is becoming Industrial Hub due to Hindustan Zinc. JK industries make 1% employees permanent every year. In the same way Hindustan Zinc should also permanent the contract workers or temporary employees. Because most	Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		of the people /workers in this region are working in Hindustan Zinc since 1998 through Contractors only. Apart from this, water in the fields of farmers becoming dry and the crops are also getting damaged, that is why more and more people of the region should be provided employment. Besides, a greenhouse should be developed in the region with the consultation of farmers in the region there by providing facilities such as fertilizer, seeds, Dairy etc., to the farmers. Further, Hindustan Zinc should also provide buffaloes and cows to the farmers at reasonable prices or providing grant to them so that Dairy business should grow in the region.	their eligibility, requirement and company policy. Detailed CSR activities in the field of agriculture and animal husbandry have been worked out.	
5	Shri Chetan Parik, Resident – Relmagra	Hindustan Zinc management has done a well job of exploiting the people of the region. They have played a dual role with the people of Relmagra. People of the region repeatedly approach for employment. Therefore, Hindustan Zinc should provide employment to these people and win their hearts.	HZL is giving employment opportunities to people of the region as per the requirement, eligibility and policy of the company.	
6	Shri Madhavlal Jat, Vill-Chouthpura, Member-Zilla Parishad	Hindustan Zinc authorities should fully take care of the farmers within the radius of 5kms. I brought the samples of soil and water which if tested, we will find that how much fertile is this land and how much water is being polluted. He said that the water and soil samples got tested at Chittodgarh in which acid levels are found much high. Due to damage of the soil, proper crops/ yields could not take place in the region. People of the region want to meet Hindustan Zinc management, but they don't want to meet which has resulted mistrust among the people of the region. Local people should be given more and more employment.	HZL is monitoring the environmental parameters of soil and water and being submitted as a part of the EC compliance. As on date there is no contamination of pollutant recorded due to the mitigation measures in place. Local people will be given preference in the employment opportunities.	
7	Shri Botlal Jat, Vill-Mataji Ka Kheda	He said that there are 4 Mataji temples in our region, which have to be developed. Here in the past, there used to be tigers, and due to pollution, now we are not finding them. As being said by Hindustan Zinc authorities regarding plantation	Phase wise plantation has been done in mine area and also planned in future. Afforestation program will be implemented in	Rs. 3.00 Crores for plantation for next three

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		of many trees, if it is so, by this time the entire region should have become totally green all around the area, but it is not there. Management must have planted trees, but they are not properly maintained and grow properly. Hindustan zinc should provide at least 10 tree guards to each farmer so that they can plant the trees on their own and safeguard them. Management is spending very less amount for the development in the region under CSR funds, they have not opened any college or hospital in the region. Management is not providing employment to the local people because they think that the local people will make dharnas, strikes etc., for their rights whereas outsiders will not do like that. That is the reason outsiders are provide more employment than local people, Hence HZL should provide more and more employment to the local people. M/s. R.K. Marble has constructed hospital at Kankroli, in similar way Hindustan Zinc should also construct a hospital so that the local people should be benefitted. Besides, a building should be constructed for arranging Police Chowki/station in the region. HZL should plant trees on the sides of the roads in the region. If HZL gives something to the people of this region they will also get something from the people. Until and unless they win the confidence of the local people, nothing can be done.	consultation with local village panchayats/ state forest/ PWD department officials in the surrounding areas along with the maintenance costs. Support to all the sectors like health, education, infrastructure other amenities are being provided by HZL.	years.
8	Smt Manju Devi, Annapurna Mahila Help Group	She said that our Mahila group is running well with the help of HZL, so many women associated with this and they are getting many benefits.	Noted.	
9	Shri Rajmal Jain, Panchayat Representative, Village Panchayat – Kabra	Shri Rajmal Jain said that there will be always fault with both the sides and we should not blame any one side. Hindustan Zinc Limited is working directly or indirectly at 500 bigha land in village Panchayat Kabra, but they should do good things on various points.	Already covered under previous points.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		1. Public Management has to provide drinking water (RO/Tubewell/ Pipe line etc.,) to the people of surrounding villages. 2. Afforestation: Management should plant fruit trees and thick & wide trees which will give shelter so that people will get fruits and shadow and there should not be any pollution. 3. Employment : Proper employment should be provided to unemployed youth as per their eligibility and qualifications		
10	Smt Hemlata Kanwar, Vill-Kotadi	Smt Hemlata Kanwar said that Mahila self-help group is running well with the help of HZL, so many women associated with this and they are getting many benefits. Management is also providing health kit to the women in the region. I salute the management of HZL for this help	Noted.	
11	Shri Yogesh Sukhwal, Vill- Bamania Kala	Shri Yogesh Sukhwal said that the calm nature of the local people is giving strength to HZL. People in the region are not getting employment. Environment is exploited in all villages and there is imbalance of the hills in the region resulting lack of fauna in the region and we hardly see birds in the region. Unemployed youth of the region who have qualified ITI were not even paid Rs.5,000/- per month whereas outside workers are paid more wages than the local people, why it is so? The infertility in the animals of the region is increasing a lot for which management should take measures to solve this problem. Company allots 2% funds for CSR activities which is deposited in district administration but the same is not spent on the development of Panchayats in the region. If the local youth go for asking employment, management and police threaten them and false cases are filed against them. The owner of the company is good and peaceful, but we are afraid of his sub-ordinates. The management has to organize meetings with the local people and listen their voice/ problems	HZL will provide employment opportunities to people of the region as per the requirement, eligibility and policy of the company. HZL has established and implemented Stakeholder Engagement & Grievance Redressal Mechanism to establish healthy relationships with stakeholders. Monthly meetings are organized with farmer group, SHG members and Village representatives.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		so that there should not angriness in the region.		
12	Shri Madhavlal Jat, Village- Kotadi	Shri Madhavlal Jat said that no doubt, there are benefits with HZL but they are very less and loss and damage is more. Air pollution is spreading in the region and animals are died, flora (plant and trees) is dried, crops are damaged and no employment is provided. The land of the region is damaged/ spoiled due to the dirty and acid water of HZL and no crop is taking place in the region. Company has to give proper compensation to farmers for this.	HZL is monitoring the environmental parameters of soil and water. As on date there is no contamination of pollutant recorded due to the mitigation measures in place.	
13	Shri Mangilal, Village - Kotadi	Pits are being filled with rain water during rainy season in our village for which neither village panchayat nor HZL is ready to take responsibility, for this and they are not hearing at all. The surrounding lands and water in the wells are affected/ spoiled due to run-off water from Tailing Dams of HZL resulting in no crops in the region and the animals are died. Good works should be done for all.	HZL is monitoring the environmental parameters of soil and water. As on date there is no contamination of pollutant recorded due to the mitigation measures in place.	
14	Shri Bansilal, Village- Kotadi	My first request is for providing employment, here there are so many young ITI people are unemployed. If they approach HZL for employment, the management officials will not meet them and even if they meet also, they will discourage stating that these people do not have any experience and thus unemployed people are exploited an all ways, nobody will listen to them. That polluted water of tailing dam of the company enters into Ram Talai which is not even useful for drinking by animals also. Heavy vehicle traffic is increasing in the region which create pollution in the region. Very less developmental works are being done in the region. Very less trees are planted for balancing the environment and its conservation and they also die due to lack of maintenance. Infertility in the animals of the region is increasing a lot for which preventive measures have to be taken.	Already covered under previous points.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
15	Shri Laxmilal Suthar, Village- Mataji ka Kheda	People of the region have to face the problem of environment pollution and water pollution due to HZL. He said that our requests submitted to district administration so far, responded and directed sub divisional officer of the district for taking necessary action for the development of the region. Environmental pollution is increasing day by day in the region, and if people raise their voice against them, they will be suffered by filing false cases against them. Today's public hearing is held for increasing the production capacity of the company, but the people of the region are not ready to give their acceptance for the same keeping in view of the environmental pollution and all the persons of all the families should also to be protected. In the past, farmers of the villages have handed over their lands to government on lease for Hindustan Zinc, which was handed over to Vedanta by the government. Now Vedanta group has to return the lands to the farmers, we are not ready to extend lease further.	HZL is monitoring the Air , soil and water. As on date there is no contamination of pollutant recorded due to the mitigation measures in place. Land issue raised is related with other mine of Hindustan Zinc Limited, i.e. Rajpura Dariba (RD) Mine for which mining lease, ML No. 166/2008, Area -1142.20 ha is valid till 29.05.2030.	
16	Shri Roshanlal Tukalia, Village-Relmagra	Relmagra is a peaceful village, but when the people of this village awake, it will not take much time to revolutionary movement. HZL management has to think itself on its own, about their contribution to the local people till date and what should be done in the future. Management has to release advertisement for filling the vacant posts in the company and assess the need of local people to what extent employees are required and the local unemployed youth should be given priority for providing employment. Due to non-releasing the advertisement many doubts and ambiguities are rising in the local people. If management feels that the local people do not have adequate qualifications and experience, the unemployed youth of the region should be trained in different trades as per the necessity of the company. Drinking water facilities should	HZL will provide employment opportunities to people of the region as per the requirement, eligibility and policy of the company. HZL has setup "Hindustan Zinc Mining Academy" to train ITI pass-outs in Jumbo Drill Operations and in Winding Engine Operations, Banks-men and Bellman Operations to train youth in mining sector and increase employability.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		be provided to the people residing 10 km radius of the mining area. Management is not ready to meet or talk to the unemployed youth who approach them for employment and their voice is suppressed with the help of police administration. When the management representatives are not even ready to talk to the youth at their main gate, how can one expect the employment or development of the region. Management has to build a modern facility hospital in the region, by which employees of the company along with the local people will be benefitted	To provide additional support for local youth, step up programme is organized at our training centers so that local youth can perform better in JDO/WDO exams and local unemployment issue can be addressed to certain extent.	
17	Shri Sushil Paliwal, Village-Sindesar	There are no drainage, no roads and no electricity in our village. Management has not done anything for the development of the region. Whereas Sindesar village should at least be developed as a model village. In the past also public hearing was held, but later not even a single tree is planted in the region. Off course, boards are displayed here for protection of trees and animals but no steps are being taken for safeguarding them. The solid waste released from the company should be dumped at a suitable place. There should be an office at the main gate of the company which will be helpful for the unemployed youth of the region to consult and approach the company for their employment and the unemployed youth should be heard properly and they will be given satisfactory reply. Electricity generation also takes place in the plant here and that electricity is provided to village-Madadi and we are not getting that electricity. District administration and HZL should take up the developmental works in the region instead of creating the problems and disputes among the villages and they should win the hearts of the people of the region	CSR projects are in place covering Health & Hygiene, Education, Skill development & Self-Employment, Drinking water, Sports, Infrastructure, Agriculture & Animal Husbandry and Environment Management etc. for development of nearby villages. Phase wise plantation has been done in mine area as well as in nearby villages and also planned in future. Priority in recruitment to local villagers is being ensured.	
18	Shri Bhagawan	HZL is doing developmental works in the region, but the	Noted.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
	Sukhwal, Spokesperson, Village – Kabra Development Front	developmental works are not taking place in tune with the increasing their production capacity. He said further that Binani Cement has established Bits Pilani, HZL also should establish a good and modern Technical College in the region by which local people will get more employment opportunities. Apart from this, Management of HZL should also construct a good hospital. Many unemployed youth people are idle in the region and they are not getting employment. As the manner in which Zawar Mines Management has established a football academy, HZL management should also establish a volleyball academy in the village-Dariba.		
19	Shri Badrilal Jat, Village-Sindesar Khurd	Unemployed youth whether they are trained or untrained, should be provided suitable employment so that unhappiness of the local people can be avoided. More focus / attention should be given for protection of environment, more and more trees and plants should be planted and those who want to plant trees on their own should be provided amount as incentive. Management should fix a time to meet the local people on regular basis. Management should win the hearts of local people by discussing with them freely and open minded, If the people of the region get the employment adequately, the aggressiveness (Gundagardi) of the region will end itself. Thus, Management should give attention towards this first	Priority in recruitment to local villagers is being ensured as per skill and requirement.	
20	Shri Sohanlal Gadari, Village- Amarpura	We don't know the people from where they come and get employment and jobs in the company, but the unemployed youth of the region are wandering here and there. Hence, I request HZL to provide employment to the unemployed youth within 40km radius of mining area on priority basis and environmental pollution should be reduced.	Priority in recruitment to local villagers is being ensured as per skill and requirement. Management is committed to mitigate environmental impacts, due to this project, as per	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
			Environmental Management Plan (EMP) in the EIA report.	
21	Shri Bherulal Kshautriya , Advocate, Village – Sindesar Khurd	HZL Location head Shri Meena stated in his speech about the establishment of Nandghar, ITI coaching centre, in the region along with other developmental works to the tune of Rs.50 Crore, it will be a great achievement for the region. I feel that unemployed youth and people of the region are having prejudice about not getting of the employment in HZL which is not correct. People should work with their knowledge and commonsense for the development of the region. In my opinion, if the village is shifted elsewhere, there should not be any objection for that. If it happens, concerned villagers should be paid grant / compensation as per the act of the government.	Noted. Village shifting shall be done as per the statutory requirement. Apart from that, all the basic facilities will be provided and the same will be developed as a model village.	
22	President, Village-Anoppura, Dist – Chittourgarh	HZL should put efforts to develop the district of Chittourgarh as well as the development of villages in Rajsamand.	Noted.	
23	Shri Ramlal Jat, Village-Rajpura	CSR Department of HZL should do developmental works in the region with full awareness. Before taking up CSR activities department should survey the villages and find out / identify the developmental works required to be taken up in the region as per the priority. Though employment was provided to the people of this region by HZL, but if any poor family is deprived off from providing employment, they should also be provided employment on priority. It is a fact that upon establishment of any industry, the environment of the region will be disturbed and there will be imbalance in the environment. At the same time CSR allocated funds of 2% should be spent only in the development if affected villages instead of spending this fund for development of other villages. Company should plant more	CSR projects are in place covering Health & Hygiene, Education, Skill development & Self-Employment, Drinking water, Sports, Infrastructure, Agriculture & Animal Husbandry and Environment Management etc. for development of nearby villages. Management is committed to mitigate environmental impacts, due to this project, as per Environmental Management Plan	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		and more trees which give fruits and shelter / shadow in the region. Similarly old machines should be replaced with modern and new machines of advanced technology to control sound pollution. If the land and crop of the farmers is affected by polluted water discharges form mining activities, they should be paid proper compensation. HZL management should also provide wire fencing in the fields of farmers within 10km radius of mine area so that the crops can be safe guarded from wild animals. HZL should establish super specialty hospital, College, Training Institutions as done by M/s. R.K.Marbles. Royalty amount of HZL is deposited with district administration, which should be used on time and for the right purpose, HZL also should follow up with district administration to ensure the same. Committees consisting of 5-7 members in each village located within 8-10km radius of mining area and the management should conduct meetings with those committees time to time and identify the developmental works to be taken in that region and get them done on priority basis, so that people of the region should not express any unhappiness towards HZL. The unemployed youth of the region should be provided employment as per their qualifications. Outsiders (specially Chinese) should not be provided employment either direct or indirect employment	(EMP) in the EIA report.	
24	Shri Mukesh Purohit, Village-Sindesar Khurd	here are cracks in few houses due to blasting in the mines of HZL, It was told that unemployed youth will be provided employment within 4 months, but till now they are roaming idle in the region. Management is not giving correct information to the youth people of the region. First unemployment of the region/ villages should be avoided and then only this hill should be excavated. Outsiders are provided employment without interview whereas local people	Blasting study is being carried out quarterly by CIMFR. Vibrations due to blasting are being kept under permissible limits prescribed by DGMS. Priority in recruitment to local villagers is being ensured as per	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
		are interviewed and confused / denied for providing the jobs.	eligibility, requirement and company policy.	
25	Shri Laxmilal Suthar, Village – Mataji ka Kheda	Who so ever before me expressed their views here, everybody present here support and accept their views. People of the region are suffering from the environmental pollution and polluted water due to Hindustan Zinc.	HZL is taking utmost care to control any type of pollution in the area. Regular studies are being done for air, water, soil etc. environment.	
26	Shri Amar Singh Bundela, Siva Sena Divisional Chief	Our party members will agitate and express their opposition until then HZL provide the employment to local people and solve the main problems of the region in the same ration that they are expanding their production capacity.	Priority in recruitment to local villagers is being ensured.	
27	Shri Abhishek Chaudhary, Village Panchayat-Kotadi	Our main issue is about employment. HZL should provide employment to more and more people of the region. They may also take the help of village panchayats to identify who is in first need of employment. There is also the problem of drinking water in the villages, for which HZL should provide RO plants and provide drinking water by laying pipeline	Whenever there is an opportunity preference will be given to local villagers. Installation of RO Plant of 1 kl/hr capacity is under progress at village kotdi, which will provide potable water to the villagers of Kotdi, Naya Dariba and Kantiya Khedi.	Rs. 50 Lakh by 2017-18
28	Shri Balchand Menaria, Headmaster, State High middle school, Kotadi	HZL is doing developmental works in our school time to time as per our requirement. But company should increase its CSR fund for developmental works in tune with increasing the production capacity by the company and the same should be continued in future also by increasing developmental works.	Noted.	
29	Shri Ratansingh, village panchayat-	HZL should publicize full details of employment opportunities to be provided to unemployed youth and the type of employment to be provided in the proposed expansion of	HZL will provide employment opportunities to local people as per the requirement, eligibility and	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
	Khadvamania	production capacity so that the unemployed youth can obtain technical training in the required disciplines in a planned manner. Local unemployed youth should be provided employment in the new plant so that unhappiness among the local people will not spread across. Royalty amount should be spent in the development of village panchayats on priority basis. An systematic action plan should be prepared for planting trees in the region to avoid environmental pollution by conducting meetings with sarpanches of village panchayat within the periphery of mine are. One college and hospital for the people of Amarpura and Choudhpura should be established so that people of the region should get the benefit from that.	policy of the company. Afforestation program will be implemented in consultation with local village panchayats/ state forest/ PWD department officials in the surrounding areas.	
30	Shri Hiralal Prajapat, Village-Kotadi	The waters of wells in the region are polluted due to polluted water of Hindustan Zinc. Hence, management should provide drinking water for people and animals in the region	Sampling and analysis of the ground water is conducted regularly and no such contaminants have been found. Drinking water is provided by HZL to nearby villagers (i.e. Dariba, MataJi ka Kheda, Rajpura Kheda, Sindesar Khurd, etc.) RO Plants have been installed at villages like Mahendutiya, Dariba, Kotdi, Pipawas, Sunariya Kheda and Gawardi to ensure supply of safe potable water to the villagers. Further, installation of RO Plant of 1 kl/hr capacity is under progress at village kotdi, with a cost of Rs.	

Sr. No.	Name	Query/Concerns Raised/	Action plan	Budget & Time Frame
			50 Lakh, which will provide potable water to the villagers of Kotdi, Naya Dariba and Kantiya Khedi.	
31	Shri Suresh Jat, Deputy Chief, Panchayat Samiti-Relmagra	Local unemployed youth should be provided employment in the new plant of HZL so that angriness among the local people should not spread. More and more plants and trees should be planted. The waters of the wells which are spoiled, should be tested and necessary steps should be taken for controlling the pollution. We don't have any objection for increasing the production capacity by the company, but priority should be given to local unemployed people for providing employment in the proposed expansion. Thereafter, people of Relmagra panchayat samiti should be benefitted.	Whenever there is an opportunity preference will be given to local villagers.	
32	Shri Kishanlal, Advocate, Relmagra	God has gifted Relmagra land with adequate minerals for which we should thank God. Due to this only there are lot of developmental works are taken place. Bus Stand of Relmagra was constructed with the financial assistance of Hindustan Zinc Limited. Apart from this many developmental works are being done by the company. Rooms in many schools of the region are being constructed, necessary furniture is made available for which HZL administration is also to be lauded. Along with all these, College, Hospital and ITI should be established in Relmagra by HZL so that Company should get name / publicity and also the people of the region will be benefitted.	Noted	

7.2 Risk Assessment

The mining operations at Sindesar Khurd mine are fairly mechanized. In underground mining operations, hazardous situation may arise leading to accidents. Risk assessment involves the identification of the various hazards or unsafe conditions that exist in the mine and related operations and to take precautionary measures to eliminate the risk of accidents.

7.3 Identification of Hazard and Precautionary Measures

Identification of Hazards in a mining unit is of primary significance in the analysis, quantification and effective control of accidents. A hazard is characteristic of a system/process that presents potential for an accident. All the components of a system/process need to be thoroughly examined to assess their potential for initiating an accident. Safety is relative and implies freedom from danger or injury. It calls for identification of hazards, risk and further suggestion on hazard mitigation measures.

In the Metalliferrous Mines Regulations (1961), possibility of occurrence of hazards and the mitigation measures are spelt out in detail. Accident or hazardous situation may arise due to occurrence of any one of the following causes.

- Outbreak of fire;
- An influx of noxious gases;
- An eruption of water or inundation;
- Premature collapse of any part of workings;
- An accident due to the explosives;
- A fracture or breakage of any essential part of winding system;
- Bursting of any equipment at high pressure;
- Air blast; and
- Subsidence.

The above causes and preventive measures are discussed below.

7.3.1 Outbreak of Fire

Some precautions and remedial measures proposed to be adopted to prevent fires are:

- No inflammable material shall be stored in underground except in fireproof containers;
- To avoid surface fire, all structure with 10 m of shaft, ramp and incline to be constructed to incombustible material;
- Surface workshop, diesel filling station, compressor house and electric sub-station shall be provided with fire fighting equipments and to be maintained regularly;
- Dry vegetation shall not be allowed within a distance of 15 m from any entrance to the mine;

- Regular inspection will be done to remove accumulation of greasy material cotton waste, old conveyor pieces, waste hose pipes, wooden scrap, wood cuttings etc. and shall be removed regularly;
- A proper alarm system shall be installed to warn underground worker about outbreak of fire;
- Electric apparatus, electric cables etc. shall be checked regularly;
- Adequate number of persons will be trained in fire fighting; and
- Mock drills will be conducted on regular basis.

On the appearance of signs indicating that a fire has broken out, all persons other than those whose presence in the mine is deemed necessary for dealing with the fire shall be immediately withdrawn from the mine.

Fire fight operations would be carried out under the supervision of competent persons along with trained fire fighting personnel.

Sufficient supply of sand or incombustible dust or sufficient portable fire extinguishers shall be provided at entrance to a mine, landing and the bottom of every shaft or winze in use, engine room and at other place where timber, canvas, grease, oil or other inflammable material is stored. Water hydrants will be provided at all necessary locations. Suitable types of fire extinguishers will be provided at different locations to deal with different types of fire.

7.3.2 Influx of Noxious Gases

The following precautionary measures will be adopted.

- Inflammable gas shall be deemed to have been detected when it is indicated by the lowered flame of a flame safety lamp or where methane indicators are used they indicate one and a quarter per cent or more of inflammable gas;
- When any person detects the presence of inflammable gas, he shall immediately withdraw from the place and shall inform his superior official about the same;
- When inflammable or noxious gas is detected, all persons shall be withdrawn from the place, and the place shall be immediately fenced off so as to prevent persons inadvertently entering the same;
- No person shall be re-admitted in to the place where the gas was detected until a competent person has examined the place and has reported that the place is free from gas;
- In long drivages or blind workings, a flame safety lamp will be always maintained; and
- Persons will be trained in the use of flame safety lamps. The competent person will take steps to remove the gases by improving ventilation.

7.3.3 Irruption of Water/inundation

A water danger plan showing the following features will be maintained as required by regulations.

(1) The position of the workings below ground;
(2) Every borehole and shaft (with depth) drive, crosscut, winzes, raise, excavation and air passage connected therewith;
(3) The position of every dyke fault and other geological disturbance, with the amount and direction of throw;
(4) Levels taken in workings below ground at easily identifiable points sufficient in number to allow the construction of sections along all drives main headings and haulage roadways;
(5) Every source of water such as river, stream, water course, reservoir, water-logged workings on the surface, and also the outline of all water logged workings below ground lying within 60 meters of any part of the workings measured in any direction;
(6) Every reservoir, dam or other structure, either above or below ground, constructed to withstand a pressure of water or to control an inrush of water, along with reference to its design and other details of construction;
(7) Surface contour lines drawn at vertical intervals shall not exceed five meters; and
(8) The highest flood level of the area.

7.3.4 Premature collapse of any part of workings

Based on the rock quality assessment and the chosen method of mining, no premature collapse of any part of working is anticipated. However, following precautionary measures will be observed:-

- To prevent premature collapse of any workings, effective supports will be erected based upon the geotechnical mapping. All workings will be systematically supported to eliminate any possibility of premature collapse;

- Numerical modeling techniques will be used to determine the stable spans; and

- The hang wall and crown pillar will be instrumented with multi point boreholes extensometer and stress meter for ground monitoring on regular basis.

7.3.5 Accident due to the Explosives

Detailed guidelines have been provided in the regulations and various circulars. The measures proposed are:

- Explosives will be issued only to the authorized persons;

- Explosives and detonators will be transported in separate boxes under lock and key;

- The person holding the statutory certificates will carry out the blasting operations;

- Large diameter blasting would be carried out after withdrawing all persons from below ground;

- A register will be maintained at the gate checker office, where all section foremen will countersign indicating the removal of persons from their sections before carrying out large hole diameter blasting; and

- The blaster will ensure that all persons have taken proper shelter before blasting the charge.

7.3.6 Bursting of any Equipment at High Pressure

- All apparatus used as or forming part of the equipment of mine, which contains or produced air at a pressure greater than atmosphere pressure shall be so constructed, installed and maintained as to obviate any risk of fire, bursting explosion or collapse or the production of noxious gases;

- Every air receiver forming part of a compressing plant shall be fitted with a safety valve and an air gauge, which sows pressure in excess of the atmospheric pressure;

- Before an air receiver commissioned, the engineer or other competent person shall subject it to a hydraulic test at pressure at least one and a half times the maximum permissible working pressure; and

- A similar test shall be made after every three years. Proper records will be maintained.

The supply of air for air compressors shall be drawn from a source free from dust and fumes.

7.3.7 Precautions against Air Blast

No such danger is anticipated. However, the following precautionary measures will be observed in case of eventuality:

- Any large scale collapse of wall rocks into voids may displace the air in violent manner and cause accidents;

- Persons will be trained to deal with situations arising out of Air blasts;

- Air blast shelter would be established at suitable locations; and

- The drawal points in the stopes would not be totally emptied.

7.3.8 General

- Persons will be authorized for various skilled works;

- Every exposed part of any machinery used as, or forming part of, the equipment of a mine shall be adequately fenced by suitable guards to prevent danger;

- Only authorized and trained persons will be permitted to operate and maintain equipments; and

- Danger signs will be displayed at appropriate locations.

7.4 Use of Sodium Cyanide in Beneficiation Plant

During beneficiation of lead and zinc ore, cyanide salts are used for suppressing impurities present in the ore with a view to improve the separation of lead-zinc metals from the gaunge materials. The material safety data of sodium cyanide is presented in **Table-7.2.**

TABLE-7.2
PROPERTIES OF SODIUM CYANIDE

Sr. No	Data	Details
1	Boling point	1496^{O}C (2724 F) at 760 MMHG
2	Melting point	564^{O}C (1047 F) at 760 MMHG
3	Vapour pressure(MMHG)	1 (817^{0}C)
4	Vapour density	AIR (1): 1.7
5	Specific gravity	1.6
6	Evaporation rate	N/A
7	Solubility(H_2O)	37%
8	Volatiles by volume	0 (21^{0}C)
9	pH	11.7 (25% solution)
10	Physical state	Solid

Among various reagent used in the beneficiation plant, NACN is used in froth flotation process for depressing sphalarite, pyrite and certain copper sulphide. Cyanide salts are widely used in the selective flotation of lead-copper-zinc and copper zinc ores. The sodium cyanide renders there substances hydrophilic (water avoid) and thus prevents their flotation.

Sodium cyanide solution contains 53.1% available cyanide. Due to the solidiphic nature of cyanide ions, most of them (about 85%) form complexes with Fe and Zn and are discharged along with tailings about 10% of the free cyanide go along with tailing solution to tailing dam and balance about 5% of cyanide goes along with concentrates. The present consumption of sodium cyanide in beneficiation process is about 20 g/tonnes of ore treatment. Depending on the quantum of ore processed by Sindesar Khurd mine, the monthly consumption of NaCN is 1.2 tonnes/month.

As part of the expansion, about 5.41 tonnes per month of sodium cyanide would be required.

Sodium cyanide salts are transported through rail in mildsteel contains with HDPE liners. After the use, the empty containers and containers liners of cyanide salts are discarded as hazardous waste transported to treatment storage and disposal facility (TSDF) located at Udaipur. A comprehensive report on HCN emissions in Sindesar Khurd mines was prepared by NEERI and details are as follows:

7.4.1 Tailing Disposal

The final tailings from beneficiation process are pumped to tailing dam, which is situated at about 3.5 km away from plant through pipe lines. In the tailing dam, the water gets separated from the tailings and is recycled back to the process.

Present status of Generation of Cyanide Containers and liners: As mentioned earlier, a combination of various floatation reagents are used during the ore beneficiation process for floatation and suppression of various components of the ore. The rote of these reagents is to bring about changes in the surface properties of minerals over a wide range. The flotation reagent varies widely. In composition and include organic and inorganic compounds, acids and alkaline, salts of various compositions, water soluble substances and material which are practically insoluble in water.

Among various reagents used by HZL, sodium cyanide (NaCN) is used in froth flotation process for depressing sphalerite, pyrite and certain copper sulphide. Cyanides salts are widely used in the selective flotation of lead, copper and zinc. The sodium cyanide renders these substances hydrophilic (water avid) and thus prevents their flotation.

The sodium cyanide used by Sindesar Khurd Mine is received in MS containers which are lined with HDPE liners. Once the entire quantity of cyanide is exhausted from the containers, the empty containers and HDPE liners which are contaminated with residue/traces of sodium cyanide are discarded as wastes. Present rate of generation of empty sodium cyanide containers and liners is about 10 to 12 containers/Month. The total weight of each drum with accessories (lid, gasket, nuts and bolts) ranges from 8.0 to 8.5 Kgs.

7.4.2 Present Status of Management of Cyanide Containers and Liners

The present practice of management of cyanide drum (with accessories) and liners involve three major steps. These include i) water rinsing ii) alkaline chlorination iii) deformation and disposal.

Water Rinsing

In the first step, the empty containers, HDPE liners, lids, gaskets, circlips, nuts and bolts are washed thoroughly with water in a concrete tank. The pH of water is 7.8 to 8.5. The washing operations are carried out manually by the trained workers wearing personal protective equipments. The wash-water from this operation is recycled to process for utilization of cyanide content. The washed containers and the accessories are taken out from the tank and kept by the side of concrete tank for next step of treatment.

Alkaline Chlorination

The second step involves alkaline chlorination of cyanide. The traces of cyanide remaining in the containers and the accessories after the first step of treatment are destroyed during alkaline chlorination. Alkaline chlorination is the most widely

used cyanide (inorganic) destruction method. The process normally uses free chlorine at high-pH conditions to chemically destroy free cyanide and dissociable cyanide complexes, producing reaction products such as chlorides, carbon dioxide and nitrogen.

During this step, the tank is again filled with water. About 5 to 7% sodium hypochlorite is added to the tank and a solution is prepared by manual stirring. The washed containers, components and liners are then again immersed manually in sodium hypochlorite solution. This operation is carried out to ensure destruction of residual cyanide, if any, remaining after stage 1. The containers and accessories are immersed in the hypochlorite solution for 2-3 hrs. The pH of the solution is maintained at 9.5 to 10. The hypochlorite ions react with cyanide and convert it to carbon dioxide and nitrogen gas.

After completion of decontamination process, entire hypochlorite solution is drained out and pumped back to thickener from where it is pumped to mill overhead tank for recycling in process. Before disposal, containers and accessories are again rinsed with water and the rinse water is recycled to the process for reuse.

Deformation and Disposal

In the third stage, the decontaminated containers and liners are perforated at bottoms and sides and distorted in a safe enclosure so as to prevent reuse of containers and liners. The perforated and distorted containers, components and liners are finally disposed off at a hazardous wastes treatment storage and disposal facility (TSDF) being.

Monitoring of HCN Emissions during Decontamination Process

As apprehended by HZL, the monitoring of HCN emissions were carried out by NEERI team during the process of decontamination of empty cyanide containers and liners. During the monitoring studies, the air emissions at the surface of decontamination tank were captured through a vacuum pump and bubbled through a series of midget impingers containing 1 N sodium hydroxide solution.

During each measurement about 30 liter (@ 2LPM for 15 min) of air was sampled. After the required quantity of air was sampled for each measurement, the midget Impingers were disconnected and the NaOH solution was transferred to conical flasks for analysis. The air samples were taken at various stages of decontamination process. The cyanide in the NaOH solution was analyzed by titration using silver nitrate as titrant and p-dimethyl amino benzalrhodamine as indicator *(Standard Methods for the Examination of Waters and Wastewater, APHA-AWWA-WEF; 2Oth Edition, Washington DC,* 1998}.

It may be observed from Table-7.2 that none of the air samples indicated presence of HCN. This could possibly be due to very high solubility of sodium cyanide in water. Moreover, all the decontamination operations are carried at room temperatures, and at alkaline pH, which inhibits the release of HCN to vapour phase.

7.4.3 Observation, Conclusions and Recommendations

a) Based on the detailed reconnaissance survey and the data/information collected by the NEERI team, it was observed that present quantum of generation of empty cyanide containers and drum liners (10-12 drum/ month) is not significant.

b) The present practice of management of empty cyanide containers and drum liners involve water rinsing for recovering the cyanide followed by alkaline chlorination to destroy the traces of cyanide remaining, if any.

c) In order to evaluate most appropriate technology for treatment of empty cyanide containers and container liners at Sindesar Khurd Mine. A detailed literature review was carried out with respect to various cyanide treatment processes. Based on this review, it was observed that cyanide treatment processes are classified as either a destruction based processes or a recovery based process. In a destruction process, either chemical or biological reactions are utilized to convert cyanide into another less toxic compounds. Recovery processes utilize a recycling approach in which cyanide is removed from the solution or slurry and then re-used in a metallurgical circuit.

d) There are several treatment processes that are well proven for wastes with low levels of cyanide. These include SO_2, air, Hydrogen Peroxide, Caro's Acid, Alkaline Chlorination, Iron Precipitation, Activated Carbon, Biological, Cyanide Recovery, Reverse Osmosis, and Natural Attenuation (Natural Degradation). The treatment method adopted at Sindesar Khurd Mine, is therefore, a combination of cyanide recovery (water rinsing) and cyanide destruction process (alkaline chlorination).

e) Among various treatment options available for destruction of cyanide, the alkaline chlorination is a well proven and most widely practiced method for treatment of cyanide. The process normally uses gaseous or liquid chlorine at high-pH conditions to chemically destroy free cyanide and dissociable cyanide complexes producing reaction products such as chlorides, carbonates and hydroxides.

ii) The existing tank of 9 m^3 capacity may be divided in two chambers of equal capacity by providing a partition. The first chamber may be used for the water rinsing operation and the second chamber may be used for the alkaline chlorination. The reduction in the capacity of the existing tank will ensure better control of various parameters (viz. pH, free chlorine) during the decontamination process. This will also help in reducing the sodium hypochlorite consumption thus making the process more economical.

iii) In order to improve the mixing of chlorine ion with cyanide and the intermediate reaction products, a mechanical agitator as against the existing manual agitation may be provided in the above mentioned two chambers.

iv) Since pH and free chlorine concentrations are the two important factors responsible for cyanide destruction, these need to be continuously monitored and

maintained during the decontamination process so as to ensure proper destruction of cyanide.

v) Depending on the concentration of cyanide remaining in the containers and the requirement of chlorine for oxidation of various intermediate compounds formed during decontamination process, actual requirement of sodium hypochlorite should be worked out.

v) In case of any upset conditions during decontamination process and to make the process full proof in terms of cyanide emissions, it is recommended to provide a movable vent hood that may be positioned over the rinsing and chlorination tank for capturing cyanide emissions, if any, due to upset conditions. The exhaust from the hood may be scrubbed with caustic solution for capturing cyanide emissions if, any.

7.5 Disaster Management & Risk Management

A fully operational rescue room equipped with all necessary equipment is being maintained at Sindesar Khurd for catering to the emergency needs of all the mines. Sufficient number of rescue trained persons is available for dealing with any emergency including fire. A fire station is also maintained at Sindesar Khurd.

7.5.1 Introduction

A situation is potentially a Disaster if it entails any one or more of the following factors:

(1) Risk of loss of human lives- ten or more in single situation;
(2) Loss of property as a consequence of the incident is covered millions and / or bears a potential to above;
(3) A situation which goes beyond the control of the available resources of the mine/plant; and
(4) A situation which apparently may not have caused much loss but whose long term severity could cause of life, production and property.

The 'emergency management plan' is designed to deal with the emergency situations in a mine in such a way that immediate action is to be taken by workmen, supervisors and officials working at the mine.

7.5.2 Emergency Response Organization

The purpose of the Emergency Response teams at Sindesar Khurd mines is to provide a group of trained individuals for emergency response. This section outlines the description of each organization, their selection, training, and overall managing processes to ensure ER effectiveness. The basic function of the Emergency organization is to save lives and this should be the main concern of one and all. The emergency organization chart is presented in **Figure-7.3.**

a) Rescue Recovery Committee (RRC):

This committee will be responsible for the overall direction of all the operations connected with the rescue / recovery work and will function in close contact with EMC. All the activities connected with the rescue & recovery operation will be done as per the direction of RRC. The Mine Manager will instruct all his officials and supervisors to report to RRC Room in the back shifts for smooth operation of rescue & recovery work. All necessary instructions and guidelines will be displayed on the notice board/black board.

b) Rescue-recovery Committee Room:

The Rescue, Recovery Committee Room will be set up at Rescue Room. It will be equipped with one external and two internal phones, a large table for the display of plans & sections, a black board for technical guidelines, almirah to hold plans, emergency tokens, telephones call lists, logbooks registers etc.

c) Rescue Room and Rescue Team

The Rescue Room will be setup at the surface inside the mine premises. The Rescue Room will have all the facilities for Storage of required Equipment and material, Washing and ablution facilities, Oxygen filling and Equipment maintenance Room. In addition, another room should be made available for accommodation of the Rescue team.

The Rescue team will be formed with personnel working in the Mine and consist of Engineers, Maintenance persons and Contractual Manpower. The total no. of persons in the team shall be 12. The Rescue team will report to Rescue Room In charge at the Rescue Room.

d) Checking of Persons

As soon as the RRC Room is set up, all persons who are required to go underground must first obtain authorization from the RRC. A record of such persons shall be maintained in the RRC Room. Each person authorized will be given an envelope containing two tokens with a common number but different in colors. The list of person receiving the envelope will be recorded. The Red Token must be handed over to the Gate Checker before entering the Cage/Mine. The Copper Token must be worn suspended from the neck whilst in underground. On returning to the surface, all persons must collect their tokens from the Gate Checker and hand over the same to the RRC.

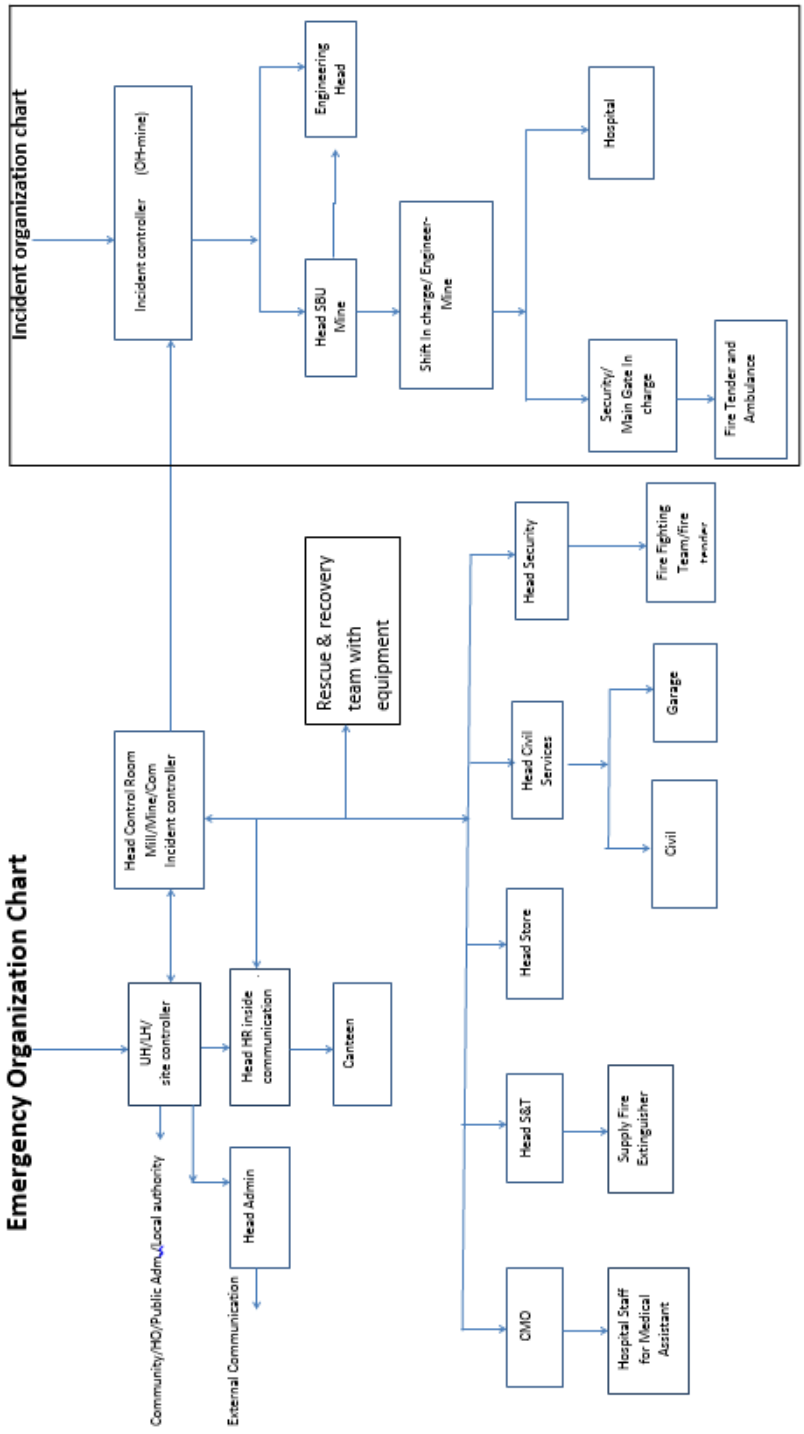


FIGURE-7.3
EMERGENCY ORGANISATION CHART

e) Establishing a Chain – of – Command

A great number of people will be doing many different jobs during a rescue and recovery operation. Therefore, it is important to establish a clear chain-of-command so that rescue and recovery work can be well coordinated.

Located at the top of the chain-of-command is the Mines Manager or a designated responsible person who delegates duties to other people. These people must know exactly what their duties and responsibilities are, who to report to, and who reports to them. State officials will arrive at the mine site to advise and observe. Govt. mining officials can take charge of an operation if they deem it necessary, but normally their role is to consult with and advise the company personnel on how the rescue and recovery work might best be carried out safely.

The team is under the direct supervision of the team captain. The captain also works and communicates with the designated official(s) who are responsible for coordinating the work carried out by mine rescue teams.

Mine rescue teams must receive accurate, concise, and reliable briefing information from the Rescue room to perform rescue/recovery duties in a safe, timely, and efficient manner. The teams will also need up-to-date mine maps for exploration duties. It is extremely important to develop a standardized method of reporting gas readings and other critical information to the Command Centre and the Fresh Air Base (FAB).

7.5.3 Mine Gases and Air monitoring

The mine rescue team members will identify the physical properties and characteristics of gases they may encounter during rescue and recovery work. They will identify where the gases are normally found, how to test them, and the meanings of their findings.

a) Self-rescuer – Ensuring that every person going underground carries self-rescuer.

b) Gas monitoring – Supervisors in every shifts equipped with gas monitors to ascertain safe working environment for CO and H_2S

Self-rescuer

Gas monitoring

c) Mine Ventilation

The purpose of mine ventilation is to provide a volume of air sufficient to disperse and remove harmful gases, dust, smoke, and fumes, and to provide adequate oxygen. Through mechanical ventilation. When a mine is ventilated, air from the surface enters the mine at the main intake or intakes and is directed or "coursed" through the mine by a system of ventilation controls. These controls force the air to move in certain directions and at certain velocities so that it reaches all levels or sections of the mine. All the return air from the levels or sections is then channeled to the main exhaust and eventually exits the mine.

d) Ventilation Maps

As mine rescue team members, should know how to read a mine map that shows ventilation. This is basic knowledge for any team member, especially the map person. The team's map person is responsible for marking down information on the map as the team explores and assesses ventilation.

7.5.4 Emergency/ Crisis Management Control Room

An emergency /Crisis Management Control Room shall be set up in the mine office complex earmarked for the purpose and shall be manned round the clock during the emergency by AGM(Mines), or any other persons decided by the Chairperson.

Emergency Control Room will be equipped with at least two internal phones and one external phone for liaison work. All public relation work connected with the Crisis such as answering inquiries and giving information to the Head Office, Liaison with Press, Public etc., shall be done by Mgr (HR)/ AM (HR) from Control Room so as to avoid any misinformation and unnecessary crowding at actual place of rescue /recovery operation.

The EMC shall consist of the following:

Sr. No	Name	Function	Designation	Mobile No
1	Sh. K.C.Meena	SitePresident	Chairman	8003833320
2	Sh. Rajeev Bora	Agent	Member Secretary	9799099771
3	Sh. S.K. Sharma	Mine Manager	Member	8003097074
4	Sh. H.P.Kalawat	HSE/VTC	Member	9829119260
5	Sh. D. K. Yadav	Engineering Head	Member	8003699466
6	Sh. Joydeep Chandra	Mill Head	Member	9001294929
7	Sh. Ram Murari	Tech. Head	Member	9799490163
8	Sh. Sanjay Khator	RD Mine(Agent)	Member	9001294941
9	Sh. Kalu Ram Jat	Central Store	Member	9929098163
10	Sh. Anand Mahavar	Medical Services	Member	9001795783
11	Sh. Deepak Gakhreja	HR Head	Member	9568006215
12	Sh. Sunil Dixit	Commercial Head	Member	8003994956
13	Sh. Akhil Soni	Security	Member	9636632835
14	Sh. Jyotirmay Sarkar	Mill Maintenance	member	8003690117
15	Sh. Arvind Jangid	Elect. Maintenance	Member	9929103178

The EMC members will ensure to meet once in every three months in order to keep liaison with one another and one to check the **Emergency Management Preparedness** of the mine/surface departments. Such meetings shall be convened and organized by Sr. Manager in consultation with the Chairperson.

During an Emergency, the DMC shall meet regularly in order to assess the progress of rescue/ recovery operations and decide further strategy and guidance to be given to Rescue Recovery Committee (RRC). The RRC will give instructions to Rescue team the situation of Crisis Place, likely to have the atmospheric condition on the spot. Rescue team will equip with suitable apparatus/ appliances to deal the situation.

7.5.5 Roles and function of Emergency Team

7.5.5.1 Functions of the incident controller

To assess the scale of the incident against predetermined criteria and decide whether emergency exists or is likely; if so, to immediately activate Emergency Plan.

- To assumes duties of Crisis Controller pending his arrival, in particular to:
  - Ensure emergency services called.
  - Direct shutting down and evacuation of other Sidesar Khurd Mines areas likely to be affected.
  - Ensure key personnel summoned.
- To direct all operations at the scene of the incident e.g.
  - Rescue and firefighting operations
  - Search for causalities
  - Evacuation of non-essential workers to assembly areas.
- To set up communication point with radio, telephone/mobile/email or messenger contact with DCR.
- To give advice and information to emergency services.
- To brief the Emergency Controller and keep him informed of developments.

7.5.6 Incident / Emergency Scenarios

1. Equipment Fire in Underground : Major underground diesel equipment are provided with auto fire suppression system, other diesel equipment are provided with two portable fire extinguishers
2. Diesel Pump station fire: 50 Kg capacity fire extinguishers are kept ready at site along with sand bucket.
3. Magazine area fire: Water sprinkler system is established surrounding the area. A fire hydrant is provided and fire tender filling point is provided for continuous water supply for tender to operate for long duration.
4. Winding operation failure due to electric fault: Winder can be operated by gravity to reach the nearest level. The effects of emergency scenario details area presented in the below **Table-7.3.**

TABLE-7.3
EFFECTS OF EMERGENCY SECENARIO

Factors	Emergency Scenario	Locations	Level-1 Incident	Level-2 Emergency	Level-3 Crisis
Internal	Fire	in HEMM	Hydraulic hose leakage, puncture and spill over hot pipe, exhaust	Equipment burn/fumes	Affecting surroundings with smoke, suffocation to the persons
		in diesel pump station/oil storage tank	Small fire within control of the fire extinguisher& sand.	Large fire un controlled by fire extinguishers and affecting the large area and smoke	Uncontrolled by fire tender and other means of fire extinguisher affecting large area and nearby locality with fume smoke and chances of explosion
		Of combustible material/sub station	Asphyxia due to minor fire	Major fire affecting persons in return section	Major fire at/near mine intake affecting all persons in u/g
		in magazine	Small fire by dry grass vegetation, miss handling of explosives	External threat by nuisance attack/lightening	Lightening/thunderstorms
	Environment	Ore/waste transportation from mine to mill/tailing dam	Falling of material from moving vehicle on road/farms		
		Mine waste dump slope failure	Small failure within control	Big failure within unit affecting the work persons	Muck spill over the boundary wall and affecting the locality
		Oil spillage	Small leakage	Large leakage	Affecting locality
	Food poisoning	Canteen	First aid case like vomiting ,stomach ache and outdoor treatment	Severity in life threatening of several person and hospitalization	
	Confined space entry	Sump	Fall of person in sump		
		Shaft bottom	Fall of object from upper level	Suffocation due to deficiency of O2 at shaft bottom	Sudden inrush of water submerging persons working at shaft bottom
	Electrocution	Power cables in shaft	Minor shock due to damaged cable	Live cable coming in contact with cage	Live cable coming in contact with cage during man winding
		Haulage (trolley wire locomotive)	Shock due to earth leakage current	Falling of live trolley wire	
	Height working	Sheet works, overhead pipe lines, shaft maintenance, long hole blasting at sub levels, raising	Fall of person	Cage stuck between levels	Cage submerging at shaft bottom
	Collapse of major structures	Shaft head gear, crusher/bunkers, chutes, overhead	Property damage	Persons entrapped in mine	Catastrophic

Factors	Emergency Scenario	Locations	Level-1 Incident	Level-2 Emergency	Level-3 Crisis
		crane structure, Rupture of pipelines in shaft, etc			
	Air blast	Underground	Flying rocks hitting persons in its pathway	Air blast affecting several number of people in nearby vicinity	Air blast causing major fall of material in shaft during man winding
	Entrapment or falling of person in running equipment's/conveyors or FOB	Surface & u/g	Person / body part getting trapped in running conveyor	Breakage of loaded conveyors in running condition	
	Equipment run over / collision	Surface as well as underground	Collision of two vehicle and serious injury to person, roll over of person		
External	Bomb threat		No chances- peace full area away from border except in war		
Natural	Floods		Flooding of mine due to sudden inrush of water		
	Lightning strikes		Direct exposure of person to lightning	Surface Magazine explosion	Fire due to explosion involving community in surroundings
	earthquake		No chance- non seismic Zone-II		
	storms		Flying of sheets may cause injury	Electric pole or big tree falling over passenger vehicles	

Whenever an Emergency/ accident occur, no time is left for any discussion to deal with the situation and a state of confusion arises. To deal with such Crisis/ accidents, it is proposed to form an **"Emergency Management Committee"** (EMC) For Sindesar Khurd Pb-Zn Mine. In case of Emergency and if felt appropriate by the In-charge (OD), the EMC shall immediately swing into action so that the rescue' recovery work can be taken up in a most systematic and efficient way without any delay, confusion and panic.

7.5.7 Emergency Response Team

The basic function of the Emergency organization is to save lives and this should be the main concern of one and all. The main features of this organization are as follows:

1. Rescue recovery committee (RRC):

This committee will be responsible for the overall direction of all the operations connected with the rescue / recovery work and will function in close contact with DMC. The RRC will consist of:

- HoD (OD)/In-charge, Mine - Chief Coordinator

- Asst. Manager/ Safety Officer
- Dy. Director (MS) for Sindesar Khurd Mine.
- Engineering I/C (Maint.) Central Services
- In-charge, Electrical

Henceforth, all the activities connected with the rescue and recovery operations will be done as per the direction of the RRC. The Mine Manager will instruct all his officials and supervisors to report to RRC for further orders/instructions. The RRC will make arrangements for manning the RRC Room in the back shifts for smooth operations of rescue and recovery work. All necessary instructions and guide lines will be displayed on the notice board/ black board. As soon as the RRC is set up, all persons who are required for rescue/ recovery work must first obtain authorization from the RRC. A record of such persons shall be maintained in the RRC Room.

2. Rescue-recovery committee room:

Depending upon the location of the accident a Rescue Recovery Committee Room will be set up on the surface. It will be equipped with one external and two internal telephones, a large table for display of plans and sections, a black board for technical guidelines, almirah to hold plans, Emergency tokens, and telephones call lists, log books registers etc. In addition, another room should be made available for accommodation of this rescue team

3. Duties of persons in emergency:

a) HoD (Mine) Phone no: 8003097074

- As soon as the mine manager gets the information of any serious nature, he will immediately inform the Agent and Location head (Phone No.) and send an urgent call for mine officials to attend essential works prior to the set-up of RRC and subsequently ask them to report to RRC for further instructions and line of action
- He will make all necessary arrangements for the functioning of RRC and office accommodations with all necessary facilities to take the charge of rescue work.
- He will ensure that all affected persons are withdrawn in the best possible ways and only those persons shall be allowed to proceed to the affected area who will be needed for rescue and recovery work.
- He will take necessary steps so as to get deployed all other work force in other areas, except those needed by RRC for rescue work.
- In addition to the above, Chief Manger (OD)/ In-charge Mine shall take necessary actions independently warrant for situation without loss of time.

b) Asst. Manager/ other Mine officials:

- Depending upon the nature and severity of the accident, the RRC, will make a duty distribution chart and the same shall be immediately displayed on the

notice board. All officials/ supervisors will be briefed by RRC about their duty timings, place of work and nature of job assigned to them.

- All officials will keep close liaison with the RRC.
- The persons shall be relieved at the site.
- All necessary steps should be taken to make a telephone arrangement and First aid station as near to the affected area as possible.
- All critical activities shall be done as per the guidelines of RRC. Findings and actions taken shall be recorded in abounded paged book kept in the RRC room and duty signed by them with date and time
- They will keep all necessary liaison for quick shifting of the affected persons to surface and if felt necessary, send the information for sending rescue/ medical team which will be in ready state at the mine office.
- They will ensure that all persons engaged for rescue work are safely withdrawn at the end of the shift and record in the register kept for the purpose in RRC room
- C.M. /OH (Mine) should be ensuring that the restore functioning of critical equipment at earliest, if conditions warrant. In consultation with C.M. /OH (Mine)/In-charge, Mine
- In-charge of Mine Electrical department shall take necessary action for restoration of power if tripped during Emergency, taking consideration of all safety measures and the matter may be consulted with OH/ C.M. (Mine)/ In-charge, Mine
- Separate ambulance to handle underground emergencies
- Well established first-aid room

c) Rescue Room In-charge:

For the purpose of coordinating fire-fighting activities and to enforce all regulations for prevention of fire: and

- To extricate persons from debris.
- To hand over dead bodies and injured persons to first aid parties.
- To take immediate steps as may be necessary for the temporary supports or demolition of buildings and structures, the collapse of which is likely to endanger life or obstruct traffic,
- To cut off supplies to damaged structures etc.,
- To keep his rescue / firefighting teams in ready state in the place assigned by RRC.
- To divide his team in such a fashion so that the rescue teams is readily available round the clock.
- To ensure to make all necessary arrangements for timely refilling of oxygen cylinders of breathing apparatus

d) Safety Head: Sindesar Khurd Mine VTC

He will keep a close watch over the rescue/ recovery activities and will report the development to RRC. If required the services of surveyor may be called for preparing drawings of the affected areas.

e) CMO I/C Hospital: (Ph. No.9001795783)

- He will summon all the Doctors. And medical staff and will give the necessary instructions to deal with the affected persons and keep the mortuary ready for post-mortem and identification.
- He will keep the ambulance and first-aid equipment ready with the necessary staff at the Mine office or at the place proposed by RRC
- He will arrange for sufficient beds and other facilities for the treatment of injured persons.
- He will ensure to maintain at all times minimum stock of oxygen and other medicines to meet out any Emergency. However, he shall make all arrangements for additional requirements during Crisis/ accident depending upon the gravity of the situation.
- He will inform nearby hospitals and will ensure that in case of Emergency, the injured persons can be immediately shifted and given necessary treatment;
- He will arrange for recording causalities by putting the label on each patient seen, treated and transported which would bear the particulars about the name, date of accident, details of injury conditions of the patient and treatment. The following 3 types of labels are to be used for different type of casualties.

f) Ventilation officer [Ph.8003296136]

- He shall keep a close watch over the running of Main Ventilating Fan;
- Any unusual variation shall be immediately reported to RRC and recorded in a Register; and
- In case of fire, he shall ensure the stoppage and reversal of main ventilating fan as per the instruction of Mine Manager/RRC. In addition, he shall take necessary actions for the re-coursing of air current as per the requirement in consultation with Mine Manager.

g) Survey Officer

He shall prepare all relevant plans & sections of they affected areas that shall be readily available in sufficient quantities.

h) Gate Checker

- He shall keep record of the persons going below ground and coming out from the underground .immediately after the withdraw of work persons, he shall make a head –count and report the Mine Manager;

- He shall permit only those persons to proceed for below ground, who have been authorized by Mine Manager/RRC for rescue work; and

- In case of any relevant information received from underground, he shall immediately inform the RRC.

i) HR Head: (Phone no.9568006215)

- On receiving information from the Location head, he will arrange immediately for Emergency signal.
- He will keep proper record of all injured persons and casualties. He will also deal with the relatives of the injured, state administration officials and other agencies.
- In addition, he shall make all arrangements for lodging and boarding of outside agencies in the Guest House and transport facility if required.

j) Manager (Stores) I/C Central Stores: (Phone no.9929098163)

He will make all necessary arrangements to keep the stores open round- the-clock for drawl of material and make available sufficient stock of materials needed during the course of rescue and recovery operations. He will be in close contact with the RRC for any material requirement.

k) Canteen In-charge/ Welfare Officer (Ph No: 9001992611)

He will make all necessary arrangements and organisation for the additional food supplies to meet out the Emergency.

l) In-charge of Garage (Phone):8003699466

- He will make the arrangements for availability of transport facility round the clock.
- The Central workshop facility shall be available as per the requirement.

m) Stocking of tools and materials:

All tools and materials and safety items needed for the rescue/ recovery operations will be stored in a safe place near the RRC room so that the work is not affected for want of any such material. A store Officer/ Mine Engineer will be made in-charge to look into the arrangements of the materials and to keep the RRC informed. To deal with such exigency, certain materials as listed below shall be kept at VTC and the materials shall be shifted expeditiously to the required place as per requirement.

n) Security In Charge (9636632835)

The chief of the Security is the Commanding Officer of the security staff. On the instruction of HR Head (HR) the Commanding Officer shall arrange to record the entry of outside personnel at the main gate to avoid any hindrance during the course of rescue / recovery operations. The Chief of Security shall keep close liaison with local police and district authorities to:

- Control the vehicular/ personnel traffic in and around the mine/ surface installations.
- Help local police in controlling the area of the mine/ surface installations, if necessary.

- Assist in Transporting injured persons.
- Control traffic. The security personnel on duty shall ensure that all roads at the scene of fire/ emergencies are kept clear from obstruction. Persons arriving by motor transport at the scene of fire/ Emergency are not permitted to park their vehicles within 100 meters of fire, near fire hydrants, at road junction and access roads. The ignition key should be left in the vehicles.
- Assist local police in patrolling in township and workout adequate arrangements for protection of property.
- Ensure separate entries of different materials received from external agencies for coping up emergencies operations.

7.5.8 Training of Persons

All the rescue and fire-fighting teams must be properly trained to carry out their duties in an Emergency. Practice drills shall be carried out once in every six months to ensure that persons are fully conversant with their duties and can carry them out efficiently when the need arises. A record of all such drills and meetings will be maintained.

Training must also include classroom training as well as hands-on through electronic media

7.5.9 Emergency Event Public Relations

The Officer –in-charge of Public Relation Services acts as the Commanding Officer. His main function is to consult with Emergency Controller before communication, if required, with outside agencies.

The Chief Public Relation Officer is to be authorized as official spokesman for the mining unit. He shall arrange for photographs and filming of the whole Crisis (this is of immense value for the purpose of investigation, training and education).

7.5.10 Proposed Action to be taken in Different Cases

7.5.10.1 In Case Of Fire

Any person notices fire at any place will report to the shift in-charge to gate checker (in case of mine) shift in-charge DG Set (in case of surface), in turn will inform to security gate/ Main gate and to the mine manager (designated)/ incident controller.

The concerned Mine Manager (Designated)/incident Controller will get the report from the Shift in-charge/ Gate Checker (in case of Mine), Shift in-charge DG Set (in case of surface)/ security gate in-charge and will act accordingly to the situation.

Incident Controller and security gate personnel will inform to all facilities to the fire fighting crew, Hospital, Emergency vehicle may be used for informing the members.

The crew member/facility team will report immediately and take charge of the situation.

For case the Name & Addresses of the crew members & facility team may be including Internal Telephone Directory to be displayed at all notice boards/departments.

A system shall have to be made to ensure that a minimum number of crew members always remain in Sindesar Khurd Mines for this a register may be maintained at the main gate to mark the absence of the crew members who has left Sindesar Khurd Mines.

The leave application of these persons may be granted by a regulatory body i.e. DC or IC.

In the absence of AGM (Safety & Training) one official of Administration may be designated or alternatively the matter should be intimated to AC (Security), who will take the charge of fire fighting.

7.5.10.2 In Case of Flood

In case of problem in the mine the intimation shall be given to the main gate and IC/DC.

DG Set in charge shall look into it that power supply shall be ensured till the substation is not flooded.

All designated Mines Manager shall ensure compliance of Mine Rules & Regulation, e.g. every point in the mine is connected with the ladders.

One inflatable boat/Raft may be kept at VTC.

7.5.10.3 In Case of Air Blast

Each person shall follow the instruction given in the action plan already in force in the mine.

7.5.10.4 In Case Of Accident

In case of accident, Hospital should intimate.

DGMS & Union may be informed depending upon severity of the accident.
A list may be prepared of the materials to be kept in VTC. One copy of the list shall be given to the DC.

The VTC in charge may be high ranking official and VTC should be the nobel agency for such situation.

7.5.10.5 Refuge Chambers

"In case of emergency situations like fire, rock fall and blockage of escape routes among others in the underground mines, refuge chambers, constructed with a robust 6mm steel plate, provide a place of safe refuge with fresh air to the employees"

"Employees in the mines can immediately take refuge in the refuge chamber, which is designed to provide life support system up to 36 hours."

With in-built oxygen supply and carbon-dioxide absorbing system, the refuge chambers also offer facilities such as toilets and air-conditioning.

Escape hatch with external access handles are also available to indicate lights or strobe and siren in order to alert during emergency situation.

According to HZL, the refuge chambers that are linked to mine power supply comprise basic first aid kits, stretchers and eye washes.

Chapter-8
Project Benefits

8.0 PROJECT BENEFITS

The proposed project is an expansion of existing Zinc and Lead underground mines and beneficiation plant. The existing project has already created far reaching socio-economic benefits for surrounding area. The proposed expansion project will bring in an investment to the tune of INR 1051 crores.

Besides meeting the Company's requirement of its own downstream plants, the mining and processing of both these minerals (Lead and Zinc) are vital for the development of our country at large.

8.1 Employment Potential

The impact of mining on the economic aspects can be clearly observed. The proposed expansion will provide employment to persons of different skills and trades. Contractual workers will increase in coming years when we enhance higher meters of mine development & other activities at Mines. The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service oriented activities.

The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. This will in-turn improve the socio-economic conditions of the area.

The proposed expansion project would generate direct and indirect employment, improve the social and economic environment in the vicinity and also meets the raw material requirements of the expanded capacities of the company's existing smelters. Project would also contribute to meet the global Zinc demand and Make in India vision, infrastructure improvement etc.

The proposed underground expansion would immensely influence the economic aspect of the society around the project and also the state and the nation through increased revenues. About 300 nos (direct and indirect) would get direct or indirect employment in the operations and maintenance of the project.

In addition to the direct and indirect employment opportunity, HZL is already, through the CSR initiatives, providing various skills development opportunity through vocational training that would enable people become self-employed or entrepreneurs. Self help group activities is also implemented to empower rural women and make them self sufficient. Assistance being provided to the village population for access to banking facility has helped further increase the access to cheaper funds and financial facilities. Various health camps are being organized with distribution of essential medicines to improve the basic health of the village population in the vicinity of the project site. Educational material, uniform and scholarship incentives are being distributed to the village school children to motivate them.

All these actions as above has direct economic and social benefits to the people by increasing their income and reducing their expenditure towards health, education, and interest burden, thus substantially improving their economic aspects.

With the proposed expansion, all these activities will be further strengthened by appropriately increasing the fund allocation 3.0% of total project cost and widening the coverage and area of focus for socio-economic development.

8.2 Infrastructure

The Mining project and its associated activities require development of basic infrastructure such as road, water supply, electricity, housing, health care etc. for an uninterrupted production and processing. These developments will provide opportunities for getting similar infrastructure in surrounding villages of the Project area. The existing project has developed many infrastructures facilities and the proposed expansion will provide more opportunities to further improve the already develop infrastructure facilities. Some of the important infrastructure development already in place in the Project surrounding area includes:

- Widening and Up gradation of major connectivity roads;
- Village road up gradation;
- Construction of community, primary health centres;
- Provision of solar power lightings for Street lights;
- Development of training centres for unemployed youth and women's;
- Construction of sanitation facilities.
- Dirking water facilities
- Skill development trainings
- Women empowerment
- Mobile health units
- Infrastructure development
- Agriculture and Animal Husbandry

8.3 National Economic Development

The present production capacities of Zinc in India are sufficient to meet the domestic requirements. However, the demand for zinc in India is expected to grow at a rate of 8%which makes it viable for the expansion of the zinc production capacities. Further the deficit in international market during the upcoming years provides opportunity for export.

8.4 Land value appreciation

The infrastructure development related to the proposed project is likely to cause appreciation of land prices in the nearby areas. Locals with land holdings in neighbouring areas are likely to benefit economically.

8.5 Awards/ Recognition

- Prestigious FIMI award 2006-07 for social awareness to RD Mines which is complying in SK mine CSR activities
- State Level Prestigious Bhamashah Award 2008 in the Field of promotion of Education in Rajsamand Distt.
- Recognition of our CSR activities on Independence Day by Honble' State Minister of Water Resources GoR.

Bhamashah Award under Education Initiatives

ABP News Award for Best CSR Global Practices

Energy Conservation for SK Mine

FIMI Social Awareness Award SK Mine

IBM - 5 Star Rating Shield

FIMI - NMDC Social Awareness Award

FIGURE-8.1
AWARDS & ACCOLADES

8.6 Enterprise Social Commitment

As per TOR point number 44 details of action plan with financial and physical breakup (2.5% of the total cost of the project) to be earmarked towards the Enterprise Social Commitment (ESC) based on local needs. The project proponent kept 4.7 % of the total cost of the project based on local needs is given in **Table-8.1**. The R&R form-I submitted to District Collector is given **Annexure-XII.**

TABLE -8.1
ENTERPRISE SOCIAL COMMITMENT PLAN FOR THREE YEARS

Sr. No.	Main Area	Developmental Program	Proposed Budget (Rs. in Lakhs)
1	Health and Hygiene	Free medical check-up in the Zinc Hospital/ Medical Camps	732
2	Education	Khushi Project, Nandghar Project, ShikshaSambhal program, Bal Chetna Centre, Support for Education and School Development.	2029
3	Skill Development & Self Employment	Hindustan Zinc Mining Academy, Women Empowerment program "Sakhi".	894
4	Drinking Water and Sports	Drinking water Supply, Zinc Football Academy, Rural Sports.	264
5	Basic Infrastructure	Development of basic infrastructure in Rural areas.	746
6	Agriculture and Animal Husbandry	"Samadhan"- Agriculture and Animal husbandry development.	260
7	Environment Protection and Others	Plantation and Others.	99
	Total		**5024**

Chapter-9
Administrative Aspects

9.0 ADMINISTRATIVE ASPECTS

9.1 Institutional Arrangements for Environment Protection and Conservation

HZL, Sindesar Khurd mines is being operational since more than decades and supervised and controlled by unit head supported by mines manager and adequate team of technically and statutorily qualified personnel as well as the operating staff of skilled, semi skilled, unskilled and other categories.

Currently, the Unit Head is the overall in charge of the Sindesar Khurd Mine and a Statutory Mine Manager recruited under Mines Regulation 1963 and Mineral Conservation & Development Rules 1988 for supervision and control of the Mine is reporting to the unit head.

Environment Management Cell headed by an experienced Manager (Environment) who directly reports to unit Head regarding all environmental concerns. EMC also coordinate with department heads for ensuring implementation & monitoring of the proposed mitigative measures & with Project Head about project related requirements and developments. Corporate HSE head and site president bring the concern and development in the knowledge of CEO and Whole Time directors. Organizational structure of environment management cell is given in **Figure-9.1.**

The same cell will supervise the monitoring of environmental pollution levels viz. ambient air quality, water and effluent quality, noise level etc. for the expansion underground project EMC will also co-ordinate for green belt development etc.

HZL is one of the company in India who has taken initiative to reduce the carbon foot print of their plants and operations by adopting environment friendly technologies, business practices and innovations. The Health Safety and Environmental Policy of Corporate, Environmental Policy of Unit, Energy and Climate Change Management Policy, Biodiversity Policy and Water Management Policy of HZL duly signed by Chief Executive Officer is shown in **Figure-9.2** to **Figure-9.6.**

9.2 Mechanism for addressing Environmental Issues

Sindesar Khurd of Mines of Hindustan Zinc Limited is certified for Quality Management Services (ISO 9001:2008), Environment Management System (ISO 14001:2004), Occupational Health and Safety (OHSAS 18001:2007) and energy 50001:2011. The Management Representative (MR) of the certification system is an experienced manager with due authority to implement and drive an Integrated Management Systems (IMS). The system has a well laid documented procedure for all environmental aspect, Impacts and suitable mitigation measures.

The company has three level monitoring mechanism for addressing environmental concerns at unit level, HZL corporate level and Vedanta group company level. Depending on the scale and nature of the issue, the concern is escalated to different level right upto the Board of the company and also the shareholders of the company in the general body meetings.

The compliances to Environment Clearance and all environmental licenses are reviewed and monitored regularly and reports are submitted to the respective regulatory authorities at every manufacturing location and mine, by a dedicated environmental professional, who reports directly to the Unit Head. The compliance is periodically reviewed and audited by Corporate Environment Department, which reports to the top management of the company. A Corporate Sustainability Committee, chaired by the CEO of the company, oversees all sustainability issues including Environment, Safety and Health and also reviewing any policy matters.

Any non-compliances/show cause/notices received from regulatory authority or any stakeholder is addressed jointly by the unit and corporate environment department. Such issues are also reported to the top management every month. Further, all show cause, complaint letters and notices from any stakeholder, along with the action taken report is submitted to the Board of Directors of the company every quarterly. All major concerns are reported to the stakeholders through the annual general body meetings of the company.

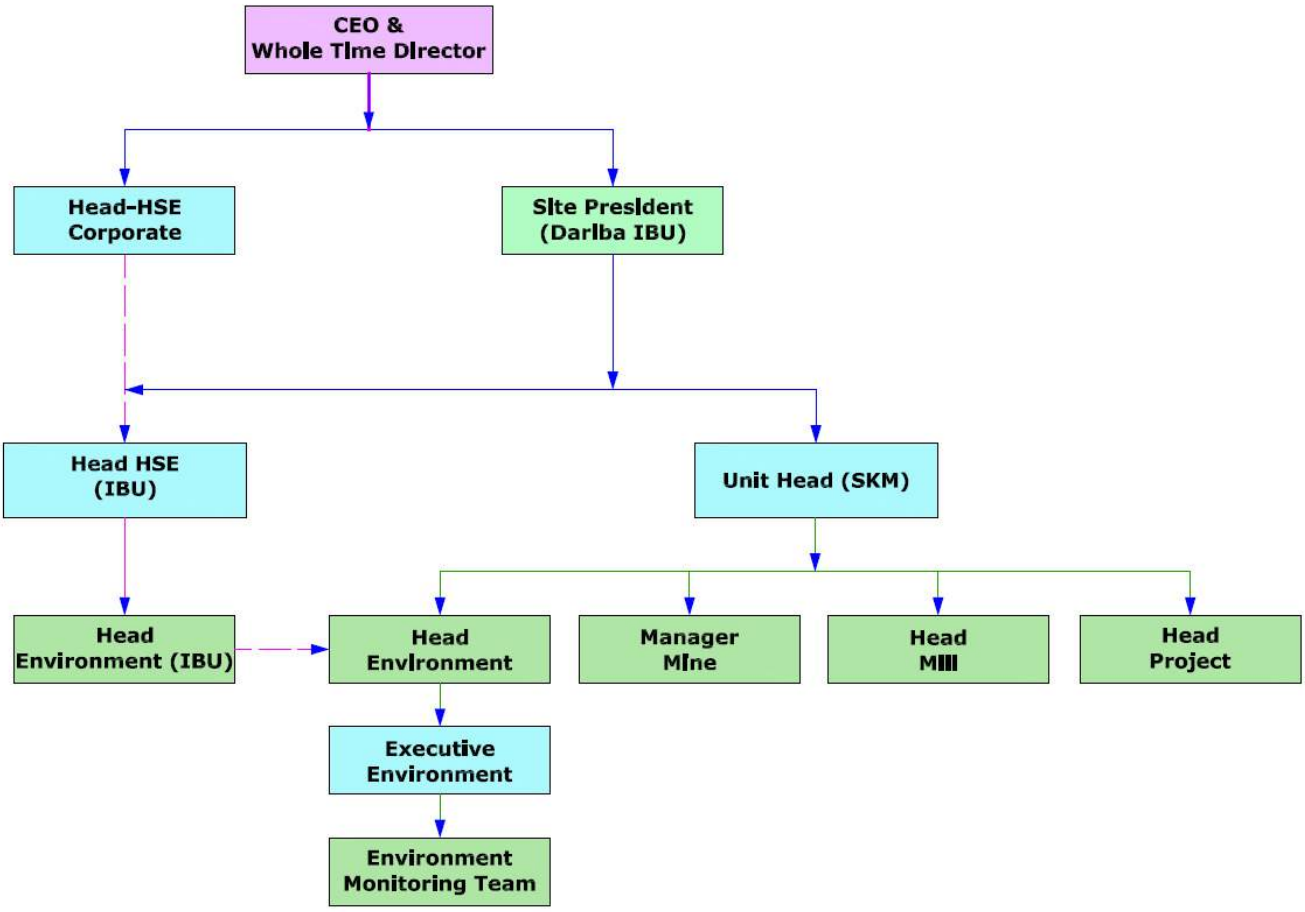


FIGURE-9.1
ORGANIZATIONAL STRUCTURE OF ENVIRONMENT MANAGEMENT

Environmental Policy HZL – Sindesar Khurd Mine

At HZL-Sindesar Khurd Mine, we believe in sustainable development and are committed to effective environmental management as an integral part of our business. HZL-SK mine will comply with all environmental laws and regulations applicable to our activities i.e. mining, beneficiation, storage and transportation of Lead & Zinc concentrate and will continue to work for reducing negative footprint on environment and will fulfil the requirements of ISO 14001.

To achieve this, we will:

- Conserve natural resources, through adopting environmentally friendly & energy efficient technology and process improvements for reducing and preventive pollution.
- Adopt and maintain global best practices on carbon and energy management;
- Prevent wherever possible, minimize and mitigate biodiversity risks throughout our operations;
- Maintain a water balance that minimize the amount of fresh water consumed by beneficiation process by reutilizing the tailing water as much as possible and will also encourage rain water harvesting;
- Improve and enhance environmental conditions and avoid, reduce or mitigate the environmental impacts of lead & zinc mining & beneficiation operations to neighbouring communities and aquatic lives in areas where we operate including air, water, land and noise. We will ensure to abide by the following at our Sindesar Khurd Mine:
    1. We will ensure that all environmental impact during the blasting, drilling and beneficiation operations will be minimised by taking proper mitigation measures.
    2. Apply a zero discharge philosophy wherever possible.
    3. Fugitive emissions will be controlled by regular water spraying on waste dump, roads & ore storage at mines site.
    4. Adequate Dust controlling equipment's will be provided at Beneficiation Plant.
    5. The lead and Zinc concentrate will be transported in trucks covered by tarpaulin.
- Address employee concerns about environmental performance fairly and seriously;
- Influence our contractors and suppliers to adopt principles and practices adopted by us and work in accordance with our policies;
- Communicate with all our stakeholders on the progress and performance of our Environmental Management System.

We will measure and report progress against this policy and review performance on a periodic basis to ensure on-going management of environment. The content and implementation of this policy will be reviewed periodically and actions taken accordingly including the sharing of good practices throughout the HZL- Sindesar Khurd Mine.

Rajeev Bora,
Unit Head –Sindesar Khurd Mine
Date: 05.06.2017

FIGURE-9.2
ENVIRONMENTAL POLICY (UNIT)

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HINDUSTAN ZINC

Health, Safety & Environment (HSE) Policy

Hindustan Zinc is committed to conduct all business activities in a responsible manner, which ensures the health and safety of our stakeholders and the environment. In order to achieve that, we shall:

- Ensure Zero Harm to personnel and environment.
- Demonstrate visible HSE leadership that HSE is our core value.
- Comply with all HSE rules, regulations, obligations and requirements and will strive to go beyond compliance to the relevant requirements and shall continually improve our HSE management systems.
- Incorporate appropriate HSE Criteria for all business decisions for selection of plant, technology, contractors and personnel.
- Identify and evaluate HSE risks for all activities and take actions to eliminate / mitigate risks and hazards.
- Encourage, train, equip and empower personnel, including contractors & contract employees, to adopt a healthy and safe working approach both on and off the job. The HSE performance of individual personnel shall decide his career advancement.
- Conserve natural resources and eliminate waste through reduction, recycling and reuse methods, which are environment friendly and energy efficient.

Health, Safety & Environment (HSE) Guiding Principles:

- Management shall demonstrate its strong commitment towards HSE at all times.
- All injuries, occupational illnesses and adverse environmental incidents are preventable.
- Reporting and investigation of all incidents is an obligation.
- We are responsible and accountable for preventing injuries, occupational illnesses and adverse environmental incidents.
- We are empowered and obligated to stop any job being carried out in an unsafe manner.
- HSE values shall never be compromised.
- Adherence to HSE management system is a condition of employment.

We personally commit to applying the policy & principles for building positive HSE culture at Hindustan Zinc and report wherever applicable.

Date: 1st June, 2017

Sunil Duggal
Chief Executive Officer & Whole-Time Director

www.hzlindia.com

FIGURE-9.3
HEALTH SAFETY AND ENVIRONMENTAL POLICY (CORPORATE)

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transforming elements

HINDUSTAN ZINC

Energy and Climate Change Management Policy

Hindustan Zinc acknowledges the global concern on climate change and recognizes that concerted and sustained global action is required to reduce the scale of the problem and to adapt to its impacts. Hindustan Zinc is committed to this effort through its own progressive Energy and Climate Change programme that forms an integral part of our vision for sustainable development and is consistent with our overall business vision and mission.

Hindustan Zinc strives to:

Reduce Carbon Footprint

- Adopt and maintain global best practices on climate change and energy management and minimising greenhouse gas emissions throughout our operations. We will continue to measure our direct energy usage and carbon emissions, and maintain our year-on-year efforts to reduce energy consumption across our operations. We will endeavour to define and publish specific energy and specific carbon reduction targets, maximising the benefits of process improvements and technology advances.
- Invest in clean energy and maximise benefits from waste energy recovery.
- Consider carbon emissions minimization for our project and R&D investments.

Engage Stakeholders

- Communicate our approach and achievements actively to stakeholders, and work closely with policy-makers to encourage effective and equitable abatement policies within our sectors of operation.
- Periodically measure, monitor and report to all relevant stakeholders on our green house gas emissions in compliance with the internationally recognised protocols and working closely with other stakeholders to reduce energy consumption and carbon intensity.
- Foster research and innovative techniques within our operations leading to optimal utilisation of resources with continuous focus on minimising specific energy consumption in all our operations. We will seek to use our leading position within the geographies that we operate to act as an advocate of effective energy and climate change management.
- Work with our staff, wider communities and other stakeholders to demonstrate our commitment to greenhouse gas emission reduction principles and practices.

Influencing Supply Chain

- Communicating our policies and creating awareness.
- Mandatory criteria in procurement procedures.

Adapting to Climate Change

- Screening and assessing risk of climate change on our activities.
- Provide adaption and future-proofing of our facilities.

We will measure and report progress against this policy and review performance on a periodic basis to ensure ongoing management of energy and carbon. The content and implementation of this policy will be reviewed periodically and actions taken accordingly including the sharing of good practices throughout Hindustan Zinc.

Date: 1st June, 2017

Sunil Duggal
Chief Executive Officer & Whole-Time Director

www.hzlindia.com

FIGURE-9.4
ENERGYA AND CLIMATE CHANGE MANAGEMENT POLICY

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HINDUSTAN ZINC

Biodiversity Policy

Protecting and enhancing biodiversity is an integral part of Hindustan Zinc's commitment to sustainable development. We are conscious of the potential impacts and dependencies of our business on biodiversity. Integrating the need for biodiversity conservation into operational decision making processes and taking all necessary measures to minimize impacts, is a Commitment across the company. We are conscious that biodiversity is a complex phenomenon that needs to be identified, understood and valued from a biological and societal (i.e. in terms of ecosystem services) perspective. We believe that our performance on biodiversity conservation will create long term sustainability for our business and the society.

Hindustan Zinc strives to:

- Create awareness to prevent, where possible, minimise and mitigate biodiversity risks throughout our businesses. We will manage and use land in our operations in a manner that allows biodiversity conservation, which is integrated with business needs throughout the project lifecycle, including decommissioning, closure and rehabilitation.
- Comply with, and exceed where possible, the local, regional and national legislative requirements on land management and biodiversity conservation and applicable international conventions in all jurisdictions in which it operates.
- Identify and assess biodiversity status, value and its impacts, due to resettlement, loss of cultural heritage, loss of protected land and endangered species before the start and over the project lifecycle.
- Consider the impacts on ecosystem services in business decisions.
- Work towards the conservation of threatened/rare and endemic species and high priority conservation areas, and support local, national and global conservation initiatives. We will provide information and raise awareness among our employees and other stakeholders to enhance knowledge and understanding of biodiversity and conservation issues, where applicable.

We will measure and report progress against this policy and review performance on a periodic basis to ensure ongoing management of biodiversity. The content and implementation of this policy will be reviewed periodically and actions taken accordingly including the sharing of good practices throughout Hindustan Zinc.

Date: 1st June, 2017

Sunil Duggal
Chief Executive Officer & Whole-Time Director

www.hzlindia.com

FIGURE-9.5
BIODIVERSITY POLICY

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transforming elements

HINDUSTAN ZINC

Water Management Policy

Hindustan Zinc recognises the social, economic and environmental value of water and the increasing global concern of water scarcity. We understand that water is a key resource and needs to be used responsibly, balancing the needs of different stakeholders.

Hindustan Zinc strives to:

- Comply with applicable national, regional and local regulations.
- Identify water conservation projects through reduction, recycling and reuse and monitor progress against water consumption reduction targets across our businesses. We will avoid pollution of surface water, ground water and other water resources arising from our activities and also society wherever possible; and we will ensure that water/wastewater storage facilities are engineered and maintained.
- Apply a zero discharge and water positive philosophy wherever possible.
- Understand our water footprint at all our projects and operations and focus on reduce, reuse and recycle, will maintain a water balance that minimises the amount of freshwater consumed by re-using as much water as possible in our processes.
- Treat all wastewater to international best practice standards.
- Participate in local or regional water catchment planning activities to secure sustainable water resources for our operations and the activities of other stakeholders in the surrounding communities and encouraging rainwater harvesting where we can.
- Determine baselines and develop ongoing monitoring of water regime.
- Work with communities and communicate with all our stakeholders on the progress and performance of water conservation and water management.

We will measure and report progress against this policy and review performance on a periodic basis to ensure ongoing management of water resources. The content and implementation of this policy will be reviewed periodically and actions taken accordingly including the sharing of good practices throughout Hindustan Zinc.

Date: 1st June, 2017

Sunil Duggal
Chief Executive Officer & Whole-Time Director

www.hzlindia.com

FIGURE-9.6
WATER MANAGEMENT POLICY

9.3 Budgetary Allocation for Environmental Protection

Estimated cost of the mining project is about Rs. 1051 Crores. The cost proposed for environment protection measures will be about Rs. 100 Crores with a recurring cost of about Rs. 12 crores. The cost towards environmental protection measures is shown in **Table-9.1**.

TABLE-9.1
COST TOWARDS ENVIRONMENT PROTECTION MEASURES

Particulars	Approved		Proposed	
	Cost in cr.		Cost in cr.	
	Capital	Recurring	Capital	Recurring
Excavation & installation of Dust control/suppression systems for crushers & cement silos	5	2	1	0.2
Tailing Dam management (height raising, HDPE lining on side wall, pumping system and water recycle line)	61.5	0	60	5
Tailing thickener	5	5	1	0.2
Surface water sprinkler	1	0.1	1	0.2
Mechanical road sweeper	1	0.1	1	0.2
Ventilation System	80	4.8	27	4.8
Rainwater harvesting	1	0.2	1	0.2
Plantation/Green belt development and drip irrigation system	1	0.5	2	0.6
Different Environmental Monitoring equipment	1	5.1	1	0.2
Automation in Environment Monitoring & Safety	17		2	0
Construction of Garland drain and silt settling tank and recycle system for waste dump management	1	0.1	1	0.1
Schedule-I fauna conservation plan cost	2	0.4	0	0
Installation of Sewage treatment plant and Oil grease trap system	3	0.5	1	0.2
Water hydrant system	1	0.1	1	0.1
Water tanker with pumps	3	0.1	0	0
Grand Total (Rs. in cr.)	**183.5**	**19**	**100**	**12**

Chapter-10
Summary and Conclusions

10.0 SUMMARY & CONCLUSIONS

10.1 Introduction

Hindustan Zinc Limited (HZL) intends to enhance Lead and Zinc ore production and beneficiation capacities from the Expansion of Sindesar Khurd mine from 4.5 million TPA to 6.0 million TPA Ore Production (ROM basis) and Beneficiation from 5.0 million TPA to 6.5 million TPA, located at Sindesar Khurd Village, Relmagra Tehsil, Rajamand District, Rajasthan.

As per Environment Impact Assessment (EIA) notification dated 14th September 2006, the proposed expansion project falls under 'Category A' and requires public consultation to be conducted before approaching Ministry of Environment, Forest and Climate Change, New Delhi for Environmental Clearance (EC).

The EIA report has been prepared based on the Terms of Reference (TOR) approved by MoEF&CC and on primary data collected during 1st March 2017–31st May 2017 representing pre-monsoon season, 2017.

10.2 Environmental Setting

The study area covers 10 km radius around the proposed mine lease area. The environmental setting of the proposed expansion mine site is as follows:

- The proposed expansion mine lease area Latitude and Longitude values

A-24°59′ 32.470″N, 74° 08′23.22″ E
B-25°00′ 58.980″N, 74° 08′25.28″ E
C-25°00′ 51.570″N, 74° 08′51.03″ E
G-25°00′ 23.940″N, 74° 08′51.27″ E
H-25°00′ 20.940″N, 74° 08′59.51″ E
I-25°00′ 01.470″N, 74° 09′00.77″ E
J-25°00′ 01.000″N, 74° 08′48.29″ E
K-24°59′ 27.350″N, 74° 08′42.02″ E

- The mine is approachable from Rajpura Dariba by nearest airport, Dabok (Udaipur) at (47.0 km, SSW) and nearest railway station is Fathenagar about (19.4 km, SSW) on Chittorgarh-Udaipur broad gauge railway line and 4 Lane State Highway (SH-9).

- Banas river is (4.4 Km, N), Site elevation is about 510-546 m above MSL;

- Present land use is industrial activity;

- There are no ecological sensitive areas/ protected areas as per Wild Life Protection Act 1972 within 10 km radius.

The study area map is shown in **Figure-10.1.**

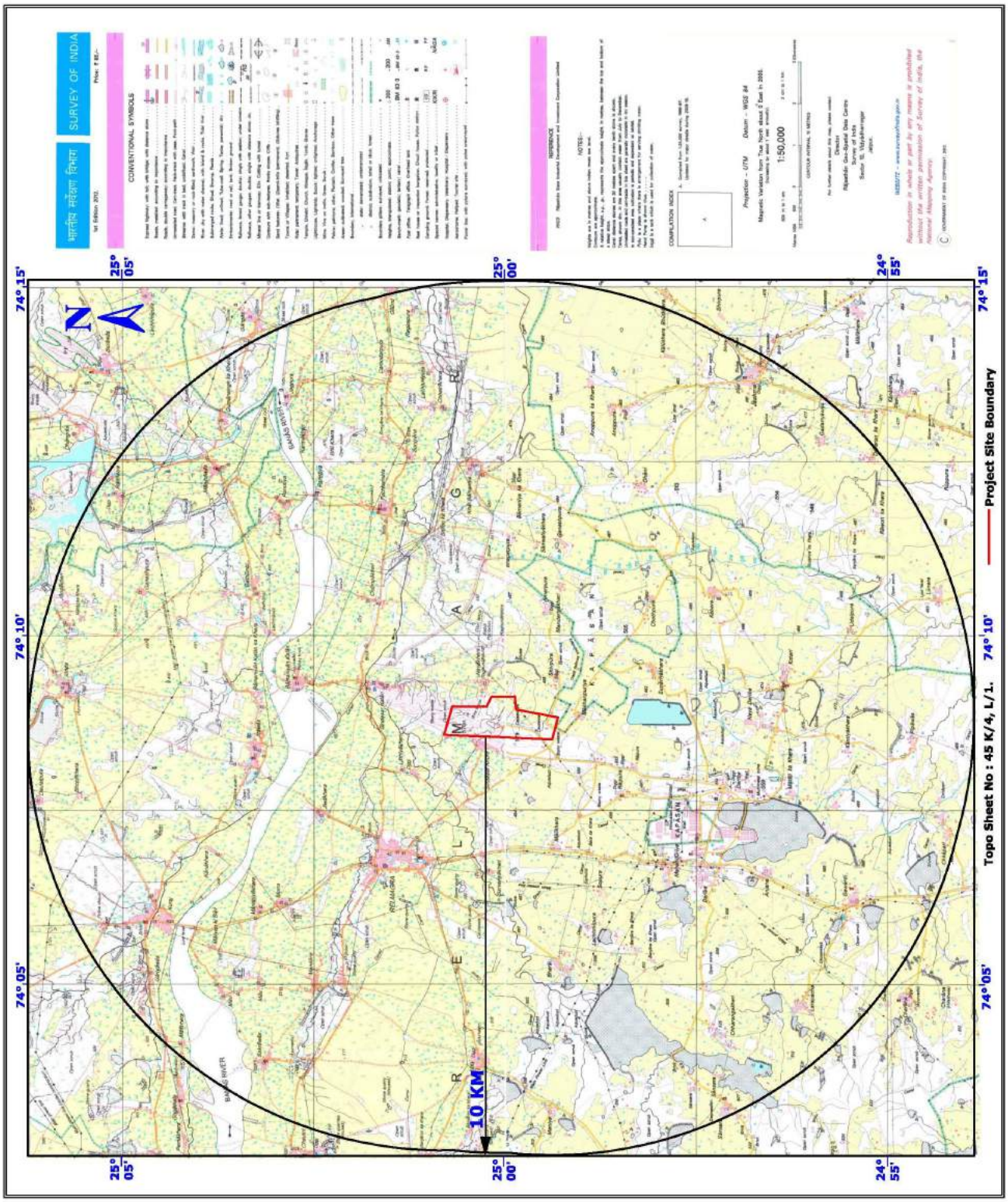

FIGURE-10.1
STUDY AREA MAP OF 10 KM RADIUS

10.3 Project Description

The present capacity is 4.5 million TPA of ore production. The proposed enhancement is intended for raising ore production capacity from 4.5 million TPA to 6 .0 million TPA and Beneficiation from 5.0 million TPA to 6.5 million TPA. The present Blast Hole Stoping method is proposed to be continued with its variants for raising the ore production capacity.

10.3.1 Salient Features of Lead Zinc Ore Mine

The salient features of Lead Zinc ore mine are given below in **Table-10.1**.

TABLE-10.1
SALIENT FEATURES OF LEAD ZINC ORE MINE

Sr. No.	Description	Existing	Proposed
1	Mine lease No., Area & Validity	ML-7/95, 199.84 ha, valid till 19.03.2049	ML-7/95, 199.84 ha, valid till 19.03.2049
2	Reserves & Resources	106.88 million tons 4.52 % Zn, 2.70% Pb (As on 01.04.2016)	122.79 million tons 3.99 % Zn, 2.36% Pb (As on 01.04.2017)
3	Capacity –Mining	4.5 million TPA	6.0 million TPA
4	Capacity- Beneficiation	5.0 million TPA	6.5 million TPA
5	Mode of Entry	Ramp & Shaft	
6	Methods of Mining	Blast hole Stopping with backfilling	
7	Land Requirement	125.52 ha	125.52 ha
8	Power Requirement	40 MW	46 MW
9	Power Source	Captive Generation & AVVNL	
10	Water requirement	14000 m^3/day (STP-Udaipur & Matrikundia Dam)	16000 m^3/day (STP-Udaipur & Matrikundia Dam)
11	Manpower	1500	1800
12	Project Cost (Rs.)	2980	1051 Crores
13	Environment Protection Cost (Rs.)	183.5	100

10.4 Baseline Environmental Status

The baseline data monitoring studies have been carried out for three months representing covering Pre-monsoon season 2017 (1st March 2017 to 31st May 2017). The details are as follows:

10.4.1 Land Use

As per Satellite Imagery, the Built-up Land is 8.5%, Crop Land is about 62.6%, Water Body is 6.8% and remaining land is either area waste land. There are no wildlife sanctuary, national park and migratory routes of fauna within study area.

10.4.2 Soil Quality

For the nine soil sample under consideration the pH ranges between 7.4 to 8.5 indicating soils are slight to moderately alkaline. The EC of nine soil samples is between 83.4 to 386 µs/cm and are below the limits to be called as saline and hence the soils are normal for crop growth. The available nitrogen in the nine samples as per analysis ranges between 7.8 to 60.6 kg / ha showing low nitrogen content for crop growth. The phosphorus content of soil of nine samples ranges between 15.8 to 70.3 kg/ha and falls under low to sufficient category for crop growth. The Potassium content of nine soil samples ranges between 124.6 to 191.4 kg/ha and is very low to low for crop growth.

As per analysis of soils data and field observation the land can be classified as class III land i.e. Good soils on plain to gentle slopes subject to water erosion, as per land capability classification (USDA) i.e. good land for sustained agriculture.

10.4.3 Meteorology

Temperature ranged from 21.3^{0}C to 43.1^{0}C and the relative humidity recorded in the range of 28.1% to 53.2%. Climate represents dry arid conditions. Predominant wind direction is South West with wind speeds ranging from 1-19 kmph.

10.4.4 Ambient Air Quality

Eleven ambient air quality monitoring stations were selected in and around project site. The minimum and maximum values of PM_{10} and $PM_{2.5}$ were observed in the range of 33.6 µg/m^3 to 105.6 µg/m^3 and 21.4 – 47.3 µg/m^3 respectively. Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards.

10.4.5 Water Quality

The baseline water quality status in the region is established by analysing samples at 11 locations consisting of eight ground water samples and three surface water samples. The ground and surface water samples were analysed and found that ground water quality is well within the drinking water quality limits and surface water has been found to be suitable for drinking after the conventional treatment followed by disinfection.

10.4.6 Noise Levels

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. Noise monitoring results reveal ambient noise levels in all the locations are well within the limits as per CPCB Ambient noise standards.

10.4.7 Ecological Environment

Primary survey carried-out with respect to flora in the study area revealed about 41 species of plants, of which 14 species comprise of trees, 5 shrub species and 22 species of herbs including climbers and grass. About 24 species of birds, 8 species of mammals, 4 species of reptiles, 1 species of amphibians and 6 species of insects were reported from this region. Among the life-forms recorded herbs recorded highest species diversity and density in outer buffer layer compared to inner buffer layer. As per records of state forest department and Ministry of Environment, Forests and Climate Change, there are no protected areas and also wildlife corridors in 10 km radius from mine lease area boundary.

10.4.8 Social Environment

The study area (10-km radius) area has a total population of 91563 according to 2011 census. Total male population is about 50.26 % and total female population is around 49.74%. The average literacy rate 61.46% in the region.

10.5 Anticipated Environmental Impacts

10.5.1 Topography

The proposed expansion is an underground mining operation. The changes in the topography and landscape for excavation of mining stopes, storage of overburden, storage of ore and construction of buildings for office and machineries have already been completed for the present operations. However, some excavation for approach, mill expansion and road construction shall be done in existing land with some levelling. The existing facilities are adequate for the proposed expansion project thus not making perceptible impact on the topography and the landscape.

10.5.2 Land Use

The impacts on land use due to the mining activities are limited to the acquired leasehold area. Presently in the lease area of 199.8425 ha, 125.5 ha land has already been acquired for the proposed expansion would be within the premises only.

No land degradation would take place on account of underground mining operations.

10.5.3 Solid Waste

The waste coming out of mines is being utilized and also proposed to be utilized for height raising, filling of stope voids.

Tailing from Beneficiation Plant

The tailings are impounded separately in a dam. Water contained in the tailing slurry is reclaimed from the tailing dam and same is being used in process zero

discharge is maintained at tailing dam. Proper management of tailing disposal not only reduces fresh water input to the mill but also protects the environment from contamination due to slurry / water.

10.5.4 Air Quality

The emissions from lead and zinc mining activity depend on the intensity of ore extraction operations, mode of transportation and processing / beneficiation.

Ore loading activities, waste dumping and vehicular movement are the sources to air pollution on the surface. Drilling, blasting and crushing will be confined to underground. However, two crushing system in mine have been planned at surface. Further, the crushers in beneficiation plant are provided with dust extraction/suppressions with outlets connected to stacks which are regularly monitored also 3 nos of continuous online monitoring systems (CAAQMS) have been installed for regular ambient air quality monitoring.

Excavation of ore by drilling, blasting is carried out underground. Wet drilling is being used to suppress dust generation. Similarly, water spraying is carried out to ensure sufficient moisture in the ore transported to the surface. This minimizes any fugitive dust generation and hence impact on ambient air quality from the underground mining activity is not expected to be significant.

10.5.5 Noise Levels and Ground Vibrations

The main noise generating sources are compressors, crusher house, Ball mills, and floatation cells. Installation of ventilation fans is designed in such a manner to control the noise levels and also they are placed at isolated locations in the mine area to avoid noise pollution in the surrounding.

The noise levels and vibration induced by blasting are attenuated due to depth of the mine below ground. With the proposed expansion, the mine development will occur faster into deeper levels that shall further reduce the noise and vibration impact on the surface. Blasting is carried as per the recommendations of the CIMFR, Dhanbad and every blasting is monitored for vibration as per the DGMS rules and is found well within the permissible limits.

10.5.6 Water Quality

Water from tailing dam is being recycled/ reused for the beneficiation purposes and the same will be continued.

An additional 2,000 m^3/d of water is required for proposed expansion, in addition to approved 14,000 m^3/d water requirement for 4.5 MTPA mining & 5.0 MTPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant & Matrikundia dam. Zero discharge is being maintained. Mine dewatering due to intersection will also be consumed in the process.

10.5.7 Flora and Fauna

There are no forest blocks in the study area within 10-km radius from the mine lease boundary. Nor there any sanctuaries or national parks in 10 km radius of the mine lease area.

The schedule I species of the study area represented by avian species such as Peafowl, Indian Grey Hornbill, White Eye buzzard and Black Shouldered Kite, along with Indian monitor lizard, Indian flap shell turtle along with Indian Leopard which are listed in the Indian Wildlife (Protected) Act, 1972.

Whereas the rest of remaining fauna in the study area represented by respective schedules such as II, III, IV and V of the Indian Wildlife (Protection) Act, 1972.

Incidentally there is no presence of endangered botanical flora in the study area, as per the records of Botanical Survey of India.

10.6 Environnent Management Plan

10.6.1 Air Pollution Management

Sindesar Khurd mines being underground mine, the source of air pollution is not significant. The only possible sources of pollution are due to handling, storage, transportation & crushing ore above ground and due to plying of vehicles in the mine premises and transportation of concentrate to smelters. Transportation of extracted ore from mines to beneficiation plant is through conveyors/trucks. Dedicated fleet of trucks are deployed and maintained to ensure minimum impact due to vehicular movement.

Presently, ambient air quality monitoring is being carried out five (5) locations considering the predominant wind direction and in consultation with RSPCB. Same will be continued for the expansion. Online Ambient Air Quality monitoring have been installed in 3 locations in core zone for continuous monitoring of PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO.

10.6.2 Noise Pollution Management

The following control measures are being adopted to keep the ambient noise levels well below the limits:

- Majority of mining activities shall be restricted to underground only.
- Proposed primary crusher will be installed in 1000m depth in underground.
- Compressors are installed in isolated building.
- Ventilation fans are provided with dampeners.
- DG sets having acoustic enclosure will be installed.
- All vehicles and machineries used have noise emissions within permissible limits through regular maintenance.
- Regular monitoring of noise level of mining & milling equipment.
- PPEs (Ear plug & Ear Muff) are provided.

HZL will adopt the following control measures to obviate/minimize the impact of vibration:

- Blast design parameters have been decided based on extensive studies carried out by CIMFR who are also involved in validation/ analysis & monitoring on regular basis.
- Regular vibrating monitoring at surface on fixed stations by standard seismographs.
- Determination of predictor equation.
- Total charge and Maximum Charge per delay (MCPD) for each stope is decided based on its location derived from predictor equation.
- Use of Non electric/electronic detonator.
- Quality drilling and charge per delay optimized as per design.
- Ground vibrations are kept within statutory limits.

10.6.3 Water Pollution Management

Water will be required for various mining activities like drilling, vehicle maintenance, dust suppression, wet grinding of ore, greenbelt development and domestic consumption. Water requirement is 14000 KLD for existing operations. Additional requirement will be 2000 KLD making total water requirement after capacity enhancement to 16000 KLD. To reduce the fresh water consumption, pumped out water from mine sumps shall be recycled and utilized in appropriate industrial applications, used in dust suppression and in beneficiation plant. Water reclaimed from tailing dam will be re used in process.

10.6.4 Greenbelt Development

Suitable greenbelt has been already developed around the mine site to improve the aesthetic of the area to attenuate the noise levels and to reduce the impact of dust generated due to vehicular movement and other operations.

10.6.5 Traffic Management

Due to proposed expansion in the Mine & Mill production, traffic will be increased marginally. As the road condition is very good as per IRC Guidelines, so post expansion will have minimal impact on the current traffic as most of the traffic will be restricted between SK mine and Dariba complex and to the tailing dam to some extent.

10.6.6 Solid Waste Management

In the proposed expansion of S K Mine, no additional waste will be dumped on the surface beyond the already approved waste quantity and no additional waste dump is envisaged. The increased waste generated will be disposed off into the underground voids and height rising of tailing dam

10.7 Environmental Monitoring Programme

Regular environmental monitoring is conducted in and around project area as per stipulated guidelines by State Pollution Control Board norms, Central pollution Control Board, New Delhi and as per conditions stipulated in environmental clearance. An amount of Rs. 100 crores have been allotted for cost towards pollution control.

10.8 Risk Assessment and Disaster Management Studies

The mining operations at Sindesar Khurd mines are fairly mechanized. In underground mining operations, hazardous situation may arise leading to accidents. In the Metalliferrous Mines Regulations (1961), possibility of occurrence of hazards and the mitigation measures are spelt out in detail. Accident or hazardous situation may arise due to occurrence of any one of the following causes:

- Outbreak of fire;
- An influx of noxious gases;
- An erruption of water or inundation;
- Premature collapse of any part of workings;
- An accident due to the explosives;
- A fracture or breakage of any essential part of winding system;
- Bursting of any equipment at high pressure; and
- Air blast.

Proper precautions and remedial measures will be taken to prevent the occurrence of the above mentioned causes.

10.9 Conclusion

The proposed expansion project will have minimum impacts on the local environment, with proper mitigation measures and effective implementation of the environment management technologies and measures as suggested in the EIA/EMP report and as recommended by MoEF&CC, CPCB and SPCB. The negative impacts will be minimized to a great extent by judicious implementation of EMP.

The proposed underground expansion would immensely influence the economic aspect of the society around the project and also the state and the nation through increased revenues. About 300 nos (direct and indirect) would get direct or indirect employment in the operations and maintenance of the project.

In addition to the direct and indirect employment opportunity, HZL is already, through the CSR initiatives, providing various skills development opportunity through vocational training that would enable people become self-employed or entrepreneurs. Self help group activities is also implemented to empower rural women and make them self sufficient. Assistance being provided to the village population for access to banking facility has helped further increase the access to cheaper funds and financial facilities. Various health camps are being organized with distribution of essential medicines to improve the basic health of the village

population in the vicinity of the project site. Educational material, uniform and scholarship incentives are being distributed to the village school children to motivate them.The project proponent kept 3.0% of the total cost of the project based on local needs.

The present production capacities of Zinc in India are sufficient to meet the domestic requirements. However, the demand for zinc in India is expected to grow at a rate of 8%which makes it viable for the expansion of the zinc production capacities. Further the deficit in international market during the upcoming years provides opportunity for export.

This will improve the social and economic environment in the vicinity and also meets the raw material requirements of the expanded capacities of the company's existing plants. Besides meeting the Company's requirement of its own smelters, the mining and processing of both these minerals (Lead and Zinc) are vital for the development of our country at large.

Thus, in view of considerable benefits from the project, the proposed project is beneficial to the region as well as to the nation.

Chapter-11
Disclosure of Consultants

11.0 DISCLOSURE OF CONSULTANTS

11.1 Introduction

Vimta Labs Limited is a leading multi-disciplinary testing and research laboratory in India. VIMTA provides contract research and testing services in the areas of clinical research, pre-clinical (animal) studies, clinical reference lab services, environmental impact assessments and analytical testing of a wide variety of products.

VIMTA-Environment Division has been in the forefront of its vision to provide better environment through guiding and assisting the industry for sustainable development. A stalwart in the mission to protect and preserve the natural resources on earth for future generations, Vimta offers extensive research and consultancy services in the field of Environment. With its rich experience, multi-disciplinary expertise and with the support of its state-of the-art analytical equipment, the services offered by Vimta are wide ranging and encompasses entire gamut of environment management and monitoring services. With its emphasis on quality services, Vimta, over the years, has evolved itself into a single reference point in India for comprehensive environmental services.

11.1.1 Services Offered

Spread over 70,000 sq.ft lush green garden premises at Cherlapally, Hyderabad (India), the scientifically designed and meticulously groomed infrastructural facility of the Central Laboratory of **VIMTA** has the most sophisticated instruments backed by an excellent team of professionals.

Over 150,000 sq. ft. of world class research laboratory is also under operation at Biotech Park-Genome Valley, Hyderabad (India). Having all the facilities under one roof is perhaps the only one of its kind in South Asia in the contract testing and research sector.

Vimta offers services under the following specializations:

- Environment;
- Analytical;
- Clinical Reference Lab;
- Clinical Research;
- Preclinical;
- Molecular Biology; and
- Research and Development.

The environment division of VIMTA Labs Limited (VLL) has its presence all over India and other countries including a strong association with international consultants like Japan Bank for International Cooperation (JBIC), Kennametal Inc. - USA, Rudal Blanchard – UK, E&E Solutions – Japan, NAPESCO & Kuwait National Petroleum Corporation – Kuwait, Marafiq and Haif Consultants – Saudi Arabia and others. Vimta Labs Limited has the following credentials:

- Recognition by BIS, India;
- Recognition by Ministry of Environment, Forests and Climate Change, Govt. of India and various State Pollution Control Boards (wherever applicable);
- Recognition by Department of Science & Technology, Govt. of India (NABL);
- Accreditation by QCI/NABET; (validity up to 19th September 2016);
- Recognition by Ministry of Defence, Govt. of India;
- Recognition by APEDA, Ministry of Commerce, Govt. of India;
- Recognition by Saudi Arabia Standard Organization (SASO), Saudi Arabia;
- Recognition from NEMC, Tanzania;
- Accreditation by NCTCF;
- Certification from Standard Australia;
- Recognition from ANVISA Brazil;
- Recognition from USFDA;
- Quality Assurance Services as per ISO/IEC 17025;
- Quality Assurance Services as per ICH Guidelines; and
- Recognition by World Health Organization (WHO).

11.1.2 Quality Systems

The basic fact that environment division and its supporting site laboratories are accredited by NABL (IS0-17025) and Ministry of Environment, Forests and Climate Change, India and by other international bodies stand testimony to its emphasis on Quality Systems.

The details of the personnel's/Experts involved in the preparation of EIA/EMP report are given below:

DETAILS OF PERSONNEL INVOLVED IN EIA/EMP STUDY – VIMTA LABS LTD

Sr. No.	Name	Qualification	Position	Contribution	Experience
1	Mr. M. Janardhan	M. Tech (Env)	Vice President & Head	Co-ordination	About 24 years of experience in the field of environmental management and environmental engineering
2	Dr. B. Chandra Sekhar	M.Sc., Ph.D	Sr. Manager	Co-ordination	About 14 years of experience in the field of environmental management and modeling
3	Mr. G. V. Raghava Rao	M. Tech (Env)	Manager	Expert	About 15 years of experience in the field of environmental management and environmental engineering
4	Mr. S. Srinivas Goud	M.S.W	Group Leader	Expert	About 23 years of experience in the field of social Impact Assessment Studies
5	Mrs. Bh. Durga Bhavani	M.Sc., M. Tech (Env)	Group Leader	Expert	About 13 years of experience in the field of Environmental Management and Environmental Chemistry
6	Mr. S. Kishore Kumar	M. Tech (Env)	Group Leader	Expert	About 5 years of experience in the field of environment management and engineering
7	Mr. Rajasekhar T	M. Sc (Ecology)	Sr. Scientist	Expert	About 11 years of experience in ecological and biodiversity studies
8	Mr. M. Raja Manohar	M.Tech (Env)	Env Engineer	Expert	About 5 years of experience in the field of environment management and engineering
9	Mr. A Ch. Ramesh Kumar	M. Sc	Scientist	Expert	About 12 years of experience in the field of environment monitoring
10	Mr. Rajeshwar J	M. Sc (Geo)	Scientist	Expert	About 7 years of experience in the field of Geology and Hydrogeology
11	Dr. M. Subba Reddy	PhD (Env Chem)	Sr. Scientist	Expert	About 5 years of experience in the field of Environmental Management and Environmental Chemistry
12	Mr. K.V.Suryanarayana	M Sc, M.Tech	Env Engineer	Expert	About 15 years of experience in the field of Environmental Management and Environmental Chemistry
13	Mr. P. Rama Krishna	M. Tech (Env)	Engineer	Expert	About 3 years of experience in the field of environment management
14	Mr. Ch. Narendra	M.S.W	Scientist	Expert	About 3 year of experience in the field of Social Impact Assessment Studies
15	Mr. M. Praveen kumar	M. Tech (Env)	Tr. Engineer	Trainee	About 2 year of experience in the field of environment management
16	Mr. J. Sunil kumar	M. Tech (Env)	Tr. Engineer	Trainee	About 2 year of experience in the field of environment management
17	Mr. K S Vishnu Teja	M. Tech (Env)	Env Engineer	Trainee	About 2 years of experience in the field of environment management and engineering
18	Ms. Ashwani	M.S.C	Trainee Scientist	Expert	About 1 year of experience in the field of Environmental Management and Environmental Chemistry
19	Ms. Olive Eunice	M.Tech	Trainee Env Engineer	Expert	About 1 year of experience in the field of Environment Management and Engineering
20	Mr. P. Niranjan Babu	B.Com	Dy Manager	Secretarial Support	About 21 years of experience in the field of environmental monitoring and secretarial support
21	Mr. P. Krishna	I.T.I (Civil)	Jr. Engineer	Cartography	About 16 years of experience in the field of environmental management and civil drawings
22	Mr. J. Rama Krishna	I.T.I (Civil)	Jr. Engineer	Cartography	About 15 years of experience in the field of environmental management and civil drawings

Annexure-IA

DGM Letter

ANNEXURE-I (A)
MINE LEASE LETTER

राजस्थान सरकार
Government Of Rajasthan
कार्यालय खनि अभियन्ता, खण्ड–द्वितीय राजसमन्द ।
OFFICE OF MINING ENGINEER, DIV. II, RAJSAMAND.
खनिज भवन, बाईपास रोड, राजसमंद KHANIJ BHAWAN, BYPASS ROAD
RAJSAMAND. दूरभाष 02952–222345, फेक्स नम्बर– 02952–220190.

क्रमांक :– खअ–II / राज / सीसी–मेजर / एम0ए0ल0–7 / 1995 / 5308 दिनांक– 26.11.25
प्रेषिति :–

सर्वश्री हिन्दुस्तान जिंक लिमिटेड,

यशद भवन, उदयपुर–राजस्थान।

विषय:– एम0एम0डी0आर0 अधिनियम, 1957 की धारा 8 ए में किये गये संशोधन अनुसार खननपट्टों की अवधि वृद्धि के सम्बन्ध में।

प्रसंग:– आपके पक्ष में धारित खननपट्टा वास्ते खनिज लेड जिंक एंड एसोसियेटेड मिनरल्स निकट ग्राम सिंदेसरखुर्द तहसील रेलमगराजिला राजसमंद के सम्बन्ध में।

महोदय,

उपरोक्त विषयान्तर्गत आपको सूचित किया जाता हैकि हाल में एम0एम0डी0आर0 (संशोधन) अध्यादेश, 2015 की धारा 8 ए का समावेश किया गया है, जो कि खननपट्टों की समयावधि से संबंधित है।

आपके पक्ष में धारित प्रासंगिक खननपट्टे की अवधि दिनांक 19.3.2029 तक वैध है, एम0एम0डी0आर0 संशोधन अध्यादेश, 2015 की धारा 8ए (5) के अनुसार उक्त खननपट्टे की अवधि दिनांक 19.3.2049 तक स्वत: बढ़ गई है।

अत: संबंधित खननपट्टे की संविदा स्वत: ही उक्तानुसार संशोधित हुई मानी जाती है।

भवदीय

(ए0के0नंदवाना)
खनि अभियन्ता
खण्ड–द्वितीय,राजसमंद।

क्रमांक:– समसंख्यक / दिनांक:–
प्रतिलिपि:–
1–संयुक्त शासन सचिव महोदय खान (ग्रुप–2) विभाग, राजस्थान–जयपुर को प्रेषित है।
2– निदेशक महोदय, खान एवं भूविज्ञान विभाग, राजस्थान–उदयपुर को उनकी पत्रावली संख्या निखाभू / राज–2 / सीसी–4 / प–1(1) 7 / 1995 के संदर्भ में।
3– अतिरिक्त निदेशक (खान) महोदय, उदयपुर जोन–उदयपुर।
4– अधीक्षण खनि अभियन्ता महोदय, राजसमंद वृत, राजसमंद।

खनि अभियन्ता
खण्ड–द्वितीय,राजसमंद।

Annexure-IB

Covering Letter IBM

ANNEXURE-I (B)
APPROVED MINE PLAN LETTER

भारत सरकार
खान मंत्रालय
भारतीय खान ब्यूरो
क्षेत्रीय खान नियंत्रक का कार्यालय

पंजीकृत/साधारण

सं 682(23)(624)/2008-खनिखस(उ)उदय

हिरणमगरी,सेक्टर 11,
उदयपुर (राज.)
दिनांक
30 [illegible]

प्रेषित :- मै. हिन्दुस्तान जिंक लिमि.,
यशद भवन,
पोस्ट व जिला उदयपुर
पिन-313001 (राज.)

विषय :- खनिज रियायत नियमावली, 2016 के नियम 17 के अंतर्गत प्रस्तुत निकट ग्राम सिंदेसर खुर्द, तहसील रेलमगरा जिला- राजसमंद (राजस्थान)में स्थित सिंदेसर खुर्द लेड-जिंक खान (क्षेत्रफल-199.8425 हेक्टर) की खनन योजना सह उत्तरोत्तर खान बन्द करने की योजना का अनुमोदन ।

संदर्भ :- 1. आपका पत्र संख्या NIL दिनांक 13.06.2016 ।
2. आपके क्यू.पी. का पत्र दिनांक 28.09.2016 ।
3. इस कार्यालय का समसंख्यक पत्र दिनांक 21.09.2016 ।

Sir,

In exercise of the power conferred by the clause (b) of sub section (2) of Section 5 of the Mines and Minerals (Development & Regulation) Act, 1957 read with Government of India Order No. S.O. 445 (E) dated 28.04.1987, I hereby approve the aforesaid Mining Plan (including Progressive Mine Closure Plan). This approval is subject to the following conditions.

1) That the Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other law applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.
2) That this approval of the Mining Plan (including Progressive Mine Closure Plan) does not iin any way imply the approval of the Government in terms of any other provision of the Mines & Mineral (Development & Regulation) Act, 2015 and its Amendments or the Mineral Concession Rules 2016 or any other law including Forest (Conservation) Act, 1960, Environment Protection Act, 1986 and the rules made there under.
3) That this Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other order or direction from any court of competent jurisdiction.
4) Provisions of the Mines Act, 1952 and Rules & Regulations made thereunder including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.
5) The provisions made under MM(D&R) Act,2015 and its Amendments and Rules made thereunder shall be complied with.
6) The contents of circular No.2/2010 issued by the Chief Controller of Mines, IBM,Nagpur vide his letter No. 11013/3/MP/90-CCOM Vol.-VII dated 06.04.2010 shall be complied with.
7) The execution of Mining Plan shall be subjected to vacation of prohibitory orders/notices, if any.
8) This approval of mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under rule 28 of Mineral Conservation and Development Rules,1988, by the lessee. Indian Bureau of Mines does not take any responsibility regarding correctness of the boundaries of the lease shown on the ground with reference to the lease map and other plans furnished by the lessee.
9) The Environmental Monitoring Cell of the lessee/ Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations establishedfor the purpose both in core zone and buffer zone, as per Department of Environment guidelins and keeping in view IBM's Circular

कृ.पृ.उ.

ANNEXURE-I (B)
APPROVED MINE PLAN LETTER

3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer on demand.

10) If anything is found to be concealed as required by the Mines Act in the contents of Mining Plan and proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

11) Yearly report as required under Rule 23E(2) of MCDR, 1988 setting for the extent of protection and rehabilitation works carried out as envisaged in the approved progressive mine closure plan and if there is any deviations, reasons thereof shall be submitted before 1st July of every year to the regional office,IBM,Udaipur.

12) The mining plan is approved for the proposals contained therein and as applicable from the date of approval of the document for the mining activities to be carried out within the mining leasehold.

13) The financial assurance submitted should be renewed before expiry of the same.

14) In case mining lease falls within a radius of 10 kms. Of National Park/ Sanctuary, recommendations of NBWL have to be obtained as per the orders of the Hon'ble Supreme Court in I.A.No. 460/2004.

भवदीय

संलग्न :– अनुमोदित खनन योजना सह
उत्तरोतर खान बन्द करने की योजना की प्रति

(टी. के. रथ)
क्षेत्रीय खान नियंत्रक
भारतीय खान ब्यूरो

प्रतिलिपि सूचनार्थ –

1. श्री राम मुरारी, सिंदेसर खुर्द खान,पोस्ट दरीबा–313211, जिला राजसमंद (राज.)
2. श्री ललित चोरडिया, सिंदेसर खुर्द खान,पोस्ट दरीबा–313211, जिला राजसमंद (राज.)
3. निदेशक, खान एवं भू–विज्ञान निदेशालय, राजस्थान सरकार, खनिज भवन, शास्त्री सर्किल, उदयपुर (अनुमोदित खनन योजना सह उत्तरोतर खान बन्द करने की योजना की एक प्रति सहित– पंजीकृत डाक द्वारा)

क्षेत्रीय खान नियंत्रक
भारतीय खान ब्यूरो

Annexure-IC

Authenticated Past Production Details from DMG

ANNEXURE-I (C)
AUTHENTICATED PAST PRODUCTION DETAILS FROM DMG

राजस्थान– सरकार
कार्यालय खनि अभियन्ता, खान एवं भू–विज्ञान विभाग, राजसमंद खण्ड–द्वितीय
क्रमांक–खअ/राज–2/का.स./2017–18/ 274 दिनांक– 21.11.2017

–:: प्रमाण पत्र ::–

यह प्रमाणित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड के पक्ष में खननपट्टा एम. एल. सं. 07/1995 निकट ग्राम सिन्धेसर खुर्द तहसील रेलमगरा जिला राजसमन्द में खनिज लेड– जिंक दिनांक 19.03.2049 वर्ष तक वैध है।

पट्टाधारी द्वारा प्रस्तुत आकडों के अनुसार उत्पादन निम्नानुसार है–

वर्ष	उत्पादन टन में ओर प्रोडक्शन (मिलियन टन)
2005–06	0.0056
2006–07	0.060
2007–08	0.295
2008–09	0.299
2009–10	0.444
2010–11	0.654
2011–12	1.303
2012–13	1.585
2013–14	1.723
2014–15	1.910
2015–16	2.969
2016–17	3.664
2017–18(till Oct.2017	2.410

(एन.एल.मेघवाल)
खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

Annexure-ID
Rider Agreement

राजस्थान RAJASTHAN

पूरक संविदा

AC 881940

खननपट्टा संख्या–7/1995
प्रधान खनिज

यह नोन ज्यूडिशियल स्टाम्प क्रमांक 7028 दिनांक 01.07.2016 राशि रूपये 100/– (अक्षरे रूपया एक सौ मात्र) वास्ते खननपट्टा अवधि वृद्धि की पूरक संविदा के क्रम में सर्वश्री हिन्दुस्तान जिंक लिमिटेड के पक्ष में स्वीकृत खननपट्टा के निमित है।

चूंकि खननपट्टा शासन के आदेश क्रमांक प.17(61)/खान/ग्रुप/2/1995 जयपुर दिनांक 11.06.1998 द्वारा खनिज लेड जिंक एवं एसोसिएटेड मिनरल्स क्षैत्रफल 199.8425 हे0 के लिए सर्वश्री हिन्दुस्तान जिंक लिमिटेड यशद भवन, उदयपुर (राज.) के पक्ष में, निकट ग्राम सिंदेसर खुर्द तहसील रेलमगरा जिला राजसमन्द में संविदा पंजीयन की तिथी से 30 वर्ष के लिए, स्वीकृत किया गया, जिसकी संविदा का निष्पादन दिनांक 14.12.1998 को किया जाकर संविदा का पंजीयन दिनांक 28.03.1999 को हुआ अतः खननपट्टा अवधि दिनांक 20.03.1999 से 30 वर्ष तक प्रभावशील हुआ।

चूंकि एम0एम0डी0आर0 (संशोधन) अध्यादेश, 2015 की धारा 8 ए का समावेश किया गया है, जो कि खननपट्टों की समयावधि से संबंधित है। तदनुसार कार्यालय पत्र संख्या 5308 दिनांक 26.11.2015 से उक्त खननपट्टे की अवधि दिनांक 19.03.2049 तक स्वतः बढ कर संशोधित होने बाबत जारी किया गया। अतः खननपट्टा की अवधि दिनांक 20.03.1999 से 19.03.2049 तक एवं उक्त खननपट्टे की संविदा भी उक्तानुसार संशोधित हुई मानी गई है। वर्तमान में उक्त खननपट्टा दिनांक 19.03.1949 तक एम. एम.आर. एक्ट, एम.सी.आर. तथा भारत सरकार/राज्य सरकार द्वारा जारी विभिन्न परिपत्रों/निर्देशों के अधीन प्रभावी रहेगा। पूर्व में किये गये संविदा निष्पादन में उल्लेखित शर्ते पूर्ववत रहेंगी।

उपरोक्त पूरक संविदा का निष्पादन आज दिनांक 9-8-2016 को हस्ताक्षर किया गया।

NOTARY OF RAJASTHAN
Regd. No. 1077
Smt. ALKA JOSHI
6, MEERA PARK
BHATTIYANI CHOHATTA
UDAIPUR (RAJ.)

हस्ताक्षर पट्टाधारी (R. PANDWAL)
COMPANY SECRETARY
HINDUSTAN ZINC LTD.
YASHAD BHAWAN, UDAIPUR

हस्ताक्षर राज्यपाल की ओर से
S.K. VASHISTH S/o S.L. Sharma H.Z.L. Udaipur

गवाह नं. (1)

गवाह नं. (2)

Sign./Mark/Photo/Thumb

ATTESTED
SMT ALKA JOSHI
Reg No 1077
NOTARY UDAIPUR (RAJ.)
10/8/16

सचिव अभियन्ता
खान एवं भूविज्ञान विभाग
खण्ड द्वितीय, राजसमन्द

स्टाम्प क्रमांक 7078 श्री Hindustan Zinc Ltd

पिता श्री.................... जाति.............. उम्र........ वर्ष

निवासी Udr हस्ते श्री S.K. VASHISTH

मार्फत Agreement हेतु दिया गया दिनांक 1-7-16

1-7-16

(S.K. VASHISTH)
AGM-Geology
Hindustan Zinc Ltd
Yashad Bhawan
Udaipur-313004

(R. PANDWAL)
COMPANY SECRETARY
HINDUSTAN ZINC LTD.
YASHAD BHAWAN, UDAIPUR

Annexure-IIA&B
TOR and its Compliance

ANNEXURE-II (A)
TOR LETTER AND ITS COMPLIANCE

By Speed Post

No. J-11015/7/2017-IA.II (M)
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division
***

Indira Paryavaran Bhavan,
Vayu Wing, 3rd Floor, Aliganj,
Jor Bagh Road,
New Delhi-110 003.

Dated: 03 April, 2017

To,

The Unit Head, S-K Mine
M/s Hindustan Zinc Limited
Sindesar Khurd, P.O. Dariba,
Tehsil – Reimagra,
Distt.-Rajsamand (Rajasthan).

Sub.: Expansion of Sindesar Khurd Lead – Zinc underground mine from 4.5 million TPA to 6.0 million TPA Ore production (ROM basis) and Beneficiation from 5.0 million TPA to 6.5 million TPA, located at Sindesar Khurd Village, Tehsil: Reimagra, District Rajsamand, Rajasthan (ML No.07/95, Total M.L. Area - 199.8425 Ha., M.L Area acquired-125.52 Ha.) of M/S Hindustan Zinc Limited (HZL) – prescribing TOR regarding

Ref.: Online proposal no. IA/RJ/MIN/62174/2017

Sir,

This has reference to above mentioned online proposal for determining the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the Proponent had submitted information in the prescribed format (Form-1) along with a Pre-feasibility Report.

2. The proposal is for expansion of mineral ore production from Sindesar Khurd Lead – Zinc underground mine from 4.5 million TPA to 6.0 million TPA (ROM basis) and ore beneficiation from 5.0 million TPA to 6.5 million TPA. The project is located at Sindesar Khurd Village, Tehsil: Railmagra, District Rajsamand, Rajasthan (ML No.07/95 and M.L. area of 199.8425 Ha). The Mining Lease area acquired is 125.52 Ha which falls in Survey of India Topo sheet No. 45L/1 and 45K/4 and lies between Latitudes 24°59'N-25°01'N and Longitudes 74°09"E-74°10'E. The Mining lease was granted on 11.06.1998 and executed on

ANNEXURE-II (A)
TOR LETTER AND ITS COMPLIANCE

20.03.1999 for a period of 30 years which was subsequently extended for additional 20 years by Government of Rajasthan under the amendment of rule 8A of MMDR, 1957 on letter vide no. M.E.-II/Raj/CC-Major/ML7/1995/5308 dated 26.11.2015. The lease is now valid up to 19.03.2049. The PP had presented the proposal before the EAC using KML/SHP files on Decision Support System and submitted that the estimated in-situ ore reserves & resources in Sindesar Khurd deposit is 106.88 million tons with grades of 4.52% Zinc and 2.70% Lead.

3. Total proposed mine lease area is 199.8425 Ha out of which 125.52 Ha is acquired. The total acquired land of 125.52 Ha is barren land. The project site and surrounding area of 10 km radius from the mining lease boundary does not have any protected areas such as National Parks or Wildlife Sanctuaries, reserve or protected forest. The project is a mechanised underground Lead-Zinc mine project and the mining method adopted for SK Mine is blast hole stoping method. The ROM ore from the mine after primary crushing transported to coarse ore stock pile by belt conveyor.

4. The EC for operating mine was granted by MoEF&CC for 3.75 million TPA ore production & 4.25 million TPA ore beneficiation for Sindesar Khurd underground mine vide letter no. J-11015/10/2014-IA.II (M) dated 15-01-2016, and amended from 3.75 million TPA to 4.5 million TPA ore production & 4.25 million TPA to 5.0 million TPA ore beneficiation vide letter no. J-11015/10/2014-IA.II (M) dated 21-12-2016 under clause 7 (ii) of EIA notification, 2006. The Consent to Operate was granted by Rajasthan State Pollution Control Board, Jaipur for carrying mining activities vide letter no. F(Mines)/ Rajsamand (Railmagra)/1714(1)/2015-2016/7455-7460 dated 29.01.2016 & F(Mines)/ Rajsamand (Railmagra)/1714(1)/2015-2016/7449 -7455 dated 29.01.2016. The proposed expansion of mine is from 4.5 to 6.0 million TPA of Lead-Zinc Ore Production (ROM basis) & Lead-Zinc ore Beneficiation from 5.0 to 6.5 million TPA of which 6.0 million TPA ore will be beneficiated from SK Mine and 0.5 million TPA from Bamnia Kalan mine & other mines. The additional cost of this expansion project is around Rs. 1051Crores. The Project Proponent reported that there is no court case/ litigation is pending against the project.

5. The proposal of Terms of Reference (TOR) was considered before the Expert Appraisal Committee (Non Coal Mining Sector) in its meeting held during February **20-21, 2017** wherein the Committee prescribed the Standard TOR for undertaking detailed EIA study.

6. The matter was examined in the Ministry and the undersigned is directed to say that the Ministry of Environment, Forest and Climate Change after accepting the recommendations of the EAC, hereby decided to accord the Terms of Reference for the above mentioned project. Accordingly, the Project Proponent is requested to

ANNEXURE-II (A)
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prepare and submit the EIA/EMP report based on the TOR prescribed which are as under:-

A. Specific TOR

1) The PP should provide detailed R&R plan of Rs. 148 Crores as proposed during the presentation before EAC and the same has to be approved by District Collector/State Government of Rajasthan.

B. Standard TOR

1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.

2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.

3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.

4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

5) Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.

6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.

7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.

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8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.

9) 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.

10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.

11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.

12) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.

13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.

15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.

17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be

obtained from the Standing Committee of National Board of Wildlife and copy furnished.

18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan alongwith budgetary provisions 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.

19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.

20) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

22) One season (non-monsoon) [i.e. March - May (Summer Season); October - December (post monsoon season) ; December - February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM_{10}, particularly for free silica, should be given.

23) 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 modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.

24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.

25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.

27) 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.

28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. 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 Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.

29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.

30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.

31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government)

should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.

33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.

35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.

36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.

37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.

38) Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.

39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.

40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.

44) Details of action plan with financial and physical breakup (2.5% of the total cost of the project) to be earmarked towards the Enterprise Social Commitment (ESC) based on local needs.

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C. ADDITIONAL TOR

45) Impact of mining activity on adjacent land with particular reference to run off, soil erosion and loss of top soil due to change in topography;

46) Details of Transportation of mined out materials as per the Indian Road Congress for both the ways (loaded as well as unloaded trucks) load and its impact on Environment;

47) Cumulative impact of all existing mining on the present land use in the study area.

48) Details of the permission of the State Government as per Law for diversion of land use change, if applicable, needs to be submitted.

D. Standard TOR for mineral beneficiation project

1) The alternate sites considered, the relative merits and demerits and the reasons for selecting the proposed site.
2) Details of the technology and process involved in the project.
3) Location of the proposed plant w.r.t. the source of raw material and mode of transportations of the ore from mines to the beneficiation plant.
4) Treatment of run of from the fines/waste dump.
5) Estimation of the fines going into the washings and its management.
6) Details of the equipment, settling pond etc.
7) Detailed material balance to be provided.
8) Source of raw material and its transportation. Steps proposed to be taken to protect the ore from getting air borne.
9) Management and disposal of tailings and closure plan of the tailing pond, if any, after the project is over.
10) 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.
11) A copy of the document in support of the fact that the Proponent is the rightful lessee of the unit should be given.
12) All documents including EIA and public hearing should be compatible with one another in terms of the production levels, waste generation and its management and technology and should be in the name of the lessee.
13) All corner coordinates of the unit, superimposed on a High Resolution Imagery/toposheet should be provided. Such an Imagery of the proposed unit should clearly show the land use and other ecological features of the study area (core and buffer zone).

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14) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large may also be detailed in the EIA report.
15) Issues relating to Safety should be detailed. The proposed safeguard measures in each case should also be provided. Disaster management plan shall be prepared and included in the EIA/EMP Report.
16) The study area will comprise of 10 km zone around the plant.
17) Cumulative impact study of both beneficiation plant with suggested mitigation measures as per the study.
18) Railway siding and its location with handling capacity and safety measures.
19) Option to provide only silo for storage of minerals instead to open stacking to avoid fugitive dust.
20) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
21) Details of the land for any Over Burden Dumps outside the lease, such as extent of land area, distance from lease, its land use, R&R issues, if any, should be given.
22) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.

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23) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

24) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.

25) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

26) A study shall be got done to ascertain the impact of the Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.

27) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.

28) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan alongwith budgetary provisions 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.

29) Proximity to Areas declared as 'Critically Polluted' shall also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB/CPCB shall be secured and furnished to the effect that the proposed activities could be considered.

30) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the unit w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

31) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the lease area will be shifted or not. The issues relating to shifting of Village including their R&R and socio-economic aspects should be discussed in the report.

32) One season (non-monsoon) [i.e. March - May (Summer Season); October - December (post monsoon season) ; December - February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the unit in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.

33) Air quality modelling 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 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.

34) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.

35) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

36) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.

37) 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.

38) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.

39) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to the pollution.

40) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.

41) Details of the onsite shelter and facilities to be provided to the workers should be included in the EIA report.

42) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.

43) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
44) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
45) Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
46) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.
47) The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.
48) Provide a brief background of the project, financial position, group companies and legal issues etc.; past and current important litigations.
49) Benefits of the project if the project is implemented. The benefits of the projects shall clearly indicate environmental, social, economic, employment potential, etc.

7. Besides the above, the below mentioned general points are also to be followed:-

a) Executive Summary of the EIA/EMP Report.
b) All documents to be properly referenced with index and continuous page numbering.
c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
e) Where the documents provided are in a language other than English, an English translation should be provided.
f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-

11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.

h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.

j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

8. The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

9. The prescribed TOR would be valid for a period of three years for submission of the EIA/EMP report, as per the O.M. No. J-11013/41/2006-IA.II (I) dated 22.3.2010, 22.08.2014, 08.10.2014 and 07.11.2014. The instant TOR is valid upto **02.04.2020.**

10. After preparing the draft EIA (as per the generic structure prescribed in Appendix- III of the EIA Notification, 2006) covering the above mentioned issues, the proponent will get the public hearing conducted and take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

Yours faithfully,

3/4/17

(Surendra Kumar)
Director (S)
Tele-fax: 24695304

Copy to:

1). **The Secretary**, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi-110 001.

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2). **The Secretary**, Department of Environment, Government of Rajasthan
3). **The Secretary**, Department of Mines and Geology, Government of Rajasthan.
4). **The Chairman**, Central Pollution Control Board, Parivesh Bhawan, CBD-cumoffice complex, East Arjun Nagar, Delhi-110032
5). **The Chairman**, Rajasthan State Pollution Control Board, Jhalana Dungri, Jaipur, Rajasthan
6). **Additional Principal Chief Conservator of Forests**(C), Ministry of Environment, Forest and Climate Change, Regional Office (CZ), Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow - 226020
7). **The Controller General**, Indian Bureau of Mines, Indira Bhavan, Civil Lines, Nagpur-440 001.
8). **The Member Secretary**, Rajasthan State Pollution Control Board, Jhalana Dungri, Jaipur, Rajasthan
9). **The Member Secretary**, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
10). **The Chief Wildlife Warden** , Govt. of Rajasthan, Aranya Bhawan, Jhalana Institutional Area, Jaipur 302004 Rajasthan(India)
11). **The District Collector**, District - **Rajsamand**, Rajasthan.
12). **Guard File**
13). **MoEF&CC website**.

(Surendra Kumar)
Director (S)

ANNEXURE-II(B)
TOR COMPLIANCE

<table>
<tr><th>Sr. No.</th><th>TOR point</th><th>Compliance Status</th></tr>
<tr><td>A</td><td>Specific TOR</td><td></td></tr>
<tr><td>1</td><td>The PP should provide detailed R&R plan of Rs 148 Crores as proposed during the presentation before EAC and the same has to be approved by district Collector/State Government of Rajasthan</td><td>HZL SK Mines has prepared R&R plan of Rs 148 Crores.

Application for shifting of Sindesar Khurd village has been submitted to the District Collector in Rajasamand vide Lr No RDC/SP/R&R/2017-18 Dated 28.07.2017.(Annexure-XII)</td></tr>
<tr><td>B</td><td>Standard TOR</td><td></td></tr>
<tr><td>1</td><td>Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.</td><td>Year wise production details are given below and in Table-2.3
<table>
<tr><th>Year</th><th>EC Sanctioned</th><th>Actual</th><th>Excess Production</th></tr>
<tr><td>2005-06</td><td>0.3</td><td>0.0066</td><td>Nil</td></tr>
<tr><td>2006-07</td><td>0.3</td><td>0.060</td><td>Nil</td></tr>
<tr><td>2007-08</td><td>0.3</td><td>0.295</td><td>Nil</td></tr>
<tr><td>2008-09</td><td>0.3</td><td>0.299</td><td>Nil</td></tr>
<tr><td>2009-10</td><td>2.0</td><td>0.444</td><td>Nil</td></tr>
<tr><td>2010-11</td><td>2.0</td><td>0.654</td><td>Nil</td></tr>
<tr><td>2011-12</td><td>2.0</td><td>1.303</td><td>Nil</td></tr>
<tr><td>2012-13</td><td>2.0</td><td>1.585</td><td>Nil</td></tr>
<tr><td>2013-14</td><td>2.0</td><td>1.723</td><td>Nil</td></tr>
<tr><td>2014-15</td><td>2.0</td><td>1.910</td><td>Nil</td></tr>
<tr><td>2015-16</td><td>3.75</td><td>2.969</td><td>Nil</td></tr>
<tr><td>2016-17</td><td>4.5</td><td>3.664</td><td>Nil</td></tr>
<tr><td>2017-18 (till -Oct 17)</td><td>4.5</td><td>2.410</td><td>Nil</td></tr>
</table>
* All values are in Million Tonnes</td></tr>
<tr><td>2</td><td>A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.</td><td>The document of the rightful lessee of SK Mines is given by Department of Mines and Geology (DMG) vide Lr No is given in Annexure–I (A)

Mining Lease granted on 11.06.1998, executed on 20.03.1999 to Hindustan Zinc Limited, valid till 19.03.2049 Annexure–I (B)</td></tr>
<tr><td>3</td><td>All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.</td><td>While preparation of the EIA report compatibility of all documents like approved mine plan of ML area, production levels, waste generation, mining technology and management has been ensured.</td></tr>
<tr><td>4</td><td>All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery / toposheet should be provided. Such an Imagery of the proposed area should clearly show the</td><td>The coordinates of the mine lease area is given in following Table and also in Table–1.2 of Chapter-1 of EIA report. High resolution Imagery,</td></tr>
</table>

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TOR COMPLIANCE

<table>
<tr><th>Sr. No.</th><th>TOR point</th><th>Compliance Status</th></tr>
<tr><td></td><td>land use and other ecological features of the study area (core and buffer zone).</td><td>Land use pattern and Toposheet is shown in Figure-3.3.1, Figure-3.3.2 and Figure-1.2 clearly indicating land use and other ecological features of the study area.

<table>
<tr><th></th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>24°59'32.470"N</td><td>74°08'23.22"E</td></tr>
<tr><td>B</td><td>25°00'58.980"N</td><td>74°08'25.28"E</td></tr>
<tr><td>C</td><td>25°00'51.570"N</td><td>74°08'51.03"E</td></tr>
<tr><td>G</td><td>25°00'23.940"N</td><td>74°08'51.27"E</td></tr>
<tr><td>H</td><td>25°00'20.940"N</td><td>74°08'59.51"E</td></tr>
<tr><td>I</td><td>25°00'01.470"N</td><td>74°09'00.77"E</td></tr>
<tr><td>J</td><td>25°00'01.000"N</td><td>74°08'48.29"E</td></tr>
<tr><td>K</td><td>24°59'27.350"N</td><td>74°08'42.02"E</td></tr>
</table></td></tr>
<tr><td>5</td><td>Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.</td><td>Information of the Survey of India Toposheet showing the important water bodies, streams and rivers etc are shown in the study area map in Figure-1.2 of Chapter-1

Geological maps showing minerals and its sections of is shown in Figure-2.2.

Soil characteristics have been analysed in 9 locations in the study area and results are given in Table-3.4.3.</td></tr>
<tr><td>6</td><td>Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.</td><td>The land proposed for mining activities is as per the land use policy of the State and land has been approved by DMG for mining activity. (DMG Approval letter given in Annexure-I(A).</td></tr>
<tr><td>7</td><td>It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement / deviation /violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or</td><td>HZL has well laid policies to meet the various standards and are given in Section-9.2 of Chapter-9.

Following are some of the policies along with other policies

1. Environment Policy of Unit
2. Health, Safety and Environment Policy of Corporate
3. Energy and Climate change management Policy
4. Biodiversity Policy
5. Water Management Policy
The hierarchical system or</td></tr>
</table>

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	stakeholders at large, may also be detailed in the EIA Report.	administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions is given in **Figure-9.1.**
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Mine Safety details are covered in detail of including risk and disaster management plan is given in Chapter-7 and also subsidence studies are given in **Section-4.3.9.** Center Institute Mining & Fuel Research (CIMFR), Dhanbad is regularly carrying out subsidence study in the existing mine and same will be continued in the proposed expansion also. Blast and vibration impacts are given in **Section-4.3.3** which is studies in details by CSIR/CIMFR.
9	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.	The study area covers 10 km radius from ML boundary is given in **Figure-1.2** of **Chapter-1**. The total generation of waste till the end of mine life is 74,00,000 cum. The details of waste dump are given in **Table-2.9, Section-2.12.5 of Chapter-2.**
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre-operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given	The satellite imagery and land use maps showing the study area covering 10 km radius is given in **Figure-3.3.1** and **Figure-3.3.2** in **Section-3.3 of Chapter-3** of EIA report. Mine Lease area land use break up is given in **Table -2.7.** There is no forest, wildlife sanctuary, national park, migratory routes of fauna in the mine lease area.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Mining waste dumps are located within Mine lease. Detailed R&R plan for Rs.148 Crores has been proposed to be executed.

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12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	There is no forest land is involved. Certificate issued by DCF enclosed as **Annexure-X**.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished	Not applicable as the mine lease area does not cover any forest area.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not applicable as the mine lease area does not cover any forest area.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given	Not applicable as the mine lease area does not cover any forest area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	A study has been conducted to ascertain the impact of the Mining Project on wildlife and no impact was found due to mine operation. However conservation plan has been prepared for the schedule-I species of the study area given in **Annexure-X**
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed) within 10 km radius study area. A letter from Deputy Conservator of Forests, Rajasthan is given in **Annexure-X**.
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried	Detailed ecology and biodiversity study for the core and buffer zone was carried out during study period.

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	out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions 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.	The flora and fauna details are given **Chapter-3, Section-3.10.** The conservation plan for the schedule-I species has been given in **Annexure-X.** A budgetary provision of Rs 200 lakhs has been made and will be implemented as per the directive of the State Forest and Wild life department.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered	The project site and surrounding area are not part of critically polluted areas. The existing mine operations and proposed expansion is not falling under Aravali range. The certificate issued by Department of Mines and Geology (DMG) enclosed here as **Annexure XIII.**
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished.(Note: The Mining Project under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Application for shifting of Sindesar Khurd village has been submitted to the District Collector in Rajasamand vide Lr No RDC/SP/R&R/2017-18 Dated 28.07.2017.(**Annexure-XII**) R&R plan has been made as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 rules of Rajasthan.
22	One season (non-monsoon) [i.e. March - May (Summer Season); October – December (post	The Environmental base monitoring has been conducted from March

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	monsoon season) ; December - February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	2017 to May 2017 (Summer season). The location of the monitoring stations have been carried out representing whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. Also one monitoring station within 500 m of the mine lease is installed in the pre-dominant downwind direction. The details of site-specific, soil, meteorological data, baseline data on ambient air quality, water quality, noise level and flora and fauna are presented in Section-3.4, Section-3.5, Section-3.6, Section-3.7, Section-3.8 and Section-3.9 respectively of Chapter-3. The mineralogical composition is given in **Table-3.6.3** of **Chapter-3.**
23	Air quality modelling 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 modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map	Air quality prediction due to proposed expansion mining activity is estimated by using AERMOD modeling software and contours have been shown in **Figure-4.1 (A) to 4.1 (D).** The details provided in **Section 4.2.5 of Chapter-4.** The site specific wind rose of pre-dominant wind direction indicated on the map is shown in **Figure-3.5.1** of **Chapter-3.**
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The water requirement for the Project is being met and will be met out from the Sewage treatment plant located in Udaipur and Matrikundia Dam. The water requirement of the existing and proposed water balance is given in **Figure-2.14(A)** and **Figure-2.14(B)** given in **Section-2.11.2** of **Chapter-2.**

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25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided	Copy of agreement made for Water supply from STP Udaipur and Matrikundia Dam is given in **Annexure-VIII.** Year-wise intersection of groundwater due to underground working is envisaged and maximum intersection is estimated to be 143.40 m^3/day. Approval from CGWA will be obtained.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided	Details of water conservation measures and rainwater harvesting are given in **Section-4.2.7.2** of **Chapter-4.**
27	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.	Total 9 samples of surface and ground water have been analysed for water quality for assessing and measures are suggested in **Section-4.2.7.2** of **Chapter-4**.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. 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 Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Year-wise intersection of groundwater due to underground working is envisaged and maximum intersection is estimated to be 143.40 m^3/day. Approval from CGWA will be obtained. A detailed hydrogeological study is carried out by M/s Hydro Geosurvey Consultants Private Limited, Jodhpur and impacts have been studied and mitigation measures are given **Section-4.3.2** of **Chapter-4** and detailed hydro-geological report is given **Annexure-X.**
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Four first order streams are passing through the mine lease area, without being disturbed by the underground mining and impact details are given in hydro-geological report given in **Annexure-X.**
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	The site elevation is 579 MSL. Working depth varying from 300 m RL and 350 mRL in the underground mine, ground water table is ranging from 10 m to 12 in post- monsoon and 15 m to 20 m in pre-monsoon seasons respectively. Schematic layout plan of the project is given in **Figure-13.** of

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		Hydrogeology report
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Time bound progressive plan with selection of species has been made and Greenbelt development (46 ha) is already done in existing operation and remaining 4 ha is proposed to be completed by 2018-2019. A detailed greenbelt development Plan of the project in **Section-4.3.6** of **Chapter- 4.**
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Impact on local transport infrastructure due to the proposed project expansion is taken into consideration and traffic load has been estimated as per Indian Road Congress Guidelines. The existing road is capable to handle the incremental load, however widening of road from proposed project to Dariba smelter is planned. Details of additional traffic due to project are given in **Section-4.2.6.1** of **Chapter-4.**
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Onsite shelter and facilities to the mine workers is already available and for further expansion will be provided in the existing facility for the additional workers.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA Report.	Post mining land use and reclamation and restoration of mined out areas given in **Section-2.8.9.**
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures	Occupational Health impacts of the Project are anticipated and the proposed preventive measures are discussed in detail. Also pre-placement medical examination and periodical medical examination is being carried out and incorporated in

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	with required facilities proposed in the mining area may be detailed.	the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area are of Occupational Health and Safety details are provided In **Section-4.2.12** of **Chapter-4**. Occupational Health Measures details are provided in **Section-4.3.7**.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations	There is no public health implications due to the expansion of the mining Project and related activities on the population in the impact zone. The Periodical medical examination (PME) of all workers is being carried out and details with budgetary allocation is given in **Section-4.2.12**.
37	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation	Detailed Social Impact assessment has been carried out and proposed measures including socio economic significance and influence to the local community. Proposed measures are suggested in the management plan by HZL. Details are given in **Chapter-8**.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	All the activities of proposed project are planned within acquired area of 125.52 ha. No impact has been envisaged in loss of agricultural and grazing land and on occupational health. Environmental management plan (EMP) to mitigate the environmental impacts due to proposed project has been made and is given in **Section-4.3** of **Chapter-4**.
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing action plan will be included in **Section-7.1, of Chapter-7.**
40	Details of litigation pending against the project, if any, with direction /order passed by any	No litigation is pending against the project.

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	Court of Law against the Project should be given.	
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The estimated capital cost of the project is about Rs. 1051 Crores. Includes cost of environment protection measures (100 Crores) and recurring cost of about Rs. 12 Crores. The details are provided in **Section-9.3** of **Chapter-9**.
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	A detailed disaster management plan for the proposed expansion has been made and given in **Section-7.5** of **Chapter-7.**
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Benefits of the Project includes Increase in direct and indirect employment, Improvement socio economic status of the surrounding area, Additional Exchequer to the government etc. A detailed project benefits due to the proposed expansion project in social, economic and employment details are given in **Chapter-8.**
44	Details of action plan with financial and physical breakup (2.5% of the total cost of the project) to be earmarked towards the Enterprise Social Commitment (ESC) based on local needs.	HZL kept 3.5 % of total cost Rs 1051 Crores i.e Rs 36.75 Crores for the project based on local needs. Details given in **Section 8.6** of **Chapter-8.**
C	**Additional TOR**	
45	Impact of mining activity on adjacent land with particular reference to run off, soil erosion and loss of top soil due to change in topography;	No activity is proposed in the adjacent land and with particular reference to run off, soil erosion and loss of top soil are not anticipated.
46	Details of transportation of mined out materials as per the Indian Road Congress for both the ways (load) as well as unloaded trucks) load and its impact on Environment;	Impact on local transport infrastructure due to the proposed project expansion is taken into consideration and traffic load has been estimated as per Indian Road Congress Guidelines. The existing road is capable to handle the incremental load, however widening of road from proposed project to Dariba smelter is planned. Details of additional traffic due to

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		project and its probable impacts are given in **Section-4.2.6.1** of **Chapter-4**.
47	Cumulative impact of all existing mining on the present land use in the study area.	Existing mining operations and proposed project is within acquired area of 125.52 ha. No impact is anticipated in buffer zone.
48	Details of the permission of the State Government as per Law for diversion of land use change, if applicable, needs to be submitted.	Not Applicable.
D.	**Standard TOR for Mineral beneficiation project**	
1	The alternate sites considered the relative merits and demerits and the reasons for selecting the proposed site.	No alternate sites were considered. The proposed expansion of underground mine and mineral beneficiation is brown field project.
2	Details of the technology and process involved in the project	The details of the technology and process details are given in **Chapter-2, Section-2.10.** Typical process flow diagram is shown in **Figure-2.12.**
3	Location of the proposed plant wrt the source of raw material and mode of transportations of the ore from mines to the beneficiation plant	The ore produced from mine will be transported through conveyors/ trucks to the beneficiation plant.
4	Treatment of run off from the fines/waste dump	Run off from the waste dump is being collected through garland drains and connected to de-silting pond and further recycled in process.
5	Estimation of the fines going into the washings and its management.	The tailing from beneficiation plants is being pumped to the existing tailing dam and for filling of underground mine voids. It is proposed to continue the same.
6	Details of the equipment, settling pond etc	The equipment details are given in **Table-2.8.** The tailing dam details given in **Section-2.12.5.1**
7	Detailed material balance to be provided	A detailed material balance is given in **Figure- 2.13.**
8	Source of raw material and its transportation. Steps proposed to be taken to protect the ore	The ore generated will be transported through closed

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	from getting air borne.	conveyors/ covered trucks. Mitigation measures suggested in EMP will be implemented to minimize the air pollution.
9	Management of disposal of tailings and closure plan of the tailing pond if any after the project is over	**Management of disposal of Tailing** : A) Dewatering & disposal section comprise of tailing thickener, pumping of tailing to tailing dam and reclaimed water pumping is a part of the disposal management of tailings. B) Also the tailings from beneficiation plant is being pumped to underground mine through hydro fill/paste fill plant after mixing with cement for filling of stopes. Tailing dam summary for the life of the mine is given in **Table-2.10** of **Section-2.10 (g & h).** The detailed action plan for the disposal of the tailing is given in **Section -2.12.5.**
10	The water requirement for the project its availability and source furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be given.	The water requirement for the Project is being met and will be met out from the Sewage treatment plant located in Udaipur and Matrikundia Dam. The water requirement of the existing and proposed water balance is given in **Figure-2.14(A)** and **Figure-2.14(B)** given in **section-2.11.2** of **Chapter-2.**
11	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The document of the rightful lessee of SK Mines is given by DMG is given in **Annexure–I (A).** Mining Lease granted on 11.06.1998, executed on 20.03.1999 to Hindustan Zinc Limited, valid till 19.03.2049.
12	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and	While preparation of the EIA report compatibility of all documents like approved mine plan of ML area, production levels, waste generation, mining technology and management

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<table>
<tr><th>Sr. No.</th><th>TOR point</th><th>Compliance Status</th></tr>
<tr><td></td><td>should be in the name of the lessee.</td><td>has been ensured.</td></tr>
<tr><td>13</td><td>All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery / toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).</td><td>The coordinates of the mine lease area is given Table–1.2 of Chapter-1 of EIA report. High resolution Imagery and Toposheet is shown in Figure-3.3.1 and Figure-1.2.

<table><tr><th></th><th>Latitude</th><th>Longitude</th></tr><tr><td>A</td><td>24°59'32.470"N</td><td>74°08'23.22"E</td></tr><tr><td>B</td><td>25°00'58.980"N</td><td>74°08'25.28"E</td></tr><tr><td>C</td><td>25°00'51.570"N</td><td>74°08'51.03"E</td></tr><tr><td>G</td><td>25°00'23.940"N</td><td>74°08'51.27"E</td></tr><tr><td>H</td><td>25°00'20.940"N</td><td>74°08'59.51"E</td></tr><tr><td>I</td><td>25°00'01.470"N</td><td>74°09'00.77"E</td></tr><tr><td>J</td><td>25°00'01.000"N</td><td>74°08'48.29"E</td></tr><tr><td>K</td><td>24°59'27.350"N</td><td>74°08'42.02"E</td></tr></table></td></tr>
<tr><td>14</td><td>Does the company have a well laid down Environmental Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large may also be detailed in the EIA report.</td><td>HZL has well laid policies to meet the various standards and are given in Section-9.2 of Chapter-9.

Following are some of the policies along with other policies

1) Environment Policy of Unit
2) Health, Safety and Environment Policy of Corporate
3) Energy and Climate change management Policy
4) Biodiversity Policy
5) Water Management Policy

The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions is given in Figure-9.1.</td></tr>
<tr><td>15</td><td>Issues relating to Safety, should be detailed. The proposed safeguard measures in each case should also be provided. Disaster management plan shall be prepared and included in the EIA/EMP report.</td><td>Safety details including risk assessment and disaster management plan is given in Chapter-7.</td></tr>
<tr><td>16</td><td>The study area will comprise of 10 km zone around the plant</td><td>The study area comprises of 10 km around the plant.
The study area map is given in Figure-1.2.</td></tr>
<tr><td>17</td><td>Cumulative impact study of both beneficiation plant with suggested mitigation measures as per the study.</td><td>Cumulative impact studies of both beneficiation plant has been carried out and mitigation measures, given</td></tr>
</table>

ANNEXURE-II(B)
TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
		in **Section-4.2.6** of **Chapter-4.**
18	Railway siding and its location with handling capacity and safety measures	Not Applicable. There is no railway siding is proposed.
19	Option to provide only silo for storage of minerals instead of to open stacking to avoid fugitive dust.	Silos are being used for storage of minerals and the additional silos will be provided to control fugitive dust emission.
20	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given	The satellite imagery and land use maps showing the study area covering 10 km radius is given in **Figure-3.3.1** and **Figure 3.3.2** in Section-3.3 of Chapter-3 of EIA report. Mine Lease area land use break up is given in **Table -2.7.** There is no forest, wildlife sanctuary, national park, migratory routes of fauna in the mine lease area.
21	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Mining waste dump is located within acquired area. Detailed R&R plan for Rs.148 Crores has been proposed and to be executed.
22	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	There is no forest land is involved. Certificate issued by DCF enclosed as **Annexure-IX.**
23	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished	Not applicable as the mine lease area does not cover any forest area.
24	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of	Not applicable as the mine lease area does not cover any forest area.

ANNEXURE-II(B)
TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
	Forest Rights) Act, 2006 should be indicated.	
25	The vegetation in the RF / PF areas in the study area, with necessary details, should be given	Not applicable as the mine lease area does not cover any forest area.
26	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	A study has been conducted to ascertain the impact of the Mining Project on wildlife and no impact was found due to mine operation. However conservation plan has been prepared for the schedule-I species of the study area given in **Annexure-IX**
27	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed) within 10 km radius study area. A letter from Deputy Conservator of Forests, Rajasthan is given in **Annexure-IX**.
28	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions 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.	Detailed ecology and biodiversity study for the core and buffer zone was carried out during study period. The flora and fauna details are given **Chapter-3, Section-3.10**. The conservation plan for the schedule-I species has been given in **Annexure-IX.** A budgetary provision of Rs 200 lakhs has been made and will be implemented after approval of the State Forest and Wild life department.
29	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered	The project site and surrounding area is not part of critically polluted areas. The existing mine operations and proposed expansion is not falling under Aravali range. The certificate issued by Department of Mines and Geology (DMG) enclosed here as **Annexure-XIII.**
30	Similarly, for coastal Projects, A CRZ map duly	Not Applicable

ANNEXURE-II(B)
TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
	authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished.(Note: The Mining Project under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	
31	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Application for shifting of Sindesar Khurd village has been submitted to the District Collector of Rajasamand vide Lr No RDC/SP/R&R/2017-18 Dated 28.07.2017.(**Annexure-XIII**) R&R plan has been made as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 rules of Rajasthan.
32	One season (non-monsoon) [i.e. March - May (Summer Season); October – December (post monsoon season) ; December - February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	The Environmental base monitoring has been conducted from March 2017 to May 2017 (Summer season). The location of the monitoring stations have been carried out representing whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. Also one monitoring station within 500 m of the mine lease is installed in the pre-dominant downwind direction. The details of site-specific, soil, meteorological data, baseline data on ambient air quality, water quality, noise level and flora and fauna are presented in Section-3.4, Section-3.5, Section-3.6, Section-3.7, Section-3.8 and Section-3.9 respectively of Chapter-3. The mineralogical composition is

ANNEXURE-II(B)
TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
		given in **Table-3.6.3** of **Chapter-3**.
33	Air quality modelling 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 modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air quality prediction due to proposed expansion mining activity is estimated by using AERMOD modeling software and contours have been shown in **Figure-4.**. The details provided in **Section-4.2.5 of Chapter-4.** The site specific wind rose of pre-dominant wind direction indicated on the map is shown in **Figure-3.5.1** of **Chapter-3**
34	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The water requirement for the Project is being met and will be met out from the Sewage treatment plant located in Udaipur and Matrikundia Dam. The water requirement of the existing and proposed water balance is given in **Figure-2.14(A)** and **Figure-2.14(B)** given in **Section-2.11.2** of **Chapter-2.**
35	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided	Copy of agreement made for Water supply from STP Udaipur and Matrikundia Dam is given in **Annexure-VIII.** Year-wise intersection of groundwater due to underground working is envisaged and maximum intersection is estimated to be 143.40 m^3/day. Approval from CGWA will be obtained.
36	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided	Details of water conservation measures and rainwater harvesting are given in **Section-4.2.7.2** of Chapter-4.
37	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.	Total 9 samples of surface and ground water have been analysed for water quality for assessing and measures are suggested in **Section-4.2.7.2** of **Chapter-4**.
38	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Four first order streams are passing through the mine lease area, without being disturbed by the underground mining and impact details are given in hydro-geological report given in

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TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
		Section (Annexure-X)
39	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Time bound progressive plan with selection of species has been made and Greenbelt development (46 ha) is already done in existing operation and remaining 4 ha is proposed to be completed by 2018-2019. A detailed greenbelt development Plan of the project in **Section-4.3.6** of **Chapter- 4**
40	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.	Impact on local transport infrastructure due to the proposed project expansion is taken into consideration and traffic load has been estimated as per Indian Road Congress Guidelines. The existing road is capable to handle the incremental load, however widening of road from proposed project to Dariba smelter is planned. Details of additional traffic due to project are given in **Section-4.2.6.1** of **Chapter-4**.
41	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Onsite shelter and facilities to the mine workers is already available and for further expansion will be provided in the existing facility for the additional workers at mine.
42	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts of the Project are anticipated and the proposed preventive measures are discussed in detail. Also pre-placement medical examination and periodical medical examination schedules are being carried out and incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the

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Sr. No.	TOR point	Compliance Status
		mining area are of Occupational Health and Safety details are provided in **Section-4.2.12** of **Chapter-4**. Occupational Health Measures details are provided in **Section-4.3.7.**
43	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations	There is no public health implications due to the expansion of the mining Project and related activities on the population in the impact zone. The Periodical medical examination (PME) of all workers is being carried out and details with budgetary allocation is given in **Section-4.2.12.**
44	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation	Detailed Social Impact assessment has been carried out and proposed measures including socio economic significance and influence to the local community. Proposed measures are suggested in the management plan by HZL. Details are given in **Chapter-8.**
45	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing action plan will be included in **Section-7.1 of Chapter-7**
46	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending against the project.
47	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The capital estimated cost of the mining project is about Rs. 1051 Crores. And also cost proposed for environment protection measures will be about Rs. 100 Crores with a recurring cost of about Rs. 12 Crores. The details are provided in **Section-9.3** of **Chapter-9.**
48	Provide a brief background of the project, financial position, group companies and legal issues etc.; past and current important litigations.	A detailed disaster management plan for the proposed expansion of the ML area is given in **Section-7.5** of **Chapter-7.**

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Sr. No.	TOR point	Compliance Status
49	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Benefits of the Project includes Increase in direct and indirect employment, Improvement socio economic status of the surrounding area, Additional Exchequer to the government etc. A detailed project benefits due to the proposed expansion project in social, economic and employment details are given in **Chapter-8.**
7.	**Besides the above, the below mentioned general points are also to be followed**	
	a) Executive Summary of the EIA/EMP Report. b) All documents to be properly referenced with index and continuous page numbering. c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project. e) Where the documents provided are in a language other than English, an English translation should be provided. f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-1013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed. h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should	Complied

ANNEXURE-II(B)
TOR COMPLIANCE

Sr. No.	TOR point	Compliance Status
	be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation. i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological map sand section sand (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area	

Annexure-III
Compliance Report

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
क्षेत्रीय कार्यालय (मध्य)
Ministry of Environment, Forest and Climate Change
Regional Office (Central Region)

केन्द्रीय भवन, पंचम तल, सेक्टर–एच, अलीगंज, लखनऊ–226024
Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow- 226024, Telefax: 2326696, 2324340, 2324047, 2324025
Email: (Env.) rn_env@rediffmail.com, (Forest) goimoefrolko@gmail.com

Speed post

F. No. IV/ENV/R/Mine-540 /915/2016 /203

Date: 08.11.2017

सेवा में,

निदेशक (वै0),
माइनिंग, आई.ए. डिविजन,
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रायलय,
इन्दिरा पर्यावरण भवन, तृतीय तल, वायु विंग,
जोर बाग, रोड, अलीगंज, नई दिल्ली।

विषयः सर्टिफाइड कम्प्लायन्स रिपोर्ट ऑफ सिन्देस्वर खुर्द अण्डरग्राउण्ड माइन विद एनहैन्समेन्ट ऑफ प्रोडक्शन कैपेसिटी फाम 2.0 एम.टी.पी.ए. टू 3.75 एम.टी.पी.ए. (ROM) ऑफ लेड एवं जिंक ओर एण्ड एक्पैन्शन ऑफ ओर बेनिफीसिएशन फाम 2.0 एम.टी.पी.ए. टू 4.25 एम.टी.पी.ए. (ROM) बाय मे0 हिन्दूस्तान जिंक लि0 लोकेटेट इन विलेज सिन्देस्वर खुर्द, तहसील रेलमग्रा, राजसमन्द, राजस्थान (एम.एल.ए. 199.84 हे0)।

Ref: Environment clearance letter no. J-11015/10/2014 IA.II(M) dated 15th January, 2016

Sir,

Please find enclosed herewith duly certified compliance reports for the above mentioned project of M/s Hindustan Zinc Ltd. Sindesar Khurd, Rajasthan.

भवदीया,

सत्या

(डा0 श्रीमती सत्या)
वैज्ञानिक "डी"

प्रतिलिपिः

असि0 वाइस प्रेसिडेन्ट (पर्या0), राजपूरा दरिबा कॉम्प्लैक्स, मे0 हिन्दूस्तान जिंक लि0 पोस्ट–दरिबा, तहसील रेलमग्रा, राजसमन्द,राजस्थान।

(डा0 श्रीमती सत्या)
वैज्ञानिक "डी"

Certified Compliance Report

Subject: Sindesar Khurd underground mine with enhancement of production capacity from 2.0 MTPA to 3.75 MTPA (ROM) of lead and zinc ore & expansion of ore beneficiation from 2.0 MTPA to 4.25 MTPA (ROM) by M/s Hindustan Zinc Ltd. Located at village Sindesar Khurd, Tehsil-Railgram, Rajsamand, Rajasthan (MLA 199.84 Ha.).

Ref: MoEF & CC, New Delhi Environmental Clearance Letter No.: J-11015/10/2014-IA.II(M) dated 15.01.2016

S. No.	Specific condition	Compliance Status
i.	Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Rajasthan and any other Court of Law, if any, as may be applicable to this project.	Notes, as reported by PA.
ii.	This Environmental Clearance is subject to obtaining requisite NBWL Clearance from the Standing Committee of National Board for Wildlife, if any, applicable for this Mining project.	They have stated that this condition is not applicable for this mining project. They have also submitted that core and buffer zone area of this project has no national parks, sanctuaries, biosphere reserves, wildlife corridors, tiger/elephant reserves. During visit they have provided letter which has already been issued by office of DFO, Rajasamand.
iii.	No mining activities will be allowed in forest area, if any, for which the Forest Clearance is not available.	As reported by PA this condition is not applicable for this project as all mining activities comes under non forest area.
iv.	The project proponent shall obtain Consent to Operate from the State Pollution Control Board, Rajasthan and effectively implement all the conditions stipulated therein.	As per provided document during visit, the CTO is valid till 31.12.2018. However, application for CTE and CTO for expansion submitted to RSPCB as reported by PA.
v.	The Proponent shall install online Ambient Air Quality Monitoring System and there should be system for display AAQ data within 03 months at least at three locations as per wind direction. Online provisions of pH and turbidity meters at discharge points of STP and ETP and also at water storage ponds in the mining area may be made. Project Proponent should display the result digitally in front of the main gate of the mine site.	Three nos. online monitoring station at site and they have inform that commissioning of the same is under progress.
vi.	The Project Proponent has to take care of gullies formed on slopes. Dump mass should be consolidated with proper filling/leveling with the help of dozer/compactors. The report on slope	The waste dump consolidation is being done by compactor and dozer. Monitoring report dated 12.04.2017 has been send to this office.

Certified Compliance Status

	and stability monitoring should be sent to MoEFCC and its Regional office every six-months. Regular monitoring of slope stability of waste dump mass is being done. The waste dump consolidation is being done by compactor and dozer on regular basis. The Survey of waste dump is carried out regularly and records are maintained in bound paged book.	
vii.	The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation has been followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate. This may be recommended to be studied by hiring Expert Ecology Group.	It was found that presently waste dump is active stage. In active waste dump will be reclaim in scientific manner as reported by PA. They have also reported that it will be filled back in mine voids at the time of mine closure.
viii.	There is need for regular monitoring of invertebrates and aquatic life of water bodies including the reservoir located close to the mining lease to establish that fish and other animals including the water is not contaminated with heavy metal. There could be a research on "bio accumulation of heavy metals in invertebrates" to completely establish that there in not impact of mining.	As per submitted report conducted study report indicated that all heavy metals are found within the limit.
ix.	A specialized Institution may be hired to carry out ecological survey on the plant species to evaluate their growth in terms of stunted, deformed and seed viability. The sensitive species and indicator species to heavy metal pollution may be screened out and plantation accordingly designed. Similarly, uptake of Zinc, Cadmium and lead etc. by crops and vegetables grown in the crop lands around the mining lease may be studied. Bottom sediment analysis of ponds, wells and Rivers to ascertain the level or accumulation of heavy metal may be done.	During visit as per document provided by PA , it was indicated that zinc was traceable and lead cadmium found bdl.
x.	The Proponent shall conduct an Occupational health study with respect to the pressure impact on ear drums as person goes underground and implement the recommendations.	As per discussion and information provided during visit, they have conducted occupational health study on 130 employees and no impact has been observed irrespective of depth of working.

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xi.	Project Proponent shall carry out vibration studies well before approaching any such habitats or other buildings to evaluate the zone of influence and impact of blasting on the neighborhood. Within 500 meters of such sites vulnerable to blasting, vibration avoidance of use of explosives and adoption of alternative means of mineral extraction. A provision for monitoring of each blast should be made so that the impact of blasting on nearby habitation and dwelling units could be ascertained. The convenient of lease deed under Rule 31 of MCR 1960 provides that no mining operations shall be carried out within 50 meters of public works such as public roads and buildings or inhabited sites except with the prior permission from the Competent Authority.	As per discussion and information provided by PA blast design is being done as per recommendations of CIMFR keeping public infrastructure in view. Due care is taken in designing the blast, optimizing, the explosive, selection the detonator and delay to ensure safe vibration limit on surface.
xii.	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariable be provided with Bag filters and or dry fogging system. Belt-conveyors should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	During visit, it was found that permanent water sprinkler has been provided at crusher point. Haul roads were found wetted through mobile water sprinkler. Conveyers belts were found cover during visit.
xiii.	The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly. Project should obtain "PUC" certificate for all the vehicles from authorized pollution testing centers.	As per information provided by PA during visit PUC certificates for all vehicles are being ensured. During visit all transportation vehicles were found with tarpaulin.
xiv.	Project Proponent shall appoint an Occupation Health Specialist for Regular and Periodical medical check-up once in six months and necessary medical care/preventive measures undertaken accordingly. Recommendations of National Institute for Labour for ensuring good occupational environment for mine workers should also be adopted. Project Proponent has occupational health center and hospital catering to all the medical checkups as per the guide lines laid down by the DGMS.	Occupation health specialist is appointed for PME once in six month is being ensured as reported by PA.
xv.	Proponent shall carryout monitoring of lead in the blood samples of the	The analytical report are attached Annexure-I.

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	employees and the villagers in the areas surrounding the mine in their schedule of health check-up. The nearby water bodies shall be monitored every six months and report submitted to Regional office of the MoEF to ascertain impact due to lead contamination.	
xvi.	Implementation of Action Plan on the issues raised during the Public Hearing shall be ensured. The Project Proponent shall complete all the tasks as per the Action Plan submitted with budgetary provisions during the Public Hearing.	Action plan is in under implementation as reported.
xvii.	Project Proponent reported that there is Schedule -I species viz. Indian Peafowl, Indian Grey Hornbill, White eyed Buzzed, Black Shouldered Kite, Monitor Lizard and Indian Flap Shell /Turtle in the study area for which Proponent has made Conservation Plan. The Proponent shall implement the Wildlife Conservation Plan along with the funds so allocated with consultation of Chief Wild Life Warden of the State Govt. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office, Lucknow and the Chief Wild Life Warden of the Stat Govt.	They have stated that conservation plan is submitted to DFO, Rajasamand. Copy of the action plan submitted to this regional office along with first EC compliance report on 25.05.2016 as stated.
xviii.	Implementation of the outcome of study with regards to "optimization of blast design parameter for the safety and stability of surface structures and subsequent monitoring of vibration on the surface structures for their long term stability" which was carried out by Central Institute of Mining and Fuel Research should be ensured.	They have stated that blast design study by CSIR-CIMFR and Implementation of outcome are being ensured as reported.
xix.	Continuous monitoring of radioactive elements, if any, shall be undertaken till entire mine is dewatered and report has to be submitted to MoEFCC Regional Office. Periodic monitoring of any adverse impact of Radon and its daughter products on any worker should be included in the Occupational health Monitoring Programme.	Monitoring report is enclosed as Annexure-2.
xx.	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, forest and Climate Change 5 years in advance of final mine closure for approval.	They have stated that it shall be ensured before closure.

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General Conditions:		
i.	No change in mining technology and scope of working should be made without prior approval of the Environment, Forest and Climate Change.	Assured to comply
ii.	No change in the calendar plan including excavation, quantum of mineral Zinc-Lead ore and waste should be made.	Following information has been submitted by PA: Year / Ore Production / Ore Treatment 2014-15 / 1910055 / 1913751 2015-16 / 2969587 / 2567816 2016-17 / 3664768 / 2921337
iii.	Implementation of Environment Management Policy of the Company w.r.t. judicious use for Mineral resources for growth & development synchronizing mining & environment with prosperity.	Assured to comply
iv.	There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis in consultation with Regional Director, Central Ground Water Board. And implementation of conservation measures to augment ground water resources in the area of consolation with Central Ground Water Board.	They have stated that deepening of nine numbers village ponds in consultation with CGWB implemented in June, 2016 in nearby villages.
v.	Regular monitoring of ground water table should be carried out at the upstream and depth of water available in the dug well is to be measured. Monitoring should be done by establishing a network of existing wells and constructing new piezometers.	Details are attached in Annexure-3
vi.	Monitoring of Ambient Air Quality should be carried out based on the new Notification of 2009, as amended from time to time by the Central Pollution Control Board.	Ambient Air Quality monitoring report is attached as Annexure-4.
vii.	For the upliftment of scheduled caste/scheduled tribe population, specific programmes have to be taken specially with respect to education, health care, livelihood generation, infrastructure development & promotion of sports & culture for SC/ST population and that these will be intensified in future.	As reported by PA Rs. 0.33 Crores spent for uplift of the community.
viii.	The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations. Catch drains and siltation ponds of appropriate size shall be	They have stated that no natural water course is obstructed during mining operation. Catch drains have been provided by PA. Water is being recycle.

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	constructed around the mine working and mineral dumps to prevent run off of water and flow of sediments directly into the river and other water bodies. The water so collected should be utilized for watering the mine area, roads, green belt development etc. the drains shall be regularly desilted particularly after monsoon and maintained properly. The drains, settling tanks and check around the mine and dumps to prevent run off of water and flow of sediments directly into the river and other water bodies and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years date) and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals.	
ix.	Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintained.	Details are attached in Annexure-5.
x.	Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained and submitted to the Ministry of Environment, Forest and Climate Change, its Regional Office, Lucknow, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	This condition has already been stated in previous condition.
xi.	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring shall be carried out four times in a year – pre – monsoon (April-May), Monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to Ministry of Environment, Forest and Climate Change, its Regional Office, Lucknow, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	This condition has already been stated in previous condition. Five AAQ monitoring stations have been established.

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xii.	Four ambient air quality- monitoring stations should be established in the core zone as well as in the buffer zone for PM_{10}, $PM_{2.5}$, So_x & NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the state Pollution Control Board.	This condition has already been stated in previous condition.
xiii.	Data on ambient air quality PM_{10}, $PM_{2.5}$, So_x & NO_x should be regularly submitted to the Ministry including its Regional office located at Lucknow and the state Pollution control Board/ Central Pollution Control Board once in six months.	This condition has already been stated in previous condition.
xiv.	The critical parameter such as PM_{10}, $PM_{2.5}$, So_x & NO_x in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [[TDS, DO, pH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The circular No. J-20012/1/2006IA.II (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.	This condition has already been stated in previous condition. Zero discharge is being maintained by recycling process. Data is being displayed on company website and display at main gate.
xv.	Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.	This condition has already been stated in previous condition.
xvi.	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs/ muffs.	As per submitted report the noise level is mentioned below 85 dBA. During visit it was found that ear plub/muffs are provided to workers.
xvii.	Plantation shall be raised in a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around water body, along the roads	As reported by PA till date 70,000 numbers plant have been planted in 46.0 hectares of acquired area. 4.0 heatare area will further be covered under plantation in next two years, as

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	etc. by planting the native species in consultation with the local DFO/ Agriculture Department. The density of the trees should be around 2500 plants per ha or more. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.	assured by PA.
xviii.	Industrial waste water (workshop and waste water from the mine) should be properly collected treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	It was found that mine water is being reused in process oil and grease tap system is provided in workshop.
xix.	Personnel working in dusty areas should wear protective respiratory device and they should also be provided with adequate training and information on safety and health aspects.	Being implemented
xx.	Occupation health surveillance program of the workers should be undertaken periodically to observe any contractors due to exposure to dust and take corrective measures, if needed.	This condition has already been stated in previous condition.
xxi.	A separate environmental management cell with qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.	Being complied
xxii.	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Lucknow.	Details are attached in Annexure-6.
xxiii.	The project authorities should inform to the Regional Office located at Lucknow, date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	Assured to comply
xxiv.	The Regional Office of this Ministry located at Lucknow shall monitor compliance of the stipulated conditions. The project authorities should extent full cooperation to the officer(s) of the Regional Office by furnishing the requisite date/ information/ monitoring reports.	Being complied

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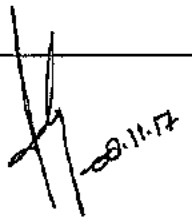
xxv.	The project proponent shall submit six monthly report on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment, Forest and Climate Change, its Regional Office, Lucknow, Central Pollution Control Board and State Pollution Control Board.	Being complied
xxvi.	A copy of clearance letter will be marked to concerned Panchayat/ local NGO, if any, from whom suggestion/ representation has been received while processing the proposal.	As reported, letter has sent to local panchayat in January, 2017
xxvii.	State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and Collector's office/ Tehsildar's Office for 30 days.	Noted as reported.
xxviii.	The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issued of the clearance letter informing that the project has been accorded environmental clearance and s copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment, Forest and Climate Change at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Lucknow. Published on 16.01.2016 in Rajasthan Patrika & Danik Bhasker Rajsamand Edition	As reported it is published on 27.12.2016 in Rajasthan Patrika and Dainik Bhasker.



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Annexure-I

BLOOD ANALYSIS OF VILAGGERS , EMPLOYEES AND CONTRCTOR EMPLOYEES

VILLAGERS

Sr No	NAME	FATHER NAME	VILLAGE	AGE	SEX	BLOOD LEAD mcg PER 100 ml BLOOD
V-1	SHANKRI	BHAGWAN	RAGHUNATHPURA	30	FEMALE	3
V-2	CAOSAR BAI	JASRAJ	RAGHUNATHPURA	40	FEMALE	7
V-3	KAMLESH GADRI	SHANKERLAL	RAGHUNATHPURA	35	FEMALE	4
V-4	SITA DEVI	DEVILAL	RAGHUNATHPURA	21	FEMALE	2
V-5	KAMLI	HARIRAM	RAGHUNATHPURA	45	FEMALE	5
V-6	PUSHPA	SHIVLAL	RAGHUNATHPURA	57	FEMALE	9
V-7	KALI	BADRILAL	MAKANPURIA	45	FEMALE	1
V-8	MANGI BAI	BHERAJI	MAKANPURIA	37	FEMALE	6
V-9	BHANWARI BAI	MOHANLAL	MAKANPURIA	32	FEMALE	7
V-10	BHOLI BAI	DOONGAI	MAKANPURIA	37	FEMALE	7
V-11	CHAMELI BAI	DEVAJI	MAKANPURIA	42	FEMALE	3
V-12	BHAGWAN LAL	GHASI RAM	RAGHUNATHPURA	75	MALE	4
V-13	DOLARAM	DAYARAM	RAGHUNATHPURA	65	MALE	10
V-14	KANHIYALAL	GOPILAL	RAGHUNATHPURA	40	MALE	3
V-15	DINESH	BHERULAL	RAGHUNATHPURA	18	MALE	1
V-16	GOPILAL	GANESHJI	RAGHUNATHPURA	18	MALE	6
V-17	BHERULAL	DOLAJI	RAGHUNATHPURA	35	MALE	3
V-18	AMBALAL	LEHRULAL	RAGHUNATHPURA	50	MALE	5
V-19	GANESH	BHURALAL	RAGHUNATHPURA	53	MALE	7
V-20	NARAYAN	JEETMAL	MAKANPURIA	47	MALE	4
V-21	SHANKERLAL	BHERULAL	MAKANPURIA	44	MALE	2
V-22	GOVERDHAN	LEHRUJI	MAKANPURIA	43	MALE	5
V-23	MUKESH	BADRILAL	MAKANPURIA	48	MALE	3
V-24	SHRILAL	LEHRUJI	MAKANPURIA	23	MALE	4
V-25	GOVERDHAN	BHURIAJI	MAKANPURIA	39	MALE	5

Patil

EMPLOYEES

Sr.NO.	NAME	E.NO	SAMPLE NO.	LEAD VALUE
1	S PRAVEEN(SK MILL)	289902	954	4
2	AMIR KHAN(SK MILL)	268022	955	6
3	MOTA RAM KUMAWAT(SK MILL)	283574	956	8
4	AKSHITA(SK MILL)	577397	958	6
5	ARUN KUMAR(SK MILL)	296791	959	4
6	HIMANSHU JOSHI(SK MILL)	296869	960	5
7	NAVEEN KUMAR(SK MILL)	296953	961	2
8	MALIK MOHD.(SK MILL)	296898	962	7
9	ROHIT KUMAR(SK MILL)	297059	969	9
10	SHIV RAJ(SK MILL)	297088	970	8
11	SAITAN SINGH(SK MILL)	297075	971	7
12	SUBHASH SINGH(SK MILL)	297091	972	2
13	UPENDRA SHARMA(SK MILL)	297156	973	10
14	SUVANKAR BHODRA(SK MILL)	298087	976	7
15	SUMMIT SHRINGI(SK MILL)	298809	978	9
16	RAMESH KUMAR SAINI(SK MILL)	298757	979	5
17	RAHUL GUPAT(SK MILL)	298715	981	4
18	SURESH PAILA(SK MILL)	299882	982	5
19	SWAGAT RANJAN(SK MILL)	561961	983	4
20	NAVNEETHA KRISHNAM(SK MILL)	297509	984	7
21	A K JAIN(SK MILL)	31190	985	3
22	MANDHATA SINGH	31189	986	4
23	MANOJ(SK MILL)	560964	988	6
24	ASHOK KUMAR(SK MILL)	560621	989	6
25	AMRITA LAKHRU(SK MILL)	561167	990	7
26	NAVED AZAD(SK MILL)	561277	991	4
27	SOBHA LAL JAT(SK MILL)	561073	992	3
28	MOHAN LAL(SK MILL)	59656	1057	7
29	P IRFAN(SK MILL)	573430	1058	6
30	PRADEEP(SK MILL)	562331	1070	5
31	LINGESHWAR(SK MILL)	563217	1071	5
32	GAURAV GAUR(SK MILL)	562140	1074	5
33	AMANDEEP BENIWAL(SK MILL)	563356	1076	4
34	RAJENDRA SHARMA(SK MILL)	563593	1077	9
35	PRAFUL PATEL(SK MILL)	564119	1080	7
36	AVINASH (SK MILL)	296335	1089	5
37	V J K CHATANYA(SK MILL)	564135	1090	5
38	PRABHU LAL PANWAR(SK MILL)	565697	1096	3
39	ASHVINI KUMAR (SK MILL)	565503	1097	6
40	VISHNU KUMAR(SK MILL)	565817	1098	10
41	GUNJAN KOTHARI(SK MILL)	567475	1108	6
42	GAYTRI(SK STORE)	566764	1110	7
43	ANKITA(SK LAB)	565846	1111	8
44	VEENEET GUPTA(SK MILL)	297172	1115	10
45	PITAMBER VARMA(SK MILL)	567679	1116	7
46	ANIL KUMAR PATWA(SK MILL)	567763	1117	8
47	ANIL KUMAR BUNKAR(SK MILL)	570213	1140	2
48	KARTIK KUMAR M(SK MILL)	571238	1149	7
49	FAIYAZ ANSHARI(SK MILL)	571115	1150	6
50	KANCHAN SINHA(SK MILL)	571226	1157	3
51	GOMPAVARAHA LALITHA(SK MILL)	573338	1167	4
52	RAJESH TARD(SK MILL)	577485	1740	16

Sr.No	NAME	E.No	LEAD VALUE
1	DEVENDRA SINGH	13200	12
2	CHETRAM NAGAR	13953	15
3	SATYANARAYN MEWARA	13958	13
4	ROSHAN KUMAR-1	13887	12
5	SOHAN GADRI	—	10
6	KISHAN LAL TAK	17927	9
7	PARSHRAM SHARMA	17911	9
8	SANJAY MALVIA	14152	7
9	SHANATI LAL	18013	8
10	SALIM BEG	17973	6
11	BALU RAM	18020	7
12	SHANKAR LOHAR	18021	4

This status report should be submitted by the authorized user of the nucleonic devices through eLORA system in the first week of January & July every year, as per the terms and conditions of the authorization issued under the Atomic Energy (Radiation Protection) Rules, 2004.

Name of Institution:	Sindesar Khurd Mines
LORA Institution Number	RJ-35620
Period of the report	January'17

1.	Total number of Nucleonic Gauge (NG) devices/sources in possession of your institution:	22
2.	Total number of NG devices/sources not in use:	0
3.	Total number of NG devices/sources which are disused and to be disposed off:	0
4.	Steps being taken to dispose of disused sources, if any:	NA
5.	Whether periodic radiation protection survey performed for all NG devices/sources and records are maintained?	Yes /No
6.	Whether personal monitoring services availed for radiation workers (as applicable):	Yes /No /NA
7.	Whether adequate physical security measures provided for NG devices/ sources?	Yes /No
8.	Whether Radiation symbol and warning in English, Hindi and regional language displayed on source housing and at the fencing/ at the access point of NG devices?	Yes /No
9.	Emergency procedures with contact details of responsible person displayed at appropriate location in the institution?	Yes /No
10.	Whether the representatives of AERB inspected the Nucleonic Device installations:	Yes /No
11.	If yes, dates of inspection	
12.	Any other information:	NA

09. DETAILS OF NUCLEONIC GAUGES

Sl. No.	Make, Model of nucleonic device	Number of nucleonic devices	Serial number of nucleonic device	Source & Activity	*Stray Radiation Level from External surface of device (mSv/hr or mR/hr)		Location/ Plant name	Reference No. of NOC issued by AERB/BARC
					5 cm	100cm		
1	Berthold LB491	1	463-02-10	Cs137 & 15 mCi	0.25	0.01	U/P HYDROBIL	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2010
2	Berthold LB492	1	464-02-10	Cs137 & 15 mCi	0.27	0.06	U/P HYDROBIL	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2011
3	Berthold LB493	1	465-02-10	Cs137 & 15 mCi	0.19	0.08	REGRIND CYCLONE	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2012
4	Berthold LB494	1	466-02-10	Cs137 & 10 mCi	0.27	0.08	PR.SEC CYCLONE STR-1	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2013
5	Berthold LB495	1	467-02-10	Cs137 & 10 mCi	0.29	0.06	PR.SEC CYCLONE STR-2	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2014
6	Berthold LB496	1	468-02-10	Cs137 & 10 mCi	0.27	0.05	TDFH	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2015
7	Berthold LB497	1	469-02-10	Cs137 & 10 mCi	0.23	0.09	TDFH	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2016
8	Berthold LB498	1	470-02-10	Cs137 & 10 mCi	0.2	0.08	TDFH	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2017
9	Berthold LB499	1	471-02-10	Cs137 & 10 mCi	0.17	0.02	TAILING THICKENER	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2018
10	Berthold LB500	1	472-02-10	Cs137 & 10mCi	0.23	0.08	ZN FLOTATION	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2019
11	Berthold LB501	1	473-02-10	Cs137 & 20mCi	0.08	0.07	ZN THICKENER	AERB/RSD/NG/NR435/2010/2641 Dt.22/03/2020

[illegible]	Berthold [illegible]	1	1017-06-10	Cs137 & 10mCi	0.16	0.03	TAILING THICKENER	AERB/RSD/NG/NR[illegible]/2011/[illegible] Dt 15/02/2011
[illegible]	[illegible]	1	TB616	Cs137 & 200mCi	1.43	0.24	LOW	AERB/RSD/NG/NR435/[illegible] Dt 14/10/2010
14	[illegible]	1	TB617	Cs137 & 200mCi	1.55	0.37	HIGH	AERB/RSD/NG/NR435/201[illegible] Dt 14/10/2011
[illegible]	Berthold [illegible]	1	1372-08-12	Cs137 & 10mCi	0.21	0.08	CYCLONE FEED HYDROFILL	AERB/RSD/NG/NR435/2012/[illegible] Dt 23/08/2012
[illegible]	Berthold [illegible]	1	1373-08-12	Cs137 & 20mCi	0.29	0.11	CYCLONE FEED HYDROFILL	AERB/RSD/NG/NR435/2012/[illegible] Dt 23/08/2013
17	Berthold 18507	1	1374-08-12	Cs137 & 10mCi	0.13	0.02	HYDROFILL	AERB/RSD/NG/NR435/2012/[illegible] Dt 23/08/2014
18	Berthold 18508	1	1375-08-12	Cs137 & 10mCi	0.18	0.09	HYDROFILL	AERB/RSD/NG/NR435/2012/[illegible] Dt 23/08/2015
19	Berthold [illegible]	1	1514-08-13	Cs137 & 50mCi	0.2	0.06	PASTE FILL TAILING THICKNER	AERB/RSD/NG/NR435/2013/[illegible] Dt 02/09/2013
20	Berthold [illegible]	1	1515-08-13	Cs137 & 50mCi	0.23	0.07	PASTE FILL TAILING THICKNER	AERB/RSD/NG/NR435/2013/[illegible] Dt 02/09/2014
21	Berthold [illegible]	1	1516-08-13	Cs137 & 20mCi	0.5	0.09	PASTE FILL	AERB/RSD/NG/NR435/2013/[illegible] Dt 02/09/2015
22	Berthold [illegible]	1	1599-09-13	Cs137 & 20mCi	0.35	0.14	PASTE FILL	AERB/RSD/NG/NR435/201[illegible] Dt 24/09/201[illegible]

I hereby certify that the above particulars are true to the best of my knowledge and belief and are in complete conformity with the applicable terms and conditions of authorization and that the sources in our possession have been physically verified by me and found satisfactory from radiation safety point of view.

Radiological Safety Officer
Signature:
Name: [illegible]
Date: [illegible]

Employer/Licensee
Signature:
Name: [illegible]
Date: [illegible]

(Seal of the Institution)
[illegible]
Sindesar Khurd Mine
Hindustan Zinc Limited
P.O. Dariba 313211
Dist. Rajsamand (Raj.)

Annexure -III

Table-1. Co-ordinates of the constructed Piezometers during January, 2017 to September, 2017

S. No.	PZ No.	Location	Latitude	Longitude	Depth of Piezometer	Jan 2017	Feb 2017	Mar 2017	April 2017	May 2017	June 2017	Aug 2017	Sept 2017
1.	Pz-1	main gate before	24° 59' 32.92"	74° 08' 32.14"	145.0	21.93	23.78	21.14	26.69	27.23	27.92	18.97	19.10
2.	Pz-2	Garage	25° 00' 07.19"	74° 08' 49.65"	140.0	16.59	7.18	17.11	19.15	21.02	23.27	13.56	14.38
3.	Pz-3	Temple	25° 00' 12.9"	74° 08' 44.39"	140.0	22.69	23.73	25.13	26.37	29.21	29.35	21.76	22.03
4.	Pz-4	2nd gate at right side	24° 59' 51.86"	74° 08' 41.77"	135.0	9.48	11.35	13.95	16.76	18.61	20.44	10.41	11.76
5.	Pz-5	Straight Last wall boundary	25° 00' 22.68"	74° 08' 50.07"	145.0	23.67	24.82	25.58	26.81	27.10	27.32	23.14	24.38

Table-2. Co-ordinates and hydrogeological data of existing open wells to be monitored as key wells under the network system during January, 2017 to September, 2017

Well No.	Village	Latitude	Longitude	Depth of well	Jan 2017	Feb 2017	March 2017	April 2017	May 2017	June 2017	Aug 2017	Sept 2017
K-1	Shivpura	24° 59' 22.2"	74° 08' 38.9"	30.46	6.72	20.13	21.63	22.15	21.62	23.71	7.55	8.41
K-2	Shivpura	24° 59' 43.0"	74° 08' 55.2"	26.21	7.15	20.17	21.72	22.19	22.87	23.11	7.09	8.06
K-3	Sindesar Khurd	25° 00' 28.1"	74° 08' 27.7"	28.96	11.23	23.08	23.47	18.32	23.51	24.16	7.51	8.35
K-4	Sindesar Khurd	25° 00' 41.7"	74° 08' 18.5"	31.09	10.86	22.57	22.74	19.44	23.54	24.33	8.11	8.78
K-5	Lathiyakheri	25° 01' 09.9"	74° 07' 58.8"	30.39	12.45	14.61	9.81	11.15	12.03	13.15	8.49	9.06
K-6	Lathiyakheri	25° 01' 31.7"	74° 08' 34.1"	28.96	8.59	10.95	15.54	16.18	17.38	18.08	13.63	14.03
K-7	Navachara	25° 00' 42.8"	74° 09' 18.3"	34.00	9.07	11.07	13.14	15.11	17.01	19.21	9.39	10.06
K-8	Near Railmagra	25° 00' 42.4"	74° 07' 29.7"	30.00	8.71	10.33	12.06	13.09	13.86	15.73	11.05	11.27

HINDUSTAN ZINC LIMITED
SINDESAR KHURD MINE

Ambient Air Reports

Month : Oct.2016

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	289.26	35.83	51.41	16.11	6.16	230
Rajpura	249.64	29.8	66.53	15.15	5.62	250
Sindesar Khurd	205.68	40.5	54.18	14.21	5.8	210
Within Acquired Area	303.77	32.34	77.27	15.95	5.42	340
Mine Area Boundary in N-E direction	201.78	43.19	70.85	17.7	5.27	380

Month : Nov.2016

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	196.91	49.17	71.72	14.9	5.82	250
Rajpura	199.77	28.47	86.95	22.46	3.82	190
Sindesar Khurd	353.71	38.71	80.3	16.69	5.67	230
Within Acquired Area	281.8	33.87	71.11	14.05	6.44	430
Mine Area Boundary in N-E direction	245.25	48.84	80.77	15.16	5.16	370

Month : Dec. 2016

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	336.4	38.94	87.38	15.78	3.58	450
Rajpura	340.97	19.01	80.91	21.7	7.38	240
Sindesar Khurd	248	46.58	80.43	16.09	5.47	430
Within Acquired Area	318.01	44.91	89.49	12.79	5.67	420
Mine Area Boundary in N-E direction	178.66	40.21	81.93	14.92	5.07	390

Digambar S.Patil
(Head -Environment)

HINDUSTAN ZINC LIMITED
SINDESAR KHURD MINE

Ambient Air Reports

Month : January 2017

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	205.55	47.89	81.71	21.83	4.75	200
Rajpura	431.14	48.07	87.8	28.54	5.42	490
Sindesar Khurd	246.71	44.68	87.55	19.46	5.85	230
Within Acquired Area	418.31	45.85	83.19	21.59	5.61	380
Mine Area Boundary in N-E direction	225.1	31.62	71.11	23.12	7.65	410

Month : February 2017

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	355.6	49.98	81.82	21.62	6.16	210
Rajpura	182.31	42.87	86.55	13.38	5.36	190
Sindesar Khurd	388.06	34.84	77.27	17.63	3.57	230
Within Acquired Area	282.37	49.19	74.29	12.24	5.07	470
Mine Area Boundary in N-E direction	335.38	46.77	83.94	12.51	6.16	380

Month : March 2017

(All values are in µg/m³)

Location	SPM	PM2.5	PM10	NOx	SO2	CO
Bamania Kalan	142.02	17.23	67.13	18.23	5.85	320
Rajpura	125.33	27.42	50.18	16.97	5.94	230
Sindesar Khurd	268.48	28.38	68.63	15.99	4.27	210
Within Acquired Area	262.15	27.44	76.56	18.04	5.24	460
Mine Area Boundary in N-E direction	215.31	33.51	74.01	14.97	6.4	380

Digambar S.Patil
(Head -Environment)

Annexure - IV

Monitoring Report of Flow Rate of Spring and Perennial Nallas Inside and around the Mine lease

Sr.No	Details of drains	Avg. Flow rate during Monsoon in M3/Hr
1	Near Sec. gate	174
2	Near Old Weigh Bridge	139
3	Near Reservoir	174
4	Near Core Shed.	209

155	ROSHAN JAT	17970	2
156	UMESH SUTHAR	17975	1
157	INDAR MAL JAT	18741	4
158	LAXMAN SINGH	14359	9
159	H RAHAMAN	15857	1
160	KESHAR SINGH	15634	2
161	MUKESH KUMAR VIJAYVARGI	13969	3
162	JAI CHAND	14161	2
163	JAGDISH KUMAWAT	---	1
164	BHARAT MENARIA	17951	3
165	KAILASH CHANDRA GADRI	13889	1
166	TEJ SINGH(SKM HOFINCONS)	17930	3

5. Year wise expenditure is required (general condition xxii)

Environmental Expenditure of last five years is as per following,

Year	Expenditure in Crore
2016-17	2.72
2015-16	1.25
2014-15	2.00
2013-14	1.37
2012-13	1.25

Thanking You,

For Hindustan Zinc Limited

Yours Faithfully,

10/10/17

Rajeev Bora
Unit Head ,
Sindesar Khurd Mine.

Annexure-IV

Applicable Environmental Standards

ANNEXURE-IV
APPLICABLE ENVIRONMENT STANDARDS

1.0 Ambient Air Quality Standards

National Ambient Air Quality Standards for ambient air has been prescribed by the Environment (Protection) Seventh Amendment Rules, 2009 dated 16th November 2009. The prescribed Standards are given below in **Table-1.**

TABLE-1
NATIONAL AMBIENT AIR QUALITY STANDARDS

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur dioxide (SO_2), µg/m³	Annual*	50	20	-Improved West and Gaeke -ultraviolet fluorescence
		24 Hours**	80	80	
2	Nitrogen Dioxide (NO_2), µg/m³	Annual*	40	30	-Modified Jacob & Hochheiser (Na-Arsenite) -Chemiluminesence
		24 Hours**	80	80	
3	Particulate Matter (Size less than 10µm) or PM_{10} µg/m³	Annual*	60	60	-Gravitmetric -TOEM -Beta attenuation
		24 Hours**	100	100	
4	Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$ µg/m³	Annual*	40	40	-Gravitmetric -TOEM -Beta attenuation
		24 Hours**	60	60	
5	Ozone (O_3) µg/m³	8 hours **	100	100	-UV photometric -Chemiluminiscence -Chemical Method
		1 hour **	180	180	
6	Lead (Pb) µg/m³	Annual*	0.50	0.50	-AAS /ICP method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
		24 Hours**	1.0	1.0	
7	Carbon monoxide (CO) mg/m³	8 Hours	02	02	-Non Dispersive Infra Red (NDIR)
		1 Hour**	04	04	
8	Ammonia (NH_3) µg/m³	Annual*	100	100	-Chemiluminiscence -Indophenol blue method
		24 Hours**	400	400	
9	Benzene (C_6H_6) µg/m³	Annual*	05	05	-Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis
10	Benzo(α) Pyrene (BaP)- particulate phase only ng/m³	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis

ANNEXURE-IV
APPLICABLE ENVIRONMENT STANDARDS

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
11	Arsenic (As) ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

Note:

* *Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.*

** *24 hourly or 8 hourly or, 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, the may exceed the limits but not on two consecutive days of monitoring.*

2.0 Ambient Noise Standards

Ambient standards with respect to noise have been notified by the Ministry of Environment and Forests vide gazette notification dated 26th December 1989 (Amended on January, 2010), Noise Pollution (Regulation and Control) Rules, 2010. It is based on the A weighted equivalent noise level (L_{eq}). The standards are presented in **Table-2.**

TABLE-2
AMBIENT NOISE STANDARDS

Area Code	Category of Area	Noise Levels dB(A) eq	
		Day time*	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone**	50	40

Note: - 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.

2. Night time shall mean from 10.00 p.m. to 6.00 a.m.

3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.
"A",in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
Leq: It is an energy mean of the noise level over a specified period.

ANNEXURE-IV
APPLICABLE ENVIRONMENT STANDARDS

3.0 Noise Standards for Occupational Exposure

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which are being enforced by Government of India through model rules framed under Factories Act. These are given in **Table-3** below.

TABLE-3
STANDARDS FOR OCCUPATIONAL EXPOSURE

Total Time of Exposure per Day in Hours (Continuous or Short term Exposure)	Sound Pressure Level in dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105
¾	107
½	110
¼	115
Never	>115

Note:

1. *No exposure in excess of 115 dB(A) is to be permitted.*
2. *For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column (1), the permissible level is to be determined by extrapolation on a proportionate scale.*

Annexure-V

Methodology for Sampling and Analysis

ANNEXURE-V
METHODOLOGY ADOPTED FOR SAMPLING AND ANALYSIS

1.0 Meteorology

The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (IS:8829) and India Meteorological Department (IMD).

1.1 Methodology of Data Generation

The Central Monitoring Station (CMS) equipped with continuous monitoring equipment was installed at site at a height of about 10 m above ground level to record wind speed, direction, relative humidity and temperature. The meteorological monitoring station was located in such a way that it is free from any obstructions and as per the guidelines specified under IS:8829. Cloud cover was recorded by visual observation. Rainfall was monitored by rain gauge.

The continuous recording meteorological instrument of Dynalab, Pune (Model No.WDL1002) has been used for recording the met data. The sensitivity of the equipment is as given in **Table-1**.

TABLE-1
SENSITIVITY OF METEOROLOGY MONITORING STATION

Sr. No.	Sensor	Sensitivity
1	Wind speed Sensor	± 0.02 m/s
2	Wind direction Sensor	± 3 degrees
3	Temperature Sensor	± 0.2°C

Hourly maximum, minimum and average values of wind speed, direction and temperature were recorded continuously with continuous monitoring equipment. All the sensors were connected to filter and then logged on to datalogger. The readings were recorded in a memory module, which was attached to datalogger. The memory module was downloaded in computer through Dynalab software. The storage capacity of memory module was 256 KB. Data was downloaded every fortnight into the computer. The data was recorded continuously. The recovery of data was about 98%. The rest of 2 % data gaps were filled by referring to IMD data and daily weather reports in the local newspapers. However, Relative Humidity and Rainfall were recorded manually.

1.2 Ambient Air Quality

The air samples were analyzed as per standard methods specified by Central Pollution Control Board (CPCB), IS: 5184 and American Public Health Association (APHA).

The techniques used for ambient air quality monitoring and minimum detectable level are given in **Table-3.**

ANNEXURE-V
METHODOLOGY ADOPTED FOR SAMPLING AND ANALYSIS

TABLE-3
TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

Parameters	Test Method [as per GSR 826(E), Sch-VII]	Minimum Detectable Limit ($\mu g/m^3$)
Particulate Matter, PM10	Gravimetric Method	1.0
Particulate Matter, PM2.5	Gravimetric Method	1.0
Sulphur dioxide (SO_2)	Improved West and Gaeke Method	4.0
Nitrogen dioxide (NO_x)	Modified Jacob and Hochheiser Method	9.0
Carbon Monoxide (CO) (3 x 8 hr)	Gas Monitor	12.5
Ozone (O_3) (3 x 8 hr)	Spectroscopic analysis	0.01 ppm /20 $\mu g/m^3$
Ammonia, NH_3	Indophenol Blue method	4.0
Benzene, C_6H_6	Solvent extraction followed by GC analysis	0.001
Benzo(a)pyrene in Particulate phase	Solvent extraction followed by GC analysis	0.0001
Heavy metals in particulate phase for Arsenic (As), Nickel (Ni), Lead (Pb)	AAS/ICP method	0.0001

1.3 Water Analysis

Samples for chemical analysis were collected in polyethylene carboys. Samples collected for metal content were acidified with 1 ml HNO_3. Samples for bacteriological analysis were collected in sterilized glass bottles. Selected physico-chemical and bacteriological parameters have been analyzed for projecting the existing water quality status in the study area. Parameters like temperature, Dissolved Oxygen (DO) and pH were analyzed at the time of sample collection.

The methodology for sample collection and preservation techniques was followed as per the Standard Operating Procedures (SOP) mentioned in **Table-4**.

TABLE-4
STANDARD OPERATING PROCEDURES (SOP) FOR WATER AND WASTEWATER SAMPLING

Parameter	Sample Collection	Sample Size	Storage/ Preservation
pH	Grab sampling Plastic /glass container	50 ml	On site analysis
Electrical Conductivity	Grab sampling Plastic /glass container	50 ml	On site parameter
Total suspended solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
Total Dissolved Solids	Grab sampling Plastic /glass container	100 ml	Refrigeration, can be stored for 7 days
BOD	Grab sampling Plastic /glass container	500 ml	Refrigeration, 48 hrs
Hardness	Grab sampling Plastic /glass container	100 ml	Add HNO_3 to pH<2, refrigeration; 6 months
Chlorides	Grab sampling Plastic /glass container	50 ml	Not required; 28 days
Sulphates	Grab sampling	100 ml	Refrigeration; 28 days

ANNEXURE-V
METHODOLOGY ADOPTED FOR SAMPLING AND ANALYSIS

Parameter	Sample Collection	Sample Size	Storage/ Preservation
	Plastic /glass container		
Sodium, Potassium	Plastic container	100 ml	Not required; 6 months
Nitrates	Plastic containers	100 ml	Refrigeration; 48 hrs
Fluorides	Plastic containers only	100 ml	Not required; 28 days
Alkalinity	Plastic/ glass containers	100 ml	Refrigeration; 14 days
Ammonia	Plastic/ glass containers	100 ml	Add H_2SO_4 to pH>2, refrigeration, 28 days
Hexavalent Chromium, Cr^{+6}	Plastic/ Glass rinse with 1+1 HNO_3	100 ml	Grab sample; refrigeration; 24 hrs
Heavy Metals (Hg, Cd, Cr, Cu, Fe, Zn, Pb etc.)	Plastic/ Glass rinse with 1+1 HNO_3	500 ml	Filter, add HNO_3 to pH>2; Grab sample; 6 months

Source: Standard Methods for the Examination of Water and Wastewater, Published By APHA, AWWA, WEF 19th Edition, 1995

1.3.1 Analytical Techniques

The analytical techniques used for water and wastewater analysis is given in the **Table-5.**

TABLE-5
ANALYTICAL TECHNIQUES
FOR WATER AND WASTEWATER ANALYSIS

Parameter	Method
pH	APHA-4500-H^+
Colour	APHA-2120 C
Odour	IS: 3025, Part-4
Temperature	APHA-2550 B
Dissolved Oxygen	APHA-4500 O
BOD	APHA-5210 B
Electrical conductivity	APHA-2510 B
Turbidity	APHA-2130 B
Chlorides	APHA-4500 Cl^-
Fluorides	APHA-4500 F^-
Total dissolved solids	APHA-2540 C
Total suspended solids	APHA-2540 D
Total hardness	APHA-2340 C
Sulphates	APHA-4500 SO_4^{-2}
Arsenic	APHA-3120 B/ APHA-3114 B/ APHA-3500 As
Calcium	APHA-3120 B/ APHA-3500 Ca
Magnesium	APHA-3120 B/ APHA-3500 Mg
Sodium	APHA-3120 B/ APHA-3500 Na
Potassium	APHA-3120 B/ APHA-3500 K
Manganese	APHA-3120 B/ APHA-3500 Mn
Mercury	APHA-3112 B/ APHA-3500 Hg
Selenium	APHA-3120 B/ APHA-3114 B/ APHA-3500 Se
Lead	APHA-3120 B/ APHA-3500 Pb
Copper	APHA-3120 B/ APHA-3500 Cu
Cadmium	APHA-3120 B/ APHA-3500 Cd
Iron	APHA-3120 B/ APHA-3500 Fe
Zinc	APHA-3120 B/ APHA-3500 Zn
Boron	APHA-4500 B
Coliform organisms	APHA-9215 D
Alkalinity	APHA-2320 B

ANNEXURE-V
METHODOLOGY ADOPTED FOR SAMPLING AND ANALYSIS

1.4 Soil Quality

At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and are homogenized. This is in line with IS: 2720 & Methods of Soil Analysis, Part-1, 2nd edition, 1986 of (American Society for Agronomy and Soil Science Society of America). The homogenized samples were analyzed for physical and chemical characteristics. The soil samples were collected and analyzed once in each season.

The samples have been analyzed as per the established scientific methods for physico-chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectrophotometer and Inductive Coupled Plasma Analyzer.

The methodology adopted for each parameter is described in **Table-6.**

TABLE-6
ANALYTICAL TECHNIQUES FOR SOIL ANALYSIS

Parameter	Method (ASTM number)
Grain size distribution	Sieve analysis (D 422 – 63)
Textural classification	Chart developed by Public Roads Administration
Infiltration capacity	Infiltrometer
Bulk density	Sand replacement, core cutter
Porosity	Void ratio
Sodium absorption ratio	Flame colourimetric (D 1428-82)
PH	pH meter (D 1293-84)
Electrical conductivity	Conductivity meter (D 1125-82)
Nitrogen	Kjeldahl distillation (D 3590-84)
Phosphorus	Molybdenum blue, colourimetric (D 515-82)
Potassium	Flame photometric (D 1428-82)
Copper	AAS (D 1688-84)
Iron	AAS (D 1068-84)
Zinc	AAS (D 1691-84)
Boron	Surcumin, colourimetric (D 3082-79)
Chlorides	Argentometric (D 512-81 Rev 85)
Fluorides	Fusion followed by distillation and estimation by Ion selective electrod.

1.5 Noise Levels

1.5.1 Method of Monitoring

Noise level monitoring was carried out continuously for 24-hours with one hour interval starting at 0030 hrs to 0030 hrs next day. The noise levels were monitored on working days only and Saturdays, Sundays and public holidays were not monitored. During each hour L_{eq} were directly computed by the instrument based on the sound pressure levels. Lday (Ld), Lnight (Ln) and Ldn values were computed using corresponding hourly Leq of day and night respectively. Monitoring was carried out at 'A' response and fast mode.

Parameters Measured During Monitoring

For noise levels measured over a given period of time interval, it is possible to describe important features of noise using statistical quantities. This is calculated

using the percent of the time certain noise levels exceeds the time interval. The notation for the statistical quantities of noise levels is described below:

- Hourly L_{eq} values have been computed by integrating sound level meter.
- L_{day}: As per the CPCB guidelines the day time limit is between 07:00 hours to 22.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.
- L_{night}: As per the CPCB guidelines the night time limit is between 22:00 hours to 07.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.

A rating developed by Environmental Protection Agency, (US-EPA) for specification of community noise from all the sources is the Day-Night Sound Level, (L_{dn}).

L_{dn}: It is similar to a 24 hr equivalent sound level except that during night time period (10 PM to 07 AM) a 10 dB (A) weighting penalty is added to the instantaneous sound level before computing the 24 hr average. This nighttime penalty is added to account for the fact that noise during night when people usually sleep is judged as more annoying than the same noise during the daytime.

The L_{dn} for a given location in a community may be calculated from the hourly L_{eq}'s, by the following equation.

$$L_{dn} = 10Log \frac{[\sum_{i=1}^{15} 10^{(L_{eq}i/10)} + \sum_{i=1}^{9} 10^{(L_{eq}i+10/10)}]}{24}$$

Annexure-VI

Ambient Air Quality Levels

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ1: Mine Lease Area																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	ng/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$
						I	II	III	I	II	III							
1	02-03-2017	91.7	41.3	14.9	15.2	319	400	304	6.9	7.6	6.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	03-03-2017	95.0	45.8	15.3	16.5	338	410	314	7.6	7.4	7.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	09-03-2017	96.8	40.9	14.6	17.4	312	420	300	7.3	7.7	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	10-03-2017	94.8	37.7	15.4	17.3	331	431	305	6.7	7.5	5.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	16-03-2017	96.0	35.1	13.9	17.8	352	393	310	7.0	7.2	6.7	<20	<0.01	<0.01	0.40	3.2	<0.1	<0.01
6	17-03-2017	93.3	36.8	14.2	17.6	359	404	318	7.1	7.3	6.8	<20	<0.01	<0.01	0.30	2.5	<0.1	<0.01
7	23-03-2017	89.8	34.2	15.5	16.7	310	414	299	7.0	7.7	6.9	<20	<0.01	<0.01	<0.01	3.8	<0.1	<0.01
8	24-03-2017	86.7	39.8	14.7	18.0	384	423	309	7.4	8.3	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
9	30-03-2017	91.6	44.2	15.5	17.0	349	395	296	7.7	8.3	7.3	<20	<0.01	<0.01	0.20	<0.1	<0.1	<0.01
10	31-03-2017	96.3	41.6	13.5	17.3	305	412	307	7.8	8.0	7.6	<20	<0.01	<0.01	0.10	2.8	<0.1	<0.01
11	06-04-2017	97.8	44.3	16.4	18.4	326	429	313	7.8	8.0	7.1	<20	<0.01	<0.01	<0.01	3.6	<0.1	<0.01
12	07-04-2017	98.1	45.2	15.8	17.2	345	389	302	7.3	7.8	6.9	<20	<0.01	<0.01	<0.01	2.9	<0.1	<0.01
13	13-04-2017	99.7	41.9	14.1	17.0	335	408	306	5.9	7.4	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
14	14-04-2017	101.4	44.9	14.8	16.6	361	422	312	8.8	7.7	7.1	<20	<0.01	<0.01	0.50	<0.1	<0.1	<0.01
15	20-04-2017	105.6	47.3	13.1	17.7	308	397	316	7.7	9.1	7.0	<20	<0.01	<0.01	0.30	3.2	<0.1	<0.01
16	21-04-2017	98.4	45.7	14.2	17.1	322	435	298	7.3	7.6	6.9	<20	<0.01	<0.01	<0.01	2.7	<0.1	<0.01
17	27-04-2017	93.9	43.2	15.7	16.9	333	387	301	7.2	7.7	7.1	<20	<0.01	<0.01	<0.01	3.6	<0.1	<0.01
18	28-04-2017	89.7	44.9	15.8	17.2	347	402	307	7.8	8.0	7.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
19	05-05-2017	94.0	46.3	13.4	16.4	354	418	311	8.7	9.0	8.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
20	06-05-2017	96.7	45.8	12.1	15.9	317	427	317	6.2	7.6	5.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
21	11-05-2017	93.4	42.5	14.5	16.9	342	406	303	7.4	7.8	6.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
22	12-05-2017	99.3	45.7	15.2	17.2	303	399	297	7.0	7.9	6.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	18-05-2017	95.7	43.9	15.9	17.5	329	425	308	7.4	8.0	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	19-05-2017	97.3	44.6	15.1	17.1	340	433	315	8.4	9.2	8.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	25-05-2017	94.3	41.9	15.6	16.7	315	391	300	8.2	9.0	6.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	26-05-2017	97.9	44.6	14.9	17.5	356	416	314	7.0	8.3	6.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**86.7**	**34.2**	**12.1**	**15.2**	**296**			**5.5**			**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**105.6**	**47.3**	**16.4**	**18.4**	**435**			**9.2**			**<20**	**<0.01**	**<0.01**	**0.50**	**3.80**	**<0.1**	**<0.01**
	Avg	**95.6**	**42.7**	**14.8**	**17.1**	**351**			**7.4**			**<20**	**<0.01**	**<0.01**	**0.18**	**2.00**	**<0.1**	**<0.01**
	98th	**103.5**	**46.8**	**16.2**	**18.2**	**432**			**9.0**			**<20**	**<0.01**	**<0.01**	**0.40**	**2.40**	**<0.1**	**<0.01**

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ2 : Sarvariya Kharl																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O_3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	02-03-2017	55.6	32.1	10.5	12.9	205	286	190	4.9	5.6	4.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	03-03-2017	58.9	35.6	10.1	13.5	224	296	200	5.3	5.6	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	09-03-2017	58.0	33.4	11.7	13.0	255	306	186	5.3	5.7	5.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	10-03-2017	54.9	34.9	10.5	12.7	217	317	191	4.7	5.5	3.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	16-03-2017	57.9	31.5	10.8	12.9	225	279	196	5.0	5.2	4.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
6	17-03-2017	59.6	29.3	11.3	13.3	245	290	204	5.1	5.3	4.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
7	23-03-2017	60.9	27.1	11.9	14.0	267	300	185	5.2	5.7	4.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
8	24-03-2017	62.0	31.4	12.3	14.5	210	309	195	5.4	6.3	5.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
9	30-03-2017	55.9	32.9	11.1	12.8	235	281	182	5.7	6.4	5.3	<20	<0.01	<0.01	0.08	3.0	<0.1	<0.01
10	31-03-2017	58.3	35.7	12.5	14.6	241	298	193	5.6	6.1	4.2	<20	<0.01	<0.01	0.04	1.5	<0.1	<0.01
11	06-04-2017	61.9	37.8	13.3	15.4	212	315	199	5.8	6.0	5.1	<20	<0.01	<0.01	0.03	2.2	<0.1	<0.01
12	07-04-2017	57.3	34.2	11.2	13.1	231	275	188	5.3	5.8	4.9	<20	<0.01	<0.01	0.02	2.8	<0.1	<0.01
13	13-04-2017	60.2	36.7	12.0	14.3	221	294	192	3.9	5.4	3.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
14	14-04-2017	56.6	35.6	10.9	13.1	247	308	198	6.8	5.7	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
15	20-04-2017	62.9	37.2	12.4	14.9	202	283	192	5.7	7.1	5.0	<20	<0.01	<0.01	0.07	<0.1	<0.1	<0.01
16	21-04-2017	54.6	35.6	11.0	12.6	208	321	184	5.3	5.6	4.9	<20	<0.01	<0.01	0.05	2.4	<0.1	<0.01
17	27-04-2017	56.9	34.1	11.7	13.8	219	273	187	5.2	5.7	5.1	<20	<0.01	<0.01	<0.01	3.0	<0.1	<0.01
18	28-04-2017	58.6	36.0	10.7	12.5	233	288	193	5.8	6.0	5.4	<20	<0.01	<0.01	<0.01	2.1	<0.1	<0.01
19	05-05-2017	55.9	35.5	11.6	13.5	240	304	197	6.7	7.1	5.6	<20	<0.01	<0.01	0.06	2.4	<0.1	<0.01
20	06-05-2017	60.8	36.9	12.2	14.4	265	313	203	4.2	5.6	3.5	<20	<0.01	<0.01	<0.01	2.6	<0.1	<0.01
21	11-05-2017	55.3	33.6	11.5	13.6	228	292	189	5.2	5.8	4.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
22	12-05-2017	59.8	34.9	12.0	14.5	231	285	183	5.1	5.9	4.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	18-05-2017	57.6	35.4	12.2	13.4	215	311	194	5.4	6.0	5.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	19-05-2017	59.2	35.9	11.0	12.8	226	319	201	6.4	7.2	6.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	25-05-2017	56.3	35.7	11.4	13.1	201	277	186	6.2	7.0	4.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	26-05-2017	59.9	36.1	12.2	13.9	242	302	200	5.0	6.3	4.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**54.6**	**27.1**	**10.1**	**12.5**	**182**			**3.5**			**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**62.9**	**37.8**	**13.3**	**15.4**	**321**			**7.2**			**<20**	**<0.01**	**<0.01**	**0.08**	**3.00**	**<0.1**	**<0.01**
	Avg	**58.3**	**34.4**	**11.5**	**13.6**	**239**			**5.4**			**<20**	**<0.01**	**<0.01**	**0.03**	**2.00**	**<0.1**	**<0.01**
	98th	**62.5**	**37.5**	**12.9**	**15.2**	**318**			**7.1**			**<20**	**<0.01**	**<0.01**	**0.06**	**2.90**	**<0.1**	**<0.01**

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ3 : Relmagra																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m²	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	02-03-2017	60.8	30.7	11.7	14.2	258	329	233	6.3	7.0	6.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	03-03-2017	65.2	32.6	12.6	15.3	267	339	243	7.0	6.8	6.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	09-03-2017	67.4	33.4	13.2	15.8	241	349	229	6.7	7.1	6.4	<20	<0.01	<0.01	0.02	3.2	<0.1	<0.01
4	10-03-2017	59.9	32.0	14.0	16.2	260	360	234	6.1	6.9	5.3	<20	<0.01	<0.01	0.04	3.8	<0.1	<0.01
5	16-03-2017	63.9	29.8	12.1	13.7	281	322	239	6.4	6.6	6.1	<20	<0.01	<0.01	0.3	2.4	<0.1	<0.01
6	17-03-2017	66.1	31.9	10.8	14.2	288	333	247	6.5	6.7	6.2	<20	<0.01	<0.01	0.42	3.2	<0.1	<0.01
7	23-03-2017	67.9	34.7	12.9	15.3	264	343	228	6.4	7.1	6.3	<20	<0.01	<0.01	0.25	1	<0.1	<0.01
8	24-03-2017	68.7	32.4	13.5	16.2	253	352	238	6.8	7.7	6.4	<20	<0.01	<0.01	0.32	2.5	<0.1	<0.01
9	30-03-2017	61.3	30.9	12.4	14.9	278	324	225	7.1	7.7	6.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
10	31-03-2017	64.3	29.1	13.8	13.9	294	341	236	7.2	7.4	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
11	06-04-2017	69.2	31.5	14.9	12.1	271	358	242	7.2	7.4	6.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
12	07-04-2017	63.0	32.9	11.9	14.6	274	318	231	6.7	7.2	6.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
13	13-04-2017	67.0	34.2	13.1	15.5	264	337	235	5.3	6.8	5.0	<20	<0.01	<0.01	0.38	2.5	<0.1	<0.01
14	14-04-2017	62.1	33.5	11.4	14.7	290	351	241	8.2	7.1	6.5	<20	<0.01	<0.01	0.39	3.2	<0.1	<0.01
15	20-04-2017	70.5	31.7	12.6	13.2	286	326	245	7.1	8.5	6.4	<20	<0.01	<0.01	0.25	2.9	<0.1	<0.01
16	21-04-2017	59.5	32.1	10.4	13.8	251	364	227	6.7	7.0	6.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
17	27-04-2017	62.6	30.5	12.6	15.7	262	316	230	6.6	7.1	6.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
18	28-04-2017	64.8	33.9	11.1	13.6	276	331	236	7.2	7.4	6.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
19	05-05-2017	68.7	35.8	12.5	14.8	283	347	240	8.1	8.4	7.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
20	06-05-2017	67.6	34.4	13.4	15.6	294	356	246	5.6	7.0	4.9	<20	<0.01	<0.01	0.48	1.5	<0.1	<0.01
21	11-05-2017	60.4	32.6	14.0	16.3	271	335	232	6.8	7.2	6.2	<20	<0.01	<0.01	0.5	1.8	<0.1	<0.01
22	12-05-2017	68.3	36.2	12.8	14.9	256	328	226	6.4	7.3	6.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	18-05-2017	63.5	35.6	11.2	13.7	261	354	237	6.8	7.4	6.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	19-05-2017	65.7	33.5	11.6	14.5	269	362	244	7.8	8.6	7.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	25-05-2017	61.7	35.9	11.9	13.7	244	320	229	7.6	8.4	6.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	26-05-2017	66.5	34.6	13.1	15.3	285	345	243	6.4	7.7	6.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	59.5	29.1	10.4	12.1	225			4.9			<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Max	70.5	36.2	14.9	16.3	364			8.6			<20	<0.01	<0.01	0.39	3.8	<0.1	<0.01
	Avg	64.9	32.9	12.5	14.7	282			6.8			<20	<0.01	<0.01	0.15	1.8	<0.1	<0.01
	98th	69.8	36.1	14.5	16.3	361			8.4			<20	<0.01	<0.01	0.39	2.1	<0.1	<0.01

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ4 : Bamnia Kalan																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	02-03-2017	51.0	28.3	12.6	13.2	269	319	223	5.8	6.5	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	03-03-2017	54.8	29.8	13.1	12.6	257	329	233	6.5	6.3	5.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	09-03-2017	55.9	30.8	11.3	14.9	231	339	219	6.2	6.6	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	10-03-2017	51.4	28.0	10.8	15.5	263	350	224	5.6	6.4	4.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	16-03-2017	53.7	26.1	11.7	13.8	271	312	229	5.9	6.1	5.6	<20	<0.01	<0.01	0.14	4.5	<0.1	<0.01
6	17-03-2017	55.6	24.3	12.8	11.8	278	323	237	6.0	6.2	5.7	<20	<0.01	<0.01	0.18	3.2	<0.1	<0.01
7	23-03-2017	57.1	27.6	13.2	12.3	254	333	218	5.9	6.6	5.6	<20	<0.01	<0.01	0.05	2.8	<0.1	<0.01
8	24-03-2017	53.4	29.2	13.5	14.7	243	342	228	6.3	7.2	5.9	<20	<0.01	<0.01	0.07	1.5	<0.1	<0.01
9	30-03-2017	51.4	30.6	13.1	13.6	268	314	215	6.6	7.2	6.2	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
10	31-03-2017	54.1	27.7	12.9	14.5	274	331	226	6.7	6.9	6.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
11	06-04-2017	58.3	28.9	14.2	15.9	251	348	232	6.7	6.9	6.0	<20	<0.01	<0.01	0.1	3.3	<0.1	<0.01
12	07-04-2017	52.9	25.4	12.7	14.2	264	308	221	6.2	6.7	5.8	<20	<0.01	<0.01	0.12	4.1	<0.1	<0.01
13	13-04-2017	51.6	28.5	13.3	14.9	254	327	225	4.8	6.3	4.5	<20	<0.01	<0.01	0.15	1.2	<0.1	<0.01
14	14-04-2017	52.2	29.6	12.5	14.3	280	341	231	7.7	6.6	6.0	<20	<0.01	<0.01	0.13	0.8	<0.1	<0.01
15	20-04-2017	57.3	31.2	13.6	15.3	276	316	235	6.6	8.0	5.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
16	21-04-2017	59.4	27.9	13.1	14.8	241	354	217	6.2	6.5	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
17	27-04-2017	52.6	29.1	13.0	14.6	252	306	220	6.1	6.6	6.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
18	28-04-2017	54.5	25.8	12.3	14.5	266	321	226	6.7	6.9	6.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
19	05-05-2017	57.9	23.1	13.0	14.5	273	337	230	7.6	7.9	7.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
20	06-05-2017	58.3	26.7	13.4	15.1	264	346	236	5.1	6.5	4.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
21	11-05-2017	50.7	27.4	12.6	14.4	261	325	222	6.3	6.7	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
22	12-05-2017	57.5	29.5	12.9	14.3	247	318	216	5.9	6.8	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	18-05-2017	53.3	30.7	13.7	15.4	248	344	227	6.3	6.9	5.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	19-05-2017	52.5	28.2	12.5	14.3	259	352	234	7.3	8.1	6.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	25-05-2017	51.8	28.8	12.8	14.4	234	310	219	7.1	7.9	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	26-05-2017	56.0	30.3	13.4	14.9	275	335	233	5.9	7.2	5.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	50.7	23.1	10.8	11.8	215			4.4			<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Max	59.4	31.2	14.2	15.9	354			8.1			<20	<0.01	<0.01	0.18	4.5	<0.1	<0.01
	Avg	54.4	28.2	12.8	14.3	272			6.3			<20	<0.01	<0.01	0.06	2.7	<0.1	<0.01
	98th	58.9	31.0	14.0	15.7	351			7.9			<20	<0.01	<0.01	0.12	3.4	<0.1	<0.01

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQS : Champakheri																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	02-03-2017	45.3	25.6	12.8	12.8	230	311	215	5.5	6.2	5.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	03-03-2017	46.0	21.4	13.2	13.6	249	321	225	6.2	6.0	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	09-03-2017	43.5	26.1	11.2	14.1	223	331	211	5.9	6.3	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	10-03-2017	44.7	25.3	13.1	12.4	242	342	216	5.3	6.1	4.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	16-03-2017	42.8	24.9	11.7	13.1	263	304	221	5.6	5.8	5.3	<20	<0.01	<0.01	0.12	<0.1	<0.1	<0.01
6	17-03-2017	41.7	27.8	12.9	13.4	270	315	229	5.7	5.9	5.4	<20	<0.01	<0.01	0.16	<0.1	<0.1	<0.01
7	23-03-2017	43.7	23.1	13.4	14.0	221	325	210	5.6	6.3	5.5	<20	<0.01	<0.01	0.15	2.5	<0.1	<0.01
8	24-03-2017	45.9	26.6	13.7	13.9	235	334	220	6.0	6.9	5.6	<20	<0.01	<0.01	0.18	2.4	<0.1	<0.01
9	30-03-2017	51.0	22.8	12.4	14.6	260	306	207	6.3	6.9	5.9	<20	<0.01	<0.01	<0.01	1.9	<0.1	<0.01
10	31-03-2017	46.1	25.0	13.2	13.9	268	323	218	6.4	6.6	6.2	<20	<0.01	<0.01	<0.01	2.4	<0.1	<0.01
11	06-04-2017	45.4	26.3	14.3	16.9	237	340	224	6.4	6.6	5.7	<20	<0.01	<0.01	<0.01	2.3	<0.1	<0.01
12	07-04-2017	44.6	27.5	12.9	15.4	256	300	213	5.9	6.4	5.5	<20	<0.01	<0.01	<0.01	2.6	<0.1	<0.01
13	13-04-2017	46.3	25.8	13.4	14.0	246	319	217	4.5	6.0	4.2	<20	<0.01	<0.01	0.11	2.4	<0.1	<0.01
14	14-04-2017	46.2	27.4	12.6	13.1	272	333	223	7.4	6.3	5.7	<20	<0.01	<0.01	0.14	2.2	<0.1	<0.01
15	20-04-2017	52.1	29.8	13.7	14.6	219	308	227	6.3	7.7	5.6	<20	<0.01	<0.01	0.13	<0.1	<0.1	<0.01
16	21-04-2017	44.4	27.1	13.3	14.2	233	346	209	5.9	6.2	5.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
17	27-04-2017	46.6	26.4	14.0	15.0	244	298	212	5.8	6.3	5.7	<20	<0.01	<0.01	<0.01	2.3	<0.1	<0.01
18	28-04-2017	48.1	27.0	12.5	13.1	258	313	218	6.4	6.6	6.0	<20	<0.01	<0.01	<0.01	2.2	<0.1	<0.01
19	05-05-2017	44.4	27.8	13.1	13.7	265	329	222	7.3	7.6	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
20	06-05-2017	51.3	25.9	13.6	14.4	297	338	228	4.8	6.2	4.1	<20	<0.01	<0.01	0.15	<0.1	<0.1	<0.01
21	11-05-2017	45.0	24.7	14.1	14.8	253	317	214	6.0	6.4	5.4	<20	<0.01	<0.01	0.16	<0.1	<0.1	<0.01
22	12-05-2017	50.6	26.9	13.1	13.6	246	310	208	5.6	6.5	5.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	18-05-2017	47.2	27.4	13.9	14.7	240	336	219	6.0	6.6	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	19-05-2017	48.7	25.5	12.7	13.2	251	344	226	7.0	7.8	6.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	25-05-2017	45.9	26.1	13.0	13.6	259	302	211	6.8	7.6	5.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	26-05-2017	45.0	27.5	13.3	14.1	267	327	225	5.6	6.9	5.2	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**41.7**	**21.4**	**11.2**	**12.4**	**207**			**4.1**			**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**52.1**	**29.8**	**14.3**	**16.9**	**346**			**7.8**			**<20**	**<0.01**	**<0.01**	**0.18**	**2.5**	**<0.1**	**<0.01**
	Avg	**46.3**	**26.1**	**13.1**	**14.0**	**263**			**6.0**			**<20**	**<0.01**	**<0.01**	**0.16**	**2.0**	**<0.1**	**<0.01**
	98th	**51.7**	**28.8**	**14.2**	**16.2**	**343**			**7.6**			**<20**	**<0.01**	**<0.01**	**0.9**	**2.1**	**<0.1**	**<0.01**

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ6 : Raghunathpura																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m²	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	06-03-2017	51.0	24.3	10.8	12.3	223	297	208	5.6	6.3	5.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	07-03-2017	49.4	26.1	11.4	13.2	242	307	218	6.3	6.1	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	13-03-2017	52.3	29.2	11.7	13.7	259	317	204	6.0	6.4	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	14-03-2017	50.4	25.7	10.9	12.6	235	328	209	5.4	6.2	4.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	20-03-2017	52.1	23.8	10.5	11.6	256	290	214	5.7	5.9	5.4	<20	<0.01	<0.01	0.30	2.8	<0.1	<0.01
6	21-03-2017	48.9	25.7	11.0	12.6	263	301	222	5.8	6.0	5.5	<20	<0.01	<0.01	0.10	1.9	<0.1	<0.01
7	27-03-2017	53.3	24.3	11.6	13.3	274	311	203	5.7	6.4	5.6	<20	<0.01	<0.01	0.15	2.4	<0.1	<0.01
8	28-03-2017	51.7	27.9	11.9	13.8	258	320	213	6.1	7.0	5.7	<20	<0.01	<0.01	0.18	2.6	<0.1	<0.01
9	03-04-2017	47.8	29.0	12.3	15.1	253	292	200	6.4	7.0	6.0	<20	<0.01	<0.01	0.22	2.3	<0.1	<0.01
10	04-04-2017	53.3	26.1	11.7	13.5	269	309	211	6.5	6.7	6.3	<20	<0.01	<0.01	0.25	2.5	<0.1	<0.01
11	10-04-2017	49.3	22.1	12.8	15.9	242	326	217	6.5	6.7	5.8	<20	<0.01	<0.01	0.28	2.1	<0.1	<0.01
12	11-04-2017	46.8	25.9	10.9	12.5	249	286	206	6.0	6.5	5.6	<20	<0.01	<0.01	0.14	2.0	<0.1	<0.01
13	17-04-2017	53.6	27.0	11.6	13.4	259	305	210	4.6	6.1	4.3	<20	<0.01	<0.01	0.16	1.6	<0.1	<0.01
14	18-04-2017	52.7	24.6	10.6	12.3	265	319	216	7.5	6.4	5.8	<20	<0.01	<0.01	0.19	<0.1	<0.1	<0.01
15	24-04-2017	57.4	21.5	12.0	14.2	287	294	220	6.4	7.8	5.7	<20	<0.01	<0.01	0.21	<0.1	<0.1	<0.01
16	25-04-2017	55.4	24.6	11.5	13.4	264	332	202	6.0	6.3	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
17	02-05-2017	52.1	27.7	11.8	13.9	237	284	205	5.9	6.4	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
18	03-05-2017	53.6	28.4	10.4	12.0	251	299	211	6.5	6.7	6.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
19	08-05-2017	51.4	28.7	11.3	13.3	258	315	215	7.4	7.7	7.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
20	09-05-2017	56.6	27.2	11.8	13.7	291	324	221	4.9	6.3	4.2	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
21	15-05-2017	50.7	25.8	12.2	14.3	246	303	207	6.1	6.5	5.5	<20	<0.01	<0.01	0.23	<0.1	<0.1	<0.01
22	16-05-2017	55.5	28.2	11.2	12.9	254	296	201	5.7	6.6	5.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	22-05-2017	52.7	28.8	11.9	13.7	233	322	212	6.1	6.7	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	23-05-2017	53.5	26.7	10.7	12.3	244	330	219	7.1	7.9	6.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	29-05-2017	51.6	27.3	11.1	12.8	261	288	204	6.9	7.7	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	30-05-2017	54.8	28.7	11.7	13.5	260	313	218	5.7	7.0	5.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**46.8**	**21.5**	**10.4**	**11.6**	**200**			**4.2**			**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**57.4**	**29.2**	**12.8**	**15.9**	**332**			**7.9**			**<20**	**<0.01**	**<0.01**	**0.3**	**2.8**	**<0.1**	**<0.01**
	Avg	**52.2**	**26.4**	**11.4**	**13.3**	**258**			**6.1**			**<20**	**<0.01**	**<0.01**	**0.11**	**1.6**	**<0.1**	**<0.01**
	98th	**57.0**	**29.1**	**12.6**	**15.5**	**329**			**7.7**			**<20**	**<0.01**	**<0.01**	**0.2**	**2.1**	**<0.1**	**<0.01**

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ7 : Amarpura																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	06-03-2017	46.9	23.1	11.1	13.3	201	249	160	5.3	6.0	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	07-03-2017	50.1	25.7	11.4	12.8	196	259	170	6.0	5.8	5.5	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	13-03-2017	51.5	22.8	11.7	13.1	219	269	156	5.7	6.1	5.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	14-03-2017	49.7	24.3	12.0	15.7	259	280	161	5.1	5.9	4.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	20-03-2017	46.1	25.3	10.9	15.3	208	242	166	5.4	5.6	5.1	<20	<0.01	<0.01	0.10	<0.1	<0.1	<0.01
6	21-03-2017	43.1	26.8	11.2	16.1	215	253	174	5.5	5.7	5.2	<20	<0.01	<0.01	0.02	<0.1	<0.1	<0.01
7	27-03-2017	41.8	23.5	11.6	14.5	226	263	155	5.4	6.1	5.3	<20	<0.01	<0.01	0.09	3.8	<0.1	<0.01
8	28-03-2017	48.4	21.4	11.8	15.7	234	272	165	5.8	6.7	5.4	<20	<0.01	<0.01	0.04	2.5	<0.1	<0.01
9	03-04-2017	47.2	24.2	13.1	15.8	205	244	152	6.1	6.7	5.7	<20	<0.01	<0.01	0.05	3.2	<0.1	<0.01
10	04-04-2017	49.4	23.6	12.3	17.1	195	261	163	6.2	6.4	6.0	<20	<0.01	<0.01	0.08	2.9	<0.1	<0.01
11	10-04-2017	52.8	24.8	14.8	16.3	264	278	169	6.2	6.4	5.5	<20	<0.01	<0.01	0.09	1.5	<0.1	<0.01
12	11-04-2017	50.1	26.0	12.9	15.4	201	238	158	5.7	6.2	5.3	<20	<0.01	<0.01	0.01	2.3	<0.1	<0.01
13	17-04-2017	51.2	26.5	11.6	17.2	198	257	162	4.3	5.8	4.0	<20	<0.01	<0.01	0.06	2.1	<0.1	<0.01
14	18-04-2017	47.8	25.9	13.5	15.3	228	271	168	7.2	6.1	5.5	<20	<0.01	<0.01	0.07	2.8	<0.1	<0.01
15	24-04-2017	52.7	27.1	11.9	16.5	221	246	172	6.1	7.5	5.4	<20	<0.01	<0.01	<0.01	3.8	<0.1	<0.01
16	25-04-2017	54.9	23.8	13.4	14.7	234	284	154	5.7	6.0	5.3	<20	<0.01	<0.01	<0.01	2.4	<0.1	<0.01
17	02-05-2017	51.6	25.0	12.1	13.9	189	236	145	5.6	6.1	5.5	<20	<0.01	<0.01	<0.01	2.6	<0.1	<0.01
18	03-05-2017	49.7	25.6	10.8	13.5	203	251	163	6.2	6.4	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
19	08-05-2017	52.5	26.7	13.6	15.2	210	267	167	7.1	7.4	6.8	<20	<0.01	<0.01	0.03	<0.1	<0.1	<0.01
20	09-05-2017	52.9	24.5	14.9	16.5	223	276	173	4.6	6.0	3.9	<20	<0.01	<0.01	0.04	<0.1	<0.1	<0.01
21	15-05-2017	46.6	23.3	15.2	15.1	198	255	159	5.8	6.2	5.2	<20	<0.01	<0.01	0.03	<0.1	<0.1	<0.01
22	16-05-2017	52.2	25.4	13.2	13.1	184	248	153	5.4	6.3	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	22-05-2017	48.8	26.6	12.3	16.4	243	274	164	5.8	6.4	5.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	23-05-2017	50.3	24.1	10.5	15.2	196	282	171	6.8	7.6	6.4	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	29-05-2017	47.5	24.7	11.2	15.3	171	240	156	6.6	7.4	5.3	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	30-05-2017	50.9	26.2	12.0	15.8	212	265	170	5.4	6.7	5.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**41.8**	**21.4**	**10.5**	**12.8**		**145**			**3.9**		**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**54.9**	**27.1**	**15.2**	**17.2**		**284**			**7.6**		**<20**	**<0.01**	**<0.01**	**0.1**	**3.8**	**<0.1**	**<0.01**
	Avg	**49.5**	**24.9**	**12.3**	**15.2**		**212**			**5.8**		**<20**	**<0.01**	**<0.01**	**0.04**	**2.1**	**<0.1**	**<0.01**
	98th	**53.9**	**26.9**	**15.1**	**17.2**		**281**			**7.4**		**<20**	**<0.01**	**<0.01**	**0.08**	**3.2**	**<0.1**	**<0.01**

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ8 : Malikhera																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_5	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	06-03-2017	53.5	27.6	10.5	13.9	206	280	191	5.9	6.6	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	07-03-2017	56.7	25.1	11.3	15.0	225	290	201	6.6	6.4	6.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	13-03-2017	56.1	27.5	11.8	15.7	199	300	187	6.3	6.7	6.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	14-03-2017	52.8	27.3	12.4	16.4	218	311	192	5.7	6.5	4.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	20-03-2017	51.6	24.7	10.1	13.6	239	273	197	6.0	6.2	5.7	<20	<0.01	<0.01	0.05	<0.1	<0.1	<0.01
6	21-03-2017	49.2	23.4	10.8	14.4	246	284	205	6.1	6.3	5.8	<20	<0.01	<0.01	0.03	<0.1	<0.1	<0.01
7	27-03-2017	48.1	22.8	11.5	15.3	268	294	186	6.0	6.7	5.9	<20	<0.01	<0.01	0.02	3.8	<0.1	<0.01
8	28-03-2017	59.4	21.9	12.0	15.9	211	303	196	6.4	7.3	6.0	<20	<0.01	<0.01	0.04	2.9	<0.1	<0.01
9	03-04-2017	53.8	30.2	12.6	16.5	236	275	183	6.7	7.3	6.3	<20	<0.01	<0.01	0.03	2.6	<0.1	<0.01
10	04-04-2017	56.1	27.6	12.9	17.0	249	292	194	6.8	7.0	6.6	<20	<0.01	<0.01	0.02	2.5	<0.1	<0.01
11	10-04-2017	54.7	28.3	13.2	17.3	213	309	200	6.8	7.0	6.1	<20	<0.01	<0.01	0.05	2.3	<0.1	<0.01
12	11-04-2017	55.1	29.5	10.6	14.2	232	269	189	6.3	6.8	5.9	<20	<0.01	<0.01	0.04	3.2	<0.1	<0.01
13	17-04-2017	58.0	29.4	11.7	15.6	222	288	193	4.9	6.4	4.6	<20	<0.01	<0.01	0.01	3.9	<0.1	<0.01
14	18-04-2017	54.4	29.4	10.3	13.8	248	302	199	7.8	6.7	6.1	<20	<0.01	<0.01	0.03	3.6	<0.1	<0.01
15	24-04-2017	60.6	30.6	12.2	16.1	259	277	203	6.7	8.1	6.0	<20	<0.01	<0.01	<0.01	3.5	<0.1	<0.01
16	25-04-2017	52.5	27.2	11.4	15.2	209	315	185	6.3	6.6	5.9	<20	<0.01	<0.01	<0.01	2.4	<0.1	<0.01
17	02-05-2017	54.8	28.4	12.7	16.7	220	267	188	6.2	6.7	6.1	<20	<0.01	<0.01	<0.01	2.3	<0.1	<0.01
18	03-05-2017	56.4	29.0	9.9	13.5	234	282	194	6.8	7.0	6.4	<20	<0.01	<0.01	<0.01	1.5	<0.1	<0.01
19	08-05-2017	55.6	29.8	11.2	14.8	241	298	198	7.7	8.0	7.4	<20	<0.01	<0.01	<0.01	2.5	<0.1	<0.01
20	09-05-2017	59.4	30.0	11.9	16.0	204	307	204	5.2	6.6	4.5	<20	<0.01	<0.01	<0.01	2.6	<0.1	<0.01
21	15-05-2017	53.1	26.7	12.8	16.9	229	286	190	6.4	6.8	5.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
22	16-05-2017	59.0	29.3	11.0	14.6	190	279	184	6.0	6.9	5.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	22-05-2017	55.4	29.7	13.1	17.1	216	305	195	6.4	7.0	6.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	23-05-2017	53.9	27.5	10.4	14.0	227	313	202	7.4	8.2	7.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	29-05-2017	54.1	28.1	10.9	14.5	202	271	187	7.2	8.0	5.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	30-05-2017	57.7	29.7	12.3	16.0	243	296	201	6.0	7.3	5.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	48.1	21.9	9.9	13.5	183			4.5			<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Max	60.6	30.6	13.2	17.3	315			8.2			<20	<0.01	<0.01	0.05	3.9	<0.1	<0.01
	Avg	55.1	27.7	11.8	15.4	237			6.4			<20	<0.01	<0.01	0.03	2.0	<0.1	<0.01
	98th	60.0	30.4	13.1	17.2	311			8.0			<20	<0.01	<0.01	0.04	3.4	<0.1	<0.01

ANNEXURE-VI
AMBIENT AIR QUALITY LEVELS

AAQ9 : Kantiyakhera																		
Sr.No	Monitoring Date	PM10	PM2.5	SO_2	NOx	CO			O3			NH_3	C_6H_6	B(a)P	Pb	Ni	As	Benzene
Units		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³	ng/m³	ng/m³	µg/m³
						I	II	III	I	II	III							
1	06-03-2017	40.7	24.6	11.4	13.3	165	239	150	5.0	5.7	4.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
2	07-03-2017	44.3	26.1	12.2	14.4	184	249	160	5.7	5.5	5.2	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
3	13-03-2017	46.2	26.8	9.8	15.1	158	259	146	5.4	5.8	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
4	14-03-2017	40.0	24.3	11.3	15.8	177	270	151	4.8	5.6	4.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
5	20-03-2017	43.2	25.7	10.5	13.0	198	232	156	5.1	5.3	4.8	<20	<0.01	<0.01	0.05	<0.1	<0.1	<0.01
6	21-03-2017	45.1	26.7	11.7	13.8	205	243	164	5.2	5.4	4.9	<20	<0.01	<0.01	0.04	<0.1	<0.1	<0.01
7	27-03-2017	46.5	22.4	12.4	14.7	156	253	145	5.1	5.8	5.0	<20	<0.01	<0.01	0.02	1.4	<0.1	<0.01
8	28-03-2017	47.8	23.7	12.9	15.3	170	262	155	5.5	6.4	5.1	<20	<0.01	<0.01	0.01	1.8	<0.1	<0.01
9	03-04-2017	41.1	26.7	13.5	15.9	195	234	142	5.8	6.4	5.4	<20	<0.01	<0.01	0.03	2.1	<0.1	<0.01
10	04-04-2017	43.6	24.0	13.8	16.4	151	251	153	5.9	6.1	5.7	<20	<0.01	<0.01	0.05	3.2	<0.1	<0.01
11	10-04-2017	44.0	25.2	14.1	16.7	172	268	159	5.9	6.1	5.2	<20	<0.01	<0.01	0.04	2.8	<0.1	<0.01
12	11-04-2017	42.5	26.4	11.5	13.6	191	228	148	5.4	5.9	5.0	<20	<0.01	<0.01	0.02	2.6	<0.1	<0.01
13	17-04-2017	43.1	24.8	12.6	15.0	181	247	152	4.0	5.5	3.7	<20	<0.01	<0.01	0.03	3.1	<0.1	<0.01
14	18-04-2017	39.5	26.6	11.2	13.2	207	261	158	6.9	5.8	5.2	<20	<0.01	<0.01	0.01	2.4	<0.1	<0.01
15	24-04-2017	35.6	27.5	13.1	15.5	154	236	162	5.8	7.2	5.1	<20	<0.01	<0.01	0.04	2.2	<0.1	<0.01
16	25-04-2017	39.6	24.2	12.3	14.6	168	274	144	5.4	5.7	5.0	<20	<0.01	<0.01	<0.01	2.1	<0.1	<0.01
17	02-05-2017	36.1	25.4	13.6	15.4	179	226	147	5.3	5.8	5.2	<20	<0.01	<0.01	<0.01	2.4	<0.1	<0.01
18	03-05-2017	34.7	26.0	11.5	11.9	193	241	153	5.9	6.1	5.5	<20	<0.01	<0.01	<0.01	2.2	<0.1	<0.01
19	08-05-2017	33.6	26.7	12.1	14.2	200	257	157	6.8	7.1	6.5	<20	<0.01	<0.01	<0.01	2.0	<0.1	<0.01
20	09-05-2017	41.3	24.9	12.8	15.4	163	266	163	4.3	5.7	3.6	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
21	15-05-2017	49.4	23.7	13.7	16.3	188	245	149	5.5	5.9	4.9	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
22	16-05-2017	45.8	25.8	11.9	14.0	204	238	143	5.1	6.0	4.8	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
23	22-05-2017	43.7	26.7	14.0	16.5	225	264	154	5.5	6.1	5.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
24	23-05-2017	44.7	24.5	11.3	13.4	186	272	161	6.5	7.3	6.1	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
25	29-05-2017	41.4	25.1	11.8	13.9	209	230	146	6.3	7.1	5.0	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
26	30-05-2017	45.4	26.6	13.2	15.4	202	255	160	5.1	6.4	4.7	<20	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01
	Min	**33.6**	**22.4**	**9.8**	**11.9**	**142**			**3.6**			**<20**	**<0.01**	**<0.01**	**<0.01**	**<0.1**	**<0.1**	**<0.01**
	Max	**49.4**	**27.5**	**14.1**	**16.7**	**274**			**7.3**			**<20**	**<0.01**	**<0.01**	**0.05**	**3.2**	**<0.1**	**<0.01**
	Avg	**42.3**	**25.4**	**12.3**	**14.7**	**196**			**5.5**			**<20**	**<0.01**	**<0.01**	**0.02**	**1.8**	**<0.1**	**<0.01**
	98th	**48.6**	**27.2**	**14.0**	**16.6**	**271**			**7.1**			**<20**	**<0.01**	**<0.01**	**0.03**	**2.1**	**<0.1**	**<0.01**

Annexure-VII
Demographic Details

ANNEXURE-VII
DEMOGRAPHIC DETAILS

Sl.No.	Name of Village	No.of House Holds	Total Male	Total Female	Total Population	Male Below 6 Agegroup	Female Below 6 Agegroup	Population Below 6 Age group	SC Population	ST Population	Male Literates	Female Literates	Total Literates	Total Workers	Main Workers	Marginal Workers	Non Workers	Non Workers Male	Non Workers Female
0-3 km Relmagra Tehsil, Rajsamand district, Rajasthan																			
1	Lathiya Kheri	134	331	325	656	43	29	72	34	169	207	105	312	414	401	13	242	119	123
2	Sindesar Kalan	497	1128	1152	2280	180	168	348	631	142	714	411	1125	1199	815	384	1081	477	604
3	Chanpa Kheri	141	364	370	734	69	57	126	122	10	220	103	323	389	388	1	345	149	196
4	Rajpura	223	595	581	1176	81	79	160	63	117	439	261	700	745	483	262	431	225	206
5	Sunariya Khera	184	411	401	812	57	37	94	86	80	281	157	438	446	429	17	366	155	211
6	Bakhatpura	107	303	283	586	44	36	80	154	0	192	98	290	316	159	157	270	136	134
7	Amarpura	142	363	352	715	51	58	109	282	1	208	89	297	219	212	7	496	152	344
8	Sindesarkhurd	203	505	533	1038	81	75	156	304	0	341	194	535	490	446	44	548	200	348
9	Shivpura	92	227	196	423	54	37	91	98	325	94	28	122	232	150	82	191	111	80
10	Makanpuriya	77	211	198	409	45	31	76	87	54	99	59	158	247	238	9	162	85	77
	Sub Total	**1800**	**4438**	**4391**	**8829**	**705**	**607**	**1312**	**1861**	**898**	**2795**	**1505**	**4300**	**4697**	**3721**	**976**	**4132**	**1809**	**2323**
3-7 km Relmagra Tehsil, Rajsamand district, Rajasthan																			
11	Pachhmata	553	1299	1326	2625	174	176	350	441	190	892	517	1409	1197	1128	69	1428	531	897
12	Panotiya	315	791	750	1541	95	91	186	310	36	506	237	743	843	680	163	698	322	376
13	Kanna Kheri	17	46	46	92	9	6	15	0	0	24	19	43	40	28	12	52	21	31
14	Jagpura	217	657	640	1297	108	116	224	13	1	449	231	680	437	250	187	860	312	548
15	Ganeshpura	88	227	226	453	28	21	49	5	48	149	88	237	232	163	69	221	96	125
16	Bethumbi	355	805	802	1607	131	135	266	342	242	418	167	585	971	598	373	636	312	324
17	Bamniya Kalan	578	1354	1391	2745	200	164	364	161	9	850	525	1375	1407	1216	191	1338	574	764
18	Jeetawas	440	1074	1097	2171	145	151	296	459	118	671	348	1019	1044	902	142	1127	444	683
19	Jeewa Khera	170	339	363	702	43	32	75	52	135	252	134	386	426	389	37	276	126	150
20	Morra	228	560	536	1096	48	60	108	27	74	382	181	563	644	510	134	452	216	236
21	Damodarpura	102	276	281	557	34	37	71	72	44	195	104	299	303	302	1	254	98	156
22	Chitri Khera	141	309	311	620	55	50	105	102	148	193	89	282	240	222	18	380	136	244
23	Soniyana	198	473	476	949	68	61	129	74	76	282	155	437	372	363	9	577	197	380
24	Ganeshpura	95	208	227	435	30	27	57	169	0	136	75	211	280	271	9	155	65	90
25	Sanwaliya Khera	42	108	99	207	9	17	26	0	0	85	35	120	126	126	0	81	39	42
26	Mali Khera	102	253	297	550	24	49	73	6	178	177	116	293	306	231	75	244	96	148
27	Sarwariya Kheri	87	221	185	406	26	17	43	22	85	164	76	240	137	85	52	269	103	166
28	Shoupura	42	82	95	177	13	13	26	4	87	28	25	53	110	105	5	67	31	36
29	Laxmipura	86	209	196	405	31	28	59	57	96	120	52	172	235	211	24	170	83	87
30	Kabra	334	749	720	1469	103	95	199	258	227	461	251	712	754	575	179	715	347	368
31	Kotril	673	1702	1707	3409	262	223	485	635	488	1054	620	1674	1825	1548	277	1584	707	877
32	Udaipura	99	240	250	490	23	26	49	30	36	164	120	284	303	300	3	187	101	86
33	Mahenduriya	919	2040	1887	3927	254	252	506	1121	424	1490	946	2436	1745	1442	303	2182	796	1386
34	Katiya Khera	50	116	110	226	21	10	31	0	72	64	32	96	111	104	7	115	54	61
35	Mataji Ka Khera	94	242	229	471	37	27	64	20	139	150	72	222	233	226	7	238	119	119
Kapasan tehsil, Chittaurgarh district, Rajasthan																			
36	Dhani	167	350	351	701	46	56	102	0	15	248	106	354	413	164	249	288	155	133
37	Anoppura	29	54	55	109	6	6	12	0	14	38	26	64	37	36	1	72	21	51
38	Goojariya Khera	106	253	220	473	29	36	65	86	2	166	58	224	309	305	4	164	94	70
39	Chak Papariya	34	56	36	92	5	2	7	0	0	51	33	84	43	43	0	49	20	29
40	Manohar Kheri	75	178	171	349	28	27	55	11	124	131	59	190	212	212	0	137	75	62
	Sub Total	**6436**	**15271**	**15080**	**30351**	**2085**	**2012**	**4097**	**4477**	**3108**	**9990**	**5497**	**15487**	**15335**	**12735**	**2600**	**15016**	**6291**	**8725**
7-10 km Relmagra Tehsil, Rajsamand district, Rajasthan																			
41	Kuraj	1465	3415	3385	6800	468	402	870	1829	205	2525	1663	4188	2618	2135	483	4182	1566	2616
42	Rampuriya	67	170	157	327	33	22	55	0	112	83	48	131	166	65	101	161	76	85
43	Joonda Ki Kheri	152	398	387	785	63	67	130	68	158	269	188	457	373	182	191	412	151	261
44	Joonda	599	1523	1477	3000	181	170	351	416	19	1039	590	1629	1711	1372	339	1289	569	720
45	Mataji Ka Khera	26	67	68	135	7	12	19	0	66	41	18	59	69	59	10	66	33	33
46	Peepawas	121	315	314	629	56	52	108	173	162	178	76	254	331	330	1	298	130	168
47	Anjana	337	755	795	1550	108	111	219	210	310	506	327	833	753	603	150	797	293	504
48	Gaweradi	507	1281	1276	2557	172	185	357	213	289	924	533	1457	1003	482	521	1554	570	984

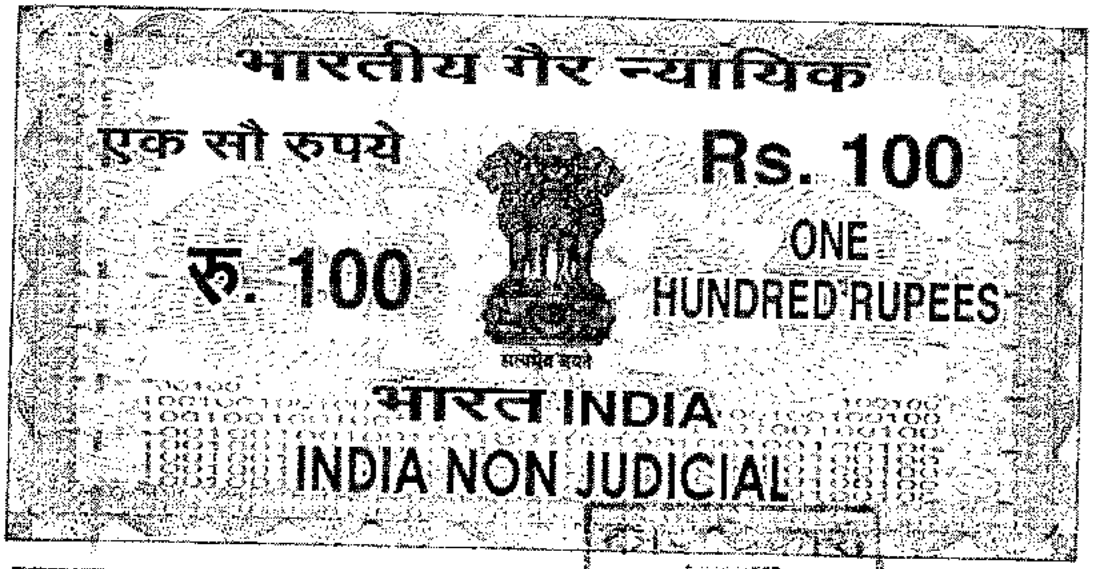
ANNEXURE-VII
DEMOGRAPHIC DETAILS

Sl.No.	Name of Village	No.of House Holds	Total Male	Total Female	Total Population	Male Below 6 Agegroup	Female Below 6 Agegroup	Population Below 6 Age group	SC Population	ST Population	Male Literates	Female Literates	Total Literates	Total Workers	Main Workers	Marginal Workers	Non Workers	Non Workers Male	Non Workers Female
49	Chhapri	212	458	525	983	63	86	149	123	281	260	173	433	527	503	24	456	178	278
50	Bharai	236	564	589	1153	99	98	197	291	86	328	149	477	663	576	87	490	226	264
51	Chhdanga Kheri	205	493	463	956	80	82	162	143	337	290	131	421	387	368	19	569	201	368
52	Ladpacha	318	725	720	1445	108	104	212	105	277	416	183	599	846	845	1	599	259	340
53	Madara	423	1082	1060	2142	164	110	274	213	176	718	414	1132	1018	651	367	1124	525	599
54	Mau	218	611	626	1237	99	81	180	51	133	430	246	676	644	516	128	593	261	332
55	Raßmagra	1783	4328	4283	8611	583	504	1087	1980	175	3318	2417	5735	3533	2577	956	5078	1969	3109
56	Gangas	226	512	545	1057	67	64	131	99	71	324	200	524	475	423	52	582	203	379
57	Kundiya	521	1124	1153	2277	186	153	339	447	132	717	394	1111	1362	883	479	915	428	487
58	Gilund	1445	3449	3426	6875	458	396	854	1817	80	2424	1470	3894	3207	2171	1036	3668	1491	2177
59	Lakhmipura	70	178	166	344	27	23	50	40	67	113	56	169	156	132	24	188	85	103
Kapasan tehsil, Chittaurgarh district, Rajasthan																			
60	Jashma	987	2422	2325	4747	327	298	625	1102	71	1630	915	2545	2623	2422	201	2124	952	1172
61	Gadriyawas	89	240	222	462	46	26	72	35	40	151	54	205	212	170	42	250	112	138
62	Loonera	252	677	627	1304	105	75	180	70	309	339	143	482	545	541	4	759	309	450
63	Deoron Ka Khera	143	392	376	768	75	51	126	94	131	228	116	344	460	206	254	308	158	150
Sahara Tehsil, Bhilwara district, Rajasthan																			
64	Majhawas	450	1129	1110	2239	162	128	290	313	184	711	375	1086	1229	1032	197	1010	452	558
	Sub Total	**10852**	**26308**	**26075**	**52383**	**3737**	**3300**	**7037**	**9832**	**3871**	**17962**	**10879**	**28841**	**24911**	**19244**	**5667**	**27472**	**11197**	**16275**
	Grand Total	**19088**	**46017**	**45546**	**91563**	**6527**	**5919**	**12446**	**16170**	**7877**	**30747**	**17881**	**48628**	**44943**	**35700**	**9243**	**46620**	**19297**	**27323**
Source: Census of India 2011																			

Annexure-VIII

Water Allocation Letter

ANNEXURE-VIII
WATER ALLOCATION LETTER



This agreement is made on this Wednesday, 9th of May 2012, at Udaipur, Rajasthan.

Between

(A) Municipal Council Udaipur acting through its Commissioner (hereinafter referred to as UMC, which expression shall unless repugnant to the context or meaning thereof, mean and include its successors and assignees)

(B) Urban Improvement Trust, Udaipur acting through Secretary (hereinafter referred to as UIT, which expression shall unless repugnant to the context or meaning thereof, mean and include its successors and assignees)

Referred as ONE PART

AND

Hindustan Zinc Ltd (HZL), a Company incorporated under Companies Act 1956 and having its registered office at Yashad Bhawan, Udaipur – 313 004 (hereinafter referred to as "HZL" which expression shall, unless repugnant to the context or meaning thereof shall mean and include its successors and assignees) where the context so require include its successors and assignees of the OTHER PART.

9.5.12

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(R. PANDWAL)
COMPANY SECRETARY
HINDUSTAN ZINC LTD.
YASHAD BHAWAN, UDAIPUR

ANNEXURE-VIII
WATER ALLOCATION LETTER

WHEREAS

1. UMC has the jurisdiction to collect, store, treat and dispose Sewage, Gas and Sludge generated from Households of Udaipur and has decided to develop Municipal Sewage collection and treatment facility for the Udaipur city to protect environment and facilitate the health and hygiene of the city.

HZL is a leading Industry in the vicinity of Udaipur engaged in the Mining and Mineral processing. It requires water, to meet its process requirement at the plants located near Debari, also to meet the requirements of future expansion and new units in the state of Rajasthan. Thus, HZL has potential to make best use of T. eated Sewage Water.

In consideration to have exclusive right to use or dispose treated water, HZL offered to construct suitable Sewage Treatment Plant on behalf of UMC on DBOOT (Design Build Own Operate and Transfer) basis.

NOW THEREOFRE THE AGREEMENT WITNESSETH AND IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES AS FOLLOWS:

1. Definitions and Interpretation

"Agreement" means this agreement between UMC, UIT and HZL including its schedules and annexures and includes any amendments made hereto in accordance with the provision hereof.

"Date of commissioning" or DOC means the date notified by the UMC when Sewage treatment plant is complete in all respect and successful trial has been conducted of all the equipments and the STP is ready to take delivery of sewage water on regular basis.

"Effective date" means the date on which this agreement is formally signed.

"Sewage Treatment Plant or STP" means STP with MBBR Technology with facilities including equipments and civil work created by HZL for treatment of 20 MLD of Sewage at Manwa Khera (Technology details at ANNEXURE - I.)

"Force Majeure Event" means any event which prevents or delays the performance of obligations under this agreement in whole or in part by either party by reasons of public agitation, civil disturbances, riots, war, hostilities, acts of public enemies civil commotion, sabotage, fire, flood, earthquake, epidemics, explosion, strikes, lockouts, acts of God, rules and regulations or delay or abandonment due to order of court or any other cause beyond the reasonable control of the party affected.

"Conveyance mains" means the pumping station and pipe line laid by HZL for taking off the treated sewage water to its existing plants or expansion locations.

"Term" means the time period of twenty five years or any extended period thereafter for which this agreement remains valid and effective.

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YASHAD BHAWAN, UDAIPUR

ANNEXURE-VIII
WATER ALLOCATION LETTER

"Treated Sewage" means liquid residue derived from the sewage treatment process of the STP that is capable of re-use for purpose other than human consumption and meets discharge norms.

2. Interpretation

All the words in singular shall be deemed to connote their respective plurals and vice-versa, unless the context suggests otherwise.

Headings of the clauses in this agreement are merely for the purpose of convenience and shall have no bearing on the interpretation of this agreement.

3. Sewage Treatment Plant

3.1 HZL has agreed to construct 20 MLD STP facilities at Manwa Khera. The plant will be designed to take peak load and seasonal fluctuations with an average treatment capacity of 20 MLD based on MBBR technology as per annexure –I. The plant will meet all standards and norms prescribed by the pollution control authorities or agencies for discharge of treated water.

3.2 UMC, in consideration of capital expenditure and operating expenses during the term of the agreement, hereby vests HZL with the exclusive right for the term to take off treated water from STP and use at its plants or expansion location of plants. In no case HZL will use this water for commercial sale.

3.3 UMC hereby agrees that it will ensure delivery of whatsoever sewage generated through its collection network at the input point of STP up to 20 MLD. However, 20 MLD sewage to STP can only be assured after completion of sewerage network proposed to be done under NLCP in the STP catchment. Maintenance of the sewage collection network shall be responsibility of the UMC. The junction connections structure of sewerage system with STP shall be developed by HZL at their cost.

3.4 HZL & UMC hereby agree that the STP is capable to treating Domestic Sewage only. The UMC agrees to take all possible steps to check merging of industrial sewage & hazardous waste, if any occurring in the catchments area & lawful action shall be initiated against defaulters by UMC to check recurrences.

3.5 UMC shall have the exclusive right over the manure generated by STP. Manure shall be collected & stored properly by HZL on a site within the land provided for STP. HZL shall provided unhindered access to UMC for the purpose of disposing the manure as may be determined by UMC from time to time. UMC will take steps to dispose the manure on fortnightly basis so that it is not accumulated in the STP site and interfere with STP operations.

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3.6 HZL may suspend the treatment Sewage at STP by giving 24 Hours notice in the event of Force majeure event, if any, arises during the term of agreement.

3.7 The land for the STP is being acquired by PHED, Government of Rajasthan. the compensation for the land would be paid by the UIT and land will be transferred in the name of UIT. The land required, by HZL for construction of STP and disposal of residual solid waste at Manwa Khera shall be provided to HZL on lease rent basis at a token amount, of Rs. 1.00/ square meter per year by UIT.However incase, the land measuring 6.51 hectares or part thereof is utilized by HZL for development of STP or its expansion in future, HZL shall reimburse the compensation amount to UIT. The land so made available shall be exclusively used for the STP and no other use. In case HZL fails to construct and operate the STP as per CPCB or RSPCB norms, UMC will be free to take possession of the land along with the STP and other fixed assets with all its operating equipments free from all encumbrances for its regular operation at risk and cost of HZL. However HZL's right for treated water would remain intact.

3.7(a) Alternatively HZL will also explore possibilities of purchasing suitable alternate land at Manwakhera or near by area. The cost of purchasing land will be born by HZL for setting of STP and lands so purchased will be surrendered to UIT by HZL and same will be again allotted to HZL on lease rent basis at a token amount of Rs. 1.00 per square meter per year by UIT for setting up STP. HZL agrees to build all necessary infrastructure facilities internal and external along with approach roads to alternate site at their cost.

HZL further agrees to bear the cost of additional trunk sewer line from the exisiting site of Manwakhera to alternate site. The cost of additional sewer line will be intimated by UIT to HZL.

HZL will take all necessary steps for change of land use , environmental clearance, NOC and permission for routing of sewer line and pumping facility that may be required to put on the bank of the river shall be at their cost. However, UMC or UIT (as the case may be) shall provide necessary support for getting permission from statutory body.

3.8 The STP with its operating infrastructure, tertiary and additional treatment plants, if any, fixed asset, equipments, land etc situated within the premises of the land made available to the HZL or alternate land purchased by HZL, excluding the treated water conveyance system developed by HZL for its use, shall be handed over by HZL to UMC without any encumbrances on expiry of the Term of this Agreement in working condition.

4. Battery Limits

HZL battery limits will start from Sewage intake point of STP, prior to sewage intake point all the ownership or responsibilities with respect to Sewage collection system etc lies with UMC.

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ANNEXURE-VIII
WATER ALLOCATION LETTER

5. Operation

HZL shall manage the operation and maintenance of STP during the term of this Agreement at its own cost including payment of power charges required for operation of the plant.

6. Power Connection

HZL shall take the power connection as per the requirement of the STP plant; however UMC shall provide HZL authorization required in this connection. Monthly Bills as per utilization of power shall be paid by HZL at their cost. Power, water and any other charges, expenses during construction period will be born by HZL at its own cost.

7. Force Majeure

Notwithstanding anything contained in this agreement, in case of a Force Majeure Event, if the party which is prevented from performing its obligations under this agreement has given notice of the force majeure event to other party, within 30 days of occurrence of such event than the particular obligation of that party, which cannot be performed due to occurrence of force majeure event shall be suspended without any liability towards the other party. The Term of this agreement shall stand extended by the time lost by virtue of such Force Majeure Event.

8. Dispute Resolution & Arbitration

In the event of any dispute or difference arising out of, relating to, under or in respect of this agreement between the parties the same shall be referred to the Divisional Commissioner, Udaipur by the aggrieved party and the decision made by the Divisional Commissioner will be binding on all the parties to the agreement.

9. Term

Both the parties agree that this agreement shall be valid for a period of twenty five years from the date of commissioning of the STP or signing of Agreements whichever is later, and shall be reviewed thereafter for extension with mutual consent.

10. Miscellaneous

10.1 The parties hereto represent that this Agreement has been duly executed in accordance with the applicable law, regulations and bye-laws governing them and that it is valid, binding and legally enforceable upon them.

10. 2 any tax liability during the Term of the Agreement relating to STP shall be borne by HZL at his own cost.

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HINDUSTAN ZINC LTD.
YASHAD BHAWAN, UDAIPUR

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ANNEXURE-VIII
WATER ALLOCATION LETTER

10.3 All the notices or communication required to be served under this Agreement shall be issued by registered post, fax, E-mail or hand delivered to the following address or as intimated by each party :-

i. Company Secretary, Hindustan Zinc Limited, Yashad Bhavan, Udaipur -313004

ii. UMC – Commissioner, Municipal Council, Udaipur – Town Hall Road, Udaipur- 313001

iii. UIT-Secretary, Urban Improvement Trust, Udaipur-313001

10.4 Delay in exercising or omission to exercise any right to a party under this agreement shall not impair any such right and shall not be considered to be a waiver thereof.

10.5 No modification alteration or amendment of this Agreement shall be valid unless executed with mutual consent and acknowledged accordingly.

10.6 Obtaining all the statutory certifications or clearance from Statutory Bodies and Government will be the sole responsibility of HZL. However if required, UMC may assist in getting all statutory permissions for installation of STP to HZL, for its efficient operations and developing water conveyance system for treated water to HZL plants.

10.7 HZL undertakes to build all necessary infrastructure, like roads, drainage, administrative buildings, lighting, water supply , toilets, boundary wall etc, within the STP premises at their cost and maintain the same.

10.8 Ownership of STP, including with its developed infrastructure there in for operation will remain with HZL during Term of the Agreement.

10.9 HZL shall commission the STP within a period of 18 months from the date of taking over possession of the designated land free from all encumbrances. In case of delay on the part of HZL in constructing of STP, Performance Guarantee may be forfeited partly or fully as may be determined by the UMC In case of failure, the land along with infrastructure so developed therein shall vest in the UMC.

10.10 The UMC & other authorities of the Government shall have the right to enter, inspect the STP during construction, implementation or running of the project at any time with prior intimation to HZL.

10.11 The treated water should meet the Central Pollution Control Board (CPCB) and the Rajasthan State Pollution Control Board (RSPCB) norms.

10.12 The drawings, design and project appraisal of the STP (20 MLD capacity) including the necessary infrastructures, as developed and estimated by the consultant appointed by the HZL shall be got vetted by any of the IITs or MNIT, Jaipur.

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YASHAD BHAWAN, UDAIPUR

ANNEXURE-VIII
WATER ALLOCATION LETTER

10.13 HZL agrees to establish a laboratory in the STP premises for day to day testing of the quality of treated sewage water meet the CPCB and RSPCB norms or standards at their cost.

10.14 In case UMC provides more than 20 MLD of raw sewage at inlet point of STP, HZL agrees to treat the excess sewage also in the STP plants, maximum up to additional 10% of design capacity, and will be free to use the excess treated water for their own purpose. In case the raw sewage quantity gets increased more than aforesaid limit, HZL agrees in principal to modify the STP to treat the same to such an extend, it is technically feasible with limited modifications in the STP. The said modifications along with the modality of disposing the excess treated water born out of this modification shall be decided mutually at that point of time.

10.15 HZL agrees to utilize the treated water of STP for its own Plants and their expansion plans in future & will not use the treated water for any other commercial purpose or sale etc. And if a situation so arises that HZL is not in a position to use all the treated water in their own plants and future expansions due to any force majeure events, then the alternate disposal of treated water shall be worked out with the mutual consent of HZL and UMC.

10.16 HZL agrees to be liable and responsible for any unforeseen happening or accident fatal or nonfatal in the premises of STP during its construction and operation of during the period of Term of Agreement or till such time the STP is lawfully handed over to UMC or upto the time the STP is taken over by the UMC , as the case may be. HZL will take all reasonable measures and precautions for the safety and security of the STP and its premises.

10.17 HZL agrees to be solely responsible for the happening of any theft , damage , breakages of the structure etc during construction or operation of STP & till such time the STP and its premises are handed over to ,or, taken over by UMC. HZL shall restore the damages, breakages etc to its original position immediately at their cost.

10.18 HZL agrees to make investments required for the setting up of the STP and it is estimated to cost approximately Rs 26.25 crores as per ANNEXURE-II, and Rs. 10 crores for establishment of additional treatment facility to make the treated water usable in industry, excluding the cost of land for STP at Manwa khera and operation and maintenance for 25 years after commissioning of STP for generating sources of water for its plants or expansions. HZL also agrees to arrange water and electricity required during construction of the entire work and all other expenses during pre-commissioning period at their cost.

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YASHAD BHAWAN, UDAIPUR

ANNEXURE-VIII
WATER ALLOCATION LETTER

10.19 HZL also agrees to release 15% of the treated water from the STP in the river during dry season (March through June) every year to maintain the water table in the area for the potential users or farmers.

10.20 UMC and State Government reserve the right to terminate the agreement incase of any breach of terms and conditions of this MOU after providing an opportunity of hearing to HZL.

10.21 HZL also agrees to provide a performance guarantee within a period of one month from the signing of this agreement or handing over the land which ever is later, in the form of Bank Guarantee for Rs 2.5 crores from a Nationalized bank valid for 36 Month in favour of UMC for successful construction , completion and commissioning of the STP within the scheduled period of 18 months. UMC shall have right to impose penalty for non performance and forfeiture of the bank Guarantee in part of full. UMC's decision in this regard shall be final and binding on all parties.

10.22 HZL agrees, to provide Rs. 15.00 crores as financial support to the implementing agency for laying of trunk sewer lines in the STP's catchment area. This amount will be paid to the implementing agency of the Sewerage project and the amount will be paid by HZL in three installments of 30% (on issuance of work order), 30% (on completion of 40% of the physical progress) and 40% (on completion of 75% of the physical progress), respectively. Any default shall attract an interest @ 18% per annum.

10.23 HZL agrees to pay, from date of commissioning, Rs. 20.00 lacs annually for first five years, 30 lacs annually for next five years and Rs. 40 lacs annually for rest of the years up to 25 years to UMC on account of maintenance of the sewerage network system in the catchment area of the STP. The said amount shall be payable in two equal installments every year. The first installment shall be paid within thirty days from date of commissioning and the second installment shall be paid after the completion of six month from the date of commissioning but within a period of thirty days thereafter. The installments for rest of years shall become due and payable as per the same principal at an interval of six months. Any default shall attract an interest @ 18% per annum.

10.24 HZL will also incur a minimum expenditure of Rs. 1.00 Crore per annum under its corporate social responsibility in Udaipur city and the utilization of this amount will be decided by a committee under the chairmanship of the District Collector, Udaipur, Chair person of Municipal Council, secretary, UIT and a representative of HZL as its member and Commissioner, UMC as its member Secretary.

10.25 In case the water tariff for industrial use is increased by the competent authority in future, HZL agrees to pay 40% of such incremental tariff to UMC on monthly basis. This increase rate will be calculated on the basis of 20.00 MLD of water supply , irrespective of the actual delivery of raw sewage water to the STP. However, this system will come in

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(R. PANDWAL)

to force only after the completion of 5 years from date of commissioning of the STP. Any default shall attract an interest @ 18% per annum.

10.25(a) HZL further agrees to abide by rules of National and State water policy as approved by State Government and in case of water crisis the orders of State Government shall prevail for such duration.

10.26. HZL undertakes to plant trees in the buffer zone of the premises and maintain the same.

10.27. All parties shall abide by any amendment or directions issued by State Government which shall be mutually agreed in writing upon by all parties to the Agreement from time to time in respect of all the clauses of this Agreement in future.

11 Court of Jurisdiction

The courts situated at Udaipur in the State of Rajasthan shall alone have jurisdiction over matters arising out of this agreement

This Agreement bears the approval of the State Government vide letter no F55()PA/SE/DLB/10/STP/Udaipur/12664 dated16.8.2011 and No 2077 dated 01.05.2012.

IN WITNESS whereof the parties have executed this Agreement on the date and month aforementioned in the presence of witness named hereunder:

For and on Behalf of:

UMC	UIT	HZL
Name Satya Narayan Acharya	Name Dr. R.P. Sharma	Name (R. PANDWAL) COMPANY SECRETARY HINDUSTAN ZINC LTD. YASHAD BHAWAN, UDAIPUR
Designation ~~आयुक्त~~ नगर परिषद, उदयपुर	Designation	Designation
Date	Date 09-05-2012	Date
Place	Place Udaipur सचिव नगर विकास प्रन्यास उदयपुर (राज.)	Place

In witness hereof:

1. _____ (D.S Rathore) HZL — witness 3 — witness 4.
2. _____ (C.L. Kothari) — C.K. Varshney — (ANIL AGRAWAL)

Annexure-IX

Forest Authentication Letter and Wild Life Conservation Plan

Sadhna Sikhar Road, Rajsamand Phone & Fax No. 02952-220096 Email- dcf.rjsmnd.forest@rajasthan.gov.in

क्रमांकः पत्रा ( ) सर्व/उवसं/2017–18/ 3722 दिनांकः 22-9-17

निमित्त :–

यूनिट हेड
सिन्देसर खुर्द माईन
हिन्दुस्तान जिंक लि0
जिला राजसमन्द।

विषय :– Duly Authenticate list of Flora and Fauna in core & Buffer zone (10Km Radius of Sindesar Khurd Mine (M.L. No. 07/95)

संदर्भ :– आपका पत्रांक HZL/SKM/Env/2017/08/41 Date : 29.08.2017 के कम में।

उपरोक्त विषयान्तर्गत संदर्भित पत्र से चाही गई फ्लोरा एवं फौना की प्रमाणित सूची संलग्नक भिजवाई जा रही है।

संलग्न :– उपरोक्तानुसार

(कुमार स्वामी गुप्ता)
उप वन संरक्षक
राजसमन्द

पाये जाने वाली वनस्पती की सूची

वृक्ष (Trees)

क्र सं.	अन्तर्राष्ट्रीय लैटीन नाम	स्थानीय नाम	कुल
1	*Acacia auriculiformis*	अकेसिया ,दालमांठ	*Mimosaceae*
2	*Acacia catechu* (L.f) willd.	खैर ,खेड़ा	*Mimosaceae*
3	*Acacia ferruginea* DC.	कैगर खैर	*Mimosaceae*
4	*Acacia leucophloea* (Roxb.) Willd.	रोंझ ,अरूँझिया	*Mimosaceae*
5	*Acacia nilotica* (Linn.) Willd.	बोलिळा ,बबूल	*Mimosaceae*
6	*Acacia senegal* (Linn.) Willd.	कुमठा	*Mimosaceae*
7	*Adina cordifolia* (Willd. Ex Roxb.) Hook	हल्दु	*Rubiaceae*
8	*Aegle marmelos* (Linn.) Corr	बेल ,बीली	*Rutaceae*
9	*Ailanthus excelsa* Roxb.	अरडू, पाबा	*Simarubaceae*
10	*Alangium salvifolium* (L.f.) Wangerin	अकोल	*Alangiaceae*
11	*Albizia lebbeck* (Linn.) Benth.	कालिया ,काला सिरस	*Mimosaceae*
12	*Albizia odoratissima* (L.f.) Benth	कालिया	*Mimosaceae*
13	*Albizia procera* (Roxb.) Benth.	गुराड़ ,सफेद सिरस	*Mimosaceae*
14	*Anogeissus acuminata* (Roxb.ex DC.) Guill.	धोंक	*Combretaceae*
15	*Anogeissus latifolia* (Roxb.ex DC.) Wall.	धावडा	*Combretaceae*
16	*Anogeissus pendula* Edgew.	धोंक ,कल्थी	*Combretaceae*
17	*Anogeissus sericea* Brandis	इन्द्रोक	*Combretaceae*
18	*Azadirachta indica* A.Juss	नीम	*Meliaceae*
19	*Bauhinia racemosa* Lamk.	झींझा ,हीतरा	*Caesalpiniaceae*
20	*Bauhinia variegata* Linn.	कचनार	*Caesalpiniaceae*
21	*Bombax ceiba* Linn.	सेमल ,सेमला	*Bombacaceae*
22	*Boswellia serrata* Roxb.ex Coleb.	सालर	*Burseraceae*
23	*Bridelia retusa* (L.) Spreng.	अगणा ,लम्पाण ,लांपकणा	*Euphorbiaceae*
24	*Butea monosperma* (Lamk.) Taub.	खाखरा ,पलास ,छीला , ढाक	*Fabaceae*
25	*Butea monosperma* Variety *Leutea*	खाखरा पीला (फूल)	*Fabaceae*
26	*Casearia elliptica* Willd.	मुंजाल ,चिल्ला	*Flacourtiaceae*
27	*Cassia fistula* Linn.	अमलतास ,बरडावन , कस्मेला	*Caesalpiniaceae*
28	*Cassia siamea* Lam.	केसिया	*Caesalpiniaceae*
29	*Cordia dichotoma* Forsl. f.	गून्दा ,लसोंडा	*Ehretiaceae*

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30	*Cordia gharaf* (Forsk.) Ehrenb.	गुन्दी	*Ehretiaceae*
31	*Crateva religiosa* Forst.f.	वाहीवरना ,वरना	*Capparaceae*
32	*Dalbergia latifolia* Roxb.	काला शिशम	*Fabaceae*
33	*Dalbergia paniculata* Roxb.	पई ,पेही ,धोवन	*Fabaceae*
34	*Dalbergia sissoo* Roxb.	शीशम	*Fabaceae*
35	*Delonix elata* (L.) Gamble	सन्देसरा ,सन्देडा	*Caesalpiniaceae*
36	*Delonix regia* (Bojer) Raf.	गुलमोहर	*Caesalpiniaceae*
37	*Diospyros melanoxylon* Roxb.	टीमरू ,तेन्दू	*Ebenaceae*
38	*Diospyros montana* Roxb.	गांगली ,विषतेंदु	*Ebenaceae*
39	*Dolichandrone falcata* (Wall. Ex DC.) Seem.	मीठोल ,मीन्डला	*Bignoniaceae*
40	*Ehretia laevis* Roxb.	तम्बोलिया	*Ehretiaceae*
41	*Eriolaena hookeriana* Wight & Arn.	गादिया सागवान ,बूटी	*Sterculiaceae*
42	*Erythrina variegata* L.var.*orientalis* (L.)Merr.	गधापलास	*Fabaceae*
43	*Erythrina suberosa* Roxb.	बोला ,बोदलिया	*Fabaceae*
44	*Eucalyptus species*	नीलगिरि ,सफेदा	*Myrtaceae*
45	*Feronia limonia* (L.) Swingle	कोटबडी ,कैथ	*Rutaceae*
46	*Ficus arnottiana (Miq.) Miq.*	पिम्पली,पाल्ही,पहाडी पिपल	*Moraceae*
46	*Ficus benghalensis* Linn.	वडला ,बड ,बरगद	*Moraceae*
47	*Ficus racemosa* Linn.	गुलर , उमर	*Moraceae*
48	*Ficus religiosa* Linn.	पीपल	*Moraceae*
49	*Gardenia tergida* Blume	पडेरी (पेन्डडी)	*Rublaceae*
50	*Ficus virens Ait.*	पीलक, पीलखण	*Moraceae*
51	*Gardenia turgida* Roxb.	पडेरी	*Rubiaceae*
52	*Garuga pinnata* Roxb.	करपटा	*Burseraceae*
53	*Gmelina arborea* Roxb.	इबन ,सेवण	*Verbenaceae*
54	*Grewia tiliifolia* Vahl.	धामन	*Tiliaceae*
55	*Holoptelea integrifolia* (Roxb.) Planch.	कणजी ,कंजडी ,चन्दरबाटी , चुरैल	*Ulmaceae*
56	*Hymenodictyonexcelsum Roxb.*	लूणिया	*Rublaceae*
57	*Jacaranda mimosaefolia* D.Don	जकरन्डा	*Bignoniaceae*
58	*Kydia calycina* Roxb.	कपासिया ,पुला ,रामडी	*Malvaceae*
59	*Lagerstroemia parviflora* Roxb.	कलझारिया ,काकडियो	*Lythraceae*
60	*Lannea coromandelica* (Houtt.) Merrill	गोदल ,गुर्जन	*Anacardiaceae*
61	*Madhuca indica* J. F. Gmelin	महुआ	*Sapotaceae*
62	*Mallotus philippensis* (Lam.) Muell.-Arg	रोली ,सिन्दुरी	*Euphorbiaceae*
63	*Mangifera indica* Linn.	आम	*Anacardiaceae*
64	*Melia azedarach* Linn.	वकायन	*Meliaceae*

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65	*Miliusa tomentosa* (Roxb.) J.Sinclair	उम्बिया ,करी	*Anonaceae*
66	*Mimusops elengi* Linn.	मोरसली	*Sapotaceae*
67	*Mitragyna Parvifolia* (Roxb.) Korth.	कलम ,कीमडा	*Rubiaceae*
68	*Morinda tomentosa* Heyne ex Roth	आल	*Rubiaceae*
69	*Moringa concanensis* Nimmo ex Dalz.& Gibs.	हिंगवा ,सैंजना	*Moringaceae*
70	*Oroxylum indicum* (Linn.) Vent.	फर्सी ,टेंटु	*Bignoniaceae*
71	*Ougeinia oogeinsis* (Roxb.) Hochr.	तिन्सा ,तनस	*Fabaceae*
72	*Phoenix sylvestris* (L.) Roxb.	खजूर	*Arecaceae*
73	*Phyllanthus emblica* Linn.	आँवला	*Euphorbiaceae*
74	*Pithecellobium dulce* (Roxb.) Benth.	कीकर ,जंगल जलेबी	*Mimosaceae*
75	*Polyalthia longifolia* (Sonnerat) Thw.	आसापाला ,अशोक	*Anoneceae*
76	*Pongamia pinnata* (Linn.) Pierre	करंज ,कणजी	*Fabaceae*
77	*Prosopis cineraria* (L.) Druce	सभेला ,खेजड़ी	*Mimosaceae*
78	*Pterocarpus marsupium* Roxb.	बीजा	*Fabaceae*
79	*Putranjiva roxburghii* Wall.	अड़क ,चन्दन ,जियापोता	*Euphorbiaceae*
80	*Salvadora oleoides* Decne.	पीलु ,खाराजाल	*Salvadoraceae*
81	*Salvadora persica* Linn.	पीलु ,मीठाजाल	*Salvadoraceae*
82	*Santlum album* Linn.	चन्दन	*Santalaceae*
83	*Sapindus laurifolius* Vahl.	अरीठा	*Sapindaceae*
84	*Schrebera swietenioides* Roxb.	मोखा	*Oleaceae*
85	*Soymida febrifuga* (Roxb.) A. Juss.	रोहण	*Meliaceae*
86	*Sterculia urens* Roxb.	कड़ाया	*Sterculiaceae*
87	*Stereospermum colais* (Buch.-Ham.ex Dill.) Mavv.	पाडल, पाडर	*Bignoniaceae*
88	*Syzygium cumini* (Linn.) Skeels	जामुन	*Myrtaceae*
89	*Syzygium heyneanum* (Duthie) Wall.exGamble	कठ जामुन	*Myrtaceae*
90	*Tamarindus indica* Linn.	इमली	*Caesalpiniaceae*
91	*Tecomella undulata* (Sm.) Seem.	रोहिडा	*Bignoniaceae*
92	*Tectona grandis* L. f. Suppl	सागडौ ,सागवान	*Verbenaceae*
93	*Terminalis arjuna* (Gaertn.) Roxb.	अर्जुन	*Combretaceae*
94	*Terminalia tomentosa* Wight& Arn	सादड	*Combretaceae*
95	*Toona ciliata* Roem.	तून	*Meliaceae*
96	*Wrightia tinctoria* (Roxb.) R.Br.	खिरनी , दूधी ,वेरा,खन्नी	*Apocynanceae*
97	*Wrightia arborea* (Dennst.) Mabb.	खिरना ,दूधी ,खन्नी	*Apocynanceae*
98	*Ziziphus xylopyrus* (Retz.) Willd.	घटबोर	*Rhamnaceae*

ख–छोटे वृक्ष, क्षुप (Under trees,shrubs)

क.सं.	अन्तर्राष्ट्रीय (लैटीन) नाम	स्थानीय नाम	कुल
1	*Abutilon ramosum* (Cav.) Guill. & Perr.	पीथारिया	*Malvaceae*
2	*Acacia Jacquemontii* Benth.	बौली	*Mimosaceae*
3	*Adhatoda vasica* Nees	अडूसा	*Acanthaceae*
4	*Annona squamosa* Linn.	सीताफल	*Annonaceae*
5	*Artemisia scoparia* Waldst.& Kit.	सीतावनी	*Asteraceae*
6	*Balanites aegyptiaca* (L.) Delile	हिंगोट	*Simaroubaceae*
7	*Caesalpinia bonduc* (L.) Roxb.	कटकरंज ,खरकोन्दा , कॉटाबेल	*Caesalpiniaceae*
8	*Caesalpinia decapetala*	दुरमची	*Caesalpiniaceae*
9	*Calotropis gigantea* (L.) R.Br.	ऑकडा ,शिवआर्क	*Asclepiadaceae*
10	*Calotropis procera* R.Br.	ऑकडा ,मदार	*Asclepiadaceae*
11	*Capparis decidua* (Forssk.) Edgew.	कैर ,करील	*Capparaceae*
12	*Capparis sepiaria* Linn.	कंथेर ,कंथार	*Capparaceae*
13	*Capparis spinosa* Linn.	कलवारिया ,काबर	*Capparaceae*
14	*Carissa spinarum* Linn.	कमदी ,करोन्दा	*Apocynaceae*
15	*Cassia auriculata* Linn.	ऑवल	*Caesalpiniaceae*
16	*Clerodendrum phlomidis* Linn.f.	अरनी	*Verbenaceae*
17	*Commiphora wightii* (Arn.) Bhandari	गुगल	*Burseraceae*
18	*Corchorus trilocularis* Linn.	कोश्ता ,कागली तम्बाकू , कराक	*Tiliaceae*
19	*Crotalaria burhia* Buch.-Ham.ex Benth.	करसाना ,सिणिया ,बॉसी , गुलालि	*Fabaceae*
20	*Crotalaria L, Herbacious species*	बॉसी , गुलालि आदि	*Fabaceae*
21	*Dendrocalamus strictus* (Roxb.) Nees	बॉस	*Poaceae*
22	*Dendrophoe falcata* (L.f.) Etting. (Brnach parasite)	बॉदा	*Loranthaceae*
23	*Dichrostachys cineria* (L.) Wight & Arn.	गोयाखैर ,अमीणा	*Mimosaceae*
24	*Ensete superbum*	केला (जंगली) चौ	*Musaceae*
25	*Euphorbia nivulia* Buch.& Ham.	घोटाथौर ,थोर	*Euphorbiaceae*
26	*Ficus hispida* L.f.	कदुमर ,घोटेर ,कालमुंगरी	*Moraceae*
27	*Flacourtia indica* (Burm.f.) Merrill	काकण ,काकोण	*Flacourtiaceae*
28	*Flemingia congesta* Roxb.ex Aiton	वन अरहड़	*Fabaceae*
29	*Grewia flavescens* A.Juss.	काली स्याली	*Tiliaceae*

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30	*Grewia hirsuta* Vahl	फरांगणी	*Tiliaceae*
31	*Grewia tenax* (Forsk.) Fiori	गेंगसी ,गंगेडन	*Tiliaceae*
32	*Grewia villosa* Willd	डोल्कन ,वन फालसा	*Tiliaceae*
33	*Helicteres isora* Linn.	मरोडफली	*Sterculiaceae*
34	*Holarrhena pubescens* (Buch.-Ham) Wall.ex G Don(Syn.Holarrhena antidysenterica Wall.ex A.DC.)	कडुआ ,इन्द्रजो ,दुधी	*Apocynaceae*
35	*Ipomoea fistulosa* (Mart. ex Choisy) Austin	बेशर्म ,गाँडा ,ऊखडा	*Convolvulaceae*
36	*Ixora arborea* Roxb.	इमना ,राइकुडा ,जिलपाइ	*Rubiaceae*
37	*Jatropha curcas* Linn.	रतनजोत	*Euphorbiaceae*
38	*Jatropha jatrophagosypilolia* Linn.	रतनजोती	*Euphorbiaceae*
39	*Lantana camara* Linn.	बेवाण ,लैंटाना	*Verbenacea*
40	*Lantana wightiana* Wall.ex Gamble	बेवाण ,लैंटाना	*Verbenacea*
41	*Leptadenia Pyrotechnica* (Forsk.) Decna	खींप ,खीम्परा	*Asclepiadaceae*
42	*Maytenus emarginatus* (Willd.) Ding Hou	कंफेडा ,कूँकर,	*Celastraceae*
43	*Mimosa hamata* Willd.	बन्दर की राखी ,लीप्टी	*Mimosaceae*
44	*Mimosa himalayana* Gamble	झीझनी ,हजेरा ,स्याहकाटॅा	*Mimosaceae*
45	*Nerium Oleander* Linn.	कनेर लाल	*Apocynaceae*
46	*Nyctanthes arbor-eristis* Linn.	टामट ,हारसिंगार	*Oleaceae*
47	*Ocimum gratissimum* Linn.	वन तुलसी	*Lamiaceae*
48	*Opuntia dillenii* (Ker-Gawler) Haworth	नागफनी ,थापाथोर	*Cactaceae*
49	*Pavonia odorata* Willd.	घोंच कामडी	*Malvaceae*
50	*Plumbago zeylanica* Linn.	चित्रक ,चित्रावल	*Plumbaginaceae*
51	*Pogostemon benghalense* (Burm.f.) O.Ktze.	वन तुलसा	*Lamiaceae*
52	*Prosopis juliflora* (Swartz) DC.	विलायती बबूल	*Mimosaceae*
53	*Pupalia lappacea* (L.) Juss.	चिरचिटा	*Amaranthaceae*
54	*Rhus mysurensis* G.Don	डासरण	*Anacardiaceae*
55	*Sarcostemma viminale* (L.) R.Br.	खरसरा ,सामंरवेल	*Asclepiadaceae*
56	*Securinega leucopyrus* (Willd.) Muell.- Arg.	हेल्पी	*Euphorbiaceae*
57	*Tamarix ericoides* Rottl.	झाउ	*Tamaricaceae*
58	*Tephrosia candida* DC.	वासूगी	*Fabaceae*
59	*Thespesia lampas* (Cav.) Dalz. & Gibs.	वन कपास	*Malvaceae*
60	*Urgenia indica* (Roxb.) Kunth	कोली कान्दा	*Liliaceae*
61	*Viscum articulatum* Burm.f. (Stem-parasite)	बॉन्दा	*Loranthaceae*
62	*Vitex negundo* Linn.	नेगड़ ,निर्गुन्डी	*Verbenaceae*

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63	*Woodfordia frutitosa* (L.) Kuntz	धाय	*Lythraceae*
64	*Xanthium strumarium* Linn.	ओंगीडा ,आधाशीशी ,चिरचिटा	*Asteraceae*
65	*Ziziphus mauritiana* Lam.	बडावोर ,बोर	*Rhamnaceae*
66	*Ziziphus nummularia* (Burm. f.) Wight & Arn.	चणवौर ,झाडी बैर	*Rhamnaceae*
67	*Ziziphus oenoplia* (L.) Miller	बोर	*Rhamnaceae*

छोटी झाड़िया एवं शाक (Under shurbs and Herbs)

क्र.सं.	अन्तर्राष्ट्रीय (लैटीन) नाम (अंग्रेजीमें)	स्थानीय नाम	कुल
1	*Acanthospermum hispidum* DC.	काँटी	*Asteraceae*
2	*Achyranthes aspera* Linn.	ओंधी झाडा	*Amaranthaceae*
3	*Aerva javanica* (Burm.f.) Juss. ex Schult.	बुइ	*Amaranthaceae*
4	*Agave americana* Linn.	राम बाँस	*Agavaceae*
5	*Ageratum conyzoides* Linn.	उँचती ,मकुवर	*Asteraceae*
6	*Alhagi maurorum* Medic.	जवासा	*Fabaceae*
7	*Aloe vera* (L.) Burm.f.	ग्वारपाठा	*Liliaceae*
8	*Amaranthus spinosus* Linn.	जंगली कोंटेवालीचोलाई , राजगिरा	*Amaranthaceae*
9	*Argemone mexicana* Linn.	सत्यानासी , पीला धतुरा	*Papaveraceae*
10	*Barleria cristata* Linn.	वज्रदन्ती (नीली)	*Acanthaceae*
11	*Barleria prionitis* Linn.	वज्रदन्ती (पिली)	*Acanthaceae*
12	*Borreria pusilla* (Wall.) DC.	सटगंठिया , गांठिया	*Rubiaceae*
13	*Cassia occidentalis* Linn.	कसोंदी ,ताल्का ,चक्कुन्दरा	*Caesalpiniaceae*
14	*Cassia tora* Linn.	पुँवाड	*Caesalpiniaceae*
15	*Centella asiatica* (L.) Urban	ब्राह्मी–बूटी ,मण्डूक पर्णी	*Aplaceae*
16	*Chlorophytum tuberosum* (Roxb.) Baker	सफेद मुसली	*Liliaceae*
17	*Commelina benghalensis* Linn.	बोकना ,बोकनिया	*Commelinaceae*
18	*Corchorus trilocularis* Linn.	कोश्ता ,कागली तम्बाकू ,कराक	*Tiliaceae*
19	*Curculigo orchioides* Gaertn.	काली मुसली	*Hypoxidaceae*
20	*Datura fastuosa* Linn.	काला धतुरा	*Solanaceae*
21	*Datura ferox* Linn.	धतूरा	*Solanaceae*
22	*Darura Innoxia* Mill.	धतूरा	*Solanaceae*

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23	*Desmodium gangeticum* (L.) DC.	शालपर्णी	*Fabaceae*
24	*Digera muricata* (Linn.) Mart.	सरवाली कुकड़ी , लेहसुआ, खंजरू	*Amaranthaceae*
25	*Dyerophytum indicum* (Gibs. ex Wt.) O.Ktze	चितायल	*Plumbaginaceae*
26	*Echinops echinatus Roxb.*	उटँकटेली	*Asteraceae*
27	*Eclipta alba* (Linn.) Hassk.	भृंगराज ,भाँगरा	*Asteraceae*
28	*Enicostema axillare* (Lam.)	नवरी,छोटा चिरायता, मामेज्यो	*Gentianaceae*
28	*Euphorbia chamaesyce* Linn.	दुधी	*Euphorbiaceae*
29	*Euphorbia granulata* Forsk.	दूधेली	*Euphorbiaceae*
30	*Euphorbia hirta* Linn.	दूधी	*Euphorbiaceae*
31	*Euphorbia indica* Lam.	दुधाली	*Euphorbiaceae*
32	*Euphorbia thymifolia* Linn.	दुधी	*Euphorbiaceae*
33	*Fagonia indica* Burm. f.	धमासा	*Zygophyllaceae*
34	*Glinus lotoides* Linn.	सतियालेटी ,बाकडा	*Molluginaceae*
35	*Hygrophila auriculata (Schum.) Heine*	तालमखाना ,उंटकटेला	*Acanthaceae*
36	*Indigofera caerulea* Roxb.	नील	*Fabaceae*
37	*Indigofera cordifolia* Heyne ex Roth	बेकर ,मेह–फूली	*Fabaceae*
38	*Indigofera hochstetteri* Baker	वेकरियों ,आडियो बेकरियो	*Fabaceae*
39	*Indigofera linifolia* (L. f.) Retz.	बेकरी ,पन्डारफली	*Fabaceae*
40	*Indigofera oblongifolia* Forsk.	कुऑरा	*Fabaceae*
41	*Indigofera tinctoria* Linn.	नील	*Fabaceae*
42	*Lepidagathis cristata* Willd.	ऐवलकांगिओ	*Acanthaceae*
43	*Lepidagathis hamiltoniana Wall.ex Ness*	कटेली	*Acanthaceae*
44	*Lepidagathis trinervis* Wall.ex Ness	पत्थरफोड	*Acanthaceae*
45	*Martynia annua* Linn.	बाघनखी	*Martyniaceae*
46	*Mollugo pentaphylla* Linn.	चिड़ियों का धनिया	*Molluginaceae*
47	*Nelumbo nucifera* Gaertn.	कमल	*Nelumbonaceae*
48	*Ocimum canum* Sims.	बापची	*Lamiaceae*
49	*Oxalis corniculata* Linn.	त्रिपत्ती ,खटी–बूँटी	*Oxalidaceae*
50	*Parthenium hysterophorus* Linn.	गाजर घास	*Asteraceae*
51	*Peristrophe paniculata* (Forsk.) Brummitt	कगतोर	*Acanthaceae*
52	*Sesamum indicum* Linn.	जंगली तिल	*Pedaliaceae*
53	*Sida acuta* Burm. f.	बला	*Malvaceae*
54	*Sida ovata* Forssk. Fl.	खरैटी, डावी	*Malvaceae*

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55	*Solanum nigrum* Linn.	मकोय ,चिरपोटी	*Solanaceae*
56	*Sphaeranthus indicus* Linn.	गोरख–मुण्डी ,मुण्डी	*Asteraceae*
57	*Tephrosia purpurea* (L.) Pers.	झोडारू ,सरपंखा	*Fabaceae*
58	*Tribulus terrestris* Linn.	गोखरू	*Zygophyllaceae*
59	*Tridax procumvbens* Linn.	कुमरू ,रक्तास्तम्भी	*Asteraceae*
60	*Typha angustata* Bory & Chaub.	एरा–पटेरा	*Typhaceae*
61	*Typha elephantina* Roxb.	एरा	*Typhaceae*
62	*Withania somnifera* (Linn.) Dunal	असगन्ध	*Solanaceae*
63	*Zenia elegana*	गन्दफूल	*Asteraceae*

लतायें एंव काष्ठ लतायें (Climbers and lianas)

क्र. सं.	अन्तर्राष्ट्रीय (लेटिन) नाम	स्थानीय नाम	कुल
1	*Abrus precatorius* Linn.	रत्ती ,चिरमी ,चिरमू	*Fabaceae*
2	*Acacia pennata* (L.) Willd	ऐली , अराल	*Mimosaceae*
3	*Acacia sinuata* (Lour.) Merr.	शिकाकाई	*Mimosaceae*
4	*Ampelocissus latifolia* (Roxb.) Planch.	खाटोलीम्बो , भूसल	*Vitaceae*
5	*Argyreia nervosa* (Burm.f.) Bojer	सॉम्रवेल	*Convolvulaceae*
6	*Argyrela stigosa* (Roth) Roberty	—	*Convolvulaceae*
7	*Aristolochia bracteata* Retz.	हुक्काबेल	*Aristolochiaceae*
8	*Asparagus racemosus* Willd.	नाहरकांटा , शतावरी	*Liliaceae*
9	*Cayratia trifolia* (L.) Domin	कतूम्बा , चार	*Vitaceae*
10	*Celastrus paniculata* Willd.	माल कांगनी	*Celastraceae*
11	*Ceropegia hirsuta* Wight & Arn.	खसूला	*Asclepiadaceae*
12	*Cissampelos pereira* L.	पहाड बेल ,पाडबेल	*Menispermaceae*
13	*Cissus repanda* Vahl	खाटोलीम्बो , भीसाताट	*Vitaceae*
14	*Coccinia grandis* (L.) J.O.Voigt	कुन्दरू ,गोल	*Cucurbitaceae*
15	*Cocculus hirsutus* (L.)Diels	जल जमनी ,वाजरबेल	*Menispermaceae*
16	*Corallocaarpus epigaeus* (Rottl.&Willd.) Hook.f.	मिर्चिया कंद ,मरस्यू	*Cucurbitaceae*
17	*Cryptolepis buchananii* Roen.& Schult.	गॅडासिंगी , करमाता की बेल	*Periplocaceae*
18	*Cryptostegia grandiflora* R.Br.	दूधी , रबड बेल	*Periplocaceae*

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राज[illegible]द

19	*Cucumis melo* L. var. *momordica* Duthie& Fuller	काचरी (खानेयोग्य)	*Cucurbitaceae*
20	*Cucumis prophetarum* L.	काचरी (फल पर नर्म कॉटे)	*Cucurbitaceae*
21	*Cucumis setosus* Cong.	काचरी (फल पर तीक्ष्ण (कॉटे)	*Cucurbitaceae*
22	*Cuscuta hylina* Heyne ex Roth (Stem parasite)	अमर बेल	*Cuscutaceae*
23	*Cuscuta reflexa* Roxb. (Stem parasite)	अमर बेल	*Cuscutaceae*
24	*Dioscorea bulbifera* (Linn.)	कान्दा गिलोय , गेंथी	*Dioscoreaceae*
25	*Dioscorea hispida* Dennstedt	अलीठी	*Dioscoreaceae*
26	*Dioscorea pentaphylla* Linn.	अलीठी	*Dioscoreaceae*
27	*Gloriosa superba* (Linn.)	कलिहारी , तालुखी	*Liliaceae*
28	*Hemidesmus indicus* (L.) R. Br.	अनन्तमूल , सारिवा, दुधी	*Periplocaceae*
29	*Holostemma ada-kodien* Schult.	दुग्धी	*Asclepiadaceae*
30	*Ichnocarpus frutescens* (L.) R.Br.	दूधीवेल, काली दुधी	*Periplocaceae*
31	*Ipomoea nil* (L.)Roth	कालादाना	*Convolvulaceae*
32	*Ipomoea pes-tigridis* L.	घेटा	*Convolvulaceae*
33	*Ipomoea sindica* Stapf	रोंटावेल	*Convolvulaceae*
34	*Ipomoea sinensis* (Desr.) Choisy	–	*Convolvulaceae*
35	*Jacquemontia paniculata* (Burm.f.) Hall.f.	–	*Convolvulaceae*
36	*Leptadenia reticulata* (Retz.) Wt. & Arn.	ड्रनका , खीप बेल	*Asclepiadaceae*
37	*Luffa acutangula* (L.) Roxb.	जंगली तुरई , कालीतोरी ,तोरी	*Cucurbitaceae*
38	*Marsdenia tenacissima* (Roxb.) Moon.	जौती भरवा बेल	*Asclepiadaceae*
39	*Momordica blasamina* Linn.	बाड़	*Cucurbitaceae*
40	*Momordica dioica* Roxb. Ex Willd	किंकोडा ,ककोडा	*Cucurbitaceae*
41	*Mucuna pruriens* (L.) DC.	केमच , कौंच	*Fabaceae*
42	*Oxystelma esculenta* (L.f.) R.Br.	दुग्धी की बेल	*Asclepiadaceae*
43	*Pergularia daemia* (Forsk.)Chiov.	मदारिया की बेल	*Asclepiadaceae*
44	*Pueraria tuberose* DC	मोदी ,गेंजुआ	*Fabaceae*
45	*Rhynchosia rothii* Roxb.ex Aitch.	लोयटन	*Fabaceae*
46	*Rivea hypocrateriformis* (Desr.) Choisy	फॉग ,गवाल ककडी	*Convolvulaceae*
47	*Telosma cordata* (Burm.f.) Merrill	दुग्धी की बेल	*Asclepiadaceae*

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48	*Tinospora cordifolia* Miers	नीम गिलोय	*Menispermaceae*
49	*Trichosanthes bracteata* (Lam.) Voigt	लाल इन्द्रायण	*Cucurbitaceae*
50	*Trichosanthes cucumerina* L.	जंगली पल्वल	*Cucurbitaceae*
51	*Tylophora asthmatica* W.& A.	दमावैल	*Asclepiadaceae*
52	*Vallaris solanaceae* (Roth) Kuntze	दूधी बेल	*Apocynaceae*
53	*Wattakaka volubilis* (L.f.) Staph	मूंछवैल	*Asclepiadaceae*

घ–घास

क.सं.	अन्तर्राष्ट्रीय (लैटीन) नाम	स्थानीय नाम	कुल
1	*Apluda mutica* Linn.	पोलड ,पोलरडी	*Poaceae*
2	*Aristida adscensionis* Linn.	लांपला	*Poaceae*
3	*Cenchrus pennisetiformis* Hochst.& Steud.	काइताइ ,घामणियो–काइताइ	*Poaceae*
4	*Cenchrus setigerus* Vahl	घामण	*Poaceae*
5	*Chloris dolichostachya* Lag.	यामण	*Poaceae*
6	*Chrysopogon hackelii* (Hook.f.) Fischer	गन्देल	*Poaceae*
7	*Coix aquatica* roxb.	गडियाला	*Poaceae*
8	*Coix lacryma-jobi* Linn.	जोरगडी	*Poaceae*
9	*Cymbopogon martinii* (Roxb.) Watson	रोसा	*Poaceae*
10	*Cynodon dactylon* (L.) Pers.	दूब	*Poaceae*
11	*Dichanthium annulatum* (Forsk.) Stapf	करड़	*Poaceae*
12	*Dichanthium foveolatum* (Del.)	बुड्डाथी	*Poaceae*
13	*Echinochloa colona* (Linn.) Link	हामा	*Poaceae*
14	*Heteropogon contortus* (Linn.) P.Beauv.ex Roem.& Schult.	सूखाला ,लांप	*Poaceae*
15	*Imperata cylindrica* (L.) Raeuschel.	दाव	*Poaceae*
16	*Panicum antidotale* Retz.	गारमेनो	*Poaceae*
17	*Saccharum spontaneum* Linn.	कॉस	*Poaceae*
18	*Sehima nervosum* (Rottl.) Stapf	सीण	*Poaceae*
19	*Sorghum halepense* (L.) Pers.	बरू	*Poaceae*

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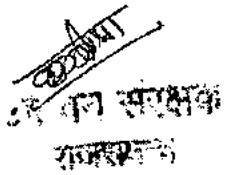
20	*Themeda quadrivalvis (L.) O.Ktze*	रातरड़ा	*Poaceae*
21	*Tragus roxburghii Panigrahi*		*Poaceae*
22	*Vetiveria zizanioides (L.) & Nash*	खस	*Poaceae*

बांस

क.सं.	अन्तर्राष्ट्रीय (लैटीन) नाम	स्थानीय नाम	कुल
1	*Dendrocalamus strictus (Roxb.)*	बांस	*Poaceae*



थेलोफायटा (Thalophyta)

(I) Algae: (एलगी) :–

Spirogyra spp.
Ulothrix spp.
Volvox spp.

(II) Fungii : (फंगस) :–

S. No.	Name of Mashroom	Common Name	Family
1	*Ganoderma lucidium*	-	Ganodermetaceae
2	*Favolus canadansis*	-	Agaricaceae
3	*Agaricus spp.*	-	Agaricaceae
4	*Lepiota procera*	-	Agaricaceae
5	*Auricularia arucula judae*	-	Hygrophoraceae
6	*Pisolithus tinctoris*	-	Gasteromycetes
7	*Mycenia spp.*	-	Agaricaceae
8	*Tricholoma spp*	-	Tricholomataceae
9	*Phellorinia inquinans*	Khumbi	Gasteromycetes
10	*Podaxis pistillaris*	Khumbi	Gasteromycetes
11	*Coprinus spp.*	-	Agaricaceae
12	*Tulostoma spp.*	-	Gasteromycetes
13	*Marasmus spp.*	-	Agaricaceae
14	*Agaricus bisporus*	-	Agaricaceae
15	*Panaeolus separatus*	-	Agaricaceae
16	*Armillaria mellea*	-	Agaricaceae
17	*Clitocybe eludens*	-	Agaricaceae
18	*Clitocybe phyllophila*	-	Agaricaceae
19	*Coltricia perenmi*	-	Agaricaceae
	ज– ब्रायोफायटस (Bryophytes)		

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	Riccia spp.		
	Plageochasma spp.		
	Anthoceros spp.		
	Notothyllus spp.		
	Funaria spp.		
	— टेरीडोफायटस (Pteridophytes)		
	(Ferns)		
	Ampelopterus proli fera		
	Ophiogloshm cosfatum	सर्पजीव्ही	
	Ophiogloshm petiolatum	सर्पजीव्ही	
	Selegenella rependa	संजीवनी	
	Selegenella rajasthanensis	संजीवनी	
	Adiantum caudatum	—	
	Adiantum lunulatum	हंसराज	
	Actinopterns radiatum	मोरपंखी	
	Chelanthes sp.		
	Azola sp.		

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राजसमन्द

क्षैत्र में सामान्यतः पाये जाने वाले स्तनधारी प्राणियों की सूची

क0स0	स्थानीय नाम	अंग्रेजी नाम	लैटिन नाम
1	लंगूर	Common Langur	Presbytis entellus
2	बघेरा,तेंन्दुआ	Baghera	Panthera pardus
3	जंगली बिल्ली	Jungle cat	Felis chaus
4	नेवला	Common mongoose	Herpestes edwerdsi
5	नेवला	ruddy mongoose	Herpestes smithi
6	सियार	Jackal	Canis aureus
7	लोमड़ी	Indian fox	Vulpes bengalensis
8	जरख	Striped hyaena	Hyaena hyaena
9	झाऊ चूहा	Pale hedgechog	Paraechinvs
10	बिज्जू	Common palm civet	Paradoxarus hermaphoodilus
11	बिज्जू	Small indian civet	Viverriculs india
12	उद बिलाव	Smooth indian otter	Lutra perspicillata
13	नील गाय	Blue bull	Boselaphus tragocamelus
14	चीतल	Spotted dear	Axis axis
15	सांभर	Sambhar	Cervus unicolor
16	जंगली सूअर	Indian wild bear	Sus seroja cristatus
17	गिलहरी	five striped palm	Funambulus pennant
18	गिलहरी	Three striped palm squirrel	Funambulus palmarnm
19	चूहा	Common house rat	Rattus rattus
20	चूहा	Indian field mouse	Mus booduga
21	सेही	Indian porurpine	Hystvix india
22	खरगोस	Indian hare	Lepus nigricollis
23	छछुन्दर	Grey musk shrew	Suncus murinus
24	उड़न गिलहरी ,खाया	Large brown flying squirrel	Peturista peturista
25	चमगादड़ (फलखाने वाली)	Fulvovs fruit bat	Rousettus leschekaulti

26	चमगादड़ (फलखाने वाली)	Shortnosed fruit bat	*Cynopterus sphinx*
27	चमगादड़	Indian false vampire	*Megaderma lyra*
28	वागल	Flying fox	*Pteropus giganteus*
29	चमगादड़	Pigmy pipistrelle	*Pipistrellus pigmeous*
30	चिन्कारा	Indian gazelle	*Gazella gazelle*
31	चौसिंगा, भेडल	Four hornedantelope	*Tetraacerus quadriecrnis*
32	भेड़िया	Wolf	*Canis lupus*
33	रींछ	Sloth bear	*Malursus ureinus*

क्षेत्र में सामान्यः पाये जाने वाले पक्षियों की सूची

क्रं सं	हिन्दी नाम	कॉमन अग्रेंजी नाम	लैटिन नाम
1	पनडुब्बी, डुबडुबी	Little grebe	*Podicaps rullicallia*
2	पनकोआ, कागली	Little cormorant	*Phalacrocorax niger*
3	पनडूब्बी	Indian darter	*Ankinga ruta*
4	अंजन	Gray heron	*Ardeola gravil*
5	अंधा बगला	Pond heron,Paddy bird	*Ardeola gravil*
6	सुरखिया बगला	Cattle egret	*Buoulcus ibis*
7	किलछिया	Little egret	*Egretta qurzetta*
8	कोकरी	Painted stork	*Mycteria leucocephala*
9	मानिक जोर	Whitenecked stoyk	*Ciconia episcopus*
10	चमचा	Spoonbill	*Platales leucorodia*
11	गुन्डा	Whiteneoked stork	*Ciconia episcopus*
12	सीलही	Lessor whistling teal	*Dendrocygna javenenica*
13	चकवा चकवी	Rubby sheldrake	*Tadorna ferruginea*
14	सींख पर	Pintail	*Anas scuta*
15	छोटी मुरगाबी	Cotton teal	*A.creoca*
16	गर्म पाई	Spotbill	*A. poecilorhvcha*
17	नकटा	Nukta	*Sarkindiornis melanotes*

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18	कपासी	Blackwinged kite crested ho	*Elanus caeruleus*
19	चील	Parah kite	*Milvus migrans*
20	शिकरा	Shikara	*Accipiter badius*
21	तीसा	white-eyed buzzard	*Butastur teesa*
22	राजगिद्ध,हमला	King vulture	*Targus calyus*
23	गिद्ध,हमला	White backed vulture	*Neophron perenopterus*
24	ओकाब	Tawny eagle	*Aoulla repax*
25	सफेद गिद्ध,हमली	White scavanger vulture	*Neophron perenopterus*
26	कोस्तिया	Eestrel	*Falce tinnunculus*
27	काला तीतर	Black partridge	*Franoolinus francolinus*
28	चाईना बटेर	Rain quail	*Coturnix coromandelica*
29		Jungle bush quail	*Pericula asiatics*
30	मोर(नर),धेलडी(मादा)	Indian peafoul	*Pavo cristatus*
31	सारस	Sarus crane	*Grus antigone*
32	जलमुर्गी	white breasted water hen	*Amaurernis phoenicurus*
33	जलमुर्गी, बोदुर	Moorhen	*Gallinula chloropus*
34	कर्मा ,खरीन	Purple moorhen	*Porphyria porphyries*
35	आरी	Common coot	*Fulica atra*
36	पीहो	Pheasant-tailed jacana	*Hydrophasianus ohirurgus*
37	टिटहरी	Red-wattled lapwing	*Vanellus indicus*
38	जिर्दी	Yellow-wattled lapwing	*V. malabaricus*
39	सुरमा	Red shank	*Tringa tetanus*
40	छुपकश	Wood sand piper common sundpiper	*Tringa glareola T.hypoleucos*
41	रूनी	Little stint	*Calidris munuta*
42	तिनधुर	Black winged stilt	*Himantopus*
43	बहा गुलिन्दा	Curlew stone curlew	*Numenius arouata Burhinus oedionemus*
44	नुकरी	Indian courser	*Coursorius coromandelicus*
45	कुरी	River tern	*Sterna aurantis*
46	भट तीतर	Common sandgrouse	*Pterooles exustus*
47	हरियल	Green pigeon	*Treron phoenicoptera*
48	कबूतर,पारेवा	Blue rock pigeon	*Columba Olivia*
49	गिरवी फाख्ता, होली	Red turtle deve	*Streptopelia tranouebarica*

उपवन संरक्षक
राजसमन्द

50	धोर,फाख्ता,होली	Indian ring dove	*Streptopelia decaocta*
51	परकी,होली	Spotted dove	*Streptopelia chinensis*
52	छोटा फाख्ता,होली	Little brown dove	*Streptopelia sengalensis*
53	राय तोता,गागरोन, जंगली तोता	Large indian parakeet	*Psittacula krameri*
54	तोता	Roseriyed parakeet	*Psittacula eupatoria*
55	टुई	blossom headed parakeet	*P.cyanocephala*
56	पपीहा	Common hawk cuckoo	*Cuculus varius*
57	पपिया	Pied crested cuckes	*Clamator jacobinus*
58	कोयल	Koel	*Eudynam*
59	कूका	Coucal crowpheasan t	*Centropus ainensis*
60	छापेड़,छीबड़ा	Spotted owlet	*Athene brama*
61	धरकवि छोमड़	Collared scops owl	*Otus bakkamoena*
62	बबीला छपका	Franklins nightjar	*C. affimis*
63		House swift	
64		Palm swift	*Cypsiurus paryus*
65	कोरयाला किलकिला	Plid kingfisher	*Ceryle rudis*
66	छोटा किलकिला	Common kingfisher	*Alcedo atthis*
67	किलकिला कोरिला	Whitebreasted kingfisher	*Haleyon smyrensis*
68	बादामी कोरिला	Brownheaded stork billed kingfisher	*Pelargopsis capensis*
69	पतरिंगा	Green bee-eater	*Merops orientalis*
70	बड़ा पतरिंगा	Bluetailed bee-eater	*Merops philippinus*
71	पतरिंगा	Blue cheeked bee eater	*M.persicue*
72	नीलकंठ	Indian boller]blue Jay	*Coracias benghalen*
73		Europeon boller	*C.garrulus*
74	हुद हुद	Hoopoe	*Upupa epope*
75	चलोतरा	Grey hornbill	*Tockus birostris*
76	छोटा बंसत	Coppersmith Crimsonpreasted barbet	*Megalaima haemacephala*
77	वीरी मोर	Wryneel	*Jynx torquilla*
78	कठफोड़ा	Goldenbacked wood pecker	*Dinopium benghalensa*
79	कठफोड़ा	Yellow fronted pied woodpecker	*Picoides mahrattensis*
80	नवरंग	Indian pitta	*Pitta brachvura*

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राजसमन्द

81		Redwiaged bush lack	*Mirafra erythroptere*
82		Ashy crowned finch lark	*Ermopterise grises*
83		Rufous tailede finch lark	*Ammomanes phoonicuries*
84	चन्चुल	Creasted lark	*Calerida cristata*
85		Dusky crag martin	*Hirunde concolor*
86	लीशरा	Wireetailed swallow	*H. smithil*
87	मरजीद अबाबील	Red-rumpled swallow	*H.daurica*
88	सफेद लटोरा	Cray shrike	*Lanius excubitor*
89	छोटा लटोरा	Bay backed shrike	*L. vittatus*
90	काजला लटोरा	Rufousbaacked shrike	*Lanius schach*
91	पीलक	Golden oriole	*Oriolus oriolus*
92	कोतवाल	black dronge,king crow	*Dicrurus adminilbe*
93	पहाड़ी भुजंग	White bellied dronge	*D.caerulescens*
94	बामनी मैना	Brahimony or black headed myna	*Sturnus pagodarum*
95	तिलार	Rody paster	*S. roseus*
96	देंसी मैना, कावर	Common myna	*Acridotheres tristis*
97	गंगा मैना, कावर	Bank myna	*A. ginginianus*
98	महालर, गणेला	Indian tree pie	*Dendrocitta vagabunda*
99	कोटा कागला	House crow	*Corvus splandens*
100	जंगली कौआ	Jungle crow	*C.macrorhynchos*
101	जंगली कसिया	Black headed cuckoo shrike	*Corachina melane*
102	पहाडी	Scarlst minivat	*Pericrocotus flsmmeus*
103	सहेली	Small minivet	*P.cinnamomeus*
104	शोबीगी	lora	*Aegithina tiphia*
105	बुलबुल	Redvented bulbul	*P.oafer*
106		Yelloweyed bulbler	*Chrysomma sinense*
107	चिलाचिल	Common bubbler	*Turdoides caudatus*
108	बहना	Large gray babbler	*T.malcolmi*
109	तुएरा	Red breasted flycatcher	*Miscicapa parya*
110		Grey headed flycatoher	*Gulicicapa oeylonensis*
111		white browed fantail flycatcher	*Rhipidura aureola*
112	शाह बुलबुल	Paradise flycatcher	*Terpsiphone paradise*

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113			
114	दर्जी	Franklin's ween-warbler	*Prinia hodgsonil*
115		Tailor bird	*Orthotoomus sutorius*
116	दया	Lesser whitethroat	*Sylyia curruca*
117	कालचिड़ी	Magole robin	*Copsychus saularis*
118	थिरथिरा	Indian robin	*Saxicololdes fulicata*
119		Black redslzit	*Phoenicurus ochruros*
120	खर पिद्दा	Brown rockchat	*Cercomela torouata*
121	काला पिपद्दा	Collared bushchatl	*Saxicola torouata*
122	कासिया	Pied buschat	*S. caprata*
123		Large chukoo shrike	*C.novaehollandiae*
124	रामगंगरा	Wood shrike	*Tephrodornis pondicerianus*
125		Grey tit	*Parus major*
126	पानी का पिलाकिया	Yellow checked tit	*P. xanthogenys*
127	पिलाकिया	Yellowheaded wagtail	*Motaacilla citreola*
128	धोबन	Grey wagtail	*Motacilla caspica*
129	खंजन	White wagtail	*M. alba*
130	शक्कर खोरा	Large pied wagtail	*M.maderaspatebsus*
131	बचूना	Pruple sunbird	*Nectarinia asistica*
132	गोरेया	White eye	*Zosterops palpebrosa*
133	वया, चटकली	House sparrow	*Passer domesticus*
134	लाल मुनिया	Weaver bird	*Ploceus philippinus*
135	हरी मुनिया	Red avadavat	*Amandava amamdava*
136	सर मुनिया	Green avadavat	*Amandava Formosa*
137	चितीदार मुनिया	White throated munia	*Lonchura malabarica*
138	पहार चिड़िया	Scaly breasted munia	*Lonchura Punctulata*
		Crested bunting	*Melophus lathami*

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सरीश्रृप (Reptiles)

क्रं सं	हिन्दी नाम	कॉमन अग्रेंजी नाम	लैटिन नाम
1	नगर	Margh crocodile	*Crocodylus palustris*
2	कछुआ (पानी का)	Indian sawback	*Kachnga tecta*
3	कछुआ (तालाब का)	Indian mud turtle	*Lissemys punctata*
4	पातल,शातल	Ganges softshell	*Aspideretes gengeticus*
5	कछुआ (भूमि का)	Starred tortoise	*Geochelone elegans*
6	छिपकली	Northern house geeko	*Hemidactylus flaviviridis*
7	छिपकली	Fat tailed gecko	*Eublepharis maculariv*
8	गिरगिट	Common garden lizard	*Calotes versicolor*
9	हालनियाँ	Indian chameleo	*Chamaeleon zeylanicaul*
10	नागर बामणी	Common skink	*Mabuya carinata*
11	गोह	Common indian monitor	*Varanus beagalansis*
12	दुमुही	John's earth boa	*Eryx johnli*
13	अजगर	Indian pythoon	*Python molurul*
14	धामण	Common rat snake	*Ptyas mucosus*
15		Common wolf snake	*Lycodon aulicas*
16	लीला सॉप	Green kedbaack	*Macropisthodom plumsicolor*
17	करायत	Common indian krait	*Bungarus caeruleus*
18	नाग	Indian cobra	*Naja naja*
19	चित्ती	Russell's viper	*Vipera rapelli*
20	पड,कंकरीवाला	Saw scaled viper	*Echis carinata*

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AMPHIBIA

उभयचारी वर्ग

क्र सं	हिन्दी नाम	कॉमन अंग्रेजी नाम	लैटिन नाम
1	मेंढक, डेटका	Common Indian Toad	*Bufo melanostictus*
2	मेंढक, डेटका	Marbled Toad	*Bufo stomaticus*
3	मेंढक, डेटका	Ornate Microhylid	*Microhyla ornata*
4	मेंढक, डेटका	Marbled Balloon Frog	*Uperodon systoma*
5	मेंढक, डेटका	Common Tree Frog	*Polypedates maculatus*
6	मेंढक, डेटका	Skittering Frog	*Euphlyctis cyonophlyctis*
7	मैंदा, डेटका	Indian Bull Frog	*Rana tigerina*
8	मैंदा, डेटका	Indian Cricket Frog	*Rana limnocharis*
9	मैंदा, डेटका	Burrowing Frog	*Rana tomopterna*

उप वन संरक्षक

HINDUSTAN ZINC LIMITED
SINDESAR KHURD MINE

SKM/ENV/DFO/ 2017/

Date: 06.11.2017

Deputy Conservator of Forest,
Office of Deputy Conservator of Forests,
Department of Social Forestry,
Rajsamand (Raj.)

Sub.: - **Approval of Conservation Plan for Schedule-I species for Non-Forest Area for Buffer Zone (10 Km. radius of the mine lease area, ML No. 07/95, Sindesar Khurd Mine)**

Ref.:-**Ministry of Environment & Forests, Climate Change, (MoEF & CC), Letter No: 3-11015/7/2017-IA.II(M), dated 3rd April, 2017.**

Sir,

With reference to above, Conservation Plan for Schedule-I Species is enclosed herewith for approval please.

Thanking You,

Yours Faithfully

(Rajeev Bora)
Unit Head

6.11.17
उपवन संरक्षक
राजसमन्द(राज.)

कार्यालय उप वन संरक्षक, राजसमन्द

Sadhna Sikhar Road, Rajsamand Phone & Fax No. 02952-220096 Email- dcf.rjsmnd.forest@rajasthan.gov.in

क्रमांक: पत्रा ( ) सर्वे/उवसं/2017–18/ 3722 दिनांक: 22-9-17

निमित्त :–

यूनिट हेड
सिन्देसर खुर्द माईन
हिन्दुस्तान जिंक लि0
जिला राजसमन्द।

विषय :– Duly Authenticate list of Flora and Fauna in core & Buffer zone (10Km Radius of Sindesar Khurd Mine (M.L. No. 07/95)

संदर्भ :– आपका पत्रांक HZL/SKM/Env/2017/08/41 Date : 29.08.2017 के कम में।

उपरोक्त विषयान्तर्गत संदर्भित पत्र से चाही गई फ्लोरा एवं फौना की प्रमाणित सूची संलग्नक भिजवाई जा रही है।

संलग्न :– उपरोक्तानुसार

(कुमार स्वामी गुप्ता)
उप वन संरक्षक
राजसमन्द

कार्यालय उप वन संरक्षक, राजसमन्द

Sadhna Sikhar Road, Rajsamand Phone & Fax No. 02952-220096 Email- dcf.rjsmnd.forest@rajasthan.gov.in

क्रमांकः पत्रा ( ) सर्वे/उवसं/2017–18/ 3721 दिनांकः 22-9-17

निमित्त :–

यूनिट हेड
सिन्देसर खुर्द माईन
हिन्दुस्तान जिंक लि0
जिला राजसमन्द।

विषय :– Certificate for Non-involvement of National Park, Sanctuary, Biosphere Reserve, Wild life corridor, Tiger/Elephant Reserves in Core and Buffer Zone. (10 km radius of Sindesar Khurd Mine, M.L. No. 07/95)

संदर्भ :– आपका पत्रांक HZL/SKM/Env/2017/08/42 Date : 29.08.2017 के कम में।

उपरोक्त विषयान्तर्गत संदर्भित पत्र में वर्णित एम.एल. नम्बर 07/95 सिन्देसर खुर्द माईन के चारो तरफ 10 किमी0 की परिधि में National Park, Sanctuary, Biosphere Reserve, Wild life corridor, Tiger/Elephant Reserves in Core and Buffer Zone क्षेत्र नही पड़ता है।

(कुमार स्वामी गुप्ता)
उप वन संरक्षक
राजसमन्द

CONSERVATION PLAN FOR SCHEDULE 1 SPECIES

FOR

EXPANSION OF SINDESAR KHURD LEAD –ZINC UNDERGROUND MINE FROM 4.5 MILLION TPA TO 6.0 MILLION TPA ORE PRODUCTION (ROM) BASIS AND BENEFICATION FROM 5.0 MILLION TPA TO 6.5 TPA,

LOCATED AT SINDESAR KHURD VILLAGE TEHSIL: RELMAGRA, DISTRICT, RAJASMAND, RAJASTHAN (ML NO.07/95), TOTAL M.L.AREA 199.8425 HA, HINDUSTAN ZINC LIMITED

Submitted to

Hindustan Zinc Limited
Udaipur

Submitted by

Vimta Labs Limited
Hyderabad

1.0 Introduction

Hindustan Zinc Ltd. is undertaking the proposed expansion of SinderSar Khurd Lead Zinc Underground mine from 4.5 Million TPA to 6.0 Million TPA Ore Production (ROM) Basis and Benefication from 5.0 million TPA to 6.5 TPA, Located at Sindesar Khurd Village Tehsil: Relmagra, District, Rajasmand, Rajasthan (ML No.07/95), comprising of total mine lease area of 199.8425 ha.

2.0 Location & Ecological Sensitivities

The project is located at 25° 0' 58.98" N – 74° 8'25.28 E and there are no reserve forests, nor national parks or biosphere reserves within 10 km radius of the study area.

As per the compliance of Terms of Reference, issued by Ministry of Environment & Forests, Climate, Change (MoEF & CC), Government of India, the Wildlife Conservation Plan of the Schedule-I species, need to be prepared, based on vide letter issued by Ministry of Environment & Forests, Climate Change, (MoEF & CC), No: 3-11015/7/2017-IA.II(M), dated 3rd April, 2017.

2.1 Methodology

To achieve the above objectives, a detailed study of the area was undertaken with the proposed mine lease as its boundary for the purpose of the study, mine lease area is considered as 'Core zone' and 10 km study area around the 'Core zone' is considered as 'Buffer Zone'. The different methods adopted were as follows:

- Generation of primary data by undertaking systematic ecological survey in the study area;
- Primary data collection for flora through random sampling method for trees, shrubs and herbs from the selected locations to know the vegetation cover qualitatively;
- Faunal studies by taking transect in the study area to spot the fauna and also to know the fauna through secondary indictors such as pugmarks, scats, fecal pallets, calls and other signs;
- For ecological information, the secondary sources such as local officials, villagers, and other stakeholders were interviewed; and
- Sourcing secondary data with respect to the study area from published literature.

2.2 As per the observations in the buffer zone, there is presence of *Pavo cristatus*(Indian Peafowl), along with other schedule –I birds and reptilian fauna in the study area, along with Indian Leopard, which were identified in the ecological studies based on primary and secondary data available and is listed in Schedule-I as given in the Table-1.

TABLE-1
LIST OF SCHEDULE – I SPECIES in BUFFER ZONE

Sr. No	Scientific Name	Common Name	Schedules as per Indian Wildlife (Protection) Act, 1972
Aves			
1	*Pavo cristatus*	Indian Peafowl	Schedule-I, Part-III
2	*Ocyceros birostris*	Indian Grey Horn Bill	Schedule-I
3	*Elaenus caerulieus*	Black Shouldered Kite	Schedule-I
4	*Butastur teesa*	White-Eyed Buzzard	Schedule-I
Reptiles			
5	*Varanus bengalensis*	Indian Monitor Lizard	Schedule-I
6	*Lissemys punctata*	Indian Flapshell Turtle	Schedule-I
Mammal			
7	*Panthera pardus*	Indian Leopard	Schedule-I

Thus as per Terms of Reference, TOR, Wildlife Conservation Action Plan for Scheduled -I species is prepared.

Accordingly "Wildlife Conservation Action Plan for Schedule-I birds" and Schedule-I reptiles is given below.

2.2.1 **The Flora of Study Area- Buffer Zone :** The following flora were observed to the found in the Study area –Buffer zone, which provides foraging and roosting for the birds listed in the Table-2.

TABLE-2
FLORA OF THE STUDY AREA –BUFFER ZONE

Sr.No	Botanical Name	Family Name	Common Name
1	*Azadirachta indica*	Meliaceae	Neem/Nimba
2	*Proposis cineraria*	Mimosaceae	Khejri
3	*Pongamia pinnata*	Fabaceae	Karanj
4	*Cassia fistula*	Caesalpinaceae	Amaltas
5	*Pithecellobium dulce*	Mimosaceae	Jangli Jalebi
6	*Butea monosperma*	Fabaceae	Palash
7	*Adenanthera pavonia*	Fabaceae	Rakthrohida
8	*Prosopis juliflora*	Mimosaceae	Vilayati Babul

3.0 Conservation Action Plan for the Schedule –I species of Indian Wildlife (Protection), Act 1972 found in the Study area.

EIA studies are undertaken to address the environmental impacts of the proposed project and to propose the mitigation measures for the same. In this regard, a detailed flora and fauna report has been prepared for authentication from forest department. Field studies have been conducted for three months during the period 1st March to 31st May, 2017, representing pre-monsoon season.

Pertaining to the above-proposed project, the detailed ecological study was undertaken as an important aspect of Environmental Impact Assessment (EIA) with a view to conserving environmental quality and biodiversity.

Generally, biological communities are good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important for the safety of natural flora and fauna. The biological environment includes terrestrial and aquatic ecosystems.

The animal and plant communities co-exist in a well-organized manner. Their natural settings can get disturbed by any externally induced anthropological activities or by naturally occurring calamities or disaster. So, once this setting is disturbed, it sometimes is either practically impossible or may take a long time to get back to its original state. Hence, it is ideal to protect the natural habit and habitat for the conservation of the protected species.

Based on the EIA study, it was noted that the study area of 10 km radius around mine lease area shows the presence of scheduled I birds which are protected under the Indian Wildlife (Protection) Act, 1972, *Panthera pardus* –Leopard, Indian Monitor Lizard and Flat Shell Turtle were found in the buffer zone of the study area. Thus the conservation plan for these 'Schedule-I species' is here with prepared as per the Terms of Reference.

3.1 Introduction of Indian Peafowl- *Pavo cristatus*

Peafowl has a splendid glossy green long tail feathers that may be more than 60 percent of the birds total body length. These features have blue, golden green and copper coloured ocelli (eyes). The long tail feathers are used for courtship displays. The feathers are arched into magnificent fan shaped form across the back of the bird and almost touching the ground on both sides. Females do have graceful tail feathers. They have fan like crest with whitish face and throat, chestnut brown crown and hind neck, metallic green upper breast and mantle, white belly and brown back rump and tail. Their primaries feathers are dark brown.

Genus: ***Pavo***
Species: ***cristatus***

3.2 Ecology and Behavior of Indian Peafowl

Peafowl forages on the ground in small groups, known as musters that usually have a cock and 3 to 5 hens. After the breeding season, the flock tends to be made up only of females and young. They are found in the open early in the mornings and tend to stay in cover during the heat of the day. They are fond of dust-bathing and at dusk, groups walk in single file to a waterhole to drink. When disturbed, they usually escape by running and rarely take to flight.

Peafowl produces loud calls, especially in the breeding season. They may call at night when alarmed and neighboring birds may call in a relay like series. Nearly seven different call variants have been identified in the peacocks apart from six alarm calls that are commonly produced by both sexes. Peafowl roosts in groups during the night on tall trees but sometimes make use of rocks, buildings or pylons. Birds arrive at dusk and call frequently taking their position on the roost trees. Due to this habit of congregating at the roost, many population studies are made at these sites.

3.3 Distribution of Indian Peafowl

Indian Peafowl is found in the study area of the buffer zone of SK mines.

3.4 Reproduction and Growth In the, wild Indian Peafowl live in groups, usually dry open forest, they habitually go to roost early on tall trees, calling loudly as they move upward.

3.5 Action Plan for Conservation of Indian Peafowl

In India, it is given highest protection by including it in the Schedule-I of the Wildlife (Protection) Act, 1972.

Reducing Road kills, the conservation of the species of Indian Peafowl can be ensured by community awareness and setting up speed limits for all the vehicles in SK mines of Hindustan Zinc Limited administrated routes. Proper instructions should be provided to all the driving staff hired for the companies work regarding the do's and don'ts when the bird crossing is encountered while driving on roads. Signage all along the approach roads to be provided for increasing the awareness for conservation of species.

No major threats were identified for the species in the study area, conservation can be promoted by planting avenue trees on all SK mines, Hindustan Zinc Limited administered roads in the study area mainly bearing such as *Bauhinia variegata, Azadirachta indica* provide shelter and habitat for the peacocks. Protection and maintaining the naturally occurring species of the trees will aid in conservation of the species.

3.6 References for Indian Peafowl Conservation

1. Ramesh K & P McGowan (2009). On the current status of Indian Peafowl *Pavo cristatus* (Aves: Galliformes: Phasianidae): keeping the common species common. *Journal of Threatened Taxa* 1(2): 106-108.

4.1 Introduction of - Grey Horn Bills:

Indian grey hornbill is a beautiful bird. Size between 55 cm. to 70 cm. Indian grey hornbill have grey feathers all over the body with a light grey or dull white belly. Ear coverts are darker. Upper parts are light (dark some time) greyish brown and there is a slight trace of a pale super-cilium.

Flight feathers of the wing are dark brown with a whitish tip.The tail has a white tip and a dark sub-terminal band. They have a red iris and the eyelids have eyelashes. The bare skin around the eye is dark in the male while it is sometimes pale reddish in females. The horn is black or dark grey with a casque extending up to the point of curvature in the

horn. The casque is short and pointed. Male has a larger casque on a dark bill, and the culmen and lower mandible are yellowish and female has a more yellowish bill with ack on the basal half and on the casque.The bare skin around the eye is dark in the male, but sometimes pale reddish in females. The female has a more yellowish bill with black on the basal half and on the casque.

Indian grey hornbill (*Ocyceros birostris*), is found in pairs or small groups.

Common Indian Grey Hornbill – *Ocyceros birostris*

4.2 Ecology and Behavior of Grey Horn Bills

They usually nest in tree hollows on tall trees. The female stays inside the nest and nest entrance is sealed by the female using its excreta and mud-pellets supplied by the male. Indian grey hornbill feed on fruits, nuts, seeds, small insects, lizards, and small snakes.

Call of the Indian Grey Hornbill sounds like a shrill "*wheee*"; the other is a cackling "*k-k-k-kae*". Habit and Habitat of Indian Grey Hornbill.

4.3 Distribution of Grey Horn Bills

Grey Horn bills are found in the buffer zone of SK mines study area.

4.4 Reproduction and Growth of Grey Horn Bills

Nesting season is between February to June every year.

4.5 Action Plan for Conservation of Grey Horn Bills

Conservation of Indian Grey Hornbill is listed under Indian (Wildlife) Conservation, Act, 1972, listed in the Schedule-I of the Act, conservation of grass-lands, and even dead trees or old trees which act as roosting perches of Indian Grey Horn bill.

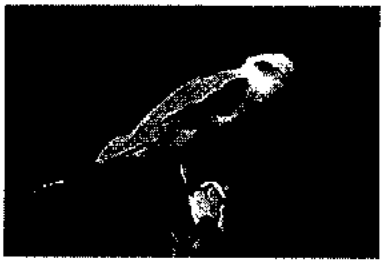
No major threats were identified for the species in the study area, conservation can be promoted by planting avenue trees on all **SK mines, Hindustan Zinc Limited** administered roads in the study area mainly bearing *Ficus bengalensis,* planting of *Ficus species,* which are key stone species for the survival of the hornbills, are essential for their conservation initiatives. *Ficus* species, provide forage and roosting for species. The conservation can be ensured by spreading awareness by posters for spreading awareness for conservation in the study area.

4.6 References of Grey Indian Hornbill:

1. Buceros: ENVIS Newsletter Avian Ecology & Inland Wetlands Vol.7. No:3, 2002: A BNHS Review of the avifaunal list of the Wildlife (Protection) Act, 1972.

5.0 *Introduction* of *Elanus caeruleus* –Black Shouldered Kite

(Elanus caeruleus) is a small diurnal bird of prey in the family of Accipitridae. This kite is distinctive, with long-wings, white, grey and black plumage and owl like forward-facing eyes with red irises. Although mainly seen on the plains, they are sometimes seen on grassy slopes of hills in the higher elevation regions of Asia. They are not migratory, but make short-distance movements in response to weather.



***Elanus caeruleus* – Black Shouldered Kite**

This long-winged raptor is predominantly grey or white with **black shoulder** patches, wing tips and eye stripe. The long falcon-like wings extend beyond the tail when the bird is perched. In flight, the short and square tail is visible and it is not forked as in the typical kites of the genus *Milvus*. When perched, often on roadside wires, it often adjusts its wings and jerks its tail up and down as if to balance itself. The sexes are alike in plumage. Their large forward-facing eyes and velvety plumage are characters that are shared with owls and the genus itself has been considered as a basal group within the Accipitridae

5.2 Ecology and Behaviour of Black Shouldered Kite:

The species' prey comprise small grassland mammals (up to 90g), reptiles, birds and insects, hunting its quarry from both a perch and hovering vantage, as well as quartering the ground and hawking insects in flight. It will often hunt during dawn to dusk.

5.3 Distribution of Black Shouldered Kite

Black Shouldered Kite is found in the buffer zone of SK mines.

5.4 Reproduction and Growth

The black-winged kite breeds at different times of the year across its range. The female spends more effort in the construction of the nest than the male. The eggs are pale creamy with spots of deep red. Both parents incubate but when the chicks hatch, the male spends more time on foraging for food. Females initially feed the young, sometimes hunting close to the nest but will also receive food from the male. After fledging the young birds continue to be dependent for food on the male parent for about 80 days, initially transferring food at perch and later in the air.

Nests are made of small twigs lined with finer material, and are located in tree branches 3-20m above the ground, usually in open areas. The same tree may be occupied in successive years although new nests are usually built each year.

5.5 Action Plan for Conservation of Black Shouldered Kite

The Black Shouldered Kite is listed under Indian Wildlife (Protection), Act, 1972 and listed in IUCN –International Union for Conservation of Nature- Least Concern species and it is listed in the on Annex I of the European Union of Birds U Birds Directive and Annex II of the Bern Convention.

The species is not under any major threat from the project activities of the **SK mines.** The conservation can be ensured by spreading by posters in local schools for the children and awareness generating posters could be posted in the study area. Planting of tall avenue trees will act and provide roosting for these birds in the study area.

5.6 References of Black Shouldered Kite:

1. Buceros: ENVIS Newsletter Avian Ecology & Inland Wetlands Vol.7. No:3, 2002: A BNHS Review of the avifaunal list of the Wildlife (Protection) Act, 1972.
2. Shirihai, H.; Yosef, R.; Alon, D.; Kirwan, G. M.; Spaar, R. 2000. *Raptor migration in Israel and the Middle East: a summary of 30 years of field research*. International Birding and Research Center in Eilat, Eilat, Israel.

6.1 Introduction of *Butastur teesa* – White Eye Buzzard :

The white-eyed buzzard is a medium sized bird of prey, measuring 35 to 45 cm in length and weighing 350 grams. The wingspan is 85 to 100 cm. The female buzzard is slightly larger than the male. It is slim bodied and has whitish iris and throat. The ceres are distinctly yellow and there is a dark mesial stripe. The head and back are dark and the underside of the body is darkly barred. When perched, the wing tip nearly reaches the tip of the tail. On the rufous tail there is a darker sub-terminal band. The wings appear narrow and the tips of the wing feathers are dark. The buzzard call is a mewing sound.

White Eyed Buzzard

6.2 Ecology and Behaviour of White Eyed Buzzard

The white-eyed buzzard inhabits dry open land, open forest and cultivated lands. The white-eyed buzzard preys on small birds, mammals, reptiles, frogs, crabs and insects like locusts, grasshoppers and crickets.

6.3 Breeding Seson of –*Butastur teesta* – White Eye Buzzard

The white-eyed buzzard breeding season is from February to June. The nest is built on a tree with twigs and both the parents take part in nest building. The nest may contain up to three eggs. The female buzzard alone incubates the eggs.

6.4 Distribution of White Eye Buzzard

The White Eye Buzzard is found in the buffer zone of the SK mines.

6.5 Action Plan for Conservation of White Eye Buzzard

The white-eyed buzzard has an extremely large range and population and hence it considered not threatened, as per International Union for Conservation of Nature (IUCN) as it is listed in the **Least Concerned Category** (LC). Listed in the Schedule-I of the Indian Wildlife (Protection), Act, 1972. The habitat loss and fluctuations in prey populations are the main threats to survival of these species of birds.

There are no major threats which are identified for the species in the study area, conservation is initiated by planting avenue trees on all SK mines buffer area, Hindustan Zinc Limited administered roads in the study area mainly bearing *Ficus bengalensis, Strebulus asper, Grewia tiliaefolia, Lannea coromandelica, Prosopis cineraria* for roosting & nesting etc. The conservation can be ensured by spreading awareness by with posters in the vicinity about their conservation and also through display boards highlighting their conservation.

6.6 References of White Eye Buzzard

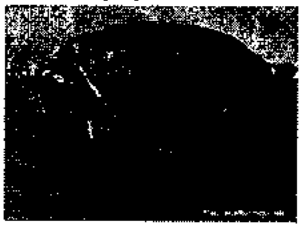
1. http://www.iucnredlist.org/details/22695718/0

7.1 **Introduction of the Indian flapshell turtle (*Lissemys punctata*)** is a freshwater species of turtle found in South Asia. The "flap-shelled" name stems from the presence of femoral flaps located on the plastron. These flaps of skin cover the limbs when they retract into the shell. It is unclear what protection the flaps offer against predators. Indian flapshell turtles are widespread in the study area of SK mines buffer zone.

The carapace of *L. punctata* viewed from above is broadly oval in adults, but more circular in young, widest just anterior to hind limbs. The width of the disc is 77-86% of its length, the carapace is moderately arched, shell height is 35.0-40.5% of carapace length, the margin of the carapace is smooth and slightly flared posteriorly, the marginal bones are not united with the pleurals, the plastron is large but mostly cartilaginous, and its length is 88-97% of the carapace length. A pair of large flaps can be closed over the hind limbs and a smaller flap over tail; seven plastral callosities are present, and the head is large, its width is 21-25% of the carapace width. The proboscis is short and stout; the nasal septum has no lateral ridge, the edges of the jaws are smooth, the alveolar surfaces are expanded and granular. The claws are large and heavy; the penis is thick and oval, with deep dorsal cleft and four pointed, soft papillae; the tail is very short in both sexes.

The carapace length of *Lissemys punctata* has been known to range from 240 to 370 mm in length.

Indian Flapshell Turtle - *Lissemys punctata*



7.2 **Ecology and Behaviour of Indian Flapshell Turtle**

The Indian flapshell turtle is known to be omnivorous. Its diet consists of frogs, fishes, shrimp, snails, aquatic vegetation, plant leaves, flowers, fruits, grasses, and seeds.

7.3 **Distribution of *Lissemys punctata*–Indian Flapshell Turtle**: Indian Flapshell

Turtle is found in the buffer zone of the SK mines area in the marshy and near the wetlands in the study area.

7.4 Reproduction and Growth of Indian Flapshell Turtle

Lissemys punctata-Indian Flapshell turtle becomes reproductively active at the age of 2-3. Nesting times of *L.punctata* occur during many periods in the year depending on the habitat and location. Swampy areas with soil and exposure to sunlight are common nesting sites. Eggs are usually laid two to three per year in clutches of 2 to 16 eggs. These eggs are buried in soil for protection.

7.5 Conservation Action Plan for Lissemys punctata *Lissemys punctata*- Indian Flapshell turtle is listed in the Appendix –II (CITES), Convention on International Trade in Endangered Species of wild fauna and wild flora), 1973 and it is listed in the Schedule-I of the Indian Wildlife (Protection), Act, 1972.

There are no major threats in the study area to these species and wetlands and marshy areas conservation initiatives by the management of the SK mines will ensure conservation and spreading awareness through posters aid in their wildlife conservation.

7.6 References on Indian Flapshell Turtle

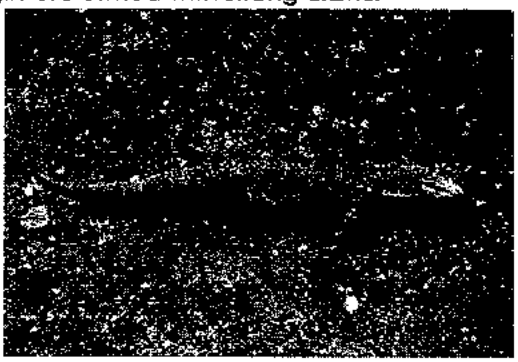
1. *Asian Turtle Trade Working Group. 2000. Lissemys punctata. (errata version published in 2016) The IUCN Red List of Threatened Species 2000: e.T46579A97399871. Downloaded on 16 June 2017).*

8.1 Introduction of *Varanus bengalensis* –Bengal Monitor Lizard

Monitor lizards or *Varanus*) (Varanidae with a single genus *Varanus*) are the most conspicuous lizards of the subcontinent.

8.2 Description of Bengal Monitor Lizard – *Varanus bengalensis*

They are distinguished by their long and flattened body, long tail, long neck and extremely elongated, slender, forked tongue similar to that of the snakes. Eyes with well-developed eyelids. Body covered with small round or oval scales. Limbs are well developed and digits are armed with strong claws.



Varanus bengalensis – Monitor Lizard.

8.3 Ecology and Behaviour of Bengal Monitor Lizard- *Varanus bengalensis*

Mainly ground dweller, but a busy climber as well. Bengal Monitor Lizards are solitary and usually found on the ground although the young are often seen on trees. They shelter and spend nights in burrows or crevices in rocks and buildings, also make use of abandoned termite mounds. In their body temperature drops below ambient. During day time their body temperatures by basking before commencing activity.

8.4 Distribution of Bengal Monitor Lizard – *Varanus bengalensis*

Is found in the buffer zone of the SK mines area.

8.5 Action Plan for Conservation of Bengal Monitor Lizard – *Varanus bengalensis*

Varanus bengalensis is protected by its inclusion in the Schedule-I of the Indian Wildlife (Protection), Act, 1972. Buffer Zone of the SK mines. It is listed in the **LC – Least Concerned** category of the International Union for Conservation of Nature – IUCN.

In the project area there are no major threats to the Indian Monitor Lizard in the study area and more over the conservation Awareness is spread by the issue of posters for the general public and for the school children in the vicinity and to create general awareness about conservation amongst locals and local field staff and operating drivers which operate in the SK mines project area.

Especially protection of wetlands in the study area, village ponds is ensured and spreading awareness from time to time for conservation of Indian Monitor Lizard – *Varanus benghalensis* will ensure it is conservation in the wild devoid of any potential risks it may face due to habitat fragmentation.

8.6 Bibliography of Bengal Monitor Lizard - *Varanus bengalensis*

1. K.C.Agrawal. 2002. Threatened Animals of India, Nidhi Publishers, India, Pg 18-20, Bikaner, India. ISBN:81-901181-7-x.

9.1 Introduction of Leopard – *Panthera pardus fusca* The Indian leopard (*Panthera pardus* fusca) is a leopard subspecies of Panther species which is widely distributed on the Indian subcontinent. The species of the *Panthera pardus fusa* is found in the SK mines buffer zone

The species Panthera pardus is listed as Vulnerable on the IUCN Red List because populations have declined following habitat loss and fragmentation, poaching for the illegal trade of skins and body parts, and persecution due to conflict situations.

Indian Leopard – *Panthera pardus fusca* –Wildlife Institute of India

In 1794, Friedrich Albrecht Anton Meyer wrote the first description of *Felis fusca*, in which he gave account of a panther-like cat from Bengal of about 85.5 cm (33.7 in), with strong legs and a long well-formed tail, head as big as a panther's, broad muzzle, short ears and small, yellowish grey eyes, light grey ocular bulbs; black at first sight, but on closer examination dark brown with circular darker coloured spots, tinged pale red underneath. – *Panthera pardus* fusca,

Male Indian leopards grow to between 4 ft 2 in (127 cm) and 4 ft 8 in (142 cm) in body size with a 2 ft 6 in (76 cm) to 3 ft (91 cm) long tail and weigh between 110 and 170 lb (50 and 77 kg).

Females are smaller, growing to between 3 ft 5 in (104 cm) and 3 ft 10 in (117 cm) in body size with a 2 ft 6 in (76 cm) to 2 ft 10.5 in (87.6 cm) long tail, and weigh between 64 and 75 lb (29 and 34 kg). Sexually dimorphic, males are larger and heavier than females.

The coat is spotted and rosetted on pale yellow to yellowish brown or golden background, except for the melanistic forms; spots fade toward the white underbelly and the insides and lower parts of the legs. Rosettes are most prominent on the back, flanks and hindquarters. The pattern of the rosettes is unique to each individual. Juveniles have woolly fur, and appear dark due to the densely arranged spots. The white-tipped tail is 60–100 centimetres (24–39 in) long, white underneath, and displays rosettes except toward the end, where the spots form incomplete bands. The rosettes are larger in Asian populations and their yellow coat tends to be more pale and cream coloured in desert

populations, more gray in colder climates, and of a darker golden hue in rainforest habitats.

9.2 Ecology and Behaviour of Indian Leopard

Leopards are elusive, solitary, and largely noctural. They are known for their ability in climbing, and have been observed resting on tree branches during the day, dragging their kills up trees and hanging them there, and descending from trees headfirst. They are powerful swimmers, although are not as disposed to swimming as some other big cats, such as the tiger. They are very agile, and can run at over 58 kilometres per hour (36 mph), leap over 6 m (20 ft) horizontally, and jump up to 3 m (9.8 ft) vertically. They produce a number of vocalizations, including grunts, roars, growls, meows, and purrs.

Leopards are versatile, opportunistic hunters, and have a very broad diet. The diet of Indian leopards include spotted deer, sambar deer, nilgai, wild boar, common langur, hares and Indian peafowl.

Though they are smaller than most other members of the genus *Panthera*, they are able to take large prey due to their massive skulls and powerful jaw muscles.

9.3 Distribution of Indian Leopard – *Panthera pardus* : Is found in the buffer zone of SK mines lease area.

9.4 Reproduction and Growth of Indian Leopard

Depending on the region, leopards may mate all year round. The estrous cycle lasts about 46 days and the female usually is in heat for 6–7 days.

Gestation lasts for 90 to 105 days. Cubs are usually born in a litter of 2–4 cubs. Mortality of cubs is estimated at 41–50% during the first year.

Females give birth in a cave, crevice among boulders, hollow tree, or thicket to make a den. Cubs are born with closed eyes, which open four to nine days after birth.

The fur of the young tends to be longer and thicker than that of adults. Their pelage is also more gray in colour with less defined spots.

Around three months of age, the young begin to follow the mother on hunts. At one year of age, leopard young can probably fend for themselves, but remain with the mother for 18–24 months. The average typical life span of a leopard is between 12 and 17 years.

9.5 Conservation Action Plan for Indian Leopard- *Panthera pardus*

Indian Leopard is listed in the Schedule- I of Indian Wildlife (Protection) Act, 1972 and it is listed in the Vulnerable Category of IUCN – International Union for Conservation of Nature- VU in the 'Red List' because population of leopard have declined following habitat loss and due to fragmentation, poaching for illegal trade for skins and body parts and persecution due to man-animal conflict situations.

Leopards are also listed in Appendix –I of CITES (Convention on International Trade in Endangered Species of wild fauna and wild flora), 1973 due to extensive trade of leopard skins and its products.

Leopards are well protected in the buffer zone of SK mines area and also their conservation measures are undertaken by the management of SK mines in consultation with the forest department and also to mitigate the man – animal conflict situations and also to pay for the compensation of any livestock kills in the study area.

The photograph of the Leopard and its cub belongs to the study area taken along with Wildlife Institute of India researchers.

9.6 References on Conservation of Indian Leopards:

Singh, H. S. 2005. Status of the leopard P. p. fusca in India. Cat News 42: 15-17.

10. 0 Conservation Plan and Budgetary Provision in subsection 11.0

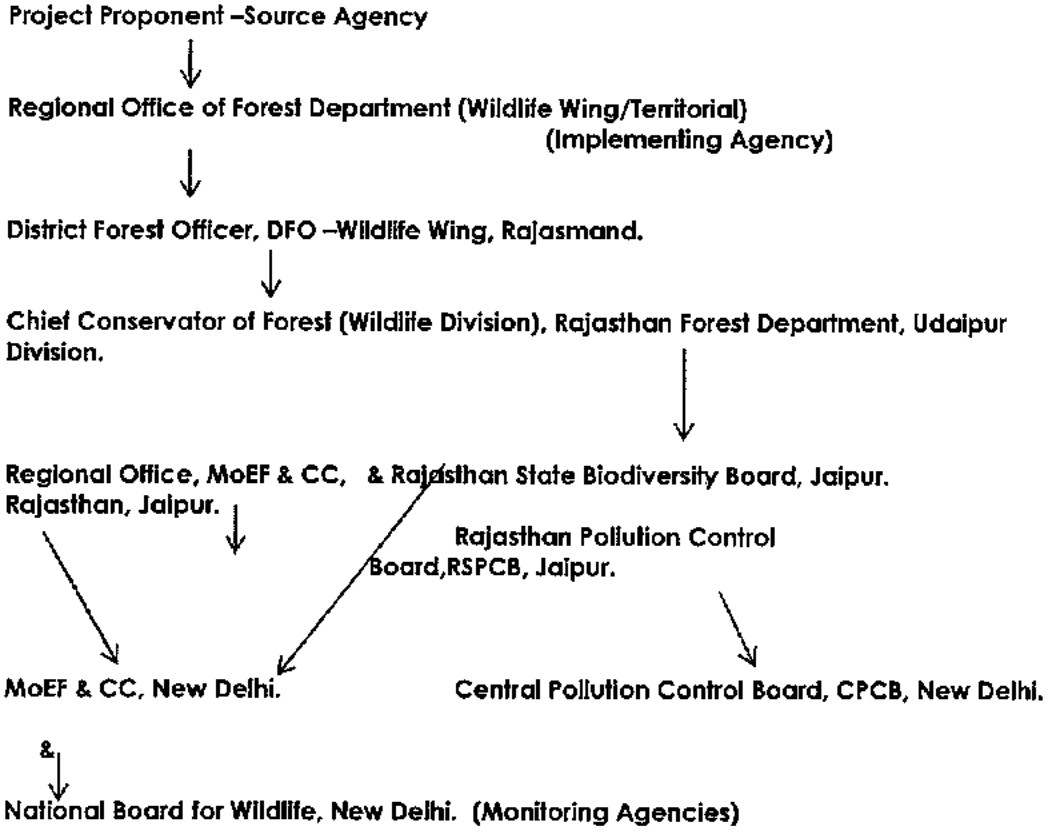
Conservation and management are two words sometimes used as synonyms and sometimes with different meanings. Generally speaking wildlife conservation is regarded as the antithesis to economic development. However, according to International Union for Conservation of Nature (IUCN), the term conservation should be interpreted as management of biosphere and the components of its ecosystem for human use in order to derive the greatest sustainable benefits for the present generation while maintaining their potential to needs and aspirations of future generations. Wildlife management is application of scientific knowledge and technical skills to protect, conserve, limit, ehance or create wildlife habitat. Wildlife management also includes implementation of laws, protecting the wildlife under Indian Wildlife (Protection), Act, 1972, and its subsequent amendments, in 2003.

The pragmatic Action Plan for the Conservation of Schedule-I fauna particularly in the buffer zone shall be adhered by the Management of Hindustan Zinc Limited (HZL), in consultation and collaboration with local forest department, Government of Rajasthan, besides entrusting the responsibility to exclusive 'in-house expertise'.

1. In the present scenario the management of Hindustan Zinc Limited, envisages and values the essence of "Wildlife Conservation in the study area".
2. Constitution of **Village Level Protection Committee (VLPC):** Formation of village level protection committee will help and coordination of local forest department in the villages. This village level committee will report any sightings or incident of man-animal conflict, attack on the livestock or on human life, through Range Officer, to Office of Deputy Conservator of Forests (DCF) and District Forest Officer, for timely reporting up to the authority leads into prompt conflict management situation.
3. Habitat Improvement: This will include plantation of native species on priority basis. In order to improve vegetation cover, it is suggested to carry out extensive afforestation by the management of Hindustan Zinc Limited (HZL) will be highly beneficial for the conservation agenda undertaken in the study area.
4. Management of Water –Holes: In summer season water will be filled in the existing (selected by local forest department) water holes by water tankers).

5. Conducting Wildlife Week celebrations, Van-Mahotsav celebrations and creating awareness amongst the staff, children of the vicinity and general public through awareness generating posters will promote "Wildlife Conservation initiatives envisaged by HZL-Hindustan Zinc Limited.

10. 1 Schematic Diagram for Implementation of Conservation Plan



10.2 Further Suggestions /Recommendations

1. Restricting the use of indiscriminate use of pesticides, if any by the villages in the agricultural fields.
2. Provision of food grains for Indian Peafowl
3. Veterinary care in consultation with local forest department.

11.0 Budgetary Allotment of Wildlife Conservation Plan of the given Schedule-I Species.

Capital Cost for Conservation Plan

Sr. No.	Heads	Cost (Rs. in Lakhs)
1	Land Procurement (4 ha)	120
2	Construction of Water Tank	20
3	Fencing of site	20
4	Plantation within and around the site	20
5	Deployment of security guards	10
6	Procurement of vehicles	10
7	**Total**	**200**

Recurring cost for implementation of conservation

Sr. No.	Heads	1st Yr	2nd Yr	3rd Yr	4th Yr	5th Yr	Total (Rs.)
	Involvement and Training to the local youths for rescue and rehabilitation for wildlife						
1	Forest Department inviting students of wildlife sciences for summer/winter dissertation in wildlife	100,000	100,000	100,000	100,000	100,000	500,000
2	Research, settling up wildlife alert cell within study area for information to Rescue	150,000	150,000	150,000	150,000	150,000	750,000
3	Rehabilitation, increasing awareness through posters and village group meetings	50,000	50,000	50,000	50,000	50,000	250,000
4	Maintenance of water tank within the plantation area and maintenance	75,000	75,000	75,000	75,000	75,000	375,000
5	Plantation of species with dense canopies in mining	100,000	100,000	100,000	100,000	100,000	500,000

	lease area						
6	Increase awareness among the employees of HZL and also the local population on the importance and methods of conservation of avifaunal species by holding group meetings in different villages	100,000	100,000	100,000	100,000	100,000	500,000
7	Plantation of Ficus benghalensis, Streblus asper, Cansjera rheedii, Carissa carandas, Grewia tilliaefolia, Lannea coromandelica, Ficus spp., Sterculia urens and Securinega leucopyrus species for Avenue Plantation	50,000	50,000	50,000	50,000	50,000	250,000
8	Celebrations of World Environment Day (5th june,) in Schools and nearby villages	75,000	75,000	75,000	75,000	75,000	375,000
9	Environment Quiz to studies	50,000	50,000	50,000	50,000	50,000	250,000
10	Fire Protection Measures	50,000	50,000	50,000	50,000	50,000	250,000
	Total						40,00,000

Annexure-X

Hydrogeological Report

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA

1.0 INTRODUCTION

Hindustan Zinc Ltd., Udaipur (HZL) is carrying out underground mining for lead-zinc ore near village Sindesar Khurd, Tehsil Relmagra, District Rajsamand since 1999. HZL has obtained mining lease (ML-07/95) covering an area of 199.84 hectares with present annual production is 4.50 MTPA and 5.0 MTPA Ore Beneficiation. It lies between Latitudes 24°59'N – 25°01'N and Longitudes 74°09'E- 74°10'E on Survey of India topo sheet No. 45/L1 and 45K/4. It is now proposed to enhance the annual production from 4.5 MTPA to 6.00 MTPA along with expansion of beneficiation plant from 5.00MTPA to 6.5 MTPA capacity.

Environmental Clearance for the increased production, HZL has been issued Terms Of Reference by the Ministry of Environment, Forests and Climate Change (MoEF& CC) for furnishing the detailed information to be incorporated in the EIA report which in addition to many studies, has few points pertaining to hydrogeological studies of the core and buffer zones of beneficiation plant and impact of mining on water regime. It has also been asked to get the NOC from Central Ground Water Authority (CGWA) for the inflow of ground water in the underground mine due to intersection of ground water table for enhanced annual production.

Keeping in view the statutory requirement, HZL is submitting the application for getting the No Objection Certificate (NOC) from the Central Ground water Authority (CGWA) for mine discharge for the next five years period (onwards 2017) and its conceptual stage as the mine has to be deepened further and extended laterally. The first NOC from CGWA was obtained based on the estimation of ground water inflow done by Hydro-Geo Survey Consultants Private Limited (HCPL) on 14.7.2009 and it was for 31.23 m^3/day for 2.00 MTPA capacity. The next NOC was issued by CGWA on 17.2.2013 for additional quantity of inflow of ground water for 89.77 m^3/day for annual production of 3 .75 MTPA.

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA

HZL is submitting this report of the hydrogeological studies of the core and buffer zones of beneficiation plant and mine along with estimation of inflow of ground water in the mine as per its approved Mining Scheme by modeling, using MODFLOW to the CGWA for getting NOC for the annual production of 6.00 MTPA and also for appending it in the EIA report to get the Environmental Clearance for 6 MTPA production.

Hydro-Geosurvey Consultants Pvt. Ltd., Jodhpur (HCPL) has been retained to conduct the hydrological and hydrogeological studies of the core zone (mining lease area) and buffer zone (10 km radius area) and study the impact of mining on the water regime.

HZL retained the services of Hydro-Geosurvey Consultants Pvt. Ltd. Jodhpur (HCPL), who had earlier conducted similar studies during its EC for 3.75 MTPA in 2013, was given the assignment of conducting the impact studies due to underground mining on the water regime of core and buffer zones.

HCPL initiated the hydrological and hydrogeological studies of the core zone (beneficiation plant area) and buffer zone (10 km radius area) and impact of mining on the water regime by collecting hydrogeological data of keywells by visiting them in the field, studying the present ground water conditions, estimating the long term ground water recharge, present ground water withdrawal and status of ground water development. The pre and post-monsoon data was collected from 30 key wells of core and buffer zones during year 2016. The fluctuation of water levels in the lease and 10 km radius area as recorded by monitoring wells was interpreted in relation of mining depth and its impact on quantity and quality of water.

The present report estimates the inflow of ground water in the mine by modeling using MODFLOW as per the approved Mining Scheme for the period 2017 -18 to 2021-22 and at conceptual stage along with geological sections for each year. This report is being attached

with the CGWA application and also in the EIA report. With a view that dewatering from the mine does not affect the open wells of the area being operated for irrigation, a rain water harvesting program has also been proposed.

2.0 HYDROLOGY OF BANAS RIVER BASIN

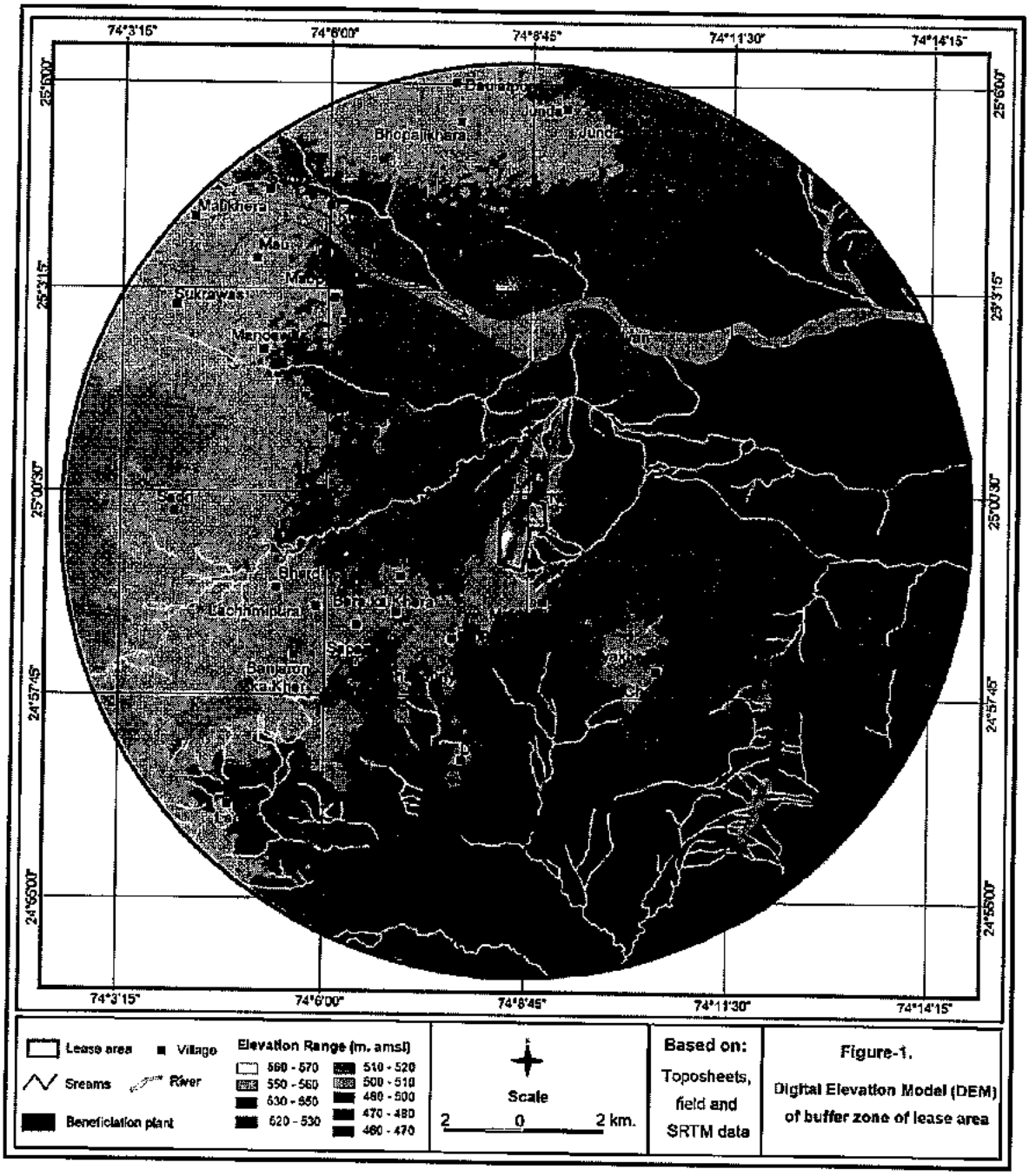
2.1 Physiography of Banas river basin

The buffer zone of Sindesar Khurd base metal deposit falls in the catchment area of Banas river, which flows through the lease area. Banas river originates in the eastern slopes of the Aravali ranges near Kumbhalgarh and after flowing eastwards for about 512 km through districts of Rajsamand, Chittorgarh, Bhilwara, Tonk, and Sawai Madhopur meets Chambal river near Rameshar village in Sawai Madhopur district. The Banas river basin c overs an area of 47,052 km^2. Banas river after originating in the eastern slopes of Aravali ranges and traveling through Rajsamand district enters Chittorgarh district near Rashmi. Banas River, within Rajsamand district is joined from left by Chandrabhaga river near village Gangas.

Banas river is an ephemeral river and flows in direct response to rainfall and goes dry during summer months. It is an influent river, recharging ground water all along its course before it meets Chambal river. Banas river has limited flow till mid-December and afterward remains dry till monsoon.

Physiography of the lease area is characterized by almost flat country with isolated few low ridges. The mineralized zone is about 2.5 km away from the Banas river in southern direction and there are no faults traversing the mineralized zone and the river.

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA



Faults and lineation are however present away from the mineralized zone and from the proposed main mine workings. A quartzite ridge, trending NNE-SSW, south of Sindesar Kalan is a prominent feature of the area achieving the elevation of 579 metres above msl. Digitized Elevation Model has been prepared and is shown as **Figure-1**. There are few tanks near Chokri, Mandara, Railmagra, Jitwas and Armi which get filled up during rainy season and go dry by the summer. There is big size tank near Rajpura-Dariba mine known as Mataji Ka Khera and another near village Pipawas.

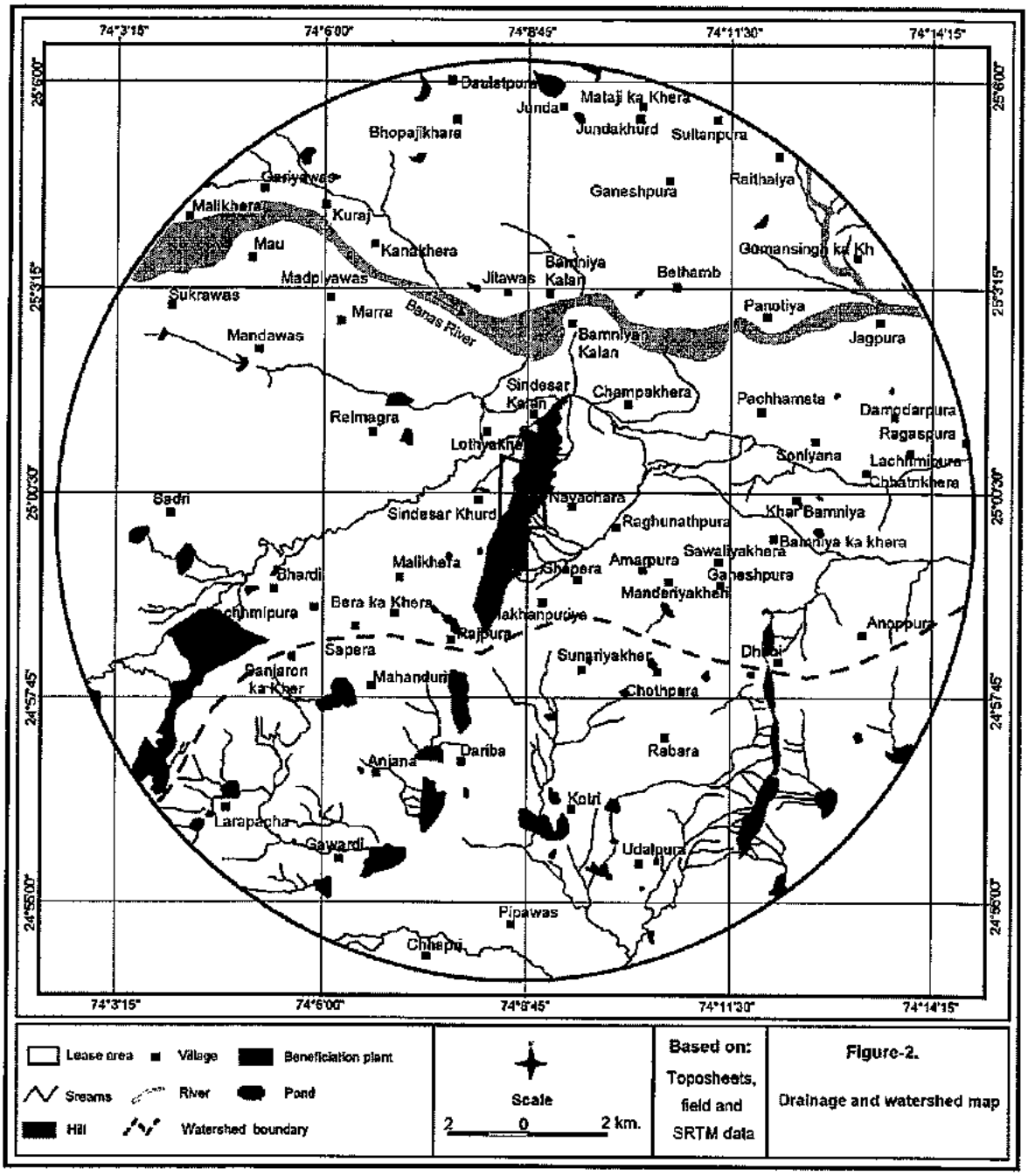
2.2 Drainage pattern

There is a well defined drainage system having dendritic drainage pattern in the buffer zone **(Figure-2).** Major part of drainage has been harnessed by constructing minor irrigation projects, tanks and anicuts. Whatever runoff is produced by the average annual rainfall of 606 mm in the buffer zone, major part goes as surface runoff after meeting the evapo-transpiration losses and a part percolates to the zone of saturation.

The lease area is drained by Banas river in the northern part of the buffer zone while the southern part forms the catchment area of Berach river. Almost all the streams have been harnessed by village tanks within the buffer zone while the major stream meets Bhopalsagar dam, just outside the buffer zone in south. The drainage divide passes near Rajpura villages in east –west direction as shown in **Figure-2.**

2.3 Run-off

Average annual rainfall in the buffer zone of Sindesar base metal deposit is 606 mm (from 1984 to 2016) out of which 90% happens to be during monsoon period from June to October. Winter monsoon is low and hardly contributes any surface runoff. The rainfall during the year 2016 was recorded as 1180 mm at the mine. The surface run-off in Banas river basin has been computed as 15 to 20% based on the storage of irrigation dams.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Daulatpura
Mataji ka Khera
Junda
Jundakhurd
Sultanpura
Bhopajikhara
Ganeshpura
Raithalya
Gariyawas
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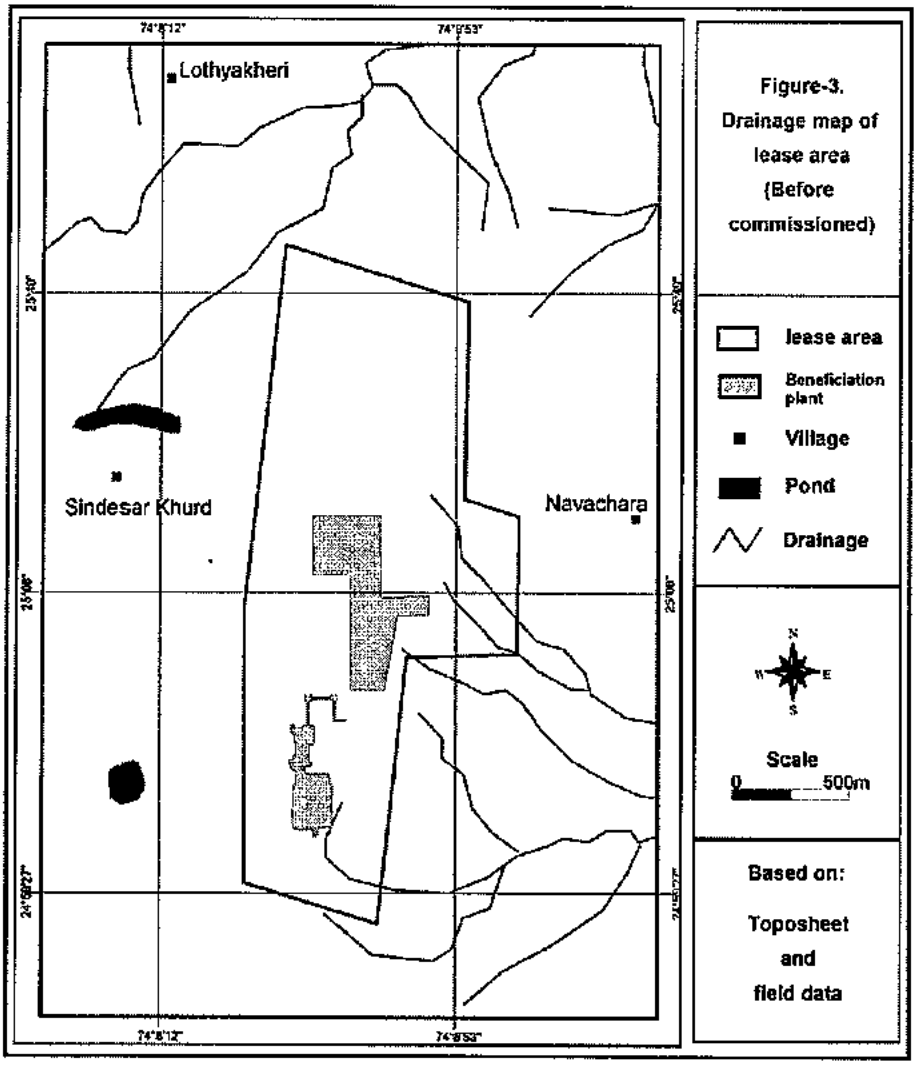
Jagpura
Sindesar Kalan
Champakhera
Pachhamata
Damodarpura
Relmagra
Ragaspura
Lothiyakhera
Soniyana
Lachhmipura
Chhatrikhera
Sadri
Navachara
Sindesar Khurd
Raghunathpura
Khar Bamniya
Bamniya ka khera
Malikhera
Amarpura
Sawaliyakhera
Bhardi
Ganeshpura
Mandaniyakheri
Bera ka Khera
Rajpura
Anoppura
Sapera
Sungariyakher
Dhabi
Banjaron ka Kher
Mahanduri
Chothpara
Anjana
Dariba
Rabara
Kotri
Larapacha
Gawardi
Udaipura
Pipawas
Chhapu
Lease area
Village
Beneficiation plant
Streams
River
Pond
Hill
Watershed boundary
Scale
2 0 2 km.
Based on:
Toposheets, field and SRTM data
Figure-2.
Drainage and watershed map

2.4 Drainage pattern in lease area

The drainage pattern of the lease area is shown in **Figure-3** where four streams of first order originate near the eastern border of the lease area. The catchment areas of these streams originating inside the lease area is small and these streams carry limited surface runoff during the rains. These first order streams will continue to flow uninterrupted as underground mining will be carried out and no surface activity is proposed on the eastern slope of the hill.



2.5 Climate

The nearest IMD meteorological station from lease area is at Udaipur which is hardly 50 km in south west. The climatic conditions as recorded at Udaipur therefore can be considered applicable for the buffer zone of Sindesar mine. The Indian Meteorological Department (IMD) has divided Rajasthan in two meteorological sub-divisions, i.e. west Rajasthan and east Rajasthan and the sub-basin falls in east Rajasthan sub-division.

Based on Koppen classification of climatic pattern, Sindesar buffer zone may be classified as tropical steppe, semi-arid and hot. The year is divided in to four seasons. The winter season is from mid-December to February and is followed by the hot summer season from March to mid-July, including the pre-monsoon season from April to June. The period from July to mid-September constitutes the south west monsoon season and the period from the later half of September to mid-December as post monsoon season.

2.5.1 Temperature

Temperature records from Udaipur IMD station are available for 60 years. The period from April to June is marked by continuous increase in the temperatures. May is the hottest months of the year with a mean daily maximum and minimum temperature (in May) of 38.6°C and 24.9°C respectively. Night temperatures in June are relatively higher than the May. With the onset of south west monsoon by about mid-June, the temperatures down considerably. From November onwards, both the day and night temperatures decrease and January, the coldest month, with daily maximum and minimum temperatures of 24.2°C and 7.8°C. The annual range in temperature, i.e. the difference between extreme maximum and minimum temperatures, may be over 45°C. The highest temperature for the period for which data are available was 45.6°C recorded on 11th June, 1901 while the lowest temperature 2.8°C recorded on 16th January, 1935.

2.5.2 Rainfall

Average annual rainfall based on rainfall data recorded at Rajpura-Dariba mine, about 10 km from Sindesar deposit in southeast for last 33 years has been observed as 606 mm. The rainfall recorded from January 2016 to December, 2016 at Rajpura-Dariba was 1180 mm, above the average annual rainfall of 606 mm. Of the annual rainfall, about 90% fall during four monsoon months (June to September) with July and August getting the maximum rains. The following table gives the annual rainfall recorded at Rajpura-Dariba, since 1984.

Table-1. Rainfall recorded at Rajpura-Dariba mines

Year	Rainfall in mm.	Year	Rainfall in mm.	Year	Rainfall in mm.
1984	402.50	1995	479.75	2006	1025.00
1985	323.50	1996	690.00	2007	586.75
1986	465.75	1997	609.50	2008	619.50
1987	317.00	1998	590.50	2009	562.50
1988	681.50	1999	440.50	2010	858.00
1989	612.25	2000	324.00	2011	632.00
1990	739.00	2001	593.00	2012	723.00
1991	532.00	2002	254.00	2013	861.00
1992	726.75	2003	450.00	2014	634.00
1993	370.00	2004	624.00	2015	585.00
1994	710.50	2005	780.00	2016	1180.00
				Average annual rainfall = 606 mm	

2.5.3 Humidity

Relative humidity during the south west monsoon is generally over 60%. During the rest of the year, air is normally dry. Relative humidity during summer afternoon is as low as 20% while during monsoon, it does not go more than 80%. The mean annual humidity values in the morning are 60% and in the evening 43%.

2.5.4 Winds

Winds are generally light to moderate, except during the south west monsoon season, when these are moderate to strong. Mean wind speed is highest in June (7.4 km/hour) and lowest in November and December (1.5 km/hour).

2.5.5 Cloudiness

Skies are generally moderately to heavily clouded during southwest monsoon season, being overcast on some days. During the rest of the year, the skies are normally clear to lightly clouded. During the months of July-August, the mean cloudiness (in Oktas) is usually more than 4, being generally higher in the mornings than the evenings.

Table-2. Meteorological data as recorded at Udaipur
(Based on last 60 years data)

Month	Temperature		Relative Humidity		Mean Wind Speed	Mean Cloudiness	
	Mean Daily Max.°C	Mean Daily Min.°C	08:30 %	17:30 %	Km/hr	08:30 Oktas	17:30 Oktas
Jan.	24.2	7.8	66	40	2.2	1.0	1.0
Feb.	27.6	9.7	55	29	2.6	0.9	0.9
Mar.	32.3	15.1	43	24	3.6	0.8	0.9
Apr.	36.0	20.2	34	25	4.6	0.7	0.9
May	38.6	24.9	38	25	6.3	0.8	0.6
Jun.	35.9	25.3	63	48	7.4	3.1	2.6
Jul.	30.7	23.9	78	70	6.3	4.0	3.9
Aug.	29.3	22.9	81	75	4.7	5.5	4.9
Sep.	30.9	22.1	76	65	3.7	3.2	3.4
Oct.	32.0	18.9	62	42	2.3	1.4	1.2
Nov.	29.1	11.0	57	39	1.5	1.1	1.2
Dec.	26.3	8.3	63	40	1.5	1.1	1.1
Annual mean	**31.1**	**17.5**	**60**	**43**	**3.9**	**2.0**	**1.8**

2.6 Quality of surface water

The quality of surface water is good as the rocks are mostly crystalline metamorphics having thin alluvial cover. The rainfall being moderate and having adequate drainage, the surface water remains free from salinity. Water sample collected from Banas river and village tanks during rainy season has indicated low salts content, less than 250 mg/l and all constituents within permissible limits of drinking, industrial and irrigation purposes.

3.0 HYDROGEOLOGY

3.1 Regional geology

The geology of the area is mainly composed of thin alluvial cover, belonging to Sub-Recent to Recent period of CenozoicEra followed by Rajpura-Dariba group of Bhilwara Super Group of Archaeans. The geological succession can be summarized as under.

Era	Period	Super Group	Group /Formations	Rock Types
Cenozoic	Sub-Recent to Recent	Fluvial & Colluvium	Alluvium	Sand, silt, clays gravel etc.
----------Unconformity----------				
Intrusives				Pegmatite, quartz Veins.
		Bhilwara Super Group	Rajpura-Dariba Group	Dolomitic marble, Graphitic kyanite schist, Quartzite.
Archaeans		Mangalwar Complex		Migmatite, gneiss, mica schist, quartzites
		Banded gneissic Complex		Gneisses, schist, etc.

Lead –zinc mineralization is hosted mainly by dolomites and quartz mica schist. Other rocks which also carry mineralization are carbonaceous and calc-silicates.

Of all the rocks exposed in the area, only mica schist form poor aquifers while alluvium generally thin, remains above water table **(Figure-4).**

3.2 Hydrogeology of 10-km area (Buffer zone)

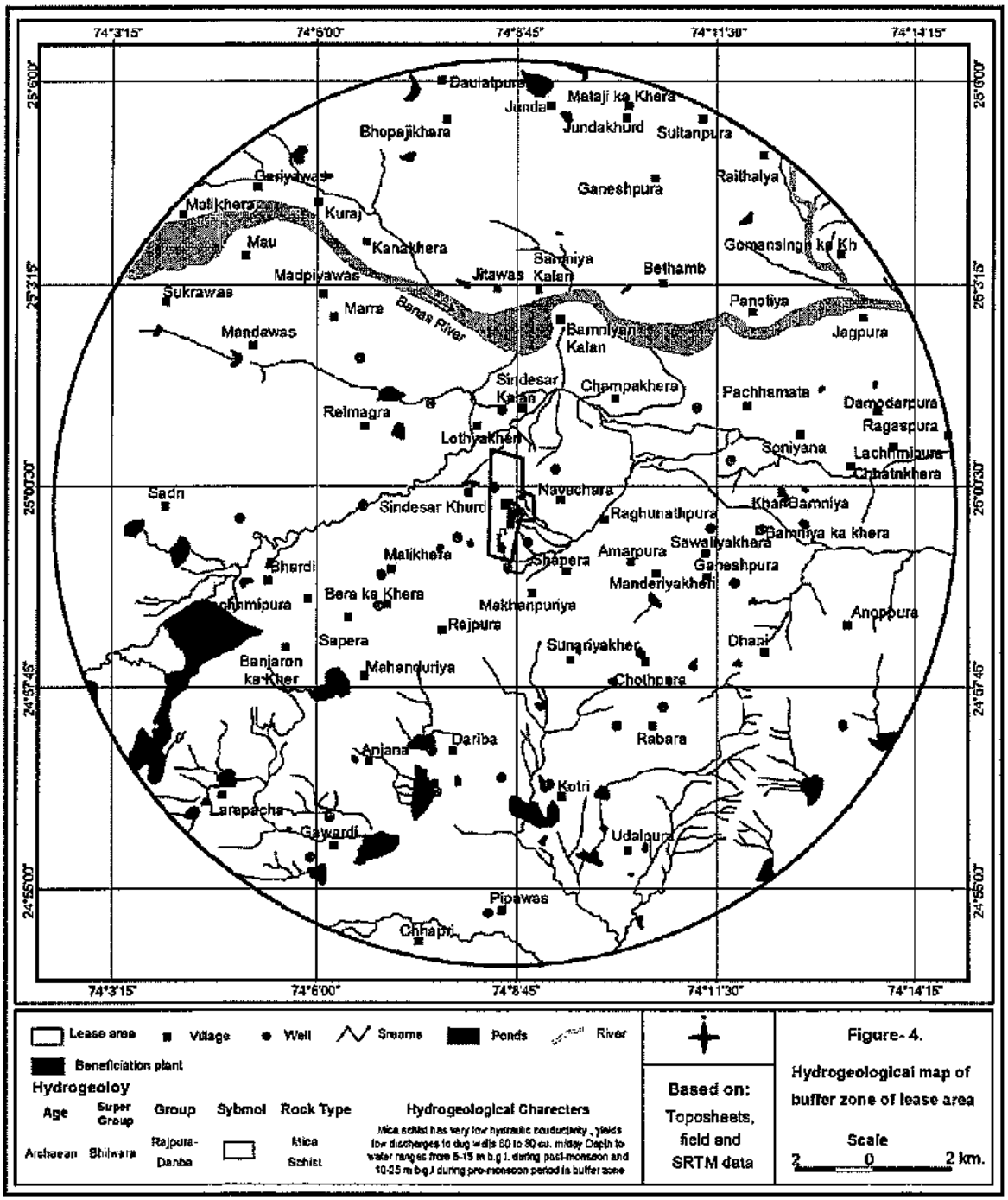
Mica schist is the main rock exposed in the buffer zones. Mica schist is intruded by pegmatite and quartz veins. The general strike of the rocks is NNE-SSW to NE-SW with steep dips towards east.

3.2.1 Nature of occurrence of ground water

Ground water occurs under water table conditions and is transmitted through fractures, joints and foliations. Mica schistis impervious in nature and have developed secondary porosity only due to joints and fractures. There is very limited thickness of weathered zone and generally lies above the zone of saturation.

The depth to water in crystalline metamorphics in core zone, during post monsoon period ranges from 10 metres to 12 metres below the land surface. It is shallow near the river courses, surface water reservoirs and ponds while it is deeper in the area away from these sources. The depth to water ranges from 15 to 20 metres below the land surface during pre-monsoon period in lease area. The depth to water in buffer zone ranges from 3 metres to 12 metres during post monsoon period and 5 metres to 23 metres during pre-monsoon period. The fluctuations due to rainfall and ground water withdrawal are significant as the rocks have very low fracture porosity and hydraulic conductivity.

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA



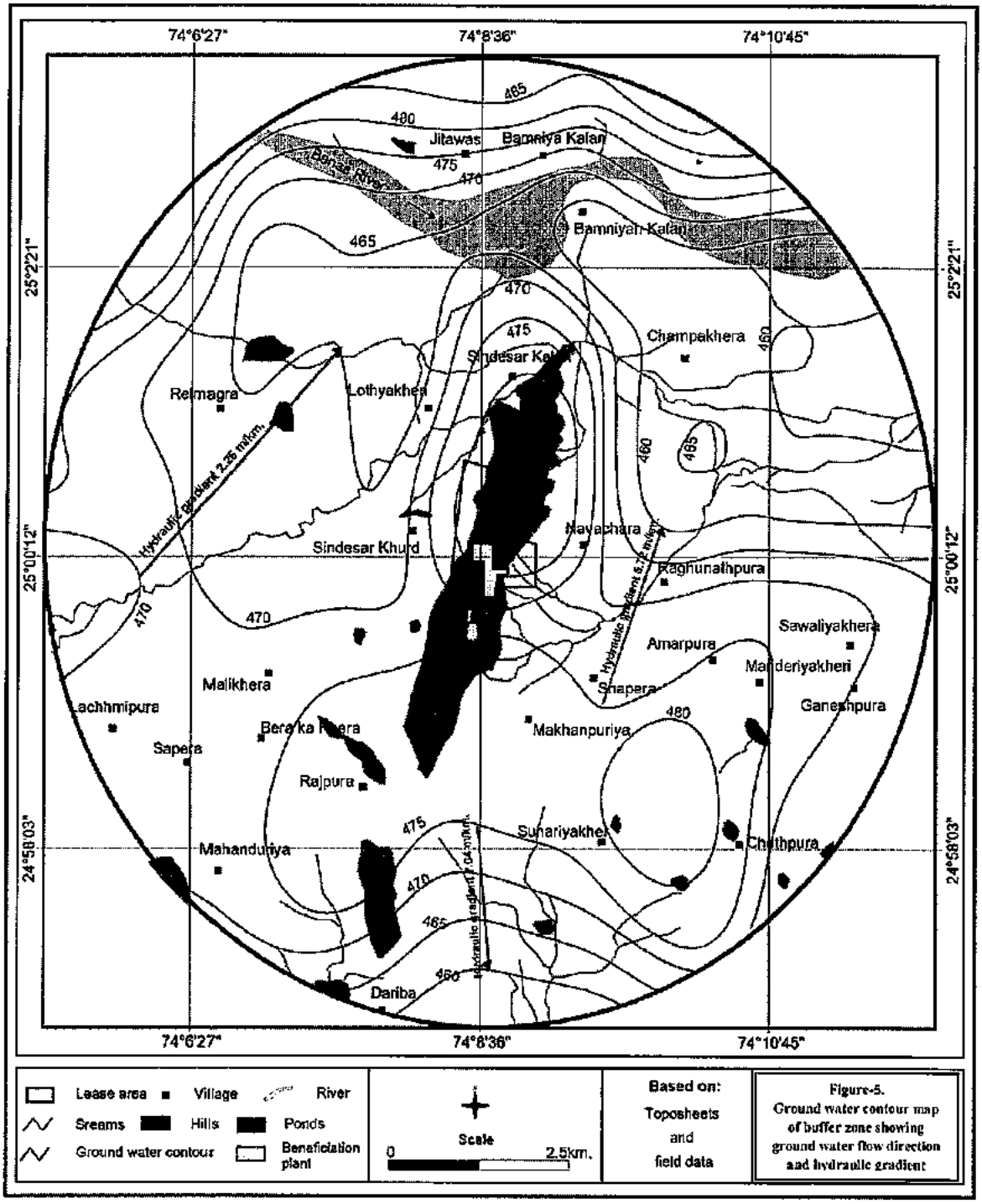
3.2.2 Movement of ground water

Ground water movement is controlled mainly by the hydraulic conductivity of the crystalline metamorphics and hydraulic gradient. The ground water movement mainly takes place through the fractures and foliations of the crystallines.

A review of the topography and drainage pattern of the buffer zone reveals that there is a drainage divide passing in the central part of the buffer zone demarcating two water sheds, Banas river water shed forms a major part of the buffer zone covering northern part while a small area in the southern area of the buffer zone belongs to Berach river water shed **(Figure-2)**. The ground water flow, which follows in general the surface topography has flow in two directions. The main ground water flow direction is towards the north east and towards Banas river while the southern part has ground water flow direction in southern direction **(Figure-5)**.

The hydraulic gradient of ground water flow on the western side of the hill is towards Banas river with value of 2.26 m/km while in the eastern side is 5.72 m/km. The lower hydraulic gradient in the western part of Banas river water shed is due to ground water flow mainly through alluvial zone while in the eastern part, it is through mica schist which has lower hydraulic conductivity. The hydraulic gradient in the southern part is 7.05 m/km towards the south indicating ground water flow through metamorphic with very low hydraulic conductivity.

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA



3.2.3 Nature of hydraulic conductivity

As the principal aquifer of the area is mica schist in Sindesar area, the hydraulic conductivity is mainly developed due to fractures and foliations.

The hydraulic conductivity is very low. The depth of productive hydraulic conductivity has been observed up to maximum depth of 110 metres in the metamorphics, beyond which there are hardly any secondary openings, making the metamorphics completely barren. Bore wells, drilled deeper than 110 metres did not release any additional discharge. It is therefore expected that in the underground mine also, the main aquifer zone from the depth of 10 metres to 110 metres from the general ground water will contribute the major component of inflow of ground water.

3.3 Pump test for aquifer parameters

A pump test was conducted on an existing private bore well on 5th June, 2014 which is 110 metres deep and is located in village Sindesar. Fortunately, there was another borewell, 30 metres away which was used as an observation well. The pumping well was yielding 6 m^3/hour during the pump test and drawdown of 1.8 metres was observed in the observation well in which Data logger was installed. The details of pumping and observation wells are shown as under while its layout plan is shown in **Figure-6.**

Location: **Near Sindesar Khurd (25° 01' 37.7" N, 74° 09' 20.6" E)**
Depth of Pumping Well: **110 metres**
Depth of Observation Well: **75 metres**
Water Level in observation well: **15.68 m bgl**
Pump Capacity: **5H.P.**
Yield of pumping well: **6 m^3/hour**
Maximum drawdown in Observation well: **1.8metres**
Distance of observation well from pumping well: **30metres**

Figure-6. Layout plan of pumping and observation wells

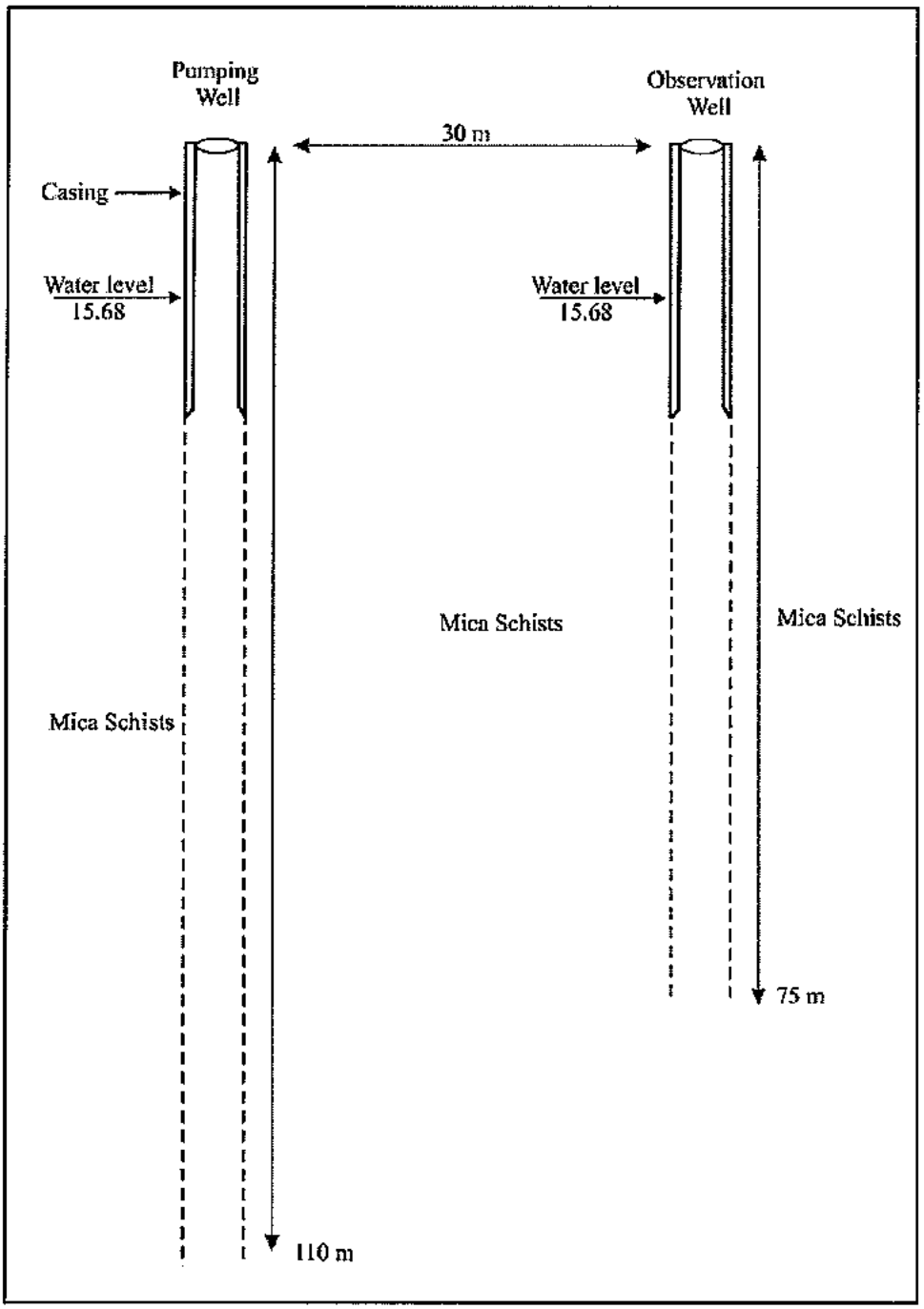


Figure-7. Logger data

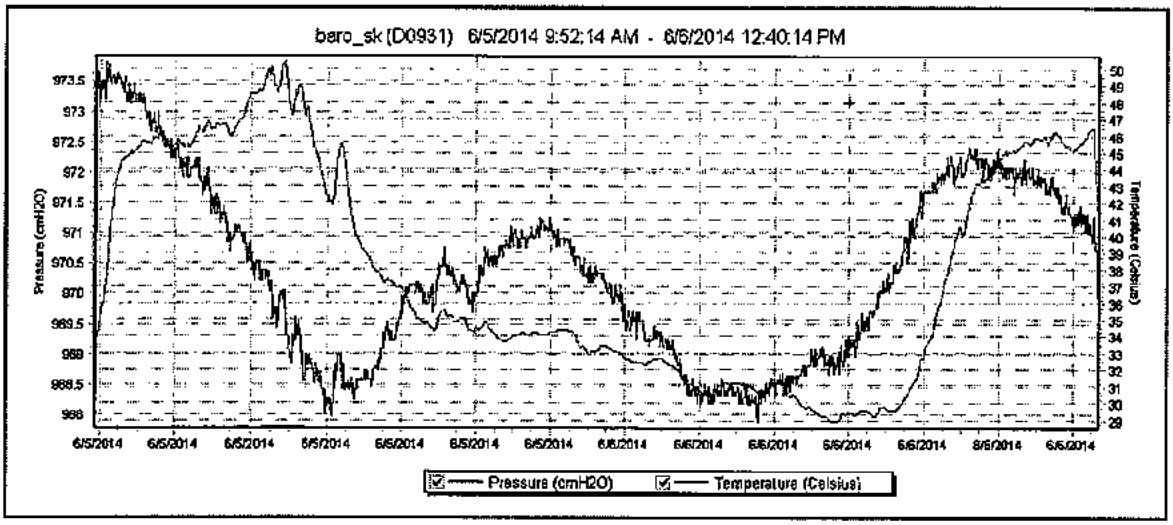


Figure-8. Drawdown v/s time data

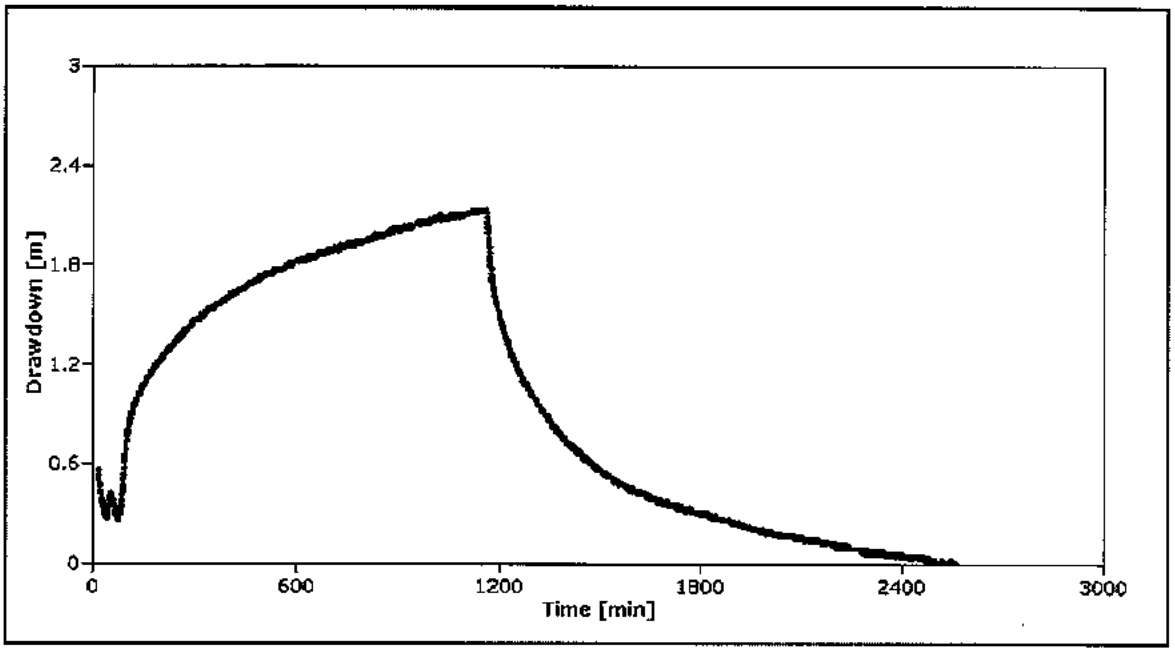


Figure-9. Calculation after Theis

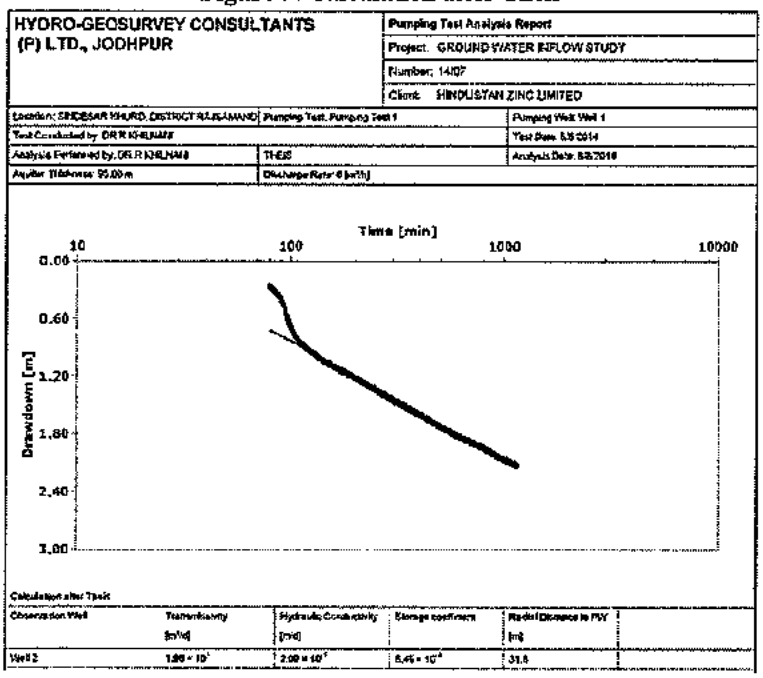


Figure-10. Calculation after Double Porosity

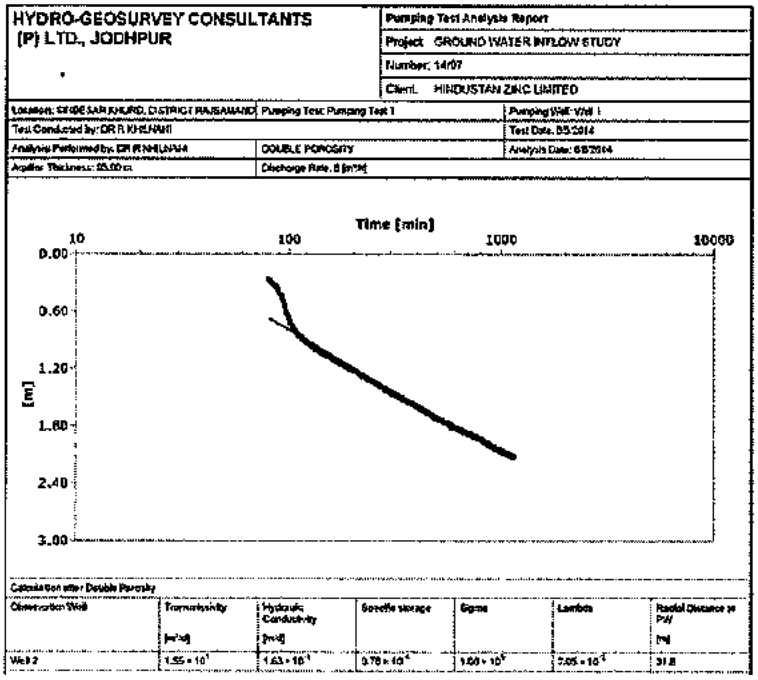


Figure-11. Calculation after Moench Fracture Flow

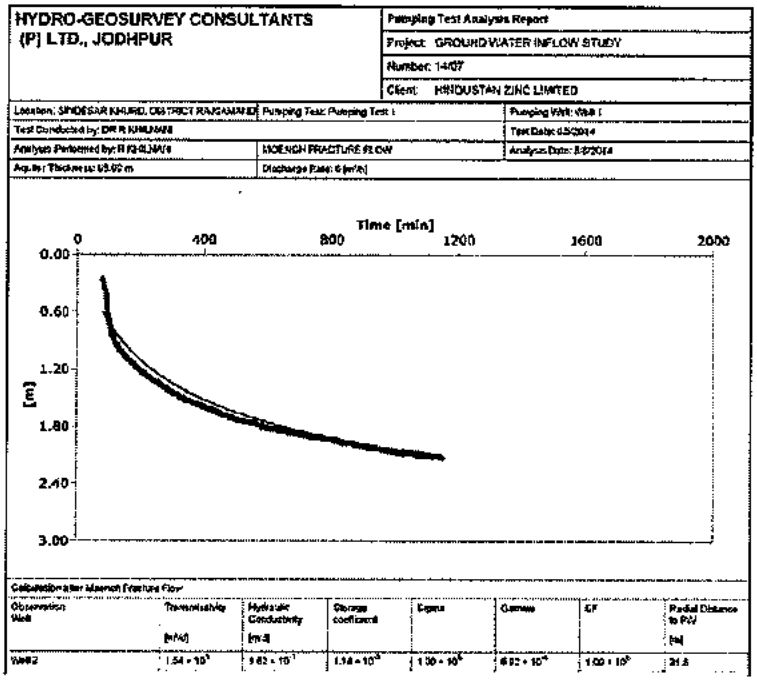


Figure-12. Calculation after Cooper & Jacob-I

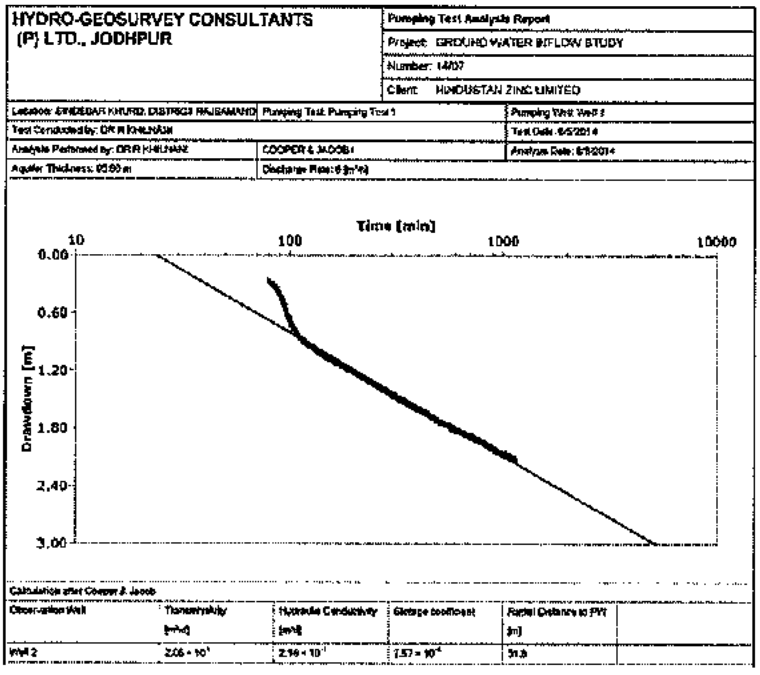


Table-3. Result of pumping tests

S. No.	Method Employed	Transmissivity (m^2/d)	Hydraulic Conductivity (m/d)	Storage Coefficient
1.	Theis	1.98×10^{1}	2.09×10^{-1}	8.46×10^{-4}
2.	Double Porosity	1.55×10^{1}	1.63×10^{-1}	9.78×10^{-4}
3.	Moench Fracture Flow	1.54×10^{1}	1.62×10^{-1}	1.14×10^{-3}
4.	Cooper & Jacob - I	2.06×10^{1}	2.16×10^{-1}	7.57×10^{-4}
Average		$\mathbf{1.78 \times 10^{1}}$	$\mathbf{1.88 \times 10^{-1}}$	$\mathbf{10.50 \times 10^{-4}}$

The pump test has indicated the average value of hydraulic conductivity (K) as 0.188 m/day while the average transmissivity has been found as 1.78 m^2/day. The aquifer is showing confined nature due to heterogeneity caused by fracture pattern of impervious rock.

The value of K of 0.2 mm/day has been used while calculating the inflow of ground water in the mine by Darcy Law.

3.4 Yield of wells

There are large numbers of open dug wells in the buffer zone. Majority of these wells yield meager discharge ranging from 30 to 60 m^3/day of potable quality of water. These wells do not sustain pumping more than few hours and go dry and recoup after 12 to 16 hours further confirming very low hydraulic conductivity. However, due to higher rainfall, this year, wells are expected to yield 60 to 80 m^3/day with average of 70 m^3/day. Wells are mostly operated by centrifugal pumps either by electrical motors of 5 H.P. or diesel engines of 8 H.P.

3.5 Quality of ground water

Quality of ground water in general is potable in mica schist having total dissolved salts less than 1500 mg/l in the core and buffer zones. The ground water in general, is suitable for

drinking and irrigation purposes. All the constituents like chloride, sulphate, fluoride, nitrate etc. are within permissible limits of drinking water standards as per IS. 10500–2012

3.6 Ground water recharge

The main source of ground water recharge is by the rainfall by direct percolation to the zone of saturation. As already indicated, there is well developed drainage in the area due to loamy soils. A significant part of the rainfall is lost as runoff from the area due to thin loamy soils. A limited percentage of rainfall therefore reaches zone of saturation and becomes the part of ground water storage after meeting the evaporation and evapo -transpiration losses. There is also ground water recharge from the return flow of irrigation water pumped from dug wells operated by the cultivators. As there are small tanks and irrigation projects in the buffer zone, an area of 1520 hectares is commanded. The ground water recharge from return flow of irrigation is normally taken as 20% of the total water applied for irrigation. This percentage has been suggested by the Ground Water Estimation Committee for ground water assessment for this part of the state.

4.0 COMPREHENSIVE HYDROGEOLOGICALASSESSMENT STUDIES

4.1 Ground water recharge of lease area

The core zone covers 199.8425 hectares area of mining lease, mostly composed of mica schist. There are two non operational open wells owned by private cultivators in the lease area. The recharge from rainfall infiltration as per the guidelines of the Ground Water Estimation Committee, Govt. of India (1997) has also been calculated just for counter check.

4.1.1 Increment in ground water storage

The ground water recharge can be computed by multiplying the increment in ground water storage by measuring the water level fluctuation during pre and post monsoon periods with area of assessment and specific yield. The equation can express as under:

$$h \times Sy \times A = R$$

Where h is the rise of water level due to monsoon, Sy is the specific yield of the aquifer, and A is the area of computation of recharge, while R is ground water recharge.

Increment in the ground water storage in the core zone was determined by recording the water levels in the wells in the lease area and very close to the lease area during pre and post-monsoon periods of 2016 **(Annexure-I)**. Average rise of water level in the mica schist due to rainfall was found as 5.90 m. Taking the specific yield value of 1.75% for the mica schist (same value as adopted by the CGWB), the ground water recharge is estimated as under:

$$1.99 \times 1000 \times 1000 \times 5.90 \times 0.0175 = 0.206 \text{ mcm}$$

Area of core zone x Rise of water level x Specific Yield = Recharge

The ground water recharge of the core zone from the rainfall of 1180 mm of the year 2016 therefore amounts to 0.206 mcm which when adjusted to average rainfall of 606 mm, amounts to **0.106 mcm**.

4.1.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells can not be done or has not been done.
The recharge can be estimated by the following equation:

$$Rf \times A \times r = R$$

Where Rf is rainfall infiltration factor, A is area and r is annual rainfall while R is ground water recharge.

The committee has suggested 10% to 15% as the rainfall infiltration factor for metamorphics area having loamy soils with moderate rainfall and well developed drainage. An infiltration factor of 10% is adopted for this area which appears to be reasonable looking to the hydrogeological and geomorphological settings. Although, there is no need to use this theoretical approach in this case which has been monitored on a comprehensive scale, an attempt can be made to find out if it matches with the ground water recharge as calculated by increment in the ground water storage and it is found that it matches very well.

$$1.99 \times 1000 \times 1000 \times 0.606 \times 0.1 = 0.121 \text{ mcm}$$

Area of core zone x rainfall x infiltration = Recharge

4.2 Ground water recharge of 10 km area (Buffer zone)

Buffer zone has mainly mica schist as principal aquifer occupying an area of 376.36 km^2 (378.35 – 1.99 km^2 of core zone) **(Figure-5)** in the tehsil of Relmagra, district Rajsamand.

The ground water fluctuation of water table during pre and post monsoon periods were recorded for the year 2016 from the 30 key wells (Appendix I) as per the guidelines of the Ministry of Environment & Forests and taking specific yield values of 1.75% for mica schist, the ground water recharge by rain fall has been calculated as under:

4.2.1 Increment in ground water storage

Ground water recharge from rainfall for the year 2016, which was more rainfall year for the area, has been calculated by measuring the rise of water levels in the key wells of the 376.36 km^2 area of buffer zone. The water levels were recorded during post-monsoon period and again during pre monsoon period of the year 2016. The rise of water level indicates the quantity of water percolated to zone of saturation due to recharge from rainfall.

The aerial rise of water has been computed by contour method for water bearing formation and rise was noted as 5.90 m in mica schist. Such a high value of rise of water level is due to rainfall of 2016. Taking specific yield value of 1.75% for mica schist, the ground water recharge has been calculated for the area covered by water bearing formation. The mica schist covers an area of 376.36 km^2.

376.36 x 1000 x 1000 x 5.90 x 0.0175 = 38.86 mcm

Area of mica schist x Rise of water level x Specific Yield = Recharge

The ground water recharge for the year 2016 by rainfall of 1180 mm when measured as increment in ground water storage amounts to 38.86 mcm which when adjusted for a average annual rainfall 606 mm amounts to **19.96 mcm.**

4.2.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells has not been done.

The committee has suggested 10% to 15% as the rainfall infiltration factor for metamorphics area having loamy soils with moderate rainfall and well developed drainage. An infiltration factor of 10% is adopted for this area which appears to be reasonable looking to the hydrogeological and geomorphological settings. Although, there is no need to use this theoretical approach in this case which has been monitored on a comprehensive scale, an attempt can be made to find out if it matches with the ground water recharge as calculated by increment in the ground water storage and it is found that it matches very well.

376.36 x 1000 x 1000 x 0.606 x 0.1 = 22.81 mcm

Area of buffer zone x rainfall x infiltration = Recharge

4.2.3 Return flow of irrigation

The norms prescribed by the Estimate Committee for return seepage from the irrigation fields having loamy soils has been suggested as 20% of the total water applied for the irrigation. The total water applied for irrigation from open wells in the buffer zone is 22.21 mcm and from surface reservoirs is 3.04 mcm (1520 hectares). The total water applied for irrigation amounts to 25.25 mcm, of which 20% joins ground water storage as return flow of irrigation, amounting to 5.05 mcm.

25.25 x 0.20 = 5.05 mcm

Water applied for irrigation x Return seepage = Recharge

The total ground water recharge of buffer zone from all the sources therefore amounts to **25.01 mcm.**

4.3 Ground water discharge of core zone

Presently, there is no operational well in the plant area. So, total ground water discharge from core zone is nil.

4.3.1 Ground water discharge of buffer zone

Ground water discharge in the buffer zone takes place mainly by dug wells operated for irrigation by cultivators. There are 2644 dug wells with pumps tapping mica schist with average yield of 70 cu.m/day. The annual ground water withdrawal from these wells is calculated as under:

2644 x 70 x 120 =22.21 mcm (wells with pumps tapping mica schist)

No. of wells x yield/day x No. of days of operation = Annual withdrawal

In addition, the drinking and livestock water requirement of around 65 villages having a local population of 1,14,484 is met by bore wells, open dug wells and hand pumps and is around 3.13 mcm considering 75/litre/capita/day consumption. The total ground water discharge therefore amounts to **25.34 mcm.**

5.0 PRESENT STATUS OF GROUND WATER DEVELOPMENT OF THE AREA

The Central Ground Water Board (CGWB) in association with state ground water organization carry out estimation of dynamic ground water reserves of every taluka/tehsil of the state by monitoring the water levels in key wells during pre and post monsoon periods every year along with estimation of ground water draft. Based on these two figures, the stage of ground water development is computed as under:

$$\text{Stage of ground water development (\%)} = \frac{\text{Annual ground water draft} \times 100}{\text{Long term ground water recharge}}$$

The present study reveals that against the total ground water recharge of 25.11 mcm, including recharge from return flow of irrigation water, the ground water discharge is 25.34 mcm indicating the status of ground water development of buffer zone as 100.92%. The buffer zone therefore appears in Over-exploited category. Similarly, against nil ground water discharge and the core zone receives ground water recharge of 0.106 mcm indicating present status of ground water development as 0.0%. The core zone falls in the safe category.

CGWB report is published once in two years and last report has been released in July, 2014 for the dynamic ground water reserves as on 31.03.2011. This report places all the talukas/ tehils in different categories like safe, semi-critical, critical and over-exploited depending on the status of ground water development and long term water level trend. This report shows that the status of ground water development of Relmagra block and Rajsamand district is

more than 100% and there is a long term decline of water levels. CGWB therefore has placed **Relmagra block and Rajsamand district under over-exploited category**. The findings of this study for the buffer zone matches with the assessment done by the CGWB for Relmagra block, although the findings of the CGWB are for the assessment year 2011.

6.0 PROPOSED MINING PROGRAMME

As the base metal deposit at Sindesar Khurd is located at the depth of 100 metres below the ground level with strike length of 1300 metres in the form of a lens (300 mRL to 350 mRL), underground mining is being carried out. The recent exploration from surface, within leasehold, revealed the continuity of mineralization in the southern extension. Besides main lens, 12 auxiliary lenses have also been delineated. The ore bodies dip westerly in upper part (upto 200 mRL) and dip changes to steep easterly in lower part thereafter. The ore body has been proved up to -800 mRL level. The ore body lies close to the contact of quartz mica schist envelope with dolomite/ graphite mica schist.

The general strike of the ore body is N10°E to N15°E while dips vary from 45° to 60° towards west and in deeper levels steep easterly. Pinching and swelling is also observed in the ore body. The thick footwall barren dolomite, occurring east of mineralization along the strike, is sparsely mineralized. Average width of the main ore body is about 28 m and shows remarkable variation both along strike and dip. The ore body is open at a depth of 1100 m below (in the southern extremity of leasehold) surface.

The current ore production is achieved through existing system of two ramps. Currently the production is being carried out from the blocks between 425-315 mRL and 290-215 mRL. It is proposed to bring blocks between 195-160 mRL, 135-15 mRL, 135-(-55) mRL, (-95) - (-285) mRL, SKA8 Lens, SKA2 Lens, SKA11PB lens into production. For this, ramps and

raises will be extended to lower levels to attain the proposed 6.00 MPTA production from 2017-18.

The mine life is anticipated to be around 20 years assuming progressive enhancement of ore production from present production rate of 4.50 MTPA to the proposed rate of production of 6.00 MTPA.

7.0 IMPACT OF MINING ON WATER REGIME

7.1 Impact of mining on surface water

As the underground mining is being carried out, the surface drainage is not going to be disturbed. The four first order streams which originate within the lease area on the eastern and southern slopes of the hill will continue to flow without getting disturbed by the underground mining or any surface activity. So, the surface drainage will take its natural course in the lease area. River Banas which crosses the buffer area in its northern side from village Jitawas to Panotia is flowing without being disturbed by the mining activity. In the lease area, there are few village roads and the village houses which are not affecting the surface drainage which is controlled by streamlets.

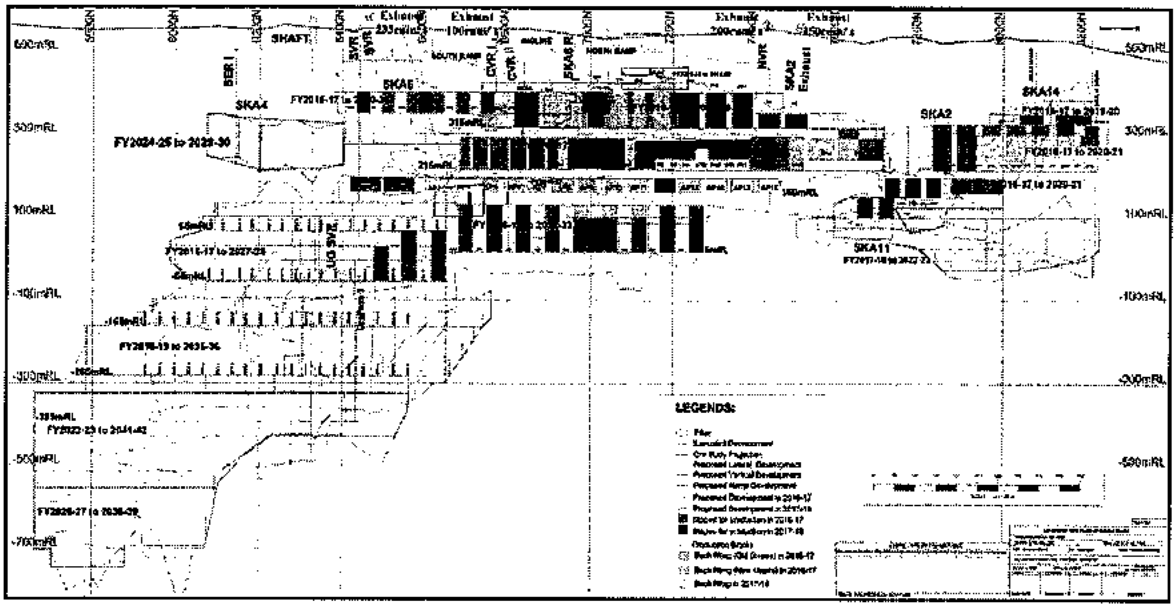
It is therefore apparent that there is hardly any impact of mining on the surface water regime. The surface water is not going to be pumped or utilized anywhere in the lease area for any purpose. Whatever surface runoff develops in the lease area by rainfall is allowed to join the natural drainage system as it was prior to mining activity.

8.0 GROUND WATER MODELING

With a view to find out the inflow of ground water in the mine due to intersection of ground water table from the voids created by mining in metamorphics, a ground water simulation

study has been taken up for Sindesar Khurd mine **(Figure-13).** The broad objectives of this modeling exercise is to replicate the field parameters numerically into the ground water model, development of three dimensional ground water flow model and simulation of the existing field conditions, calibration and testing of the proposed pumping scenario through the model.

Figure-13. Underground mining plan of Sindesar Khurd mines (2017-2022)



Groundwater simulation models provide a platform to study the problems in broader perspective and resolve solutions for the optimal benefit taking into considerations the simplest and complex aspects along with economic, social and environmental aspects. A model is a device that represents an approximation of a field situation. A mathematical model simulates groundwater flow indirectly by means of governing equations. In the present scenario, the mathematical model will be dealt which is a conceptual description or approximation that describes the physical systems using mathematical equations but these are not exact descriptions of physical systems or processes. The applicability or usefulness of a

model depends on how closely the mathematical equations approximate the physical system being modeled. In order to evaluate the applicability or usefulness of a model, it is necessary to have a thorough understanding of the physical system and the assumptions embedded in the derivation of the mathematical equations.

These equations are based on certain simplifying assumptions which typically involve the direction of flow, geometry of the aquifer, the heterogeneity or anisotropy of the aquifer. It is because of these assumptions, and the many uncertainties in the values of data required by the model, that a model must be viewed as an approximation and not an exact duplication of field conditions.

In Numerical models, the response is estimated at pre-selected space and time, encompasses large computational burden and numerical errors are inevitable. The commonly used numerical approaches used in practice today for solving ground water flow equations are Finite Difference Method (FDM) and Finite Element Method (FEM), other than that some latest models also uses Method of Characteristics (MOC) as well. Each model, whether it is a simple analytical model or a complex numerical model, has applicability and usefulness in hydrogeological and remedial investigations, in spite of the simplifications inherent in the model equations.

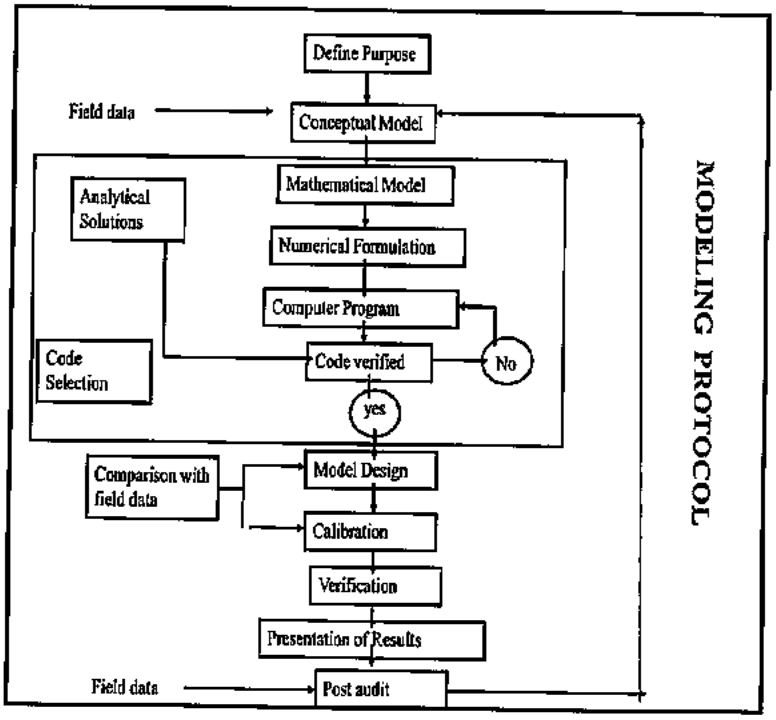
The accuracy of model predictions depends upon the degree of successful calibration and verification of the model simulations. Errors in the model used for predictive simulations, even though small, can result in gross errors in solutions projected forward in time. Monitoring of hydraulic heads and groundwater chemistry (performance monitoring) will be required to assess the accuracy of predictive simulations. Numerical modeling requires a complete protocol to be followed starting from establishing the purpose or objectives of

modeling to conceptualization to model design to calibration, validation, predictions, sensitivity analysis and finally the post audit. Availability of data pertaining to geometry of the aquifer, hydraulic parameters as well as prevailing boundary conditions need to be ascertained before a model is conceptualized.

8.1 Modeling protocol

A lot of advancement has taken place in last few decades in the field of ground water modeling. With fast developing computing techniques and availability of computer codes the modeling exercise has become much easier. A complete protocol enumerating various steps in modeling has more or less been firmed up. The various steps considered in modeling are shown as under.

A protocol for modeling includes code selection and verification, model design which involves discritizing the space and time, calibration, sensitivity analysis, and finally predictions and post auditing. The various steps in a modeling protocol is presented below as flow diagram.



8.2 Data requirement for modeling

Ideally speaking, the data requirement for constructing a ground water flow / transport model requires all the parameters which constitute a groundwater flow equation at maximum number of points in space and time. However in real world situation, it may not be possible to achieve this owing to various constraints including cost considerations. Hence, depending upon the objective of modeling and the accuracy desired the frequency of observation and the density of data requirement should be optimized. A good strategy is to start with a very simplified model with minimal data, carry out sensitivity analysis to identify critical data gaps and gradually refine the model through expanding the database. The data required for modeling may be grouped under two broad categories, the data pertaining to physical framework of the system and data pertaining to hydrogeologic framework, the details of data requirements are listed below;

8.2.1 Physical framework

- Geologic map and cross sections, fence diagrams showing the aquifer geometry and boundaries of the system.
- Contour maps showing the elevations of the top and bottom of the aquifers to be modeled.
- Map showing the extent and thicknesses of the stream, rivers, drains and canals etc to be modeled.

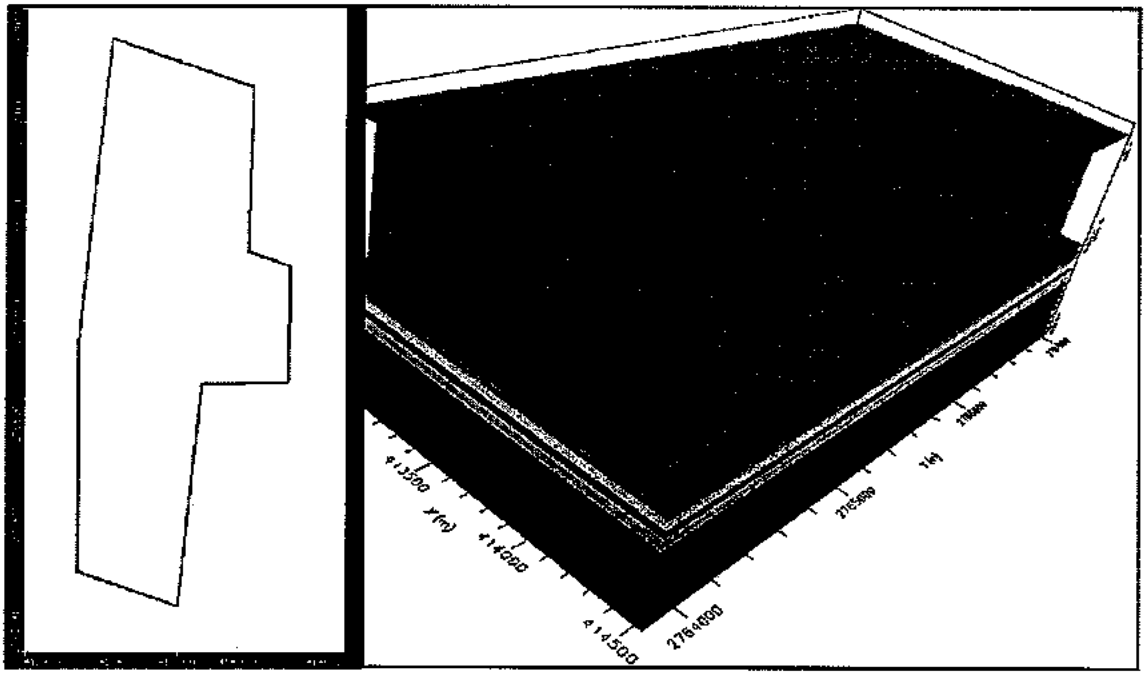
8.2.2 Hydrogeologic framework:

- Water table and piezometric point data, maps, interpolated values etc. for all the aquifers under consideration to be used as initial piezometric heads.
- Historical water tables, piezometric heads surface water levels, discharges of streams etc.
- Maps and cross sections showing the distribution of hydraulic properties such as hydraulic conductivity (K) and transmissivity (T).
- Maps and cross sections showing the storage properties such of the aquifers and confining beds.
- Hydraulic properties such as conductance for the surface water bodies, streams etc.
- Spatial and temporal variation of rates of evapo-transpiration, groundwater recharge, groundwater withdrawal etc.

8.3 Model Domain and Grid

The entire model area measuring 1.52 km in the X direction and 3.24 km in the Y direction has been discritized into 380 Columns and 406 Rows. Each cell measures 4 m x 8 m representing an area of about 32 m^2. The model domain along with the grids is shown in **Figure-14.**

Figure-14. Model domain and grid model



8.4 Model Layering

The entire modeling thickness is depending on year wise production depth. The top of Layer 1 has been generated from the reduced level (ground level) data for interpolation through GIS softwares (ArcView & ERDAS) has been used, similarly the bottom of all the layers have been specified from the depth of voidsafter cementation/filling**(Table-4 to 9).** The model

layers represent level of voids after cementation/filling within which groundwater flow is expected to occur.

Table-4. Depth and location of voids after cementation for year 2017-2018

Level		Northing of net voids after cementation/filling
From	To	
425	400	7152-7192
400	350	6525-6555, 6615-6645, 6675-6705, 6887.5- 6927.5
350	325	6887.5- 6927.5
325	315	6887.5- 6927.5
300	290	7829-7874, 8009-8054, 8069-8112, 8131-8174
290	250	7450-7481, 7829-7874, 8009-8054, 8069-8112, 8131-8174
250	215	7450-7481
195	160	6380-6410, 7825-7865, 7875-7930
130	100	6615-6650, 6680-6715, 6750-6785, 6820-6855
100	15	6615-6650, 6680-6715, 6750-6785, 6820-6855
15	-55	6545-6580

Table-5. Depth and location of voids after cementation for year 2018-2019

Level		Northing of net voids after cementation/filling
From	To	
400	350	6435-6465, 6495-6525, 6795-6825
350	325	8129-8216
325	315	6555-6585, 8129-8216
315	300	6555-6585, 8129-8216
300	290	6555-6585, 8129-8216
290	250	6555-6585, 8129-8216
195	160	7715-7755, 7770-7810, 7945-8000
140	130	7700-7735
130	100	6405-6440, 6825-6960, 6995-7030, 7065-7100, 7700-7735
100	15	6405-6440, 6825-6960, 6995-7030, 7065-7100
15	-55	6475-6510

Table-6. Depth and location of voids after cementation for year 2019-2020

Level		Northing of net voids after cementation/filling
From	To	
400	350	6585-6615, 6645-6675, 6705-6735
350	325	7970-8025,8040-8095
325	315	6615-6645, 6675-6705, 6735-6765, 7970-8025, 8040-8095
315	300	6615-6645, 6675-6705, 6735-6765, 7970-8025, 8040-8095
300	290	6615-6645, 6675-6705, 6735-6765, 7874-7889, 7934-7949, 7994-8009
290	250	6615-6645, 6675-6705, 6735-6765, 7874-7889, 7934-7949, 7994-8009
140	130	7650-7685, 7715-7755, 7770-7810
130	100	6715-6750, 6785-6820, 6855-6890, 7650-7685, 7715-7755, 7770-7810
100	15	6715-6750, 6785-6820, 6855-6890
15	-55	6335-6370, 6405-6440, 6475-6510
-85	-230	6400-6435, 6540-6575

Table-7. Depth and location of voids after cementation for year 2020-2021

Level		Northing of net voids after cementation/filling
From	To	
400	350	6765-6795, 6825-6855
350	325	8025-8040
325	315	8025-8040
315	300	8025-8040
300	290	8054-8069, 8112-8131, 8174-8189
290	250	8054-8069, 8112-8131, 8174-8189
140	130	7825-7865, 7875-7930, 7945-8000
130	100	6370-6405, 6440-6475, 6510-6545, 6580-6615, 7825-7865, 7875-7930, 7945-8000
100	15	6370-6405, 6440-6475, 6510-6545, 6580-6615
15	-55	6510-6545, 6580-6615
-85	-230	6120-6155, 6190-6225, 6260-6295, 6470-6505

Table-8. Depth and location of voids after cementation for year 2021-2022

Level		Northing of net voids after cementation/filling
From	To	
350	325	6825-6855
15	-55	6240-6275, 6305-6335, 6370-6405, 6440-6475
-55	-85	6240-6275, 6305-6335, 6370-6405, 6440-6475
-230	-265	5910-5945, 5980-6015, 6050-6085, 6435-6470, 6505-6540

Table-9. Depth and location of voids after cementation for conceptual stage

Level		Northing of net voids after cementation/filling
From	To	
-460	-515	5800-5850, 5900-5950, 6000-6050, 6100-6150
-555	-695	5850-5900, 5950-6000, 6050-6100

Visual Modflow Version 4.3.0.154 Pro which is internationally accepted standard software for ground water flow and transport modeling in ground water domain has been used in the present study. The Visual Modflow uses the source code of MODFLOW (Mc Donald and Harbaugh, 1988) which is a numerical model that simulates flow in three dimensions by solving a finite difference approximation of the partial differential equations describing groundwater flow.

8.5 Model Calibration – Preliminary

At this stage of the study, a base-case model was developed and manually calibrated under steady-state conditions. The steady-state approach assumes that the observed groundwater levels are typical of the system.

The base-case model includes first-pass estimates of aquifer material properties and hydrological variables. The calibration process involved altering (a) the recharge rates, and (b) the horizontal hydraulic conductivity of the phyllite, until the model simulated water table

matched (imperfectly) the interpreted water table. The important parameters of the current model are given below. Note that the hydraulic conductivities adopted are within range of limited field tests, and the recharge rates are similar to that estimated for other locations in the area.

8.6 Input parameters

Various parameters used in the model have either been directly determined from field studies, analysis of pumping test carried out by HCPL The important aquifer parameters as specified in the model such as Hydraulic conductivity, storage parameters like specific yield or storativity, are shown in **Figure-15&16.** In all layers, the hydraulic conductivity value has been entered as zones (i.e. Zone-1 = to be mined/backfilled area by cementation and Zone-2 = mined out/void area) depending upon the overlying and underlying lithology as metamorphics, which is the only principal aquifer in the area contribute water in the mine, after the intersection of the ground water table. Similarly the storage parameters have been specified layer wise.

Figure-15. Hydraulic conductivity

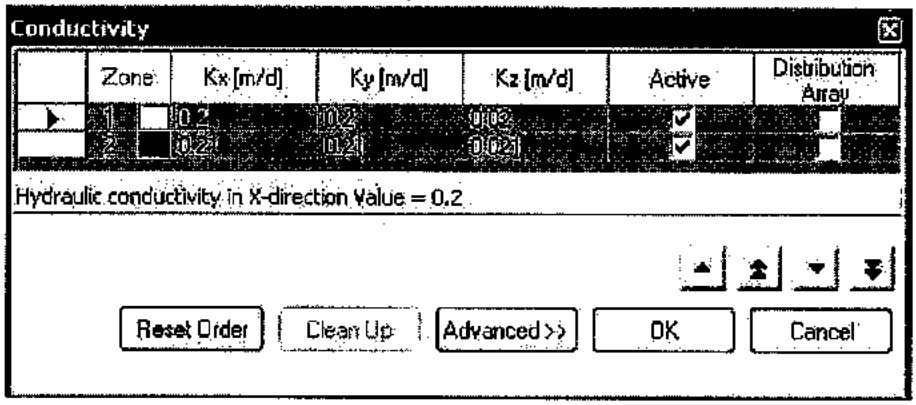
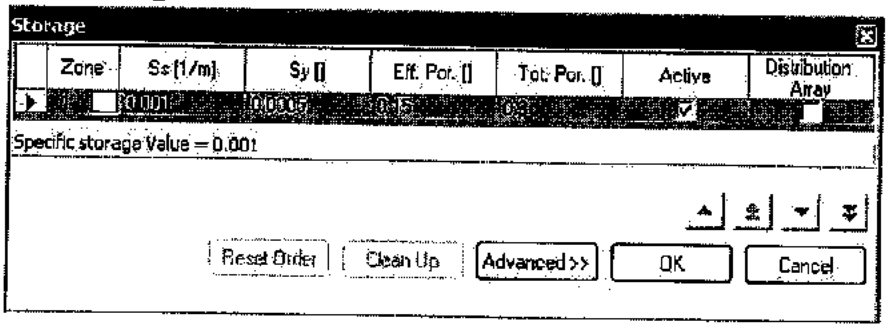
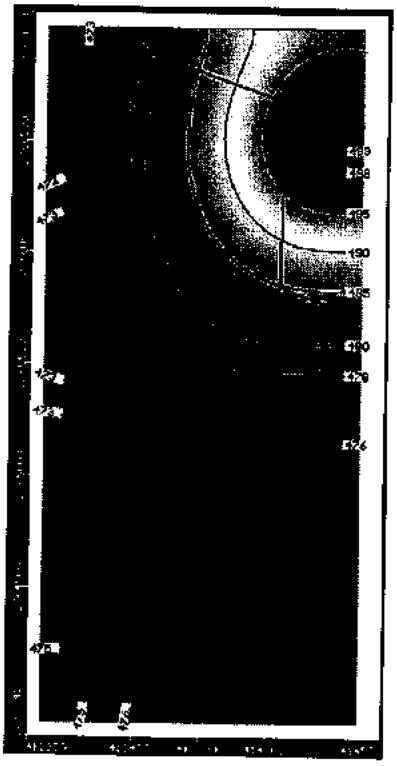


Figure-16. Storage



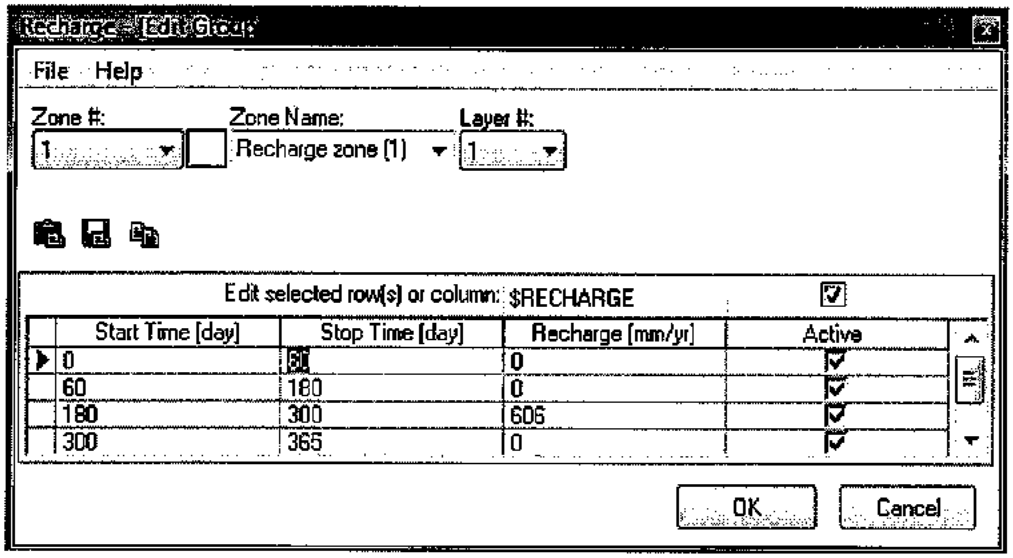
One of the most important input parameter in the entire modeling exercise is the initial piezometric heads which need to be specified. In the present study, the ground water level data of Layer 1 as collected from field has been used for cell wise interpolation through GIS softwares **(Figure-17).**

Figure-17. Initial piezometric head of the study area



The other important input to be considered is recharge from rainfall **(Figure-18).** The long term ground water recharge of the area as derived from the comprehensive hydrogeological assessment studies of lease area and its buffer zone from normal annual rainfall of 606 mm. This figure is based on pre and post monsoon water levels as measured by the HCPL as increment in the ground water storage due to rainfall.

Figure-18. Recharge



8.7 Model calibration

The present day water level scenario has been assumed as initial condition for the aquifers to start the calibration. In view of the limited availability of aquifer parameters in spatial domain for both the aquifer, as well as absence of historical piezometric head data for aquifer, number of trial runs have been made by varying the hydraulic conductivity and storage parameters so as to achieve a good agreement between the observed and computed heads in space and time.

The model has been run in transient/ unsteady state to see the impact of pumping and storage change. In order to calibrate the model and verify the model outputs, the model was run for the existing pumping scenario from deeper shear zone aquifer.

8.8 Groundwater budget and model predictions

The regional groundwater budget is estimated using zone budget package in Visual Modflow. The area has been divided into 2 major zones (i.e. Zone-1 = to be mined/backfilled area by cementation and Zone-2 = mined out/void area) for making groundwater budget computations for the mine management. This could help to mine management to handled further to update or predict inflows at different mine development stages. The extent of void area and depth of mine varies year wise during the underground mining operation. Hence, groundwater conditions vary dynamically during mine development. The stage wise groundwater mine floors are simulated using stage wise mine plans by incorporating the void area and depth. The groundwater budget for the entire study area for six different mine development stages are presented in **Figures-19 to 42**. The predicted groundwater inflows at different mine development stages is shown in **Table-10.**

Figure-19. Zone budget at 60th day of model for the year 2017-18

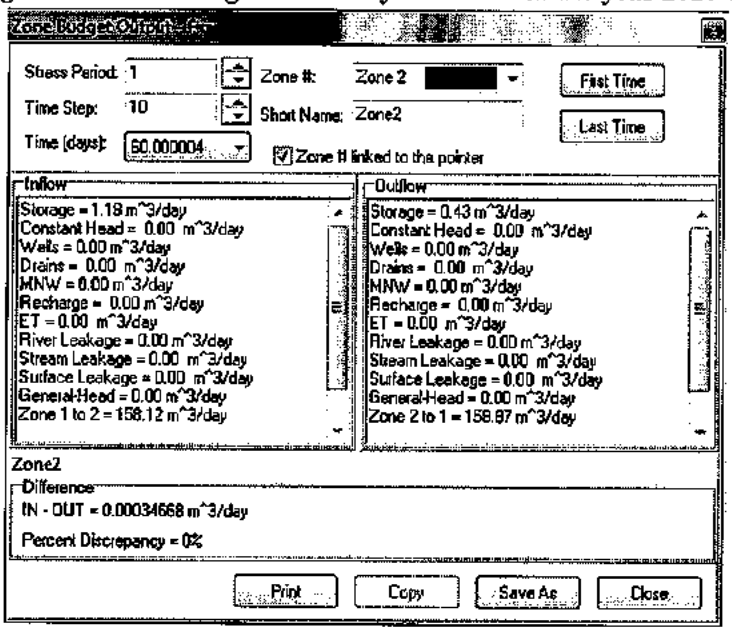


Figure-20. Zone budget at 180th day of model for the year 2017-18

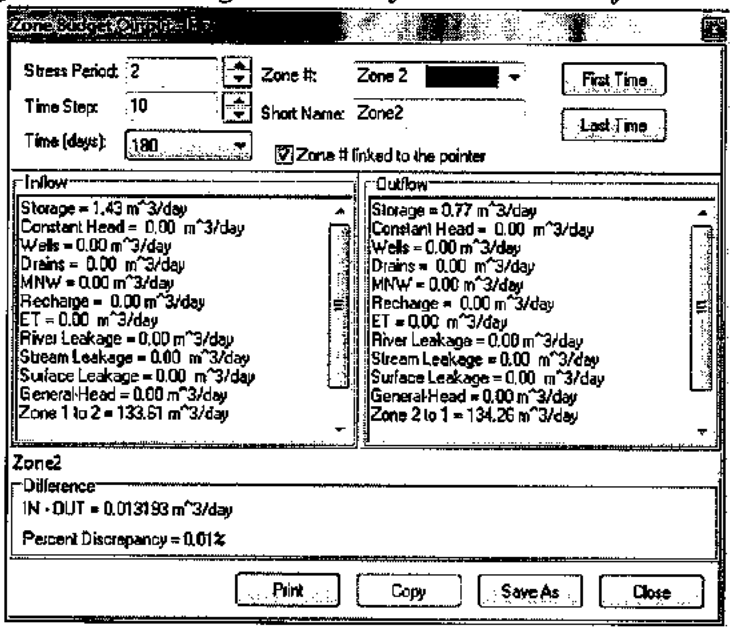


Figure-21. Zone budget at 300th day of model for the year 2017-18

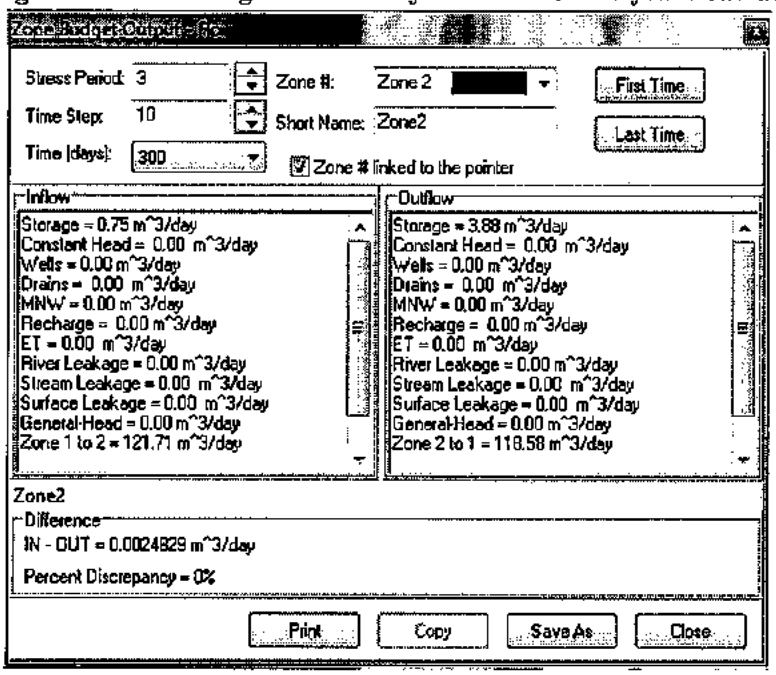


Figure-22. Zone budget at 365th day of model for the year 2017-18

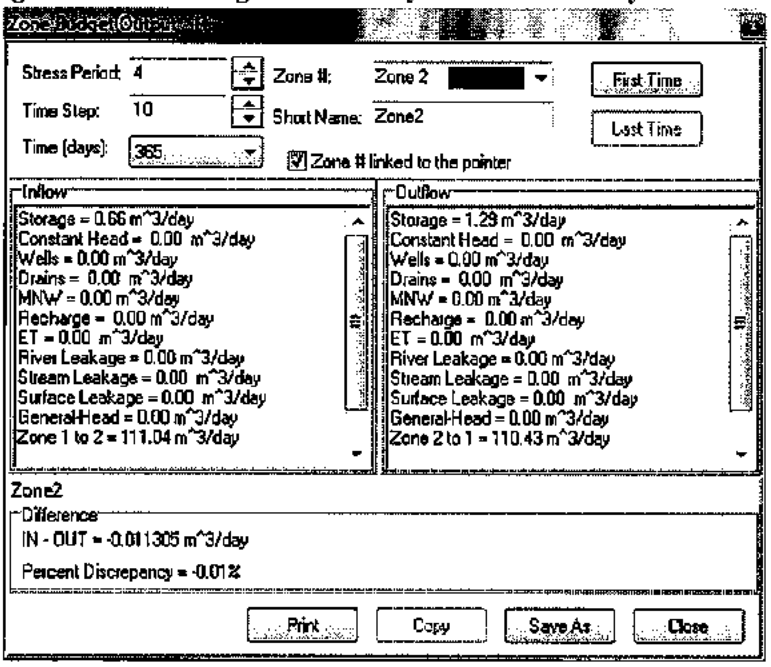


Figure-23. Zone budget at 60th day of model for the year 2018-19

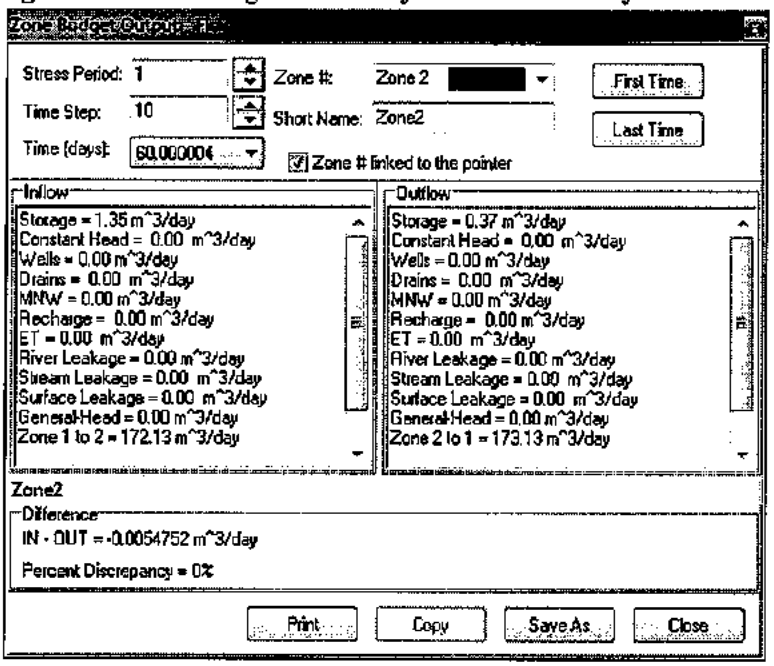


Figure-24. Zone budget at 180th day of model for the year 2018-19

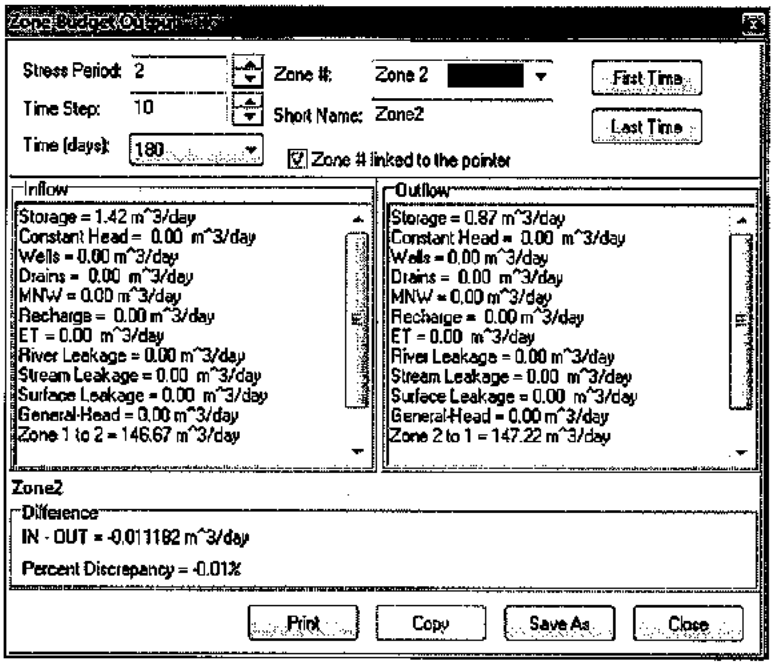


Figure-25. Zone budget at 300th day of model for the year 2018-19

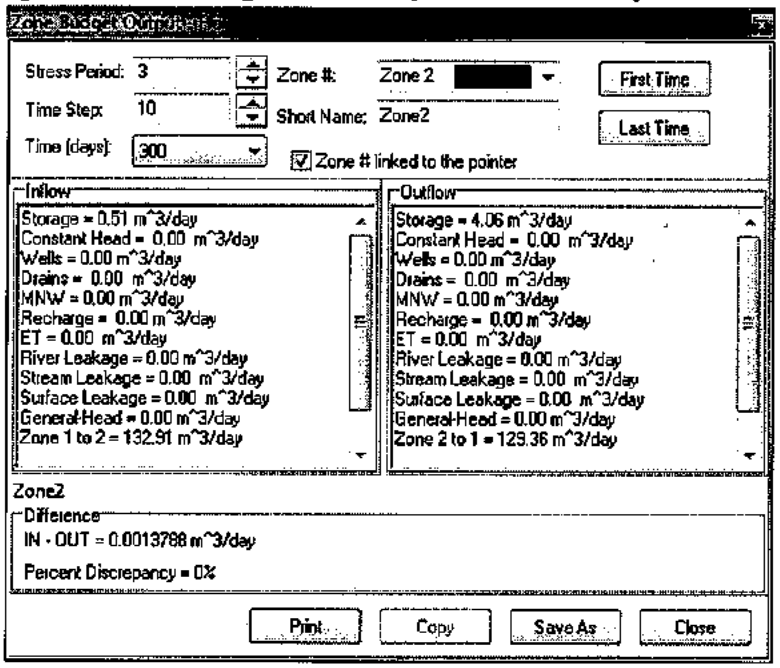


Figure-26. Zone budget at 365th day of model for the year 2018-19

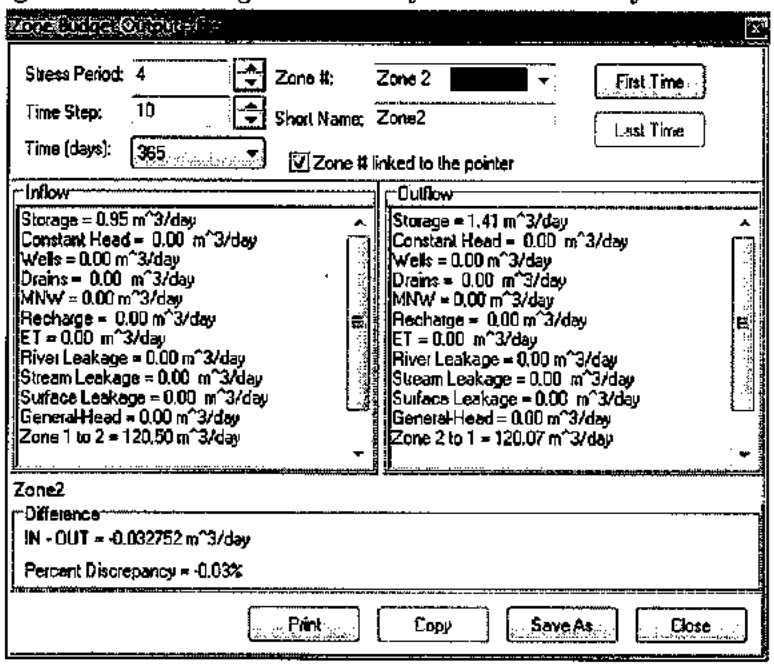


Figure-27. Zone budget at 60th day of model for the year 2019-20

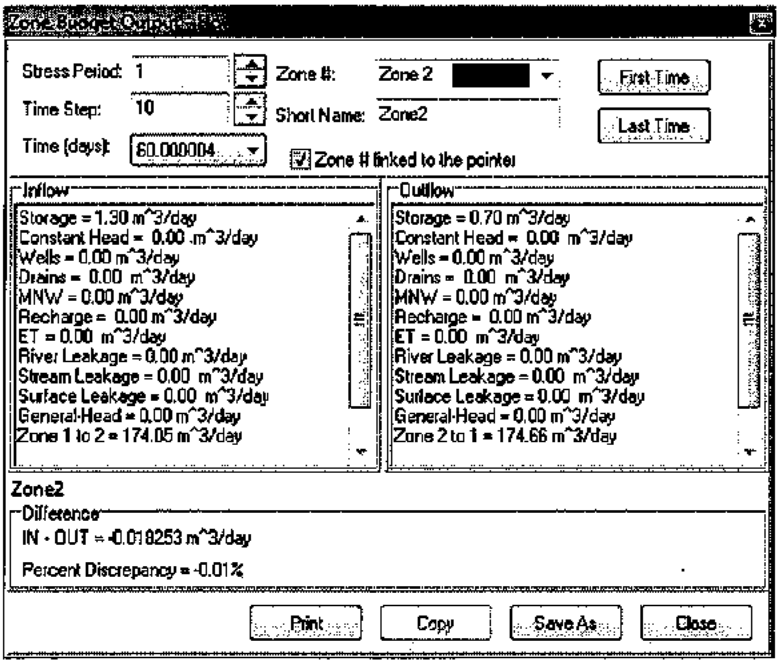


Figure-28. Zone budget at 180th day of model for the year 2019-20

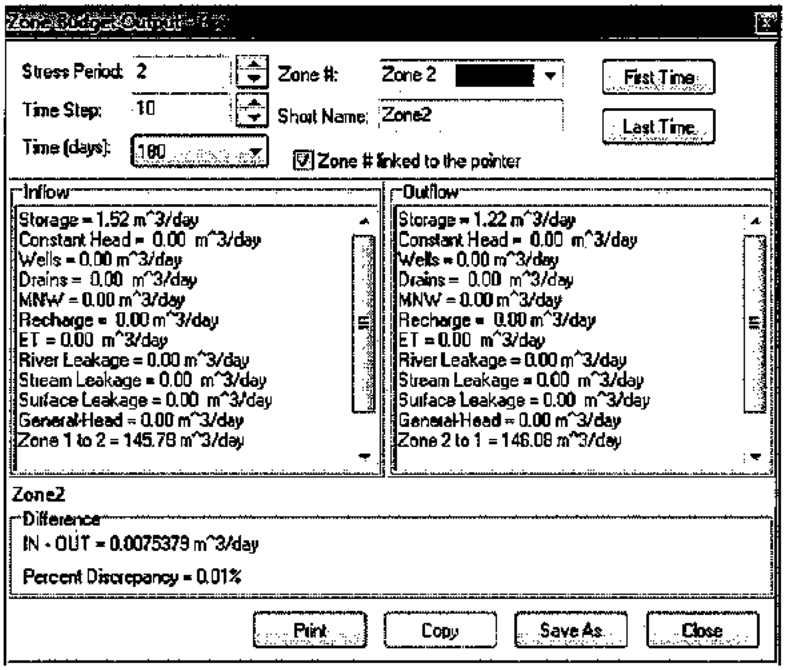


Figure-29. Zone budget at 300th day of model for the year 2019-20

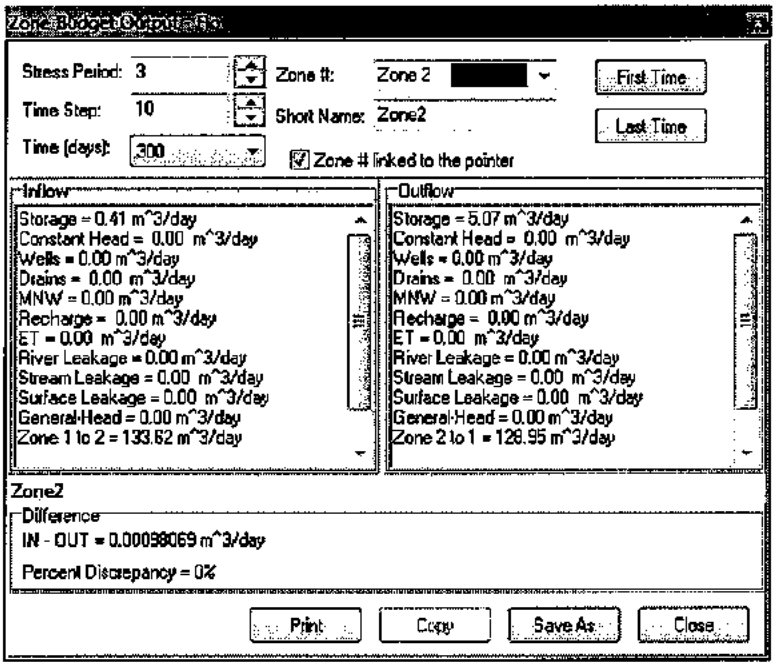


Figure-30. Zone budget at 365th day of model for the year 2019-20

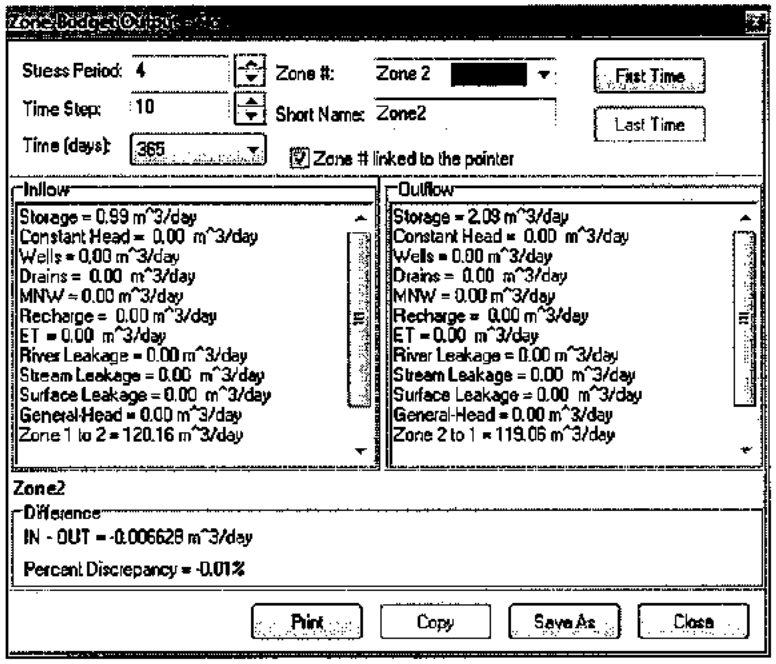


Figure-31. Zone budget at 60th day of model for the year 2020-21

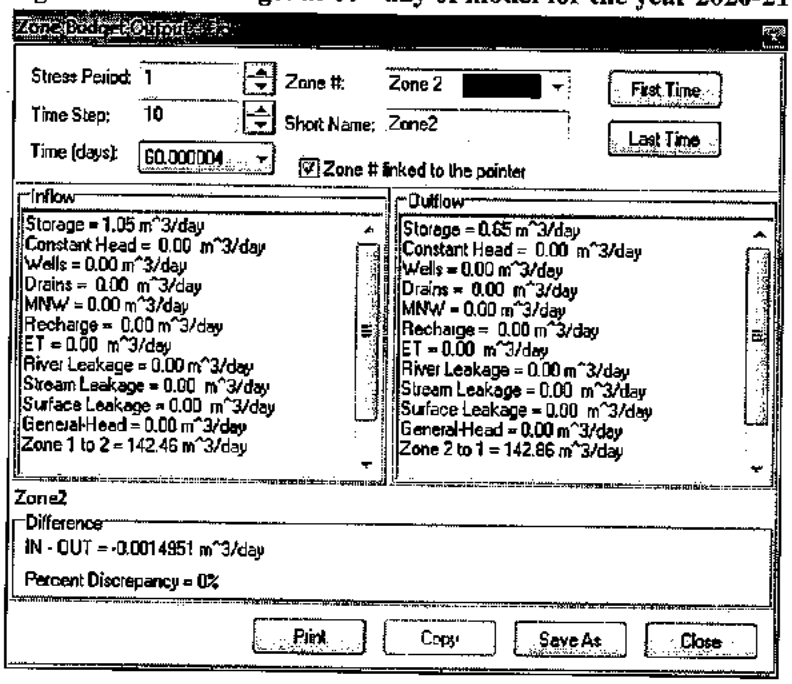


Figure-32. Zone budget at 180th day of model for the year 2020-21

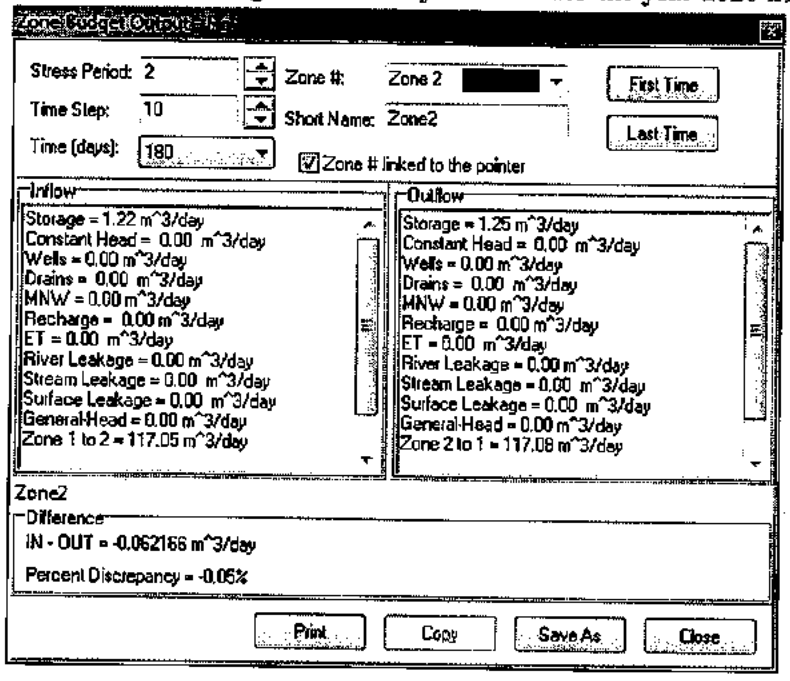


Figure-33. Zone budget at 300th day of model for the year 2020-21

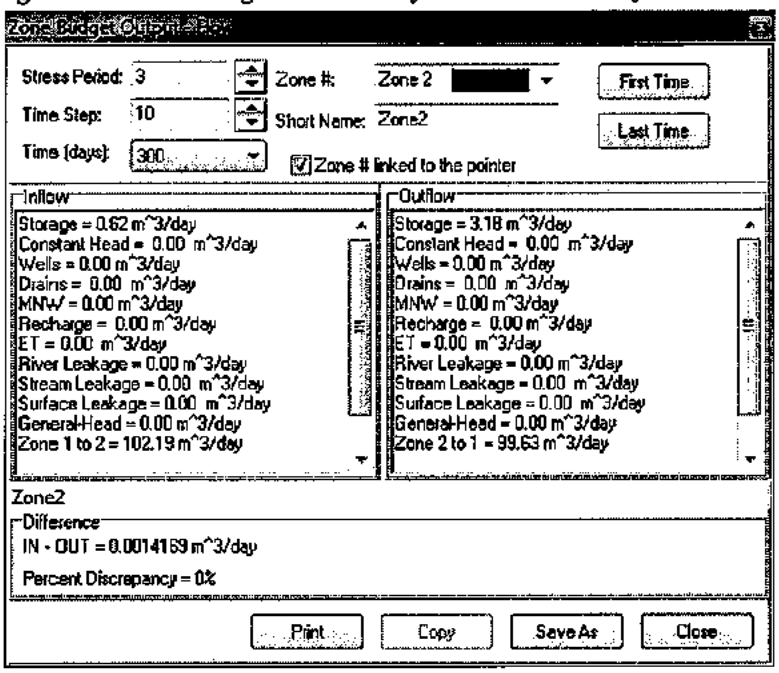
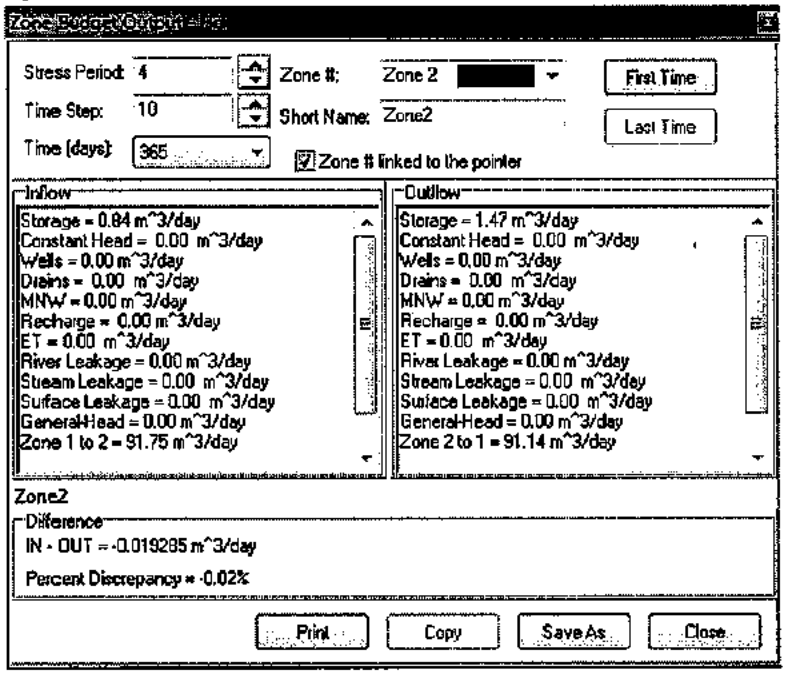


Figure-34. Zone budget at 365th day of model for the year 2020-21



Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA

Figure-35. Zone budget at 60th day of model for the year 2021-22

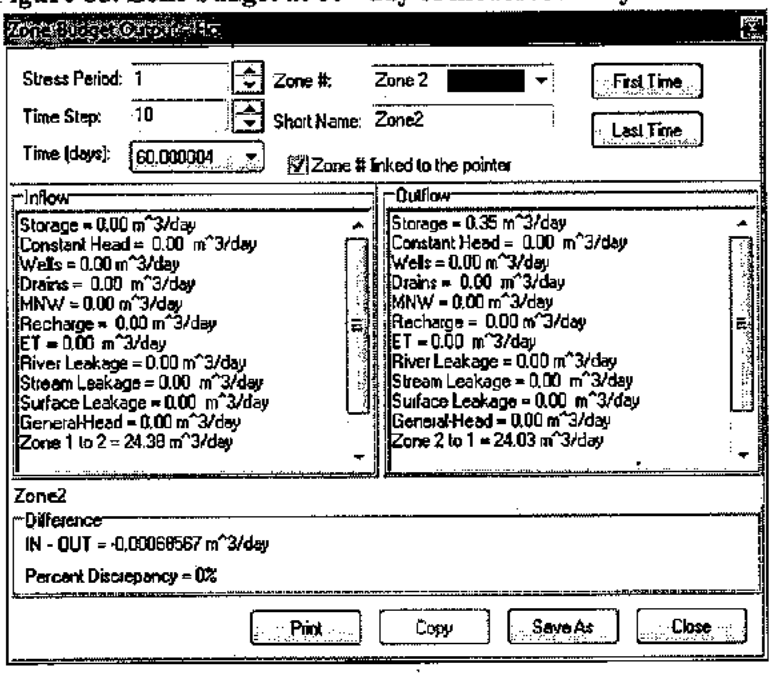


Figure-36. Zone budget at 180th day of model for the year 2021-22

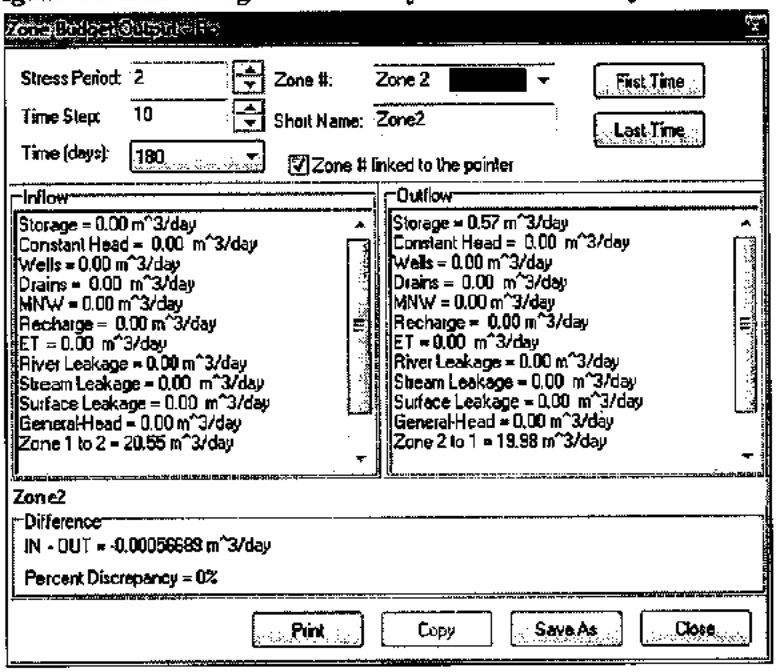


Figure-37. Zone budget at 300th day of model for the year 2021-22

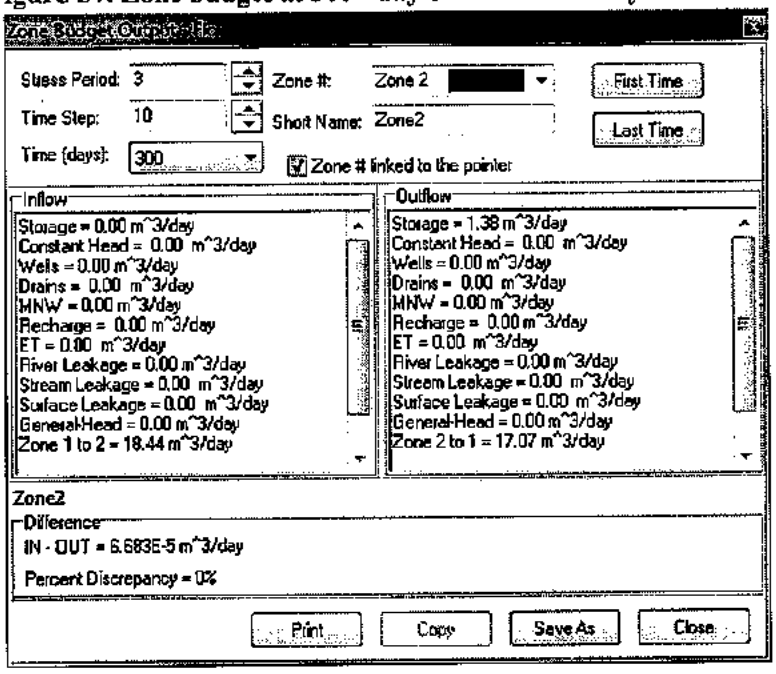


Figure-38. Zone budget at 365th day of model for the year 2021-22

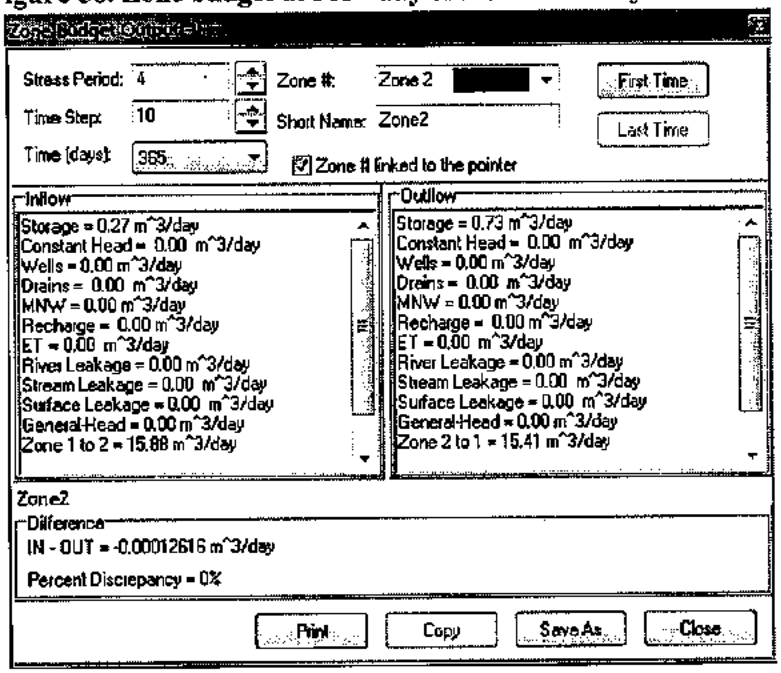


Figure-39. Zone budget at 60th day of model at conceptual stage

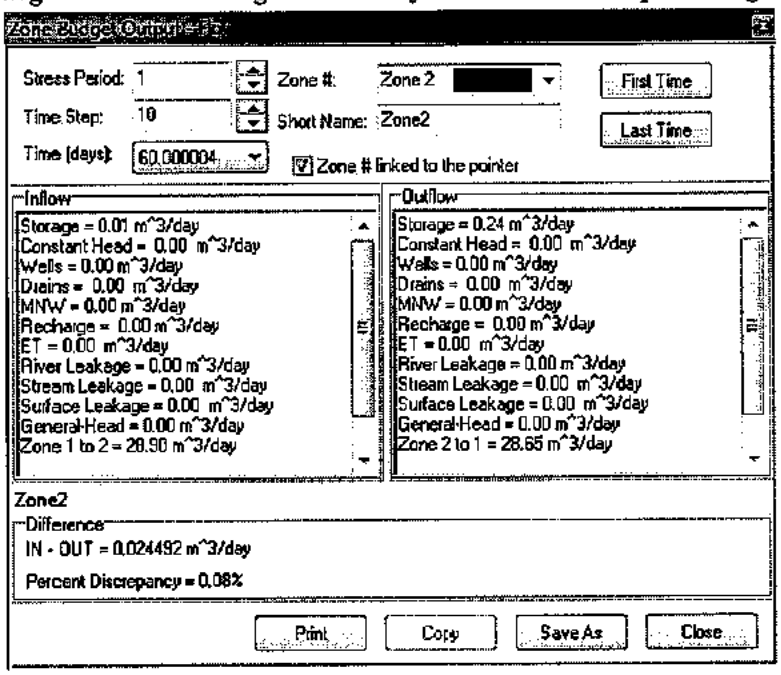


Figure-40. Zone budget at 180th day of model at conceptual stage

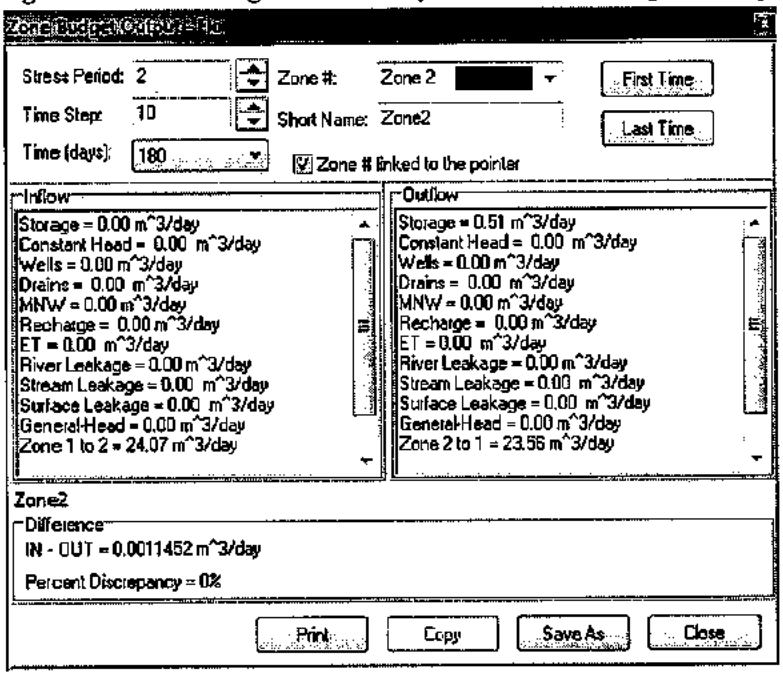


Figure-41. Zone budget at 300th day of model at conceptual stage

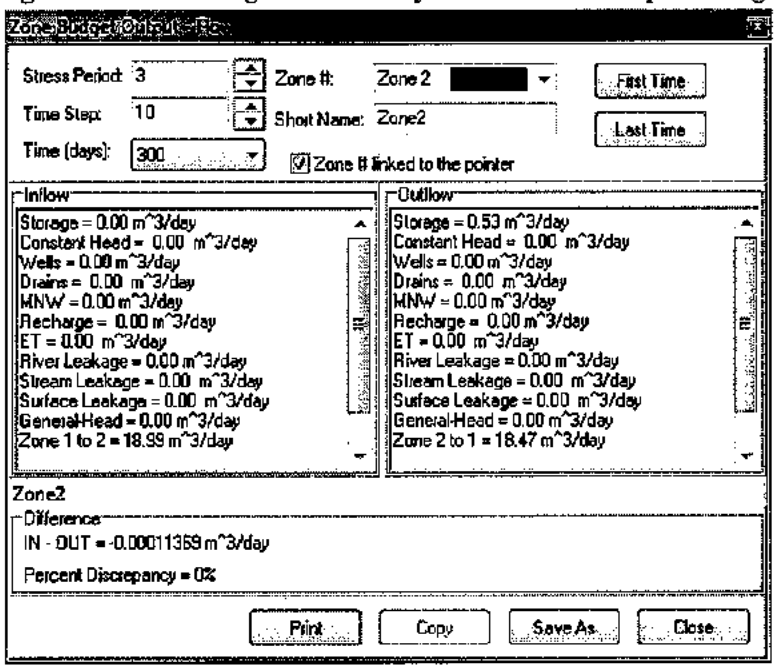
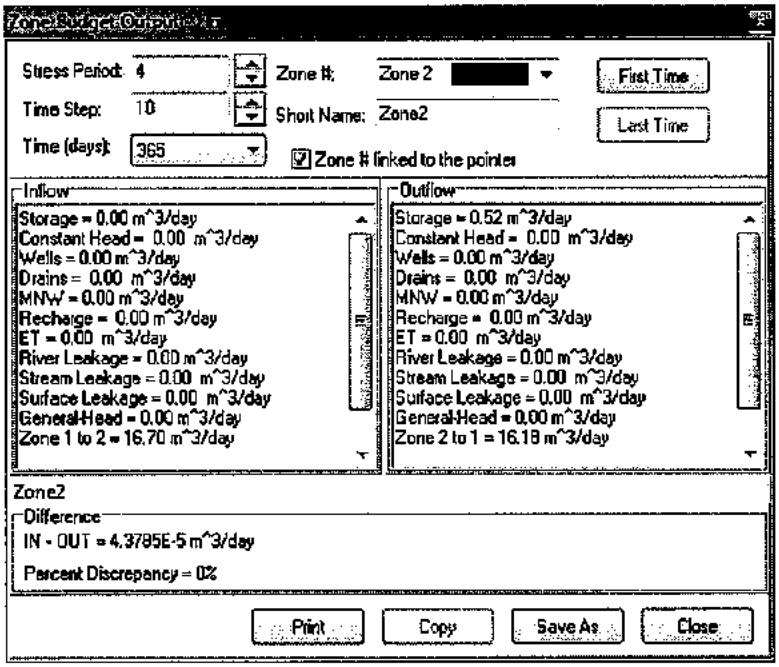


Figure-42. Zone budget at 365th day of model at conceptual stage



8.9 Estimation of inflow during each year of the five years and at conceptual stage

Based on the findings of the modeling inflow has been estimated by considering four seasons. Although, the mining is being carried out at such depth that effect of monsoon is not observed and at the conceptual stage, there is hardly nay fracture porosity that metamorphic have no ground water and all upper mined out area has been back filled by cementation thereby with no inflow from upper mined out area. **Table-10** shows the net average ground water inflow in m^3/day for each year of the five years of the Mining Scheme. It is observed that maximum average inflow is 143.40 m^3/day during the year 2019-20 while it is average minimum during the 2021-22 when excavation is minimum and upper mined out area had been back filled by cementation. So, the average inflow of ground water during five years period will be 110.15 m^3/day or 110 m^3/day. Inflow in the mine at the conceptual stage will be only 22.18 m^3/day as the mine will achieve the depth of -695 mRL having no fracture porosity due to overlying weight of about over 1100 metres of rock above it and major part will be back filled by cementation.

Table-10. Estimation of ground water inflow in the mine

Time	Level	60th day (m^3/day) Monsoon period	180th day (m^3/day) Post-monsoon	300th day (m^3/day) Winter	365th day (m^3/day) post Pre-Monsoon	Net average ground water inflow in the mine in m^3/day
2017-18	425-400 400-350 350-325 325-315 300-290 290-250 250-215 195-160 130-100 100-15 15-(-55)	158.12	133.61	121.71	111.04	**131.12**
2018-19	400-350 350-325 325-315 315-300	172.13	146.67	132.91	120.50	**143.05**

	300-290					
	290-250					
	195-160					
	140-130					
	130-100					
	100-15					
	15-(-55)					
2019-20	400-350	174.05	145.78	133.62	120.16	**143.40**
	350-325					
	325-315					
	315-300					
	300-290					
	290-250					
	140-130					
	130-100					
	100-15					
	15-(-55)					
	(-85)-(-230)					
2020-21	400-350	142.46	117.05	102.19	91.75	**113.36**
	350-325					
	325-315					
	315-300					
	300-290					
	290-250					
	140-130					
	130-100					
	100-15					
	15-(-55)					
	(-85)-(-230)					
2021-22	350-325	24.38	20.55	- 18.44	15.88	**19.81**
	15-(-55)					
	(-55)-(-85)					
	(-85)-(-265)					
Average of annual inflow during five years						**110.15**
Conceptual	(-460)-(-515)	28.90	24.07	18.99	16.76	**22.18**
	(-555)-(-695)					

9.10 Impact of mining on water quality

The Environment Department of HZL at Sindesar Khurd is regularly monitoring the water quality of mine water and open wells. Water samples are being collected from open wells and bore wells surrounding the working mine at Sindesar Khurd are being regularly monitored

and have shown the absence of heavy metals or below the prescribed limits. The information pertaining to the water levels and water quality is being regularly submitted to the concerned authorities. So far, no adverse impact has been noticed.

9.0 GAINFUL UTILIZATION OF MINE DISCHARGE

Having estimated that the ground water inflow in the mine will range from 19.81 m^3/day (2021-22) to 143.40 m^3/day, during the year 2019-20 and 22.18 m^3/day at the conceptual stage, mine discharge pumped from the mine will be desilted in a water reservoir and pumped back in the mine for mining activity. If any surplus mine discharge is available, it is supplied to beneficiation plant where the major part of water requirement will be obtained from the dam through pipe line. So, no mine output will be discharged either within the lease area or outside it.

10.0 NEED FOR RAIN WATER HARVESTING FOR BUFFER ZONE OF SINDESAR KHURD MINE

Knowing that the present the status of ground water development of Relmagra block and Rajsamand district is more than the long term ground water recharge and accordingly has been declared as an over-exploited area, HZL realizing its national obligation proposes to utilize the surface runoff of the buffer zone of Sindesar Khurd mine by percolation tanks. Recharge of the buffer zone by way of percolation tanks, which has been declared as over-exploited zone by CGWB, will help in arresting the long term trend of declining of water table.

10.1 Basic requirement for artificial ground water recharge project

There are two basic requirements for taking up any artificial ground water recharge project and these are:

a) Availability of non-committed surplus monsoon runoff and

b) Identification of suitable hydrogeological environment and sites for creating sub-surface reservoir through cost effective artificial recharge techniques.

While considering these two aspects in special reference to buffer zone of Sindesar Khurd mine, it is observed that there is a definite availability of surplus runoff in the buffer zone during monsoon months which has been harvested by villagers by constructing village tanks for livestock use.

Another important aspect is to evaluate the storage potential of sub-surface reservoir having maximum unsaturated zone and maximum specific yield during the period when water is available for recharge. Artificial ground water recharge cannot be undertaken where water level is within 3 metres below the land surface during the monsoon period. Fortunately, the water table in the buffer zone ranges from 6 metres to10 metres during post monsoon period so on an average, about 3 to 5 metres of unsaturated zone comprising of alluvium and weathered schist is available which can be recharged.

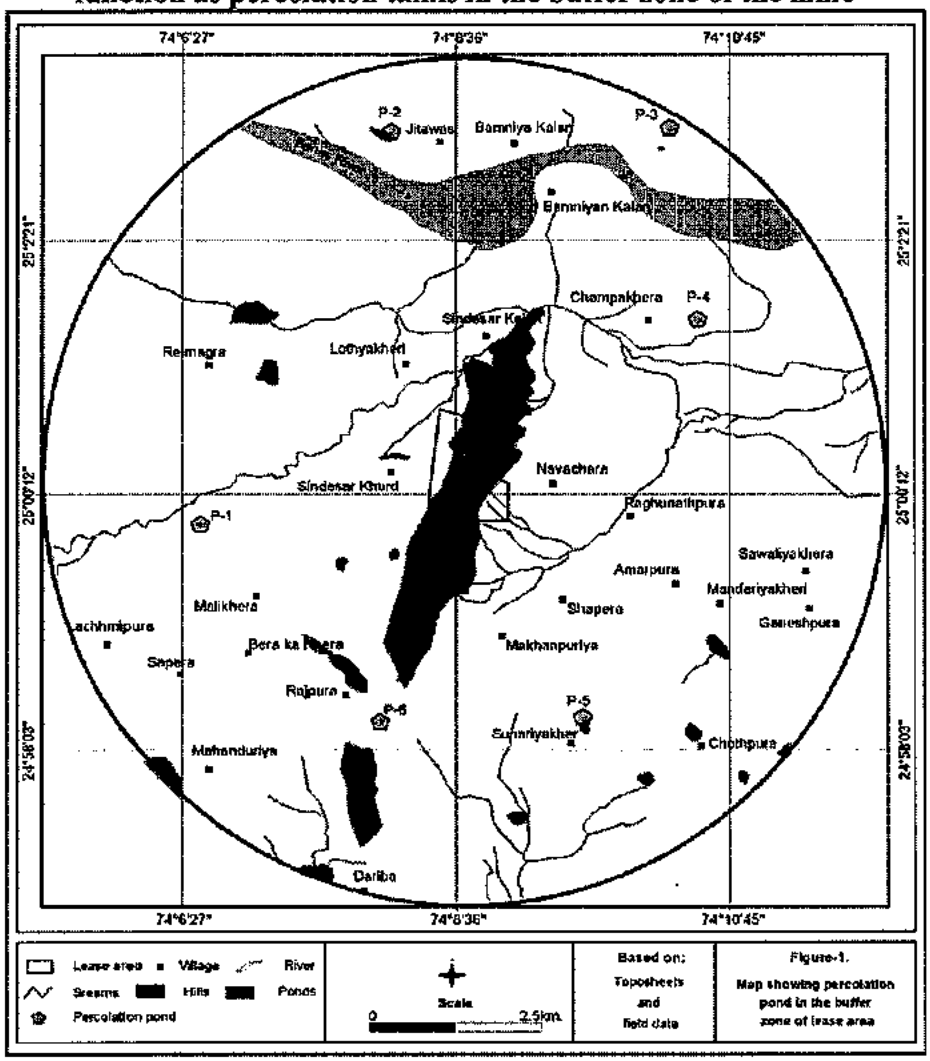
Keeping these considerations in view, surface runoff of the buffer zone has been utilized by deepening the existing village thereby storing more water for ground water recharge which is getting percolated faster with the removal of clays deposited in the past in the bottom of the tank bed.

10.2 Surface runoff utilization

After reviewing the area around the mines and nearby villages, Nine existing village tanks have been identified which have more catchment yield than the present water storage capacity of village tanks and have been deepened to accommodate major part of the surface runoff available. The percolation tanks are mainly for ground water recharge and are not be

used for any water withdrawal except the normal evaporation or used by stray cattle. So the entire accumulated water will have no other escape other than to percolate and join the ground water storage. The villagers appreciate the program of deepening of their existing village tanks as the water storage capacity of their village tanks has been increased, keeping the same evaporation loss thereby retaining water during summer for their cattle.

Figure-43. Map showing location of existing village tanks proposed for deepening to function as percolation tanks in the buffer zone of the mine



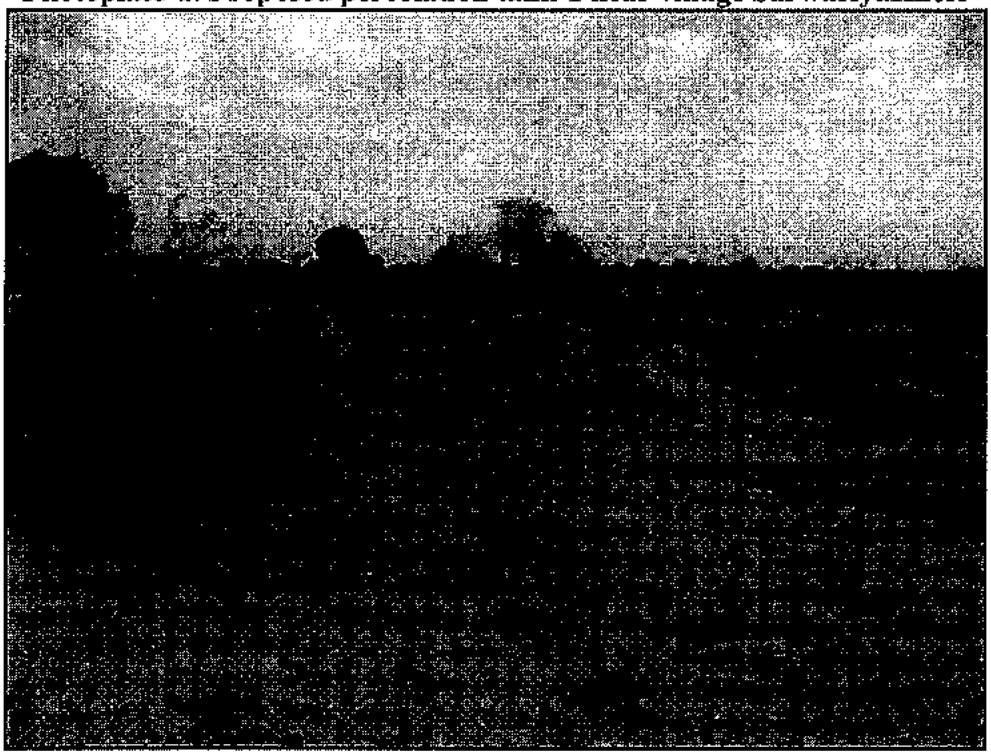
10.2.1 Percolation tank near village Sarwariya Kheri

An existing tank near village Sarwariya Kheri (N 24°59'57.5", E 74°06'37.0") is proposed for recharging the ground water basin and functions as percolation tank **(Photoplate-1).** During the post–monsoon period, the tank develops the maximum water storage capacity of 22,500 m^3 with water column of 1.5 metres in an area of 150 m x 100 m. The catchment area of the tank has been determined as 24 hectares which has provided 75,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 2.0 metres. The additional storage capacity of this tank of 150 m x 100 m, which has been deepened up to average depth of 2.0 metres has been increased by 30,000 m^3.

$$150 \times 100 \times 2.0 = 30{,}000\ m^3$$

As the tank, had the additional water storage capacity of 30,000 m^3 which is being received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional water storage capacity of 15,000 m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 15,000 m^3 is getting lost as evaporation, by stray cattle and general use by the villagers. There is an unsaturated zone, about 7 metres thick during post-monsoon period, a part of which is getting recharged from this percolation tank.

Photoplate-1. Proposed percolation tank-1 near village SarwariyaKheri



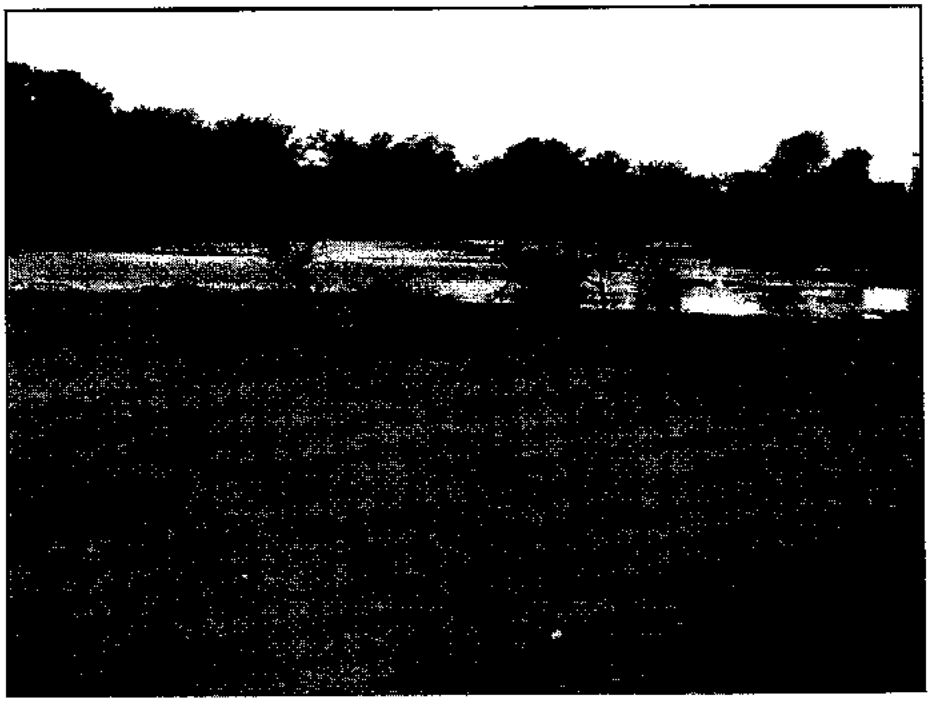
10.2.2 Proposed percolation tank near village Jitawas

An existing tank near village Jitawas (N 25°03'16.5", E 74°08'06.5") has been identified for recharging the ground water basin and is functioning as percolation tank **(Photoplate-2).** At present, the tank has storage capacity of 37,500 m^3 with water column of 1.0 metre in 250 m x 150 m area. The catchment area of the tank has been determined as 43 hectares which is getting 1,33,929 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 metres. The additional storage capacity of this tank of 250 m x 150 m has been increased by 56,250 m^3 by deepening up to average depth of 1.5 metres.

$$250 \times 150 \times 1.5 = 56{,}250\ m^3$$

As the tank, has additional water storage capacity of 56,250 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity 28,125m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is being lost as evaporation and consumed by stray cattle etc.

Photoplate-2. Proposed percolation tank-2 near village Jitawas



10.2.3 Proposed percolation tank near village Bethumbi

An existing tank near village Bethumbi (N 25°03'18.5", E 74°10'17.0") has been identified and deepened so as to function as percolation tank **(Photoplate-3).** At present, the tank has storage capacity of 24,000 m^3 with water column of 1.5 metres in an area of 160 m x 100 m. The catchment area of the tank has been determined as 26 hectares which is getting 80,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The

storage capacity of the existing tank has been increased by deepening the tank by 2.0 metres. The additional storage capacity of this tank of 160 m x 100 m, has been developed by 32,000 m^3.

$$160 \times 100 \times 2.0 = 32{,}000\ m^3$$

As the tank, has now the additional water storage capacity of 32,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity, 16,000 m^3 is getting recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is lost as evaporation and consumed by stray cattle. There is an unsaturated zone, about 10.0 metres thick during post - monsoon period a part of which would is getting recharged from this tank.

Photoplate-3. Proposed percolation tank-3 near village Bethumbi

10.2.4 Proposed percolation tank near village Champakheri

An existing tank near village Champakheri (N 25°01'41.4", E 74°10'31.0") has been identified and deepened for recharging the ground water basin and functions as percolation tank **(Photoplate-4).** At present, the tank has storage capacity of 10,000 m^3 with water column of 1.0 metre in 100 m x 100 m. The catchment area of the tank has been determined as 12 hectares which is providing 35,714 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 metres. The additional storage capacity of this tank of 100 m x 100 m, by deepening it to average depth of 1.5metres is 15,000 m^3.

$$100 \times 100 \times 1.5 = 15{,}000\ m^3$$

As the tank, has developed the additional water storage capacity of 15,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity is getting recharged ,7,500 m^3as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water is lost either due to evaporation or consumed by stray cattle. There is an unsaturated zone, about 10.0 metres thick during post -monsoon period of which 7 metres is being recharged from this tank, as upper 3 metres of unsaturated zone can be not recharged which will otherwise create soil salinity and alkalinisation. A part of 7 metres of unsaturated zone gets recharged by this percolation tank.

Photoplate-4. Proposed percolation tank-4 near village Champakheri

10.2.5 Proposed percolation tank-5 near village Sonariyakhera

An existing tank near village Sonariya khera (N 24°58'19.9", E 74°09'36.0") has been identified and deepened for recharging the ground water basin and functions as percolation tank **(Photoplate-5).** At present, the tank has storage capacity of 8,000 m^3 with water column of 1.0 metre in 100 m x 80 m. The catchment area of the tank has been determined as 9 hectares which provides 28,571 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area. The storage capacity of the existing tank has been increased by deepening the tank by 1.5 metres. The additional storage capacity of this tank of 100 m x 80 m, has been created by deepening it up to average depth of 1.5 metres.

$$100 \times 80 \times 1.5 = 12{,}000\ m^3$$

The additional water storage capacity of 12, 000 m^3 which is being received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity ,6,000 m^3 is getting recharged as the tank bottom has an alluvial zone followed by weathered mica schist. The balance quantity of water is being lost either as an evaporation or used by stray cattle.

Photoplate-5. Proposed percolation tank-5 near village Sonariya khera

10.2.6 Proposed percolation tank-6 near village Rajpura

An existing tank near village Rajpura (N 24°58'17.7", E 74°08'01.0") has been identified and deepened for recharging the ground water basin and functions as percolation tank **(Photoplate-6).** At present, the tank has storage capacity of 15,000 m^3 with water column of 1.5 metres in 100 m x 100 m. The catchment area of the tank has been determined as 16

hectares which provides 50,000 m^3 of water as surface runoff, taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streamlets. The storage capacity of the existing tank has been increased by deepening the tank by 2.0 metres. The additional water storage capacity of this tank of 100 m x 100 m after deepening up to average depth of 2.0 metres has become 20,000 m^3.

$$100 \times 100 \times 2.0 = 20{,}000\ m^3$$

With additional water storage capacity of 20,000 m^3 which is received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the storage capacity, 10,000 m^3 is getting recharged as the tank bottom has an alluvial zone followed by weathered mica schist. The balance quantity of water is lost either as an evaporation or by stray cattle.

Photoplate-6. Proposed percolation tank-6 near village Rajpura

10.3 Total rainwater harvested

With the proposed program of deepening of nine existing village tanks by storing the available catchment yield, the ground water basin of the buffer zone is being recharged by 2,77,575 m^3/year. The details of ground water recharge of each village tank by deepening are shown in table below.

Deepening of Following Ponds has been done:

1.	Percolation tank near village Sarwariya kheri	15,000 m^3
2.	Percolation tank near village Jitawas	28,125 m^3
3.	Percolation tank near village Bethumbi	16,000 m^3
4.	Percolation tank near village Champakhera	7,500 m^3
5.	Percolation tank near village Sonariyakhera	6,000 m^3
6.	Percolation tank near village Rajpura	10,000 m^3
7.	Percolation tank near village Menduria	105036 m^3
8.	Percolation tank near village Charana	5500 m^3
9.	Percolation tank near village Shashera	3500 m^3
	Total	**2,77,575 m^3**

11.0 RAINWATER HARVESTING SYSTEM OF BENEFICIATION PLANT & WATER CONSERVATION

11.1 Basic requirement for artificial ground water recharge project

There are two basic requirements for taking up any artificial ground water recharge project and these are:

a) Availability of non-committed surplus monsoon runoff and

b) Identification of suitable hydrogeological environment and sites for creating sub-surface reservoir through cost effective artificial recharge techniques.

While considering these two aspects in special reference to the beneficiation plant constructed in the acquired area of Sindesar Khurd mine, it is observed that there is a definite availability of surplus runoff in the industrial area during monsoon months from the roof top areas of different buildings and industrial sheds which can be collected through drain pipes and recharged by recharge trenches.

Another important aspect is to evaluate the storage potential of sub-surface reservoir having maximum unsaturated zone and maximum specific yield during the period when water is available for recharge. Artificial ground water recharge cannot be undertaken where water level is within 3 metres below the land surface during the monsoon period. Fortunately, the water table in the industrial area zone ranges from 10 metres to 12 metres during post monsoon period so on an average ,about 7 to 9 metres of unsaturated zone comprising of alluvium and weathered schist is available which can be recharged.

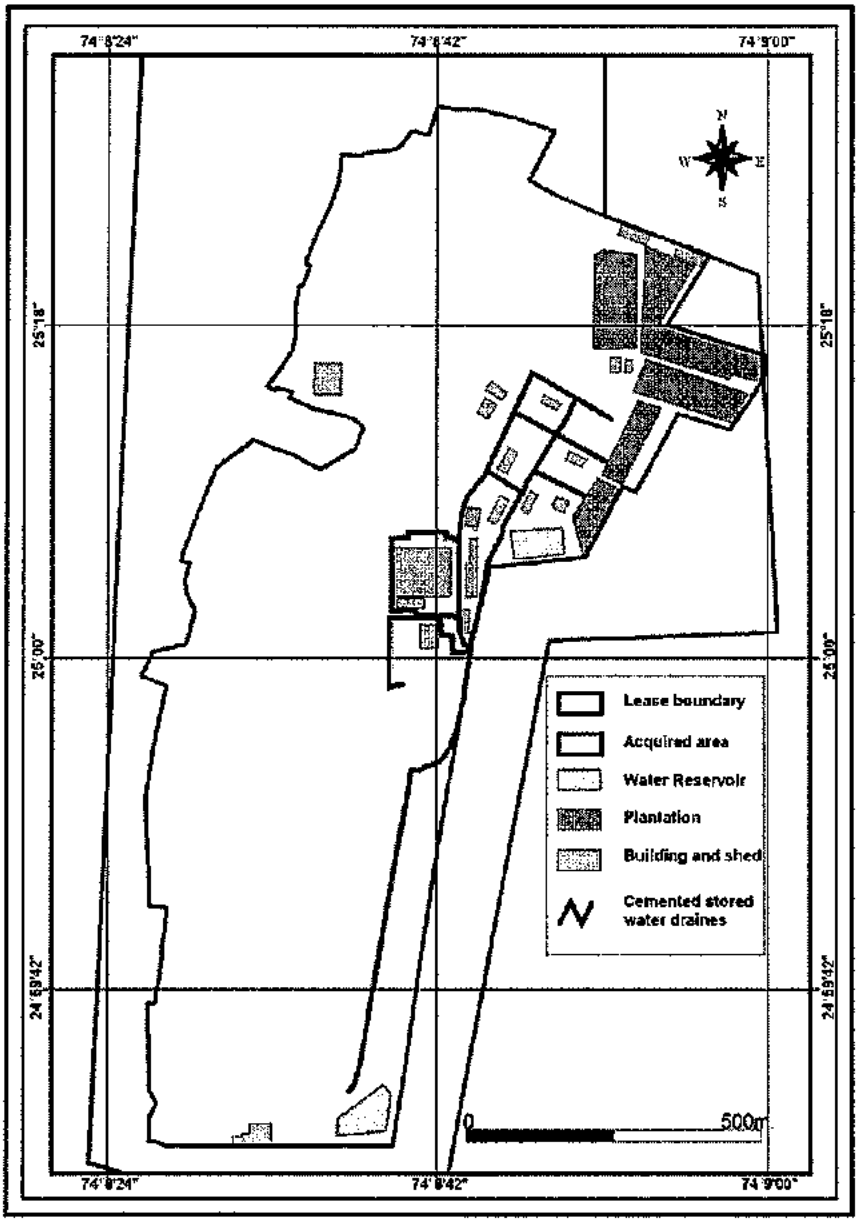
Keeping these considerations in view, the availability of water from rain water from different buildings and industrial sheds have been calculated and is proposed to be recharged through recharge trenches as there is a permeable zone from surface to the water table comprising alluvium and weathered schist.

11.2 Existing storm water drainage system in the acquired area

Out of 199.8425hectares of the total lease area, HZL has acquired 125.52 of the land for the Sindesar Khurd mine which is now having different buildings, industrial sheds, paved roads and open area for plantation. Three buildings like MCC & switch gear building, Canteen and Administrative block (Main office building) are having RCC flat roof top and have been provided with PVC drain pipes which take water to a cemented drain which on an average is about 1.5 metre deep and 0.5 metre in width At places, depending on the slope and gradient required, the drain size ranges to some extent. All these cemented drains also get the water from paved roads and from the industrial sheds where drain pipes have not been provided

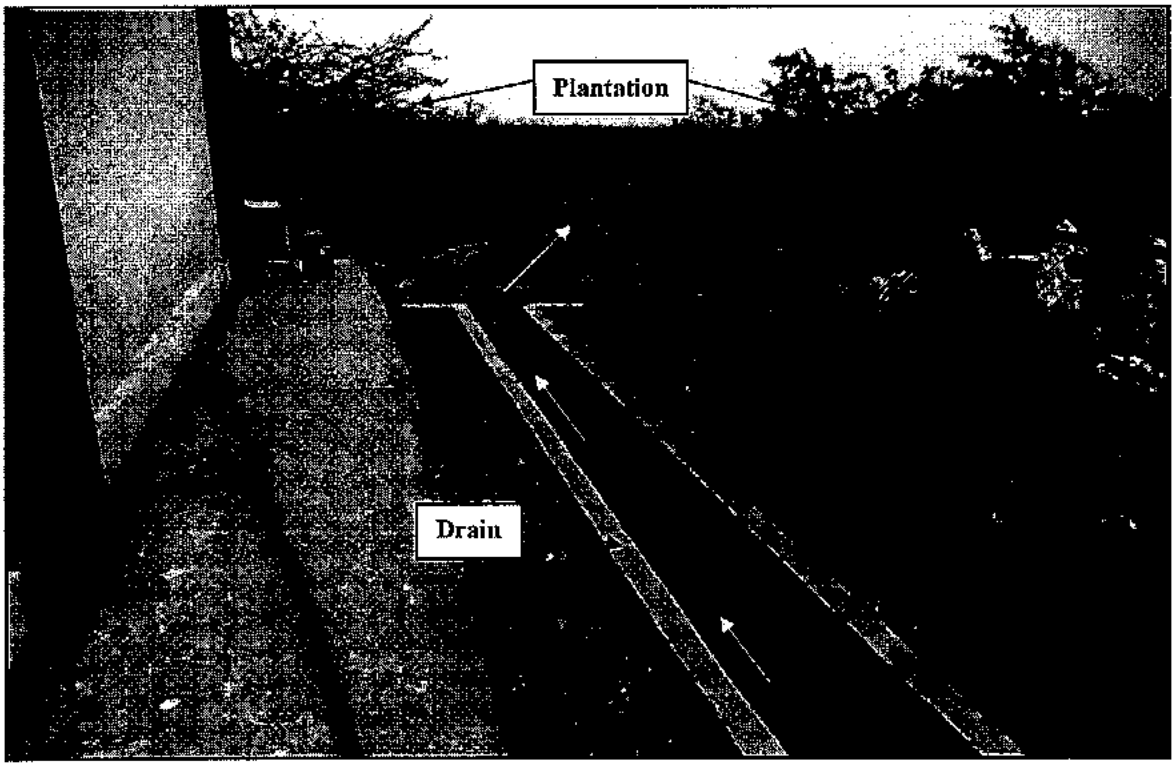
and roof top rain water falls on the paved roads and joins the net work of cemented drains. The bottom of the drains is cemented and carry water to the plantation area **(Figure-44).**

Figure-44. Map of SK mine showing the acquired area and the existing storm water cemented drains and the plantation



At present, the acquired area has not been provided with any ground water recharge structures except that rain water falling on the roof tops of different buildings and industrial sheds and on the paved roads gets collected in the cement drains which is ultimately taken to the plantation area developed in the north eastern part of the mine which is also the low lying area. The plantation covers about 5.28 hectares and a part of water which is received gets percolated to ground water table as ground water recharge and the rest is consumed by the plantation and lost by evaporation and evapo-transpiration.

Photoplate-7. Cemented storm water drain discharging water in the plantation area



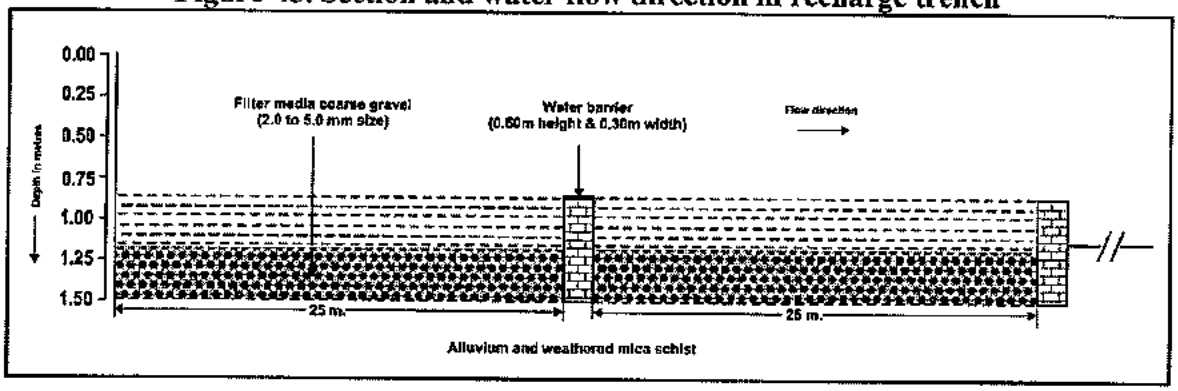
11.3 Proposed artificial ground water recharge program

It is proposed that all the cemented drains, already constructed as storm water drains may be converted in to recharge trench by breaking the cemented bottom so that water flowing

through them percolates down and joins the water table which lies at the depth of 10 to 12 metres below the land surface during the post-monsoon period. These drains will work as recharge trench having unlined bottom which may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. The total length of the cemented drains, which have so far been constructed is about 2500 metres till it joins the plantation area. It is also proposed that efforts may be made so that water flowing through the recharge trench may get longer time to stay in the trench and major part of water gets percolated to join ground water table.

Accordingly, it is proposed, at every length of 25 metres, a cemented wall of 0.6 m in height may be constructed in the trench having width of 30 cm so that water gets collected in its upstream side and accumulated water gets more time to percolate. The rest of the depth of about 0.90 m of the trench will remain empty and water will flow through it and also over the 0.3 m barrier wall. The coarse sand and gravel can be obtained from Banas river, which is flowing at distance of about 4 km from the SK mine by screening the river bed sand. The existing cemented storm water drains will function as most cost-effective ground water recharge structure once its cemented bottom is removed and it is filled by filter media and also by 60 cm height of cemented barrier at every distance of 25 metres all along the length 2500 metres of the drain.

Figure-45. Section and water flow direction in recharge trench

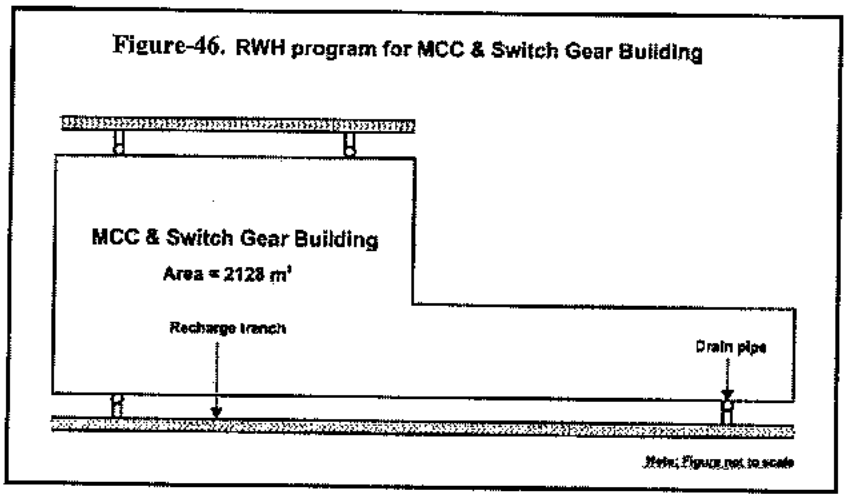


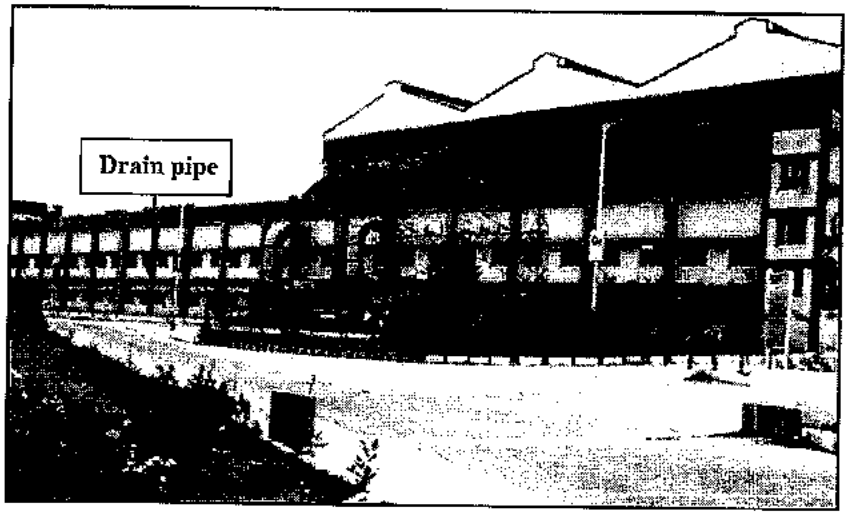
The availability of roof top rain water from different buildings provided with PVC drain pipes and taking water to recharge trench is discussed as under.

11.4 Roof top rain water utilization from RCC flat roof buildings

11.4.1 MCC & Switch gear building

There is a MCC & Switch gear building having RCC flat roof top area of 2128 m^2. The entire roof top rain water is being collected by PVC drain pipes and is taken to the cemented drain constructed on the other side of the road. Now the existing cemented drain when converted in to recharge trench having unlined the bottom and filled with filter media of 30 cm thick layer (Approx. 1.0 ft.) will function as ground water recharge structure as shown in **Figure-46.**





The availability of roof top water and the peak runoff from the roof top of MCC & Switch gear building 2028 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for cemented flat roof and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area. As the recharge trench is 2500 metres in length till it joins the plantation area, the major part of the water in the trench will get recharged and only limited quantity of water will join the plantation area when there is excessive rain fall during the day.

Availability of roof top rain water 2128 x 0.85 x 0.606 = 1096 m^3

Peak availability of water during one hour 2128 x 0.85 x 0.045 = 81 m^3

11.4.2 Canteen Building

There is a Canteen Building having total roof top area of 690 m^2. All the roof top rain water is being collected through PVC drain pipes in the cemented drain constructed in front and back of the building which is proposed to be converted in to recharge trench and filled with filter media as shown in **Figure-47.**

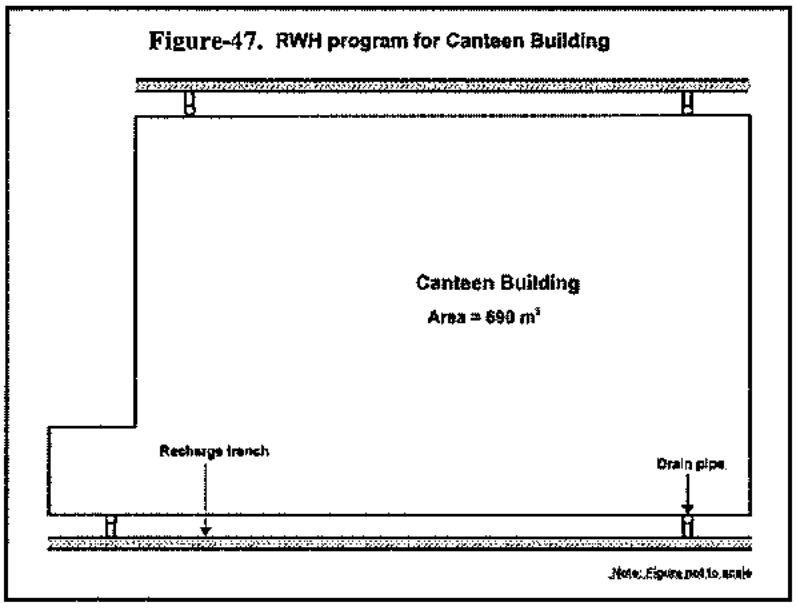


Figure-47. RWH program for Canteen Building

The availability of roof top water and the peak runoff from the roof top of the Canteen Building total roof top area (RCC SLAB) of 690 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for RCC flat roof top area and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

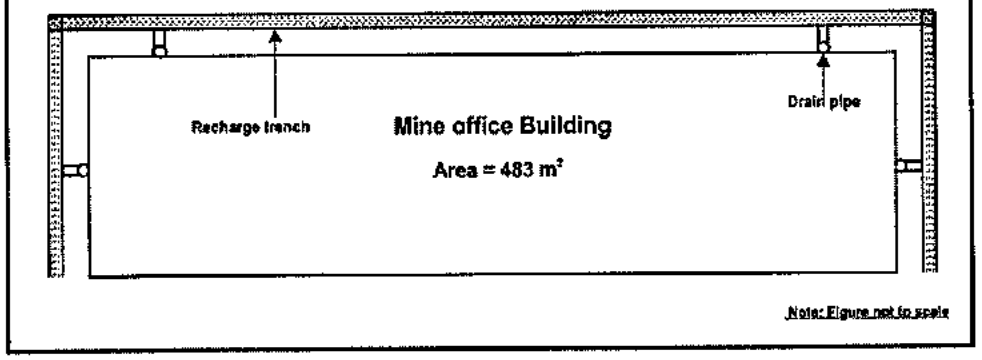
Availability of roof top rain water 690 x 0.85 x 0.606 = 355 m^3

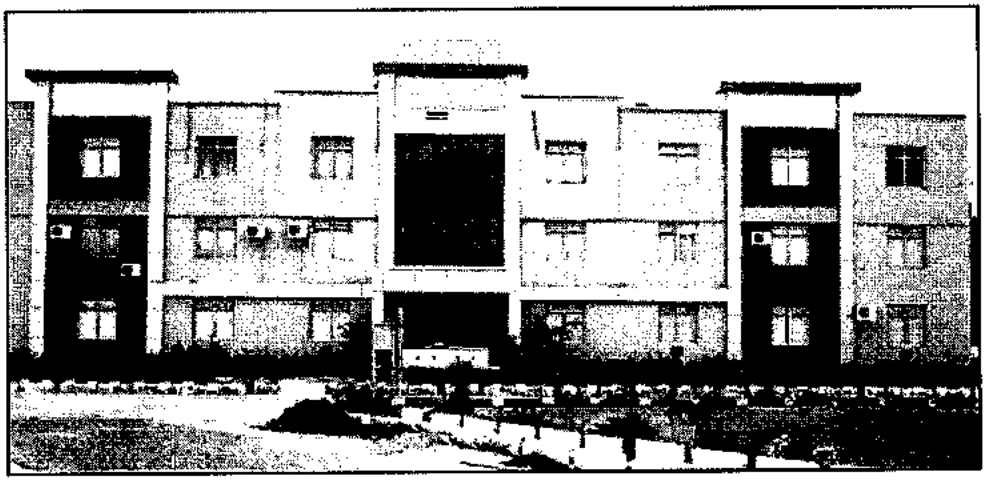
Peak availability of water during one hour $690 \times 0.85 \times 0.045 = 26\ m^3$

11.4.3 Mine Office Building

There is a Mine Office Building having total flat roof top area of 483 m^2. All the roof top rain water is being collected through drain pipes in the cemented drain constructed in front and sides of the building which is now proposed to be converted in to recharge trench and filled with filter media as shown in **Figure-48.**

Figure-48. RWH program for Mine office Building





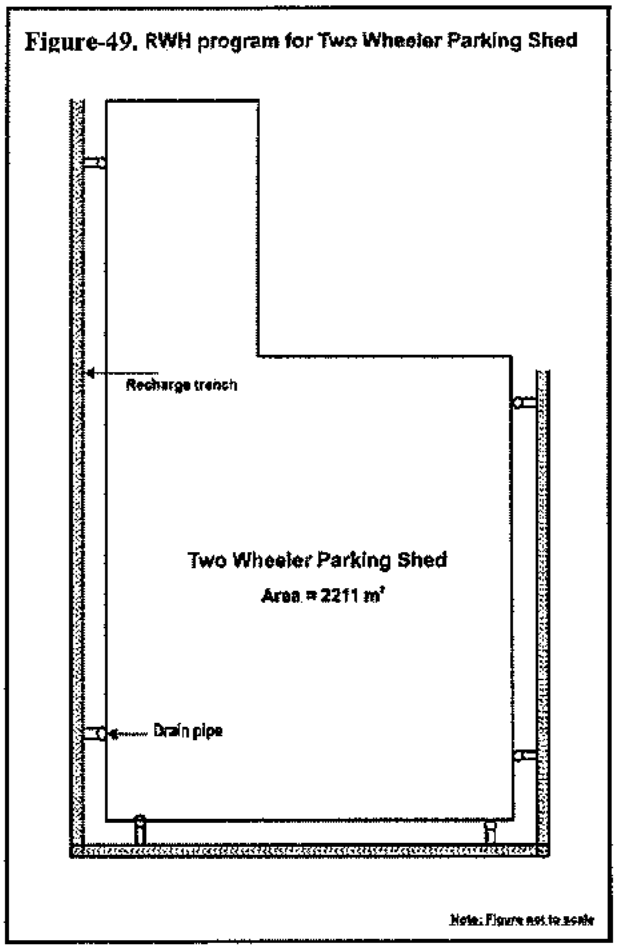
The availability of roof top water and the peak runoff from the roof top of the Mine Office Building total roof top area (RCC SLAB) of 483m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.85 as runoff coefficient for RCC flat roof top area and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	483 x 0.85 x 0.606 = 249 m^3
Peak availability of water during one hour	483 x 0.85 x 0.045 = 18 m^3

11.5. Roof top rain water utilization from industrial sheds (Beneficiation plant) having corrugated colour sheets

11.5.1 Two Wheeler parking Shed

There is a two wheeler parking shed having total roof top area of corrugated colour PVC sheets of 2211 m^2. All the roof top rain water falls on the paved /cemented roads and gets collected in cemented storm water drain which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. and 0.6 m height of cemented wall with width of 15 cm to act as water barrier so that additional water gets stored which will get percolated thereby recharging more drain water **Figure-49.**



The availability of roof top water and the peak runoff from the roof top of the Two wheeler parking shed having total roof top area (Color coated sheet) of 2211 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	2211 x 0.90 x 0.606 = 1206 m^3
Peak availability of water during one hour	2211 x 0.90 x 0.045 = 90 m^3

11.5.2 Secondary Crusher House Building Shed

There is a secondary crusher house building shed having total roof top area (Color coated sheet) of 980 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-50.**

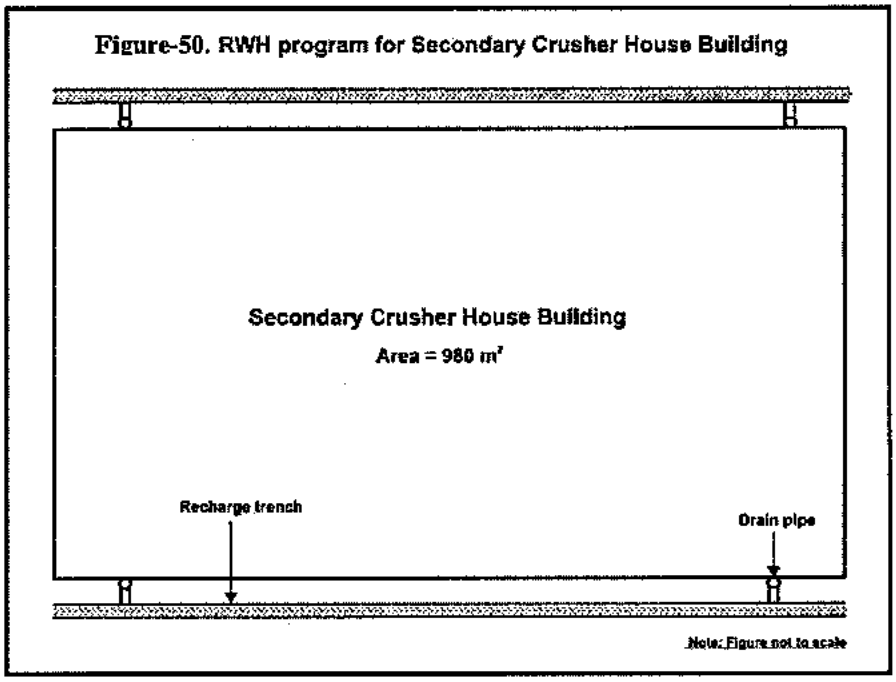


Figure-50. RWH program for Secondary Crusher House Building

The availability of roof top water and the peak runoff from the roof top of the secondary crusher house building shed having total roof top area (Color coated sheet) of 980 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	980 x 0.90 x 0.606 = 534 m^3
Peak availability of water during one hour	980 x 0.90 x 0.045 = 40 m^3

11.5.3 Reagent Building shed

There is a reagent building shed having total roof top area (Color coated sheet) of 864 m^2. All the roof top rain water already collected in storm water drains and now to may be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-51.**

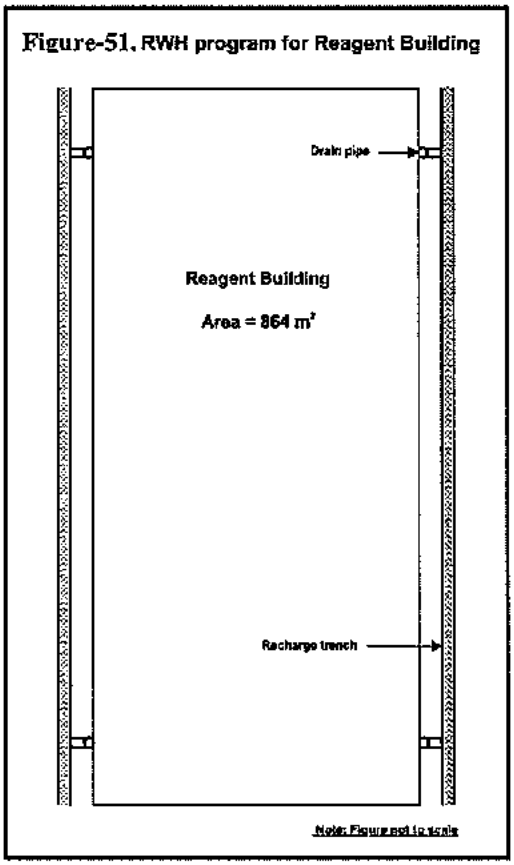


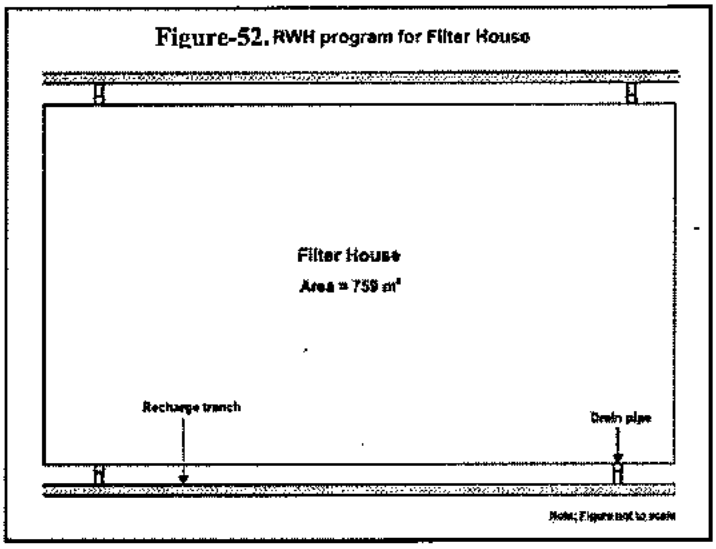
Figure-51. RWH program for Reagent Building

The availability of roof top water and the peak runoff from the roof top of the reagent building shed having total roof top area (Color coated sheet) of 864 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	864 x 0.90 x 0.606 = 471 m^3
Peak availability of water during one hour	864 x 0.90 x 0.045 = 35 m^3

11.5.4 Filter House Shed

There is a filter house shed having total roof top area (Color coated sheet) of 759 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now proposed to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-52.**

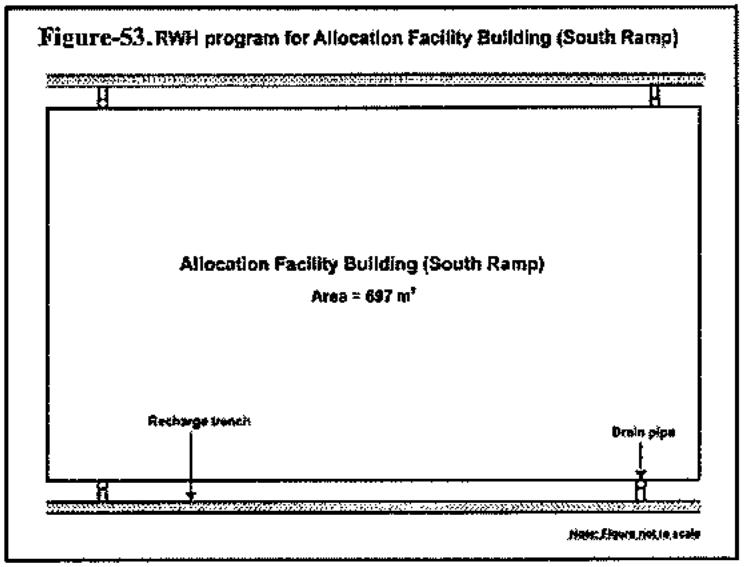


The availability of roof top water and the peak runoff from the roof top of the filter house shed having total roof top area (Color coated sheet) of 759 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	759 x 0.90 x 0.606 = 414 m^3
Peak availability of water during one hour	759 x 0.90 x 0.045 = 31 m^3

11.5.5 Allocation Facility Building (South Ramp)

There is an allocation facility building (South Ramp) having total roof top area (Color coated sheet) of 697 m^2. All the roof top rain falls on the paved road and gets collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-53.**

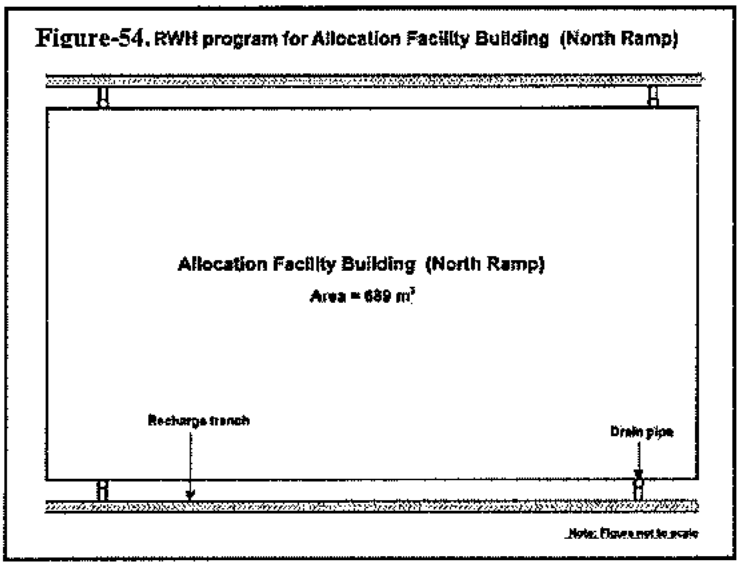


The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 697 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	697 x 0.90 x 0.606 = 380 m^3
Peak availability of water during one hour	697 x 0.90 x 0.045 = 28 m^3

11.5.6 Allocation Facility Building (North Ramp)

There is an allocation facility building (North Ramp) having total roof top area (Color coated sheet) of 689 m^2. All the roof top rain water falls on the paved road and gets collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-54.**

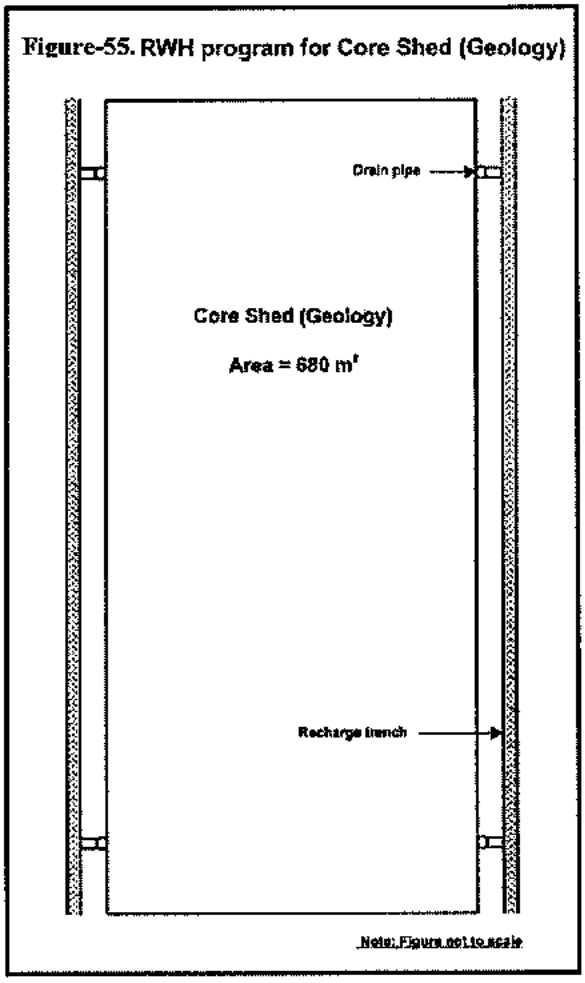


The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 689 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	689 x 0.90 x 0.606 = 376 m^3
Peak availability of water during one hour	689 x 0.90 x 0.045 = 28 m^3

11.5.7 Core Shed (Geology)

There is a coal shed having total roof top area (Color coated sheet) of 680 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-55.**

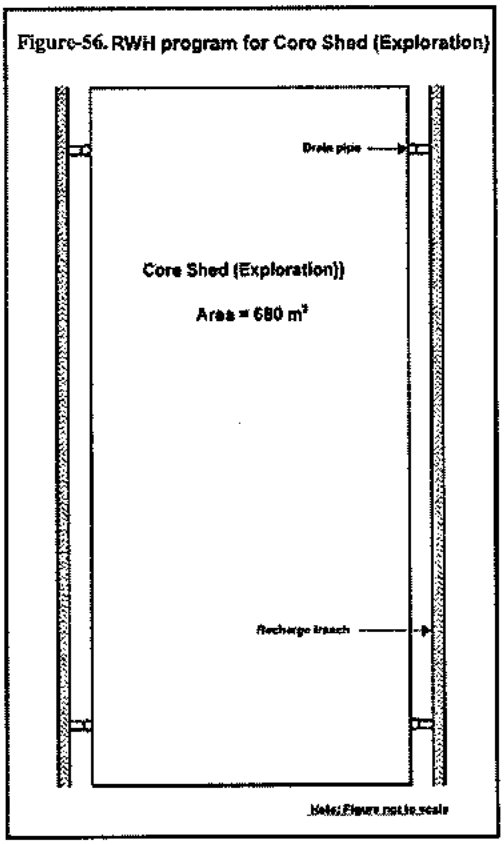


The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 680 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	680 x 0.90 x 0.606 = 371 m^3
Peak availability of water during one hour	680 x 0.90 x 0.045 = 27 m^3

11.5.8 Core Shed (Exploration)

There is a core shed having total roof top area (Color coated sheet) of 680 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-56.**



The availability of roof top water and the peak runoff from the roof top of the allocation facility building having total roof top area (Color coated sheet) of 680 m^2 has been estimated

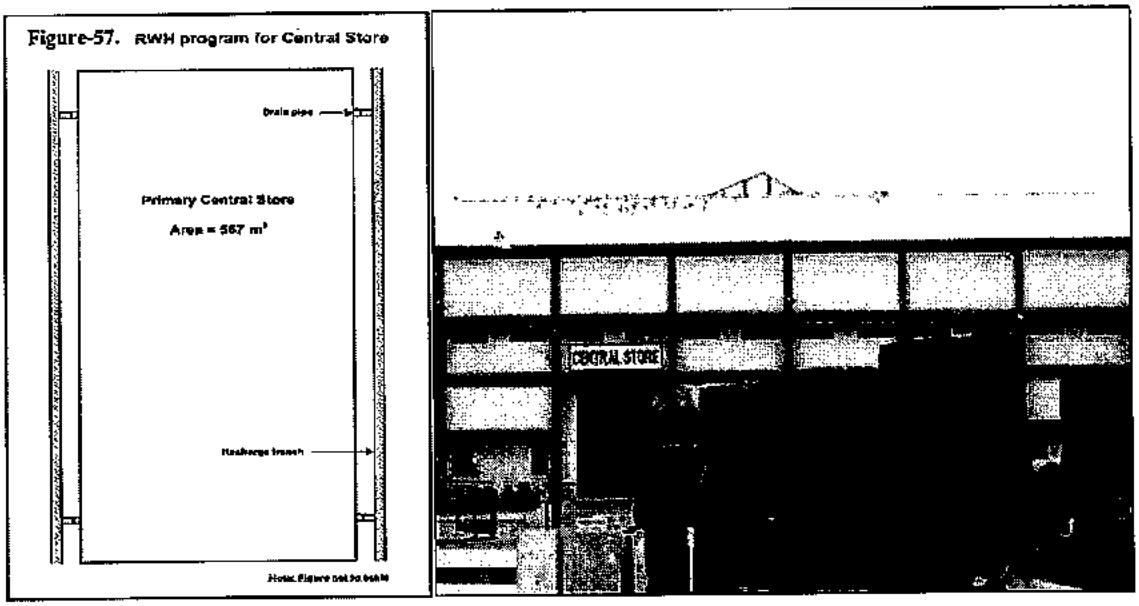
as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	680 x 0.90 x 0.606 = 371 m^3
Peak availability of water during one hour	680 x 0.90 x 0.045 = 27 m^3

11.5.9 Central Store

There is a central store shed having total roof top area (Color coated sheet) of 567 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-57.**

Figure-57. RWH program for Central Store

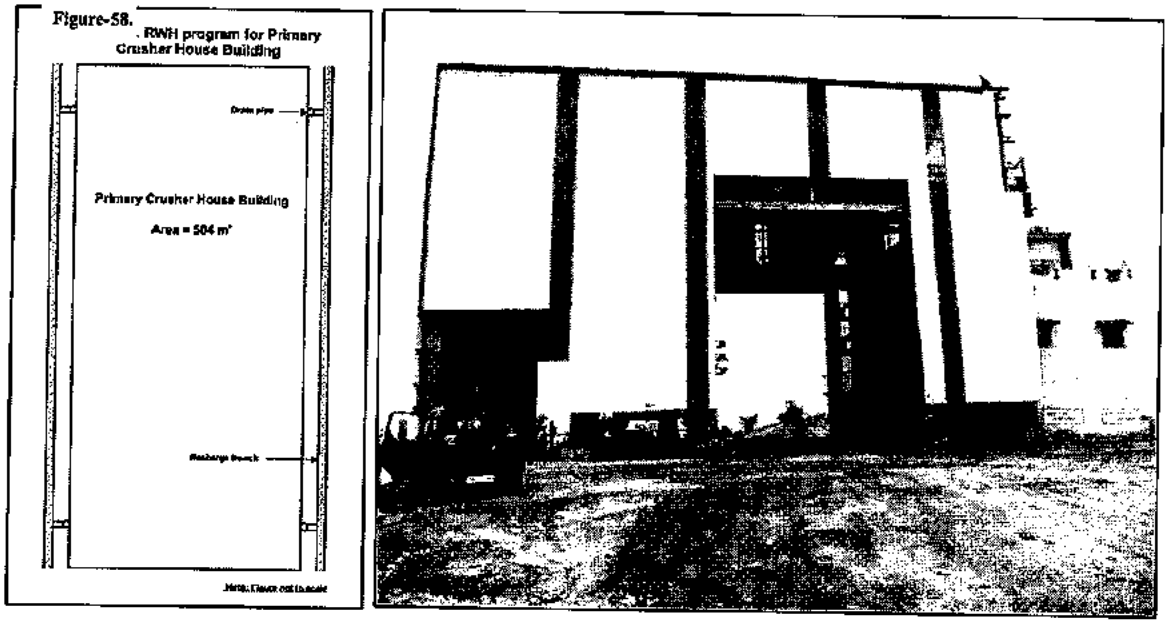


The availability of roof top water and the peak runoff from the roof top of the central store having total roof top area (Color coated sheet) of 567 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	567 x 0.90 x 0.606 = 309 m^3
Peak availability of water during one hour	567 x 0.90 x 0.045 = 23 m^3

11.5.10 Primary Crusher House Building

There is a primary crusher house building shed having total roof top area (Color coated sheet) of 504 m^2. All the roof top rain water falls on the paved road and is collected in storm water drains which is now to be converted in to recharge trench by breaking the cemented bottom so that water flowing through them percolates down and joins the water table. These drains may be filled with filter media comprising coarse sand and gravel (2.00 mm to 5 mm in size) up to thickness of 0.3 m. **Figure-58.**



The availability of roof top water and the peak runoff from the roof top of the primary crusher house building having total roof top area (Color coated sheet) of 504 m^2 has been estimated as under, taking annual average rainfall as 606 mm, 0.90 as runoff coefficient for curvature color coated sheet and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of roof top rain water	504 x 0.90 x 0.606 = 275 m^3
Peak availability of water during one hour	504 x 0.90 x 0.045 = 20 m^3

11.6 Surface runoff utilization from roads and paved area through recharge trenches

The paved area and black topped tar roads in the plant area cover an area of 23,500 m^2. The surface runoff from paved roads gets collected in cemented drains, 0.5 m in width and 1.0 m in depth on either sides **(Figure-59)**. The water in recharge trench will gradually

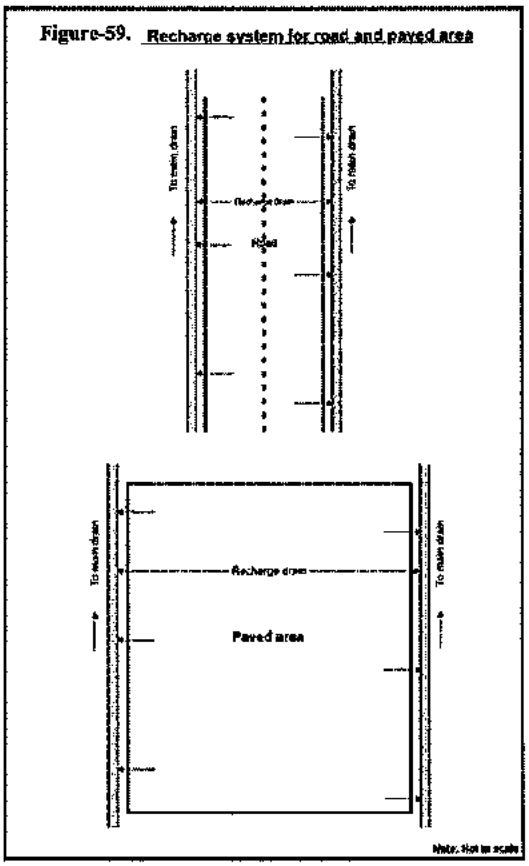
percolate to the the zone of saturation. The bottom of the recharge trench will remain naked and filled with filter media as shown in Figure-21.

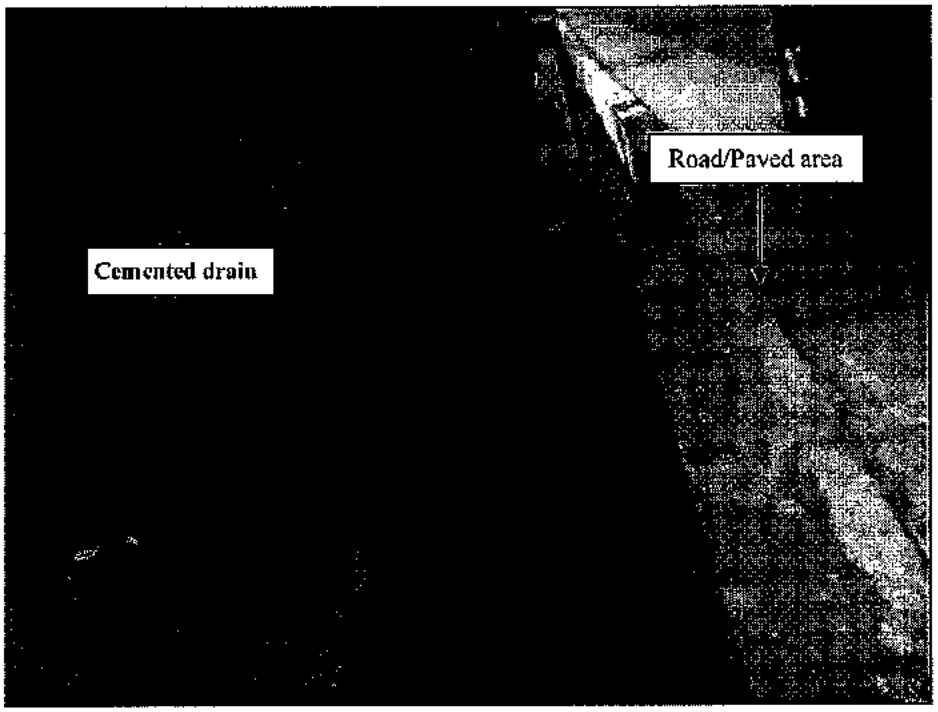
The availability of water from paved area and roads has been estimated as under, taking annual average rainfall as 606 mm, 0.65 as runoff coefficient for black top roads and rainfall intensity which is about 45 mm/ hour as peak rainfall for Rajpura-Dariba area.

Availability of rain water from paved are and roads 23,500 x 0.65 x 0.606 = 9257 m^3

Peak availability of water during one hour 23,500 x 0.65 x 0.045= 687 m^3

Figure-59. Recharge system for road and paved area





11.7 Total rainwater harvested and ground water recharged through recharge trenches

All the roof top rain water from RCC flat topped buildings, industrial sheds having corrugated colour PVC sheets and paved roads which used to get collected in the storm water cemented drains will now be recharged through recharge trenches when the bottom of the drains will be broken along with barrier wall of 0.6 m in height at interval of 25 metres in the trench and filled with filter media. It has been calculated that total rain water harvested from all sources will be 7832 m^3 during a normal rainfall year. As the total length of the recharge trench is 2500 m and the water will remain in the trench for longer period due to 0.6 m high barriers at every 25 metres, it expected that almost 50% of the harvested water will be recharged. The recharge trench has the capacity to store major part of the water rained in one hour period and only small part will reach the plantation area for its growth. It will only when the rainfall is more than 100 mm/day the surplus water will reach the plantation area. The

details of rain water harvested and recharged are shown in the **Table-11.**

Table-11. Details of rain water harvesting from roof tops and paved area in the recharge drain and consequent ground water recharge

S. No.	Recharge structures	Total rain water harvested in m^3	Ground water recharge in m^3 50 % of the harvested water
Building having RCC flat rooftop			
1.	MCC & Switch Gear Building	1096	548
2.	Canteen Building	355	178
3.	Mine Office Building	249	125
Building having corrugated sheet industrial sheds			
4.	Two wheeler parking shed	1206	603
5.	Secondary Crusher House Building	534	267
6.	Reagent Building	471	236
7.	Filter house shed	414	207
8.	Allocation Facility Building (South Ramp)	380	190
9.	Allocation Facility Building (North Ramp)	376	188
10.	Core Shed (Geology)	371	186
11.	Core Shed (Exploration)	371	186
12.	Central Store	309	155
13.	Primary Crusher House Building	275	138
Surface runoff utilization			
14.	Paved roads	9257	4629
	Grand Total	**15664**	**7832**

11.8 Annual maintenance for ground water recharge structures

While carrying out roof top rain water harvesting, the following precautions must be taken so that maximum benefits are derived with trouble free operations and ground water recharge takes place each year and infiltration rate remains restored.

1. The roof tops of the buildings to be used for collecting rain water must be cleaned before the onset of first rainfall so that any dust, leaves, pollutants do not enter the recharge trenches.

2. The filter material like coarse sand and gravel must be washed with water before putting in the recharge trench as these may be covered with silt or clay. Every year, before the onset of first monsoon, the filter material must be taken out and washed and then put back in the trench so that silt/clay deposited during the filtration process of preceding year is removed and original filtration rate is achieved.

3. The bottom of the recharge trench must be cleared from any silt or clay deposited and naked bottom must be exposed so that rate of infiltration is restored each year.

11.9 Water conservation measures adopted in Beneficiation plant

With a view to maintain the Zero discharge from the Beneficiation plant and lease area, all efforts are being made to conservation the water used in the process .The following water conservation measures are being adopted.

1. The quantity of water pumped from the underground mine due to intersection of ground water table is being used in the beneficiation plant after meeting the water requirement for dust suppression and green land development.

2. All necessary measures and precautions have been taken that there is no seepage or leakage from the beneficiation plant. All the tailings produced by the plant is sent through a pipe line to a tailing pond which is located in the another water shed so that no seepage joins the surface or ground water of SK mine area. A HDPE lining has been provided in the tailing pond to arrest the percolation of tailing water.

3. All the water used for workshop where mining machinery is washed and may release oil and grease is collected and treated before feeding it to the beneficiation plant.

4. All the surface runoff from the paved area and open land is collected in a water reservoir located in the south-eastern part of the lease area from where it is pumped to beneficiation plant.

5. A regular monitoring system is being undertaken by the Environment Division of SK mine to find out if any contamination of soil, surface and ground water has taken place. The studies so far carried out in the lease area,as discussed in this report, reveal that there has not been any contamination outside the lease area and water regime is well protected by the all water conservation measures being adopted .

6. The main issue of undertaking the only remedial measures is to see that Zero discharge concept is maintained and it should be a top priority and main concern of the mine /plant management.

12.0 IMPACT OF BENEFICIATION PLANT OF SURFACE AND GROUND WATER REGIME

The rain fall during the year 2016 was 1180 mm, exceptionally high with the results that there was excessive surface runoff in the area and higher ground water recharge. This has resulted in accumulation of more water in the existing village ponds in the surrounding area of S.K. mine, more surface runoff from S.K hill, particularly from its eastern slopes and joining Banas river along with and higher flow for longer duration in the streams.

With a view to find out the quality of ground water and surface water which might have been affected by mining, 10 ground water samples and 9 surface water samples were collected from key wells and village ponds and streams/river. The location of key wells from where ground water samples were collected is shown in **Figure-60.**

All the ground water and surface water samples were chemically analyzed by Envirogreen Consultants (India) Pvt. Ltd., Udaipur, an NABL accredited Lab. (Certification of Accreditation enclosed as **Annexure-II**). While analyzing the all the samples, the LAB followed the analytical protocol prescribed by IS-10,500-2012. **Table-12** shows the parameters and its protocol followed by the Lab for the different constituents /parameters analyzed by the LAB of 19 surface and ground water samples.

Table-12. Analytical Protocol Followed for Water Quality Analysis

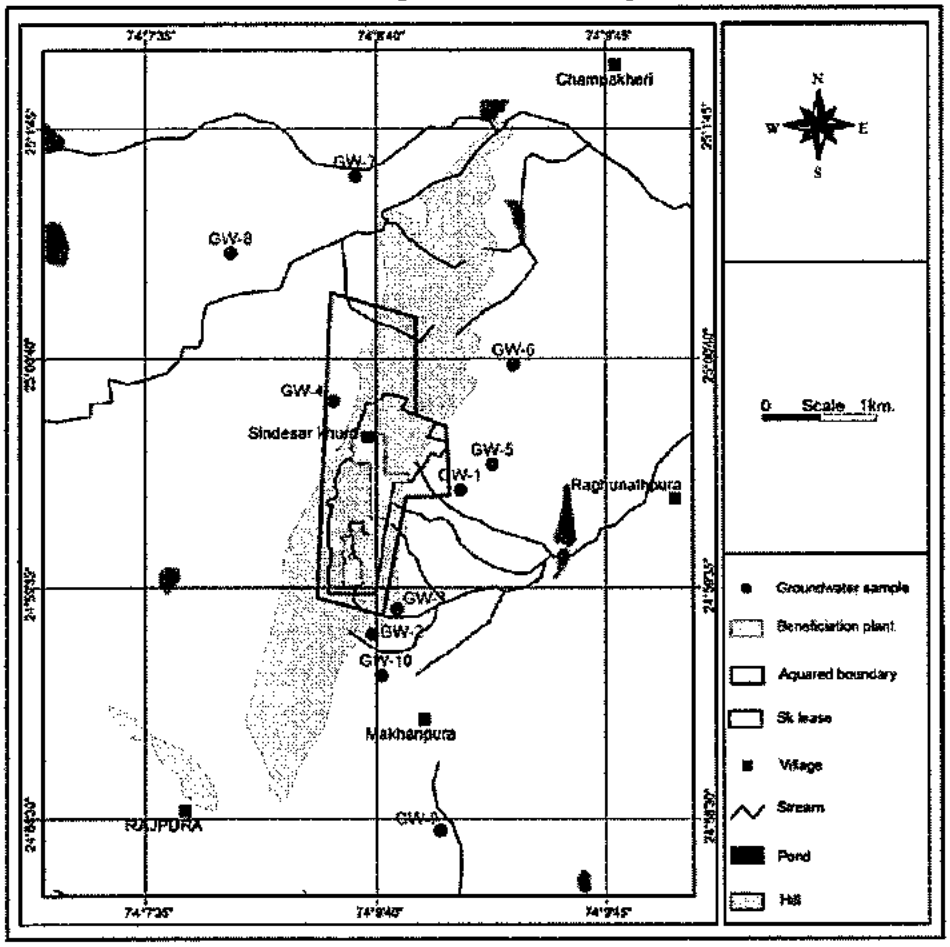
S. No.	Parameter	Protocol Followed	Detection Limit
1.	pH	IS:3025 (Part-11)	2.0
2.	Total Hardness (as CaCO3), mg/l	IS:3025 (Part-21)	6.6
3.	Iron (as Fe), mg/l	IS:3025 (Part-53)	0.3
4.	Chlorides (as Cl), mg/l	IS:3025 (Part-32)	1.0
5.	Fluoride (as F), mg/l	IS:3025 (Part-23)	0.1
6.	Total Dissolved solids, mg/l	IS:3025 (Part-16)	25
7.	Magnesium (as Mg), mg/l	IS:3025 (Part-46)	10
8.	Calcium (as Ca), mg/l	IS:3025 (Part-40	1.0
9.	Copper (as Cu), mg/l	IS:3025 (Part-42)	0.01
10.	Manganese as Mn, mg/l	IS:3025 (Part-35)	0.01
11.	Sulphate (as SO4), mg/l	IS:3025 (Part-24)	1.0
12.	Nitrate (as NO3), mg/l	IS:3025 (Part-34)	1.0
13.	Cadmium (as Cd), mg/l	IS:3025 (Part-41)	0.002
14.	Lead (as Pb), mg/l	IS:3025 (Part-47)	0.01
15.	Zinc (as Zn), mg/l	IS:3025 (Part-49)	0.2
16.	Alkalinity (as CaCO3), mg/l	IS:3025 (Part-23)	0.5
17.	Dissolved Oxygen, mg/l	APHA 4500 O-C	0.1

12.1 Ground water quality of study area

With a view to find out the quality of ground water which might have been affected by mining and beneficiation plant, which is the main activity in S.K mine, otherwise it is an underground water mine having no impact on water regime, 10 ground water samples were collected from open key wells of the area surrounding the mine as shown in **Figure-60.** The

results of chemical analysis of 10 ground water samples **(GW-1 to GW-10)** are shown. It has been indicated that Sindesar Khurd mine is being worked on Zero discharge concept and surface water from the mining lease area is not allowed to leave the boundary wall of the mine. All the rain water falling on dumps paved and mine roads etc is being collected in the pond within the mine area which is gainfully utilized for dust suppression and green land development. The area surrounding the mine therefore gets recharged from rainfall, return flow of irrigation water and influent seepage from the streams.

Figure-60. Map showing location of ground water samples were collected surrounding the beneficiation plant



Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA

Table-13. Results of chemical analysis of 10 ground water samples

S. No.	Unit	GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-8	GW-9	GW-10	Acceptable limit as per IS 10500, 2012	Permissible limit as pec IS10500, 2012
1	pH value	7.30	7.83	7.98	7.54	7.66	8.00	8.14	7.37	7.35	8.00	6.5 to 8.5	No relaxation
2	TDS	528	558	894	602	878	380	550	581	1436	828	500, Max	2000
3	EC	825	958	1480	966	1460	655	940	990	2298	1340	N.P	N.P
4	Total Hardness (as CaCO3)	239	291	455	303	455	183	224	310	467	317	200	600
5	Calcium (As Ca)	58	72	105	72	110	47	52	73	115	81	75	200
6	Magnesium as Mg	23	27	47	30	44	16	23	31	45	28	30	100
7	Total Alkalinity (as CaCO3)	340	324	392	364	360	176	328	332	201	480	200, Max	600
8	Chlorides (as Cl)	121	142	230	126	116	92	140	137	542	161	250, Max	1000
9	Sulphate (as SO4)	56	63	83	57	80	22	52	64	398	52	200, Max	400
10	Nitrate (as NO3)	36	31	42	41	42	13	31	36	42	43	45, Max	No relaxation
11	Fluoride (as F)	1.05	0.2	0.8	0.2	1.2	0.2	1.1	1.05	1.3	1.1	1	1.5
12	Manganese	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1	0.3
13	Copper (as Cu)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05, Max	1.5
14	Lead (as Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01, Max	No relaxation
15	Cadmium (as Cd)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003, Max	No relaxation
16	Zinc (as Zn)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.5	BDL	5, Max	15
17	Iron (as Fe)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.20	BDL	0.3	No relaxation

All units are in mg/l except for pH and EC which is in micromohs/ cm
N.P: Not promulgated

12.2 Discussions on the quality of ground water

While reviewing the results of the chemical analysis, it is observed that in general the quality of ground water is potable and all constituents are within the desirable limits and in few cases it is under permissible limits except one ground water sample (GW-9) which was collected from a key well near the tailing pond located near Rajpura-Dariba mine, which has shown high concentration of contaminates as it is getting seepage from the tailing pond. This water sample was taken intentionally to find out the quality of ground water if the seepage affects the entire area, which is of course a presumptive situation. Moreover, this key well is located in another watershed taking southerly course while S.K mine watershed has northerly course meeting Banas river which is flowing about 6 km away in the north from the centre of the mining lease. The each constituent is discussed as under.

12.2.1 pH

The pH limit for drinking water samples as per IS: 10,500-2012 should be within 6.5 to 8.5. Beyond this range, the water will affect the mucus membrane and /or water supply system. Within the study area, all the key wells have shown pH to vary between 7.3 and 8.0. The pH values for all the samples collected in the study area during the study period were found to be within acceptable limits.

12.2.2 Total Hardness

The acceptable limit as per IS:10,500-2012 for Total hardness as calcium carbonate is 200 mg/l whereas its permissible limit is 600 mg/ l. Beyond this limit, encrustation takes place in water supply system and adverse effect on domestic use will be observed. In all groundwater samples, the total hardness values were found to vary 183 mg/l to 467 mg/l. The total hardness in all the ground water samples is within permissible limit and one sample (GW-6) within acceptable limit.

12.2.3 Total dissolved salts

The acceptable limit for total dissolved solids as per IS: 10,500-2012 is 500 mg/l whereas the permissible limit in the absence of alternate source is 2,000 mg/l, beyond this palatability decreases and may cause gastrointestinal irritation. In groundwater samples collected from the study area, the total dissolved solids (TDS) were found to be varying between 380 mg/l to 1436 mg/l. It is therefore found that 9 ground water samples have TDS within permissible limit while only ground water samples (GW-6) has TDS within acceptable limit.

12.2.4 Calcium

Calcium concentration values in the groundwater samples collected from the study area were found to be varying between 47 mg/l to 115 mg/l. So, Calcium in six samples is within acceptable limit and 4 samples are within the permissible limit of 200 mg/l.

12.2.5 Magnesium

Magnesium values in the groundwater samples collected from the study area were found to be varying between 23 mg/l and 47.0 mg/l. So, six ground water samples have Magnesium within the acceptable limit of 30 mg/l while four samples have within permissible limit.

12.2.6 Total alkalinity

The total alkalinity in all the water samples ranges from 176 mg/l to 480 mg/l against the acceptable limit of 200 mg/l and within the permissible limit of 600 mg/l. So total alkalinity is not a problem.

12.2.7 Chloride

Chloride values in nine groundwater samples collected from the study area were found to be varying between 92 mg/l and 230 mg/l, except of GW-9 which has 542 mg/l. So, all the nine ground water samples have Chloride within the acceptable limit of 250 mg/l.

12.2.8 Sulphate

Sulphate values in nine groundwater samples collected from the study area were found having 22 mg/l to 83 mg/l except of GW-9 which has 398 mg/l. So, all the nine ground water samples have Sulphate within the acceptable limit of 200 mg/l. The permissible limit of Sulphate is 400 mg/l so only GW-9 has Sulphate within the permissible limit.

12.2.9 Nitrate

Nitrate values in all 10 groundwater samples collected from the study area were found ranging from 13 mg/l to 43 mg/l. So, all the ground water samples have Nitrate within the acceptable limit of 45 mg/l. There is no relaxation in the case of Nitrate the higher values of Nitrate is due to use of Urea for agricultural use and due to legume crops which deposit Nitrate in the soil.

12.2.10 Fluoride

Fluoride concentration values in the groundwater samples collected from the study area were found to be varying between 0.2 mg/l to 1.3 mg/l. The Fluoride in four samples was found less than 1.00 mg/l, the acceptable limit while in six samples, it was within permissible limit of 1.5 mg/l. The fluoride concentration in general remains on higher side due to granite/gneiss rocks where Fluorspar is an accessory mineral contributing Fluoride on weathering in the ground water.

12.2.11 Manganese

Manganese in all the 10 ground water sample was found below the detection limit of 10 mg/l. so, there is total absence of Manganese in ground water of study area.

12.2.12 Copper

Copper in all the 10 ground water sample was found below the detection limit of 0.01 mg/l. Its acceptable limit is 0.05 mg/l while its permissible limit is 1.5 mg/l. So, there is total absence of Copper in the ground water of the study.

12.2.13 Lead

Lead in all the 10 ground water sample was found below the detection limit of 0.01 mg/l. Its acceptable limit is 0.01 mg/l while there is no relaxation limit for it. So, there is total absence of Lead in the ground water of the study.

12.2.14 Cadmium

Cadmium in all the 10 ground water sample was found below the detection limit of 0.001 mg/l. Its acceptable limit is 0.003 mg/l while there is no relaxation limit for it. So, there is total absence of Cadmium in the ground water of the study.

12.2.15 Zinc

Zinc in 9 ground water sample was found below the detection limit of 0.002 mg/l. It was however found as 0.5 mg/l in GW-9 .Its acceptable limit is 5 mg/l while its permissible limit is 15 mg/l. So, there is total absence of Zinc in the ground water of the study of entire area except in GW-9 which has Zinc much within the acceptable limit.

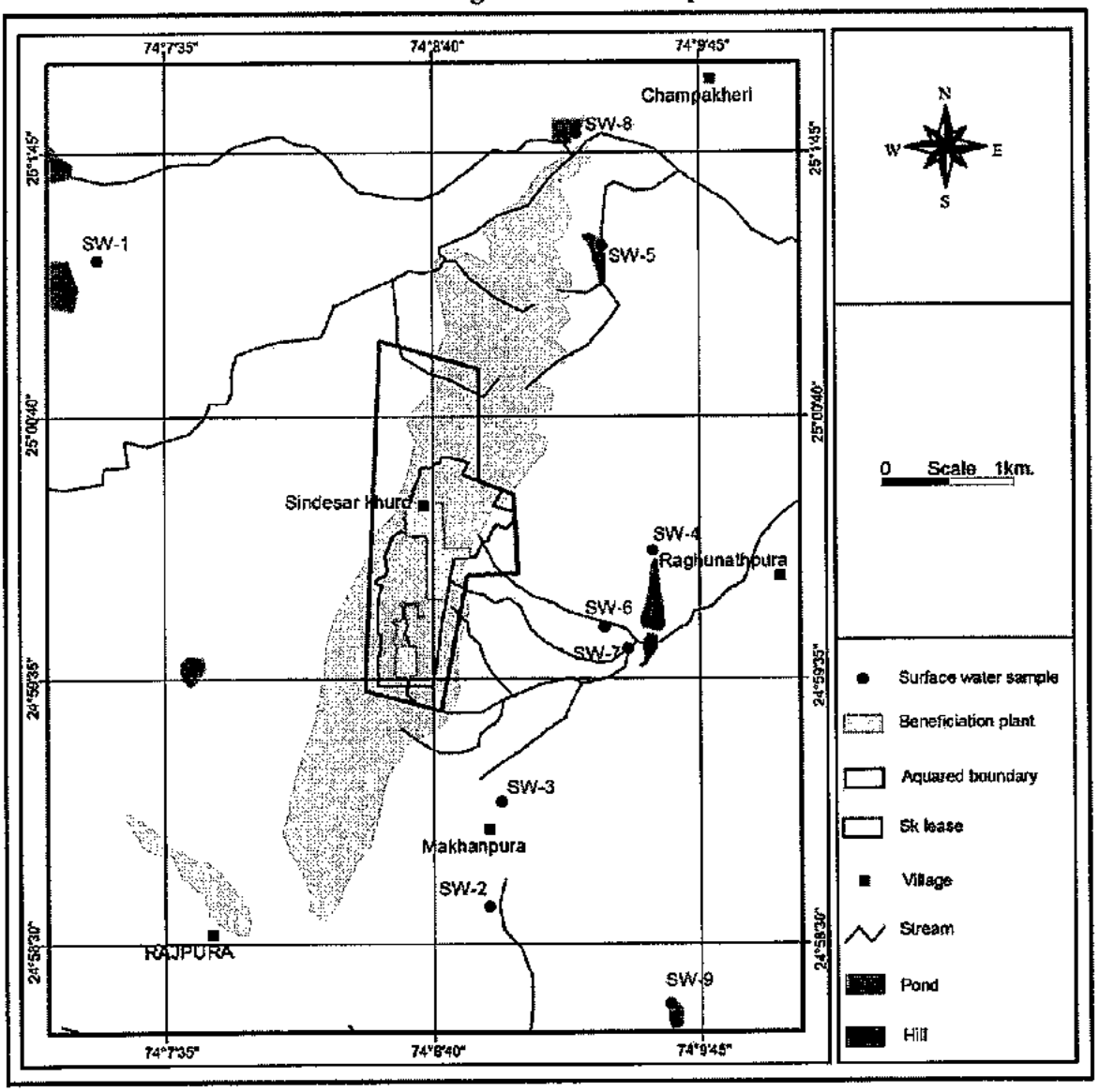
12.2.16 Iron

Iron in 9 ground water sample was found below the detection limit of 0.03 mg/l. It was however found as 0.20 mg/l in GW-9.Its acceptable limit is 0.3 mg/l while there is no relaxation for it. So, there is total absence of Ironin the ground water of the study of entire area.

12.3 Quality of surface water in the study area

It has been indicated that Sindesar Khurd mine is being worked on Zero discharge concept and surface water is not allowed to leave the boundary wall the mine. All the rain water falling on dumps, paved and mine roads etc is being collected in the pond within the mine area and is gainfully utilized for dust suppression and green land development. 9 surface water samples were collected from existing village ponds and streams as shown in the **Figure-61.** The results of chemical analysis of 9 surface water samples **(SW-1 to SW-9)** are shown in **Table-14.**Some of the ponds from where the samples were collected, the samples of aquatic life (Fishes etc.) were also collected with a view to find out that village ponds have suitable quality of water in which aquatic life can survive.

Figure-61. Map showing location of surface water samples were collected surrounding the beneficiation plant



12.3.1 Quality of surface water

The chemical analysis results of the 9 surface water samples are indicated in **Table-14.**

Table-14. Results of chemical analysis of 9surface water samples

S. No.	Unit	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	Acceptable limit as per IS 10500: 2012	Permissible limit as per IS10500: 2012
1	pH value	7.96	7.32	7.55	7.82	7.37	7.93	7.97	7.81	7.79	6.5 to 8.5	No relaxation
2	TDS	120	740	322	286	408	720	470	336	116	500, Max	2000
3	EC	211	1184	530	458	655	1225	785	618	195	N.P	N.P
4	Total Hardness (as CaCO3)	69	535	167	92	130	413	158	183	59	200	600
5	Calcium (as Ca)	19	125	47	22	34	80	37	37	12	75	200
6	Magnesium as Mg	7	55	12	9	11	52	16	22	7	30	100
7	Total Alkalinity (as CaCO3)	96	136	100	164	155	156	120	152	115	200, Max	600
8	Chlorides (as Cl)	23	272	71	54	76	162	113	82	27	250, Max	1000
9	Sulphate (as SO4)	14	142	26	24	26	58	32	46	12	200, Max	400
10	Nitrate (as NO3)	6	30	12	16	17	22	11	19	5	45, Max	No relaxation
11	Fluoride (as F)	0.20	0.60	0.40	0.25	0.60	1.00	0.60	0.18	0.13	1	1.5
12	Manganese	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1	0.3
13	Copper (as Cu)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05, Max	1.5
14	Lead (as Pb)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01, Max	No relaxation
15	Cadmium (as Cd)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003, Max	No relaxation
16	Zinc (as Zn)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.5	5, Max	15
17	Iron (as Fe)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.20	0.3	No relaxation
18	D.O.	3.95	3.85	4.83	3.66	4.91	3.45	3.88	5.20	4.75	-	-

All units are in mg/l except for pH and EC which is in micromohs/ cm

12.3.2 Discussions on the quality of surface water

While reviewing the results of the chemical analysis, it is observed that in general the quality of surface water is potable and all constituents are within the acceptable limits of drinking water and is also suitable for irrigation and industrial purposes. The surface water is mostly the rain water, falling outside the lease area pond. As S.K mine is being worked on the concept of Zero discharge and surface water from the mine area is not allowed to go outside the boundary wall, there is no possibility of any contamination of any heavy metals from the mine and of the water being leached from dumps etc. As the rainfall during the year 2016 was much more than the average rainfall, there was much collection of water in the village ponds and flow in the streams even in the month of November, 2016.

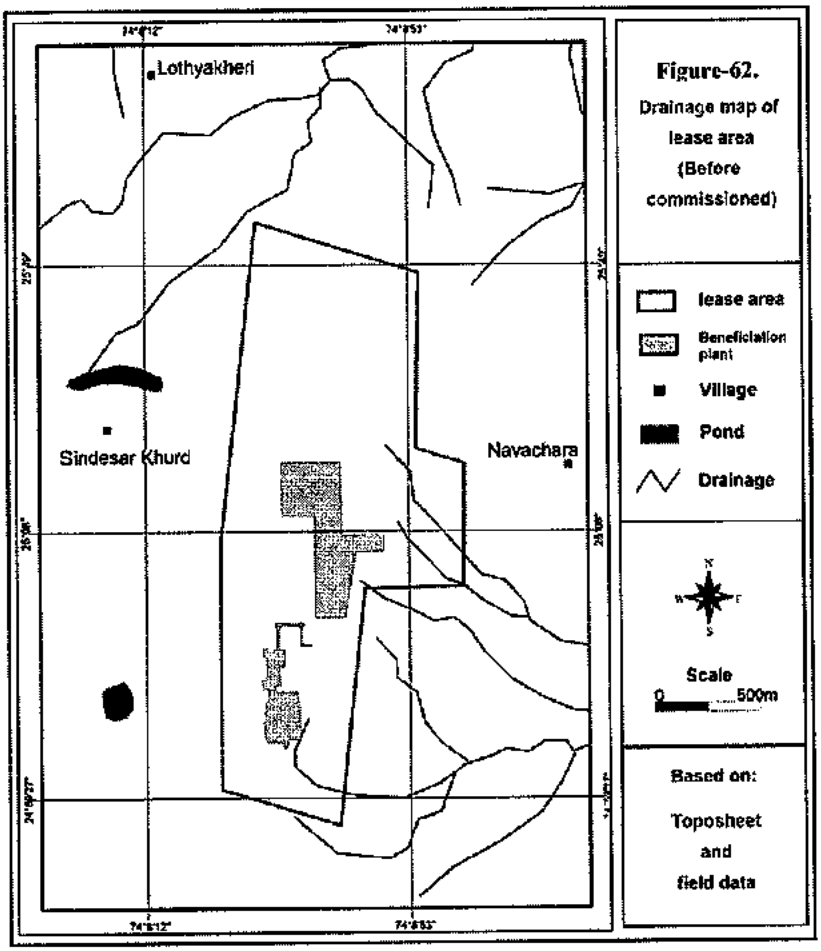
All the 9 surface water samples were also analyzed for Dissolved Oxygen (D.O.) as it is very important source for the survival of aquatic life. It was found water that in general the D.O ranged from 3.70 to 5.20 mg/l which is adequate quantity for survival of aquatic life.

It is therefore observed that all the surface water samples have the toxic and heavy metals like Lead, Zinc, Manganese, Copper, Cadmium and Iron in such a quality that could not be determined as they were all below detection level (BDL) as per Indian Standards (**Table-4.1**).

13.0 DRAINAGE PATTERN IN LEASE AREA HAVING BENEFICIATION PLANT

The drainage pattern of the lease area is shown in **Figure-62** where four streams of first order originate near the eastern border of the lease area and on the eastern side of the hill. The catchment areas of these streams originating inside the lease area is small and these streams carry limited surface runoff during the rains. These first order streams will continue to flow uninterrupted as underground mining will be carried out and no surface activity is proposed on the eastern slope of the hill.

The beneficiation plant is located on the western side of the hill and is mostly in the plain area where there is no natural drainage. All the roof top rain water from the different buildings is s collected and recharged through recharge trenches. The surface runoff generated by the rainfall is collected in the water reservoir located in the south eastern part of the lease area from where is pumped and sent to the beneficiation plant. The tailings from the beneficiation plant are sent by a pipe line to tailing pond located in the south eastern direction, about km away near the RD mine. As this tailing pond is located in another water shed, there is no impact of the tailing pond on the surface and ground water of S.K mine as observed by chemical analysis of ground water and surface water samples.



14.0 HYDROGEOLOGICAL ASSESSMENT STUDY OF BENEFICIATION PLANT

14.1 Ground water recharge of beneficiation plant area (Core zone)

The core zone covers 6 hectares area of beneficiation plant, mostly composed of mica schist. There is no operational well in the plant area.

The recharge from rainfall infiltration as per the guidelines of the Ground Water Estimation Committee, Govt. of India (1997) has also been calculated just for counter check.

14.1.1 Increment in ground water storage

The ground water recharge can be computed by multiplying the increment in ground water storage by measuring the water level fluctuation during pre and post monsoon periods with area of assessment and specific yield. The equation can express as under:

$$h \times Sy \times A = R$$

Where h is the rise of water level due to monsoon, Sy is the specific yield of the aquifer, and A is the area of computation of recharge, while R is ground water recharge.

Increment in the ground water storage in the core zone was determined by recording the water levels in the wells very close to the plant area during pre and post-monsoon periods of 2016 (**Annexure-I**). Average rise of water level in the mica schist due to rainfall was found as 5.90 m. Taking the specific yield value of 1.75% for the mica schist (same value as adopted by the CGWB), the ground water recharge is estimated as under:

$$0.06 \times 1000 \times 1000 \times 5.90 \times 0.0175 = 0.0062 \text{ mcm}$$

Area of core zone x Rise of water level x Specific Yield = Recharge

The ground water recharge of the core zone from the rainfall of 1180 mm of the year 2016 therefore amounts to 0.0062 mcm which when adjusted to average rainfall of 606 mm, amounts to **0.0032 mcm**.

14.1.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells can not be done or has not been done.

The recharge can be estimated by the following equation:

$$Rf \times A \times r = R$$

Where Rf is rainfall infiltration factor, A is area and r is annual rainfall while R is ground water recharge.

The committee has suggested 10% to 15% as the rainfall infiltration factor for metamorphics area having loamy soils with moderate rainfall and well developed drainage. An infiltration factor of 10% is adopted for this area which appears to be reasonable looking to the hydrogeological and geomorphological settings. Although, there is no need to use this theoretical approach in this case which has been monitored on a comprehensive scale, an attempt can be made to find out if it matches with the ground water recharge as calculated by increment in the ground water storage and it is found that it matches very well.

$$0.06 \times 1000 \times 1000 \times 0.606 \times 0.1 = 0.0036 \text{ mcm}$$

Area of core zone x rainfall x infiltration = Recharge

14.2 Ground water recharge of 10 km area (Buffer zone)

Buffer zone has mainly mica schist as principal aquifer occupying an area of 378.29 km^2 (378.35 – 0.06 km^2 of core zone) **(Figure-5)** in the tehsil of Relmagra, district Rajsamand.
The ground water fluctuation of water table during pre and post monsoon periods were recorded for the year 2016 from the 30 key wells (Appendix I) as per the guidelines of the Ministry of Environment & Forests and taking specific yield values of 1.75% for mica schist, the ground water recharge by rain fall has been calculated as under:

14.2.1 Increment in ground water storage

Ground water recharge from rainfall for the year 2016, which was more rainfall year for the area, has been calculated by measuring the rise of water levels in the key wells of the 378.29 km^2 area of buffer zone. The water levels were recorded during post-monsoon period and again during pre monsoon period of the year 2016. The rise of water level indicates the quantity of water percolated to zone of saturation due to recharge from rainfall.

The aerial rise of water has been computed by contour method for water bearing formation and rise was noted as 5.90 m in mica schist. Such a high value of rise of water level is due to rainfall of 2016. Taking specific yield value of 1.75% for mica schist, the ground water recharge has been calculated for the area covered by water bearing formation. The mica schist covers an area of 378.29 km^2.

$$378.29 \times 1000 \times 1000 \times 5.90 \times 0.0175 = 39.06 \text{ mcm}$$

Area of mica schist x Rise of water level x Specific Yield = Recharge

The ground water recharge for the year 2016 by rainfall of 1180 mm when measured as increment in ground water storage amounts to 39.06 mcm which when adjusted for a average annual rainfall 606 mm amounts to **20.06 mcm.**

14.2.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells has not been done.

The committee has suggested 10% to 15% as the rainfall infiltration factor for metamorphics area having loamy soils with moderate rainfall and well developed drainage. An infiltration

factor of 10% is adopted for this area which appears to be reasonable looking to the hydrogeological and geomorphological settings. Although, there is no need to use this theoretical approach in this case which has been monitored on a comprehensive scale, an attempt can be made to find out if it matches with the ground water recharge as calculated by increment in the ground water storage and it is found that it matches very well.

378.29x 1000 x 1000 x 0.606 x 0.1 = 22.92 mcm

Area of buffer zone x rainfall x infiltration = Recharge

14.2.3 Return flow of irrigation

The norms prescribed by the Estimate Committee for return seepage from the irrigation fields having loamy soils has been suggested as 20% of the total water applied for the irrigation. The total water applied for irrigation from open wells in the buffer zone is 22.21 mcm and from surface reservoirs is 3.04 mcm (1520 hectares). The total water applied for irrigation amounts to 25.25 mcm, of which 20% joins ground water storage as return flow of irrigation, amounting to 5.05 mcm.

25.25x 0.20 = 5.05 mcm

Water applied for irrigation x Return seepage = Recharge

The total ground water recharge of buffer zone from all the sources therefore amounts to **25.11 mcm.**

14.3 Ground water discharge

14.3.1 Ground water discharge of core zone

Presently, there is no operational well in the plant area. So, total ground water discharge from core zone is nil.

14.3.2 Ground water discharge of buffer zone

Ground water discharge in the buffer zone takes place mainly by dugwells operated for irrigation by cultivators. There are 2644 dug wells with pumps tapping mica schist with average yield of 70 cu.m/day. The annual ground water withdrawal from these wells is calculated as under:

2644 x 70 x 120 = 22.21 mcm (wells with pumps tapping mica schist)

No. of wells x yield/day x No. of days of operation = Annual withdrawal

In addition, the drinking and livestock water requirement of around 65 villages having a local population of 1,14,484 is met by bore wells, open dug wells and hand pumps and is around 3.13 mcm considering 75/litre/capita/day consumption. The total ground water discharge therefore amounts to **25.34mcm.**

14.4 Present status of ground water development of the area

The Central Ground Water Board (CGWB) in association with state ground water organization carry out estimation of dynamic ground water reserves of every taluka/tehsil of the state by monitoring the water levels in key wells during pre and post monsoon periods every year along with estimation of ground water draft. Based on these two figures, the stage of ground water development is computed as under:

$$\text{Stage of ground water development (\%)} = \frac{\text{Annual ground water draft} \times 100}{\text{Long term ground water recharge}}$$

The present study reveals that against the total ground water recharge of 25.11 mcm, including recharge from return flow of irrigation water, the ground water discharge is 25.34 mcm indicating the status of ground water development of buffer zone as 100.92%. The buffer zone therefore appears in Over-exploited category. Similarly, against nil ground water

discharge and the core zone receives ground water recharge of 0.0032 mcm indicating present status of ground water development as 0.0%. The core zone falls in the safe category.

CGWB report is published once in two years and last report has been released in July, 2014 for the dynamic ground water reserves as on 31.03.2011. This report places all the talukas/ tehils in different categories like safe, semi-critical, critical and over-exploited depending on the status of ground water development and long term water level trend. This report shows that the status of ground water development of Relmagra block and Rajsamand district is more than 100% and there is a long term decline of water levels. CGWB therefore has placed **Relmagra block and Rajsamand district under over-exploited category**. The findings of this study for the buffer zone matches with the assessment done by the CGWB for Relmagra block, although the findings of the CGWB are for the assessment year 2011.

15.0 IMPACT OF BENEFICIATION PLANT ON WATER REGIME

It is proposed that the capacity of the beneficiation plant will be increased from 5 MTPA to 6.5 MTPA which is necessary as the mineral production from the mine is going to increased from 4.5 MTPA to 6 MTPA. There are already two units of beneficiation plant in operation in the mining lease area having total beneficiation capacity of 5 MTPA and third unit of the 1.5 MTPA is to be developed. After the beneficiation, the tailings are being discharged in the tailing pond which is in use having HDPE lining at depth so that the tailing water does not percolate and join surface or ground water. The additional tailings of 1.5 MTPA beneficiation plant will also added in it.

It has been indicated that Sindesar Khurd mine is being worked on Zero discharge concept and surface water is not allowed to leave the boundary wall the mine. All the rain water falling on dumps, paved and mine roads etc is being collected in the pond within the mine area and is gainfully utilized for dust suppression and green land development after treatment

At present, the quality of ground water within the lease area, where a beneficiation plant of 5 MTPA capacity is operation along with underground mining and its dumps, has been studied by collecting 10 ground water samples within the lease area and just outside. The location from where these water samples have been collected are shown in the Figure- and its chemical analysis are shown in the Table.- A review of the chemical analysis reveals that ground water within the lease area and just side has not been contaminated by the pollutants which are likely to be released from the plant/mine area.

16.0 CONCLUSIONS

Based on the findings of comprehensive hydrogeological investigations carried out in the core and buffer zones of Sindesar Khurd mine, it is concluded that the core and buffer zones fall under over-exploited category of ground water development making it necessary to recharge the basin.

As the mine will worked out by underground method, it will intersect the ground water table and there will be inflow of groundwater in the mine. It has been calculated by modeling for five years of Mining Scheme (from 2017-18 to 2021-22) and for the conceptual stage. It is observed that maximum average inflow is 143.40 m^3/day will be during the year 2019-20 while it is average minimum will be during the 2021-22 when excavation is minimum and upper mined out area had been back filled by cementation. So, the average inflow of ground water during five years period will be **110.15 m^3/day or 110 m^3/day.** Inflow in the mine at the conceptual stage will be only 22.18 m^3/day as the mine will achieve the depth of -695 mRL having no fracture porosity due to overlying weight of about over 1100 metres of rock above it and major part will be back filled by cementation.

Against the average inflow of ground water of 110 m^3/day or 40150 m^3/year (0.040 mcm) and ground water abstraction by two open wells drawing 16,800 m^3/year (0.0168 mcm), the total ground water discharge amounts to **0.057 mcm**, the long term ground water recharge of

lease area happens to be **0.106 mcm**. The status of ground water development of the core zone amounts to **53.77% and therefore mining lease area lies in safe zone.**

A comprehensive artificial ground water recharge program has been proposed for augmenting the ground water storage of Sindesar Khurd buffer zone watershed which would recharge 82,625 m^3/year. Although , there is no mandatory requirement of ground water recharge as the core zone lies in safe zone , as rain water harvesting program has been proposed for the buffer zone which is an over-exploited zone so that there is no stress on the static ground water reserves particularly due to underground mining. It is mandatory to recharge the 200 % of average annual dewatering from the mine, which amounts to 80,300 m^3/year, a recharge program for 82,625 m^3/year has been proposed. As the mining is being carried out at great depth and very limited inflow of ground water will take place which will be gainfully utilized , there will not be any stress on the static ground water reserves of the lease area and long term trend of declining of water levels in the immediate vicinity of the mine will get arrested.

It is proposed that the capacity of the beneficiation plant will be increased from 5 MTPA to 6.5 MTPA which is necessary as the mineral production from the mine is going to increased from 4.5 MTPA to 6 MTPA. There are already two units of beneficiation plant in operation in the mining lease area having total beneficiation capacity of 5 MTPA and third unit of the 1.5 MTPA is to be developed. After the beneficiation, the tailings are being discharged in the tailing pond which is in use having HDPE lining at depth so that the tailing water does not percolate and join surface or ground water. The additional tailings of 1.5 MTPA beneficiation plant will also added in it.

It has been indicated that Sindesar Khurd mine is being worked on Zero discharge concept and surface water is not allowed to leave the boundary wall the mine. All the rain water falling on dumps, paved and mine roads etc is being collected in the pond within the mine area and is gainfully utilized for dust suppression and green land development after treatment

Inflow of ground water in Sindesar Khurd Mine ,Hindustan Zinc Limited ,estimated by modeling using MODFLOW for its expansion of Lead, Zinc Ore Production from 4.50 MTPA to 6.00 MTPA and Expansion of Ore Beneficiation Plant from 5.0 to 6.5 MTPA

At present, the quality of ground water within the lease area, where a beneficiation plant of 5 MTPA capacity is operation along with underground mining and its dumps, has been studied by collecting 10 ground water samples within the lease area and just outside. The location from where these water samples have been collected are shown in the **Figure-60** and its chemical analysis are shown in the **Table-13.** A review of the chemical analysis reveals that ground water within the lease area and just side has not been contaminated by the pollutants which are likely to be released. Similarly, the chemical analysis of 9 surface water samples have revealed that surface water has also been affected and there is total absence of toxic or heavy metals beyond the permissible limit.

for Hydro-Geosurvey Consultants Pvt. Ltd.,

(Dr. V.B. Khilnani)
Managing Director

Annexure-I. Hydrological data of key wells of core and buffer zone of Sindesar Khurd mine monitored during pre and post monsoon period, 2016

S.N.	VILLAGE	LATITUDE	LONGITUDE	DEPTH OF WELL (M)	PRE MONSOON WATER LEVEL (M)	POST MONSOON WATER LEVEL (M)	AQUIFER	YIELD m^3/hr	PUMP CAPACITY (HP)	PURPOSE
1	Mata ji ka kheda	24°56'52.6"	74°07'36.8"	12.00	6.32	3.25	Mica Schists	10.0	Manual	Drinking
2	Mata ji ka kheda	24°56'19.0"	74°07'40.1"	14.80	5.23	2.90	Mica Schists	10.0	Manual	Drinking
3	Naya Dariba	24°56'30.3"	74°08'33.9"	16.80	7.22	4.25	Mica Schists	20.0	Manual	Drinking
4	Pipawas	24°54'39.5"	74°08'22.9"	12.30	5.18	2.94	Mica Schists	20.0	Manual	Drinking
5	Kotari	24°56'25.0"	74°09'13.5"	16.45	8.95	5.25	Mica Schists	10.0	Manual	Drinking
6	Kabra ka kheda	24°57'12.6"	74°10'09.0"	16.00	12.78	6.20	Mica Schists	20.0	Manual	Drinking
7	Kabra	24°57'28.3"	74°10'47.4"	22.00	15.20	8.25	Mica Schists	20.0	Manual	Drinking
8	Ganeshpura	24°59'09.9"	74°11'46.1"	25.35	20.10	7.35	Mica Schists	10.0	Manual	Drinking
9	Khar Bamaniya	24°59'53.9"	74°12'08.5"	25.40	22.30	8.15	Mica Schists	20.0	Manual	Drinking
10	Khar Bamaniya	25°00'16.3"	74°12'28.3"	25.75	22.10	8.78	Mica Schists	20.0	Manual	Drinking
11	Khar Bamaniya	25°00'50.1"	74°11'42.7"	22.45	15.10	9.20	Mica Schists	20.0	Manual	Drinking
12	Ganeshpura	24°59'54.6"	74°11'26.4"	30.00	23.30	9.25	Mica Schists	10.0	Manual	Drinking
13	Panotiya	25°01'33.5"	74°11'15.2"	25.35	9.70	7.25	Mica Schists	20.0	Manual	Drinking
14	Relmagra	25°02'14.3"	74°06'36.8"	16.00	8.00	6.33	Mica Schists	20.0	Manual	Drinking
15	Sarwariya kheri	25°00'13.4"	74°06'39.4"	16.81	6.00	3.45	Mica Schists	10.0	Manual	Drinking
16	Mali kheda	24°59'17.2"	74°06'54.7"	28.45	18.45	11.25	Mica Schists	10.0	Manual	Drinking
17	Bela kheda	24°58'51.1"	74°06'52.4"	25.75	18.80	10.15	Mica Schists	30.0	Manual	Drinking
18	Aanjana	24°55'58.1"	74°06'12.4"	25.12	18.20	10.35	Mica Schists	30.0	Manual	Drinking
19	Gawardi	24°55'25.1"	74°05'56.7"	18.55	12.90	11.25	Mica Schists	20.0	Manual	Drinking
20	Laxmipura	24°60'03.0"	74°04'58.3"	16.00	13.44	9.25	Mica Schists	20.0	Manual	Drinking
21	Plant	25° 00' 07.1"	74° 08' 49.65"	43.95	14.80	10.25	Mica Schists	10.0	Manual	Drinking
22	Plant	25° 00' 12.9"	74° 08' 44.39"	41.55	15.60	9.25	Mica Schists	10.0	Manual	Drinking
23	Plant	25° 00' 22.6"	74° 08' 50.07"	42.26	14.88	10.25	Mica Schists	10.0	Manual	Drinking
24	Shivpura	24° 59' 22.2"	74° 08' 38.9"	30.46	11.25	6.65	Mica Schists	20.0	Manual	Drinking
25	Shivpura	24° 59' 43.0"	74° 08' 55.2"	26.21	12.25	5.75	Mica Schists	20.0	Manual	Drinking
26	Sindesar Khurd	25° 00' 28.1"	74° 08' 27.7"	28.96	16.98	9.85	Mica Schists	10.0	Manual	Drinking
27	Lathiyakheri	25° 01' 31.7"	74° 08' 34.1"	28.96	17.55	12.25	Mica Schists	20.0	Manual	Drinking
28	Sindesar Kalan	25° 00' 42.8"	74° 09' 18.3"	34.25	14.20	9.35	Mica Schists	30.0	Manual	Drinking
29	Sindesar Kalan	24° 59' 47.3"	74° 07' 57.5"	28.65	15.00	11.26	Mica Schists	20.0	Manual	Drinking
30	Sindesar Kalan	25° 01' 37.1"	74° 07' 35.0"	32.25	16.50	11.25	Mica Schists	30.0	Manual	Drinking

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Signed for and on behalf of NABL

N. Venkateswaran	Anil Relia	Prof. S. K. Joshi
Program Manager	Director	Chairman

रा.प्र.प्र.बो.

राष्ट्रीय परीक्षण और अंशशोधन प्रयोगशाला प्रत्यायन बोर्ड

(विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार के अधीन स्वायत्तशासी निकाय)

प्रत्यायन प्रमाण-पत्र

एनवायरोंग्रीन कन्सलटेन्ट्स (इण्डिया) प्राइवेट लिमिटेड

का मूल्यांकन और प्रत्यायन निम्न मानक के अनुसार

आई.एस.ओ./आई.ई.सी. 17025:2005

"परीक्षण एवं अंशशोधन प्रयोगशालाओं की सक्षमता की सामान्य अपेक्षाएँ"

उदयपुर, राजस्थान

में स्थित इसकी सुविधाओं के लिए

रासायनिक परीक्षण

के विषय क्षेत्र में किया गया।

(इस प्रयोगशाला के प्रत्यायन के विषय क्षेत्र की जानकारी एन ए बी एल वेबसाइट www.nabl-india.org से भी प्राप्त कर सकते हैं)

प्रमाण-पत्र संख्या P-3093

जारी करने की तिथि 22/08/2016

[redacted]

वैधता की तिथि 21/08/2018

यह प्रमाण-पत्र उपर्युक्त मानक तथा राष्ट्रीय परीक्षण और अंशशोधन प्रयोगशाला प्रत्यायन बोर्ड की अतिरिक्त अपेक्षाओं का निरंतर संतोषप्रद अनुपालन किए जाने पर अनुबंध में निर्दिष्टानुसार प्रत्यायन के क्षेत्र के लिए वैध रहेगा।

रा.प्र.प्र.बो. की ओर से हस्ताक्षरित

एन. वेंकटेश्वरन
कार्यक्रम प्रबन्धक

अनिल रेलिया
निदेशक

प्रो. श्रीकृष्ण जोशी
अध्यक्ष

Annexure-XI
Public Hearing Details

☎ 01482-241159

REGIONAL OFFICE
RAJASTHAN STATE POLLUTION CONTROL BOARD
18, Azad Nagar, Pannadhai Circle, Bhilwara - 311001

RPCB/RO BHL/RAJ/ १३०५ **Date :** 08/11/17

The Group Incharge (Mines),
Rajasthan State Pollution Control Board,
Jaipur.

Sub.:- Regarding public hearing for Environmental Clearance in respect of proposed Expansion of Sindesar Khurd Lead- Zinc underground Mine of M/s Hindusthan Zinc Limited from 4.5 Million TPA to 6.0 Million TPA Ore Production (ROM basis) and Beneficiation from 5.0 Million TPA to 6.5 Million TPA, located at Village- Sindesar Khurd, Tehsil- Railmagra, District- Rajsamand (ML No. 07/95).

Ref.:- Public Hearing conducted on dated. 01/11/2017 at Sindesar Khurd Mine, Village- Sindesar Khurd, Tehsil- Railmagra, District- Rajsamand

Sir,

Please find enclosed herewith minutes of public hearing conducted at Sindesar khurd Mines, Village- Sindesar khurd, Tehsil- Railmagra, District- Rajsamand on 01/11/2017 for further necessary action. C.D. of the Videography & Photographs of the public hearing are also enclosed.

Encl. 1. Minutes of Public Hearing (two sets).
2. C.D. of the Videography & Photographs (two sets).
3. Copy of News paper (Two sets)

Yours Faithfully,

Sd/-
(Rakesh Gupta)
Regional Officer

Copy to:-

1. The District Collector , Rajsamand with one set of minutes, C.D. of the videography & photography of Public Hearing.
2. The CEO, Zila Parishad, Rajsamand with one set of minutes, C.D. of the videography & photography of Public Hearing.
3. The SDM, Railmagra, District Rajsamand with one set of minutes, C.D. of the videography & photography of Public Hearing.
4. The General Manager, DIC, Rajsamand with one set of minutes, C.D. of the videography & photography of Public Hearing.
5. Analyst Cum Programmer, RPCB, Jaipur to display minutes on website of Board.
6. M/s Hindusthan Zinc limited, Dariba, Tehsil- Railmagra, District Rajsamand with copy of proceeding to display at the office of the Gram Panchyat within whose jurisdiction the project located & office of the Panchyat Samiti, Nagar Parishad.

Regional Officer

जन सुनवाई कार्यवाही विवरण

श्रीमान् जिला कलक्टर, राजसमन्द (राजस्थान) के पत्र क्रमांक प040(7) (43) सा0प्र0/प्रर्या/जन सु/2017/943 दिनांक 22.09.2017 एवं क्षेत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाड़ा (राजस्थान) के पत्र क्रमांक राप्रनिम/क्षेका भील/राज0/1171–72 दिनांक 25.09.2017 के क्रम में मैसर्स हिन्दुस्तान जिंक लि0 ग्राम–सिन्देसर खुर्द, तहसील रेलमगरा जिला राजसमन्द (राज0) (एम0एल0 नं0 07/95) में स्थित सिन्देसर खुर्द सीसा–जिंक भूमिगत खान की अयस्क उत्पादन क्षमता 4.5 मिलियन टीपीए से 6.0 मिलियन टीपीए (आरओएम आधार पर) तथा बेनिफिशिएशन को 5.0 मिलियन टीपीए से 6.5 मिलियन टीपीए तक विस्तार करने के लिये पर्यावरणीय स्वीकृति के सम्बन्ध में **दिनांक 01.11.2017 को प्रातः 11.00 बजे खनन परिसर ग्राम सिन्देसर खुर्द, तहसील रेलमगरा, जिला राजसमन्द (राजस्थान)** पर ग्रामवासियों की उपस्थिति में पर्यावरणीय जनसुनवाई का आयोजन किया गया।

उक्त पर्यावरणीय जनसुनवाई की आम जन सूचना राजस्थान पत्रिका के संस्करण दिनांक 29.09.2017 एवं टाईम्स ऑफ इण्डिया के संस्करण दिनांक 29.09.2017 में प्रकाशित की गई है, जिसकी प्रति परिशिष्ट "अ" पर संलग्न है।

पर्यावरणीय जनसुनवाई निम्न अधिकारियों की उपस्थिति में आयोजित की गयी:–

1. श्री बृज मोहन बैरवा, अतिरिक्त कलक्टर एवं अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द (राजस्थान)
2. श्री राकेश गुप्ता, क्षेत्रीय अधिकारी, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाडा (राजस्थान)
3. श्री शक्तिसिंह भाटी, उपखण्ड अधिकारी, रेलमगरा, जिला–राजसमंद
4. श्री कानसिंह भाटी, उप पुलिस अधीक्षक, रेलमगरा, जिला–राजसमंद

पर्यावरणीय जनसुनवाई के दौरान उपस्थित अधिकारियों एवं ग्रामवासियों का विवरण मय हस्ताक्षर परिशिष्ट "ब" पर उपलब्ध है।

बैठक में सर्वप्रथम श्री राकेश गुप्ता, क्षेत्रीय अधिकारी, राजस्थान प्रदूषण नियंत्रण मण्डल, भीलवाड़ा ने श्री बृज मोहन बैरवा, अतिरिक्त कलक्टर एवं अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द, श्री शक्तिसिंह भाटी, उपखण्ड अधिकारी, रेलमगरा, जिला–राजसमंद श्री कानसिंह भाटी, उप पुलिस अधीक्षक, रेलमगरा, जिला–राजसमंद, मैसर्स हिन्दुस्तान जिंक लि0 ग्राम सिन्देसर खुर्द के साइट प्रसिडेन्ट श्री के0सी0 मीना, जनप्रतिनिधिगण एवं उपस्थित आमजन का स्वागत/अभिनन्दन करते हुये माननीय अतिरिक्त कलक्टर एवं अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द की अनुमति से इस क्षेत्र में मैसर्स हिन्दुस्तान जिंक लि0 ग्राम सिन्देसर खुर्द, तहसील रेलमगरा, जिला राजसमन्द (राज0) (एम0एल0 नं0 07/95) में स्थित सिन्देसर खुर्द सीसा–जिंक भूमिगत खान की अयस्क उत्पादन क्षमता 4.5 मिलियन टीपीए से 6.0 मिलियन टीपीए (आरओएम आधार पर) तथा बेनिफिशिएशन को 5.0 मिलियन टीपीए से 6.5 मिलियन टीपीए तक विस्तार करने के लिये पर्यावरणीय स्वीकृति के सम्बन्ध में क्षेत्र के उपस्थित लोगों को विस्तार से अवगत कराया।

उन्होंने बताया कि वन एवं पर्यावरण मंत्रालय नई दिल्ली के द्वारा जारी अधिसूचना दिनांक 14.09.2006 (पर्यवरणीय प्रभाव आंकलन) के तहत उद्योग की उत्पादन क्षमता में विस्तार हेतु उसकी पर्यावरण स्वीकृति जारी करने के लिये औद्योगिक क्षेत्र स्थल के आस–पास के क्षेत्र के लोगों के मध्य जन सुनवाई किया जाना आवश्यक होता है। इसी कम में मैसर्स हिन्दुस्तान जिंक लि0, गॉव सिन्देसर खुर्द, तहसील रेलमगरा जिला राजसमन्द (राज0) (एम0एल0 नं0 07/95) में स्थित सिन्देसर खुर्द सीसा–जिंक भूमिगत खान की अयस्क

HZL Dariba 1.11.2017

क्षेत्रीय अधिकारी
राजस्थान प्रदूषण नियंत्रण मण्डल
भीलवाड़ा

अतिरिक्त कलक्टर
राजसमन्द

उत्पादन क्षमता 4.5 मिलियन टीपीए से 6.0 मिलियन टीपीए (आरओएम आधार पर) तथा बेनिफिशिएशन को 5.0 मिलियन टीपीए से 6.5 मिलियन टीपीए तक विस्तार करने के लिये पर्यावरणीय स्वीकृति हेतु आज दिनांक 01.11.2017 को पर्यावरणीय जन सुनवाई का आयोजन किया जा रहा है।

इसके बाद श्री राकेश गुप्ता, क्षेत्रीय अधिकारी, राजस्थान प्रदूषण नियंत्रण मण्डल ने मैसर्स हिन्दुस्तान जिंक लि0 गॉव सिन्देसर खुर्द, तहसील रेलमगरा जिला राजसमन्द (राज0) (एम0एल0 नं0 07/95) में स्थित सिन्देसर खुर्द सीसा–जिंक भूमिगत खान की अयस्क उत्पादन क्षमता 4.5 मिलियन टीपीए से 6.0 मिलियन टीपीए (आरओएम आधार पर) तथा बेनिफिशिएशन को 5.0 मिलियन टीपीए से 6.5 मिलियन टीपीए तक विस्तार करने के लिये पर्यावरणीय स्वीकृति के सम्बन्ध में उनके द्वारा संचालित की जाने वाली गतिविधियों का संक्षिप्त विवरण प्रस्तुत करने के लिये श्री के0सी0 मीना, साइट प्रसिडेन्ट, मैसर्स हिन्दुस्तान जिंक लि0 से आग्रह किया, जिसका विवरण इस प्रकार है:–

मैसर्स हिन्दुस्तान जिंक लि0 गॉव सिन्देसर खुर्द, तहसील रेलमगरा जिला राजसमन्द (राज0) के साइट प्रसिडेन्ट श्री के0सी0 मीना ने सर्वप्रथम आज की जन सुनवाई में उपस्थित अतिरिक्त जिला कलक्टर महोदय, राजसमन्द, उपखण्ड अधिकारी महोदय, उप पुलिस अधीक्षक महोदय, क्षैत्रिय अधिकारी महोदय, राजस्थ प्रदूषण नियंत्रण मण्डल भीलवाड़ा एवं क्षैत्र की जनता का स्वागत करते हुये ग्राम सिन्देसर खुर्द (एम0एल0 नं0 07/95) में स्थित सीसा–जिंक भूमिगत खान की वर्तमान अयस्क उत्पादन क्षमता 4.5 मिलियन टीपीए से 6.0 मिनियन टीपीए (आरओएम आधार पर) तथा बेनिफिशिएशन को 5.0 मिलियन टीपीए से 6.5 मिलियन टीपीए तक विस्तार करने के लिये पर्यावरणीय स्वीकृति के सम्बन्ध में प्रजेण्टेशन के माध्यम से संक्षिप्त विवरण प्रस्तुत किया। उन्होंने बताया कि हमारे द्वारा विश्व की अति आधुनिकतम तकनिक एवं मशीनों के द्वारा क्षैत्र में खनन कार्य करवाया जा रहा है। हमारे यहॉ पर कार्य करने वाले तकनिकी अधिकारी भी बहुत ही अनुभवी है, जो कि विश्व की अच्छी से अच्छी कम्पनी में कार्य कर चुके हैं। हमारे द्वारा कार्यरत श्रमिकों को पूरी सुविधायें उपलब्ध करवाई जाती है ताकि उन्हें किसी प्रकार की कोई असुविधा न हो। उन्होंने बताया कि हमारे द्वारा महिला दिवस पर भी महिलाओं को जागरूक करने के विभिन्न कार्यक्रम आयोजित किये जाते हैं ताकि उनका सर्वांगिण विकास हो सके। उन्होंने विभिन्न बिन्दुओं (भूमि उपयोग, जल प्रदूषण प्रबन्धन, मौसम विज्ञान, परिवेशी वायु प्रदूषण प्रबन्धन, ध्वनि प्रदूषण प्रबन्धन, परिस्थिकी पर्यावरण, सामाजिक पर्यावरण, ठोश अपशिष्ट प्रबन्धन, भूमि कंपन, वनस्पति एवं जीव जन्तु, वन्य प्राणी, हरित पट्टिका का विकास, यातायात प्रबन्धन, पर्यावरणीय अनुवीक्षण कार्यक्रम, जोखिम आंकलन एवं आपदा प्रबन्ध अध्ययन आदि) पर हिन्दुस्तान जिंक लिमिटेड द्वारा अब तक किये गये प्रयासों एवं आगे किये जाने वाले कार्यों के बारे में भी उपस्थित जन समूह को विस्तार से अवगत कराया। उन्होंने बताया कि हमारे पर्यावरणीय सलाहकार मैसर्स विमता लेब्स लिमिटेड, हैदराबाद के जरिये हमने क्षैत्र के विभिन्न बिन्दुओं (भूमि उपयोग, जल गुणवत्ता, मौसम विज्ञान, परिवेशी वायु प्रदूषण, ध्वनि प्रदूषण, परिस्थिकी पर्यावरण, सामाजिक पर्यावरण, ठोश अपशिष्ट, भूमि कंपन, वनस्पति एवं जीव जन्तु, वन्य प्राणी, यातायात गुणवत्ता, पर्यावरणीय अनुवीक्षण कार्यक्रम, जोखिम आंकलन एवं आपदा कार्यक्रम आदि) का व्यापक सर्वे करवाया है तथा उसमें प्राप्त ऑकड़ों के अनुसार हमारे द्वारा निर्धारित मापदण्डों पर खरे उतरने के समय–समय पर प्रयास किये जाते हैं और आगे भी किये जाते रहेंगे।

तत्पश्चात् जनसुनवाई कार्यक्रम प्रारम्भ करते हुये क्षेत्रीय अधिकारी, राजस्थान राज्य प्रदूषण नियन्त्रण मण्डल, भीलवाड़ा ने उपस्थित आमजन को अपने विचार, शिकायत एवं सुझाव मौखिक अथवा लिखित रूप से व्यक्त करने/प्रस्तुत करने के लिये आमंत्रित किया, जिसका विस्तृत विवरण इस प्रकार है:–

अतिरिक्त कलक्टर
राजसमन्द

HZL Dariba 1.11.2017

1. <u>श्री नवलसिंह राणावत, पंचायत समिति सदस्य:</u>

श्री राणावत ने बताया कि सन् 1965 में इस क्षैत्र में गन्ने की फसल बहुत अच्छी होती थी जिसकी वजह से भोपालसागर की सुगर मिल चला करती थी और यह बहुत ही अच्छा खुशहाल क्षैत्र था, लेकिन धीरे–धीरे गन्ने की फसल जल के अभाव में चौपट हो गयी। जल की पर्याप्तता की वजह से इस क्षैत्र का कोई व्यक्ति जब यहॉ पर हिन्दुस्तान जिंक की स्थापना हुई थी तब उसमें काम करने के लिये जाने को तैयार नहीं होता था। अब स्थिति यह है कि धीरे–धीरे जल खत्म हो गया व पेड़–पौधे भी कम हो गये जिसकी वजह से क्षैत्र में पर्यावरण असंतुलित हो रहा है। हिन्दुस्तान जिंक द्वारा जिस मात्रा में यहॉ से उत्पादन किया जा रहा है, उस अनुपात में पेड़–पौधे नहीं लगाये जा रहे हैं। इस क्षैत्र में रोजगार का एकमात्र सहारा हिन्दुस्तान जिंक लिमिटेड ही है जिनको क्षैत्र के लोगों को पर्याप्त मात्रा में रोजगार देना चाहिये। साथ ही सीएसआर के तहत भी विकास के कार्य करवावें तथा ग्राम पंचायत दरीबा को एक मॉडल ग्राम पंचायत के रूप में विकसित करें जिसे राजस्थान से लोग देखने के लिये आयें कि हिन्दुस्तान जिंक द्वारा मॉडल ग्राम पंचायत का किस तरह से विकास किया गया है। साथ ही हिन्दुस्तान जिंक वालों को इस क्षैत्र में एक अतिआधुनिक सुविधायुक्त अस्पताल भी खोलना चाहिये जिससे कि क्षैत्र की जनता को राजसमन्द व उदयपुर नहीं जाना पड़े।

2. <u>श्री नारूलाल गाडरी, ग्राम सुमेलिया खेड़ा:</u>

श्री गाडरी ने कहा कि हिन्दुस्तान जिंक की वजह से हमारे गॉव सिन्देसर के लोगों को एवं आस–पास के गॉवों के अन्य लोगों को भी रोजगार मिल रहा है जिसकी वजह से क्षैत्र के लोगों में खुशहाली आई है। उन्होंने कहा कि आगे भी हिन्दुस्तान जिंक वालों को आस–पास के बेरोजगार युवाओं को रोजगार देने चाहिये।

3. <u>श्री अम्बालाल गाडरी, वार्ड पंच, ग्राम पंचायत सिन्देसर खुर्द:</u>

श्री अम्बालाल गाडरी ने कहा कि ग्राम सिन्देसर खुर्द में ब्लास्टींग की वजह से कितना पर्यावरण प्रदूषण हो रहा है, लेकिन इसकी कोई सुनवाई नहीं हो रही है। हिन्दुस्तान जिंक द्वारा इसे रोकने के कोई उपाय नहीं किये जा रहे हैं। उन्होंने कहा कि हिन्दुस्तान जिंक वालों को खनन क्षैत्र की 10 किमी परिधि के गॉवों के लोगों को रोजगार उपलब्ध कराना चाहिये। उन्होंने कहा कि जिंक वाले अपना उत्पादन बढ़ावे, कोई बात नहीं है लेकिन क्षैत्र में अन्य विकास के कार्य भी करते रहें। इस टेण्ट के पीछे की पहाड़ी को जो काटा जा रहा है, उसे आगे नहीं काटें बल्कि समतल कर देवें। गॉव को अन्यत्र कहीं भी शिफ्ट कर देवें, कोई आपत्ति नहीं है लेकिन मुआवजा पूरा मिलना चाहिये।

4. <u>श्री शंकरलाल जाट, पूर्व सरपंच ग्राम पंचायत धनेरिया:</u>

श्री जाट ने कहा कि हिन्दुस्तान जिंक की वजह से आज ग्राम दरीबा औद्योगिक हब बनने जा रहा है। जिस तरह जेक00 इण्डस्ट्रीज में 1% श्रमिकों को प्रति वर्ष स्थाई किया जाता है, उसी तर्ज पर हिन्दुस्तान जिंक वालों को भी अपने कामगारों को स्थाई करना चाहिये। क्योंकि यहॉ पर ज्यादातर श्रमिक सन् 1998 से ठेकेदारों के मार्फत ही कार्य कर रहे हैं। साथ ही क्षैत्र के किसानों की खेती का पानी सूख रहा है तथा फसलें भी खराब हो रही है इसलिये ज्यादा से ज्यादा लोगों को रोजगार दिया जाना चाहिये। साथ ही क्षैत्र के किसानों के साथ बातचीत कर क्षैत्र में ग्रीन हाउस विकसित किया जाकर किसानों को खाद, बीज, डेयरी आदि की सुविधायें मुहैया करानी चाहिये। साथ ही हिन्दुस्तान जिंक वालों को क्षैत्र के किसानों को उचित दर एवं अनुदान पर गाय–भैंस आदि दिलाने की व्यवस्था भी करनी चाहिये ताकि क्षैत्र में डेयरी व्यवसाय पनप सके।

अतिरिक्त कलक्टर
राजसमन्द

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5. <u>श्री चेतन पारीक, निवासी–रेलमगरा:</u>

श्री पारीक ने कहा कि हिन्दुस्तान जिंक वालों ने अब तक क्षैत्र की जनता को दबाने का काम अच्छे तरीके से किया है। हिन्दुस्तान जिंक वाले रेलमगरा क्षैत्र की जनता के साथ दोगला व्यवहार कर रहे हैं। यहाँ के लोग रोजगार के लिये चक्कर लगा रहे हैं इसलिये हिन्दुस्तान जिंग वालों को स्थानीय लोगों को रोजगार देकर यहाँ के लोगों का दिल जीतना चाहिये।

6. <u>श्री माधवलाल जाट, ग्राम चौथपुरा, जिला परिषद सदस्य:</u>

श्री जाट ने कहा कि हिन्दुस्तान जिंक वालों को 5 किमी परिधि के किसानों का पूरा ध्यान रखना चाहिये। मैं आज यहाँ की मिट्टी एवं पानी का नमूनालेकर आया हूँ जिसकी जॉच करने से पता चल जायेगा कि यहाँ कि मिट्टी कितनी उपजाउ है व पानी कितना दूषित है। उन्होंने कहा कि मैं यहाँ कि मिट्टी व पानी का जॉच चित्तौड़गढ़ से भी करवा चुका है जिसमें तेजाब की मात्रा बहुत ज्यादा आई है। यहाँ की मिट्टी खराब होने से फसलें नहीं हो पा रही है, क्षैत्र की जनता हिन्दुस्तान जिंक वालों से मिलना चाहती है लेकिन वे जनता से मिलना नहीं चाहते हैं जिसकी वजह से जनता में आकोश व्याप्त है। स्थानीय लोगों को ज्यादा से ज्यादा रोजगार दिया जाना चाहिये।

7. <u>श्री बोटलाल जाट, ग्राम माताजी का खेड़ा:</u>

उन्होंने कहा कि हमारे क्षैत्र में 4 माताजी के मंदिर है जिनका विकास होना चाहिये। यहाँ पर पहले शेर रहा करते थे, जो कि प्रदूषण की वजह से अब नहीं है। हिन्दुस्तान जिंक वाले यहाँ पर इतने पेड़ लगाने की बात कह रहे हैं, तो उस हिसाब से अब तक यहाँ पर चारों ओर छाया हो जानी चाहिये थी, जो कि नहीं है। मैनेजमेण्ट द्वारा पौधे तो जरूर लगवाये जाते हैं लेकिन उनकी उचित देख–भाल नहीं होने से वे पनप नहीं पाते हैं। हिन्दुस्तान जिंक को क्षैत्र के हर किसान को कम से कम 10 ट्री गार्ड उपलब्ध कराये जाने चाहिये ताकि वे स्वयं पौधे लगाकर उनकी सुरक्षा कर सके। मैनेज़मेन्ट द्वारा सीएसआर का पैसा क्षैत्र में बहुत कम खर्च किया जा रहा है, उनके द्वारा क्षैत्र में कोई अस्पताल या कालेज भी नहीं खोला गया है। मैनेजमेण्ट स्थानीय जनता को रोजगार नहीं देता है, क्योंकि इनकी सोच है कि कोई भी बात होने पर स्थानीय श्रमिक धरना, प्रदर्शन कर सकते हैं जबकि बाहर के श्रमिक ऐसा नहीं करेंगे इसलिये स्थानीय से ज्यादा बाहर के लोगों को रोजगार दिया जाता है। अतः इनको यहाँ की जनता को ज्यादा से ज्यादा रोजगार देना चाहिये। जिस तरह आर0के0 मार्बल वालों ने कांकरोली में आर0के0 अस्पताल बना रखा है, उसी तरह हिन्दुस्तान जिंक वालों को भी यहाँ पर अस्पताल बनाना चाहिये ताकि क्षैत्र की जनता को लाभ मिल सके। साथ ही क्षैत्र में पुलिस चौकी स्थापित करने के लिये भवन बनाकर देना चाहिये। क्षैत्र की सड़कों के दोनों तरफ जिंक वालों को पेड़–पौधे लगवाने चाहिये। यदि हिन्दुस्तान जिंक वाले यहाँ की जनता को कुछ देंगे तो खुद भी कुछ लेंगे, बिना क्षैत्र की जनता का विश्वास जीते कोई काम नहीं हो सकता है।

8. <u>श्रीमती मंजुदेवी, अन्नपूर्णा महिला सहायता समूह:</u>

उन्होंने कहा कि हिन्दुस्तान जिंक के सहयोग से हमारा महिला समूह काफी अच्छा चल रहा है, इससे काफी महिलायें जुड़ी हुई है जिनको कई तरह के फायदे मिल रहे हैं।

9. <u>श्री राजमल जैन, पंचायत प्रतिनिधि ग्राम पंचायत काबरा:</u>

उन्होंने कहा कि किसी भी बात के दोनों पक्ष दोषी होते हैं, हम किसी एक पक्ष को दोषी नहीं ठहरा सकते हैं। ग्राम पंचायत काबरा की लगभग 500 बीघा जमीन पर हिन्दुस्तान जिंक वाले प्रत्यक्ष या अप्रत्यक्ष रूप से कार्य कर रहे हैं लेकिन कुछ बिन्दुओं पर इनको अच्छा कार्य करना चाहिये जो कि जनता को भी दिखे। 1. जन प्रबन्धन: मैनेजमेण्ट को आस–पास के गॉवों की जनता के लिये पीने के पानी (आरओ/ट्यूबवेल/पाईप लाईन)

की अच्छी व्यवस्था करनी चाहिये। 2. वृक्षारोपण: मैनेजमेण्ट को क्षैत्र की सड़कों के दोनों तरफ अच्छे फलदार व छायादार पेड़ लगाने चाहिये ताकि फल, छाया के साथ–साथ प्रदूषण भी नहीं फैले। 3. रोजगार: स्थानीय बेरोजगार युवाओं को उनकी योग्यता के अनुसार अच्छा रोजगार देना चाहिये।

10. <u>श्रीमती हेमलता कंवर, ग्राम कोटड़ी:</u>
उन्होंने कहा कि हिन्दुस्तान जिंक के सहयोग से हमारा महिला स्वयं सहायता समूह अच्छा चल रहा है तथा इससे जुड़ी हुई महिलाओं को भी अच्छा फायदा मिल रहा है। मैनेजमेण्ट द्वारा महिलाओं को हैल्थ किट भी वितरित किये जा रहे हैं। इसके लिये मैं हिन्दुस्तान जिंक प्रशासन को प्रणाम करती हूँ।

11. <u>श्री योगेश सुखवाल, ग्राम बामनिया कला:</u>
उन्होंने कहा कि क्षैत्रीय जनता की धीमी आवाज ही हिन्दुस्तान जिंक लि0 को मजबूती प्रदान कर रही है। क्षैत्र के लोगों को रोजगार नहीं मिल रहा है, सभी गॉवों में पर्यावरण को नुकसान हो रहा है, पहाड़ियों का संतुलन बिगड़ रहा है जिसकी वजह से पशु–पक्षी भी बहुत कम नजर आते हैं। क्षैत्र के बेरोजगार युवाओं को आईटीआई करने के बाद 5000/– रू0 भी नहीं दिये जाते हैं जबकि बाहर के लोगों को इससे कई ज्यादा मजदूरी दी जा रही है, ऐसा क्यों। यहॉ के पशुओं में बॉझपन की समस्या बहुत बढ़ रही है जिसे दूर करने के उपाय मैनेजमेण्ट को करने चाहिये। कम्पनी द्वारा सीएसआर के लिये 2% फण्ड निकाला जाता है जो कि जिला प्रशासन के पास जमा है लेकिन क्षैत्र की पंचायतों के विकास पर खर्च नहीं किया जा रहा है। यहॉ के युवा यदि रोजगार मॉगने जाते हैं तो उन्हें मैनेजमेण्ट व पुलिस प्रशासन द्वारा डराया, धमकाया जाता है, उन पर झूठे मुकदमे बनाये जाते हैं। कम्पनी का सेठ शांतिप्रिय है लेकिन हम उसके चमचों से परेशान हैं। यहॉ के मैनेजमेण्ट को स्थानीय लोगों के साथ बैठक कर उनकी बात/समस्या सुननी चाहिये ताकि क्षैत्र में आक्रोश नहीं पनपे।

12. <u>श्री माधवलाल जाट, ग्राम कोटड़ी:</u>
उन्होंने कहा कि हिन्दुस्तान जिंक की वजह से फायदा तो हो रहा है लेकिन वह बहुत ही कम है, नुकसान ज्यादा हो रहा है। क्षैत्र में वायु प्रदूषण फैल रहा है, मवेशी मर रहे हैं, पेड़–पौधे सूख रहे हैं, फसलें खराब हो रही है, रोजगार नहीं मिल रहा है। हिन्दुस्तान जिंक के गन्दे/एसिड वाले पानी की वजह से क्षैत्र की जमीन खराब हो रही है और कोई फसल नहीं हो पा रही है, इसके लिये कम्पनी को क्षैत्र के किसानों को पर्याप्त मुआवजा देना चाहिये।

13. <u>श्री मांगीलाल, ग्राम कोटड़ी:</u>
उन्होंने कहा कि हमारे गॉव के पास खड्डों में बरसात का पानी भरा रहता है जिसके लिये ग्राम पंचायत या हिन्दुस्तान जिंक कोई भी सुनने को तैयार नहीं है। हिन्दुस्तान जिंक लिमिटेड के टेलिंग डेम का पानी बहकर खेतों में आने से आस–पास की जमीन व कुओं का पानी खराब हो गया है, जिस से कोई फसल नहीं होती है तथा मवेशी भी मर रहे हैं। सभी के लिये अच्छा काम होना चाहिये।

14. <u>श्री बंशीलाल, ग्राम कोटड़ी:</u>
उन्होंने कहा कि मेरा सबसे पहला अनुरोध रोजगार के लिये है, यहॉ पर कई युवा आईटीआई किये हुये बेरोजगार बैठे हैं। यदि वे हिन्दुस्तान जिंक के पास रोजगार के लिये मिलने जाते हैं तो पहले से उनसे मैनेजमेण्ट वाले मिलते ही नहीं है और यदि मिल भी लेते हैं तो उनसे कहा जाता है कि अनुभव है या नहीं, बेरोजगार युवाओं को हर तरह से दबाया जाता है, उनकी कोई सुनवाई नहीं है। यहॉ कि राम तलाई में कम्पनी

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के टेलिंग डेम का खराब पानी आता है जो मवेशियों के पीने के काम भी नहीं आ सकता है। क्षेत्र में भारी वाहन चलते रहते हैं जिनकी वजह से प्रदूषण की समस्या रहती है, विकास के काम भी बहुत कम करवाये जाते हैं। पर्यावरण संतुलन के लिये बहुत कम पेड़ पौधे लगाये जाते हैं और वे भी देख–रेख के अभाव में मर जाते हैं। क्षेत्र के पशुओं में बॉझपन की समस्या बहुत पनप रही है जिसका समाधान करना चाहिये।

15. <u>श्री लक्ष्मीलाल सुथार ग्राम माताजी का खेड़ा:</u>

श्री लक्ष्मीलाल सुथार निवासी माताजी का खेड़ा ने सबसे पहले आज की जन सुनवाई में उपस्थित अधिकारियों एवं क्षेत्र की जनता का स्वागत किया। उसके बाद उन्होंने कहा कि अभी तक मेरे से पूर्व जितने भी वक्ता आकर जो बोले हैं, उनकी बात से उपस्थित समस्त जनता सहमत है। हिन्दुस्तान जिंक की वजह से आज क्षेत्र की जनता को पर्यावरण प्रदूषण व प्रदूषित जल का दंश झेलना पड़ रहा है। उन्होंने कहा कि हमारे बात अब तक जिला प्रशासन ने भी मानी है, हमारे द्वारा पूर्व में जो ज्ञापन दिये गये थे, उस पर कार्यवाही के लिये क्षेत्र के उपखण्ड अधिकारी को निर्देश दिये गये थे। क्षेत्र में पर्यावरण प्रदूषण फैल रहा है, इसके लिये यदि जनता आवाज उठाती है तो प्रशासन द्वारा उसे दबाया जा रहा है, उनके खिलाफ झूठे मुकदमे दर्ज करवाये जाते हैं। आज की जन सुनवाई कं0 की उत्पादन क्षमता में विस्तार के लिये आयोजित की गयी है लेकिन पर्यावरण प्रदूषण की वजह से क्षेत्र की जनता इसके लिये मंजूरी देने को तैयार नहीं है, अतः इस प्रस्ताव को ठुकराय. जावे। जब तक गॉव के प्रत्येक परिवार के प्रत्याकं व्यक्ति को सुरक्षा नहीं मिल जावे। पूर्व में ग्राम के किसानों ने राज्य सरकार को हिन्दुस्तान जिंक के लिये लीज पर जमीन दी थी, जिसे सरकार ने वेदान्ता को सौंप दी गयी है। अब वेदान्ता ग्रुप को यह जमीन किसानों को वापस सुपुर्द करनी चाहिये, हम आगे लीज अवधि बढ़ाने को तैयार नहीं हैं।

16. <u>श्री रोशनलाल टुकलिया, ग्राम रेलमगरा:</u>

उन्होंने कहा कि रेलमगरा शांतिप्रिय गॉव है लेकिन जब यहॉ की जनता जाग जाती है तो क्रांति लाते देर नहीं लगती है। हिन्दुस्तान जिंक मैनेजमेण्ट को स्वयं चिंतन करना चाहिये कि उन्होंने अब तक क्षेत्र की जनता के लिये क्या किया और आगे क्या करने की आवश्यकता है। मैनेजमेण्ट को अपने यहॉ की रिक्तियों के लिये विज्ञप्ति जारी करनी चाहिये कि उसे किस क्षेत्र में किस तरह के कितने कामगारों की आवश्यकता है तथा उसमें रोजगार पाने के लिये स्थानीय बेरोजगार युवाओं को प्राथमिकता मिलनी चाहिये। विज्ञप्ति जारी नहीं होने से क्षेत्र की जनता में विभिन्न तरह की भ्रांतियॉ ज्यादा फैल रही है। यदि मैनेजमेण्ट यह कहता है कि क्षेत्र के युवाओं के पास पर्याप्त योग्यता नहीं है तो उसे अपनी आवश्यकतानुसार ट्रेडों में बेरोजगार युवाओं को प्रशिक्षित करना चाहिये। खनन क्षेत्र के 10 किमी परिधि क्षेत्र के लोगों के लिये मैनेजमेण्ट को पीने के पानी की व्यवस्था करनी चाहिये। स्थानीय लोग या बेरोजगार युवा यदि मैनेजमेण्ट से बात करने के लिये आते हैं तो मैनेजमेण्ट बात करने को तैयार नहीं होता है तथा पुलिस प्रशासन द्वारा भी उनकी बात दबा दी जाती है। जब मैन गेट पर आकर मैनेजमेण्ट का प्रतिनिधि बात करने को तैयार नहीं है तो उससे क्षेत्र में रोजगार या विकास की क्या उम्मीद की जा सकती है। मैनेजमेण्ट को क्षेत्र में अच्छी सुविधायुक्त अस्पताल का निर्माण करवाना चाहिये जिससे कि यहॉ काम करने वालों के साथ–साथ क्षेत्र की जनता को भी लाभ मिल सके।

17. <u>श्री सुशील पालीवाल, ग्राम सिन्देसर:</u>

उन्होंने कहा कि हमारे गॉव में न तो नाली है, न सड़क है, न बिजली है। मैनेजमेण्ट ने क्षेत्र में विकास का कोई भी काम नहीं किया है जबकि कम से कम सिन्देसर गॉव को तो एक आदर्श ग्राम के रूप में विकसित करना चाहिये था। इससे पूर्व भी जन सुनवाई हुई थी लेकिन उसके बाद क्षेत्र में एक भी पौधा नहीं लगाया गया है। यहॉ पर पेड़–पौधे एवं पशु–पक्षी को बचाने के लिये बोर्ड जरूर लगे हैं लेकिन उनके बचाने के कोई उपाय नहीं किये जा रहे हैं। कम्पनी से निकलने वाले अपशिष्ट पदार्थ को उचित जगह पर डाला जाना चाहिये। स्थानीय युवाओं को रोजगार के लिये कम्पनी के मैन गेट पर एक ऑफिस खोला जाना चाहिये जहॉ

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पर आने वाले प्रत्येक बेरोजगार की बात सुनकर उसे संतोषजनक जवाब मिलना चाहिये। यहाँ के प्लाण्ट पर बिजली का उत्पादन भी हो रहा है लेकिन वह बिजली ग्राम मादड़ी के लोगों को मिल रही है, हमें नहीं मिल रही है। जिला प्रशासन व हिन्दुस्तान जिंक मैनेजमेण्ट को आस–पास के गाँवों की जनता को आपस में लड़ाने व बाँटने की बजाय क्षेत्र में अच्छा कार्य करके उनके दिलों पर राज करना चाहिये।

18. <u>श्री भगवान सुखवाल, प्रवक्ता, ग्राम काबरा विकास मंच:</u>
उन्होंने कहा कि हिन्दुस्तान जिंक द्वारा क्षेत्र में विकास के कार्य करवाये जा रहे हैं लेकिन जिस हिसाब से इनके द्वारा उत्पादन क्षमता बढ़ाई जा रही है उस अनुपात में विकास नहीं किया जा रहा है। उन्होंने कहा कि जिस तरह से बिनानी सिमेण्ट वालों ने पिलानी में बिट्स पिलानी की स्थापना की है, उसी तरीके से हिन्दुस्तान जिंक को भी क्षेत्र में एक अच्छे तकनिकी कॉलेज की स्थापना करनी चाहिये जिससे कि स्थानीय लोगों को अच्छा रोजगार मिल सके। इसके साथ ही मैनेजमेण्ट को सर्वसुविधायुक्त अस्पताल का निर्माण भी करवाना चाहिये। क्षेत्र में कई तकनिकी प्रशिक्षण प्राप्त युवा बेरोजगार घूम रहे हैं लेकिन उनको रोजगार नहीं मिल पा रहा है। जिस तरह से जावर माईन्स मैनेजमेण्ट द्वारा वहाँ पर फुटबाल अकादमी की स्थापना की गयी है, हिन्दुस्तान जिंक मैनेजमेण्ट को भी ग्राम दरीबा के लिये एक बालीबॉल अकादमी की स्थापना करनी चाहिये।

19. <u>श्री बद्रीलाल जाट, ग्राम सिन्देसर खुर्द:</u>
उन्होंने कहा कि सबसे पहले प्रशिक्षित या अप्रशिक्षित बेरोजगार को उनकी योग्यता के अनुसार रोजगार दिया जाना चाहिये ताकि क्षेत्र की जनता का असंतोष समाप्त हो सके। पर्यावरण की सुरक्षा के लिये ज्यादा जोर देना चाहिये, ज्यादा से ज्यादा पेड़–पौधे लगाने चाहिये तथा जो लोग स्वयं पेड़–पौधे लगाना चाहते हैं उन्हें प्रोत्साहन राशि दी जानी चाहिये, मैनेजमेण्ट स्थानीय लोगों से मिलने का समय निश्चित करें। मैनेजमेण्ट को क्षेत्र की जनता के साथ खुले मन से बातचीत कर उनका दिल/विश्वास जीतना चाहिये। यदि क्षेत्र के लोगों को पर्याप्त मात्रा में रोजगार मिल जायेगा तो क्षेत्र की गुण्डागर्दी अपने आप समाप्त हो जायेगी, अतः मैनेजमेण्ट को इस ओर पहले ध्यान देना चाहिये।

20. <u>श्री सोहनलाल गाडरी, ग्राम– अमरपुरा :</u>
श्री गाडरी ने कहा कि यहाँ पर न जाने कहाँ–कहाँ से आकर लोग नोकरी कर रहे हैं लेकिन क्षेत्र के युवा बेरोजगार दर–दर भटक रहे हैं। अतः मेरा अनुरोध है कि खनन क्षेत्र की 4.0 किमी परिधि के बेरोजगारों को हिन्दुस्तान जिंक लिमिटेड द्वारा प्राथमिकता से रोजगार दिया जाना चाहिये एवं पर्यावरण प्रदूषण को कम करना चाहिये।

21. <u>श्री भैरूलाल क्षौत्रिय, एडवोकेट, ग्राम–सिन्देसर खुर्द:</u>
उन्होंने कहा कि हिन्दुस्तान जिंक लि0 के लाईजन हैड श्री मीना सा0 ने अपने उद्‌बोधन में जो नन्दघर की स्थापना, आईआईटी कोचिंग सेण्टर की स्थापना एवं क्षेत्र में 50 करोड़ रू0 के विकास कार्य की जो बात कही है, वह क्षेत्र के लिये बहुत बड़ी उपलब्धि है। मेरे हिसाब से क्षेत्र के लोगों में रोजगार नहीं देने का एक भ्रम फैल रहा है, जो कि अच्छी बात नहीं है। लोगों को भ्रम से दूर रहकर अपनी बुद्धि व विवेक से काम लेना चाहिये। मेरे हिसाब से यदि यह गॉव अन्यत्र शिफ्ट किया जाता है तो इसमें कोई ऐतराज नहीं होना चाहिये। यदि ऐसा होता है तो प्रभावित व्यक्ति को एक्ट के हिसाब से पूरा अनुदान/मुआवजा दिया जाना चाहिये।

22. <u>सरपंच, ग्राम– अनोपपुरा जिला चित्तौड़गढ़:</u>
उन्होंने कहा कि हिन्दुस्तान जिंक लि0 मैनेजमेण्ट को राजसमन्द जिले के गाँवों के साथ–साथ ग्राम–अनोपपुरा जिला चित्तौड़गढ़ का भी पर्याप्त रूप से विकास करने के लिये तत्पर रहना चाहिये।

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23. श्री रामलाल जाट ग्राम राजपुरा:

उन्होंने कहा कि हिन्दुस्तान जिंक लि0 के सीएसआर विभाग को पूरी जागरूकता से क्षैत्र में विकास के कार्य करने चाहिये। इसके लिये पहले क्षैत्र के सभी गॉवों का सर्वे कर वहॉ करवाये जाने वाले कार्यों को चिन्हित करना चाहिये फिर वहॉ प्राथमिकता तय कर विकास के कार्य करवाये जाने चाहिये। हिन्दुस्तान जिंक की वजह से क्षैत्र के लोगों को रोजगार तो मिला है, लेकिन यदि कोई गरीब परिवार वंचित रह गया है तो उसे भी प्राथमिकता से रोजगार मुहैया कराना चाहिये। यह सच है कि कोई भी उद्योग लगता है तो उस क्षैत्र का पर्यावरण संतुलन बिगड़ता है लेकिन कम्पनी के लाभ की सीएसआर फण्ड की 2% राशि उसी गॉव या उसके आस–पास के गॉवों के विकास के लिये खर्च की जानी चाहिये न कि इस पैसे से अन्य गॉवों का विकास किया जाये। पर्यावरण संतुलन बनाये रखने के लिये कम्पनी को ज्यादा से ज्यादा फलदार व छायादार पौधे लगाने चाहिये। ध्वनि प्रदूषण बचाने के लिये यदि कम्पनी के पास कोई पुरानी मशीन है तो उसे बदलकर आधुनिक नई तकनिक की मशीन लगानी चाहिये। दूषित जल की वजह से यदि किसानों की जमीन व फसल खराब हो रही है तो उन्हें पर्याप्त मात्रा में मुआवजा दिया जाना चाहिये। मैनेजमेण्ट को अपने 10 किमी पेरा–फेरी क्षैत्र के किसानों की फसल को बचाने के लिये खेती की जमीन के चारों तरफ तारबन्दी करवानी चाहिये ताकि जंगली जानवरों से फसल की सुरक्षा हो सके। आर0के0 मार्बल वालों की तर्ज पर हिन्दुस्तान जिंक को भी क्षैत्र में अति आधुनिकतम श्रेणी का अस्पताल, कालेज, प्रशिक्षण केन्द्र स्थापित किया जाना चाहिये। हिन्दुस्तान जिंक से मिलने वाली रोयल्टी की राशि जिला प्रशासन के पास जमा है जिसका समय पर एवं सही जगह पर सदुपयोग होना चाहिये, इसके लिये हिन्दुस्तान जिंक मैनेजमेण्ट को भी समय–समय पर जिला प्रशासन से तकादा करते रहना चाहिये। खनन क्षैत्र के 8–10 किसी परिधि क्षैत्र के गॉवों की प्रत्येक गॉव के 5–7 व्यक्तियों की एक कमेटी बनाई जानी चाहिये, जिनके साथ मैनेजमेण्ट को समय–समय पर बैठक आयोजित कर वहॉ करवाये जाने वाले विकास के कार्यों का चिन्हिकरण कर प्राथमिकता तय करके करवाये जाने चाहिये ताकि क्षैत्र की जनता में असंतोष व्याप्त न हो। क्षैत्र के बेरोजगार युवाओं को उनकी योग्यता के अनुसार प्राथमिकता से रोजगार दिया जाना चाहिये, किसी भी स्थिति में बाहर के व्यक्तियों (विशेषकर चीन के व्यक्तियों) को प्रत्यक्ष या अप्रत्यक्ष रूप से रोजगार नहीं दिया जाना चाहिये।

24. श्री मुकेश पुरोहित, ग्राम सिन्देसर खुर्द:

श्री पुरोहित ने बताया कि माईन्स में ब्लास्टींग की वजह से कुछ घरों में दरारें आ रही है, गॉव के युवाओं को 4 माह में रोजगार देने की बात हुई थी, लेकिन अभी तक सभी यों ही घूम रहे हैं। मैनेजमेण्ट द्वारा गॉव के लोगों को गुमराह किया जा रहा है। पहले गॉव की बेरोजगारी समाप्त की जावे, उसके बाद ही इस पहाड़ी को खोदा जावे। बाहर के लोगों को बिना इन्टरव्यू के नोकरी दी जा रही है जबकि स्थानीय लोगों को इन्टरव्यू लेकर टरकाया जा रहा है।

25. श्री लक्ष्मीलाल सुथार, ग्राम– माताजी का खेड़ा:

उन्होंने कहा कि अभी तक मेरे से पूर्व जितने भी वक्ता आकर जो बोले हैं, उनकी बात से उपस्थित समस्त जनता सहमत है। हिन्दुस्तान जिंक की वजह से आज क्षैत्र की जनता को पर्यावरण प्रदूषण व प्रदूषित जल का दंश झेलना पड़ रहा है।

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26. श्री अमरसिंह बुंदेला, शिव सेना सम्भाग प्रमुख:

श्री बुंदेला ने कहा कि हिन्दुस्तान जिंक द्वारा जिस अनुपात में अपना उत्पादन बढ़ाया जा रहा है, उस अनुपात में जब तक क्षैत्र के लोगों को रोजगार नहीं दिया जायेगा एवं क्षैत्र की प्रमुख समस्याओं का समाधान नहीं किया जायेगा तब तक हमारे कार्यकर्ता इनका विरोध करते रहेंगे।

27. श्री अभिषेक चौधरी, ग्राम पंचायत–कोटड़ी:

उन्होंने कहा कि हमारा प्रमुख मुद्दा रोजगार का है इसलिये हिन्दुस्तान जिंक स्थानीय लोगों को ज्यादा से ज्यादा रोजगार देवें। इसके लिये ग्राम पंचायत से भी सहयोग ले सकते हैं कि किस व्यक्ति को रोजगार की पहले आवश्यकता है। गॉव में पीने के पानी की भी समस्या है जिसके लिये हिन्दुस्तान जिंक को आरओ लगाना चाहिये अथवा पाईप लाईन बिछाकर पानी की व्यवस्था करनी चाहिये।

28. श्री डालचन्द मेनारिया, प्रधानाचार्य, राउमावि, कोटड़ी:

श्री मेनारिया ने कहा कि हिन्दुस्तान जिंक मैनेजमेण्ट द्वारा हमारे विद्यालय में समय–समय पर जरूरत के अनुसार विकास के कार्य करवाये जा रहे हैं। लेकिन जिस हिसाब से कम्पनी अपना उत्पादन बढ़ाने जा रही है, उसी अनुपात में अपना सीएसआर फण्ड बढ़ाकर आगे भी और ज्यादा विकास के कार्य करवाने चाहिये।

29. श्री रतनसिंह, ग्राम पंचायत– खडवामणिया:

उन्होंने कहा कि हिन्दुस्तान जिंक जो अपनी उत्पादन क्षमता बढ़ाने जा रही है, उसमें किस तरह के कितने युवाओं को रोजगार के अवसर दिये जायेंगे, इसका प्रचार–प्रसार किया जाना चाहिये ताकि युवा बेरोजगार उसी अनुसार चाही गयी ट्रेड में अभी से तकनिकी प्रशिक्षण प्राप्त कर सके। नये प्लाण्ट में ज्यादा से ज्यादा रोजगार स्थानीय बेरोजगारों को दिया जाना चाहिये जिससे कि लोगों में आक्रोश नहीं फैले। रोयल्टी की राशि क्षैत्र की ग्राम पंचायतों के विकास कार्यों पर प्राथमिकता से खर्च की जानी चाहिये। पेरा फेरी क्षैत्र की ग्राम पंचातों के सरपंचों के साथ बैठकर पर्यावरण प्रदूषण की रोकथाम के लिये पेड़–पौधे लगाने बाबत् कोई कार्य योजना बनाई जानी चाहिये। अमरपुरा एवं चौथपुरा के लोगों के लिये एक कॉलेज व अस्पताल की स्थापना की जानी चाहिये ताकि क्षैत्र के लोगों को इसका फायदा मिल सके।

30. श्री हीरालाल प्रजापत, ग्राम कोटड़ी:

उन्होंने कहा कि हिन्दुस्तान जिंक की दूषित पानी की वजह से क्षैत्र के कुओं का पानी खराब हो रहा है। अतः मैनेजमेण्ट को लोगों के एवं मवेशियों के पीने के पानी की व्यवस्था करनी चाहिये।

31. श्री सुरेश जाट, उप प्रधान पंचायत समिति–रेलमगरा:

उन्होंने कहा कि हिन्दुस्तान जिंक को अपने नये प्लाण्ट में ज्यादा से ज्यादा रोजगार स्थानीय बेरोजगारों को दिया जाना चाहिये जिससे कि लोगों में आक्रोश नहीं फैले, ज्यादा से ज्यादा पेड़–पौधे लगाये जाने चाहिये। जिन कुओं का पानी खराब हो रहा है, उनकी जॉच करवाई जाकर उसके रोकने के उपाय करने चाहिये। कम्पनी का जो उत्पादन बढ़ने वाला है, उससे हमें कोई आपत्ति नहीं है लेकिन उसके रोजगार में स्थानीय लोगों को प्राथमिकता मिलनी चाहिये, उसके बाद रेलमगरा पंचायत समिति के लोगों को फायदा मिलना चाहिये।

32. श्री किशनलाल जाट, एडवोकेट, रेलमगरा:

उन्होंने कहा कि रेलमगरा की धरती में भगवान ने इतना खनिज दिया है जिसके लिये हमें भगवान को धन्यवाद देना चाहिये। इसी की वजह से आज हमारे क्षैत्र में इतने विकास के कार्य हो रहे हैं। रेलमगरा का बस स्टेण्ड हिन्दुस्तान जिंक के सहयोग से बना हुआ है। इसके अलावा जिले में और भी कई विकास के कार्य कम्पनी

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द्वारा किये जा रहे हैं, क्षेत्र की कई स्कूलों में कमरे बनावाये जा रहे हैं, फर्नीचर उपलब्ध करवाया जा रहा है, जिसके लिये हिन्दुस्तान जिंक प्रशासन भी बधाई का पात्र है। इन सबके साथ–साथ हिन्दुस्तान जिंक प्रशासन को रेलमगरा में कॉलेज, अस्पताल व आईटीआई की स्थापना करनी चाहिये जिससे कि उनका तो नाम हो और क्षेत्र की जनता को इसका लाभ मिल सके।

इसके पश्चात् श्री के0सी0 मीना, साइट प्रसिडेन्ट, मैसर्स हिन्दुस्तान जिंक लि0, द्वारा जन सुनवाई के दौरान उपस्थित ग्रामवासियों द्वारा पुछे गये प्रश्नों/आपत्तियों का उत्तर दिया गया जिनका विवरण निम्नानुसार है।

1. आज की जन सुनवाई में जनता द्वारा जो समस्यायें बताई गयी है एवं जो सकारात्मक सुझाव दिये गये हैं, उन पर आगे आने वाले समय में कार्यवाही करने का पूरा प्रयास किया जायेगा।
2. मैं स्वयं चाहता हूँ कि क्षेत्र के सभी बेरोजगार लोगों को रोजगार मिले, लेकिन हमारी भी कुछ सीमायें एवं मर्यादायें होती है जिनका पालन करते हुये ही हमें काम करना पड़ता है।
3. हम स्वयं चाहते हैं कि हमारे खनन क्षेत्र की 10 किमी की परिधि में आने वाले समस्त गॉवों में हम मूलभूत सुविधायें उपलब्ध कराते हुये उनका सर्वांगिण विकास कर सकें और इसी के तहत आगे और अच्छे व किये जायेंगे।
4. अभी गॉव के जिन घरों में दरारे आ रही है, उन्हें दूर करने के लिये हम तैयार है। और यदि ग्राम अन्यत्र शिफ्ट किया जाता है तो यह समस्या स्थाई रूप से हल हो जायेगी।
5. जहॉ तक सिन्देसर गॉव को अन्यत्र शिफ्ट करने की बात है, मैं स्वयं चाहता हूँ कि गॉव को अन्यत्र बसाने के साथ–साथ यहॉ के प्रभावित लोगों को केन्द्र सरकार की पॉलिसी के तहत पूरा मुआवजा दिया जावे।
6. सिन्देसर ग्राम को शिफ्टिंग के दौरान अन्यत्र जहॉ पर भी गॉव को बसाया जायेगा, वहॉ पर हम मॉडल स्कूल भवन बनाने, मॉडल अस्पताल भवन बनाने के साथ–साथ, मंदिर/धार्मिक स्थान बनाने व पार्क बनाकर उसमें मनोरंजन के आधुनिक संसाधन लगाने के लिये तैयार है तथा ग्राम के विकास के लिये अन्य कई प्रकार के कार्य भी आधुनिक तकनिक से करवाने के लिये हम तैयार हैं।
7. खनन क्षेत्र के आस–पास के गॉवों का जल स्तर बढ़े, इसके लिये हमने आस–पास के गॉवों के 8 तालाबों से मिट्टी हटवाकर उन्हें गहरा करवाया है ताकि उनमें बरसात का ज्यादा से ज्यादा पानी भरा रह सके।
8. हमारे द्वारा सामुदायिक विकास के तहत आगे आने वाले समय में जिले में 500 नन्दघर निर्माण करवाकर उनमें विभिन्न संसाधन उपलब्ध करवाने का लक्ष्य रखा गया है जिससे कि क्षेत्र की जनता को लाभ मि सके।
9. हमारे द्वारा क्षेत्र के आईटीआई प्रशिक्षित बेरोजगार युवाओं को भी प्रशिक्षण दिया जाकर उन्हें विभिन्न तरीके से रोजगार उपलब्ध करवाने के प्रयास किये जा रहे हैं।
10. आस–पास के लोगों को शुद्ध पेयजल उपलब्ध हो सके, इसके लिये हम ग्राम कोटड़ी में एक आरओ प्लांट लगाने की योजना पर कार्य कर रहे हैं ताकि लोगों को शुद्ध एवं गुणवत्तायुक्त पानी पीने के लिये मिल सके।
11. सामुदायिक विकास के तहत अभी भी हमारे द्वारा जनता की मॉग के अनुसार आस–पास के कई विद्यालयों में कमरे बनवाये जा रहे हैं, उनमें फर्नीचर उपलब्ध करवाया जा रहा है, कई विद्यालयों में पेराटीचर उपलब्ध करवाये जा रहे हैं। हम चाहते हैं कि यहॉ के विद्यालयों से अच्छे एवं प्रतिभावान बच्चे पढ़कर निकले और आगे बढ़े।
12. इसी के तहत हमारे द्वारा आगे आने वाले समय में सामुदायिक विकास कार्यक्रम के तहत 50 करोड़ रू0 के विभिन्न विकास कार्य आस–पास की जनता की मॉग के अनुसार विभिन्न गॉवों में करवाये जायेंगे। इसके लिये क्षेत्र के जनप्रतिनिधियों एवं प्रबुद्ध नागरिकों का सहयोग भी लिया जायेगा।

HZL Dariba 1.11.2017

राजस्थान

जिला कलक्टर

आगे भी किया जाता रहेगा। वैसे हमारे द्वारा लोगों को 6 फिट की लम्बाई के पौधे उपलब्ध करवाये जाते हैं जिनके लिये किसी ट्री गार्ड की आवश्यकता नहीं पड़ती है।

14. हमारे द्वारा आगे आने वाले समय में हमारी उत्पादन क्षमता में विस्तार के साथ–साथ क्षैत्र की जनता की समस्याओं/सुझावों पर आवश्यक कार्यवाही करते हुये क्षैत्र की ज्वलंत समस्याओं को दूर करने की तरफ भी काफी कार्य किये जायेंगे, इसका मैं उपस्थित जनता को विश्वास दिलाता हूँ।

इसके पश्चात् क्षैत्रीय अधिकारी, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाड़ा ने कहा कि आज की पर्यावरणीय जन सुनवाई में आप लोग पधारे एवं अपनी तरफ से जो समस्यायें एवं सुझाव बताये गये; उन सभी को हमारे द्वारा कलमबद्ध कर लिये गये हैं, जिन्हें आवश्यक कार्यवाही के लिये हमारे द्वारा आगे सक्षम अधिकारियों को भिजवाये जायेंगे।

आज की जन सुनवाई के दौरान तीन अभ्यावेदन/प्रार्थना पत्र प्राप्त हुये, जिनका विवरण इस प्रकार है:–

क्र.सं.	व्यक्ति/संस्था	अभयावेदन	समस्या/सुझाव
01	श्री समर सिंह बुर्देला, शिव सेना उपराज्य प्रमुख एवं उदयपुर संभाग प्रभारी	प्रार्थना पत्र	समस्या/सुझाव
02	श्री लक्ष्मीलाल सुथार, अध्यक्ष युवा समुह, माता जी का खेड़ा।	प्रार्थना पत्र	समस्या/सुझाव
03	ग्रामवासी, युवामण्डल, ग्राम–अमरपुरा।	प्रार्थना पत्र	समस्या/सुझाव

अन्त में क्षैत्रीय अधिकारी, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल द्वारा माननीय अतिरिक्त कलक्टर एवं अतिरिक्त जिला मजिस्ट्रेट महोदय, राजसमन्द, उपखण्ड अधिकारी रेलमगरा, उप पुलिस अधीक्षक रेलमगरा एवं उपस्थित समस्त ग्रामवासियों का आभार व्यक्त करते हुये धन्यवाद के साथ पर्यावरणीय जन सुनवाई समाप्ति की घोषणा की।

(राकेश गुप्ता)
क्षैत्रिय अधिकारी
स्थान प्रदूषण नियंत्रण मण्डल, भीलवाड़ा

क्षैत्रीय अधिकारी
राजस्थान प्रदूषण नियंत्रण मण्डल
भीलवाड़ा

(बृज मोहन बैरवा)
अतिरिक्त कलक्टर
एवं अतिरिक्त जिला मजिस्ट्रेट,
राजसमन्द

अतिरिक्त कलक्टर
राजसमन्द

Detailed Proceedings of Public Hearing

Public hearing was held in the presence of villagers at Mine premises, Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) on 01.11.2017, at 11.00am regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production (ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.5 Million TPA, of M/s.Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) (ML No.07/95) as per Letter no.P.40(7)(43) GA/Env./PH//2017/943 dated 22.09.2017 of Hon'ble District Collector, Dist-Rajsamand (Rajasthan) and Letter no. RPCB/RO Bhil./Raj./1171-72 dated 25.09.2017 of Regional Office, Rajasthan Pollution Control Board, Bhilwara, Rajasthan.

Public general notification regarding the above said environmental public hearing was published on 29.09.2017 in "Rajasthan Patrika " and "Times of India" of which copies are enclosed at Annexure-"A".

Public Hearing was held in the presence of the following Officers :

1. Shri Brij Mohan Bairva, Additional Collector and Additional Magistrate, Rajsamand (Rajasthan)
2. Shri Rakesh Gupta, Regional Officer, Rajasthan Pollution Control Board, Bhilwara, (Rajasthan)
3. Shri Shakti Singh Bhati, Sub-Divisional Officer, Relmagra, Dist- Rajsamand
4. Shri Kan Singh Bhati, Deputy Police Superintendent, Relmagra, Dist-Rajsamand

Details of Villagers and Officers along with their signatures who attended the said public hearing are given at Annexure-"B".

In the meeting at the outset Shri Rakesh Gupta, Regional Officer, Rajasthan Pollution Control Board, Bhilwara, has extended a warm welcome to Shri Brij Mohan Bairva, Additional Collector and Additional Magistrate, Rajsamand (Rajasthan), Shri Shakti Singh Bhati, Sub-Divisional Officer, Relmagra, Dist-

Rajsamand ,Shri Kan Singh Bhati, Deputy Police Superintendent, Relmagra, Dist-Rajsamand, Shri K.C.Meena, Site President, M/s. Hindusthan Zinc Limited, Vill-Sindesar Khurd, and the Public Representatives along with the people present in the public hearing and make aware of them regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production(ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.5Million TPA, of M/s.Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) (ML No.07/95)

He said that as per the notification dated 14.09.2006 (Environment Impact Assessment) issued by Ministry of Forest and Environment, New Delhi , conducting public hearing among the surrounding people of industrial area is necessary for obtaining environmental clearance for expansion of production capacity of any industry. Accordingly, Public hearing is being conducted today i.e. 01.11.2017 regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production(ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.0 Million TPA, of M/s. Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) (ML No.07/95).

There after Shri Rajesh Gupta, Regional Officer, Rajasthan Pollution Control Board has requested Shri K.C.Meena, Site President, M/s. Hindustan Zinc Limited, to give brief details about the activities to be undertaken by the company regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production(ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.0 Million TPA, of M/s. Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) (ML No.07/95), The details are given below :-

At the outset, Shri K.C.Meena, Site President, M/s.Hindustan Zinc Limited, at Village-Sindesar Khurd, Tehsil-Relmagra, Dist-Rajsamand (Rajasthan) made a power point presentation and explained regarding environmental clearance for expanding production capacity from 4.5 Million TPA to 6.0 Million TPA Ore production (ROM basis) and Beneficiation Plant from 5.0 Million TPA to 6.5

Million TPA, of M/s.Sindesar Khurd Lead-Zinc underground mine located at Village-Sindesar Khurd, Tehsil-Railmagra, Dist-Rajsamand (Rajasthan) (ML No.07/95). He said that they are doing mining activities in the region by using world's one of the best and sophisticated technology and modern machines. The technical officers working here are also well experienced who had worked in best companies of the world. Employees working in our mine are provided with all necessary facilities so that they should not face any problem. He further said that various programmes are conducted here for the ladies on the occasion of International Womens' Day for creating awareness among women for their overall development. He further make aware of the public present there regarding various issues such as (Land Use, Water Pollution Management, Meteorology, Ambient Air Pollution Management, Noise Pollution Management, Ecological Environment, Social environment, Solid Waste Management, Land Vibrations, Flora and Fauna, Wildlife protection, Development of Green belt, Traffic Management, Environmental Monitoring System, Emergency Plan, Disaster Management plan,) and the activities being taken up by M/s. Hindustan Zinc Limited at present and the same will be continued in future also. He further told that they made detailed survey on various point / issues (Land Use, Water quality, Meteorology, Ambient Air Pollution, Noise Pollution , Ecological Environment, Social environment, Solid Waste, Land Vibrations, Flora and Fauna, Wildlife protection, Traffic quality, Environmental Programme, Risk assessment and Disaster Management planet.etc.,) through their environmental consultant M/s.Vimta Labs Limited, Hyderabad and as per the outcome of the survey, we try to follow the specified standards and improve the parameters wherever necessary and the same will be continued in future.

Thereafter, initiating public hearing proceedings, Shri Regional Officer, Rajasthan Pollution Control Board, Bhilwara has appealed the public present there to express their opinions, complaints and suggestions either orally or in written form. The details are given below:

1. Shri Navalsingh Ranavat, Panchayat Committee Member

   Shri Ranavat said that there was a good crop of sugarcane from the agricultural fields of all people of the region in 1965 and there used to be

running of a Bhopalsagar Sugar mill very well and it was a very prosperous and happy region. But, gradually sugarcane crop vanished due to shortage of water in the region. Since there was adequate water availability in the region and the people depend on agriculture, nobody was willing to work in Hindustan Zinc Limited which was established in this region. Now the situation is that the water levels and sources are exhausted and plants and trees were also neglected and there is a reduction in flora which has resulted in imbalance in the environmental condition of the region. Hindustan Zinc is not planting trees in the region in tune with their quantity of production being made from here. Hindustan Zinc is only one source for employment in the region and they have provide adequate employment to the people of the region. Besides, they should also do a lot of developmental works under CSR activities. They should develop Village Panchayat Dariba as a model village panchayat. People from Rajasthan should visit this and appreciate and see how Hindustan Zinc has developed this village panchayat. Similarly Hindustan Zinc should also open a hospital in the region with all modern and sophisticated equipment and facilities so that the people of this region need not go Rajsamand and Udaipur for medical treatment.

2. Shri Narulal Gadari, Village- Sumelia Kheda :

   Shri Gadari said due to Hindustan Zinc, people of our village and the people of surrounding areas are getting employment which brought happiness among the people of the region. He said that Hindustan Zinc should provide employment for the unemployed youth in the surrounding areas in future also.

3. Shri Ambalal Gadari, Ward member, village Panchayat-Sindesar Khurd.

   Shri Ambalal Gadari said that there is a lot of environmental pollution due to blasting activities in Sindesar Khurd and no hearing is taking place in this regard. Hindustan Zinc is not taking any efforts to stop this. He further said that Hindustan Zinc should provide employment to the people of 10km radius of mining area. He said that we don't have any objection for increasing production by Hindustan Zinc, but at the same time they should also do developmental activities in the region. The hill behind this tent is

being broken should be stopped henceforth rather make it flat area. Village may be shifted elsewhere, but compensation should be given fully.

4. Shri Sankarlal Jat, Ex-Serpanch, Vill-Panchayat, Dhanaria :

   Shri Sankarlal Jat said that village-Dariba is becoming Industrial Hub due to Hindustan Zinc. JK industries make 1% employees permanent every year. In the same way Hindustan Zinc should also permanent the contract workers or temporary employees. Because most of the people /workers in this region are working in Hindustan Zinc since 1998 through Contractors only. Apart from this, water in the fields of farmers becoming dry and the crops are also getting damaged, that is why more and more people of the region should be provided employment. Besides, a green house should be developed in the region with the consultation of farmers in the region there by providing facilities such as fertilizer, seeds, Dairy etc., to the farmers. Further, Hindustan Zinc should also provide buffaloes and cows to the farmers at reasonable prices or providing grant to them so that Dairy business should grow in the region.

5. Shri Chetan Parik, Resident – Relmagra

   Shri Parik said that Hindustan Zinc management has done a well job of exploiting the people of the region. They have played a dual role with the people of Relmagra. People of the region repeatedly approach for employment. Therefore, Hindustan Zinc should provide employment to these people and win their hearts.

6. Shri Madhavlal Jat, Vill-Chouthpura, District Council Member

   Shri Madhavlal Jat said that Hindustan Zinc authorities should fully take care of the farmers within the radius of 5 kms. I brought the samples of soil and water which if tested, we will find that how much fertile is this land and how much water is being polluted. He said that the water and soil samples got tested at Chittodgarh in which acid levels are found much high. Due to damage of the soil, proper crops/ yields could not take place in the region. People of the region want to meet Hindustan Zinc management, but they

don't want to meet which has resulted angriness among the people of the region. Local people should be given more and more employment.

7. Shri Botlal Jat, Vill-Mataji Ka Kheda :-

   He said that there are 4 Mataji temples in our region, which have to be developed. Here in the past, there used to be tigers , and due to pollution, now we are finding them. As being said by Hindustan Zinc authorities regarding plantation of these many trees, if it is so, by this time the entire region should have become totally green all around the area, but it is not there. Management must have planted trees, but they are not properly maintained and grow properly. Hindustan zinc should provide at least 10 tree guards to each farmer so that they can plant the trees on their own and safeguard them. Management is spending very less amount for the development in the region under CSR funds, they have not opened any college or hospital in the region. Management is not providing employment to the local people because they think that the local people will make dharnas, strikes etc., for their rights where as outsiders will not do like that. That is the reason outsiders are provide more employment than local people, Hence HZL should provide more and more employment to the local people. M/s.R.K.marble has constructed at Kankroli, in similar way Hindustan Zinc should also construct a hospital so that the local people should be benefitted. Besides, a building should be constructed for arranging Police Chowki/station in the region. HZL should plant trees on the sides of the roads in the region. If HZL gives something to the people of this region they will also get something from the people. Until and unless they win the confidence of the local people, nothing can be done.

8. Smt Manju Devi, Annapurna Mahila Help Group :

   She said that our Mahila group is running well with the help of HZL, so many women associated with this and they are getting many benefits.

9. Shri Rajmal Jain, Panchayat Representative, Village Panchayat – Kabra:

   He said that there will be always fault with both the sides and we should not blame any one side. Hindustan Zinc Limited is working directly or

indirectly at 500 bigha land in village Panchayat Kabra, but they should do good things on various points. 1.Public Management has to provide drinking water (RO/Tubewell/ Pipe line etc.,) to the people of surrounding villages. 2. Afforestation : Management should plant fruit trees and thick & wide trees which will give shelter so that people will get fruits and shadow and there should not be any pollution. 3. Employment : Proper employment should be provided to unemployed youth as per their eligibility and qualifications.

10. Smt Hemlata Kanwar, Vill-Kotadi :

He said that Mahila self help group is running well with the help of HZL, so many women associated with this and they are getting many benefits. Management is also providing health kit to the women in the region. I salute the management of HZL for this help.

11. Shri Yogesh Sukhwal, Vill- Bagania Kala :

He said that the calm nature of the local people is giving strength to HZL. People in the region are not getting employment. Environment is exploited in all villages and there is imbalance of the hills in the region resulting lack of fauna in the region and we hardly see birds in the region. Unemployed youth of the region who have qualified ITI were not even paid Rs.5,000/- per month where as outside workers are paid more wages than the local people, why it is so? The infertility in the animals of the region is increasing a lot for which management should take measures to solve this problem. Company allots 2% funds for CSR activities which is deposited in district administration but the same is not spent on the development of Panchayats in the region. If the local youth go for asking employment, management and police threaten them and false cases are filed against them. The owner of the company is good and peaceful, but we are afraid of his sub-ordinates. The management has to organize meetings with the local people and listen their voice/ problems so that there should not angriness in the region.

12. Shri Madhavlal Jat, Village- Kotadi

He said that no doubt, there are benefits with HZL but they are very less and loss and damage is more. Air pollution is spreading in the region and

animals are died, flora (plant and trees) is dried, crops are damaged and no employment is provided. The land of the region is damaged/ spoiled due to the dirty and acid water of HZL and no crop is taking place in the region. Company has to give proper compensation to farmers for this.

13. Shri Mangilal, Village - Kotadi

He said that the road pits are filled with rain water in our village for which either village panchayat and HZL are ready to take responsibility for this and they are not hearing at all. The surrounding lands and water in the wells are affected/ spoiled due to run-off water from Tailing Dams of HZL resulting in no crops in the region and the animals are died. Good works should be done for all.

14. Shri Bansilal, Village-Kotadi

He said that my first request is for providing employment, here there are so many young ITI people are unemployed. If they approach HZL for employment, the management officials will not meet them and even if they meet also, they will discourage stating that these people do not have any experience and thus unemployed people are exploited an all ways, nobody will listen to them. That polluted water of tailing dam of the company enters into Ram Talai which is not even useful for drinking by animals also. Heavy vehicle traffic is increasing in the region which create pollution in the region. Very less developmental works are being done in the region. Very less trees are planted for balancing the environment and its conservation and they also die due to lack of maintenance. Infertility in the animals of the region is increasing a lot for which preventive measures have to be taken.

15. Shri Laxmilal Sudhar, Village- Mataji ka Kheda :

Shri Laxmilal Sudhar, Village-Mataji ka Kheda at the outset welcomed the officials and people of the region present in the public hearing today. Thereafter, he said that all the people present here are of the same opinion whatever the feelings expressed by pre-speakers today in the public hearing. People of the region have to face the problem of environment pollution and water pollution due to HZL. He said that our requests submitted to district

administration so far, responded and directed sub divisional officer of the district for taking necessary action for the development of the region. Environmental pollution is increasing day by day in the region, and if people raise their voice against them, they will be suffered by filing false cases against them. Today's public hearing is held for increasing the production capacity of the company, but the people of the region are not ready to give their acceptance for the same keeping in view of the environmental pollution and all the persons of all the families should also to be protected. In the past, farmers of the villages have handed over their lands to government on lease for Hindustan Zinc, which was handed over to Vedanta by the government. Now Vedanta group has to return the lands to the farmers, we are not ready to extend lease further.

16. Shri Roshanlal Tukalia, Village-Relmagra

He said that Relmagra is a peaceful village, but when the people of this village awake, it will not take much time to revolutionary movement. HZL management has to think itself on its own, about their contribution to the local people till date and what should be done in the future. Management has to release advertisement for filling the vacant posts in the company and assess the need of local people to what extent employees are required and the local unemployed youth should be given priority for providing employment. Due to non releasing the advertisement many doubts and ambiguities are rising in the local people. If management feels that the local people do not have adequate qualifications and experience, the unemployed youth of the region should be trained in different trades as pe the necessity of the company. Drinking water facilities should be provided to the people residing 10 km radius of the mining area. Management is not ready to meet or talk to the unemployed youth who approach them for employment and their voice is suppressed with the help of police administration. When the management representatives are not even ready to talk to the youth at their main gate, how can one expect the employment or development of the region. Management has to build a modern facility hospital in the region, by which employees of the company along with the local people will be benefitted.

17. Shri Sushil Paliwal, Village-Sindesar

He said that there are no drainage, no roads and no electricity in our village. Management has not done anything for the development of the region. Whereas Sindesar village should at least be developed as a model village. In the past also public hearing was held, but later not even a single tree is planted in the region. Off course, boards are displayed here for protection of trees and animals but no steps are being taken for safeguarding them. The solid waste released from the company should be dumped at a suitable place. There should be an office at the main gate of the company which will be helpful for the unemployed youth of the region to consult and approach the company for their employment and the unemployed youth should be heard properly and they will be given satisfactory reply. Electricity generation also takes place in the plant here and that electricity is provided to village-Madadi and we are not getting that electricity. District administration and HZL should take up the developmental works in the region instead of creating the problems and disputes among the villages and they should win the hearts of the people of the region.

18. Shri Bhagawan Sukhwal, Spokesman, Village – Kabra Development Front:

He said that HZL is doing developmental works in the region, but the developmental works are not taking place in tune with the increasing their production capacity. He said further that Bilani Cement has established Bits Pilani, HZL also should establish a good and modern Technical College in the region by which local people will get more employment opportunities. Apart from this, Management of HZL should also construct a good hospital. Many unemployed youth people are idle in the region and they are not getting employment. As the manner in which Zawar Mines Management has established a football academy , HZL management should also establish a volleyball academy in the village-Dariba.

19. Shri Badrilal Jat, Village-Sindesar Khurd

He said that unemployed youth whether they are trained or untrained, should be provided suitable employment so that unhappiness of the local people can

be avoided. More focus / attention should be given for protection of environment, more and more trees and plants should be planted and those who want to plant trees on their own should be provided amount as incentive. Management should fix a time to meet the local people on regular basis. Management should win the hearts of local people by discussing with them freely and open minded, if the people of the region get the employment adequately, the aggressiveness (Gundagardi) of the region will end itself. Thus, Management should give attention towards this first.

20. Shri Sohanlal Gadari, Village- Amanpura

Shri Gadari said that we don't know the people from where they come and get employment and jobs in the company, but the unemployed youth of the region are wandering here and there. Hence, I request HZL to provide employment to the unemployed youth within 40 km radius of mining area on priority basis and environmental pollution should be reduced.

21. Shri Bhirulal Kshatriya, Advocate, Village – Sindesar Khurd

He said that HZL Liaison hand Shri Meena stated in his speech about the establishment of Nandghar, ITI coaching centre, in the region along with other developmental works to the tune of Rs.50 Crore, it will be a great achievement for the region. I feel that unemployed youth and people of the region are having prejudice about not getting of the employment in HZL which is not correct. People should work with their knowledge and commonsense for the development of the region. In my opinion, if the village is shifted elsewhere, there should not be any objection for that. If it happens, concerned villagers should be paid grant / compensation as per the act of the government.

22. President , Village-Anoppura, Dist – Chittourgarh

He said that HZL should put efforts to develop the district of Chittourgarh as well as the development of villages in Rajsamand.

23. Shri Ramlal Jat, Village-Rajpura

Shri Ramlal Jat said that CSR Department of HZL should do developmental works in the region with full awareness. Before taking up CSR activities department should survey the villages and find out / identify the developmental works required to be taken up in the region as per the priority. Though employment was provided to the people of this region by HZL, but if any poor family is deprived off from providing employment, they should also be provided employment on priority. It is a fact that upon establishment of any industry, the environment of the region will be disturbed and there will be imbalance in the environment. At the same time CSR allocated funds of 2% should be spent only in the development if affected villages instead of spending this fund for development of other villages. Company should plant more and more trees which give fruits and shelter / shadow in the region. Similarly old machines should be replaced with modern and new machines of advanced technology to control sound pollution. If the land and crop of the farmers is affected by polluted water discharges form mining activities, they should be paid proper compensation. HZL management should also provide wire fencing in the fields of farmers within 10km radius of mine area so that the crops can be safe guarded from wild animals. HZL should establish super specialty hospital, College, Training Institutions as done by M/s. R.K.Marbles. Royalty amount of HZL is deposited with district administration, which should be used on time and for the right purpose, HZL also should follow up with district administration to ensure the same. Committees consisting of 5-7 members in each village located within 8-10 km radius of mining area and the management should conduct meetings with those committees time to time and identify the developmental works to be taken in that region and get them done on priority basis, so that people of the region should not express any unhappiness towards HZL. The unemployed youth of the region should be provided employment as per their qualifications. Outsiders (specially Chinese) should not be provided employment either direct or indirect employment.

24. Shri Mukesh Purohit, Village-Sindesar Khurd

Shri Purohit told that there are cracks in few houses due to blasting in the mines of HZL, It was told that unemployed youth will be provided employment within 4 months, but till now they are roaming idle in the region. Management is not giving correct information to the youth people of the region. First unemployment of the region/ villages should be avoided and then only this hill should be excavated. Outsiders are provided employment without interview whereas local people are interviewed and confused / denied for providing the jobs.

25. Shri Laxmilal Sutar, Village – Mataji ka Kheda

He said that who so ever before me expressed their views here, everybody present here support and accept their views. People of the region are suffering from the environmental pollution and polluted water due to Hindustan Zinc.

26. Shri Amarsingh Bundela, Siva sena divisional chief

Shri Bundela said that our party members will agitate and express their opposition until then HZL provide the employment to local people and solve the main problems of the region in the same ration that they are expanding their production capacity.

27. Shri Abhishek Choudhary, Village Panchayat-Kotadi

Shri Abhishek Choudhary said that our main issue is about employment. HZL should provide employment to more and more people of the region. They may also take the help of village panchayats to identify who is in first need of employment. There is also the problem of drinking water in the villages, for which HZL should provide RO plants and provide drinking water by laying pipeline.

28. Shri Balchand Menaria, Headmaster, Kotadi

Shri Menaria said that HZL is doing developmental works in our school time to time as per our requirement. But company should increase its CSR fund

for developmental works in tune with increasing the production capacity by the company and the same should be continued in future also by increasing developmental works.

29. Shri Ratansingh, village panchayat- Khadvamania

He said that HZL should publicize full details of employment opportunities to be provided to unemployed youth and the type of employment to be provided in the proposed expansion of production capacity so that the unemployed youth can obtain technical training in the required disciplines in a planned manner. Local unemployed youth should be provided employment in the new plant so that unhappiness among the local people will not spread across. Royalty amount should be spent in the development of village panchayats on priority basis. A systematic action plan should be prepared for planting trees in the region to avoid environmental pollution by conducting meetings with sarpanches of village panchayat within the periphery of mine are. One college and hospital for the people of Amarpura and Choudhpura should be established so that people of the region should get the benefit from that.

30. Shri Hiralal Prajapat, Village-Kotadi

He said that the waters of wells in the region are polluted due to polluted water of Hindustan Zinc. Hence, management should provide drinking water for people and animals in the region.

31. Shri Suresh Jat, Deputy Chief, Panchayat Samiti- Relmagra

He said that local unemployed youth should be provided employment in the new plant of HZL so that angriness among the local people should not spread. More and more plants and trees should be planted. The waters of the wells which are spoiled, should be tested and necessary steps should be taken for controlling the pollution. We don't have any objection for increasing the production capacity by the company, but priority should be given to local unemployed people for providing employment in the proposed expansion. There after, people of Relmagra panchayat samiti should be benefitted.

32. Shri Kishanlal, Advocate, Railmagra

He said that god has gifted Relmagra land with adequate minerals for which we should thank God. Due to this only there are lot of developmental works are taken place. Bus Stand of Relmagra was constructed with the financial assistance of Hindustan Zinc Limited. Apart from this many developmental works are being done by the company. Rooms in many schools of the region are being constructed, necessary furniture is made available for which HZL administration is also to be lauded. Along with all these, College, Hospital and ITI should be established in Relmagra by HZL so that Company should get name / publicity and also the people of the region will be benefitted.

Thereafter, Shri K.C.Meena, Site President, M/s. Hindustan Zinc Limited has replied for the questions/ objections raised by villagers present in the public hearing, and the details are given below :

1. All efforts will be made for taking action / fulfilling the problems expressed and suggestions given by the public in the public hearing today.
2. I sincerely wish, that all unemployed youth of the region may get employment, but we too have few limitations and restrictions and we have to work on following these.
3. We wish ourselves that all the infrastructural facilities would be provided in the surrounding areas with in 10km radius of our project and there should be overall development in the region and continue doing the good things in the future also.
4. We are ready to rectify the cracks observed in the nearby houses and if the villages is shifted elsewhere the problem will be permanently solved.
5. As far as the question of shifting of the Village Sindesar, I sincerely wish that the full compensation should be paid to the effected people under the policy of Central Government as well as shifting the village elsewhere.

6. Upon shifting the Village-Sindesar any other place and after its establishment in a new place, we are ready to build model schools, model hospital,, temples /religious buildings and beautiful parks and provide modern entertainment facilities there and we are also ready to provide whatsoever modern facilities required for the development of the village.
7. Keeping in view to increase the water levels in the region surrounding the mine area, we have removed soil from 8 ponds by deepening them as required so that more and more rain water can be stored in them.
8. We plan to construct 500 residential houses in the district under community development / Corporate Social responsibility and provide various modern facilities so that the people of the region should be benefitted.
9. We are also putting efforts to provide employment to youth of this region in different disciplines who have been trained in our ITI Colleges and unemployed.
10. With the aim that people residing nearby should get pure drinking water, for which we are planning to provide one RO Plant at Kotadi so that people will get pure and quality drinking water.
11. We are constructing rooms in many schools situated nearby as per the demand of people under Community Development Works and also furniture is being provided in these schools apart from providing other facilities. We wish that the many good and talented children should come up from this schools and progress in future.
12. Similarly, we are planning to do various developmental works at a cost of Rs.50.00 Crore in surrounding villages as per the interests and demands of the local people. Co-operation of local representatives and well known citizens of the region will also be utilized for this.
13. The same will continue in future also. We provide 6 feet height plants for which there is no need to provide tree guards.
14. We will also take steps for solving the current and social problems of the local people by taking necessary action on the problems/suggestions of local people apart from increasing our production capacity in future also.

Thereafter, Regional Officer, Rajasthan Pollution Control Board, Bhilwara said that we have recorded all the problems and suggestions expressed by the people present in Environmental Public Hearing , and the same will be forwarded to concerned officials for taking necessary action.

Three representations/ request letters have been received during today's environmental public hearing, and the details are given below:

Sl.No	Person / Institution	Representation	Problem/suggestion
01	Shri Samar Singh Budela, Shiv Sena, Sub state head and incharge, Udaipur division.	Request letter	Problem/suggestion
02	Shri Laxmilal Sutar, President/Chairman, Youth group, Mata ji ka Kheda	Request letter	Problem/suggestion
03	Village residents, Yuva mandal, Village-Amarpura	Request letter	Problem/suggestion

At the end, Regional Officer, Rajasthan Pollution Control Board presented vote of thanks expressing his gratitude for the presence of Hon'ble District Collector and Additional Magistrate, Rajsamand and Sub-divisional Officer, Relmagra, Deputy Police Superintendent, Railmagra and all the villagers and declared the closure of public hearing

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(Rakesh Gupta)
Regional Officer
Rajasthan State Pollution Control Board
Bhilwara

(Brij Mohan Bairva)
Additional District Collector
and Additional District
Magistrate, Rajsamand

हिंदुस्तान जिंक लिमिटेड, सिंदेसर खुर्द खान के विस्तारीकरण हेतु

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1	श्रीकृष्ण मोहन बैरवा Adm राजसमंद		
2	राकेश गुप्ता RO, RPCB, Bhilwara		
3	[illegible]		
4	शांतिलाल [illegible]		
5	[illegible] मीणा P.A ADM, Rajsamand		
6	हितेश [illegible] JO. RPCB Bhilwara		
7	Rajeev Bora		
8	K.C Meena		
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अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
9	नागी लाल	[illegible]	[illegible]
10	राजेश हरिजन	रेलमगरा	राजेश
11	[illegible] तुलसी राम हरिजन	रेलमगरा	तुलसीराम
12	संजय हरिजन	रेलमन्दारा	संजय
13	कालु हरिजन	रेलमगरा	कालु हरिजन
14	गोविन्द हरिजन	रेलमगरा	गोविन्द
15	घनश्याम हरिजन	रेलमगरा	घनश्याम
16	रतनलाल हरिजन	मदारा	रतन लाल
	—		

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
17	भगवान लाल	कोजपुरा का खेड़ा	
18	देवीलाल A. Mondal.	[illegible] Dariba	
19	Mahendra Singh	Dariba.	
20	Ratan Lal Sahu	Mataji ka khera	
21	Bhagwati lal Menaria	Aanjana	
22	Satya Narayan Menaria	Chanwarli	
23	Rajesh Samal	Dariba	
24	देवीलाल कुमार	देवरिया	
25	Murlidharan	Dariba	

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
२६	जगदीश चन्द्र मुरवाल	कावरा	जगदीश मुरवाल
27	शैतान	सांसेरा	शैतानसिंह
28	प्रह्लाद	गवारड़ी	[signature]
29	राधु	~~कमोर लाला~~ गवारडी	राधु
30	Jony	Gawardi	[signature]
31	सत्यनारायण	गवारडी	सत्यनारायण
32	Rajeev	Dariba	[signature]
33	रवि सिंह ~~छतरपुर~~	मेन्द्र दिया	रवि
34	छत्तोक लाक्सिन बालक गार्डन सभागार	रेलमगरा	[signature]

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगुठे का निशान
35	नाथुलाल जी कीर (ठेकेदार प्रभावक)	कीरों का खेड़ा	नाथुलाल कीर
36	रमेश जी कीर	कीरों का खेड़ा	[signature]
37	भँवर सिंह जी सोलंकी	सरवड़ीया की खेड़ी ग्रा. रायपुर	[signature]
38	Girish vyas	Rajsamand.	[signature]
39	H. C. Mathur	Dariba	[signature]
40	R. Balaji	5 km	[signature]
41	मोतीलाल रेलर	दरीबा	[signature]
42	Shiv Bhagnay	Dabo Colony	[signature]
43	[illegible]	[illegible]	[signature]

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
44	Kishan Lodhi	Maya Dauka	
45			
46	Nikhil Nebhnani	Chittorgarh	
47	BK Sharma	Dariba	
48	V.K. Goyal	Dariba	
49	Dharapal Singh	Dariba	
50	Digamber Patil	Dariba	
51	Deepak Gadhraj	Dariba	
52	Deepak Prabhakar	Dariba	

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
53	धीरज त्रिवेदी	उदयपुर	[signature]
54	दौलतसिंह	उदयपुर	[signature]
55	[illegible]	UDR	[signature]
56	Z. SHEIKH	RDM	[signature]
57	Gaurav F.	Dariba	[signature]
58	Rakesh Swarnkar	Dariba	Rakesh
59	उदित नारायण	Dariba	उदित
60	महेन्द्र [illegible]	सविना	[signature]
61	Balu [illegible]	कोरा	[signature]

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
63	D.P Singh	Dandra	D.P.Singh
63	Puneet Bordiya	Dandra	Puneet Bordiya
64	J. P. Gupta	Dandra	
65	Pradeep Singh	Dandra	
66	Sajjan Singh	Dandra	
67	Kunal Dey	Dandra	
68	NANA Lal	S.K. Mines.	
69	Nathu Lal	Near DANDA	
70	Rajesh Kumar	Dandra	

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
71	धनराज	रेलमगरा	Dhanraj
72	मयूर	रेलमगरा	[signature]
73	नारायण सिंह	नेहरुखेड़ा	[signature]
74	नारायणसिंह	दरीबा	[signature]
75	रतनलाल मीणा	माडीखेड़ा	[signature]
76	कानुराम	दरीबा	कानुराम
77	मुकेश	सिंदेसर खुर्द	[signature]
78	मुकेश कुमार शर्मा	रेलमगरा	[signature]
79	भरत कुमार	दरीबा	[signature]

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अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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दिनांक : 01.11.2017 **स्थान :** सिंदेसर खुर्द खान के बाहर ग्राम सिंदेसर खुर्द

क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1	[illegible]	कोटड़ी	[illegible]
81	[illegible]	[illegible]	[illegible]
82	[illegible]	कोटड़ी	[illegible]
83	[illegible]	पीपावास	[illegible]
84	[illegible]	पीपावास	[illegible]
85	[illegible]	पीपावास	[illegible]
86	[illegible]	पीपावास	[illegible]
87	[illegible]	पीपावास	[illegible]
88	[illegible]	[illegible]	[illegible]

हिंदुस्तान जिंक लिमिटेड, सिंदेसर खुर्द खान के विस्तारीकरण
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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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दिनांक : 01.11.2017 **स्थान :** सिंदेसर खुर्द खान के बाहर ग्राम सिंदेसर खुर्द

क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
९९	रतन सिंह राणावत	खड़ब्रामणियाँ	रतनसिंह
१०	राकेश उपाध्याय	दरीबा	[illegible]
११	राम लाल जी बनजारा	भुणेरा	रामलाल
१२	भेरूलाल जाटिया	सिंदेसर कलां	भैरूलाल
१३	बद्रीचन्द जी कुम्हार	चापरखेड़ी	बद्रीचंद
१४	देवीलाल जाटिया	सिंदेसर कलां	देवीलाल
१५	गणेश लाल	मोरी	गणेश लाल
१६	देवी लाल	मालीखेड़ा राजपुरा	देवीलाल
१७	अमित अजीत	दरीबा	[illegible]

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
98	Shyo Karan	Dariba	
99	Ipsita Mitra	Dariba	g. Mitra
100	Lalit Chordia	Dariba	
101	Rushyant	Dariba	
102	Aditya Prasad	Kotdi	
103	Chandrashekar	S.K.	
104	[illegible]	S.K	
105	Devendra Saggar	S.K	
106	Raj Kumar Yadav	Kurj	

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1	Sumit Dorli	Dariba	Sumit
108	नारायण लाल गाड़री	सुनारीया खेड़ा	नारायण
109	शंकरजी गाड़री	सुनारीया खेड़ा	शंकरलालगाड़री
110	हकीम बेग	सिन्देसरखुर्द	हकीमबेग
111	करण पालीवाल	सिन्देसरखुर्द	करण
112	[illegible]	[illegible]	[illegible]
113	Gaurav Sharma	Dariba	Gaurav
114	Ram Murari	SKM	
115	हेमलताकुमार	कोटड़ी	हेमलताकुमार

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
152	कँवरलाल भील	सिंदेसरकलाँ	कंवरलाल
153	देवकीशन जी जाटिया	मँऊ	देवकिशन
154	देवी लाल भारती	सुन्दरीमारवेड़ा	देवीलाल
155	PAVAN JINDAL	Dariba	Pavan
156	भंवर सिंह राजावत	राजपुरा	[illegible]
157	कुन्दन जोशी	गवारड़ी	Kundan
158	सदीप मान	दरीबा	Sandeep
159	शंकर लाल	सिंदेसर खुर्द	[illegible]
160	मोहनलाल नाई	सिंदेसर खुर्द	[illegible]

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
161	सत्यनारायण जाट	कावरा	सत्यनारायण
162	भेरू लाल जाट	— " —	भेरूलाल
163	देवी लाल जाट	कावरा	देवीलाल जाट
164	रोशनलाल जाट	कावरा	रोशनजाट
165	कैलाश बैरवा	सिंदेसर खुर्द	कैलास
166	मदन जाट	कावरा	मदन
167	शिव लाल जाट	कावरा	शिव लाल
168	रामलाल जैन	कावरा	
169	देवीलाल गाड़री	सुनारिया खेड़ा	देवीलाल

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
170	मंजू गोठवाल	कोटड़ी	Manju
171	राजेश कुमार गर्ग	कावरा	
172	जगदीश जी	कावरा	जगदीश
173	शिवलाल जाट	कावरा	शिवलाल जाट
174	दिनेश चन्द्र जाट	कावरा	दिनेश चन्द्र
175	राजेन्द्र जाट	कावरा	राजेन्द्र जाट
176	मुकेश जाट	कावरा	मुकेश
177	सोहन लाल जाट	कावरा	सोहन लाल
178	शिवलाल लुहार	कावरा	शिवलाल लुहार

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1[illegible]	कालुराम जाट	राजपुरा	[signature]
180	ओमप्रकाश [illegible]	[illegible]	[signature]
181	रतन लाल	सिन्देसर कलाँ	[signature]
182	पुखराज	Dariba	[signature]
183	[illegible]	Dariba	[signature]
184	[illegible]	सिंदेसर कलाँ	[signature]
185	[illegible]	[illegible]	[signature]
186	अभिषेक चौधरी	कोटड़ी	[signature]
187	देवेन्द्र चौधरी	पीपरखेड़ा रेलमगरा	[signature]

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1	महेन्द्र चौधरी	आमना	
189	भगवान लाल	[illegible]	भगवान
190	[illegible]	[illegible]	
191	VARDI SHANKER GADRI	Rajpura	
192	[illegible]	[illegible]	
193	[illegible]	[illegible]	
194	Roshan Purohit	सिंदेसर खुर्द	Roshan
195	Narendra	Narendra Khurd	Narendra
196	Kailash Menariya	[illegible]	

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
[illegible]	बालूरामगाडरी	सुनारियाखेड़ा	बालूरामगाडरी
198	आनन्द मोहन	दरीबा	[signature]
199	[illegible]	[illegible]	[signature]
200	[illegible]	[illegible]	[signature]
201	[illegible] सिंह	दरीबा	[signature]
202	Dalpatsinh	दरीबा	[signature]
203	देवीलाल	सिन्देसर खुर्द	देवीलाल
204	घनश्याम	सिन्देसर	घनश्याम
205	[illegible]	सुनारियाखेड़ा	[signature]

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1	Mangi Lal Mengwal	Dariba	[signature]
2.	V.K. Gupta.	Dariba	[signature]
3	धनराज ब्राह्मण	गवारडी	[signature]
4.	Abhishek Singh	Dariba	[signature]
5.	Avinash Tiwari	Dariba	Avinash Tiwari.
6	Ashu Singh	Dariba	[signature]
7	MADAN	Makanpurya	मदनलाल
8	सलीम बेग	SK	सलीम बेग
9	पारस मल	जावरमा	पारस मल

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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1.	Jaydeep Chandra	S.K. Mine	
2	Rajesh Kumar	-do-	
3	D P Rai Kumar	S K Mine	
4	D.K. Saraswat	SK. Mine	
5	B.K. Chaudhary	Vimta labs, Hyd	
6	K.V. Suryanarayana	Vimta Labs, Hyd	
7	A.S. Ranawat	Sanwad	
8	Dheeraj Jaiswal	Dariba	
9.	Ritesh Bhansali	Dariba	

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खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
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क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
	Phool chand Prajapat	Dariba	[signature]
117	Sunil Kumar Salvi	Kuraj	[signature]
118	Cachu lal Salvi	Kuraj	[signature]
119	मोहन	जात	द्वारका
120	नानालाल गाडरी	राजपुरा	नानालाल गाडरी
121	उमरावचंद	सिन्देसरकला	Mukesh [illegible]
122	दिलीप सिंह	सिन्देसर कलां	[signature]
123	कैलाश सिंह राठौड़	सिन्देसर कलॉ	[illegible] Rathore
124	V. S REDDY	Dariba	[signature]

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दिनांक : 01.11.2017 **स्थान :** सिंदेसर खुर्द खान के बाहर ग्राम सिंदेसर खुर्द

क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
	Jitendra Singh Rathore	Ariba	
126	शोभा लाल जाट	सिंदेसर कला	शोभा लाल.
127	चेतन पारीक	रेलमगरा (जन प्रतिनिधि)	चेतन पारीक
128	हनीष	राजपुरा का खेड़ा	हनीष
129	[illegible]	[illegible]	[illegible]
130	[illegible]	[illegible]	[illegible]
131	Krishna Bahadur	Gerba	Krishna
132	Jaya Rana	Delhi Bar	
133	B. L. Choudhary	Sindesar Khurd	

हिंदुस्तान जिंक लिमिटेड, सिंदेसर खुर्द खान के विस्तारीकरण
हेतु

पर्यावरणीय स्वीकृति से पूर्व जन सुनवाई

खनन उत्पादन क्षमता :- लेड -जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

उपस्थिति पत्रक

दिनांक : 01.11.2017 **स्थान :** सिंदेसर खुर्द खान के बाहर ग्राम सिंदेसर खुर्द

क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
134	शुभ्रभात सरकार	Darbu	
135	Aslam	Sindesr Kalan	Aslam
136	रमेश चन्द्र	सिंदेसरकलां	रमेश
137	भेरु लाल प्रजापत	सिंदेसर	
138	तरुण यादव	दरीबा	[illegible]
139	धनराज	रैलमगरा	Dhanraj
140	नरेश	दरीबा	Nar
141	राजू गाडरी	राजपुरा	राजू
142	मिठु लाल	आंजणा	[illegible]

हिंदुस्तान जिंक लिमिटेड, सिंदेसर खुर्द खान के विस्तारीकरण
हेतु

पर्यावरणीय स्वीकृति से पूर्व जन सुनवाई

खनन उत्पादन क्षमता :- लैड-जिंक अयस्क 4.5 एमटीपीए से 6.0 एमटीपीए
अयस्क सज्जीकरण क्षमता :- 5.0 एमटीपीए से 6.5 एमटीपीए

उपस्थिति पत्रक

दिनांक : 01.11.2017 **स्थान :** सिंदेसर खुर्द खान के बाहर ग्राम सिंदेसर खुर्द

क्रमांक	नाम	ग्राम का नाम	हस्ताक्षर अथवा अंगूठे का निशान
1[illegible]	देवीलाल नाई	सिन्देसरखुर्द	देवीलाल नाई
144	मांगीलाल	सिन्देसरखुर्द	मांगीलाल कुमार
145	रोशन लाल S/o प्रतापजी	सिन्देसर खुर्द	रोशन
146	महेन्द्र सिंह राजावत	राजपुरा	Mahen
147	देवीलाल गाडरी	राजपुरा खेड़ा	देवीलाल
148	[illegible] सिंह	Bandola.	[illegible]
149	चन्द्रवीर सिंह राठोड़	Suhaviya kheda	C Singh
150	विकास	रेलमगरा	[illegible]
151	Salma	Rathmajra	[illegible]

शिव सेना

उपराज्य (उदयपुर संभाग) प्रमुख
समर सिंह बुन्देला
84410 11111
76658 77777

सुधीर शर्मा
कार्यकारी
जिला प्रमुख
उदयपुर (राज.)
95878 94801
97726 95151

क्रमांक :

दिनांक : 1-11-2017

सेवामें,

श्रीमान राज्यपाल महोदय,

जयपुर, राजस्थान

मार्फत :–

विषय :– माईन्स से होने वाली स्थानीय लोगों की समस्या व रोजगार हेतु।

महोदयजी,

उपरोक्त विषय में जानकारी देते हूए वेदान्ता ग्रुप की हिन्दुस्तान जिंक लिमिटेड की दरीबा माईन्स जो कि राजसमंद जिले में है जब इस माईन्स की स्थापना हुई तो सरकार द्वारा वादें किये गए थे िकइस माईन्स के स्थापित होने से स्थानीय लोगों की बेरोजगारी व पानी जैसी समस्याएं दूर होगी परन्तु यहाँ के हालात बिल्कुल विपरित है यहाँ पर स्थानीय लोगों को रोजगार पर न रख कर बाहरी और विदेशी लोगों का चार गुना वेतन देकर रोजगार पर रखा जा रहा है। भारत एक प्रगतिशील देश होने के बावजूद यहाँ की प्रतिभाओं को नज़र अंदाज करते हूए ऐसा कार्य किया जा रहा है जिससे बेरोजगारी में बढोतरी व देश की अर्थव्यवस्था को नुकसान पहुचाया जा रहा है। माईन्स में केमिकल प्लांट जो कि आबादी क्षेत्र काफी दूर होने चाहिए परन्तु यहा आबादी क्षेत्र से केवल 1.5 कि.मी. ही स्थापित है इन केमिकल प्लांटो से अनेक प्रकार की जहरीली गैस अपशिष्ट पदार्थ पर्यावरण और आप–पास

के क्षेत्र की कृषि लायक भूमि को बंजर कर दिया है इन जहरीली गैसों व अपशिष्ट पदार्थो के पानी में घुलने से यहॉ के मवेशियों की आयु कम होती जा रही है व मवेशियों के दूध की क्षमता में भी कमी आ रही है । मवेशी अल्प आयु में ही बीमार होके मर जाते है। रेलमगरा और दरीबा क्षेत्र में बेरोजगारी तेजी से बढती जा रही है।

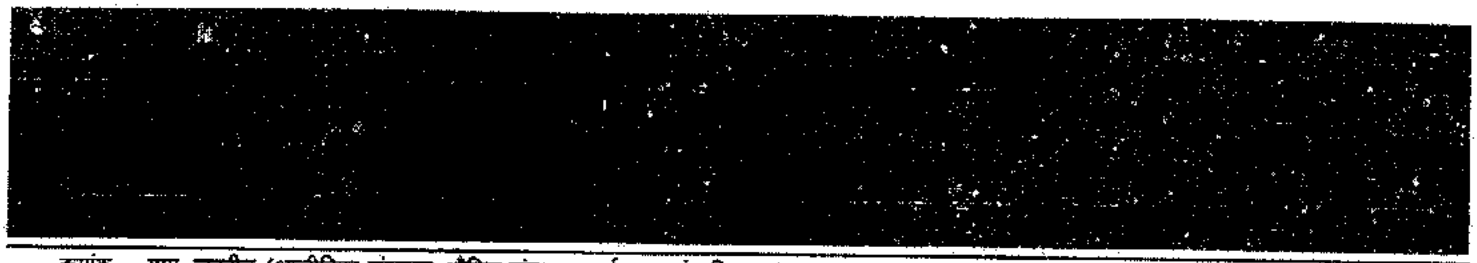
जिन बाहरी और विदेशी लोगों को यहा पर रोजगार पर रखा जा रहा है यह विदेशी लोग स्थानिय रहने वाली बहन बेटियों के साथ छेडछाड करते है।

अतः शिवसेना आपसे मांग करती है कि इस क्षेत्र की प्रमुख समस्या रोजगार जिस पर पहला हक स्थानिय व आप पास के क्षेत्र के लोगों का ही होना चाहिए व बाहरी लोग जो यहॉ रह रहे है उनका पुलिस वेरिफिकेशन करने के बाद ही उनको रखा जाए जिससे अपराध में कमी आएगी

समर सिंह बुंदेला

(उपराज्य प्रमुख व उदयपुर संभाग प्रभारी)

रेलमगरा - कलक्टर राज. (राजसमंद)



कमांक – ग्राम–जनहीत/आजीविका संसाधन, भौतिक संसाधन, पर्यावरण एवं भविष्य सुरक्षा/14/2017 दिनांक – 29.10.2017

श्रीमान अतिरिक्त जिला कलक्टर महोदय जी
जिला राजसमन्द, राजस्थान

आपत्ति–पत्र

विषय – मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल नं. 07/95), क्षैत्रफल 199.84 हैक्टयर ग्राम सिन्देसर खूर्द, तहसील रेलमगरा जिला राजसमन्द के क्षमता विस्तार से सम्बंधित योजना आपके समक्ष प्रस्तुत की गई हैं इसके विरूद्ध तथा भविष्य मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा प्रस्तुत की जाने वाली किसी भी अन्य समस्त योजनाओं पर युवा समुह माताजी का खेडा की तरफ से जनहित, व्यक्तिगत अधिकारों की रक्षा, सु–शासन की रक्षा, पर्यावरण सुरक्षा, जन सुरक्षा, समुदाय हितों की रक्षा, आजीविका के संसाधनों की सुरक्षा, मुलभुत प्राकृतिक खनिज जल वायु एवं पानी की सुरक्षा, भौतिक सम्पत्ति की रक्षा, पर्यावरणीय खनिज पदार्थो की सुरक्षा, निजि सम्पत्ति की सुरक्षा तथा उपभौक्ता अधिकारों की सुरक्षा ईत्यादि के तहत् आपात्त दर्ज करें एवं इस प्रकिया को आपके स्तर तक ही रोकने बाबत्।

सन्दर्भ –

1. जिला कलक्टर राजसमन्द के पत्रांक कमांक – प.14()सहायता/विविध/11–12/158081 दिनांक 19.07.2011
2. उपखंण्ड अधिकारी रेलमगरा के पत्रांक कमांक – 214–20/ दिनांक 11.10.2011
3. उपखण्ड मजिस्ट्रेट रेलमगरा के पत्रांक कमांक – 128–33 दिनांक 01.09.2011
4. तहसीलदार महोदय रेलमगरा के कार्यालय पत्रांक कमांक – राजस्व/2011/321 दिनांक 25.10.2011
5. जन स्वास्थ्य अभियान्त्रीकी विभाग रेलमगरा के पत्रांक कमांक– 132 दिनांक 21.11.2011
6. खण्ड मुख्य चिकित्सा अधिकारी रेलमगरा के पत्रांक कमांक – एसपीएल/07.10.2011
7. विकास अधिकारी रेलमगरा के पत्रांक कमांक – पंसरे/पंचायत/2634 दिनांक 09.12.2011

महोदय जी,

उपरोक्त सन्दर्भान्तर्गत लेख हैं कि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा रेलमगरा तहसील, जिला राजसमन्द क्षैत्र में 3 बडे उद्यम (दरिबा कॉम्प्लेक्स – जिंक स्मेल्टर लेड एवं पॉवर प्लांट, राजपुरा दरिबा खदान, सिन्देसर खुर्द खदान) स्थापित किए हुए हैं जिनसे कई प्रकार की क्षति पर्यावरणीय एवं भौतिक जगत को हुई हैं जिसका असर ग्राम वासियों की भौतिक, आजिविका एवं निजी सम्...र पर ही नहीं पर्यावरिणीय सम्पदा भी खतरे में हैं जिसके चलते स्थानीय ग्रामवासियों के आर्थिक, सामाजिक, मानसिक, धार्मिक, स्वास्थ्य स्थितियों पर विपरित प्रभाव पडा हैं जिसकी पुष्ठि जिला कलक्टर महोदय राजसमन्द द्वारा उपखण्ड अधिकारी रेलमगरा के नेतृत्व में समस्त लाईन विभागों के माध्यम से करवाई गई जांच से सिद्ध हो चुका हैं।

गांव माताजी का खेडा के किसानों कि निजि भुमि (चक–पापडिया) जिसे सुनिश्चित उद्धेश्यों के तहत् राजस्थान सरकार को पूर्व में लीज पर दिया गया था उसकी लीज समाप्ती होने के बाद वह भुमि पुनः किसानों के नाम पर आनी थी लेकिन सम्बंधित किसान से किसी प्रकार की सलाह–चर्चा एवं राय नही ली जाकर लीज भुमि के उद्धेश्यों को परिवर्तित करवा लिया गया एवं लीज को भी आगे बढा देने की जानकारी मिल रही हैं जबकि भुमि निजि किसानों की थी जिस पर किसानों की राय एवं सलाह लिए बिना स्मेल्टर, लेड एवं पॉवर प्लांट की स्थापना कर दी गई जोकि ईलीगल प्रकिया के अन्तर्गत आकर जिंक के प्लांट को पुर्णतः बन्द भी किसानों द्वारा करवा जाना चर्चा में हैं। लेड प्लांट जोकि हजार्डस/आपातकालीन गतिविधी में आता हैं जिससे बहुत बडा संकट उत्पन्न हो सकता हैं हजार्डस गतिविधियों में आने वाले उद्यमों को आबादी के नजदीक कभी स्थापित नहीं किया जा सकता क्योंकि कभी भी गेस रिसाव होने से कई जाने एवं क्षैत्र का नरसंहार हो सकता हैं मगर मैसर्स हिन्दुस्तान जिंक लिमिटेड ने इसकी स्थापना आबादी के बीच में कर दी हैं।

अतः ग्रामवासी श्री लक्ष्मीलाल सुथार द्वारा की गई शिकायत पर जिला कलक्टर द्वारा करवाई गई सरकारी जांच से यह स्पष्ठ एवं प्रमाणित होता हैं कि मैसर्स हिन्दुस्तान जिंक लिमिटेड के उद्यम द्वारा स्थानिय भुमि प्रदुषीत हुई हैं, पानी प्रदुषित हुआ हैं, वायु प्रदुषित हुई हैं जिससे प्रदुषण का एक चक शुरू हो चुका हैं, इकोलोजी पर बुरा प्रभाव निरन्तर आगे बढ रहा हैं, आजीविका के संसाधन प्रभावित हो रहे हैं, **इससे माताजी का खेडा के ग्रामीणों एवं परिवारों को अरबों रूपयों की क्षति होने की सम्भावना हैं** तथा इसका क्षैत्र नियमित बढता जा रहा हैं **इसके पर्याप्त प्राथमिक एवं द्वितीयक दोनो प्रकार के तथ्य युवा समुह के पास मौजुद हैं।**

ऐसा ना हो कि **मैसर्स हिन्दुस्तान जिंक लिमिटेड** एवं परियोजनाएं दशकों में होने वाले लोभ एवं लालच के चक्कर में कहीं स्थानिय क्षैत्र की आने वाली पिढीयों की शताब्दी बर्बाद न कर दें, इसलिए आपसे अनुरोध हैं कि जबतक पुख्ता सुरक्षा के ईन्तेजाम नहीं किए जाते एवं युवा समुह आपसे पुनः स्थानिय उपरोक्त मुददों पर समस्त प्रकार की सुरक्षाओं को लेकर आश्वस्थ होने का संवाद नही करता हैं तब तक किसी भी स्थिति में **मैसर्स हिन्दुस्तान जिंक लिमिटेड को किसी भी योजना के विस्तार सम्बंधित स्वीकृती नहीं प्रदान की जाए चाहे वह किसी भी लोकेशन से सम्बंधित ही क्यों ना हो** एवं यदि हमारा आपत्ति पत्र आपके समक्ष प्रस्तुत होने के बावजुद मैसर्स हिन्दुस्तान जिंक लिमिटेड की योजना के विरूद्ध आपत्ति दर्ज नही की जाती हैं या किसी भी प्रकार का किसी भी योजना पर अनापति प्रमाण–पत्र दिया जाता हैं या किसी भी प्रकार की पर्यावरणीय स्वीकृति प्रदान की जाती हैं तो ऐसी स्थिति में किसानों, समुदाय एवं प्राकृतिक सम्पदा को हुई क्षति एवं होने वाली क्षति का जिम्मेदार वह अधिकारी स्वयं व्यक्तिशः भी हो सकेगा जिससे यह राशि भविष्य में व्यक्तिगत वसूली जा सकेगी चूंकि सरकारी प्रकिया अनुसार आपत्ति मिलते ही दर्ज करना होता हैं,

अतः पुनः अनुरोध हैं कि सूचना अधिकार से प्राप्त सरकारी जांच के तथ्यों के अनुसार यह स्पष्ठ हैं कि पर्यावरणीय प्राकृतिक सम्पदा, भौतिक सम्पदा, आजीविका के संसाधन ईत्यादि में संकट की स्थिति शुरू हो चुकी हैं, किसान परेशान हैं अपने भविष्य को लेकर तथा स्थानिय परिवारों के हक की अवहेलना की जा रही हैं इसलिए युवा समुह माताजी का खेडा की तरफ से मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा पर्यावरणीय स्वीकृति हेतू आपके समक्ष प्रस्तुत (खनन, स्मेल्टींग, पॉवर, लेड ईत्यादि विस्तार) **की गई परियोजनाओं के विरूद्ध आपत्ति दर्ज करते हुए पर्यावरणीय स्वीकृति को स्थगित किया जाए एवं भविष्य में मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा प्रस्तुत की जाने वाली समस्त प्रकार की किसी भी लोकेशन से सम्बंधित परियोजनाओं को स्वीकार ही नहीं किया जाए जबतक की समस्याओं से सम्पूर्णरूप से सुरक्षा नहीं मिल जाती एवं किसानों से सम्बंधित मुददों को सुलझा नहीं लिया जाता तथा किसानों की मांग अनुसार मैसर्स हिन्दुस्तान जिंक लिमिटेड को भुतकाल में प्रदान की गई किसी भी प्रकार की स्व तियां एवं एनओसी को भी निरस्त करवाने की कार्यवाही को आगे बढाया जाए।**

निवेदक
(लक्ष्मीलाल सुथार)
अध्यक्ष, युवा समुह माताजी का खेडा

प्रतिलिपी सूचनार्थ एवं आवश्यक कार्यवाही हेतू भेजकर निवेदन हैं कि आपके समक्ष मैसर्स हिन्दुस्तान जिंक लिमिटेड से सम्बंधित कोई भी योजना पहूंचती हैं तो उस पर इस पत्र के हवाले से आपत्ति दर्ज करते हुए पर्यावरणीय स्वीकृति नहीं देने की कार्यवाही करवाएं तथा भुतकाल में प्रदान की गई स्वीकृतियों को भी रदद करवाएं चूंकि आपकी सरकारी जांच रिपोर्ट स्पष्ट करती हैं कि पर्यावरण एवं किसानों के हक विपरित प्रभावित हो रहे हैं –

1. श्रीमान जिला कलक्टर महोदय जी, जिला राजसमन्द, राजस्थान (dm-rel-rj@nic.in)
2. श्री राकेश गुप्ता, क्षैत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, 18, आजाद नगर, भीलवाडा। ro.rpcb.bhilwara@gmail.com
3. श्रीमति अपर्णा अरोरा, चेयरपरसन महोदया जी, राजस्थान राज्य प्रदुषण नियंत्रण मण्डल, मुख्य कार्यालय, 4, पर्यावरण मार्ग, संस्थानिक क्षैत्र, झालाना डूंगरी, जयपुर chairperson@rpcb.nic.in, **member-secretary@rpcb.nic.in**
4. Additional Principal Chief Conservator of Forests (C),Ministry of Environment, Forest and Climate Change, क्षैत्रीय कार्यालय, पर्यावरण एवं वन मंत्रालय, पंचम तल केन्द्रीय भवन, 5 फ्लोर, सेक्टर एच, अलीगंज, लखनउ । rocz.lko-mef@nic.in
5. राष्ट्रीय ग्रीन ट्रीबुनल, **Faridkot House, Copernicus Marg, New Delhi - 110 001** rg.ngt@nic.in
6. महाप्रबन्धक, हिन्दुस्तान जिंक लिमिटेड, राजपुरा दरिबा खदान – को भेजकर लेख हैं कि उपखण्ड अधिकारी रेलमगरा द्वारा लक्ष्मीलाल सुथार की एक शिकायत पर आपसे हिन्दुस्तान जिंक सम्बंधित स्पष्ठिकरण मांगा गया था ताकि सच को समझा जा सकें मगर आपके द्वारा पत्र कमांक–म.प्र(रा.द) 1734 दिनांक 18 अक्टू 1011 भेजकर जोभी जानकारियां दी गई वह बिलकुल निराधार एवं गलत थी जिसकी पुष्टि सरकारी विभागों की मौका मुआईना रिपोर्ट से क्रोसटेली करने पर सामने आया है अतः आप उपखण्ड अधिकारी रेलमगरा एवं जिला कलक्टर राजसमन्द को यह जानकारी देवें कि आपके द्वारा गलत जानकारी क्यों दी गई एवं प्रशासन को अन्धेरे में क्यों रखा गया था तथा भुतकाल में कब–कब ऐसे अन्धेरे में प्रशासन से क्या क्या कार्य करवाए हैं ?

(लक्ष्मीलाल सुथार)
अध्यक्ष, युवा समुह–माताजी का खेडा
गांव माताजी का खेडा, ग्राम पंचायत कोटडी
त. रेलमगरा, जि. राजसमन्द, राज्य राजस्थान 313211

सेवामें

दिनांक 1/11/2017

श्रीमान जिला कलेक्टर महोदयजी सा.

जिला कार्यालय राजसमन्द

जन सुनवाई स्थल S.K मार्बल्स धारी सिन्देसर खुर्द

विषय:- ग्राम अमरपुरा के समस्त ग्राम के सम्बन्ध में।

महोदयजी,

उपरोक्त विषय में नम्र निवेदन है कि सिन्देसर खुर्द की माइन्स से हमारे ग्राम में कुंओं का जल स्तर बहुत ही कम हो गया है एवं पशक्रिग प्रदुषण से पैदा होने वाली फसलों की पैदावार भी बहुत कम हो रही है। इस कारण से हमारे गांव में बेरोजगारी धीरे धीरे बढ़ती जा रही है। बेरोजगारी को कम करने के लिए पूर्व में भी जनसुनवाई में प्रार्थना पत्र दिया गया था। किन्तु उस पर कोई कार्यवाही नहीं की गई।

अत: श्रीमान से निवेदन है कि इस जन सुनवाई के डिवल पर हम ग्रामवासी के युवाओं को रोजगार हेतु S.K मार्बल्स में हमारी योग्यता के आधार पर काम पर लगाने की कृपा करावें। इस हेतु पूर्व में भी PM से लेकर CM तक प्रार्थना पत्र दिया गया था। लेकिन कोई कार्यवाही नहीं हुई। अगर सुनवाई नहीं हुई तो आगे हड़ताल करने पर विवश होना पड़ेगा।

विनीत

समस्त ग्राम वासी युवा मंडल

अमरपुरा

देवीलाल गाडरी लक्ष्मणलाल लोहार अनार रैगा

नरेश लोहार नारायण प्रजापत फकीरलाल लोहार

मेताजी लाल रवीम रोशन लाल भाट

सोहनलाल कालुराम रेगर हुलचंद रेगर मांगीलाल रेगर

मोहन गाडरी

9950035015

दिनांक = 1=11=2017

(कृषि जयश्री ... ग्राम ...)

... गाट ... [illegible]

(1) सोहनलाल गाडरी
(2) लक्ष्मणलाल लौहार
(3) साबिर खाँ
(4) नारायण लाल गाडरी
(5) ... लाल लौहार
(6) ... लाल लौहार
(7) ... लाल भाट
(8) ... राम गाडरी
(9) ... लाल गाडरी
(10) [illegible]

... पुरा ग्राम वासी

(11) ... लाल रेगर
(12) प्रकाश चन्द्र रेगर
(13) कालूराम रेगर
14 ... लाल मोहन लाल ...

SHIVA SENA

Date: 01.11.2017

To

Hon'ble Governor Sir
Jaipur, Rajasthan

Subject: Regarding problems faced by the local people due to mines and employment.

Respected Sir,

With reference to the above subject, it is to state that DaribaMines , Hindustan Zinc Limited of Vedanta group are situated in Rajsamand Dist. When this mine was established, Government has assured local people that local people will get employment upon the establishment of this mine and the drinking water problems will be solved. But the situation here is entirely different. Local people are not given employment here whereas outsiders and foreign people are provided employment by paying four times salary to them. Even though India is a developing country, the local talents are neglected resulting increase in the unemployment and damaging to economy of India. Chemical plants in the mines should be away from the public residences, where as the residential area is just within 15kms and many poisonous gases and Solid waste from the chemical plants are released into environment and in the agricultural fields of the region and the fertile lands are becoming barren lands. Even the animals are affected with the poisonous gases and solid waste. The life of animals become reduced and at the same time the quantity of milk they release also reduced. Animals are becoming sick in an early age. Unemployment is increasing rapidly in Relmagra and Dariba region.

The outsiders and foreign people who have been provided employment. Misbehave with our sisters residing at nearby places

Keeping in view of the above, Sivasena demands your honour that the main problem of this region is unemployment. The first right to get employment lies with local and people residing nearby villages. It is also requested that verification of outside and foreign people should be taken place and they should be provided employment after proper verification so that the crime percentage will come down.

Samar Singh Bundela

(Dy. State chief and in-charge, Udaipur division)

Copy to :

Collector ,Rajsamand.

Sr No	Query	Action plan
1	When this mine was established, Government has assured local people that local people will get employment upon the establishment of this mine and the drinking water problems will be solved. But the situation here is entirely different. Local people are not given employment here whereas outsiders and foreign people are provided employment by paying four times salary to them.	Employment is provided by giving priority to youths from surrounding villages and the same will be continued in future. HZL will provide employment opportunities to people of the region as per the requirement, eligibility and policy of the company. Presently 70% employees are from Rajsamand District and 80% from Rajasthan. HZL is monitoring the environmental parameters Air, soil and water. As on date there is no contamination of pollutant recorded due to the mitigation measures in place. All the employees will abide by law and will follow ethics and will be prosecuted if any illegal activity is done by employees.
2	Chemical plants in the mines should be away from the public residences, where as the residential area is just within 15 kms and many poisonous gases and Solid waste from the chemical plants are released into environment and in the agricultural fields of the region and the fertile lands are becoming barren lands	
3	Even the animals are affected with the poisonous gases and solid waste. The life of animals become reduced and at the same time the quantity of milk they release also reduced. Animals are becoming sick in an early age.	
4	Unemployment is increasing rapidly in Relmagra and Dariba region	
5	The outsiders and foreign people who have been provided employment. Misbehave with our sisters residing at nearby places	

YUVA GROUP—MATAJI KA KHEDA

No.Vill-PI/Career Resources, Physical resources, Env., and Future Safety

Dt.29.10.2017

Hon'ble Additional Collector Sir

Dist-Rajsamand, Rajasthan

Objection-letter

Subject :-A proposal/ plan was submitted regarding expansion of production capacity of Lead-Zinc underground mine located at Village-SindesarKhurd, Tehsil-Railmagra, Dist-Rajsamand(Rajasthan) by M/s.Hindustan Zinc Limited (ML No.07/95) in an area of 199.84ha. , against which Youth Group, MatajiKaKheda requests you to stop /restrict all future proposals of M/s.HZL at your level under safeguarding Public Interests, Individual Rights, Good Governance, Environment, People protection, Community interests, Career Resources, basic and natural mineral resources, protection of water, air and climate conditions, Physical Property, Environmental mineral assets, Private properties and consumer rights etc., and we raise objections against and stop the present process :

Reference :-

1. District Collector Rajsamand letter no.P.14/Asst.,/Misc./11-12/158081 Dt.19.07.2011
2. Sub-divisional Officer, Relmagra letter no.214-20 Dt.11.10.2011
3. Sub divisional magistrate Relmagra, Letter no.128-33 Dt.01.09.2011
4. Office of TahasildarRelmagra , letter no.Revenue/2011/321 dt.25.10.2011
5. Public Health Engineering Department Relmagra letter no.132, Dt.21.11.2011
6. Divisional Chief Medical Officer, Relmagra letter no. SPL Dt.07.10.2011
7. Development Officer, Relmagra letter no.Pasare/Panchayat2034 dt.09.12.2011

Respected Sir,

With reference to the above it is kindly to state that M/s.Hindustan Zinc Limited has established 3 big industries (Dariba Complex – Zinc Smelter Lead and Zinc plant, RajpuraDariba Mine, SindesarKhurd Mine), which is causing a major damage to environment and physical world along with the adverse affect on not only Physical, Career and Private properties, but also on environmental property resulting adverse affect economic, social, mental, religious, health status of local tribal people. This was investigated by Hon'ble Collector, Rajsamand and through all line departments under the leadership of Subdivisional Officer Relmagra and it was also confirmed by them.

Some private lands belonging to farmers of Village-MatajiKaKheda were given to Government of Rajasthan for specified purposes. After the expiry of said lease the lands have to be transferred to the farmers on their names, but the purposes of the lease were converted without consulting-discussing and obtaining opinion and we also understand that the lease period is being extended whereas the said private lands belong to the local farmers and Smelter, Lead and Power Plant was established without taking opinion and consent of the farmers, which is a illegal process and farmers demand to close down Zinc Plant completely. Lead Plant which comes under Hazardous / Risk activity and which may create a big threat and dangerous. Industries coming under Hazardous category should not be established near population habitats /residence because there is always chances of gas leakage / releases which may take away many lives of the people in the region. But Hindustan Zinc Limited has established such plant between the residential area (Population area).

Therefore, it is clear and certified in the verification/inspection carried out by government through District Collector on the complaint of villager

Shri LakshmilalSudhar, that local lands, water, air etc., got polluted by the industry of M/s.Hindustan Zinc Limited and this has created a big problem of environmental pollution. The adverse affect on ecology is seen continuously, Career or livelihood resources are badly affected and there is a possibility of loss of crores of property of villagers and their families in MatajiKaKheda Village and their area is increasing and YUVA GROUP of the village has both the preliminary and secondary facts with them.

All are afraid that M/s.Hindustan Zinc Limited and Projects with their greediness and self interests of decades will damage or end the future century of local people and their generations.Therefore, we kindly request you to ensure all safety norms and until and unless YUVA GROUP confirms the all safety assurances explained above and give information to you, M/s. Hindustan Zinc Limited should not be given any permission for new projects, or expansions whatever may be the location and project. We would like to inform you once again, if you don't take any action even after receiving our objection letter and ignore it and grant or issue any no-objection certificate to M/s.HZL, in such situation, you will be fully responsible and accountable for the damage and loss anticipated/ to be happened to the local farmers, people community and natural resources/properties and the officials involved in this process will be individually responsible resulting to recoveries towards loss/damage from individuals concerned since as per the government process whenever any objection is received it should be recorded immediately.

Therefore, once again it is kindly requested that keeping in view of the facts received from government under RTI replies that the crisis / threat to environmental natural properties, Physical Properties, Livelihood resources etc., has already started, and farmers are mostly worried about their future and the rights of local families are being neglected and therefore, please don't issue any permission or environmental clearances/sanctions for any

type of project against the applications or requests received from M/s.Hindustan Zinc Limited for Lead Zinc Projects, new projects or for expansion of any project what so ever the location it will be till then all the problems are heard and all the above safety threats and anticipations are cleared and resolve all the problems related to farmers and local people. We also request to ban/ take back all the permissions, sanctions, acceptances provided to M/s.Hindustan Zinc Limited immediately and encourage the further action against M/s.HZL.

Applicant

(LaxmilalSutar)

President, YUVA GROUP MatajiKaKheda

Copy forwarded for information and necessary action with a request not to sanction or grant any environmental clearance to M/s.HZL taking the reference of our objection letter and what so ever permissions or clearances given to M/s.HZL should be taken back or cancelled because your government report clarifies that there will be adverse affect on environment and farmers .

1. Hon'ble District Collector, Dist-Rajsamand, Rajasthan(dm-raj-rj@nic.in)
2. Shri Rakesh Gupta,Regional Officer, Rajasthan Pollution Control Board,18, Azaad Nagar, Bhilwara. Rorpcb.bhilwara@gmail.com
3. Smt. Aparna Arora, Chair Person, Rajasthan State Pollution Control Board, Head Office, 4, Paryavaran Marg, Institutional area, JhalanaDungri, Jaipur chairperson@rpcb.nic.inmember-secretary@rpcb.nic.in
4. Additional Principal Chief Conservator of Forests © Ministry of Environment, Forest, and Climate Change, Regional Office, Ministry of

Environment and Forest,Fifth Floor,KendriyaBhawan, Sector-H, Aliganj, Lucknowrocz.jko-met@nic.in

5. National Green Tribunal, Faridkotouse, Copernicus Marg, New Delhi-110001 rg.ngt@nic.in
6. General Manager, Hindustan Zinc Limited, Rajpura, Dariba Mine – and to state that Sub-divisional Officer, Relmagra has asked clarification from M/s.HZL with reference to complaint made by Shri LaxmilalSutar on behalf of all the people, but the information sent by you vide your letter no.GM(RV), 1734, dated 18.10.2011 is not correct, and fully baseless and this has already confirmed by the government based on their site inspection report. And hence you are asked to inform SDO, Relmagra and District Collector, Rajsamand—Why you have given wrong information and why you have kept administration in dark and in the past also -when you have kept the administration in dark and why so?

(LaxmilalSutar)
President, YUVA GROUP MatajiKaKheda
Village Panchayat—Kotadi
Tehsil—Relmagra, Dist-Rajsamand, Rajasthan State-313211

Sr No	Query	Action plan
1	M/s.Hindustan Zinc Limited has established 3 big industries (Dariba Complex – Zinc Smelter Lead and Zinc plant, Rajpura Dariba Mine, SindesarKhurd Mine), which is causing a major damage to environment and physical world along with the adverse affect on not only Physical, Career and Private properties, but also on environmental property resulting adverse affect economic, social, mental, religious, health status of local tribal people.	Due to the major industries there will be impacts. These impacts are being quantified in terms of pollution levels, which are being mitigated by control measures are found to be within the permissible limits prescribed by CPCB/SPCB and MOEF&CC. HZL is committed and all the pollution control equipment's and parameters are observed to be well below limits.
2	Some private lands belonging to farmers of Village-MatajiKaKheda were given to Government of Rajasthan for specified purposes. After the expiry of said lease the lands have to be transferred to the farmers on their names, but the purposes of the lease were converted without consulting-discussing and obtaining opinion and we also understand that the lease period is being extended whereas the said private lands belong to the local farmers and Smelter, Lead and Power Plant was established without taking opinion and consent of the farmers, which is a illegal process and farmers demand to close down Zinc Plant completely.	Land issue raised is related with other mine of Hindustan Zinc Limited, i.e. Rajpura Dariba (RD) Mine for which mining lease, ML No. 166/2008, Area -1142.20 ha is valid till 29.05.2030. All the lands will be procured as per the latest LA act and its subsequent amendments will be followed as per the orders of the District Magistrate. As per the lease agreement all the conditions will be executed. All the clearances of the existing and proposed plants are being obtained and complied.
3	Lead Plant which comes under Hazardous / Risk activity and which may create a big threat and dangerous. Industries coming under Hazardous category should not be established near population habitats /residence because there is always chances of gas leakage / releases which may take away many lives of the people in the region. But Hindustan Zinc Limited has established such plant between the residential area (Population area).	HZL is monitoring the environmental parameters Air, soil and water. As on date there is no contamination of pollutant recorded due to the mitigation measures in place.

4	Therefore, it is clear and certified in the verification/inspection carried out by government through District Collector on the complaint of villager Shri Lakshmilal Sudhar, that local lands, water, air etc., got polluted by the industry of M/s.Hindustan Zinc Limited and this has created a big problem of environmental pollution. The adverse affect on ecology is seen continuously, Career or livelihood resources are badly affected and there is a possibility of loss of crores of property of villagers and their families in MatajiKa Kheda Village and their area is increasing and YUVA GROUP of the village has both the preliminary and secondary facts with them	HZL will provide employment opportunities to people of the region as per the requirement, eligibility and policy of the company.
5	All are afraid that M/s.Hindustan Zinc Limited and Projects with their greediness and self interests of decades will damage or end the future century of local people and their generations. Therefore, we kindly request you to ensure all safety norms and until and unless YUVA GROUP confirms the all safety assurances explained above and give information to you, M/s. Hindustan Zinc Limited should not be given any permission for new projects, or expansions whatever may be the location and project. We would like to inform you once again, If you don't take any action even after receiving our objection letter and ignore it and grant or issue any no-objection certificate to M/s.HZL, in such situation, you will be fully responsible and accountable for the damage and loss anticipated/ to be happened to the local farmers, people community and natural resources/properties and the officials involved in this process will be individually responsible resulting to recoveries towards loss/damage from individuals concerned since as per the government process whenever any objection is received it	HZL has established and implemented Stakeholder Engagement & Grievance Redressal Mechanism to establish healthy relationships with stakeholders. Monthly meetings are organized with farmer group, SHG members and Village representatives

	should be recorded immediately.	
	Therefore, once again it is kindly requested that keeping in view of the facts received from government under RTI replies that the crisis / threat to environmental natural properties, Physical Properties, Livelihood resources etc., has already started, and farmers are mostly worried about their future and the rights of local families are being neglected and therefore, please don't issue any permission or environmental clearances/sanctions for any type of project against the applications or requests received from M/s.Hindustan Zinc Limited for Lead Zinc Projects, new projects or for expansion of any project what so ever the location it will be till then all the problems are heard and all the above safety threats and anticipations are cleared and resolve all the problems related to farmers and local people. We also request to ban/ take back all the permissions, sanctions, acceptances provided to M/s.Hindustan Zinc Limited immediately and encourage the further action against M/s.HZL	Support to all the sectors like health, education, infrastructure other amenities are being provided by HZL. Due to HZL there is no threat to community only development is taking place due to the upcoming industries and standard of living is increased in the area.

Dated : 01.11.2017

To

Hon'ble District Collector Sir

District Office, Rajsamand,

Public hearing venue, SK Mines holder, SindesarKhurd

Subject :- Regarding problems of Village Amarpura

Sir,

It is kindly to state on the above subject that the water levels of the wells in our village are going down and due the SindesarKhurd Mines. The crop/ yield of the agricultural fields in the region also affected due to environmental pollution due to the said mines. Due to this, unemployment in our village is increasing day by day. In the past also representations were given during the public hearing to reduce unemployment in the region. But, no action has been taken on this.

Therefore, we kindly request you to engage and employ local unemployed youth of the local villages in the jobs as per their qualifications on the day of public hearing. Representations were given PM to CM in the past also for providing employment. But no action has been taken so far. If no action is taken and the problems are not solved, we will be compelled to go on strike.

Yours Sincerely

Entire Villagers Youth group

Amarpura

Villagers of Amarpura

1) Shri SohanlalGathari

2)Shri LaxmanlalLouhar

3)Shri Safir Khan

4)Shri NarayanlalGathari

5)Shri NareshlalLouhar

6)Shri Suresh LalLouhar

7)Shri RoshanlalJath

8)Shri KaluramGadari

9) Shri KishanlalGadari

10) Shri BhawanlalKesar

11) Shri BansilalRegar

12)ShriPrakash Chandra Regar

13) Shri KaluramRegar

14) Shri ShankarlalMohanlalPil

Sr No	Query	Action plan
1	It is kindly to state on the above subject that the water levels of the wells in our village are going down and due the SindesarKhurd Mines. The crop/ yield of the agricultural fields in the region also affected due to environmental pollution due to the said mines.	HZL is monitoring the environmental parameters of soil and water and being submitted as a part of the EC compliance. As on date there is no contamination of pollutant recorded due to the mitigation measures in place.
2	It is kindly to state on the above subject that the water levels of the wells in our village are going down and due the SindesarKhurd Mines	The quality and quantity of the water of the area is being checked at regular intervals, as a part of the environmental compliance and found to be within limits.
3	Due to this, unemployment in our village is increasing day by day. In the past also representations were given during the public hearing to reduce unemployment in the region. But, no action has been taken on this	HZL will provide employment opportunities to people of the region as per the requirement, eligibility and policy of the company.

[illegible] ई-[illegible] के माध्यम से निविदा [illegible] की जाती है।

[illegible]	अनुमानित लागत	पूर्व निविदा बैठक	निविदा के ऑनलाईन प्रस्तुतीकरण की अंतिम तिथि एवं समय	बयाना जमा राशि (EMD)	निविदा के ऑनलाईन प्रस्तुतीकरण की अवधि
[illegible]	1.50 करोड़	10.10.17 प्रातः 11.00 बजे) (ऑफलाईन	24.10.2017 प्रातः 11.00 बजे तक	रुपये 2,93,408.00 (राशि रुपये दो लाख, तिरानवें हजार चार सौ आठ मात्र)	दिनांक 27.09.17 से 24.10.17 प्रातः 11.00 बजे तक

[illegible] का पूर्ण विवरण वेबसाइट https://esictenders.eproc.in पर ऑनलाईन उपलब्ध है। निविदा से सम्बंधित [illegible] एवं अधिक जानकारी हेतु कर्मचारी राज्य बीमा निगम की वेबसाइट www.esic.nic.in पर नियमित [illegible] करें।

चिकित्सा अधीक्षक

[I]N THE HIGH COURT OF DELHI AT NEW DELHI

(ORIGINAL JURISDICTION)

IN THE MATTER OF COMPANIES ACT, 1956

AND

[I]N THE MATTER OF SIMMTRONICS SEMICONDUCTORS LTD. (IN PROV. LIQN.)

IN

C.P. NO. 690/2015

FORM NO. 63

[See rule 148(1)]

[Ad]vertisement of Notice to Creditors, Workmen and [Sh]areholders to prove their claim

[Not]ice is hereby given to all the creditors (secured & unsecured) [pr]eferential creditors, workmen as well as shareholders if any of [th]e above-named company that they are required to submit to the [Of]ficial Liquidator, Delhi attached to Hon'ble High Court of Delhi to [pr]ove their respective debts or claims against the above-named [co]mpany by delivering at the office of the Official Liquidator on or [be]fore the 20-10-2017 or sending by post to the Official Liquidator [so] as to reach him not later than the said date, an affidavit proving [th]e debt or claim in the prescribed form with their respective [n]ames, addresses and particulars of the debt or claim, and any [ti]tle to priority under section 529 A & 530. Any creditor (secured & [u]nsecured) preferential creditors, workmen as well as [s]hareholders if any who fails to submit his affidavit to proof within [th]e time limited as aforesaid will be excluded from the benefit of [a]ny distribution of dividend before his debt is proved, or, as the [c]ase may be, from objecting such distribution.

[A]ny creditor (secured & unsecured) preferential creditors, [w]orkmen as well as shareholders if any who has sent in his proof, [i]f so required by notice in writing from the Official Liquidator, shall [e]ither in person or by is advocate, attend the investigation of such [d]ebt or claim at such time and place as shall be specified in such [n]otice and shall produce such further evidence of his debt or claim [a]s may be required.

Dated this..............................day of...........................2017.

Sd/- (D.P. OJHA)
OFFICIAL LIQUIDATOR, DELHI
ATTACHED TO HIGH COURT OF DELHI
8TH FLOOR, LOK NAYAK BHAWAN KHAN MARKET
NEW DELHI-110003
PH.: 011-24693393-94

Visit website www.mca.gov.in www.delhiol.com for downloading Form No. 66 of the Companies (Court) Rules 1959.

davp 07104/11/0038/1718

Dedicated Freight Corridor Corporation of India Limited
A Govt. of India (Ministry of Railways) Enterprise

Open E-Tender Invitation

On behalf of President of India, Chief Project Manager/Tundla/DFCCIL invites E-tender for following work through open E-Tender:-

Tender No. : TDL/EN/BHU-KRJ-LXING/EC/ROB4, Name of Work : Construction of 1 no. ROB (excluding approaches) in lieu of level crossings No. 67C at IR chainage 1239/21-23, between TDL-FZD stations of MGS-GZB Section of Allahabad Division of North Central Zonal Railway; **Type of Tender :** Open E-Tender (Single Stage Two Packet System), **Type of Contract : Works** Contract, **Estimated cost of work :** Rs. 11,02,60,107/-, **Duration of Work :** 12 Months, **Earnest Money :** Rs. 22,05,202/-, **Cost of Tender Documents :** Rs. 11,800/-, **E-tendering Websites : www.tenderwizard.com/DFCCIL, www.dfccil.gov.in** and CPP Portal **www.eprocure.gov.in. Last Date of Submission of Tender :** 31.10.2017 at 15:00 Hrs., **Date of opening of Tender :** 31.10.2017 at 15:30 Hrs.

Complete details of tender and terms & conditions can be downloaded from E-tendering website **www.tenderwizard.com/DFCCIL, dfccil.gov.in** and on CPP portal. It is advice to regularly visit DFCCIL's websites for other updates regarding tender. Corrigendum if any will be uploaded on websites only.

Chief Project Manager/DFCCIL, 3/20, 3rd Floor, KPS Tower, Mayur Complex, Near Tulsi Cinema, NH-2, Nagla Padi, Agra - 282002 (U.P.)

क्षेत्रीय कार्यालय — फोन: 01482-241159

राजस्थान राज्य प्रदूषण नियंत्रण मण्डल

18, आजाद नगर, [illegible], भीलवाड़ा-311001

पर्यावरणीय स्वीकृति हेतु जन सुनवाई के लिए आम सूचना

1. सर्वसाधारण को सूचित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा-जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 109.84 हैक्टयर, ग्राम-सिन्देसर खुर्द, तहसील-रेलमगरा, जिला-राजसमन्द के क्षमता विस्तार सीसा-जिंक अयस्क उत्पादन क्षमता 4.5 [illegible] [illegible] 6.5 [illegible] राजस्थान राज्य प्रदूषण नियंत्रण मण्डल [illegible] प्रस्तुत किया गया है।
2. और चूंकि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा-जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 109.84 हैक्टयर, ग्राम-सिन्देसर खुर्द, तहसील-रेलमगरा, जिला-राजसमन्द के क्षमता विस्तार सीसा-जिंक अयस्क उत्पादन क्षमता 4.5 [illegible] 6.0 [illegible] 6.5 [illegible] राजस्थान राज्य प्रदूषण नियंत्रण मण्डल को आवेदन किया है। उक्त परियोजना हेतु वन एवं पर्यावरण मंत्रालय, नई दिल्ली द्वारा जारी अधिसूचना दिनांक 14.09.2006 के अनुसार जन सुनवाई हेतु इस आशय की सूचना जारी कर 30 दिवस का नोटिस दिया जाना आवश्यक है।
3. उक्त परियोजना से सम्बंधित EIA/EMP रिपोर्ट एवं संक्षिप्त कार्यपालक सार अभिलेख निम्न कार्यालयों में उपलब्ध है:-
   - (1) जिला कलक्टर, राजसमन्द।
   - (2) जिला परिषद, राजसमन्द।
   - (3) जिला उद्योग केन्द्र, राजसमन्द।
   - (4) तहसील कार्यालय, रेलमगरा, जिला राजसमन्द।
   - (5) क्षेत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, आजाद नगर, भीलवाड़ा।
   - (6) राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, मुख्य कार्यालय, 4, पर्यावरण मार्ग, संस्थानिक क्षेत्र, [illegible], जयपुर।
   - (7) क्षेत्रीय कार्यालय, पर्यावरण एवं वन मंत्रालय, [illegible] केन्द्रीय भवन, सेक्टर [illegible] [illegible]।

अतः सर्व साधारण को नोटिस के माध्यम से एतद् द्वारा सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति के संबंधित जन सुनवाई अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द की अध्यक्षता में दिनांक 01.11.2017 को 11:00 AM से सिन्देसर खुर्द [illegible] के बाहर ग्राम सिन्देसर खुर्द तहसील रेलमगरा, जिला राजसमन्द में आयोजित की जावेगी। उक्त जनसुनवाई में कोई भी व्यक्ति उपस्थित होकर अपने सुझाव/आक्षेप प्रस्तुत कर सकते हैं।
इस संबंध में लिखित सुझाव/आक्षेप इस सूचना के प्रकाशन की तिथि से 30 दिवस के अन्दर क्षेत्रीय कार्यालय राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाड़ा में भी प्रस्तुत किये जा सकते हैं।

(राकेश गुप्ता)
क्षेत्रीय अधिकारी

TOI-New Delhi 29/09/2017

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deceased may kindly [illegible]

SHO
Police Station, Sunlight Colony, Delhi
Ph.: 011-26348324, 26347482

DP/6323/SE/17

PROCLAMATION REQUIRING THE APPEARANCE OF A PERSON ACCUSED (See Section 82 Cr.PC.)

Whereas complaint has been made before me that accused person Pawan, S/o Shri Kamal Singh, R/o B-554, Gali No. 4, Rajbir Colony, Delhi has committed the offence in case FIR No. 08/07 U/S 498-A/ 406/34 IPC PS New Ashok Nagar, Delhi and it has been returned to a warrant of arrest thereupon issued that the said accused Pawan can not be found and whereas it has been shown to my satisfaction that the said accused Pawan has absconded (or is concealing himself to avoid the service of the said warrant).

Proclamation is hereby made that the said accused person Pawan of FIR No. 08/07 PS New Ashok Nagar, Delhi is required to appear before this court to answer the said complaint on or before 08.11.17.

By Order
Ms. Rajani Ranga
Metropolitan Magistrate
Mahila Court (East)-02
Room No. 24, First Floor, Karkardooma Court, Delhi

DP/5802/ED/17

PROCLAMATION REQUIRING THE APPEARANCE OF ACCUSED PERSON

(SECTION 82 Cr.Pc.)

Whereas complaint has been made before me that the accused person **Lokesh Kumar Malhotra,** S/o Surendra Mohan Malhotra R/o H No.-188, Second Floor, Surya Niketan, Delhi, has committed (or is suspected to have committed) the offence in case FIR No- 31/16 dated 22/03/16 u/s 408/420/468/471B IPC at P.S. Mandir Marg, Delhi and it has been returned to warrant of arrest there upon issued that the said accused person **Lokesh Kumar Malhotra,** cannot be found and whereas it has been shown to my satisfaction that the said **Lokesh Kumar Malhotra,** has absconded (or is concealing himself to avoid the service of said warrant).

Proclamation is hereby made that the said accused **Lokesh Kumar Malhotra,** Under the Case FIR No.- 31/16 dated 22/03/16 u/s 408/420/468/471B IPC at P.S. Mandir Marg, Delhi is required to appear before the court.

By order
Sh. Sumit Das, CMM
Patiala House Court
New Delhi

DP/149/EOW/17

[illegible] / [illegible] / 17 / 4410

UNIDENTIFIED DE[AD BODY]

General public is hereby informed that an unknown male person was found dead at Barakhamba Park **Dated 26.09.2017 Timing: 11:00 AM.** In this regard **DD No. 13A** has been lodged at **P.S. Hazrat Nizamuddin, New Delhi.**

The description of the dead body is given as under **Name:** Unknown **S/o:** Unknown **R/o** Unknown **Age:** 65 years, **Height:** 5'5", **Complexion:** Wheatish, **Wearing:** Khaki Colour Kurta Without Lungi

Sincere efforts have been made by local [police to trace the identity of the] dead person but no clue has come to light [so far. Persons having] any information about this dead p[erson may contact the] undersigned.

P.S. Hazrat N[izamuddin]

DP/6330/SE/17 **24[illegible]**

APPEAL FOR IDEN[TIFICATION]

It is publically inf[ormed that an unidentified] dead body nam[e] Unknown, R/o Un[known] years, Height 5'6" Build medium, Eye[s] white, Wearing c[olour] white colour Pajam[a] Pole No. 4/29[illegible] Fazalpur flyover, ra[illegible] New Delhi Rly. Sta[tion] train accident. In this regard a D.D. No [illegible] has been lodged at P.S. Anand Vihar Ra[ilway].

Sincere efforts have been made by loc[al police] dead body but no clue has come to light [so far. Any] any information about this male dea[d body may contact the] undersigned.

P.S. Anand Viha[r]
Ph.: 01[illegible]

DP/2780/RLY/17

क्षेत्रीय कार्यालय फोन: 01482-241159

राजस्थान राज्य प्रदूषण नियंत्रण मण्डल

18, आजाद नगर, पन्नाधाय सर्किल, भीलवाड़ा–311001

पर्यावरणीय स्वीकृति हेतु जन सुनवाई के लिए आम सूचना

1. सर्वसाधारण को सूचित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने हेतु सम्बन्धित प्रार्थना–पत्र मय दस्तावेज पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल (यहाँ तथा बाद में मण्डल के नाम से अभिलिखित) को प्रस्तुत किया गया है।
2. और चूंकि मैसर्स हिन्दुस्तान जिंक लिमिटेड द्वारा सीसा–जिंक उत्पादन (विस्तार योजना) (एम.एल. नं. 07/95), क्षेत्रफल 199.84 हैक्टयर, ग्राम–सिन्देसर खुर्द, तहसील–रेलमगरा, जिला–राजसमन्द के क्षमता विस्तार सीसा–जिंक अयस्क उत्पादन क्षमता 4.5 एमटीपीए से 6.0 एमटीपीए करने एवं सीसा–जिंक अयस्क बेनिफिशिएशन क्षमता 5.0 एमटीपीए से 6.5 एमटीपीए करने की पर्यावरणीय स्वीकृति से पूर्व आवश्यक जन सुनवाई हेतु राजस्थान राज्य प्रदूषण नियंत्रण मण्डल को आवेदन किया है। उक्त परियोजना हेतु वन एवं पर्यावरण मंत्रालय, नई दिल्ली द्वारा जारी अधिसूचना दिनांक 14.09.2006 के अनुसार जन सुनवाई हेतु इस आशय की सूचना जारी कर 30 दिवस का नोटिस दिया जाना आवश्यक है।
3. उक्त परियोजना से संबधित EIA/EMP रिपोर्ट एवं संक्षिप्त कार्यपालक सार अभिलेख निम्न कार्यालयों मे उपलब्ध है:–
   (1) जिला कलक्टर, राजसमन्द।
   (2) जिला परिषद, राजसमन्द।
   (3) जिला उद्योग केन्द्र, राजसमन्द।
   (4) तहसील कार्यालय, रेलमगरा, जिला राजसमन्द।
   (5) क्षेत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, आजाद नगर, भीलवाडा।
   (6) राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, मुख्य कार्यालय, 4, पर्यावरण मार्ग, संस्थानिक क्षैत्र, झालाना डूंगरी, जयपुर।
   (7) क्षैत्रीय कार्यालय, पर्यावरण एवं वन मंत्रालय, पंचम तल केन्द्रीय भवन, सेक्टर एच, अलीगंज, लखनऊ।

अतः सर्व साधारण को नोटिस के माध्यम से एतद द्वारा सूचित किया जाता है कि उक्त परियोजना के पर्यावरणीय स्वीकृति से संबधित जन सुनवाई अतिरिक्त जिला मजिस्ट्रेट, राजसमन्द के पर्यवेक्षण एवं अध्यक्षता में दिनांक 01.11.2017 को 11:00 AM से सिन्देसर खुर्द माइन्स के बाहर ग्राम सिन्देसर खुर्द तहसील रेलमगरा, जिला राजसमन्द में आयोजित की जावेगी। उक्त जनसुनवाई में कोई भी व्यक्ति उपस्थित होकर अपने सुझाव/आक्षेप प्रस्तुत कर सकते हैं।

इस संबंध मे लिखित सुझाव/आक्षेप इस सूचना के प्रकाशन की तिथि से 30 दिवस के अन्दर क्षैत्रीय कार्यालय, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल, भीलवाड़ा मे भी प्रस्तुत किये जा सकते हैं।

(राकेश गुप्ता)
क्षैत्रीय अधिकारी

Annexure-XII

R&R Letter submitted to District Collector

RDC/SP/R&R/2017-18/ Date 28/7/2017

To,

District Collector Rajsamand

District Rajsamand – Rajasthan

Sub:- Form I regarding R & R of Sindesar Khud Village of Railmagra Tehsil

Respected Sir,

Enclosed here with a Form I regarding The Right to Fair Compensation and Transparency in Land acquisition, Rehabilitation and Resettlement Act 2013 of Sindesar Khurd village of Railmagra Tehsil.

प्राप्त

28-7-2017

जिला कलक्टर कार्यालय

राजसमन्द

Yours faithfully

(KC Meena)

Site President Rajpura Dariba Location

Location Head
Rajpura Dariba Complex
Hindustan Zinc Limited
P.O. DARIBA-313 211
Dist. Rajsamand (Raj.)

Hindustan Zinc Limited
Rajpura Dariba Complex, P.O. Dariba, Teh. Railmagra, Distt. Rajsamand (Rajasthan) - 313 211
T +91-2952 265 151 F +91-2952 265 143 www.hzlindia.com

Registered Office : Yashad Bhawan, Udaipur (Rajasthan) - 313 004
CIN : L27204RJ1966PLC001208

FORM-I
(See rule-3)
Request for Land Acquisition

From: Hindustan Zinc Limited- Sindesar Khurd Mines
Name K C Meena Site President

To:

1. The District Collector

District :- Rajsamand

2. Commissioner, R&R, Rajsamand

It is request to acquire 92.14 Bigha of land for which Expansion Of Sindesar Khurd Mines project/purpose and details are furnished in Annexure (Appendix)

Ann I along with three copies of combined Sketch (to scale) showing the lands to be acquired.

The gestation period of the project will be 10 years and 11 months

(applicable only if gestation period is more than 5 years).

Requisite cost of acquisition including cost of social impact assessment study (SIA) is available and will be deposited in your office, as provided under provisions of the Tight to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 as and when required by you. It is certified that the land to be acquired was demarcated on the field and all further necessary information and assistance will be provided on the date/time appointed/ stipulated by you.

Yours faithfully

(KC Meena)
Site President Rajpura Dariba Complex

Location Head
Rajpura Dariba Complex
Hindustan Zinc Limited
P.O. DARIBA-313204
Dist. Rajsamand (Raj.)

Annexure –I

Name of the project

(1)Name of the village- Sindesar Khurd Village

(2)Name of the Tehsil- Railmagra

(3)Name of the Municipality/municipal Corporation21

(4)Name of the District- Rajsamand

(5)Survey Nos. to be acquired- *आराजी नंबर 431–40.17 बीघा, 433–4.00 बीघा, 1149/433–2.00 बीघा, 1239/433–0.05 बीघा, 1244/433–0.05 बीघा, 1245/1102–0.10 बीघा,1246/433–0.05 बीघा, 1247/433–0.05 बीघा, 1248/433–0.05 बीघा, 1249/433–0.05 बीघा, 1250/433–0.05 बीघा, 1251/433–0.05 बीघा, 1252/433–0.05 बीघा, 1253/433–0.05 बीघा, 1254/433–0.05 बीघा, 1255/433–0.05 बीघा, 1256/433–0.05 बीघा, 1257/1102–1.00 बीघा, 1258/1102–3.00 बीघा, 1292/433–4.00 बीघा, 1284/433–0.05 बीघा, 1277/433–17.10 बीघा, 1102–4.10 बीघा, 433–5.06 बीघा, 1102–1.03 बीघा, 1103–5.05 बीघा कुल 92.14 बीघा*

(5) Total area under request (in hectare /Sq.metres) 92.14 Bigha

(7) Boundaries of the area to be acquired-

East- Sindesar Khurd Village

West- Sindesar Khurd Village

North- Sindesar Khurd Village

South- SK Mines

(8)Area of the agricultural and irrigated multi-cropped land :- Nil

(9)Reasons for inclusion of agricultural and irrigated multi-cropped land :- NA

(10)Details of buildings and other structures, tanks, wells, trees, etc., :- 248 Houses

(1 1) Reasons for the inclusion of religious building graveyard or tomb etc. for acquisition, if any. 10 Temples, 1 Govt. Middle School, 1 Anganwadi Centre, 1 Water Tank and 5 Pinchyat Shops.

(KC Meena)

Site President Rajpura Dariba Complex

Location Head
Rajpura Dariba Complex
Hindustan Zinc Limited
P.O. DARIBA-313211
Dist. Rajsamand (Raj.)

Annexure-XIII

Authenticated Letter regarding Aravali Hills

ANNEXURE-XIII
LETTER REGARDING ARAVALI NOTIFICATION

राजस्थान सरकार
कार्यालय खनि अभियन्ता, खण्ड–द्वितीय राजसमन्द

क्रमांक :– खअ–II/राज/सीसी–गेजर/एमएल–7/95/963 दिनांक 1.12

प्रेषिति:–

श्री ईकाई प्रबन्धक ,
सर्वश्री हिन्दुस्तान जिंक लि0
राजपुरा–दरीबा तहसील रेलमगरा जिला राजसमंद ।

विषय:–खननपट्टा वास्ते खनिज लेड जिंक एंड एसोसियेटेड मिनरल्स निकट ग्राम हीरेता तहसील एवं जिला राजसमन्द ।

महोदय,

उपरोक्त विषयान्तर्गत लेख है कि खननपट्टा में स्वीकृत 199–84 हे0 क्षैत्र शासन के पत्र संख्या एफ–14(5)माईन्स/ग्रुप/2002 दिनांक 19.8.2003 तथा निदेशालय के परिपत्र दिनांक 9.1.2006 की परिभाषा अनुसार स्थानीय भूमितल से 100 मीटर से कम उंची पहाडी पर स्थित होने से अरावली हिल रेंज में नहीं आता है ।

भवदीय

खनि अभियन्ता राजसमन्द
खण्ड–द्वितीय

ANNEXURE-XIII
LETTER REGARDING ARAVALI NOTIFICATION
ENGLISH TRANSLATION OF THE LETTER FROM MINING ENGINEER

GOVERNMENT OF RAJASTHAN

OFFICE OF MINING ENGINEER, GROUP II, RAJSAMAND

No.KhaA-II/Raj./CC-Major/ML-7/95/963 dt. 01.12.2007

To,

Unit Head
M/s. Hindustan Zinc Limited
Rajpura-Dariba, Tehsil, Relmagra
Distt. Rajsamand.

Sub: Regarding mining lease of lead-zinc minerals and associated minerals near Sindesar Village, Tehsil, Relmarga, Distt. Rajsamand.

Sir,

With reference to the above cited subject, it is to inform you that vide letter No. F/14(5)/Mines/ Group/2002 dt.19.08.2003 & according to the definition of circular by directorate dated 09.01.2006 that the height of local hills are less than 100 meters from ground level hence it does not comes under Aravali hill range.

Yours faithfully

Mining Engineer, Rajsamand
Group- II

Annexure-XIV

Occupational Health Reports

	NUMBER	DECLARED UNFIT	HIGH BP	DIABETES	MANIA	K CHEST HEALED	HIGH FREQUENCY HEARING LOSS	MILD NIHL	AMBLYOPIA
EXECUTIVES	50	0	2	2	0	0	2	0	0
WORKMEN	275	2	1	3	1	2	21	5	1

SNo	VisitAdmit Date	P Id	Patient Name	FatherHusband	Blood Group	Age/Sex	NineOrSeat elter	Designation	Department	EmployedUnit	Advise	PMERemarks	PlaceOfPosting	NextPMED ate	BP	VISION	WITH GLASS	AUDIOM ETRY	LUNG FUNCTI ONS			
1	2017-01-02	SKH0000585	LADU LAL SEN	BHERU LAL SEN	O RH+	26Years/M				SKM		FIT	SKM - TCL - MINING	2017-02-01	110/70	6/6 BE	NO	NORMAL	NORMAL			
2	2017-01-02	SKH0000582	MANALAL GADRI	RAMA GADRI	B RH+	40Years/M				SKM		FIT	SKM - TCL - MINING	2017-02-01	150/90	6/6 BE	NO	NORMAL	NORMAL			
3	2017-01-02	SKH0000588	ROSHANLAL SALVI	BHEMLAL SALVI	A RH+	27Years/M				SKM		FIT	SKM - MINING - TCL	2017-02-01	130/90	6/6 BE	NO	MILD NIHL	NORMAL			
4	2017-01-02	SKH0000584	JAGDISH PALIWAL	LEHRU PALIWAL	O RH+	37Years/M				SKM		FIT	SKM - MINING - TCL	2017-02-01	130/90	6/6 BE	NO	NORMAL	NORMAL			
5	2017-01-06	578354	NEHA DHOOKIA	CHANDRA SINGH	B RH+	24Years/F	5			Hindustan Zinc Limited		TRANSFER TO ZAWAR.	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
6	2017-01-06	578516	ROSHAN KUMAR RAY	ANIL KUMAR RAY	O RH+	22Years/M	5			Hindustan Zinc Limited		TRANSFER TO AGUCHA	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
7	2017-01-06	578082	CHIRANTAN SAMANTARAY	BOGRAM SAMANTRAY	AB RH+	22Years/M	5			Hindustan Zinc Limited		TRANSFER TO ZAWAR	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
8	2017-01-06	578228	KAUTILYA NISHANT SHUKLA	K K SHUKLA	O RH+	23Years/M	5			Hindustan Zinc Limited		TRANSFER TO ZAWAR	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
9	2017-01-06	578024	ASHISH KUMAR MISHRA	SHIV PRAKASH MISHRA	B RH+	22Years/M	5			Hindustan Zinc Limited		TRANSFERED TO ZS DEBAR	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
10	2017-01-06	578231	KIRANJIT SINGHA	DILIP KUMAR SINGH	B RH+	25Years/M	5			Hindustan Zinc Limited		TRANSFERED TO ZAWAR M	SKM	2018-06-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
11	2017-01-09	578488	KAMAL LOHAR (G/A)	LEHRULAL LOHAR	B RH+	22Years/M	5			Hindustan Zinc Limited		TRANSFERED TO AGUCHA	SKM	2018-07-01	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED	TRANSFERRED			
12	2017-01-11	SKH0001138	SUNIL KUMAR PRADHAN	ANIL CHANDER	A RH+	40Years/M		TECHNICIAN		SKM		FIT	SKM--TECHNICIAN MECH--NORMET	2017-12-01	130/90	6/6 BE	NO	NORMAL	NORMAL			
13	2017-01-11	SKH0000891	UMESH DADICH	NARENDRA KUMAR	A RH+	27Years/M				SKM		FIT	SKM - RESCUE--HRB	2017-12-01	130/90	6/6 BE	NO	NORMAL	NORMAL			
14	2017-01-11	SKH0000516	RAJ LAL GADRI	HARJIRAM GADRI	O RH+	29Years/M				SKM		FIT	SKM--RESCUE--LPDT OPERATOR	2017-12-01	120/80	6/6 BE	NO	NORMAL	NORMAL			
15	2017-01-12	601276	S K TOTLA	RATAN LAL TOTLA	B RH-	54Years/M		MANAGER	COMMERCIAL	Hindustan Zinc Limited		TRANSFERED TO CLZS	SKM	2017-12-01	TRANSFERRED	6/6 BE	NO	NORMAL	NORMAL			
16	2017-01-12	SKH0000476	LALIT SHARMA	GOPAL SHARMA	A RH+	22Years/M				SKM		FIT	SKM--RESCUE	2017-12-01	120/80	6/6 BE	NO	NORMAL	NORMAL			
17	24/01/2017	SKH0002201	YOGESH KUMAR MENARIA	SH. BHANWAR LAL	O RH+	29Years/M				SKM		FIT	FIRE SAFETY---BELL---SKM	24/01/2017	130/70	6/6 BE	NO	NORMAL	NORMAL			
18	24/01/2017	SKH0002201	DINESH CHANDRA JAT	SH. DHANNA JAT	O RH+	28Years/M		FIRE CUM PUMP OPERATOR		SKM		FIT	FIRE SAFETY--BELL--SKM	24/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
19	24/01/2017	575958	GIRISH MORE	PRABHAKARRAO	O RH+	31Years/M				Hindustan Zinc Limited		RESIGNED	SKM	24/01/2017	RESIGNED	RESIGNED	NO	NORMAL	NORMAL			
20	24/01/2017	575347	NITESH SHRIMALI	BHANWAR SHANKER SHRIMALI	B RH+	23Years/M			HVSG-MECHANICAL	Hindustan Zinc Limited	VISION CORRECTION	FIT, ADV VISION CORRECTION	COMML ASSOCIATE---SKM	24/01/2017	110/70	6/12 BE	NO	B/L HFHL	NORMAL			
21	25/01/2017	SKH0001719	YOGESH SHRIVAS	ANIL KUMAR	A RH+	28Years/M		MINING MATE		SKM		FIT	MATE--RDL--SKM	25/01/2017	110/70	6/6 BE	YES	NORMAL	NORMAL			
22	25/01/2017	SKH0002204	SHIVCHARAN SONWANE	JAIHIND SONWANE	A RH+	27Years/M		BLASTER		SKM		FIT	BLASTER--RDL---SKM	25/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
23	25/01/2017	SKH0000297	BADRI LAL NAYAK	CHOGA LAL	AB RH+	30Years/M		HELPER		SKM	REGULAR FOLLOWUP	K CHEST CLOSED CASE, FIT	HELPER--HOFFMOON--SKM	25/01/2017	90/60	6/6 BE	NO	NORMAL	NORMAL	K CHEST CLOSED CASE		
24	25/01/2017	SKH0002203	OM PRAKASH	NANA LAL	O RH+	25Years/M		HELPER		SKM		FIT	SKM--HELPER--HOFFMOON	25/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
25	25/01/2017	SKH0001707	DHANRAJ GADRI	NAGJI RAM GADRI	O RH+	29Years/M				SKM		FIT	HELPER--RDL--SKM	25/01/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
26	25/01/2017	SKH0001601	SURESH CHANDRA JAT	SHANKAR LAL JAT	O RH+	36Years/M		HELPER		SKM		FIT	HELPER--RDL---SKM	25/01/2017	130/80	6/6 BE	YES	NORMAL	NORMAL			
27	25/01/2017	SKH0001517	SUNDER LAL AMANA	KISHAN LAL AMANA	B RH+	22Years/M		HELPER		SKM		FIT	HELPER--RDL---SKM	25/01/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
28	27/01/2017	SKH0000429	HAZRI LAL JAT	KHEMRAJ JAT	AB RH+	32Years/M				SKM		FIT	JUMBO OPT--TEK---SKM	27/01/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
29	27/01/2017	SKH0000556	NANA LAL TELI	MANGILAL TELI	A RH+	50Years/M				SKM	use ear muffs	FIT	HELPER---TEK/261---SKM	27/01/2017	130/80	6/6 BE	NO	MILD NIHL	NORMAL			
30	27/01/2017	SKH0000266	BALU BHIL	DALU	B RH+	39Years/M		HELPER		SKM	ENT CONSULTATION	FIT	HELPER---HONOMARK---SKM	27/01/2017	120/80	6/6 BE	NO	B/L HFHL	NORMAL			
31	27/01/2017	SKH0000311	ASHOKA	MOHAN LAL	O RH+	28Years/M		WELDER		SKM		FIT	WELDER---HONOMARK---SKM	27/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
32	27/01/2017	SKH0000095	BADRI LAL JAT	RAM LAL JAT	AB RH+	46Years/M				SKM		FIT	NORMET OPT---TEK---SKM	27/01/2017	120/70	6/6 BE	YES	NORMAL	NORMAL	OLD HEALED K CHEST		
33	28/01/2017	SKH0000201	RAM CHANDRA SALVI	SHANKAR LAL SALVI	B RH+	29Years/M		HELPER		SKM		FIT	HELPER---HOFFMOON---SKM	28/01/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
34	28/01/2017	SKH0000276	UDAI RAM	DITU	A RH+	39Years/M		HELPER		SKM	USE EAR MUFFS.	FIT	HELPER---HOFFMOON---SKM	28/01/2017	120/80	6/6 BE	NO	B/L HFHL	NORMAL			
35	30/01/2017	SKH0001854	ONKAR LAL MENARIA	ROOP LAL MENARIA	O RH+	52Years/M		MINING MATE		SKM	ECHO,TMT,USG--NORMAL	FIT	SKM RDL MINING MATE	30/01/2017	130/90	6/6 BE	NO	B/L HFHL	NORMAL			
36	30/01/2017	SKH0000341	RAJENDRA KUMAR	GOVERDHAN LAL	O RH+	36Years/M		HELPER		SKM	VISION CORRECTION	FIT	HELPER--HONOMARK--SKM	30/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
37	31/01/2017	578176	HARMANDEEP		B RH+	30Years/M	1			Hindustan Zinc Limited	FEAR OF GOING DOWN	NOT FIT DUE TO FEAR OF UG	SKM-ELECTRICAL ENG.	31/01/2018	130/90	6/6 BE	NO	NORMAL	NORMAL			
38	31/01/2017	SKH0000271	MOHAN LAL	MANGHI RAM	O RH+	32Years/M		HELPER		SKM		FIT	HELPER---HONOMARK---SKM	31/01/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
39	31/01/2017	SKH0000303	GOVIND LAL	FUL CHAND	A RH+	32Years/M		LABOUR		SKM		FIT	SKM - HONOMARK	31/01/2017		6/6 BE	NO	NORMAL	NORMAL			
40	2017-02-06	578176	HARMANDEEP	HARDEO SINGH	B RH+	29Years/M	5			Hindustan Zinc Limited		RESIGNED	SKM--GET	2018-06-02	130/90	RESIGNED	RESIGNED	RESIGNED	RESIGNED			
41	2017-02-07	SKH0000111	SUKHAMANYAN V.B.	BALA KRISHANA V.A.	A RH-	50Years/M				SKM	ECHO, TMT=NORMAL	FIT	UG MANAGER--HONOMARK---SKM	2017-07-02	140/100	6/6 BE	YES	NORMAL	NORMAL	ECHO, TMT=NORMAL		
42	2017-02-07	SKH0000114	NARAYAN LAL SHARMA	MITTHU LAL SHARMA	O RH+	33Years/M				SKM		FIT	STORES--HONOMARK--SKM	2017-07-02	120/80	6/6 BE	NO	NORMAL	NORMAL			
43	2017-02-08	SKH0000399	SRILAL KHAROL	VARDHICHAND KHAROL	O RH+	38Years/F				SKM		FIT FOR RESCUE	LPDT,UND OPT--TEK--SKM	2017-08-02	120/80	6/6 BE	YES	B/L HFHL	NORMAL			
44	2017-02-11	SKH0000116	RATAN LAL AHIR	NARAYAN LAL AHIR	O RH+	33Years/M		WELDER	ORE DRESSING	SKM		FIT	WELDER--HONOMARK--SKM	2017-11-02	140/90	6/6 BE	NO	NORMAL	NORMAL			
45	13/02/2017	SKH0000597	LADU LAL TELI	MOHANLAL TELI	B RH+	30Years/M				SKM	DIET & EXERCISE AS ADV	FIT	SKM - MINING - TCL,TCL -122	13/02/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
46	14/02/2017	SKH0000671	RAMESH LAL JAT	SOLA JAT	O RH+	60Years/M				SKM	ECHO, TMT=NORMAL	FIT	OPERATOR--HRREC--SKM	14/02/2017	140/96	6/6 BE	NO	B/L HFHL	NORMAL	ECHO, TMT=NORMAL		
47	14/02/2017	SKH0000826	MITHU LAL SUTHAR	BADRI LAL SUTHAR	B RH+	39Years/M				SKM	ECHO,TMT=NORMAL	FIT	OPERATOR--HRREC--SKM	14/02/2017	130/90	6/6 BE	NO	NORMAL	NORMAL	ECHO, TMT=NORMAL		
48	[redacted]																					
49	21/02/2017	SKH0001700	PRAKASH KUMHAR	GOTU PRAJAPAT	A RH+	34Years/M		HELPER		SKM		FIT	HELPER--NAVDURGA--SKM	21/02/2017	140/80	6/6 BE	NO	NORMAL	NORMAL			
50	22/02/2017	SKH0001784	HAMER SINGH	KESHAR SINGH	O RH+	49Years/M		SUPERVISOR		SKM		FIT	SUP--NAV DURGA--SKM		130/90	6/6 BE	NO	NORMAL	NORMAL			
51	22/02/2017	SKH0000956	SUMER SINGH	N SINGH CHUNDAWAT	O RH+	29Years/M		HELPER		SKM		FIT	HELPER--SANDVIK--SKM		110/70	6/6 BE	NO	NORMAL	NORMAL			
52	22/02/2017	SKH0000957	RATAN LAL JAT	BHERU LAL JAT	B RH+	30Years/M		MECHANIC		SKM		FIT	MECHANIC--SANDVIK--SKM		120/90	6/6 BE	NO	NORMAL	NORMAL			
53	22/02/2017	SKH0000976	K. STALLIN	S.P. KRISHANAN	B RH+	31Years/M		WELDER		SKM		FIT	WELDER--SANDVIK--SKM		120/70	6/6 BE	NO	B/L HFHL	NORMAL			
54	22/02/2017	SKH0000934	NATHU LAL GADRI	BHERU LAL GADRI	B RH+	22Years/M		HELPER		SKM		FIT	HELPER--SANDVIK--SKM		110/70	6/6 BE	NO	NORMAL	NORMAL			
55	22/02/2017	SKH0000935	JITENDRA SINGH	RAM SING RAJPUT	O RH+	31Years/M		MECHANIC		SKM		FIT	MECHANIC--SANDVIK--SKM		110/70	6/6 BE	NO	NORMAL	NORMAL			
56	22/02/2017	SKH0000938	BHOPAL SINGH RANAWAT	CHATAR SINGH RANAWAT	O RH+	29Years/M		MECHANIC		SKM		FIT	MECHANIC--SANDVIK--SKM		130/90	6/6 BE	NO	NORMAL	NORMAL			
57	28/02/2017	SKH0000604	KAILASH CHAND CHAMAR	MADHVA LAL CHAMAR	B RH+	COLONY NO	27Years/M				POOR VISION LT EYE	NOT FIT , NOT REPORTED AFTER VISION CHECKUP		30/12/2016	110/80	6/60 LT EYE	NO	NORMAL	NORMAL			
58	28/02/2017	SKH0000830	PRAKASH BHEEL	LEHRU BHEEL		COLONY NO	26Years/M		U.G. WORKER		SKM	not reported	HELPER--HRREC--SKM	28/02/2017	not reported	not reported	not reported	not reported	not reported			
59	28/02/2017	SKH0000827	KAILASH CHANDRA PRAJAPAT	UDAI RAM PRAJAPAT	AB RH+	COLONY NO	26Years/M				SKM	FIT	OPT--HRREC---SKM	28/02/2017	130/80	6/6 BE	NO	NORMAL	NORMAL			
60	28/02/2017	SKH0001036	KAMLESH GADRI	DEVI LAL GADRI	O RH+	COLONY NO	28Years/M		ENGINEER		SKM	FIT	ENGINEER--ATLAS COP CO--SKM	28/02/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
61	28/02/2017	SKH0000826	KISHAN LAL GADRI	BADRI LAL GADRI	O RH+	COLONY NO	27Years/M				SKM	FOR. NOT FIT AS OPERATOR	OPT--HRREC--SKM	28/02/2017	120/70	6/6 BE	NO	NORMAL	NORMAL			
62	28/02/2017	SKH0000828	BHERU LAL GADRI	BADRI LAL GADRI	O RH+	COLONY NO	30Years/M				SKM	FIT	OPT--HRREC---SKM	28/02/2017	120/70	6/6 BE	NO	NORMAL	NORMAL			
63	28/02/2017	SKH0000829	PRABHU LAL JAT	CHHOGA LAL JAT	O RH+	COLONY NO	35Years/M				SKM	FIT	OPT--HRREC--SKM	28/02/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
64	28/02/2017	SKH0000830	JEET MAL GADRI	GANESH LAL GADRI	B RH+	COLONY NO	36Years/M				SKM	FIT	HELPER--HRREC--SKM	28/02/2017	130/80	6/6 BE	NO	NORMAL	NORMAL			
65	28/02/2017	SKH0000832	DINESH CHANDRA PRAJAPAT	NATHU LAL KUMHAR	AB RH+	COLONY NO	30Years/M				SKM	FIT	HELPER--HRREC--SKM	28/02/2017	150/100	6/6 BE	NO	B/L HFHL	NORMAL			
66	28/02/2017	292377	SANJAY KUMAR SHARMA	NAZIR CHAND SHARMA	O RH+	47Years/M				Hindustan Zinc Limited		FIT	MINE MANAGER--SKM	28/02/2017	150/90	6/6 BE	NO	NORMAL	NORMAL			
67	2017-03-02	SKH0000812	RAJENDRA SINGH KANTAL	NARAYAN SINGH KANTAL	B RH+	51Years/M		MINING MATE		SKM	W/W , ADV TREATMENT	FIT	MATE--HRREC--SKM	2017-02-03	110/70	6/6 BE	NO	B/L HFHL	NORMAL			
68	2017-03-03	SKH0000831	SHANKER SINGH	GOVERDHAN SINGH	A RH+	35Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-03-03	120/80	6/6 BE	NO	NORMAL	NORMAL			
69	2017-03-03	SKH0000848	LOKENDRA SINGH CHUNDAWAT	SHANBHU SINGH CHUNDAWAT	AB RH+	25Years/M				SKM		FIT	OPT--HRREC--SKM	2017-03-03	130/80	6/6 BE	NO	NORMAL	NORMAL			
70	2017-03-03	SKH0000894	MADHAV LAL LOHAR	MANGI LAL LOHAR		22Years/M		U/G WORKER		SKM		not reported	not reported	not reported	not reported	not reported	not reported	not reported	not reported			
71	2017-03-03	SKH0000803	PUSKAR LAL KUMHAR	GANESH KUMHAR	O RH+	32Years/M				SKM		FIT	OPT--HRREC--SKM	2017-03-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
72	2017-03-03	SKH0000809	PRAKASH CHANDRA GADRI	GOVERDHAN GADRI	B RH+	26Years/M				SKM		FIT	SKM - OPT--MINING ,HARD ROCK	2017-04-03	120/80	6/6 BE	NO	NORMAL	NORMAL			
73	2017-03-03	SKH0000824	RAJ MAL CHAMAR	MADHAV LAL CHAMAR	O RH+	26Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-03-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
74	2017-03-03	SKH0000825	BHERU LAL PALIWAL	HEERALAL PALIWAL	B RH+	42Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-03-02	150/90	6/6 BE	NO	NORMAL	NORMAL			
75	2017-03-03	SKH0000823	LAXMI LAL CHAMAR	GANESH LAL CHAMAR	O RH+	24Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-03-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
76	2017-03-03	SKH0000834	KRISHAN GOPAL PALIWAL	PREM LAL PALIWAL	O RH+	32Years/M				SKM		FIT	ELECTRICIAN--HRREC--SKM	2017-03-03	120/90	6/6 BE	NO	NORMAL	NORMAL			
77	2017-03-03	SKH0000844	KISHAN DAS KAMAD	HEERA DAS KAMAD	B RH+	32Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-03-03	110/90	6/6 BE	NO	MILD NIHL	NORMAL			
78	2017-03-03	SKH0002339	NARAYAN LAL SUKHWAL	UDAI RAM	AB RH+	42Years/M		HELPER		SKM		FIT	HELPER--HRREC--SKM	2017-03-03	90/70	6/6 BE	NO	NORMAL	NORMAL			
79	2017-03-04	SKH0001309	RAJESH MENARIYA	DEVI LAL MENARIYA	B RH+	28Years/M				SK MINES		FIT	HELPER--HRREC--SKM	2017-04-03	130/90	6/9 E	YES	NORMAL	NORMAL			
80	2017-03-04	SKH0002379	VISHVAJU SINGH SHAKTAWAT	LT. PURAN SINGH SHAKTAWAT	O RH+	26Years/M		HELPER		SKM		FIT	HELPER--HRREC--SKM	2017-04-03	130/80	6/6 BE	NO	NORMAL	NORMAL			
81	2017-03-04	SKH0002378	PRAVEEN KUMAR MALVI	MANA LAL MALI	A RH+	30Years/M				SK MINES		FIT	MATE--HRREC--SKM	2017-04-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
82	2017-03-04	SKH0004708	NARAYAN GADRI	DALCHAND GADRI	A RH-	30Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-04-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
83	2017-03-04	SKH0004707	RATAN SINGH RAWAT	PAN SINGH	A RH+	38Years/M		OPERATOR		SK MINE		FIT	OPT--HRREC--SKM	2017-04-03	130/80	6/6 BE	NO	NORMAL	NORMAL			

SNo	VisitAdmit Date	P Id	Patient Name	Father/Husband	Blood Group	Age/Sex	MineOrder	Designation	Department	EmployeeUnit	Advice	PMERemarks	PlaceOfPosting	NextPMEDate	BP	VISION	WITH GLASS	AUDIOMETRY	LUNG FUNCTIONS			
84	2017-03-04	SKM0004713	SANPAT LAL SHARMA	SUNDER LAL SHARMA	B RH+	25Years/M				RDM	ECHO, TMT=NORMAL	HYPERTENSION, CONTROLLED WITH MEDICINE--FIT	OPT--HRREC--SKM	2017-06-03	140/110	6/6 BE	NO	NORMAL	NORMAL	ECHO, TMT =NORMAL		
85	2017-03-04	SKM0004704	KAMLENDRA SINGH	BHAGWAT SINGH	B RH+	31Years/M				RDM		FIT	HELPER--HRREC--SKM	2017-04-03	120/70	6/6 BE	NO	NORMAL	NORMAL			
86	2017-03-04	SKM0000415	RAMESH CHAND GADRI	BHAGAWAN LAL GADRI	O RH+	31Years/M				SKM		FIT	OPT--HRREC--SKM	2017-04-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
87	2017-03-06	SKM[illegible]	RAJESH TIWARI	MADAN LAL TIWARI	B RH+	29Years/M		SERVICE ENGIN	WORKSHOP U	SKM		FIT	ENGINEER--SANDVIK--SKM	2017-06-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
88	2017-03-06	SKM[illegible]	NARAYAN SINGH RAJAWAT	ABHAY SINGH RAJAWAT	A RH+	29Years/M		HELPER		SKM		FIT	HELPER--NORMET--SKM	2017-06-03	110/80	6/6 BE	NO	NORMAL	NORMAL			
89	2017-03-06	SKM[illegible]	SURESH CHANDRA JAT	MOHAN LAL	AB RH+	24Years/M		HELPER		SKM		FIT	HELPER--NORMET--SKM	2017-06-03	140/90	6/6 BE	NO	NORMAL	NORMAL			
90	2017-03-06	SKM[illegible]	B.NEELAKANTHAM	MR.KRISHANA MURTHY	O RH+	32Years/M		TECHNICIAN		SKM		FIT	TECHNICIAN--NORMAL--SKM	2017-06-03	150/90	6/6 BE	NO	MILD HFHL	NORMAL			
91	2017-03-06	SKM[illegible]	MD. ASLAM	MR. MD. ISLAM	B RH+	39Years/M		TECHNICIAN		SKM	DIABETES UNCONTROLL	NOT FIT	TECHNICIAN--NORMET--SKM	2017-06-03	140/90	6/6 BE	NO	NORMAL	NORMAL			
92	2017-03-06	SKM[illegible]	[illegible] SINGH	HARPAL SINGH	B RH+	25Years/M		ENGINEER	WORKSHOP U	SK MINES		FIT	ENGINEER--NORMET--SKM	2017-06-03	120/80	6/6 BE	NO	NORMAL	NORMAL			
93	2017-03-06	SKM[illegible]	PARDEEP SINGH CHOUHAN	ABHAY SINGH	O RH+	22Years/M		JR. SERVICE ENGR.		SKM		FIT	ENGINEER--NORMET--SKM	2017-06-03	120/90	6/6 BE	NO	NORMAL	NORMAL			
94	2017-03-06	SKM[illegible]	JOGINDER SINGH	DILBER	O RH+	31Years/M		DIPLOMA TRAINEE (MECH.)		SKM		FIT	ENGINEER--NORMET--SKM	2017-06-03	120/80	6/6 BE	NO	NORMAL	NORMAL			
95	2017-03-06	SKM[illegible]	RANJEET SINGH	HAZARI SINGH	O RH+	30Years/M		STORE KEEPER	STORE	SKM		FIT	STORE KEEPER--HRREC--SKM	2017-06-03	110/70	6/6 BE	NO	B/L HFHL	NORMAL			
96	2017-03-06	SKM[illegible]	SONU SINGH RATHORE	LT. MEHNDI SINGH RATHORE	O RH+	24Years/M				SKM		FIT	OPERATOR--HRREC--SKM	2017-06-03	100/70	6/6 BE	NO	B/L HFHL	NORMAL			
97	2017-03-06	SKM[illegible]	VEERAL GOTHALKAR	SURESH GOTHALKAR	A RH+	22Years/M		JR. SERVICE ENGG.		SKM		FIT	ENGINEER--NORMET--SKM	2017-06-03	140/90	6/9 BE	NO	NORMAL	NORMAL			
98	2017-03-06	SKM[illegible]	BHARAT KUMAR PALIWAL	GOTU LAL JI PALIWAL	O RH+	33Years/M		HELPER		SKM	LOW SALT DIET	FIT	OFFICE ASST--NORMET--SKM	2017-06-03	140/90	6/6 BE	NO	NORMAL	NORMAL			
99	2017-03-06	SKM0007030	MUKAM CHAND	PURSHOTTAM	AB RH+	27Years/M		ENGINEER	WORKSHOP U	SK MINES	CARDIAC EVALUATION--NORMAL-	FIT	SKM - SANDVIK MINING	2017-06-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
100	2017-03-06	SKM[illegible]	VIVEK GUPTA	KULBHUSHAN GUPTA	AB RH+	25Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	2017-06-03	110/80	6/6 BE	NO	NORMAL	NORMAL			
101	2017-03-06	SKM0007010	TARUN GAUTAM	GAURAV GAUTAM	A RH+	24Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-06-03	100/70	6/6 BE	NO	B/L HFHL	NORMAL			
102	2017-03-07	SKM0006969	SUDIPTO PAL	SURESH PAL	B RH+	23Years/M		ENGINEER	WORKSHOP U	SK MINES		FIT	SKM SANDVIK SERVICE ENGINEER	2017-07-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
103	2017-03-07	SKM0015264	MUKESH SANADHYA	UDAI LAL SANADHYA	O RH+	27Years/M		HELPER	MINING	SK MINE		FIT	HELPER--HRREC--SKM	2017-07-03	120/74	6/6 BE	NO	NORMAL	NORMAL			
104	2017-03-07	SKM0007076	MAHIPAL SINGH CHAUHAN	SHIV SINGH CHOUHAN		25Years/M		JR. TECHNICIAN		SKM		NOT REPORTED	NOT REPORTED	NOT REPORTED	NOT REPO	NOT REPO	NOT REPO	NOT REPO	NOT REPORTED			
105	2017-03-07	SKM0006916	HEER SINGH	PATAB SINGH	B RH+	31Years/M		CASUAL		SKM			SANDVIK SKM,AC MAINTAINANCE	2017-07-03	100/70	6/6 BE	NO	NORMAL	NORMAL			
106	2017-03-07	SKM0007006	SHUBHANKAR DEBNATH	ANIL KRISHNA DEBNATH	O RH+	31Years/M		SERVICE ENGINEER		SKM		FIT	ENGINEER--SANDVIK-- - SKM	2017-07-03	110/80	6/6 BE	NO	NORMAL	NORMAL			
107	2017-03-07	SKM0015299	DINESH VARMA	JAGANATH VARMA	B RH-	54Years/M		MINING MATE	MINING	SKM	REGULAR CHECKUP FOR	DIABETES CONTROLLED--F	SUPERVISOR--HRREC--SKM	2017-07-03	120/78	6/6 BE	NO	B/L HFHL	NORMAL	ECHO,TMT,USG=NORMAL		
108	2017-03-07	SKM0002356	PRASHANT SAHADEO RAUT	SHIVRAM RAUT	B RH+	34Years/M		TECHNICIAN		SKM		FIT	TECHNICIAN--SANDVIK--SKM	2017-07-03	110/90	6/6 BE	NO	B/L HFHL	NORMAL			
109	2017-03-07	SKM0015165	AMIT KUMAR PATAR	LANKESHWAR PATAR	O RH+	27Years/M		ENGINEER	MINING	SK MINES	ENT CONSULTATION	FIT: USE EAR MUFFS REGUL	ENGINEER---SKM,NORMET	2017-07-03	120/80	6/6 BE	NO	RT HFHL	NORMAL			
110	2017-03-07	SKM[illegible]	SUNIL KUMAR SINGH	RAMSHANKAR SINGH	B RH+	33Years/M		SERVICE ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-07-03	116/70	6/6 BE	NO	NORMAL	NORMAL			
111	2017-03-07	SKM[illegible]	[illegible] SINGH	HAR PHOOL SINGH	A RH+	21Years/M		SERVICE ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-07-03	118/76	6/6 BE	NO	NORMAL	NORMAL			
112	2017-03-07	SKM0007266	MOHIT CHAHAL	DILBAG SINGH	O RH+	21Years/M		JR. SERVICE ENGR.		SKM		FIT	ENGINEER--NORMET--SKM	2017-07-03	100/78	6/6 BE	NO	NORMAL	NORMAL			
113	2017-03-07	SKM0001558	AZAD SATTAR MIYA	SATTAR MIYAN	A RH+	36Years/M		TECHNICIAN		SKM		FIT	TECHNICIAN--NORMET--SKM	2017-07-03	118/78	6/6 BE	NO	NORMAL	NORMAL			
114	2017-03-07	SKM0000836	SATYA NARAYAN JATIYA	HAR LAL JATIYA	O RH+	31Years/M				SKM		FIT	HELPER--HRREC--SKM	2017-07-03	120/78	6/6 BE	NO	NORMAL	NORMAL			
115	2017-03-07	SKM0001257	MOHAMMED ZAKIR SHEIKH	SAJJAD MOHD. SHEIKH	O RH+	31Years/M		HELPER		SKM		FIT	TECHNICIAN--NORMET--SKM	2017-07-03	102/78	6/6 BE	NO	NORMAL	NORMAL			
116	2017-03-07	SKM0002324	NOJEN NARZARY	RABIRAM NARZARY	O RH+	23Years/M		TECHNICIAN		SKM		FIT	TECHNICIAN--NORMET--SKM	2017-07-03	110/80	6/6 BE	NO	B/L HFHL	NORMAL			
117	2017-03-07	RDM0001647	GANPAT LAL LOHAR	NATHULAL JI	B RH+	31Years/M		HELPER	CIVIL	RD MINES		FIT	DRIVER--VINAYAK--RDM	2017-07-03	126/74	6/6 BE	NO	NORMAL	NORMAL			
118	2017-03-07	RDM0001716	MAHENDRA SINGH	KARAN SINGH	B RH+	28Years/M		HELPER		RDM		FIT	DRIVER -- RDM , VINAYAK	2017-07-03	100/70	6/6 BE	NO	NORMAL	NORMAL			
119	2017-03-08	SKM[illegible]	RAJENDRA KUMAR	GOVERDHAN LAL	O RH+	44Years/M		HELPER		SKM		FIT	HELPER--NONOMARK--SKM	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
120	2017-03-08	SKM[illegible]	JAGDISH KUMAR JAT	MANGHI RAM	B RH+	44Years/M		FITTER		SKM	LOW FAT DIET	FIT	FITTER --NONOMARK--SKM	2017-08-03	130/90	6/6 BE	NO	B/L HFHL	NORMAL			
121	2017-03-08	SKM0014919	BHAWANI SINGH RAJPUT	VARDI SINGH	A RH+	43Years/M		RIGGER		SKM		FIT	HELPER - NONOMARK--SKM	2017-08-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
122	2017-03-08	SKM0001141	NANRAJ KATHAYAT KATHAYA	DHALBAHADUR KATHAYAT	A RH+	25Years/M		TECHNICIAN		SKM	RPT BLOOD SUGAR	FIT	TECHNICIAN-- NORMET --SKM	2017-08-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
123	2017-03-08	SKM0015316	ROSHAN LAL BHILS	BRIJ RAM BHILE	O RH+	36Years/M		MINING MATE		SKM	LOW SALT & FAT DIET	HYPERTENSION CONTROLLED, FIT	MINING MATE--HRREC-- SKM	2017-08-03	170/110	6/6 BE	NO	NORMAL	NORMAL			
124	2017-03-08	SKM[illegible]	SHRI RAM SHARMA	BAL KRISHNA SHARMA	B RH+	28Years/M		SERVICE ENGIN	WORKSHOP U	SKM		FIT	ENGINEER--SANDVIK--SKM	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
125	2017-03-08	SKM[illegible]	DINESH GADRI	BADRI LAL GADRI	A RH+	24Years/M		JR. ENGINEER		SKM		FIT	TECHNICIAN--SANDVIK -- SKM	2017-08-03	116/70	6/6 BE	NO	NORMAL	NORMAL			
126	2017-03-08	SKM[illegible]	KANHAIYA LAL JAT	SHANKAR LAL	B RH+	23Years/M		JR. TECHNICIAN		SKM		FIT	S ENGINEER - SKM ,SANDVIK	2017-08-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
127	2017-03-08	SKM[illegible]	PARAM DEV THAKUR	RAGHU RAM	A RH+	48Years/M		SERVICE ENGINEER		SKM	IRON TABLETS	FIT	S . ENGINEER --SANDVIK-- SKM	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
128	2017-03-08	SKM0009007	DHARMENDRA SAHARE	TANAJI SAHARE	O RH+	29Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-08-03	100/60	6/6 BE	NO	NORMAL	NORMAL			
129	2017-03-08	SKM0001006	NOOPENDRA CHAUDHAREE	DALCHAND CHAUDHAREE	O RH+	28Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
130	2017-03-08	SKM0008939	RAJ MOHAMMED	ISHAQUE MOHAMMED	A RH+	31Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
131	2017-03-08	SKM0002297	RAJAT SAXENA	SURENDRA SAXENA	B RH+	22Years/M				SKM		FIT	ENGINEER --NORMET-- SKM	2017-08-03	120/80	6/6 BE	NO	NORMAL	NORMAL			
132	2017-03-09	SKM0000948	RAJU RAJPUT	RADHE SHYAM RAJPUT	O RH+	47Years/M		SERVICE ENGINEER		SKM	LEFT EYE AMBLYOPIA.	FIT FOR SURFACE JOB ONLY	FITTER--SANDVIK--SKM	2017-09-03	120/80	6/12 & 6/	YES	NORMAL	NORMAL			
133	2017-03-09	SKM0001039	RAVI SHANKAR KUMAR	SRI RAGHUNATH PODDAR	B RH-	31Years/M		SERVICE ENGINEER		SKM		FIT	S ENGINEER--SANDVIK-- SKM	2017-09-03	110/80	6/6 BE	NO	NORMAL	NORMAL			
134	2017-03-08	SKM[illegible]	BAGDI RAM LOHAR	MITHA LAL	O RH+	32Years/M		JR. ENGINEER		SKM	LOW FAT DIET	FIT	TECHNICIAN--SANDVIK-- SK	2017-08-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
135	2017-03-08	SKM[illegible]	DEVI LAL NAI	CHAMPA LAL NAI	O RH+	50Years/M				SKM		FIT	HELPER -- HRREC-- SKM	2017-08-03	130/80	6/6 BE	NO	NORMAL	NORMAL			
136	2017-03-08	SKM[illegible]	SHREE LAL JAT	[illegible]	B RH+	30Years/M		JR. TECHNICIAN		SKM		FIT	TECHNICIAN--SANDVIK--SKM	2017-08-03	126/70	6/6 BE	NO	NORMAL	NORMAL			
137	2017-03-09	SKM[illegible]	RAHUL MENARIA	SURESH MENARIA	O RH+	24Years/M		ENGINEER	MINING	SK MINES		FIT	ENGINEER--SANDVIK--SKM	2017-09-03	130/70	6/6 BE	NO	NORMAL	NORMAL			
138	2017-03-09	SKM[illegible]	NANTU CHAURASIA	SNP CHAURASAI	B RH+	35Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	2017-09-03	110/80	6/6 BE	NO	NORMAL	NORMAL			
139	2017-03-10	SKM0014937	LOBH CHAND	LAL RAM GADRI	O RH+	29Years/M		HELPER	ORE DRESSING	SKM	REGULAR FOLLOW UP AN	MANIA, ADV REGULAR TREATMENT--SURFACE JOB, REVIEW 6 MONTHLY.	HELPER--NONOMARK--SKM	2017-10-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
140	2017-03-10	SKM0014875	NARAYAN JATIYA	MADHU LAL	B RH+	29Years/M		HELPER	ORE DRESSING	SKM	IMPROVE WEIGHT	WEIGHT IMPROVED, FIT	HELPER--NONOMARK--SKM	2017-10-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
141	2017-03-10	SKM[illegible]	HANSRAJ	TEK CHAND	B RH+	40Years/M		SERVICE ENGIN	WORKSHOP	SKM	LOW SALT DIET, REGULA	FIT	ENGINEER--SANDVIK--SKM	2017-10-03	160/100	6/6 BE	NO	NORMAL	NORMAL			
142	2017-03-10	SKM0002323	SONU ANSARI	KURBAN ANSARI	O RH+	29Years/M		WELDER		SKM	LOW FAT DIET	FIT	WELDER--NORMET--SKM	2017-10-03	130/80	6/6 BE	NO	NORMAL	NORMAL			
143	2017-03-11	SKM0000940	MADHAV LAL CHAMAR	JAVAHARMAL CHAMAR	O RH+	40Years/M		HELPER		SKM	LOW SALT & FAT DIET;	FIT ; REVIEW FOR BP	HELPER--SANDVIK--SKM	2017-11-03	140/100	6/6 BE	NO	NORMAL	NORMAL			
144	2017-03-11	SKM[illegible]	HEMRAJ GADRI	MOHAN GADRI	O RH+	29Years/M		WORKSHOP MANAGER		SKM		FIT	HELPER--SANDVIK--SKM	2017-11-03	140/90	6/6 BE	NO	NORMAL	NORMAL			
145	2017-03-11	SKM[illegible]	ROSHAN LAL JAT	MADHAV JAT	O RH+	35Years/M		JR. TECHNICIAN		SKM		FIT	TECHNICIAN--SANDVIK--SKM	2017-11-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
146	2017-03-11	SKM[illegible]	SHIV RAJ CHOUDHARY	BORI LAL JAT	O RH+	26Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	2017-11-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
147	2017-03-11	SKM[illegible]	VED PRAKASH	ASHA RAM	O RH+	[illegible]Years/M		JR. ENGINEER		SKM	ECHO,TMT,USG=NORMAL	FIT	ENGINEER--SANDVIK--SKM	2017-11-03	130/90	6/6 BE	NO	B/L HFHL	NORMAL			
148	2017-03-11	SKM[illegible]	ANKIT MATHUR	RAKESH MATHUR	B RH+	30Years/M		SERVICE ENGINEER		SKM	LOW FAT DIET	FIT	ENGINEER--SANDVIK--SKM	2017-11-03	110/70	6/6 BE	NO	NORMAL	NORMAL			
149	2017-03-11	SKM0000297	BADRI LAL NAYAK	CHOGA LAL	AB RH+	39Years/M		HELPER		SKM	REGULAR MONTHLY FOLL	K CHEST--CLOSED CAGE, REVIEW EVERY MONTH	HELPER--NONOMARK--SKM	2017-11-03	100/60	6/6 BE	NO	NORMAL	NORMAL			
150	2017-03-11	SKM[illegible]	LALU RAM CHAMAR	PARASRAM CHAMAR	B RH+	31Years/M				SKM		FIT	HELPER--TEK--SKM	2017-11-03	130/90	6/6 BE	NO	NORMAL	NORMAL			
151	14/03/2017	SKM[illegible]	SANJAY YADAV	[illegible] SINGH YADAV	B RH+	32Years/M		SERVICE ENGIN	WORKSHOP	SKM	REDUCE WEIGHT	FIT	ENGINEER--SANDVIK--SKM	14/03/2017	140/90	6/6 BE	NO	NORMAL	NORMAL			
152	14/03/2017	SKM[illegible]	SANDEEP SHEORAN	PRAKASH CHAND	B RH+	31Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	14/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
153	14/03/2017	SKM[illegible]	ARVIND KUMAR VISHWAKAR	JUGGI LAL VISHWAKARMA	B RH+	28Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	14/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
154	15/03/2017	SKM0006915	SHEIKH HUZOOR RAHMAN	NASIR MOHAMMAD SHEIKH	O RH+	44Years/M		SUPERVISOR	WORKSHOP	SKM	ECHO/TMT=NORMAL	REVIEW FOR BP	SUPERVISOR--SANDVIK--SKM	15/03/2017	140/100	6/6 BE	NO	NORMAL	NORMAL	ECHO, TMT, USG=NORMAL		
155	15/03/2017	SKM0006952	MANORANJAN SINGH	SEWDAYAL SINGH	A RH+	27Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	15/03/2017	124/90	6/6 BE	NO	NORMAL	NORMAL			
156	15/03/2017	SKM0006891	SURENDRA CHOUDHARY	BADRI LAL CHOUDHARY	O RH+	26Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	15/03/2017	110/90	6/6 BE	NO	NORMAL	NORMAL			
157	16/03/2017	SKM0006954	RAJKUMAR BARTI	GOVIND BHARTE	O RH+	24Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
158	16/03/2017	SKM[illegible]	VIRENDRA PATIDAR	RAMGOPAL PATIDAR	O RH+	26Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
159	16/03/2017	SKM0007012	CHUNI LAL	VIRENDER KUMAR	O RH+	25Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
160	16/03/2017	SKM[illegible]	[illegible] DEY	LT ANIMA KANTI DEY	B RH+	28Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
161	16/03/2017	SKM0006913	LAXMI LAL CHOUDHARY	RUGHI LAL JAT	B RH+	31Years/M		JR. TECHNICIAN	WORKSHOP	SKM	use ear muffs/plugs	FIT	TECHNICIAN--SANDVIK--SKM	16/03/2017	120/90	6/6 BE	NO	B/L HFHL	NORMAL			
162	16/03/2017	SKM[illegible]	MANOJ KUMAR SHARMA	JAMNU LAL SHARMA	A RH+	24Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
163	16/03/2017	SKM[illegible]	VINOD MORABEY	SURESH MORABAY	B RH+	29Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	110/90	6/6 BE	NO	NORMAL	NORMAL			
164	16/03/2017	SKM0000993	PRAKASH MOON	KAILASH MOOND	A RH+	35Years/M		JR. ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
165	16/03/2017	SKM[illegible]	RANESH KHATRI	NARAYAN LAL KHATRI	A RH+	40Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	110/80	6/6 BE	NO	B/L HFHL	NORMAL			
166	16/03/2017	SKM[illegible]	HARISH LOHAR	PUSKAR LAL LOHAR	O RH+	29Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	120/90	6/6 BE	NO	NORMAL	NORMAL			
167	16/03/2017	SKM0006976	PARTHA SARTHI SAMAL	BASANTA KUMAR SAMAL	O RH+	27Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
168	16/03/2017	SKM[illegible]	SHANTANU ROY	[illegible] ROY	O RH+	25Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	16/03/2017	130/80	6/6 BE	NO	NORMAL	NORMAL			
169	16/03/2017	SKM[illegible]	KRISHNA GOPAL TAILOR	BAL CHAND TAILOR	O RH+	32Years/M		DATA ENTRY OP	WORKSHOP	SKM		FIT	DEO--SANDVIK--SKM	16/03/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
170	17/03/2017	SKM[illegible]	GOVERDHAN SINGH	PRATAP SINGH	O RH+	35Years/M		MINING MATE		SKM	ECHO,TMT,USG=NORMAL	FIT	MATE--TEK--SKM	17/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
171	17/03/2017	SKM[illegible]	DIPTY MALVIYA LOHAR	KESHU RAM LOHAR	O RH+	44Years/M		JR. ENGINEER	WORKSHOP	SKM	EXERCISE, LOW FAT AND	FIT	WELDER--SANDVIK--SKM	17/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
172	17/03/2017	SKM0006970	YASHWANT [illegible]	LT SAGAR MAL	B RH+	38Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	17/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
173	17/03/2017	SKM[illegible]	LOKESH SAHU	KAILASH CHANDRA SAHU	O RH+	35Years/M		DATA ENTRY OP	WORKSHOP	SKM	LOW SALT DIET, VISION	FIT	DEO--SANDVIK--SKM	17/03/2017	140/90	6/6 BE	NO	NA	NORMAL			
174	17/03/2017	SKM0007074	BASANT SINGH	NOTA RAM	B RH+	35Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	17/03/2017	110/70	6/6 BE	NO	MILD NIHL	NORMAL			
175	17/03/2017	SKM[illegible]	RAMESH KESKAR	CHAITU KESHKAR	B RH+	26Years/M		JR. SERVICE EN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	17/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
176	18/03/2017	SKM[illegible]	JAGPAL NATH	BAHADUR NATH CHOUHAN	A RH+	21Years/M		STORE KEEPER	WORKSHOP	SKM	LOW SATURATED FAT OI	FIT	STORE KEEPER--SANDVIK--SKM	18/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
177	18/03/2017	SKM[illegible]	ASUTOSH PANDEY	SURENDER PANDEY	O RH+	29Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	18/03/2017	120/70	6/6 BE	NO	NORMAL	NORMAL			
178	18/03/2017	SKM[illegible]	GAJENDRA PUROHIT	NARAYAN LAL PUROHIT	B RH+	24Years/M		STORES ASSIST	WORKSHOP	SK MINES		FIT	HELPER--STORE--SANDVIK--SKM	18/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
179	18/03/2017	SKM[illegible]	SANTOSH KUMAR GUPTA	[illegible] GUPTA	A RH+	31Years/M		JR. SERVICE EN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	18/03/2017	130/90	6/6 BE	NO	LT HFHL	NORMAL			
180	18/03/2017	SKM0006977	UMASHANKAR CHAKROVAR	ASHOK CHAKRAVARTY	B RH+	38Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	18/03/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
181	18/03/2017	SKM[illegible]	PANKAJ PARASHAR	RADHE SHYAM PARASHAR	B RH+	32Years/M		TECHNICIAN "B"	WORKSHOP	SKM	ENT CONSULTATION	FIT	TECHNICIAN--SANDVIK--SKM	18/03/2017	110/70	6/6 BE	NO	LT HFHL	NORMAL			
182	18/03/2017	SKM[illegible]	[illegible] JAT	RATAN LAL	O RH+	29Years/M		OPERATOR	ORE DRESSING	SKM		FIT	OPERATOR--NONOMARK--SKM	18/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
183	18/03/2017	SKM[illegible]	UPENDRA SHARMA	RAM BILASH SHARMA	A RH+	33Years/M		ENGINEER	WORKSHOP	SK MINES	LOW SALT & FAT DIET	FIT	ENGINEER--SANDVIK--SKM	18/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
184	20/03/2017	SKM0007052	ANANTA MAJUMDAR	GAJHAR MAJUMDAR	B RH+	31Years/M		SERVICE ENGIN	WORKSHOP	SKM	REPEAT SUGAR=NORMAL=5/4/17	FIT	ENGINEER--SANDVIK--SKM	20/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
185	20/03/2017	SKM0006956	SHIVENDRA KUMAR KUSHW	SHESHMANI PRASAD	B RH+	24Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	20/03/2017	100/60	6/6 BE	NO	NORMAL	NORMAL			
186	20/03/2017	SKM0007067	SHIVNATH CHOUHAN	LAKHAN NATH CHOUHAN	AB RH+	32Years/M		HELPER	WORKSHOP	SK MINES		FIT	HELPER--STORE--SANDVIK--SKM	20/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
187	20/03/2017	SKM[illegible]	SHYAM LAL SUKHWAL	PRATAP LAL	O RH+	47Years/M		MINING MATE		SKM		FIT	MATE --TEK--SKM	20/03/2017	140/90	6/6 BE	NO	MILD NIHL	NORMAL			
188	20/03/2017	SKM0000695	SUNIL KUMAR	KRISHNA PRASAD	AB RH+	38Years/M		SERVICE ENGIN	WORKSHOP	SKM	LOW SALT DIET	BLOOD SUGAR=REPEATED=NORMAL, FIT	ENGINEER--SANDVIK--SKM	20/03/2017	150/90	6/6 BE	NO	NORMAL	NORMAL			
189	20/03/2017	SKM0006964	ANIL KUMAR	SHRI CHAND	A RH+	42Years/M		SERVICE ENGIN	WORKSHOP	SKM	HIGH TG. CONTINUE TR	FIT, CONTINUE TREATMENT FOR HIGH TG	ENGINEER--SANDVIK--SKN	20/03/2017	130/90	6/6 BE	NO	RT HFHL	NORMAL			
190	20/03/2017	SKM0000953	RAJKANT DAS	KRISHTA KUMAR DAS	B RH+	38Years/M		MECHANIC		SKM		FIT	MECHANIC--SANDVIK--SKM	20/03/2017	110/90	6/6 BE	NO	NORMAL	NORMAL			
191	20/03/2017	SKM[illegible]	TUFAN SINGH BANJARA	CHALLA BANJARA	O RH+	21Years/M		HELPER	WORKSHOP	SKM		FIT	HELPER--SANDVIK--SKM	20/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			

SNo	Visit/Admit Date	P Id	Patient Name	Father/Husband	Blood Group	Age/Sex	MineOrSmelter	Designation	Department	EmployeeUnit	Advice	PMERemarks	PlaceOfPosting	NextPMEDate	BP	VISION	WITH GLASS	AUDIOMETRY	LUNG FUNCTIONS			
192	20/03/2017	SKM0000969	BAPON BAG	DILIP KUMAR BAG	B RH+	30Years/M		SERVICE ENGINEER		SKM		FIT	ENGINEER--SANDVIK--SKM	20/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
193	20/03/2017	SKM0001857	SAKET KUMAR	NIRANJAN SINGH	B RH+	27Years/M		SERVICE ENGINEER		SKM	OVERT DIABETES	FIT , DIET AS ADVISED	ENGINEER--SANDVIK--SKM	20/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
194	21/03/2017	SKM0006915	RAM NARAYAN BHAGAT	HARISH BHAGAT		31Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	21/03/2017	100/70	6/6 BE	NO	NORMAL	NORMAL			
195	21/03/2017	SKM0002051	PURAN CHAND	DHAN DEV	AB RH+	24Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	21/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
196	21/03/2017	SKM0002077	MUKESH PAWAR	KESHRI PAWAR	A RH+	29Years/M		JR. SERVICE ENG	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	21/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
197	21/03/2017	SKM0006953	SATRUGHNA SETHI	BABLA SETHI	B RH+	30Years/M		ENGINEER	WORKSHOP	SKM	LOW FAT DIET	FIT	ENGINEER--SANDVIK--SKM	21/03/2017	130/70	6/6 BE	NO	NORMAL	NORMAL			
198	21/03/2017	SKM0006970	RAJESH DAS	NARAYAN DAS	O RH+	29Years/M		SERVICE ENGIN	WORKSHOP	SKM	[illegible]	FIT FOR SURFACE ONLY.	ENGINEER--SANDVIK--SKM	21/03/2017	120/80	6/9,6/60	YES	NORMAL	NORMAL			
199	22/03/2017	SKM0006930	SATYANARAYAN VAISHNAV	BADRI DAS	A RH+	27Years/M		CASUAL	WORKSHOP	SKM		FIT	AC MAINTENANCE--SANDVIK--SKM	22/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
200	22/03/2017	SKM0006957	MOHSIN SHEIKH	ISMAIL SHEIKH	A RH+	28Years/M		CASUAL	WORKSHOP	SKM	VISION & CARDIAC CHECKUP	VISION & CARDIAC CHECKUP	HOUSE KEEPING--SANDVIK--SKM	22/03/2017	160/90	6/12 BE	NO	NORMAL	NORMAL			
201	22/03/2017	SKM0006960	AMIT PARASHAR	VIMAL KUMAR	B RH+	28Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	130/80	6/6 BE	NO	NORMAL	NORMAL			
202	22/03/2017	SKM0007012	SATYENDRA CHOUDHARY	BALU RAM CHOUDHARY	A RH+	26Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
203	22/03/2017	SKM0001061	AVINASH KUMAR VAISHYA	DWARKA PRASAD	O RH+	26Years/M		JR. ENGINEER	Mechanical	SK MINE		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
204	22/03/2017	SKM0001062	BHUBNAN MAHAJAN	JAGANNATH	B RH+	24Years/M		SERVICE ENGIN	Mechanical	SK MINE	VISION CORRECTION	FIT	ENGINEER--SANDVIK--SKM	22/03/2017	130/90	6/9 BE	NO	NORMAL	NORMAL			
205	22/03/2017	SKM0006938	DINESH PRAJAPAT	GANESH PRAJAPAT	A RH+	26Years/M		JR. SERVICE ENG	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	130/90	6/6 BE	NO	B/L HFHL	NORMAL			
206	22/03/2017	SKM0007079	UDAI RAM JAT	BHERU LAL JAT	AB RH-	28Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
207	22/03/2017	SKM0006881	RAKESH KUMAR	BINDESHWARI SHARMA	B RH+	28Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	110/70	6/6 BE	NO	B/L HFHL	NORMAL			
208	22/03/2017	SKM0006914	VISHNU SHANKAR JAT	RATAN LAL JAT	B RH+	31Years/M		JR. ENGINEER	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	22/03/2017	110/70	6/6 BE	NO	B/L HFHL	NORMAL			
209	22/03/2017	SKM0006968	ANUP ASHISH MASIH	ALISHA MASIH	B RH+	39Years/M		SAFETY ENGINEER		SK MINES		FIT	EHS--SANDVIK--SKM	22/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
210	22/03/2017	SKM0007003	SHIVNATH CHOUHAN	PARWAT SINGH CHOUHAN	B RH+	27Years/M		STORE KEEPER	WORKSHOP	SKM	LOW SALT DIET	FIT;REVIEW FOR BP	STORE KEEPER--SANDVIK--SKM	22/03/2017	140/100	6/6 BE	NO	NORMAL	NORMAL			
211	22/03/2017	SKM0006916	RATAN LAL BUNKAR	SHANKAR LAL BUNKAN	AB RH+	30Years/M		CASUAL	WORKSHOP	SKM		FIT	HOUSE KEEPING--SANDVIK--SKM	22/03/2017	130/90	6/6 BE	NO	NORMAL	NORMAL			
212	23/03/2017	SKM0006921	MANOHAR KUMAR	AMAR NATH JHA	A RH-	30Years/M		SERVICE ENGIN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	23/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
213	23/03/2017	SKM0006920	NARAYAN RAM CHAUDHARY	BHAKAR RAM CHOUDHARY	B RH+	30Years/M		SERVICE ENGIN	WORKSHOP	SKM	LOW SATURATED FAT DI	FIT	MANAGER--SANDVIK--SKM	23/03/2017	120/80	6/6 BE	NO	NORMAL	NORMAL			
214	23/03/2017	SKM0006900	SANTOSH VARMA	MANVISHARAN VARMA	B RH+	28Years/M		JR. SERVICE ENG	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	23/03/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
215	23/03/2017	SKM0006974	DEVJO AMALE	RAM DAYAL AMALE	O RH+	23Years/M		TECHNICIAN	WORKSHOP	SKM		FIT	ENGINEER--SANDVIK--SKM	23/03/2017	120/70	6/6 BE	NO	NORMAL	NORMAL			
216	23/03/2017	SKM0007002	DAVENDRA SINGH DEVRA	SHIVNATH SINGH DEVRA	AB RH+	23Years/M		DATA ENTRY OP	WORKSHOP	SKM		FIT	DEO--SANDVIK--SKM	23/03/2017	110/80	6/6 BE	NO	NORMAL	NORMAL			
217	24/03/2017	SKM0007088	RAJU SHARMA	OM PRAKASH SHARMA	O RH+	28Years/M		DATA ENTRY OP	WORKSHOP	SKM	WT REDUCTION	FIT	DEO--SANDVIK--SKM	24/03/2017	110/80	6/6 BE	NO	NA	NORMAL			
218	24/03/2017	SKM0007013	SURESH CHANDRA REGAR	BADRI LAL RAIGAR	A RH+	33Years/M		CASUAL	WORKSHOP	SKM	LOW SATURATED FAT DI	FIT	CASUAL--SANDVIK--SKM	24/03/2017	110/70	6/6 BE	NO	NA	NORMAL			
219	25/03/2017	SKM0006917	GOPAL BISWAS	SUDHANNYA BISWAS	AB RH+	30Years/M		ASSISTANT MAN	WORKSHOP	SKM	DIET LOW IN SATURATED	FIT	ASSTT MANAGER--SANDVIK--SKM	25/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
220	25/03/2017	SKM0007067	B CHRISTOPHER	A S KUMMANIPKAN	AB RH+	23Years/M		WORKSHOP MAN	WORKSHOP	SKM	LOW FAT DIET	FIT; USE EAR MUFFS	MANAGER--SANDVIK--SKM	25/03/2017	130/90	6/6 BE	NO	B/L HFHL	NORMAL			
221	25/03/2017	SKM0006986	HARISH CHOUDHARY	KISHAN LAL CHOUDHARY	A RH+	23Years/M		ENGINEER	WORKSHOP	SKM	EYE SURGEONS OPINION	DO NOT DEPLOY AT JOB W	ENGINEER--SANDVIK--SKM	25/03/2017	110/70	6/6 BE	NO	NORMAL	NORMAL			
222	30/03/2017	SKM0000011	BANWARI LAL JAISWAL	BHERI LAL	A RH+	27Years/M		TECHNICIAN		SKM	CONSULTATION WITH EN	FIT	SKM - ELECT, MAHESHWARI	30/03/2017	130/90	6/6 BE	NO	RT HFHL	NORMAL			
223	2017-04-04	SKM0001067	AJIT SHARMA	PRITHVI RAJ SHARMA	A RH+	38Years/M	M	ENGINEER	ATLAS COP CO	SKM		FIT	ENG-ATLAS COP CO-SKM	2022-04-04	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
224	2017-04-04	SKM0001098	BANSI LAL	MADHU LAL	B RH+	48Years/M	M	WELDER	ATLAS COP CO	SKM	USE EAR MUFFS.	FIT	WELDER-TECHNICIAN--ATLAS COP CO	2022-04-04	120/80	6/6 BE	NO	NORMAL	MILD HIH	NORMAL	XRAY-NAD	
225	2017-04-04	SKM0000618	TEJ SINGH KANAWAT	KALYAN SINGH KANAWAT	A RH+	42Years/M	M	U/G WORKER	TEK-348	SKM		FIT	HELPER--TEK--SKM,TEK--348	2022-04-04	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
226	2017-04-04	SKM0000616	SHANKAR LAL GADRI	BHERA LAL GADRI	A RH+	42Years/M	M	U/G WORKER	TEK-346	SKM	USE EAR MUFFS.	FIT	HELPER--TEK--SKM,TEK--346	2022-04-04	100/70	6/6 BE	NO	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
227	2017-04-06	SKM0000617	LEHRU LAL JAT	UDAYRAM JAT	A RH+	34Years/M	M	U/G WORKER	TEK-347	SKM	USE EAR MUFFS.	FIT	LHD OPT--TEK--SKM,TEK-347	2022-04-06	120/80	6/6 BE	NO	NORMAL	MILD HIH	NORMAL	XRAY-NAD	
228	2017-04-06	SKM0000615	SHANKAR LAL JAT	JAIRAM JAT	A RH+	32Years/M	M	U/G WORKER	TEK-345	SKM	USE EAR MUFFS.	FIT	HELPER--TEK--SKM	2022-04-06	110/70	6/6 BE	NO	NORMAL	MILD HIH	NORMAL	XRAY-NAD	
229	2017-04-08	SKM0000817	GOWARDHAN LAL SUKHWAL	UDAI LAL	AB RH+	29Years/M	M	HELPER	HMPL	SKM		FIT	HELPER--HMPL-SKM	2022-04-08	120/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
230	2017-04-12	SKH0014644	MANOJ KUMAR SINGH	NA	AB RH+	29Years/M	M	STEWARD	CANTEEN	SKM		FIT	STEWARD-HYGIEA-SKM	2018-04-12	110/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
231	2017-04-12	SKH0014702	[illegible] BHERA	AJAYA KUMAR BHERA	AB RH+	27Years/M	M	COOK	CANTEEN	SKM		FIT	COOK-HYGIEA-SKM	2018-04-12	110/70	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
232	2017-04-12	SKM0001611	DESH BANDHU VYAS	JAGDISH CHANDRA VYAS	O RH+	31Years/M	M	HELPER	RDL	SK MINE		FIT	HELPER-RDL-SKM	2018-04-12	130/90	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
233	13/04/2017	SKH0014995	GHANSHYAM SINGH RANAWAT	INDRA SINGH RANAWAT	A RH+	27Years/M	M	ADMIN OFFICER	Ore-Dressing	SKM		FIT	ADMIN OFFICER-OD-MONOMARK-SKM	2022-04-13	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
234	13/04/2017	SKH0014830	PRAKASH CHANDRA JAT	CHUNNI LAL JAT	O RH+	24Years/M	M	STORES ASSIST	Ore-Dressing	SKM		FIT	STORE ASST.-MONOMARK-SKM	2022-04-13	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
235	13/04/2017	SKH0014704	NARAYAN LAL GADRI	KANNI RAM GADRI	O RH+	42Years/M	M	K-HELPER	[illegible]	SKM	REVIEW FOR BP NORMO	REVIEW FOR BP NORMOTEN	KITCHEN HELPER--HYGIEA--SKM	2017-10-13	150/100	6/6 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
236	13/04/2017	SKH0014700	UDAIRAM GADRI	JEHARU LAL GADRI	O RH+	22Years/M	M	K-HELPER	[illegible]	SKM		FIT	[illegible]	2017-10-13	110/70	6/9 BE	NO	NORMAL	NO	NORMAL	NO	
237	13/04/2017	SKH0014693	AMBA LAL KUMAWAT	RAM CHANDRA KUMAWAT	B RH+	28Years/M	M	COOK	[illegible]	SKM		FIT	[illegible]	2017-10-13	110/70	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
238	14/04/2017	SKH0014683	UDAI LAL SUTHAR	MOHAN LAL SUTHAR	A RH+	30Years/M	M	K-HELPER	[illegible]	SKM	LOW SALT DIET	FIT	[illegible]	14/04/2017	140/100	6/6 BE	YES	NORMAL	NO	NORMAL	NO	
239	14/04/2017	SKH0014680	GANESH LAL LOHAR	ROOP LAL LOHAR	A RH+	26Years/M	M	K-HELPER	[illegible]	SKM		FIT--[illegible]	[illegible]	14/04/2017	110/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
240	14/04/2017	SKH0014692	JAGDISH CHANDRA	BADRI LAL GADRI	B RH+	32Years/M	M	COOK	[illegible]	SKM		FIT	[illegible]	14/04/2017	130/90	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
241	14/04/2017	SKH0014[illegible]	PHOOL CHAND SINGH	NA	O RH+	30Years/M	M	CHEFF	[illegible]	SKM		FIT	[illegible]	14/04/2017	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
242	16/04/2017	653111	A.R.MANGAL	HR MANGAL	B RH+	45Years/M	M	Manager - Instru	MILL-INSTRUM	HZL		TRANSFERRED TO AGUCHA	MANAGER-MILL-SKM	2022-04-16		6/6 BE	NO	NORMAL	NO	NO	NO	
243	19/04/2017	SKH0014644	PRABHU LAL GADRI	BADRI LAL GADRI	AB RH+	27Years/M	SKM	K-HELPER	[illegible]	SKM	LOW SALT DIET	FIT	[illegible]	19/04/2017	150/90	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
244	19/04/2017	SKH0014661	SHYAM LAL LOHAR	NATHU LOHAR	B RH+	37Years/M	SKM	K-HELPER	[illegible]	SKM		FIT	[illegible]	19/04/2017	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
245	19/04/2017	SKH0014706	DEVENDRA KUMAR	ACHCHHE LAL	B RH+	24Years/M	SKM	STEWARD	[illegible]	SKM		FIT	[illegible]	19/04/2017	110/90	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
246	19/04/2017	SKH0014704	SURESH SINGH	DHANNA SINGH	B RH+	33Years/M	SKM	COOK	[illegible]	SK MINES		FIT	[illegible]	19/04/2017	110/80	6/6 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
247	19/04/2017	SKH0014075	NARAYAN JATIYA	MADHU LAL	B RH+	38Years/M	SKM	HELPER	ORE DRESSING	SKM	WEIGHT IMPROVED	FIT.		19/04/2017								
248	20/04/2017	SKH0014591	RAM LAL GADRI	GANGA RAM GADRI	B RH+	46Years/M	M	K-HELPER	[illegible]	SKM		FIT	[illegible]	20/04/2017	130/90	RE-BLIND	NO	NORMAL	NO	NORMAL	NO	
249	20/04/2017	SKH0014654	RAMCHANDRA GADRI	PRATAP GADRI	B RH+	27Years/M	M	K-HELPER	[illegible]	SKM		FIT	[illegible]	20/04/2017	110/70	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
250	20/04/2017	SKM0002345	YASHRAJ SINGH SOLANKI	RAGHUVEER SINGH SOLANKI	B RH+	25Years/M	M	TECHNICIAN	SANDVIK	SKM		FIT	TECHNICIAN--SANDVIK--SKM	2022-04-20	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
251	20/04/2017	SKM0002346	VINOD KUMAR SUWALKA	KAILASH CHANDRA	O RH-	25Years/M	M	TECHNICIAN	SANDVIK	SKM		FIT	TECHNICIAN--SANDVIK--SKM	2022-04-20	130/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
252	21/04/2017	573279	[redacted]	NARAYAN DHAN KUMAR	O RH+	31Years/M	M			HZL		[redacted]	SKM									
253	22/04/2017	SKM0007050	SHIVAM SINGH	AJAY SINGH	B RH+	26Years/M	M	DATA ENTRY OP	MAINTENANCE	SKM		FIT	DEO--SANDVIK--SKM	2022-04-22	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
254	25/04/2017	SKM0006281	MOHAN LAL JAT	PARATIA JAT	A RH+	27Years/M	M	HELPER	ENVIRONMENT	SKM	VISION CORRECTED	FIT	HELPER--MATHU KEER--SKM	2022-04-25	130/80	RE-6/9LE-	NO	NORMAL	NO	NORMAL	XRAY-NAD	
255	26/04/2017	SKM0014684	RATAN LAL SHARMA	RAM CHANDRA SHARMA	O RH+	55Years/M	M	K-HELPER	CANTEEN	SKM	DIABETES CONTROLLED	FIT	HELPER--HYGIEA--SKM	26/04/2017	130/90	6/9 BE	NO	NORMAL	NO	NORMAL	NO	
256	26/04/2017	SKM0014690	SAROJ KUMAR	BRIJPAL	AB RH+	39Years/M	M	K-HELPER	CANTEEN	SK MINES		FIT	HELPER--HYGIEA--SKM	26/04/2017	110/70	6/6 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
257	29/04/2017	SKM0000441	RAM CHANDER TELI	KAJOD TELI	B RH+	48Years/M	M	U/G WORKER	TCL-115	SKM	LOW SALT DIET	FIT	HELPER--TEK--SKM	2022-04-29	140/100	6/9 BE	NO	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
258	29/04/2017	SKM0000438	RATAN LAL LOHAR	MOHANLAL LOHAR	B RH+	48Years/M	M	U/G WORKER	TCL-92	SKM		FIT	UG OPT--TEK--SKM	2022-04-29	110/70	RE-6/9LE-	YES	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
259	29/04/2017	SKM0000447	KISHU LAL JAT	RAM LAL JAT	B RH+	45Years/M	M	U/G WORKER	TCL-135	SKM		FIT	UG OPT--TEK--SKM	2022-04-29	120/80	6/6 BE	NO	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
260	29/04/2017	SKM0000[illegible]	PRITHVIRAJ KUMHAR	HUKMI CHAND KUMHAR	AB RH+	35Years/M	M	U/G WORKER	TCL-114	SKM		FIT	LHD/UDT OPT--TEK--SKM	2022-04-29	110/70	6/6 BE	NO	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
261	2017-05-01	SKM0014700	PINKU SINGH	BHAWANI PRASAD	A RH+	29Years/M	M	[illegible]	[illegible]	SKM		FIT	[illegible]	2017-11-01	110/70	6/6 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
262	2017-05-01	SKM0014705	ABDUL RUZIB SHEIKH	ABDUL AZIZ SHEIKH	A RH+	29Years/M	M	[illegible]	[illegible]	SKM		FIT	[illegible]	2017-11-01	110/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
263	2017-05-01	573537	ABHINAV MEHTA	TEJ SINGH	O RH+	27Years/M	M	ENGINEER	MINING	SKM		FIT	MINING ENG-SKM	2022-05-01	110/70	6/6 BE	NO	NORMAL	NORMAL	[redacted]	XRAY-NAD	
264	2017-05-02	SKM0014693	INDARPAL SINGH	SRWAN SINGH	O RH+	21Years/M	M	UTILITY [illegible]	[illegible]	SKM		FIT	UTILITY-HYGIEA--SKM	2017-05-02	130/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
265	2017-05-03	SKM0000432	MANOJ LAL KUMHAR	BHERU LAL KUMHAR		31Years/M	M	LHD OPRT	TCL	SKM		FIT	LHD OPT--TEK--SKM	2022-05-03	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
266	2017-05-03	577928	AJITH KRISHNAN	KRISHNAN UNNI	O RH+	23Years/M	M	GET	METTALURGY	SKM	LOW SALT DIET	FIT	GET-MILL-SKM	2022-05-03	150/100	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
267	2017-05-05	SKM0000349	LAL SINGH	ZORAWAR SINGH	A RH+	52Years/M	M	MINING MATE	TCL	SKM	VISION CORRECTION	FIT , VISION CORRECTION	MINING MATE-TCL-SKM	2018-05-05	130/90	6/12 BE	NO	NORMAL	MILD HIH	NORMAL	XRAY-NAD	
268	2017-05-08	673338	KAILASH CHAHANDE	LAXMAN CHAHANDE	O RH+	49Years/M	M	AGM	ORE DRESSING	SKM	TMT/ECHO--NORMAL	FIT	AGM-OD-SKM	2022-05-08	130/80	6/6 BE	YES	NORMAL	NO	NORMAL	NO	
269	2017-05-12	SKM0001390	MANOHAR DAS	PREM DAS	B RH+	51Years/M	M	WINDER DRIVER	MINING	SKM	TMT,ECHO,USG--NORMA	FIT	[illegible]	2018-05-12	140/90	6/9 BE	YES	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
270	13/05/2017	SKM0014697	PREM CHANDRA YADAV	PHOOL CHAND	O RH+	20Years/M	M	HOUSE KEEPER	CANTEEN	SKM		FIT	[illegible]	2018-05-13	100/70	6/9 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
271	13/05/2017	SKM0014689	BHANWAR LAL GADRI	RAM LAL GADRI	B RH+	37Years/M	M	[illegible]	[illegible]	SKM		FIT	[illegible]	2018-05-13	100/70	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
272	13/05/2017	SKM0001216	MADAN LAL SONI	GHOORI LAL SONI	O RH+	52Years/M	M	MINING MATE	MINING	SKM	ECHO,TMT,USG=NORMA	FIT	MATE--HRREC--SKM	2022-05-13	110/70	6/18 RE/LE	YES	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
273	13/05/2017	SKM0000522	SHAIK JAMEER	SHAIK IANIBASHA	A RH+	29Years/M	M	FOREMAN	TCL-229	SKM		FIT	FOREMAN--TEK/229--SKM	2022-05-13	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
274	17/05/2017	561785	MEENAKSHI DHIMAN	MADAN LAL DHIMAN	B RH+	29Years/F	M	GEOSCIENTIST	EXPLORATION	SKM		FIT	GEOSCIENTIST--EXPLORATION--SKM	2022-05-17	120/80	6/9LE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
275	2017-05-20	265670	PARACKAL THOMAS CHACKO	P T CHACKO	O RH+	51Years/M	M	ENGINEER	MINING	SKM	BP MONITORING (LOW S	FIT	ASS MGR ELECTRICAL-MINING-SKM	2022-05-20	140/90	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
276	24/05/2017	SKM0006902	RAJESH SHARMA	MANI KANT SHARMA	B RH+	30Years/M	M	TECHNICIAN	MINING	SKM		FIT	A C TECHNICIAN--SANDVIK--SKM	2022-05-24	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
277	24/05/2018	20176	B V RAO--RESIGNED			53Years/M	M	GM		SKM	RESIGNED	FIT		RESIGNED							XRAY-NAD	
278	2017-06-01	581367	MOHIT UPADHYAY	MAHESH UPADHYAY	B RH+	25Years/M	M	ASSOCIATE MAN	Instrumentation	HZL		FIT	ASSOCIATE MANAGER--SKM	2022-06-01	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	[redacted]	
279	2017-06-01	560715	RAHUL JAIN	MAHENDRA KUMAR JAIN	B RH+	29Years/M	M	ENGINEER - INS	Instrumentation	HZL		FIT	AM--SKM-MINING	2022-06-01	100/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	[redacted]	
280	2017-06-01	578837	ASHISH KUMAR SWAIN	ADIKANDA	O RH+	22Years/M	M	GET	MINING	HZL		FIT	GET-SKM-MINING	2022-06-01	110/80	6/6 BE	YES	NORMAL	NORMAL	NORMAL	XRAY-NAD	
281	2017-06-01	578840	ASWINI KUMAR PADHI	[redacted]	O RH+	23Years/M	M	GET	MINING	HZL		FIT	GET--SKM-MINING	2022-06-01	110/70	6/6 BE	[redacted]	NORMAL	NORMAL	NORMAL	XRAY-NAD	
282	2017-06-02	578011	ASHISH KUMAR	VIJAY PRASAD	O RH+	22Years/M	M	GET	MILL	HZL		FIT	GET-SKM-MILL	2022-06-02	100/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
283	2017-06-06	578545	SAHIL SANDILYA	NARENDRA NATH SANDILYA	B RH+	22Years/M	M	ENGINEER-METT	MILL	HZL		FIT	ENGINEER-OD-SKM	2022-06-06	100/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
284	2017-06-06	282860	BABU LAL KHATIK	GOPAL LAL KHATIK	A RH+	30Years/M	M	JT EXECUTIVE	Mechanical	HZL		FIT	SURVEYOR--SKM	2022-06-06	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
285	2017-06-07	578619	SONIKA AGRAWAL	RAMESH AGARWAL	B RH+	23Years/F	M	GET	METTALURGY	HZL-SKM		FIT	GET-SKM-MILL	2022-06-07	100/70	6/6 BE	YES	NORMAL	NORMAL	NORMAL	XRAY-NAD	
286	2017-06-07	578451	PRASHANT TIWARI	DHARMESH TIWARI	AB RH+	23Years/M	M	GET	MECHANICAL	HZL-SKM		FIT	GET-SKM	2022-06-07	120/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
287	2017-06-07	578[illegible]	ANOL DALCHAND HINGE	DALCHAND HINGE	B RH-	22Years/M	M	GET	MINING	HZL-SKM		FIT	GET-SKM	2022-06-07	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
288	2017-06-07	578150	GAURAV PRABHAT	RAMAVTAR SAHU	B RH+	22Years/M	M	GET	MINING	HZL-SKM		FIT	GET-SKM	2022-06-07	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
289	2017-06-07	578338	MUKESH BARNWAL	RAJ KUMAR BARANWAL	B RH+	22Years/M	M	GET	ELECTRICAL EN	HZL-SKM		FIT	GET-SKM	2022-06-07	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
290	2017-06-07	578472	PARTH MITTAL	MR MUKESH KUMAR MITTAL	AB RH+	23Years/M	M	GET	MECHANICAL	HZL-SKM		FIT	GET-SKM	2022-06-07	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
291	2017-06-07	578134	GAJENDRA SINGH MASWAN	BHAWANI SINGH	B RH+	24Years/M	M	GET		HZL-SKM		FIT	GET-SK-MINE	2022-06-07	110/80	6/6 BE	YES	NORMAL	NORMAL	NORMAL	XRAY-NAD	
292	2017-06-07	578477	RAJESH KUMAR	RAMCHANDRA PRAKASH ME	O RH+	23Years/M	M	GET	MINING	HZL-SKM		FIT	GET-SK-MINE	2022-06-07	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
293	2017-06-07	578568	VIKRAM BENIWAL	BABU LAL MEGHWAL	O RH+	21Years/M	M	GET	MINING	HZL-SKM		FIT	GET-SK-MINE	2022-06-07	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
294	2017-06-07	109347	A. K. GUPTA	B P GUPTA	B RH+	51Years/M	M	ASSOCIATE GM	SKM - PROJECT	HZL	DIABETES & HT	FIT	AGM-PROJECT-SKM	2022-06-07	144/114	6/6 BE	YES	NORMAL	B/L HFHL	NORMAL	NO	
295	2017-06-07	578121	D. SHIVANI	J RAM KUMAR	O RH+	23Years/F	M	GET	METTALURGY	HZL-SKM		FIT	GET-SKM-MILL	2022-06-07	120/80	6/6 BE	YES	NORMAL	NORMAL	NORMAL	XRAY-NAD	
296	2017-06-07	578163	HARIT PRIYA	RAM ASRE	B RH+	23Years/M	M	GET	CHEMICAL ENG	HZL-SKM		FIT	GET-SKM-MILL	2022-06-07	120/80	6/6 BE	YES	NORMAL	NORMAL	NORMAL	XRAY-NAD	
297	2017-06-07	580192	ASIF AJAZ	AJAZ AHMED	B RH+	25Years/M	M	ASSOCIATE MAN	ASSET OPTIMI	HZL	ECG EF=55%	FIT	AD--SKM	2022-06-08	120/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	[redacted]	
298	2017-06-09	SKM0001226	VIKRAM SINGH TANWAR	BANNE SINGH TANWAR	A RH+	42Years/M	M	SITE INCHARGE	EUROSMILE	HZL-SKM	DIABETES TREATMENT ADVISED	FIT	PROJECT MANAGER-EUROSMILE-SKM		130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD-P	
299	2017-06-10	578066	BALDEV SINGH JADON	NIRANJAN SINGH	B RH+	23Years/M	M	GET	MINING	HZL	RPT BLOOD SUGAR	FIT	GET-MINING-SKM	2022-06-10	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
300	13/06/2017	SKM0014868	NARAYAN REGAR	JAGDISH CHANDRA	O RH+	23Years/M	M	MAZDOOR	PASTE FILL	SKM		FIT	HELPER--MONOMARK--PASTE FILL--SK	2022-06-13	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
301	14/06/2017	579469	AKSHI PRABHA CHOUDHARY	DR BALURAM CHOUDHARY	O RH+	26Years/F	M	EXECUTIVE	HR	HZL		FIT	EXECUTIVE--HR--SKM	2022-06-14	[redacted]	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
302	15/06/2017	SKP0097026	NIRENDRA KUMAR	SATYA NARAYAN SINGH	A RH+	40Years/M	M	INTERPRETER	MINING	SKM	RPT BLOOD SUGAR	DIABETES, FIT	INTERPRETOR--CHINACOAL--SKM	2022-06-15	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	XRAY-NAD	
303	15/06/2017	SKM0000636	SHANKAR LAL KHAROL	HAR LAL KHAROL	B RH+	41Years/M	M	MINING MATE	MINING	SKM		FIT	MATE--HRREC--SKM,HRREC/30	2022-06-15	120/80	6/6 BE	NO	NORMAL	B/L HFHL	NORMAL	XRAY-NAD	
304	16/06/2017	372035	GULAM MOINUDDIN USMANI	MOHD USSMAN	A RH+	26Years/M	M	ENGINEER	MINING	SKM		FIT	MINING ENG-SKM	2022-06-16	[redacted]	6/6 BE	NO	NORMAL	NO	[redacted]	NO	
305	20/06/2017	SKM0001717	ABHISHEK SINGH RAO	GULAB SINGH RAO	O RH+	22Years/M	M	HELPER	MINING	SKM		FIT	HELPER--RDL--SKM	2022-06-20	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
306	21/06/2017	SKM0000[illegible]	TEJENDRA SINGH JHALA	CHAIN SINGH JHALA	AB RH+	30Years/M	M	REGISTER KEEP	OFFICE	SK MINE		FIT	HR ADMIN--HRREC--SKM	2022-06-21	110/70	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
307	21/06/2017	SKM000[illegible]	JAGADISH CHANDER JAT	RAWAT RAM JAT	O RH+	41Years/M	M	MINING MATE	MINING	SKM		FIT	MATE--TEK--SKM	2022-06-21	120/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
308	22/06/2017	206047	SAPTARSHI DATTA	SUJIT DATTA	A RH+	29Years/M	M	ASSOCIATE MAN	GEOTECH	HZL	WT REDUCTION	TRANSFERRED TO ZAWAR.	ASS MGR--GEOLOGY--SKM	2022-06-22	100/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
309	23/06/2017	SKM0007340	VIKRAM SINGH CHOUHAN	JODH SINGH CHOUHAN	B RH+	38Years/M	M	SUPERVISOR	HARD ROCK	SKM			ELECTRICAL SUPERVISOR-HRREC-SKM	2022-06-23	130/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
310	30/06/2017	SKM0007300	LOKESH KUMAR MENARIYA	GANESH LAL	O RH+	30Years/M	M	MINING MATE	CHINA COAL	SKM	LOW FAT DIET ; ENT OPI	FIT	MATE--CCJC--SKM	2022-06-30	130/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	XRAY-NAD	
311	2017-07-03	585635	HETA SHAH	JULIN SHAH	O RH+	24Years/F	M	TRAINEE	HR	SKM			TRAINEE-HR-RDC	2022-07-03	110/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2017	
312	2017-07-03	SKM0001789	DEEPAK KUMAR MONDAL	SHUDEV MONDAL	B RH+	28Years/M	M	TECHNICIAN	ATLAS COP CO	SKM			TECHNICIAN-ATLAS COP CO-SKM	2022-07-03	120/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2017	
313	2017-07-05	SKM0000644	RAMESHWAR LAL JAT	BADRI LAL JAT	B RH+	36Years/M	M	U/G WORKER	TCL	SKM		FIT	DRILLER--TEK--SKM	2022-07-05	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2017	

SNo	VisitAdmitDate	P Id	Patient Name	FatherHusband	Blood Group	Age/Sex	MineOrSmelter	Designation	Department	EmployeeUnit	Advise	PMERemarks	PlaceOfPosting	NextPMEDate	BP	VISION	WITH GLASS	AUDIOMETRY	LUNG FUNCTIONS			
314	2017-07-05	SKN0000424	SHANKAR LAL GADRI	BHERU LAL GADRI	O RH+	[redacted]	M	U/G WORKER	TCL	SKN		FIT	DRILLER---TEK---SKN	2022-07-05	130/90	6/6 BE	NO	NORMAL	MILD NIHL	NORMAL	NAD-2017	
315	2017-07-05	SKN0000436	ARAVIND KUMAR VAISHNAV	MADAN DAS VAISHNAV	O RH+	54Years/M	M	U/G WORKER	TCL-113	SKN	CARDIAC EVALUATION	NOT FIT	LOADER OPERATOR--TEK--SKN	2022-07-05	190/130	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2017	
316	2017-07-05	SKN0000410	SURESH CHANDRA JAT	MADHAVLAL JAT	O RH+	36Years/M	M	U/G WORKER	TCL-92	SKN		FIT	LHD OPRT	2022-07-05	140/90	6/6 BE	NO	NORMAL	B/L NIHL	NORMAL	NAD-2017	
317	2017-07-05	SKN0000435	PRITHVIRAJ GADRI	BHERU LAL GADRI	O RH+	37Years/M	M	U/G WORKER	TCL-435	SKN	HYPERTENSION	REGULAR BP MONITORING	LOADER OPERATOR--TEK--SKN	2022-07-05	150/100	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2017	
318	2017-07-06	SKN0000416	INDERMAL PUROHIT	VIJAY RAM PUROHIT	B RH+	47Years/M	M	OPERATOR	TCL-48	SKN	TMT/ECHO/UNCONTROLL	FIT	PUMP OPRT-SKN	2022-06-07	130/90	6/6 BE	YES	NORMAL	NORMAL	NORMAL	NAD-2017	
319	2017-07-06	SKN0000447	RADHESHYAM BHAT	KANHI LAL BHAT	B RH+	35Years/M	M	U/G WORKER	TCL-120	SKN	TMT/ECHO		SOLO OPRT-SKN	2022-06-07	130/90	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NAD-2016	
320	2017-07-06	SKN0001816	JASWANT SINGH	DHARAMPAL SINGH	O RH+	27Years/M	M	SURVEYER	RDL-53	SKN			SURVEYER-RDL-SKH	2022-06-07	130/80	6/6 BE	NO	NORMAL	NORMAL	NORMAL	NO	
321	2017-07-06	578008	SURAJ MHLJARKAR	RAJENDRA	AB RH+	26Years/M	M	MINING ENGINE	MINING	HZL		NOT FIT FOR RESCUE	RESCUE--MINING ENG-SKN	2022-06-07	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
322	2017-07-08	SKN0000100	PRAHLAD BHIL	KANHAIYA LAL BHIL	B RH+	19Years/M	M	UN. TECH A MEC	MONDHANK	SKN	REGULAR CARDIAC FOLL	FIT FOR LIGHT JOB			130/80	6/6 BE	NO	NORMAL			NO	
323	2017-07-08	577216	PRADEEP KUMAR	HANUMAN SINGH	O RH+	35Years/M	M	GET	MINING	HZL		FIT FOR RESCUE		2018-07-08	120/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
324	2017-07-08	568704	SABYASACHEE PRADHAN	SURENDRA NATH	B RH+	26Years/M	M	ENGINEER	MINING	HZL		FIT FOR RESCUE		2018-07-08	110/80	6/6 BE	NO	NORMAL	NO	NORMAL	NO	
325	2017-07-14	568708	SUPRIYO SARKAR	SAMIR SARKAR	B RH+	29Years/M	M	ENGINEER	MINING	HZL		FIT FOR RESCUE		2018-07-14	110/70	6/18 BE	NO	NORMAL	NO	NORMAL	NO	

STUDY

ON

EFFECT OF ATMOSPHERIC PRESSURE ON EAR DRUMS

OF

MINING WORKERS OF SK MINES

2016

Dr.Alka Anand
Dy.CMO
HZL

Dr Anand Mahawar
CMO
HZL

Acknowledgements

We are grateful to the management of Hindustan Zinc Limited for permitting us to carry out this prestigious Study on the Effect of atmospheric pressure on ear drums of mining workers at SK Mines

We are thankful to Mr.R P Dashora (Vice President)- R D Complex , and Mr. Rajeev Bora (Unit Head SK Mines)for allowing us to use the resources for the present study.

Executive Summary

The Management of Hindustan Zinc Limited decided to carry out a Study on the Effect of Atmospheric Pressure on the Mining Population of S K Mines.
Aim of the study was to detect any harmful effects of the mining depth –thereby atmospheric pressure on the ear drums of underground workers and to take appropriate measures for the prevention of harmful effects.

Total 130 subjects working at different levels of depths were choosen for the study. Two different levels of Mine were selected ie at surface, and at the deepest point of the mine Atmospheric Pressure at these levels was recorded to know the atmospheric pressure. Workmen and Executives from both the levels were examined for their ear and audiometry values

Objectives of the Study:-

(1) To study the effect of air pressure on ear drums of the Mining Workers of S K Mines

(2) To recommend future course of action for protecting and promoting health of the employees

Atmospheric pressure was measured at surface
Occupational history was taken of all the persons and a complete physical examination was done to rule out any associated illness which can effect the ear.
Past history of ototoxic medication was also taken.

Ears were examined of all the persons to rule out any perforation in the past. All the persons were also subjected to audiometry study.

MATERIAL & METHODS :-

(a) Selection of the subjects
(b) Measurement of Atmospheric Pressure by Barometer
(c) Ear examination and audiometry.
(d) Evaluation of Data

(a) Selection of subjects:-

Study was conducted on 130 mining workers working at various levels of depths. Both executive and contract employees were taken for the study covering 60 executives and 70 contract employees.
All were choosen randomly working near surface and at the deepest part of the mine ie at 65 MRL depth.

(b) Measurement of atmospheric pressure by Barometer:-

Atmospheric pressure was measured by Barometer from Germany, at the surface ie at 516 MRL and at the deepest part of the mine ie at 65 MRL depth.

(c) Ear Examination and Audiometry

Ear of all the persons was examined for any tympanic membrane perforation. All the persons were also subjected to audiometry study for any associated hearing loss.

OBSERVATIONS:-

Table -I

Measurement record of Atmospheric pressure.

Place	Reading of Barometer
At Surface	736 mm of Hg
At 65 MRL depth	740 mm of Hg

TABLE-2

EAR CHECKUP FOR TYMPANIC MEMBRANE (EAR DRUM) AND AUDIOMETRY OF CONTRACT EMPLOYEES

S.No	DATE OF MEDICAL	NAME	AGE	E.No	TYMPANIC MEMBRANE(EAR DRUM)	AUDIOMETRY
1	26/03/2016	NARESH GADRI	23YRS	SK-TCL	NORMAL	NORMAL
2	28/03/2016	MUMAMAL ISLAM	27YRS	SK-TCL	NORMAL	NORMAL
3	05/04/2016	RAVI KUMAR	33YRS	SK-TCL	NORMAL	NORMAL
4	07/01/2016	KARAN BAHADUR	30YRS	SK-TCL	NORMAL	NORMAL
5	13/05/2016	NARENDRA	25YRS	SK-RDL	NORMAL	NORMAL
6	13/05/2016	SHAHENDRA SINGH	40YRS	SK-RDL	NORMAL	NORMAL
7	13/05/2016	MOHAN LAL	30YRS	SK-RDL	NORMAL	NORMAL
8	13/05/2016	SURESH	35YRS	SK-RDL	NORMAL	NORMAL
9	13/05/2016	NARAYAN LAL	31YRS	SK-RDL	NORMAL	NORMAL
10	13/05/2016	RAM CHANDRA	30YRS	SK-RDL	NORMAL	NORMAL
11	13/05/2016	PUSHPENDRA	19YRS	SK-RDL	NORMAL	NORMAL
12	13/05/2016	SHANKAR LAL	27YRS	SK-RDL	NORMAL	NORMAL
13	14/05/2016	VIJAY SINGH	21YRS	SK-RDL	NORMAL	NORMAL
14	14/05/2016	SAMPATLAL SALVI	20YRS	SK-RDL	NORMAL	NORMAL
15	14/05/2016	RATAN SALVI	22YRS	SK-RDL	NORMAL	NORMAL
16	14/05/2016	PURAN SALVI	24YRS	SK-RDL	NORMAL	NORMAL
17	14/05/2016	YUVRAJ SINGH	26YRS	SK-RDL	NORMAL	NORMAL
18	14/05/2016	MUKESH KUMAR GADRI	23YRS	SK-RDL	NORMAL	NORMAL
19	17/05/2016	NARAYANLAL SAHU	22YRS	SK-TCL	NORMAL	NORMAL
20	17/05/2016	NANALAL JOSHI	30YRS	SK-TCL	NORMAL	NORMAL
21	17/05/2016	KARAN SINGH	33YRS	SK-TCL	NORMAL	NORMAL

22	17/05/2016	BHUPENDRA SINGH	25YRS	SK-TCL	NORMAL	NORMAL
23	17/05/2016	MAHESHBUGAT	28YRS	SK-TCL	NORMAL	NORMAL
24	18/05/2016	KULDEEP SINGH	24YRS	SK-TCL	NORMAL	NORMAL
25	18/05/2016	PAWAN CHAUDHARY	24YRS	SK-TCL	NORMAL	NORMAL
26	18/05/2016	MADAN LAL JAT	35YRS	SK-TCL	NORMAL	NORMAL
27	18/05/2016	SHIVLAL JAT	32YRS	SK-TCL	NORMAL	NORMAL
28	18/05/2016	AZAD SINGH CHUNDAWAT	26YRS	SK-TCL	NORMAL	NORMAL
29	18/05/2016	KAJARLAL BHIL	27YRS	SK-TCL	NORMAL	NORMAL
30	18/05/2016	PRAKASH CHANDRA JAT	23YRS	SK-TCL	NORMAL	NORMAL
31	18/05/2016	JAGANNATH	30YRS	SK-TCL	NORMAL	NORMAL
32	18/05/2016	SHOBHALAL JAT	27YRS	SK-TCL	NORMAL	NORMAL
33	18/05/2016	DEEPAK DADEECH	27YRS	SK-TCL	NORMAL	NORMAL
34	18/05/2016	KRISHNA GOPAL	20YRS	SK-TCL	NORMAL	NORMAL
35	18/05/2016	KALURAM REGAR	22YRS	SK-TCL	NORMAL	NORMAL
36	23/05/2016	JEEVAN SINGH	23YRS	SK-TCL	NORMAL	NORMAL
37	23/05/2016	DINESH SUTHAR	28YRS	SK-TCL	NORMAL	NORMAL
38	23/05/2016	OMLAL JAT	22YRS	SK-TCL	NORMAL	NORMAL
39	25/05/2016	BAURILAL SARGARA	35YRS	SK-TCL	NORMAL	NORMAL
40	06/05/2016	RAMESHWARLAL SUTHAR	30YRS	SK-RDL	NORMAL	NORMAL
41	07/05/2016	RAHUL KUMAR	30YRS	SK-TCL	NORMAL	NORMAL
42	15/05/2016	J ALAM	25YRS	SK-TCL	NORMAL	NORMAL
43	18/05/2016	HARVINDER SINGH	24YRS	SK-TCL	NORMAL	NORMAL
44	22/05/2016	S GOBIND REDDY	20YRS	SK-TCL	NORMAL	NORMAL
45	25/05/2016	RIJAL RAI	20YRS	SK-TCL	NORMAL	NORMAL
46	25/05/2016	NEPALIN AN RAI	21YRS	SK-TCL	NORMAL	NORMAL
47	25/05/2016	DHARAMPAL KUMAR	21YRS	SK-	NORMAL	NORMAL

				TC.		
48	12/07/2016	CHANANJAY ROY	31YRS	SK-TC.	NORMAL	NORMAL
49	14/07/2016	JASWANT SINGH	24YRS	SK-RDL	NORMAL	NORMAL
50	16/07/2016	V PRITHVIRAJ	33YRS	SK-TC.	NORMAL	NORMAL
51	22/07/2016	VIJAY KUMAR SHARMA	29YRS	SK-TC.	NORMAL	NORMAL
52	23/07/2016	KAMAL KISHORE	24YRS	SK-TC.	NORMAL	NORMAL
53	01/08/2016	SHUBHAM CHANDEL	22YRS	SK-TC.	NORMAL	NORMAL
54	01/08/2016	AKSHAT ACHARYA	22YRS	SK-TC.	NORMAL	NORMAL
55	03/08/2016	MADAN KHUNTIA	22YRS	SK-TC.	NORMAL	NORMAL
56	17/08/2016	DAYA SHANKAR	29YRS	SK-TC.	NORMAL	NORMAL
57	01/09/2016	PRAKASH MALI	27YRS	SK-RDL	NORMAL	NORMAL
58	01/09/2016	BHAWANI SINGH	38YRS	SK-RDL	NORMAL	NORMAL
59	02/09/2016	ROOP SINGH	34YRS	SK-RDL	NORMAL	NORMAL
60	02/09/2016	SURESH CHANDRA	32YRS	SK-RDL	NORMAL	NORMAL
61	02/09/2016	OM PRAKASH	31YRS	SK-RDL	NORMAL	NORMAL
62	02/09/2016	HEERALAL	31YRS	SK-RDL	NORMAL	NORMAL
63	02/09/2016	PUSHKARLAL KHATIK	30YRS	SK-RDL	NORMAL	NORMAL
64	02/09/2016	RAMESH CHANDRA JATIA	20YRS	SK-RDL	NORMAL	NORMAL
65	03/09/2016	PANKAJ SEN	24YRS	SK-RDL	NORMAL	NORMAL
66	03/09/2016	GANESH LAL	24YRS	SK-RDL	NORMAL	NORMAL
67	03/09/2016	RAMRAJ JAT	38YRS	SK-RDL	NORMAL	NORMAL
68	03/09/2016	SHANKAR LAL	35YRS	SK-RDL	NORMAL	NORMAL
69	03/09/2016	JAYANT KUMAR	33YRS	SK-RDL	NORMAL	NORMAL
70	03/09/2016	JAGDISH	35YRS	SK-RDL	NORMAL	NORMAL

TABLE -3

EAR CHECKUP FOR TYMPANIC MEMBRANE (EAR DRUM) AND AUDIOMETRY OF REGULAR EMPLOYEES

S.No	DATE OF MEDICAL	E.No	NAME	AGE	TYMPANIC MEMBRANE(EAR DRUM)	AUDIOMETRY
1	01/04/2016	288165	KUDAVANDLA	30YRS	NORMAL	NORMAL
2	02/04/2016	268622	AMIR KHAN	33YRS	NORMAL	NORMAL
3	07/04/2016	296859	HIMANSHU JOSHI	24YRS	NORMAL	NORMAL
4	15/04/2016	561351	SIVASAT	29YRS	NORMAL	NORMAL
5	26/04/2016	561853	PANKAJ KUMAR	26YRS	NORMAL	NORMAL
6	28/04/2016	561151	DUSHYANT TAILOR	27YRS	NORMAL	NORMAL
7	28/04/2016	296335	AVINESH	28YRS	NORMAL	NORMAL
8	29/04/2016	304531	ANUMULLA MALLESH	25YRS	NORMAL	NORMAL
9	29/04/2016	563659	SOUTAN G	25YRS	NORMAL	NORMAL
10	21/05/2016	565451	ZEESHAN JAMAL	26YRS	NORMAL	NORMAL
11	06/05/2016	568335	SUBHAJEET	26YRS	NORMAL	NORMAL
12	06/05/2016	568209	MAHENDRA KUMAR	26YRS	NORMAL	NORMAL
13	07/05/2016	568865	PRAVEEN	27YRS	NORMAL	NORMAL
14	07/05/2016	568704	SABHYASACHEE PRADHAN	26YRS	NORMAL	NORMAL
15	09/05/2016	568859	SAURAV	26YRS	NORMAL	NORMAL
16	09/05/2016	568788	SUDEEP SARKAR	27YRS	NORMAL	NORMAL
17	10/05/2016	568980	D K YADAV	47YRS	NORMAL	NORMAL
18	11/05/2016	570036	SURAJ PINJARKAR	24YRS	NORMAL	NORMAL
19	14/05/2016	573015	VIPIN	23YRS	NORMAL	NORMAL
20	17/05/2016	572169	MANOJ SINGH	26YRS	NORMAL	NORMAL
21	17/05/2016	572075	GULAM MOHINUDDIN	26YRS	NORMAL	NORMAL
22	18/05/2016	572266	PREM KUMAR	26YRS	NORMAL	NORMAL
23	18/05/2016	572337	PRAKASH KUMAR	26YRS	NORMAL	NORMAL
24	19/05/2016	573074	ASHOK KUMAR	31YRS	NORMAL	NORMAL
25	21/05/2016	573867	RAM KUMAR	24YRS	NORMAL	NORMAL
26	23/05/2016	574138	ABHISHEK KUMAR	23YRS	NORMAL	NORMAL
27	24/05/2016	574879	AB ID KHAN	22YRS	NORMAL	NORMAL
28	27/05/2016	574882	BALURAM GUJAR	22YRS	NORMAL	NORMAL
29	28/05/2016	564342	BHARAT KUMAR	28YRS	NORMAL	NORMAL
30	28/05/2016	560368	SUMMIT KUMAR	28YRS	NORMAL	NORMAL
31	28/05/2016	575269	PRITAM SINGH	24YRS	NORMAL	NORMAL
32	30/05/2016	575852	NARENDRA BAIRWA	23YRS	NORMAL	NORMAL
33	31/05/2016	575466	IRFAN ALI	23YRS	NORMAL	NORMAL
34	31/05/2016	575327	AJIT OMER	23YRS	NORMAL	NORMAL
35	01/06/2016	575560	MANISH KUMAR	24YRS	NORMAL	NORMAL
36	02/06/2016	575738	SAMEER SODANI	22YRS	NORMAL	NORMAL

37	02/06/2016	576819	VISHAL ANAND	22YRS	NORMAL	NORMAL
38	04/06/2016	576880	AKASHDWEEP SINGHAL	22YRS	NORMAL	NORMAL
39	04/06/2016	576980	SRIKANTH	28YRS	NORMAL	NORMAL
40	04/06/2016	577088	BIMAL PRASAD PANDA	28YRS	NORMAL	NORMAL
41	05/06/2016	577041	CHANDRA PRAKASH	25YRS	NORMAL	NORMAL
42	05/06/2016	577148	JITENDRA SINGH	25YRS	NORMAL	NORMAL
43	05/06/2016	577106	GAURAV GUPTA	25YRS	NORMAL	NORMAL
44	07/06/2016	577245	RAJESH KUMAR	28YRS	NORMAL	NORMAL
45	07/06/2016	577216	PRADEEP KUMAR	26YRS	NORMAL	NORMAL
46	07/06/2016	577164	KAUSHIK HAZRA	25YRS	NORMAL	NORMAL
47	09/06/2016	577465	RAJESH TARD	22YRS	NORMAL	NORMAL
48	13/06/2016	288372	SUKANTA GORAI	28YRS	NORMAL	NORMAL
49	14/06/2016	566065	KEYUR GORI	25YRS	NORMAL	NORMAL
50	14/06/2016	574235	CHETAN SINGH	28YRS	NORMAL	NORMAL
51	14/06/2016	574921	CHATURBHUJ JAT	23YRS	NORMAL	NORMAL
52	14/06/2016	574947	DEEPAK PUROHIT	23YRS	NORMAL	NORMAL
53	15/06/2016	556405	RAJENDRA SINGH	27YRS	NORMAL	NORMAL
54	16/06/2016	558542	RAMPARITH	26YRS	NORMAL	NORMAL
55	16/06/2016	572069	PLAVARASAN	24YRS	NORMAL	NORMAL
56	15/07/2016	299002	PAWAN KUMAR PATIDAR	26YRS	NORMAL	NORMAL
57	22/07/2016	563330	LALIT CHORDIA	32YRS	NORMAL	NORMAL
58	22/07/2016	282844	GAJANAN GUPTA	30YRS	NORMAL	NORMAL
59	08/08/2016	603177	JAGDISH RAM JAT	50YRS	NORMAL	NORMAL
60	13/08/2016	652005	J SARKAR	43YRS	NORMAL	NORMAL

CONCLUSIONS:-

60 Regular Employees and 70 contract employees working in the mine were examined for the health of Tympanic Membrane (Ear Drum), and simultaneously audiometry was done of all of them.

The Tympanic membrane of all the employees and contract employees was found to be intact and there was NO perforation seen.

Audiometry of all the employees and contract employees was also done which was again found to be normal and there was no hearing loss seen in any of the person.

From the audiometry data it can be said that the ear drums were intact of all the persons irrespective of the depth of the mine where they were working.

Inference:-

From the above data it can be inferred that there is no effect on the Tympanic Membrane of persons with the existing depth of the mine

Recommendations:-FOR EMPLOYEES

1) Health Risk Appraisal

a) Pre-placement and periodical Medical examination of the employees should be done religiously and a proper record of this should be maintained.

b) Advice on best health practices like hygiene, nourishment and de-addiction should be given.

2)Training

a) Training on occupational health through ectures , posters and other audio-visual aids should be continued and further strengthened.

3) Environmental & Industrial Hygiene and Monitoring:

b) Evaluation of Noise should be carried out by personal noise dosimeter and static sound sampler.

SAFETY MEASURES

All the workplace areas should be well ventilated and should have proper lighting arrangements

There should be adequate provision for washing and bathing.

The retiring rooms for workers should also be well ventilated having provisions for washing hands and bathing.

Eating, drinking and smoking should be prohibited at the work places.

Places having high amount of radiant heat should have adequate cool areas with insulated clothing for workers and liberal supply of liquid beverages.

SUMMARY OF HEALTH SURVEY CONDUCTED AROUND S K MINES IN JULY 2015

Health survey was conducted in 18 villages around S K Mines to asses the basic Health Data and to establish the base line blood lead values of villagers in respect to that of employees of S K Mines.

108 villagers were randomly picked of both genders from younger to elderly age.

Detailed physical checkup was done to establish the basic health parameters and to know about the vision defects and other illnesses prevailing in the society.

Clinical chemistry was done to know the presence of anaemia, diabetes, kidney disease and lipid abnormalities.

Specialised investigations like X Ray Chest , Sputum for Acid Fast Bacilli was also done to rule out tuberculosis.

Blood Lead estimation was done in the sample group to establish the base line blood lead values in the society and to assess the health impact of the industry on society.

INFERENCE OF THE STUDY

DISTRIBUTION OF AGE, HEIGHT, WEIGHT, VISUAL ERRORS AND ILLNESSES IN MALE /FEMALE (M/F) POPULATION.

AGE DISTRIBUTION	NUMBER OF PERSONS—M/F	AVERAGE AGE — M/F	AVERAGE Ht.—M/F	AVERAGE Wt.—M/F	VISION ERROR—M/F	HYPERTENSION-M/F	CRF — M/F	ANAEMIA—M/F	DM—M/F	ACTIVE TB—M/F	OLD K CHEST—M/F
<30 YEARS AGE	13/16	24/26	165.3/156	52.6/50.8	1/4	1/1	0/0	1/3	0/0	0/0	0/0
31 TO 50 YEARS	20/19	41/41	164.3/153.8	61.3/56.8	4/6	3/3	1/0	0/1	1/0	1/0	1/0
>51 YEARS	21/19	68/65	163.0/149.2	58.8/54.1	15/12	6/7	1/0	1/2	1/1	1/0	1/0

BLOOD LEAD VALUES
DISTRIBUTION IN VILLAGERS AND COMPARISION WITH EMPLOYEES OF S K MINES.

BLOOD LEAD VALUES	AVERAGE VALUE/NUMBER OF MALE VILLAGERS	AVERAGE VALUE/NUMBER OF FEMALE VILLAGERS	AVERAGE VALUE/NUMBER OF CONTRACTOR WORKERS—S K MINES	AVERAGE VALUE/NUMBER OF EXECUTIVES—S K MINES
< 10 mcg %	7/42	6/42	7/92	6.61/34
11-20 mcg %	12/12	13/12	14/60	14.34/16
21-30 mcg %	0/0	0/0	23/4	0/0
31-40 mcg %	0/0	0/0	0/0	0/0
>41 mcg %	0/0	0/0	0/0	0/0

No Health effects are expected as values of Blood Lead are within permissible levels.

There was no statistically significant difference between villagers and working population.

Recommendations for employees:

1. Thorough Medical examination of all the employees at the time of placement and then periodically as per DGMS rules or earlier where necessary, and to keep a health record of them for future refrence.
2. Health awareness of all the employees to be imparted at the time of medical checkups and /or through health campaigns/camps.
3.Maintaing Environmental and Industrial Hygiene standards strictly.
4. Safety Measures to be deployed at the work site like perfect ventilation, adequate lighting, washing and bathing facilities, and hygienic eating and drinking places.

Recommendations for Society:

1. Corporate Social Responsibility Programmes to be strengthened to educate the society for Healthy Living, and for their Economic Upliftment.
2.Infrastructure facilities like roads,, sanitation and safe drinking water supply to be addressed in conjunction with society, state administration and company jointly.