FINAL ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENT MANAGEMENT PLAN

{Cat. A under Item [1(a)]: Mining of Minerals}

For

"Rajpura Dariba Mine of Hindustan Zinc Limited"

(Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA)

Location: Tehsil Relmagra, Dist: Rajsamand, Rajasthan
(ML No. 166/2008, Area 1142.2106 Ha.)

Project In- Charge: Mr. Ram Murari, Unit Head, Rajpura Dariba Mine
E-mail : **ram.murari@vedanta.co.in**
Mobile no.: 9799490163

Project Cost: 660 Crores

HINDUSTAN ZINC LIMITED

PROMOTER

HINDUSTAN ZINC LIMITED

Hindustan Zinc Limited
Yashad Bhavan, Udaipur-313001 (Rajasthan)
E-mail : **ram.murari@vedanta.co.in**
Mobile no. 9799490163

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SIMPLIFYING SUSTAINABILITY

Accredited EIA Consultant Organization by NABET, QCI, New Delhi at S. No. 69 in list of Accredited EIA Consultant Organizations

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Form-2

APPLICATION FOR PRIOR ENVIRONMENTAL CLEARANCE

S. No.	Item	Details
	Whether it is a violation case and application is being submitted under Notification No. S.O.804(E) dated 14.03.2017 ?	No
1.	**Details of Project:**	
	(a)Name of the project(s)	Expansion of Lead-Zinc Ore Underground Mine from 1.08 to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA at Rajpura Dariba Mine of M/s Hin
	(b)Name of the Company / Organisation	HINDUSTAN ZINC LTD RAJPURA DARIBA MINE
	(c)Registered Address	Hindustan Zinc Limited, Rajpura Dariba Mine,Rajsamand,Rajasthan-313211
	(d)Legal Status of the Company	Private
	(e)Joint Venture	No
2.	**Address for the correspondence:**	
	(a)Name of the Applicant	Ram Murari
	(b)Designation (Owner/ Partner/ CEO)	UnitHead
	(c)Address	Hindustan Zinc Limited, Rajpura Dariba Mine,Tehsil - Relmagra, District - Rajsamand, Rajasthan,Railmagra,Rajsamand,Rajasthan-313211
	(d)Pin code	313211
	(e)E-mail	ram.murari@vedanta.co.in
	(f)Telephone No.	265459
	(g)Fax No.	265143
	(h)Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency .	Annexure-Uploaded Copy of documents in support of the competence/authority
3.	**Category of the Project/Activity as per Schedule of EIA Notification,2006:**	
	(a)Project/Activity	**1(a) Mining of minerals**
	(b)Category	**A**
	(c)Proposal Number	**IA/RJ/MIN/86877/2018**
	(d)Master Proposal Number(Single Window)	**SW/86871/2018**
	(e)EAC concerned (for category A Projects only)	**Non-Coal Mining**
	(f)Project Type	**Expansion**
4.	**Location of the Project:**	
	(a)Plot/Survey/Khasra No.	M.L.No.166/2008
	(b)Pincode	313211
	(c)Bounded Latitudes (North)	FROM 245540 To 245749
	(d)Bounded Longitudes (East)	FROM 740657 To 740841
	(e)Survey of India Topo Sheet No.	45 K/4 , 45 L/1
	(f)Uploaded Topo Sheet File	Copy of Topo Sheet File
	(g)Maximum Elevation Above Means Sea Level(AMSL)	488
	(h)Uploaded (kml) File	Copy of Kml File
	(i)Distance of Nearest HFL from the project boundary within the study area	488
	(j)Seismic Zone	2
5.	(a)Number of States in which Project will be Executed	1
	(b)Main State of the project	Rajasthan

Details of State(s) of the project

S. No.	State Name	District Name	Tehsil Name	Village Name
(1.)	Rajasthan	Rajsamand	Railmagra	Rajpura, Dariba, Mahenduria, Gawardi, Kotdi

6.	**Details of Terms of Reference (ToR)/EC:**	
	(a)MoEF&CC / SEIAA File Number	J-11015/84/2018-IA.II (M)
	(b)Date of Apply of TOR	26 Jul 2018
	(c)Date of Issue of TOR / Standard ToR	27 Sep 2018
	(d)Date of Apply of EC	25 Aug 2017
	(e)Date of Issue of EC	26 Jul 2018
	(f)Previous TOR Letter	Copy of Previous TOR letter
	(g)Previous EC Letter	Copy of Previous EC letter
7.	**Details of Public Consultation:**	
	(a)Whether the Project Exempted from Public Hearing?	No
	(b)Whether details of Public Hearing available?	Yes
	(c)Whether Public hearing was presided over by an officer of the rank of Additional District Magistrate or above	Yes

7.1. **Details of Public Hearing**

S. No.	Details of Advertisement	Details of Public Hearing	Venue	Location Details	No. of People Attended	Issues Raised	Designation of Presiding Officer	Other Designation of Presiding Officer
(1.)	Date of Advertisement : 28 Sep 2018 Copy of advertisement Copy of Advertisement	Copy of Public Hearing : Copy of Public Hearing Date : 29 Oct 2018	Rajpura Dariba mines campus	State : Rajasthan District : Rajsamand Tehsil : Railmagra	602	Employment an additional infrastructure development demand by community	District Collector	

	:	Distance of Public Hearing Venue from the Proposed Project : 0.1		Village : Rajpura Dariba		like water supply, schools etc.

8.	**Details of Project Configuration/Product:** **Details Not Applicable**

9.	**In case of Expansion / Modernisation / One Time Capacity Expansion (only for Coal Mining) / Expansion under Clause 7(ii) / Modernisation under Clause 7(ii) / Change of Product Mix under Clause 7(ii):**	
	(a)Details of certified report on compliance of earlier environmental clearance condition	
	(i)Certified Compliance By	Regional
	(ii)Details of Regional Office of MoEFCC / Zonal Office of CPCB / SPCB / UTPCC from which certified report on	Lucknow
	(iii)Letter No.	IV/Env/R/Ind-115/758/2009/503
	(iv)Status of Compliance	Partially Complied
	(v)Certified report on compliance of earlier environmental clearance conditions (Including Monitoring Report)	Copy of Certified Compliance Report
	(vi)Date of site visit	N/A
	(b)Details of Capacity Expansion	

S. No.	Product/Activity (Capacity/Area)	Quantity From	Quantity To	Total	Unit	Other Unit	Mode of Transport / Transmission of Product	Other Mode of Transport / Transmission of Product
(1.)	Lead Zinc Ore underground mining	1.08	0.92	2	Others	million tonnes per annum	Others	Shaft and Ramp
(2.)	Lead Zinc ore Beneficiation	1.2	1.3	2.5	Others	million tonnes per annum	Road	Shaft and Ramp

(c)Details of Configuration

S. No.	Plant / Equipment / Facility	Existing Configuration	Proposed Configuration	Final configuration after expansion	Remarks
(1.)	Lead Zinc ore beneficiation plant	1.2	1.3	2.5	

9.1.	**Details of Consent to Operate**	
	(i)Whether Consent to operate obtained ?	NA
	(ii)Copies of all Consent to operate obtained since inception	Copy of Consent to Operate
	(iii)Date of Issue	23 Apr 2015
	(iv)Valid Upto	28 Feb 2018
	(v)File No.	F(Mines)/Rajsamand(Railmagra)/1(1)/2008-2009/278-2
	(vi)Application No.	2015-2016/Mines/2295
	(vii)Copy of Consent to operate valid as on date	Copy of Consent to Operate

10.	**Project Cost:**	
	(a)Total Cost of the Project at current price level (in Crores)	960
	(b) Funds Allocated for Environment Management (Capital) (in Crores)	110
	(c) Funds Allocated Towards CER (Corporate Environment Responsibility) (in Crores)	5.0
	(d) Funds Allocated for Environment Management Plan (EMP) (Recurring per Annum) (in Crores)	6.95
11.	**Whether project attracts the General Condition specified in the Schedule of EIA Notification ?**	No
12.	**Whether project attract the Specific Condition specified in the Schedule of EIA Notification ?**	No
13.	**Raw Material / Fuel Requirement:**	
	(a)Proposed quantity of raw material/fuel	270
	(b)Existing quantity of raw material/fuel	180
	(c)Total quantity of raw material/fuel	450

13.1. **Raw Material / Fuel Profile**

S. No.	Raw Material / Fuel	Quantity	Unit	Other Unit	Source (incase of Import. please specify country and Name of the port from which Raw Material / Fuel is received)	Mode of Transport	Other Mode of Transport	Distance of Source from Project Site (in Kilometres) (In case of import, distance from the port from which the raw material / fuel is received)	Type of Linkage	Other Type of Linkage	Uploaded Copy of Linkage
(1.)	HSD	450	Others	KL/MONTH	IOCL, Relience	Road		300	MoU		Copy of Linkage

14.	**Baseline Data :**	
	(a)Period of Base Line Data Collection	FROM 01 Mar 2017 To 31 May 2017

	(b)Season	Pre-Monsoon

14.1. **No. of ambient Air Quality (AAQ) monitoring locations : 14**

S. No.	Criteria Pollutants	Other Criteria Pollutants	Unit	Maximum Value	Minimum Value	98 Percentile Value	Prescribed Standard
(1.)	PM10		Micro Gram per Meter Cube	82	52	81.66	100
(2.)	SO2		Micro Gram per Meter Cube	20	6	17.53	80
(3.)	Others	CO	Micro Gram per Meter Cube	490	0	486.92	2000
(4.)	NOx		Micro Gram per Meter Cube	32	6	30.79	80
(5.)	PM2.5		Micro Gram per Meter Cube	45	22	34	60

14.2. **No. of Ground Water monitoring locations : 7**

S. No.	Criteria Pollutants	Other Criteria Pollutants	Heavy Metal	Unit	Other Unit	Maximum Value	Minimum Value	Desirable Limit	Maximum Permissible Limit
(1.)	TDS			mg/l		3520	664	500	2000
(2.)	Chlorides			mg/l		910	118.7	250	1000
(3.)	Fluoride			mg/l		1.6	0.1	1	1.5
(4.)	Heavy Metals		Zinc	mg/l		0.2	0.2	5	15
(5.)	Others	Lead		mg/l		0.01	0.01	0.01	0.01
(6.)	TSS			mg/l		0	0	0	0
(7.)	pH			NA		7.84	6.72	6.5	8.5
(8.)	Total Hardness			mg/l		912	48	200	600

14.3. **No. of Surface Water monitoring locations : 3**

S. No.	Criteria Pollutants	Other Criteria Pollutants	Unit	Other Unit	Maximum Value	Minimum Value	Classification of inland water body
(1.)	BOD		mg/l		18	5.2	D
(2.)	COD		mg/l		180	54	D
(3.)	DO		mg/l		5	4.6	D
(4.)	pH		NA		7.93	7.27	D

14.4. **No. of Ambient Noise monitoring locations : 10**

S. No.	Parameter	Unit	Maximum Value	Minimum Value	Prescribed Standard
(1.)	Leq(Day)	A-weighted decibels(dB(A))	53.1	51.7	55
(2.)	Leq(Night)	A-weighted decibels(dB(A))	43.2	40.8	45

14.5. **No. of Soil Sample Monitored locations : 8**

S. No.	Parameter	Unit	Other Unit	Maximum Value	Minimum Value
(1.)	pH	Others	NA	7.84	6.98
(2.)	N(Nitrogen)	Percent		16.2	3.1
(3.)	Electric Conductivity	Others	µS/cm.	356	98.5
(4.)	K(Potassium)	Milligram per Kilogram		4858.32	168.3
(5.)	P(Phosphorus)	Milligram per Kilogram		86.6	14.3

14.6. **Details of Ground Water Table:**

(a)Range of Water Table Pre-Monsoon Season (Meters Below Ground Level (m bgl))	From 16 To 8
(b)Range of Water Table Post-Monsoon Season (Meters Below Ground Level (m bgl))	From 12 To 6
(c)Whether Ground Water Intersection will be there ?	Yes
(d)Upload Copy of Central Ground Water Authority Letter	Copy of Central Ground Water Authority Letter
(e)Letter No.	21-4(315)/WR/CGWA/2008-1905
(f)Date of Issue	16 Nov 2017

15. **Details of Water Requirement (During Operation)**

S. No.	Source	Source Other	Required Quantity	Distance from Source	Copy of Permission from Competent Authority	Mode of Transport	Other Mode of Transport	Method of Water Withdrawal	Other Method of Water Withdrawal	Letter No.	Date of Issue	Permitted Quantity
(1.)	GroundWater		3145	3.5	Copy of Permission Letter	Pipeline		Others	underground mine	21-4(315)/WR/CGWA/2008-1905	16 Nov 2017	3145

15.1.	(a)Whether Desalination is proposed	No

16. **Waste Water Management(During Operation)**

S. No.	Type/Source	Quantity of	Treatment	Treatment	Mode of	Other Mode of	Quantity of Treated	Quantity of

		Waste Water Generated (Kilolitre per Day)	Capacity (Kilolitre per Day)	Method	Disposal	Disposal	Water Used in Recycling/Reuse (Kilolitre per Day)	Discharged Water (Kilolitre per Day)
(1.)	Domestic	15	50	STP	Reuse within the Plant & Recycling		15	

16.1.	(a)Total Waste Water Generation	15
	(b)Total Discharged Water	0
	(c)Total Reused Water	15

17. **Solid Waste Generation/Management**

S. No.	Name of Waste	Item	Other Item	Quantity per Annum	Unit	Distance from Site(KM)	Mode of Transport	Other Mode of Transport	Mode of Disposal	Other Mode of Disposal
(1.)	Tailing	Others	mineral waste	2212400	Tons	3.5	Others	pipeline	Others	mines back filling and tailing dam

18.

18.1. **Air Quality Impact Prediction**

S. No.	Criteria Pollutants	Other Criteria Pollutants	Unit	Baseline Concentration	Distance GLC	Incremental Concentration	Total GLC	Prescribed Standard
(1.)	NOx		Microgram per Meter Cube	34	2.23	5.22	39.22	80
(2.)	SO2		Microgram per Meter Cube	20	0.24	0.130	20.130	80
(3.)	PM10		Microgram per Meter Cube	82	1.5	5.88	87.88	100
(4.)	PM2.5		Microgram per Meter Cube	0	0	0	0	0

18.2. **Stack Details**

S. No.	Source	Fuel	Stack Height(m)	Stack Diameter(m)	Pollutants	Other Pollutants	Emission (GLS)
(1.)	D.G.SET	HSD	5	0.12	PM10		0.066

19.	**Power Requirement:**	
	(a)Quantity (Kilo Volt Amps (kVA))	13000
	(b)Source	Capative power plant /Ajmer Vidhyut Vitran Nigam L
	(c)Uploaded Copy of Agreement	Not Applicable
	(d)Standby Arrangement (Details of DG Sets)	2 x 500 kVA
	(e)Stack Height (in m)	5
20.	**Land Ownership Pattern:**	
	(a)Forest Land	0
	(b)Private Land	578.2006
	(c)Government Land	201.34
	(d)Revenue Land	0
	(e)Other Land	362.67
	Total Land	**1142.2106**
21.	**Present Land Use Breakup of the Study Area in Ha:**	
	(a)Agriculture Area	18559.59
	(b)Waste/Barren Land	435.3
	(c)Grazing/ Community Land	7183.58
	(d)Surface Water Bodies	667.8
	(e)Settlements	642.7
	(f)Industrial	0
	(g)Forest	0
	(h)Mangroves	0
	(i)Marine Area	0
	(j)Others : TREE COVER & Scrub Land	3927.89
	Total	**31416.86**

22. **Land requirement for various activities**

S. No.	Description of Activity / Facility / Plant / Others	Others	Land Requirement	Remarks
(1.)	Others	NA	0	
	Total		0	

23.	**Ecological and Environmental Sensitivity (Within 10 Km):- WLS-Wild Life Species; NPA-Notified Protected Area; ESAs-Eco Sensitive Areas; ESZs-Eco Sensitive Zones :**

23.1. **Details of Ecological Sensitivity :**

S. No.	Details of Ecological Sensitivity	Name	Distance from the Project (Km)	Remarks
(1.)	ESAs	NA	0	NA
(2.)	ESZs	NA	0	NA
(3.)	Corridors	NA	0	NA
(4.)	WLS	NA	0	0
(5.)	Critically Polluted Area	NA	0	NA

(6.)	NPA	NA	0	0
(7.)	Wildlife Corridors	NA	0	NA

23.2. **Details of Environmental Sensitivity :**

S. No.	Details of Environmental Sensitivity	Other Details of Environmental Sensitivity	Name	Distance from the Project (Km)	Remarks
(1.)	Forest		NA	0	NA
(2.)	Others	NA	NA	0	NA
(3.)	Archaeological Sites		NA	0	NA
(4.)	Defence Installations		NA	0	NA

23.3.	(a)Whether Noc / Permission from the competent authority is required?	No
	(b)Whether NBWL recommendation is required?	No
24.	**Forest Land:**	
	Whether any Forest Land involved?	No
25.	**Tree Cutting:**	
	(a)No. of Trees Cut for the Project (if Forest Land not Involved)	0
	(b)Details of Tree Cutting and Planting of Trees	Not Applicable
26.	**Land Acquisition Status:**	
	(a)Acquired Land(Ha)	554.19
	(b)Land yet to be acquired(Ha)	0
	(c)Status of Land acquisition if not acquired	Already acquired.
27.	**Rehabilitation and Resettlement (R&R):**	
	(a)No. of Villages	0
	(b)No. of Households	0
	(c)No. of PDFs (Project Displaced Families)	0
	(d)No. of PAFs (Project Affected Families)	0
	(e)Funds Allocated for R&R(in Rs)	0
	(f)Status of R&R	Completed
28.	**Details of Presence of Schedule-I Species:**	
	(a)Whether there is Presence of Schedule-I Species ?	Yes
	(i)Details of Schedule-I Species	8 nos. of schedule I species reported.
	(b)Whether conservation plan for Schedule-I Species has been prepared ?	Yes
	(i)Uploaded copy of conservation plan	Copy of conservation plan
	(ii)Fund Provision made	Rs.126 lacs
	(iii)Period of Implementation	5 years
	(c)Whether conservation plan for Schedule-I Species has been approved by competent authority ?	No
29.	**Details of Presence of Water Bodies in Core Area:**	
	(a)Whether there is Presence of Water Bodies in Core Area ?	Yes
	(i)Details of Water Bodies in Core Area	village pond
	(b)Whether there is Diversion Required ?	No
	(c)Whether permission has been obtained from competent authority ?	No
30.	**Details of Presence of Water Bodies in Buffer Area:**	
	(a)Whether there is Presence of Water Bodies in Buffer Area ?	Yes
	(i)Details of Water Bodies in Buffer Area	Banas river
	(ii)Direction of Water Bodies in Buffer Area	North East
	(iii)Distance of Water Bodies in Buffer Area	8.2
31.	**Manpower Requirement:**	
	(a)Permanent Employment-During Construction	0
	(b)Permanent Employment-During Operation	250
	(c)Temporary Employment- During Construction	0
	(d)Temporary Employment- During Operation	0
	(e)No. of working days	365
	(f)Total Manpower	250
32.	**Green Belt in Ha:**	
	(a)Uploaded Green Belt plan	Copy of Green Belt Plan

S. No.	Description	Existing	Proposed	Total
(1.)	Total Area of Green Belt	190	0	190
(2.)	Percentage of Total Project Area	34.28	0	34.28
(3.)	No. of Plants	190000	0	190000
(4.)	Funds Allocated	20000000	10000000	30000000

33. **Project Benefits**

S. No.	Type of Project Benefits	Details of Project Benefits
(1.)	Financial	Additional Exchequer to Government will be Rs.124 Crores per annum including Royalty and taxes .

(2.)	Social	Additional employment of 250 will be generated from the proposed expansion.

34. CRZ Specific Details : Not Applicable

35. Sector Specific Details For Non-Coal Mining

S. No.	Item	Details
1.	**No. of Mineral(s) to be Mined : 2**	

S. No.	Mineral(s) to be Mined	Major or Minor Mineral
(1.)	Zinc	Major
(2.)	Lead	Major

2.	Mine Capacity in ROM (Run of Mine)	2 million tonnes
3.	Uploaded 500 meters Cluster Certificate from State Mines and Geology in case of minor minerals	Copy of 500 meters Cluster Certificate from State Mines and Geology
4.	**Mining Plan:**	
	(a)Approval Letter No.	584(4)(3)(1705)/2017 RCM-AJM
	(b)Date of Approval	26 Sep 2017
	(c)Approved Letter	Copy of Approved Letter
	(d)Approved By State Mining and Geology Department	IBM
	(e)Approved Mining Lease Area	1142.2106
	(f)Approved Capacity	2.0
5.	**Technical Details:**	
	(a)Total Geological Reserves (Million Ton)	60.05
	(b)Mineable Reserves (Million Ton)	41
	(c)Extractable Reserves(Million Ton)	33
	(d)Percent(%) of Extraction	80
	(e)Grade of Coal /Ore /Mineral	Zinc 6.38 and Lead 1.91
	(f)Stripping Ratio	0 : 0
	(g)Category of Gaseousness (Only for Coal Mining, Others may Write NA)	NA
	(h)Average Gradient(Degree)	NA
	(i)Mining Method	Underground
	(j)Life of Mine (Years)	20
6.	**Details of Beneficiations:**	
	(a)Whether it is proposed to install beneficiation plant/Coal washery within the mining lease area	Yes
	(b)Beneficiation / Washing Technology	Froth Flotation
	(c)Capacity	2.5
	(d)Whether it is proposed to install crusher within the mining lease area	Yes
	(e)No. of crushers	3

6.1. **Details of crusher:**

S. No.	Crusher ID	Capacity (in PH)	Remarks
(1.)	1	400	Secondary crusher
(2.)	2	400	Tertiary Crusher (I)
(3.)	3	400	Tertiary Crusher (II)

7.	**Details of Seams:**	
	(a)Whether details of seam applicable	No
8.	**Details of Mining Lease:**	
	(a)Mining Lease Area (in Hectare)	1142.2106
	(b)Whether obtained Letter of Intent (LOI) from the state government ?	No
	(i)Reason thereof	NOT APPLICABLE
	(c)Whether Lease Deed Executed ?	Yes
	(i)Copy of Executed Lease deed valid as on Date	Copy of Executed Lease deed
	(ii)Provide area in Hectare as per executed lease deed (initial) document	1142.2106
	(iii)Validity of the lease deed	From : 30 May 2010 To : 29 May 2030
	(iv)Date of Execution of Mining Lese	30 Aug 2012
	(v)Reference Number	166/2008
	(d)Whether Lease Deed Renewed ?	Yes

8.1. **Earlier Renewals:**

S. No.	Lease Details	Date of Renewal	Period	Copy of Earlier Lease	Letter No.	Area	Remarks
(1.)	Initial	01 Jan 1900	From : 30 May 1970 To : 29 May 1990	Copy of Earlier Lease	F3 (2)/KHANIZ/68	1142.2106	
(2.)	Renewal	16 Sep 1993	From : 30 May 1990 To : 29 May 2010	Copy of Earlier Lease	541	1142.2106	First renewal
(3.)	Renewal	12 Jun 2012	From : 30 May 2010 To : 29	Copy of Earlier Lease	168/2008	1142.2106	second renewal

			May 2030			

9.	**OB (Over Burden) Management:**	**Details Not Applicable**
10.	**Details of Topsoil Management:**	
	(a)Quantity of Topsoil excavated during the entire life of the mine (in Million Cubic metre)	0
	(b)Quantity of Topsoil proposed for utilization for reclamation during the entire life of the mine (in Million Cubic metre)	0
	(c)Quantity of Topsoil proposed for utilization for other activities during the entire life of the mine (in Million Cubic metre)	0
11.	**Details of Final Mine Void:**	
	(a)Area (in Hectare)	0
	(b)Depth (in meter)	0
	(c)Volume (in Million Cubic meter)	0
12.	**Details of Quarry:**	
	(a)Final Void of 0 (hectare) at a Depth of 0 meter which is Proposed to be Converted into a Water Body.	
	(b)Total Quarry Area (ha)	0
13.	**Details of Transportation:**	
	(a)In Pit/Underground to Surface	Shaft and Ramp
	(b)Surface to Siding/Loading	Conveyor belt and Road
	(c)Transportation / Conveyor Details	Shaft and Ramp

14. **Details of Land Usage (Pre-Mining)**

S. No.	LAND USE	Other LAND USE	WITHIN ML AREA (Hectare)	OUTSIDE ML AREA (Hectare)	TOTAL (Hectare)
(1.)	GRAZING LAND		27.33	3927.89	3954
(2.)	AGRICULTURE LAND		578.2	18559.59	19137
(3.)	SURFACE WATER BODIES		0	667.8	667
(4.)	SETTLEMENTS		362.66	642.7	1004
(5.)	WASTE LAND		131.03	7183.58	7314
(6.)	FOREST LAND		0	0	0
(7.)	OTHERS(Specify)	roads	42.98	435.3	477
TOTAL			**1142.2**	**31416.86**	**32553**

15. **Details of Land Usage (Post-Mining)**

S. No.	LAND USE	Other LAND USE	Plantation (ha)	Water Body (ha)	Public Use (ha)	Undisturbed (ha)	Total
(1.)	EXCAVATION/QUARRY		0	0	0		0
(2.)	TOP SOIL STORAGE		0	0	0		0
(3.)	INTERNAL OB DUMPS		5	0	0		5
(4.)	ROADS		0	0	0		0
(5.)	BUILT UP AREA (COLONY/OFFICE)		0	0	0		0
(6.)	VIRGIN AREA		0	0	0		0
(7.)	EXTERNAL OB DUMPS		0	0	0		0
(8.)	GREEN BELT		134	0	0		134
(9.)	Other	NA	0	0	0		0
TOTAL			**139**	**0**	**0**	**0**	**139**

16.	**Details of Reclamation:** **Total Afforestation Plan shall be Implemented Covering of Mining.** **This will Include:**	
	(a)External OB Dump(in hectare)	
	(b)Internal Dump(in hectare)	
	(c)Quarry(in hectare)	
	(d)Safety Zone(in hectare)	
	(e)Final Void of (hectare) at a Depth of meter which is Proposed to be Converted into a Water Body.	
	(f)Density of Tree Plantation per ha (in no.)	
	(g)Others in ha (such as Excavation Area along ML Boundary, along Roads and Infrastructure, Embankment Area and in Township Located Outside the Lease etc)	
	(h)Total afforestation plant (in hectare)	
17.	**Status of progressive Mining Closure Plan:**	
	Copy of Implementation of Various Activities as per Approved Progressive Mine Closure Plan	Copy of Implementation of Various Activities as per Approved Progressive Mine Closure Plan
	Any Deviation from the Approved Progressive Mine Closure Plan	
	Total Area Excavated (in hectare)	
	Total Area Backfilled after Excavation (in hectare)	
	Total Area Reclaimed (in hectare)	

18. **Details of Actual Coal/ ORE Production vis-a-vis Sanctioned Capacity since the Inception:**

S. No.	Financial Year	Sanctioned Capacity as per EC (MTPA)	Sanctioned Capacity as per CTO	Sanctioned Capacity as per approved mining plan	Actual Production	Excess Production Beyond the EC / CTO/ Mining Plan Sanctioned Capacity (MTPA)
(1.)	1993	0	900000	764000	631407	0
(2.)	1994	0	900000	794000	423805	0
(3.)	1997	0	900000	450000	311750	0
(4.)	1998	0	900000	450000	351710	0
(5.)	2003	0	900000	600000	375770	0
(6.)	2005	0	900000	600000	527328	0
(7.)	2006	0	631407	660000	506527	0
(8.)	2007	0	631407	700000	507560	0
(9.)	2009	0	631407	720000	483293	0
(10.)	2011	900000	900000	700000	496234	0
(11.)	2012	900000	900000	900000	587600	0
(12.)	2013	900000	900000	900000	554354	0
(13.)	2018	900000	900000	1000000	895568	0
(14.)	1995	0	900000	794000	248652	0
(15.)	1999	0	900000	490000	314890	0
(16.)	1996	0	900000	360000	367550	0
(17.)	2001	0	900000	400000	273400	0
(18.)	2002	0	900000	600000	375770	0
(19.)	2010	900000	900000	600000	501282	0
(20.)	2015	900000	900000	900000	573284	0
(21.)	2004	0	900000	600000	585743	0
(22.)	2000	0	900000	475000	282890	0
(23.)	2008	0	631407	700000	505749	0
(24.)	2014	900000	900000	900000	610242	0
(25.)	2016	900000	900000	636000	668777	0
(26.)	2017	900000	900000	950000	745534	0

Additional Detail Sought: NIL ,w ,**3.**NIL

S. No.	Item	Details
36.	**Details of Court Cases:**	
	(a)Whether there is any Court Cases pending against the project and/or land in which the project is proposed to be set up ?	No
37.	**Details of Direction Issued under Environment (Protection) Act / Air (Prevention & Control of Pollution)) Act / Water (Prevention & Control of Pollution) Act:**	
	(a)Whether any Direction issued under EPA Act/Air Act/Water Act ?	No
38.	**Details of EIA Consultant:**	
	(a)Have you hired Consultant for preparing document?	Yes
	(i)Accreditation No.	S.no
	(ii)Name of the EIA Consultant	GAURANG ENVIRONMENTAL SOLUTIONS PRIVATE LIMITED
	(iii)Address	501 SONI'S PARIS POINT NEAR COLLECTORATE CIRCLE BANI PARK JAIPUR
	(iv)Mobile No.	9782074776
	(v)Landline No.	0141402911
	(vi)Email Id	gaurangenviro@gmail.com
	(vii)Category of Accreditation	A
	(viii)Sector of Accreditation	Non-Coal Mining
	(ix)Validity of Accreditation	22 Jan 2020
	(x)Uploaded Certificate of Accreditation certified by QCI/NABET	Copy of Certificate of Accreditation
39.	**Documents to be Attached:**	
	(a)Uploaded Copy of EIA/EMP Report	Copy of EIA/EMP Copy of EIA/EMP(Annexures) Copy of EIA/EMP(Plans/Figures)
	(b)Uploaded Copy of Risk Assessment Report	Copy of Risk Assessment
	(c)Uploaded Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan /Approved Mining Plan	Copy of Feasibility Report/ Detailed Project Report(DPR) /Detailed Engineering Report /Detailed Conceptual Plan /Approved Mining Plan
	(d)Uploaded Copy of Final Layout Plan	Copy of Final Layout Plan
	(e)Uploaded Cover Letter	Copy of Cover Letter
	(f)Uploaded Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency	Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency
	(g)Uploaded Additional File	NA

Undertaking

I hereby give undertaking that the data and information given in the application and enclosures are true to be best of my knowledge and belief. And I am aware that if any part of the data and information found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost. In addition to above, I hereby give undertaking that no activity/ construction/ expansion has since been taken up.

	Name of Applicant	Ram Murari

	Designation	UnitHead
	Name of Company (Applicant Name should not be given here)	HINDUSTAN ZINC LTD RAJPURA DARIBA MINE
	Address	Hindustan Zinc Limited, Rajpura Dariba Mine

EXECUTIVE SUMMARY

1.1 Introduction

Hindustan Zinc Limited (HZL) intends to enhance Lead and Zinc ore production and beneficiation capacities from the Expansion of Rajpura Dariba mine from 1.08 million TPA to 2.0 million TPA Ore Production (Total Excavation 2.48 million TPA) and Beneficiation from 1.2 million TPA to 2.5 million TPA, located at 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- 24º55'40.8''N, 74º06'58.0''E
  B- 24º55'40.9''N, 74º08'41.4''E
  C- 24º57'48.3''N, 74º08'40.8''E
  D- 24º57'49.0''N, 74º06'57.7''E

- The mine is approachable by nearest airport, Dabok (Udaipur) at 44 km and nearest railway station is Fatehnagar about 13.2 km on Chittorgarh-Udaipur broad gauge railway line and 4 Lane state highway

- Banas river is (8.2 Km, N), Site elevation is about 490-525 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.**

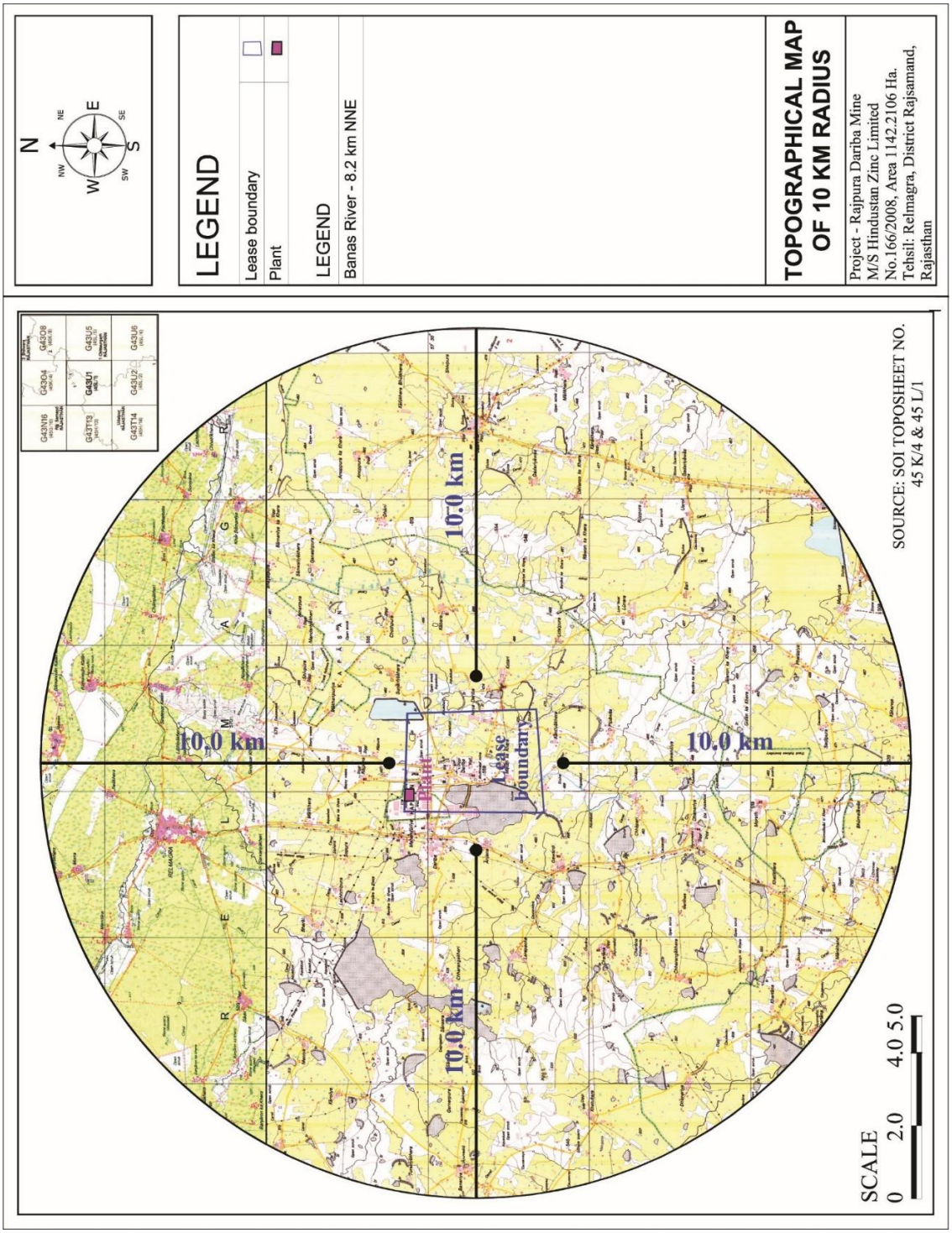

FIGURE-1.1
STUDY AREA MAP OF 10 KM RADIUS

1.3 Project Description

The present capacity is 1.08 MTPA of ore production. The proposed enhancement is intended for raising ore production capacity from 1.08 MTPA to 2.0 MTPA and Beneficiation from 1.2 MTPA to 2.5 MTPA. The present Vertical Retreat Method (VRM) & Blast hole Stoping method is proposed to be continued for raising the ore production capacity.

1.3.1 Salient Features of proposed expansion

The salient features of proposed expansion are given below in **Table-1.1**.

TABLE-1.1
SALIENT FEATURES OF PROJECT

Sr. No.	Description	Existing	Proposed	After Proposed Expansion
1.	Mine lease area (ha)	1142.20	0	No Change
2.	Acquired Land (ha)	554.19	0	No Change
3.	Ore mineral	Sphalerite & Galena		
4.	Reserves & Resources	60.05 million tons, 6.38 % Zn, 1.91 % Pb as on 31-Mar-18		
5.	Mode of Entry	2 Shafts & 1 Decline		
6.	Method of Mining	Vertical Retreat Method & Blast hole Stoping with filling		
7.	Ore Production (Mtpa)	1.08	0.92	2.0
8.	Total Excavation (Mtpa)	1.15	1.33	2.48
9.	Ore Beneficiation (Mtpa)	1.20	1.30	2.5
10.	Waste dump area (ha)	3.0	2.0	5.0
11.	Power requirement (MW)	12.0	13.0	25.0
12.	Power Source	Captive generation/ AVVNL/ Solar Power		
13.	Water requirement (m3/day)	5800	2200	8000
14.	Water Source	Matrikundia+STP+Mansi Wakal+Gosunda+Mine Water		
15.	Manpower (Nos.)	1000	250	1250
16.	Project Cost (Rs. in cr.)	300	660	960
17.	EMP Cost (Rs. in cr.)	14	96	110

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 Crop Land is about 29.6%, Water Body is 2.1%, Built-up Land is 2.0 % and remaining land is either area available for cultivation or cultivable waste land. There are no wildlife sanctuary, national park and migratory routes of fauna within study area.

1.4.2 Soil Quality

For the eight soil sample under consideration the pH ranges between 6.98 to 7.84 indicating soils are neutral to moderately alkaline. The EC of eight soil samples is between 98.5 to 356 µs/cm and are below the limits to be called as saline and hence the soils are normal for crop growth. It has been observed that the soil is sandy loam in texture and neutral in nature. The nutrient and organic matter contents are medium and the soil is normally fertile.

1.4.3 Meteorology

Temperature ranged from 28.2ºC to 40.7ºC and the relative humidity recorded in the range of 17.9% to 40.8%. Climate represents dry arid conditions. Predominant wind direction is West with wind speeds ranging from 2.3 to 4.0 m/s.

1.4.4 Ambient Air Quality

Fourteen 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 52 µg/m^3 to 82 µg/m^3 and 22 µg/m^3 to 45 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 10 locations consisting of seven ground water samples and three surface water samples. The ground and surface water samples were analysed and surface water has been found to be suitable for drinking after the conventional treatment followed by disinfection. Total Dissolved Solids, Total Hardness, Total Alkalinity were found above the permissible limit in some of the ground water samples. Iron, Copper, Mercury, Lead, Zinc and Chromium concentration in all ground water samples was observed BDL.

1.4.6 Noise Levels

The noise monitoring has been conducted for determination of noise levels at ten 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 74 species of plants, of which 30 species comprise of trees, 25 shrub species and 19 species of herbs including climbers and grass. About 69 species of birds, 10 species of mammals, 11 species of reptiles and 4 species of amphibians 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 95566 according to 2011 census. Total male population is about 50.59 % and total female population is around 49.40%. The average literacy rate 50.65 % 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 impact on land use in buffer zone due to mining activities are limited to the acquired leasehold area would be insignificant. Presently 554.19 ha land has already been acquired for the present mine and 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 filling of stope voids and height raising of tailing dam.

Tailing from Beneficiation Plant

Tailings from existing beneficiation plants is pumped to the existing lined tailing dam and it is proposed to continue the same for the expansion project as the capacity of lined tailing dam is sufficient till the mine life. Height of the existing tailing dam shall be raised, phase wise up to 523 mRL. Dry disposal of tailing is being proposed as the part of this expansion project. Tailings generated are utilized in filling the underground mine voids. Paste fill plant is proposed in the expansion project.

Water contained in the tailing slurry is reclaimed from the tailing dam and same is being reused in process. 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, three crushing system in mine have been planned at surface. Further, the crushers in beneficiation plant shall be provided with dust extraction/suppressions with outlets connected to stacks. Three nos of continuous ambient air quality monitoring stations (CAAQMS) are proposed 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 2,200 m^3/d of water is required for proposed expansion, in addition to approved 5,800 m^3/d water requirement for 1.08 MTPA mining & 1.2 MTPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant, Mansiwakal Dam & 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 Indian Peafowl, Indian Grey Hornbill, White Eye buzzard and Black Shouldered Kite, along with Indian monitor lizard, Indian Python, Indian flap shell turtle and 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.

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

Rajpura Dariba 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 at five locations considering the predominant wind direction and in consultation with RSPCB. Same will be continued for the expansion. Continuous Ambient Air Quality Monitoring Stations (CAAQMS) shall be installed at 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.
- Compressors are installed in isolated building.
- Ventilation fans are provided with dampers.
- 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 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.

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 5800 KLD for existing operations. Additional requirement will be 2200 KLD making total water requirement after capacity enhancement to 8000 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. Water generated from in-house STP will be used for horticulture.

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 RD mine and Dariba complex and to the tailing dam to some extent.

1.6.6 Solid Waste Management

In the proposed expansion of RD Mine, waste dump area shall be increased from existing 3 Ha to 5 Ha. Maximum waste generation will be 0.48 million TPA. 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. 96 crores have been allotted for cost towards pollution control measures.

1.8 Risk Assessment and Disaster Management Studies

The mining operations at Rajpura Dariba mines are fairly mechanized. In underground mining operations, hazardous situation may arise leading to accidents. In the Metalliferous 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; 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 in the form of tax, royalty, dividend etc. About 250 nos of persons would get direct employment in the operations and maintenance of the project.

In addition to the direct and indirect employment opportunity, HZL is already, 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 through the CSR initiatives, The project proponent kept 2.5% 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.

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CHAPTER -1

INTRODUCTION

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INTRODUCTION

1.1 INTRODUCTION

The term Environment Impact Assessment (EIA) refers to the anticipation of various impacts a project will have on the environment and the local community. It is a decision making tool, which guides decision makers in taking appropriate decisions prior to issue of Environmental clearance. According to the UNEP-DTIE, Environmental Impact Assessment (EIA) is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EIA, both the environmental and economic benefits can be achieved, such as reduced cost and time of project implementation, reduce the treatment/clean-up costs while abiding by the laws and regulations.

1.2 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.

Gaurang Environmental Solutions was assigned the job of conducting and preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report for the proposed expansion of "RajpuraDariba Mine (RD Mine) - Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (total excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA".

RajpuraDariba (RD) Lead-Zinc deposit was opened in year 1982 (capacity of 0.63 MTPA of ore production and mine beneficiation plant of capacity 0.9 MTPA).Environment Clearance was granted by MoEF, New Delhi for 0.9 MMTPA ore production & 1.2 MMTPA ore beneficiation plant for RajpuraDariba underground mine vide letter no. J-11011/380/2008-IA II(I) dated 4.11.2009 the EC was later amended from 0.9 million TPA to 1.08 million TPA ore production vide letter no. J-11015/380/2008-IA.II(M) dated 26.07.2018 under clause 7 (ii) of EIA notification, 2006. Copy of the same is enclosed as **Annexure I**.

Valid Consent to Operate is available from Rajasthan State Pollution Control Board (RSPCB), Jaipur for carrying Mining & Beneficiation activities vide letterno.**F(Mines)/Rajsamand(Railmagra)/1(1)/2008- 2009/278-282 dated 23.04.2015**(was valid till 28.02.2018) and same is applied for renewal to RSPCB on 26.10.2017. Acknowledgement receipt is enclosed as **Annexure II**.

The present proposal is for Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (total excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA. The ore concentrate produced shall be processed by the existing HZL smelters for refining of Lead & Zinc metal.

The RajpuraDariba deposit is located inRelmagra Tehsil of District Rajsamand.

The Ministry of Environment, Forests and Climate change, Govt. of India, through its EIA Gazette Notification of 14.09.2006 and its subsequent amendment on dated 01.12.2009, 04.04.2011 and 14.08.2018 under the Environment Protection Act, 1986, classified the projects under two *categories –A (more than 100 hect.) and B (equal or less than 100 hect.).* ***The proposed project is categorized under category A under Item [1(a)]:{ Miningof minerals}***as the lease area is 1142.2106 ha. The ML is valid till 29.05.2030. There is no change in lease area and nether the renewal of ML is due. Thus, EIA is conducted leading to EC for the expansion of production only.

The proposed expansion of mining project will require an Environmental Impact Assessment (EIA) study to be undertaken as per requirement of the EIA Notification 2006

and as amended, which notifies all mining projects having a mining lease area of 100 ha or more as **category A** under item **1(a) of the** EIA Notification 2006 and as amended.

This Environmental Impact Assessment (EIA) report has been prepared to provide information on the potential negative and positive environmental, social and economic impacts of the project. It also aims to make recommendations for mitigation of the potential negative impacts and enhancement of the positive ones. A field survey of the project site was conducted and potential environmental impacts of the project activities were identified, assessed and documented.

1.3IDENTIFICATION OF PROJECT & PROJECT PROPONENT

1.3.1 Identification of Project

The Mining lease was granted on 31.03.1970 and registered on 30.05.1970 for a period of 20 years which was subsequently renewed on 16.09.1993 and later again renewed on 12.06.2012 for additional 20 years by Government of Rajasthan under the MMDR 1957. Rajpura Dariba is an underground mine with beneficiation facilities. The commencement of ore beneficiation took place at RD mine in the year 1982.Validity of the mining lease is upto29th May 2030.

There is a large gap in demand and supply of laed and zinc in market,which makes economic sense for the proposed enhancement of production.The reason for an enhancement of production capacity of RajpuraDaribaMine from 1.08 million TPA to 2.0 million TPA (total excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA is the availability of Resource & Reserve which stands at 60.05 million tons (with 1.91% Pb& 6.38% Zn) as on 31-Mar-18.

The deposit forms a part of the southern extremity of Rajpura-Dariba-Bethumnimetallogenic belt. A spectacular zone of in situ Gossan is capping the ridge over the deposit at surface. Mining Lease is demarcated on part plan of Survey of India Toposheet no. 45K/4 & 45L/1. It lies between Latitudes 24°55’40.8”N-24°57’49.0”N and Longitudes 74°06”57.7”E-74°08’41.4”E.

1.3.2 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.Hindustan Zinc Limited (HZL) is the only integrated Lead & Zinc manufacturer in India and owns captive lead and zinc mines at RampuraAgucha, RajpuraDariba, Kayad, SindesarKhurd and Zawar Mines that cater to the requirement of lead and zinc concentrate for its smelters located at Chanderiya, Dariba&Debari. All the mining & smelting operations are based at Rajasthan.

Total Exchequer to Government during 2017-18 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, HZL have submitted proposal for doubling the capacity to 40 MLD. 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.

1.4 BRIEF DESCRIPTION OF PROJECT

1.4.1 Nature of the Project

The projects is a mechanised underground Lead-Zinc mine and beneficiation plant and is classified as **'Category A' project under '1(a)' mining of minerals"** by Ministry of Environment Forests& Climate Change, New Delhi as per EIA notification dated on 14th September 2006 and as amended.

1.4.2 Size of the Project

RajpuraDariba deposit extends over a lease area of 1142.20 ha with estimated insituore Resource & Reserve stands at 60.05 million tons (with 1.91% Pb& 6.38% Zn) as on 31-Mar-18. The proposed expansion of mine is from 1.08 million TPA to 2.0 million TPA (total excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA.Total cost of the proposed expansion is estimated to be Rs. 660crores.

1.4.3 Location of the Project

The mine is approachable from by nearest airport, MaharanaPratap Airport,Dabok (Udaipur) at 44.0km (aerial distance) towards SW and nearest railway stationBhupalSagar Railway station is about 11.2 km towards SSE andFatehnagarRailway Station about 13.8km towards SSWon Chittorgarh-Udaipur broad gauge railway line and 4 Lane state highway. Mining Lease is demarcated on part plan of Survey of India Toposheet no. 45L/1. It lies between Latitudes 24°55'40.8"N-24°57'49.0"N and Longitudes 74°06"57.7"E-74°08'41.4"E.

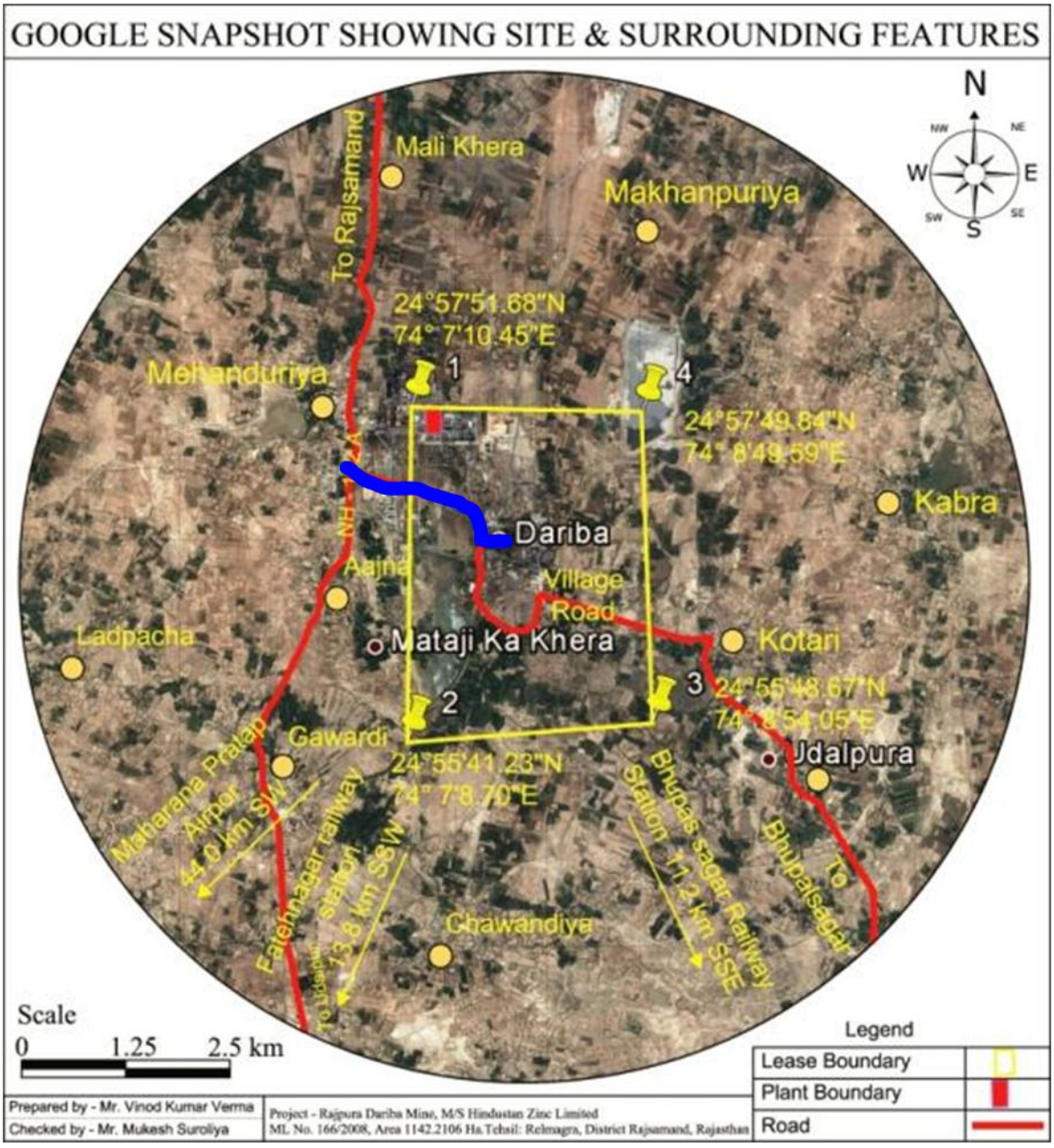


Figure1.1: Google Map Showing Site & Surrounding Features

4.4 Mining Method

Currently, the mining method is BHS (blast hole stoping) & VRM (Vertical Retreat Method) with filling and it is planned to followthe same in the proposed mining blocks.

In the proposed expansion, following are the major technological changes being done:

Table No.1.1: The major technological changes being done

S. No	Description	Benefits
1	Introduction of road grader	Road graders are being introduced to improve road conditions
2	Mechanization in diesel & explosive transportation	Mechanization is being planned in transportation of diesel dispensing & explosive transportation thereby improving safety, productivity and ergonomics.
3	Leaky feeder communication system	Communication system is being introduced for communication for any breakdown, emergency or unplanned activities in the mine
4	Top hammer drills	Top hammer drills are being introduced in underground so as to improve production drilling in lower levels of the mine and thereby reducing the dependency over compressed air. Improved productivities and ergonomics shall also count towards improved safety.
5	Long feed jumbos	In order to improve development rates, it is proposed to introduce long feed jumbo thereby improving advance per blast.
6	Bulk emulsion charging system	In order to improve development rates and mechanizing charging, bulk emulsion charging system shall be introduced. Charmec shall also be introduced for the same.
7	Mud pump	In order to strengthen mud handling system from existing manual to mechanized
8	Underground workshop	A world class underground workshop is to be introduced to improve the maintenance facility and thereby improving
9	Rock breaker & grizzly	In line with trackless mining, a rock breaker & grizzly are being proposed to be installed so as improve crusher performance.
10	High speed exploration rigs	In order to enhance exploration capacity, it is proposed to introduce high capacity exploratory drill rig of smaller dimension.
11	Raise boring	Raises are being developed with raise bores to fast the raising and thereby improving the ventilation.
12	Advanced Mine Planning techniques	Technical cell is being strengthened to design in advanced sophisticated software helping in scientific mining of minerals.
13	Shotcrete	Shotcreting facility is under development so as to improve development rates in poor ground conditions.
14	Light motor vehicles for underground	For effective supervision, LMVs (Light Motor Vehicles) are proposed to be introduced.
15	Strengthened dewatering & reticulation system	Standardization of services with detailed engineering and dedicated crews.

1.4.5 Importance to the Country & 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 250 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. By mining the deposit, HZL will provide the country with increased revenue earnings. This expansion project will further speedup transformation of the region's economy from predominantly agricultural to significantly industrial, and accelerate the pace of industrial development in the region.

1.5 STATUS OF REGULATORY CLEARANCES

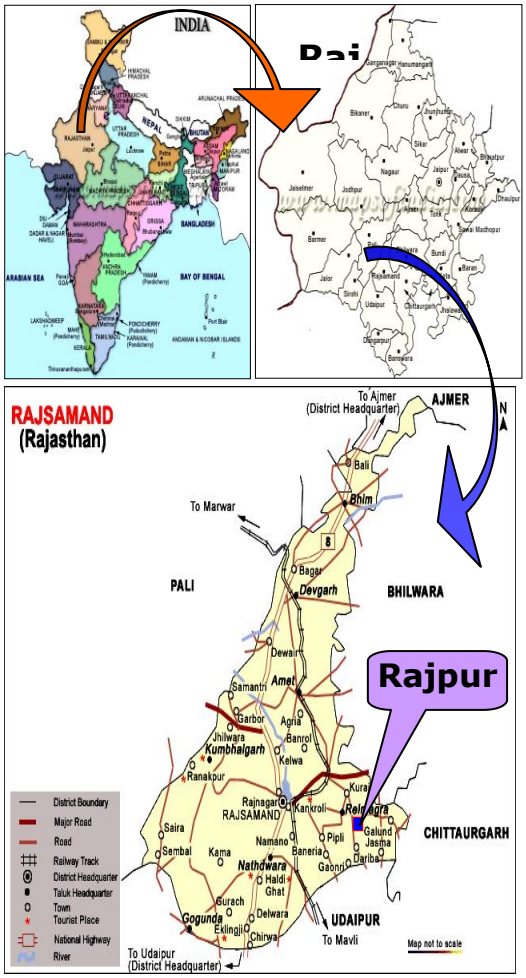
- The total ML area is 1142.2106 ha. Validity of the mining lease is upto29th May 2030, and will be renewed thereafter.
- Modified Mining Plan with progressive mine closure plan has been approved vide letter no. 584(4) (3)(1705)/ 2017-RCM-AJM dated 26.09.2017 under MCDR, 1988/MCR 1960.
- Environment Clearance was granted by MoEF, New Delhi for 0.9 MMTPA ore production & 1.2 MMTPA ore beneficiation plant for Rajpura Dariba underground mine vide letter no. J-11011/380/2008-IA II(I) dated 4.11.2009 and amended from 0.9 million TPA to 1.08 million TPA ore production vide letter no. J-11015/380/2008-IA.II(M) dated 26.07.2018 under clause 7 (ii) of EIA notification, 2006.
- Consent to Operate is available from Rajasthan State Pollution Control Board (RSPCB), Jaipur for carrying Mining & Beneficiation activities vide letter no.**F(Mines)/Rajsamand(Railmagra)/1(1)/2008- 2009/278-282 dated 23.04.2015**(was

valid till 28.02.2018) and same is applied for renewal to RSPCB on 26.10.2017. Acknowledgement receipt is enclosed as **Annexure II**.

- NOC from CGWA for mine dewatering (446.50 KLD) has been obtained wide letter no. 21-4(315)/WR/CGWA/2008-212 dated 14.07.2009. Renewal for the same was obtained vide letter dated 06.06.2012 and 16.11.2017
- Application for obtaining NOC from CGWA for additional ground water dewatering (2698.5 KLD) has been submitted on dated 31.01.2017, and resubmitted on 08.09.2018.

1.6 SCOPE OF THE STUDY

The study area map is shown in **Figure-1.3**.



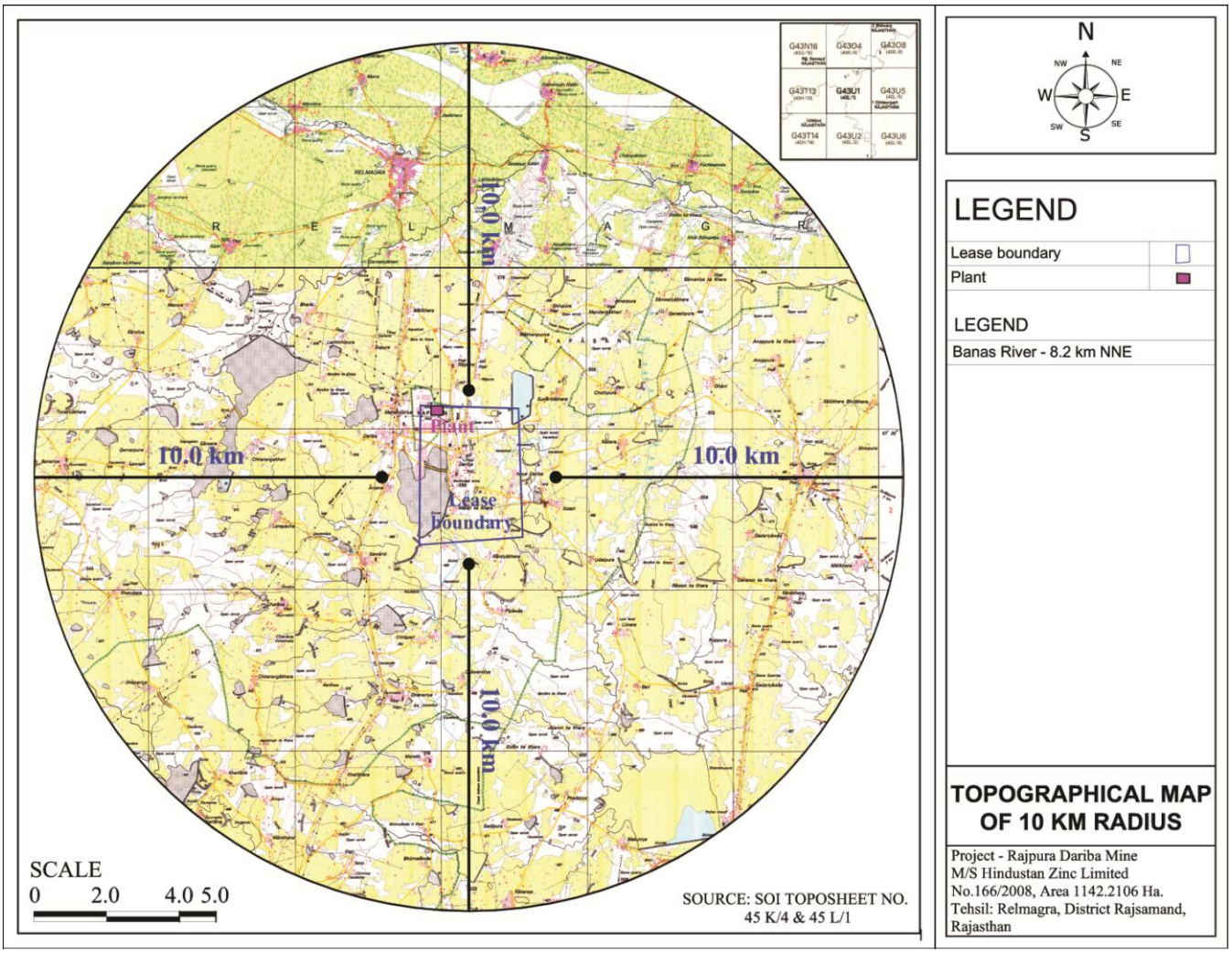


Figure 1.2: Geographical Location ofthe Project

Figure 1.3: Study Area Map

The scope of study broadly includes:

- To conduct literature review and to collect data relevant to the study area;
- Establishing the baseline environmental aspects in and around the project area;
- Identifying various existing pollution loads;

- Predicting incremental levels of pollutants in the study area due to the proposed enhancement in mining and beneficiation plant operations;

- Evaluating the predicted impacts on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies;

- To prepare an Environment Management Plan (EMP), outlining the measures for improving the environmental quality in view of proposed enhanced mining & beneficiation plant activities for environmentally sustainable development; and

- Identifying critical environmental attributes that are required to be monitored in the post-project scenario.

To determine existing conditions of various environmental attributes, field studies have been conducted during 1stMarch, 2017 to 31st May, 2017covering summerseason 2017.

COMPLIANCE OF TOR

The application for obtaining Terms of References {proposal No. IA/RJ/MIN/75956/2018,F.No.- IA-J-11015/84/2018-IA-II(M)} for carrying out EIA studies was submitted to MoEFCC on dated 26/07/2018 and the standard Terms of References for carrying out EIA studies is granted by MOEFCC.In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation by MoEFCC, New Delhi.

Terms of Reference (TOR) for Mining

S.No	TOR POINT	COMPLINCE
1.	The TOR will not be operational till such time the Project Proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors..	Noted. RD Mine is determined to comply all thestatutory requirements and compliance to Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors has been enclosed as **Annexure-XXVII.**
2.	Department of Mining & Geology, State Government shall ensure that mining operation shall not commence till the entire compensation levied, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	
3.	Year-wise production details since 1993-94 should be given, clearly stating the highest production achieved in any one year prior to 1993-94. 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 to1994. The production details need to submit since inception of mine duly authenticated by Department of Mines & Geology, State Government.	Year wise production details are present in Chapter 2, Table no 2.2, of EIA Report. The Authenticated Past Production Details are enclosed as **Annexure-XV.**
4.	A copy of the document in support of the fact that	The of the lease Deed has been

	the Proponent is the rightfullessee of the mine should be given.	enclosed has **Annexure-II** of this EIA-EMP Report.
5.	All documents including approved mine plan, EIA and Public Hearing should becompatible with one another in terms of the mine lease area, production levels,waste generation and its management, mining technology etc. and should be inthe name of the lessee.	Complied.
6.	All corner coordinates of the mine lease area, superimposed on a High ResolutionImagery/toposheet, topographic sheet, geomorphology and geology of the areashould be provided. Such an Imagery of the proposed area should clearly showthe land use and other ecological features of the study area (core and bufferzone).	Corner coordinates of the mine lease area superimposed on Topographical map is provided in Chapter 2 as Figure 2.3,and High Resolution Satellite imagery in Chapter 3 as Figure 3.4 &3.5, in this EIA-EMP Report.
7.	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.	SoI Toposheet is provided in Chapter 3 as Figure 3.2, in this EIA-EMP Report.
8.	Details about the land proposed for mining activities should be given withinformation 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.	Not applicable as the project is already under active mining operation and all the statutory clearances are already obtained for the project.Atpresent this proposalis forthe Expansion of Lead-Zinc Ore Underground Mine

		from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA. For proposed expansion is coming within same lease area and will be carried out only in acquired land.
9.	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 environmentalissues and for ensuring compliance withthe EC conditions may also be given. The system of reporting of non-compliances/ violations of environmental norms to the Board of Directors of the Companyand/or shareholders or stakeholders at large, may also be detailed in the proposed safeguard measures in each case should also be provided.	Environmental policyand organization setup details are Provided in Section 10.3 of Chapter 10 in this EIA-EMP Report.
10.	Issues relating to Mine Safety, including subsidence study in case of undergroundmining and slope study in case of open cast mining, blasting study etc. should bedetailed. The	Issues relating to mine safety are addressed in Chapter 7 of the EIA-EMP Report and Stoping Report,Ground Control

	proposed safeguard measures in each case should also be provided.	Management Plan,Emergency Preparedness&Response Plan are enclosed as **Annexure-XXI,XXIV and XXV** respectively.
11.	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.	Environmental study has been carried out in 10 km radius around the ML area Waste generation is provided for plan period as per Approved scheme in section 2.18.5 of the EIA-EMP Report.
12.	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 useshould be given.	Land use of the study area is provided in section 3.3.3 Chapter 3, Table 3.1, and shown in Figure 3.4 ofEIA report.Land use plan of mine lease area is presented in Chapter 2, section2.5, table no.2.4 and impacts on the same arediscussed in Chapter4, section 4.2, of EIA-EMP report.
13.	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.	Not applicable.
14.	A Certificate from the Competent Authority in the State Forest Department shouldbe 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	No forest land within the core as well as within the buffer zone of the project. NOC in this regard has been obtained from forest department and same is enclosed as **Annexure-V.**

	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.	
15.	Status of forestry clearance for the broken up area and virgin forestland involvedin the Project including deposition of net present value (NPV) and compensatoryafforestation (CA) should be indicated. A copy of the forestry clearance shouldalso be furnished.	This is the expansion project and expansion will be within the acquired area and there is no forest land within the core as well as within the buffer zone of the project. NOC in this regard has been obtained from forest department and same is enclosed as **Annexure-V.**
16.	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.	There are no Schedule tribes or Traditional forest dwellers in the area.
17.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There are no RF / PF areas in the study area.
18.	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.	Impact of mining on wildlife of the study area is discussed in Chapter 3, Section 3.7.7 pg.no.180, and detailed mitigative measures are provided in Chapter 4 section 4.6, Page 250 of the EIA-EMP report. Schedule I species listed in Wildlife Protection

		Act, 1972 in the Core and Buffer zone and accordingly species Conservation Plan is prepared and submitted for approval from competent authority. The same has been enclosed as **Annexure-XVIII.**
19.	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 nationalparks, sanctuaries,biosphere reserves,wild life corridors within 10km radius from ML area
20.	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	Impact of mining on wildlife of the study area is discussed in Chapter 3, Section 3.7.7, and detailed mitigative measures are provided in Chapter 4 section 4.6, Page 250 of the EIA-EMP report. Schedule I species listed in Wildlife Protection Act, 1972 in the Core and Buffer zone and accordingly species Conservation Plan is prepared and submitted for approval from competent authority. The same has been enclosed as **Annexure-XVIII.** Inventory of flora and fauna in the study area authenticated by DFO is

	the same should be made as part of the project cost.	attached as **Annexure-V.**
21.	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.	Not applicable.
22.	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 theconcerned Coastal Zone Management Authority).	Not applicable.
23.	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	R & R is Not applicable.

	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.	Not applicable
24.	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.	One season nonmonsoon primary baseline data hasbeen collected during Pre monsoon season2017(from March 2017 to May 2017). All theguidelines stipulatedwere followed inselecting the locationsfor monitoring. Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has be collected and the AAQ and other data has been compiled presented date-wise in Chapter 3 of EIA-EMP Report. The collected baseline monitoring data has been enclosed as Annexure-**XXII.**
25.	Air quality modelling should be carried out for prediction of impact of the projection 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,	Air quality modeling has been carried out using ISC AERMOD View. The predicted GLC's were superimposed on the study area map and is presented in Chapter-4, Section 4.4 in EIA-EMP report.

	if any, and the habitation. The wind roses showing predominant wind direction may also be indicated on the map.	
26.	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.	Details of waterrequirement are provided in Chapter 2,Section 2.16.2, water balance diagram is alsoshown in Chapter -2,Figure 2.16, of the EIA-EMP report.
27.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water dewatering permission from CGWA and Agreement for supply of Water from Sewage Treatment Plant at Udaipur, Mansi Wakal, and Matrikundia Dam enclosed as **Annexure VIII & Annexure-IV** respectively of theEIA-EMP Report
28.	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 conservationmeasures along with water harvesting are presented in Chapter4, Section 4.3, and **Annexure –X** of EIA-EMP report. Water quality monitoring table has been given in chapter 3 section 3.5.3 table no.3.16
29.	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.	
30.	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	The mining operation have already Intersected ground water table. Permission for pumping of ground water is enclosed as **Annexure -X** of EIA-EMP report.

	undertaken and Report furnished. The Report interalia, 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.	
31.	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.	There are only monsoon cutchannels in the ML area. There is no modification ordiversion proposed.
32.	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.	Details are providedin Chapter 2, Section 2.10 of EIA-EMP report and detailed in approved mining plan.
33.	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	Progressive green belt development plan anddetails of plantation already carried outare provided in Chapter 4, section 4.6 and chapter-10 table.10.1of EIA Report.

	species which are tolerant to pollution.	
34.	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 transport infrastructure due toproject has beenanticipated inChapter 4, section 4.2.2.3,Details of existing scenarios and survey of traffic density has been detailed in chapter 3, Section 3.4.3.4 and section 3.9 respectively of the EIA-EMP Report.
35.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Details of facilities to be provided to mine workers is discussedin Chapter 2, Para2.16.1, of EIA-EMPReport.
36.	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.	The same has been provided in Chapter-4, section-4.2and elaborated in **Annexure- VI.**
37.	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.	Details of occupationhealth impacts arediscussed in chapter 4 , Section 4.8, Chapter 7 ,section 7.12 and somemedical records areenclosed as**Annexure XIV** of EIA-EMP report

38.	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.	Public health implications of the Project and related activities for the population in the impact zone are presented in Chapter 4, table no.4.28 and table no.4.29. of EIA-EMP report.
39.	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.	The same has been detailed in Chapter 7, section 7.15 and Chapter 8, section 8.6of EIA-EMP report.
40.	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.	Detailed Environment Management Plan is provided in Chapter 10 of EIA-EMP report.
41.	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.	Same will be complied after Public Hearing.
42.	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.
43.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation	Cost of the expansion project is Rs.660 crores and cost towards

	of EMP should be clearly spelt out.	implementation of EMP is Rs.96.5 Crore with recurring cost of Rs.3.77 Crores.
44.	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report.	Disaster Managementplan is included inChapter 7, Section 7.8, of EIA-EMP Report.
45.	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.	Project benefits areprovided in Chapter 8of EIA-EMP report.
46.	The activities and budget earmarked for Corporate Environmental Responsibility (CER) shall be as per Ministry's O.M No 22-65/2017-IA. II (M) dated 01.05.2018 and the action plan on the activities proposed under CER shall be submitted at the time of appraisal of the project included in the EIA/EMP Report.	Noted.
47.	The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA.I (M), dated 25.10.2017 needs to besubmitted at the time of appraisal of the project and included in the EIA/EMP Report.	Noted.
48.	Compliance of the Ministry's Office Memorandum No. F: 3-50/2017-IA.III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2ndAugust, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMPReport.	Compliance to Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors has been enclosed as **Annexure-XXVII.**

49.	Besides the above, the below mentioned general points are also to be followed: -	
a.	All documents to be properly referenced with index and continuous page numbering.	Noted and complied.
b.	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Noted and complied.
c.	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.	Noted
d.	Where the documents provided are in a language other than English, an English translation should be provided.	Noted
e.	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Noted
f.	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.	Noted and complied.
g.	Changes, if any made in the basic scope and project parameters (as submitted inForm-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such	Noted

	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.	
h.	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.	Noted and same has been attached as Annexure-XVI.
i.	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.	Noted and same has been enclosed as Annexure-X.

Terms of Reference (TOR) for Beneficiation

S.No	TOR POINT	COMPLINCE
1.	The alternate sites considered, the relative merits and demerits and the reasons for selecting the proposed site for the Beneficiation Plant should be indicated.	The same has been detailed in Chapter 5, section 5.3 and of EIA-EMP report.
2.	Details of the technology and process involved for beneficiation should be given	The same has been detailed in Chapter 2, section 2.15 and figure no.2.14 of EIA-EMP report.

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 should be justified.	The same has been detailed in Chapter 4, section 4.4 and figure no.2.14 and figure no.4.2 of EIA-EMP report.
4.	Treatment of run of mine (ROM) and or of the fines/waste dump should be spelt out.	The same has been detailed in Chapter 2, section 2.14 & 2.15 and of EIA-EMP report.
5.	Estimation of the fines going into the washings should be made and its management described.	The same has been detailed in Chapter 2, section 2.18.5 and of EIA-EMP report.
6.	Details of the equipment, settling pond etc. should be furnished.	The same has been detailed in Chapter 2, section 2.15 and table no.2.18 of EIA-EMP report.
7.	Detailed material balance should be provided.	The same has been given in Chapter 2, section 2.15, figure no.2.14 and table no.2.16 of EIA-EMP report.
8.	Sources of raw material and its transportation should be indicated. Steps proposed to be taken to protect the ore from getting air borne should be brought out.	The same has been detailed in Chapter 4, section 4.4 and figure no.4.2 table no.4.5 and 4.15 of EIA-EMP report.
9.	Management and disposal of tailings and closure plan of the tailing pond, if any after the project is over, should be detailed in a quantified manner.	The same has been detailed in Chapter 2, section 2.15 & 2.18.5 of EIA-EMP report. Refer mining plan enclosed as **Annexure-VI.**
10.	The water requirement for the project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water	Details of water requirement are provided in Chapter 2,Section 2.16.2, water

	requirement for the project should also be indicated.	balance diagram is alsoshown in Chapter -2,Figure 2.16, of the EIA-EM report.
11.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the unit should be given.	The of the lease Deed has been enclosed has **Annexure-II** of this EIA-EMP Report.
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.	Complied.
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).	Corner coordinates of the mine lease area superimposed on Topographical map is provided in Chapter 2 as Figure2.3and High Resolution Satellite imagery in Chapter 3 as Figure 3.4 &3.5,in this EIA-EMP Report.
14.	It should be clearly indicated 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-	Environmental policyand organization setup details are Provided in Section 10.3 of Chapter 10 in this EIA-EMP Report. RD mine has ISO certificate 14000 has been obtained and details of Non-conformity are elaborated in SOP and Environment Manual.

	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.	The same has been detailed in Chapter-7 and Disaster Managementplan is included inChapter 7, Section 7.8, of EIA-EMP Report.
16.	The study area will comprise of 10 km zone around the Plant.	Environmental study has been carried out in 10 km radius around the ML area of the EIA-EMP Report.
17.	Cumulative impact study of both Beneficiation Plant with suggested mitigation measures as per the study should be described.	The same has been detailed in Chapter 4, section 4.4 and of EIA-EMP report.
18.	Location of Railway siding with its handling capacity and safety measures should be indicated.	Not applicable.
19.	Option to provide only silo for storage of minerals instead of open stacking to avoid fugitive dust should be explored and arrangements finalized justified.	The same has been detailed in Chapter 2, section 2.15 and of EIA-EMP report.
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.	Land use of the study area is provided in section 3.3.3 Chapter 3, Table 3.1, and shown in Figure 3.4 of EIA report. Land use plan of mine lease area is presented in Chapter 2, section 2.5, table no.2.4 and impacts on the same are

		discussed in Chapter 4, section 4.2, of EIA-EMP report.
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.	Not applicable.
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.	No forest land within the core as well as within the buffer zone of the project. NOC in this regard has been obtained from forest department and same is enclosed as **Annexure-V.**
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.	This is the expansion project and expansion will be within the acquired area and there is no forest land within the core as well as within the buffer zone of the project. NOC in this regard has been obtained from forest department and same is enclosed as **Annexure-V.**
24.	Implementation status of recognition of forest rights	Not Applicable

	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.	There are no RF / PF areas in the study area.
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.	Impact of mining on wildlife of the studyarea is discussed in Chapter 3, Section 3.7, and detailed mitigativemeasures are provided in Chapter 4 section 4.6, Page 211 of the EIA-EMP report.Schedule I species listed in Wildlife Protection Act, 1972 in the Core and Buffer zone andaccordingly species Conservation Plan are implemented by HZL. The samehas been enclosed as **Annexure-XVIII.**
27.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, 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 nationalparks, sanctuaries,biosphere reserves,wild life corridors within 10km radius from ML area.
28.	A detailed biological study of the study area [core	Impact of mining on wildlife

	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 scheduledI 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.	of the studyarea is discussed in Chapter 3, Section 3.7, and detailed mitigativemeasures are provided in Chapter 4 section 4.6, Page 211 of the EIA-EMP report. Schedule I species listed in Wildlife Protection Act, 1972 in the Core and Buffer zone and accordingly species Conservation Plan are implemented by HZL. The samehas been enclosed as **Annexure-XVIII.**
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/CPCBshall be secured and furnished to the effect that the proposed activities could be considered.	Not applicable.
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).	Not applicable.
31.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While	R & R is Not applicable.

	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 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.	
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.	One season nonmonsoon primary baseline data hasbeen collected during Pre monsoon season2017(from March 2017 to May 2017). All theguidelines stipulatedwere followed inselecting the locationsfor monitoring. Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has be collected and the AAQ and other data has been compiled presented date-wise in Chapter 3 of EIA-EMP Report. The collected baseline monitoring data has been enclosed as Annexure-**XXII.**

33.	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.	Air quality modeling has been carried out using ISC AERMOD View. The predicted GLC's were superimposed on the study area map and is presented in Chapter-4, Section 4.4 in EIA-EMP report.
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.	Details of water requirement are provided in Chapter 2,Section 2.16.2, water balance diagram is alsoshown in Chapter -2,Figure 2.16, of the EIA-EM report.
35.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be secured and copy furnished.	Water dewatering permission from CGWA and Agreement for supply of Water from Sewage Treatment Plant at Udaipur, Mansi Wakal, and Matrikundia Dam enclosed as **Annexure VIII & Annexure-IV** respectively of theEIA-EMP Report
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 conservationmeasures along with water harvesting are presented in 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.	Section 4.3, and **Annexure – X**of EIA-EMP report.
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.	There are only monsoon cutchannels in the ML area. There is no modification or diversion proposed. Refer hydrogeology report enclosed as **Annexure-X.**
39.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating thelinear 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.	Progressive green belt development plan anddetails of plantation already carried outare provided in Chapter 4, section 4.6 and chapter-10 table.10.1of EIA Report. Refer mining plan enclosed as **Annexure-VI.**
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 transport infrastructure due to project has been anticipated in Chapter 4, section 4.4, Details of existing scenarios and survey of traffic density has been detailed in chapter 3, Section 3.4.3.4. Traffic survey has been enclosed as **Annexure-VI**

41.	Details of the onsite shelter and facilities to be provided to the workers should be included in the EIA report.	Details of facilities to be provided to mine workers is discussedin Chapter 2, Para2.16.1, of EIA-EMPReport.
42.	Occupational Health impacts of the Project should be anticipated and the proposedpreventive 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 should be detailed.	Details of occupation health impacts are discussed in chapter-4,Section 4.8, Chapter 7 ,section 7.12 and some medical records are enclosed as **Annexure XIV** of EIA-EMP report
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.	Public health implications of the Project and related activities for the population in the impact zone are presented in Chapter 4, table no.4.28 and table no.4.29. of EIA-EMP report.
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 forimplementation.	The same has been detailed in Chapter 7, section 7.15 and Chapter 8, section 8.6of EIA-EMP report.
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.	Same has been detailed in chapter no.7 section 7.1. of EIA-EMP report. Minutes of Public hearing with English translation has

		been incorporated as **Annexure-XXXIII.**
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.
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.	Cost of the expansion project is Rs.660 crores and cost towards implementation of EMP is Rs.96.5 Crore with recurring cost of Rs.3.77 Crores.
48.	A brief background of the Project, its financial position, Group Companies and legal issues etc should be provided with past and current important litigations if any.	No litigation.
49.	Benefits of the Project, if the project is implemented should be outlined. The benefits of the projects shall clearly indicate environmental, social, economic, employment potential, etc.	Project benefits areprovided in Chapter 8 of EIA-EMP report.

1.7 ENVIRONMENT CLEARENCE PROCESS

The proposed expansion of mining project will require an Environmental Impact Assessment (EIA) study to be undertaken as per requirement of the EIA Gazette Notification of 14.09.2006 and its subsequent amendment on dated 01.12.2009, 04.04.2011 and 14.08.2018 under the Environment Protection Act, 1986, classified the projects undertwo *categories – A (more than 100 hect.) and B (equal or less than 100 hect.)*. ***The proposed project is categorized under category A under Item [1(a)] :{ Mining of minerals}***as the lease area is 1142.2106 ha.

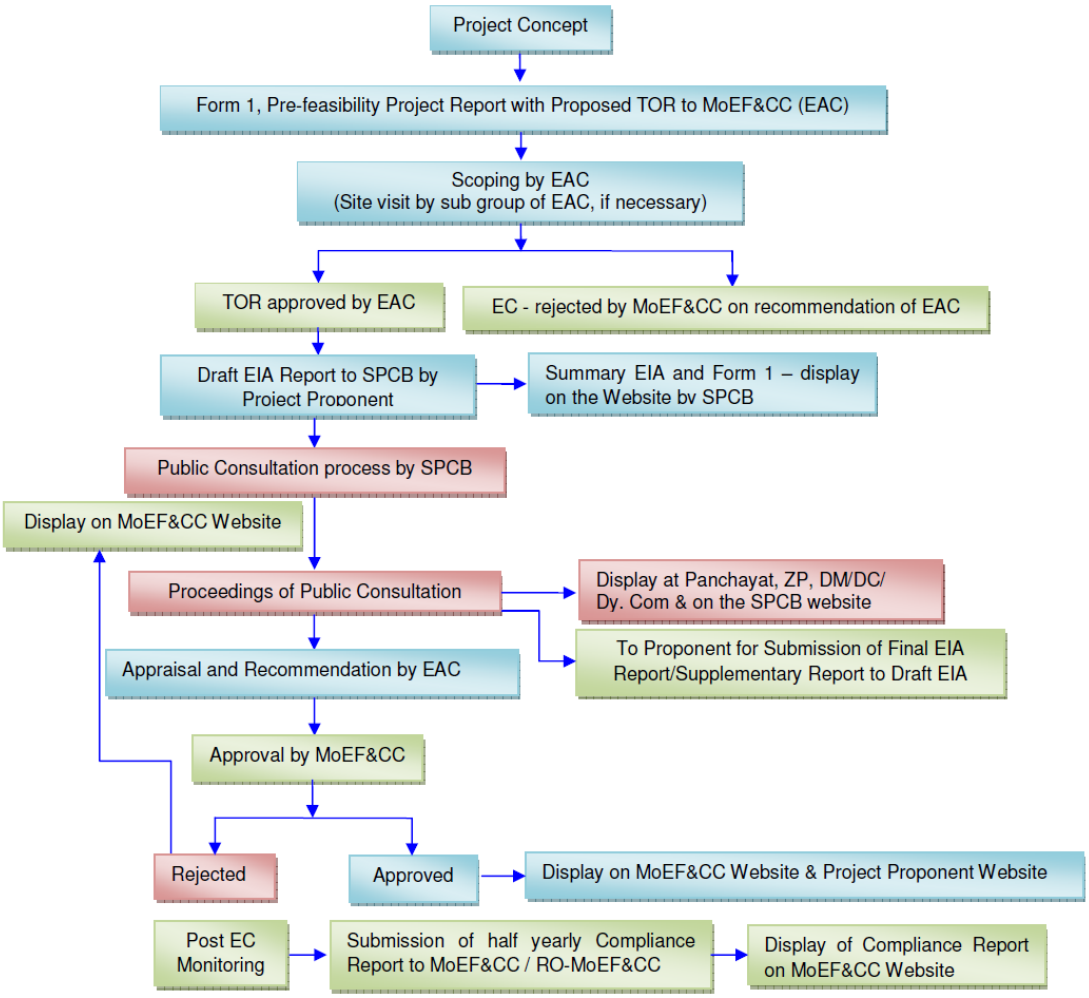


Figure 1.4: Environmental Clearance process chart

1.8 STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT

In terms of the EIA Notification of the MoEF&CC dated 14th September 2006 and subsequent amendment till date, the generic structure of EIA documents shall be as under:

1. Introduction
2. Project Description
3. Description of the Environment
4. Anticipated Environmental Impact & Mitigation Measures
5. Analysis of alternatives (Technology & Site)

6. Environmental Monitoring Program
7. Additional Studies
8. Project Benefits
9. Environmental cost benefit analysis
10. Environmental Management Plan
11. Summary & Conclusion
12. Disclosure of Consultant Engaged.

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CHAPTER -2

PROJECT DESCRIPTION

CHAPTER-2

PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

The proposed project is a mechanized underground lead-zinc mining & beneficiation Brownfield expansion project.. RajpuraDariba deposit extends over a lease area of 1142.20ha with estimated insituore reserves & resources in Rajpura Dariba deposit is60.05million tons with grades of 6.3% Zinc and 1.91% Lead as on 31st March 2018. The proposal of M/s Hindustan Zinc Limited is for the expansion of Rajpura DaribaLead – Zinc underground mine with production capacity from 1.08 million TPA to 2.0million TPA (ROM) and Lead - Zinc ore beneficiation from 1.2 million TPA to 2.5 millionTPA.

The ore concentrate produced shall be processed by the existing HZL smelters for refining of Lead & Zinc metal. The salient features of the project along with the proposed incremental load are elaborated in following **Table no.2.1.**

Table2.1: Salient features of the project

S.no	Description	Existing	Additional Proposed	After Proposed Expansion
1.	Mine lease area (ha)	1142.2106	0	No Change
2.	Acquired Land (ha)	554.19	0	No Change
3.	Ore mineral	Sphalerite & Galena		
4.	Reserves & Resources	60.05 million tons, 6.38 % Zn, 1.91 % Pb as on 31-Mar-18		
5.	Mode of Entry	2 Shafts & 1 Decline		
6.	Method of Mining	Vertical Retreat Method & Blast hole Stoping with filling		
7.	Ore Production (Mtpa)	1.08	0.92	2.0
8.	Total Excavation (Mtpa)	1.15	1.33	2.48
9.	Ore Beneficiation (Mtpa)	1.20	1.30	2.5
10.	Waste dump area (ha)	3.0	2.0	5.0
11.	Power requirement (MW)	12.0	13.0	25.0
12.	Power Source	Captive generation/ AVVNL/ Solar Power		
13.	Water requirement (m^3/day)	5800	2200	8000
14.	Water Source	Matrikundia+STP+MansiWakal+Gosunda+Mine Water		
15.	Manpower (Nos.)	1000	250	1250

16.	Project Cost (Rs. in cr.)	300	660	960
17.	EMP Cost (Rs. in cr.)	14	96	110

2.2 NEED OF THE PROJECT

The existing enhanced zinc smelting annual capacity of the HZL smelters at Debari, Chanderia&Vizagis 6.66 LT of zinc metal which requires about 13.8 LT of Zinc concentrate. At present the production capacity of zinc concentrate from RampuraAgucha mine, Zawar Group of mines and RajpuraDariba Mines (Including SindesarKhurd) is short of Zinc concentrate by about 3.5 LT. The Zawar Group of mines is depleting and will not be able to increase the capacity of concentrate production. The increased production of zinc concentrate will only be possible from capacity increase of RampuraAgucha mine, SindesarKhurd mine and RajpuraDariba mine to a limited extent from existing capacity. Therefore, the expansion of RajpuraDariba deposit is justified for future requirement. To satisfy the demand of the Lead and Zinc in the country.The Year-wise production details are provided in the following Table.

Table 2.2:Year-wise Production Details

Year–wise Annual Production Details of RDM				
Year	**Ore Production (t)**	**EC Approval (t)**	**Ore treatment (t)**	**EC Approval (t)**
2010-11	496234	9,00,000	9,55,218	12,00,000
2011-12	587600	9,00,000	6,26,649	12,00,000
2012-13	554354	9,00,000	5,61,153	12,00,000
2013-14	610242	9,00,000	6,06,785	12,00,000
2014-15	573284	9,00,000	5,73,018	12,00,000
2015-16	668777	9,00,000	6,68,034	12,00,000
2016-17	745534	9,00,000	72,52,20	12,00,000
2017-18	895568	9,00,000	89,06,53	12,00,000

2.3 PROJECT LOCATION& CONNECTIVITY

Rajpura-Dariba mine is located at the southern extremity of Rajpura-DaribaBethumnimetallogenic belt in Rajsamand district, Rajasthan, at a distance of 76 km NNE of Udaipur. The deposit is well connected by a metalled road from Udaipur, Chittorgarh, Bhilwara and District headquarters Rajsamand. The deposit falls in Survey of India Toposheet No. 45/L1.It lies between Latitudes 24°55'40.8"N-24°57'49.0"N and Longitudes 74°06"57.7"E-74°08'41.4"E.Lead – Zinc mineral deposit has been explored at this site.

The nearest connectivity details are given as under:-

- **Nearest Airport**- MaharanaPratap Airport (~44.0 km aerial distance towards SW) from mine lease boundaryand
- **Nearest Railway Station** -BhupasSagarRailway Station(11.2 km aerial distance towards South SouthEast) ,Fatehnagar Railway Station (~13.2 km aerial distance towards SSW) from mine leaseboundaryand
- **Nearest Highway** - NH-162A- at a distance of 0.5 km aerial distance towards West and SH-9 (Udaipur-Cittorgarh via Mavli)at adistance of 12.5 km aerial distance towards towards south from mine lease boundary.

The details of environmental setting are given above. Location map is shown in **Figure-2.1**. The mine lease map is shown in **Figure-2.4** and the Google map is shown in **Figure-2.3.**

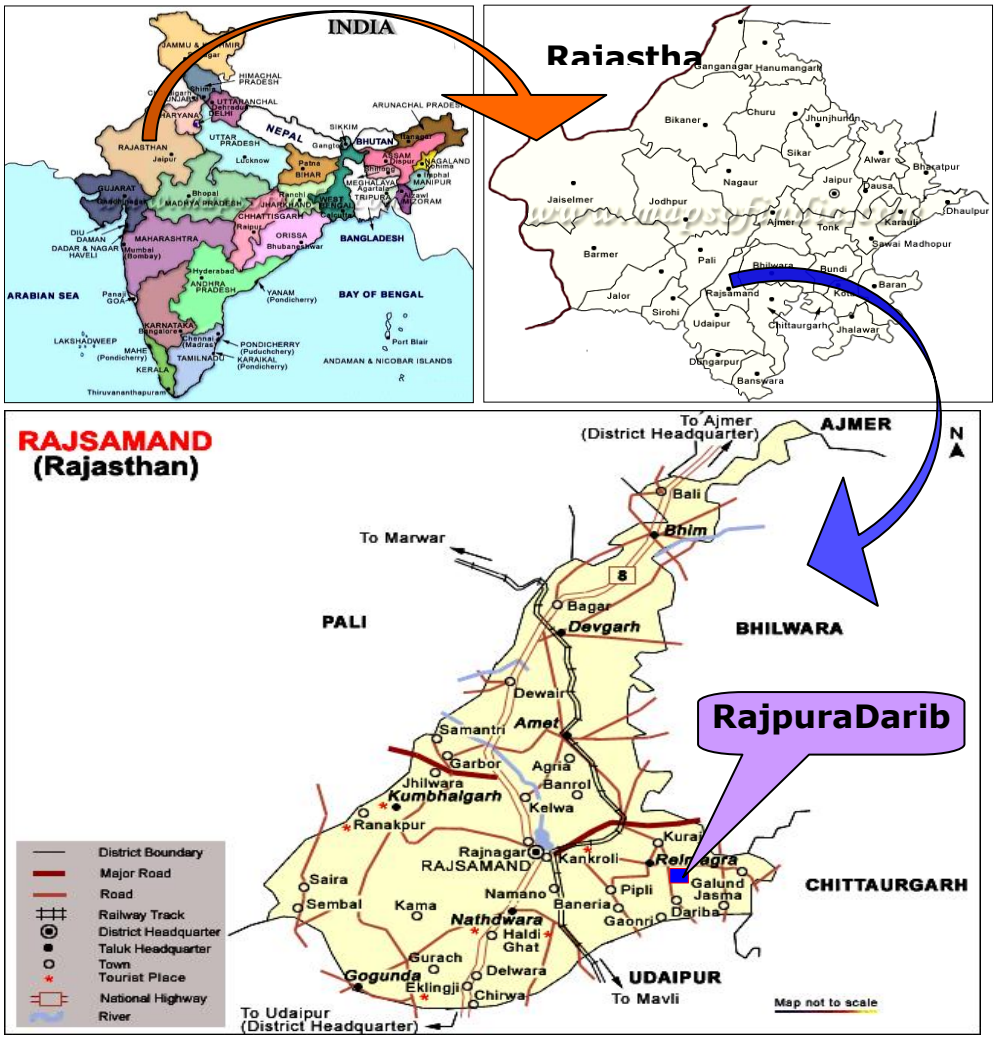

Figure 2.1: Location Map

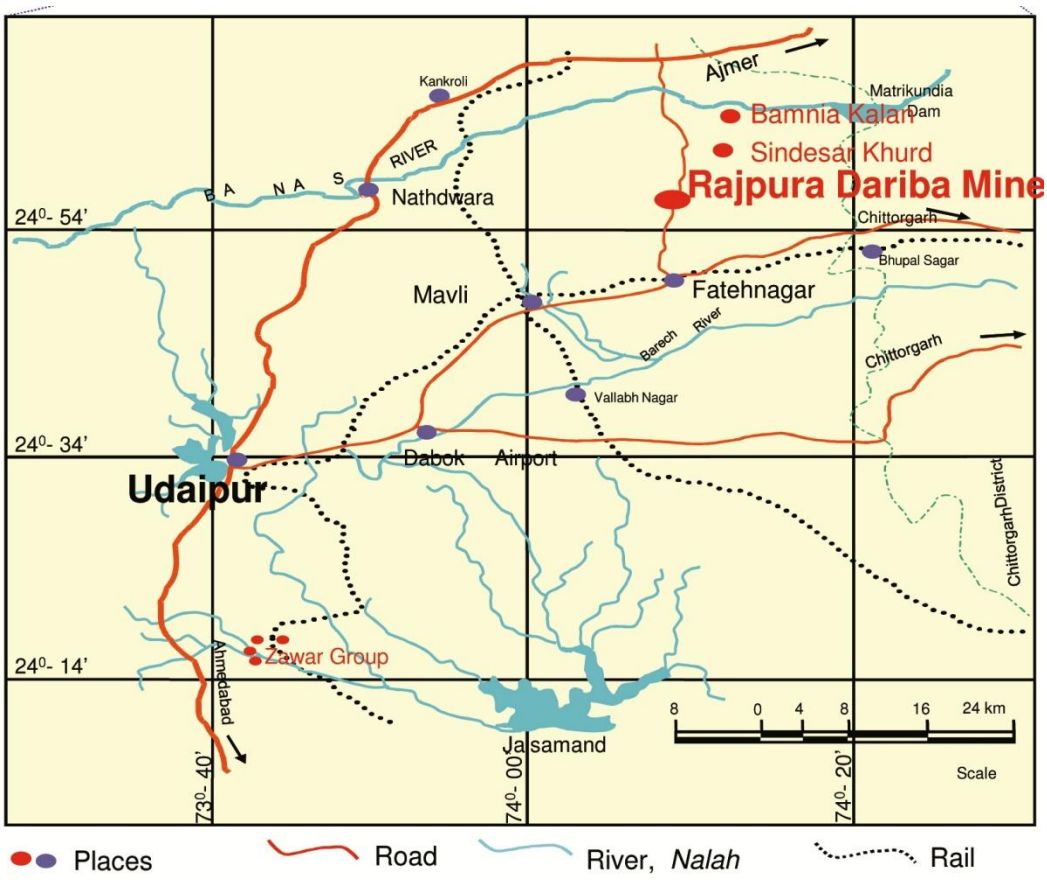

Figure 2.2: Road Location Map

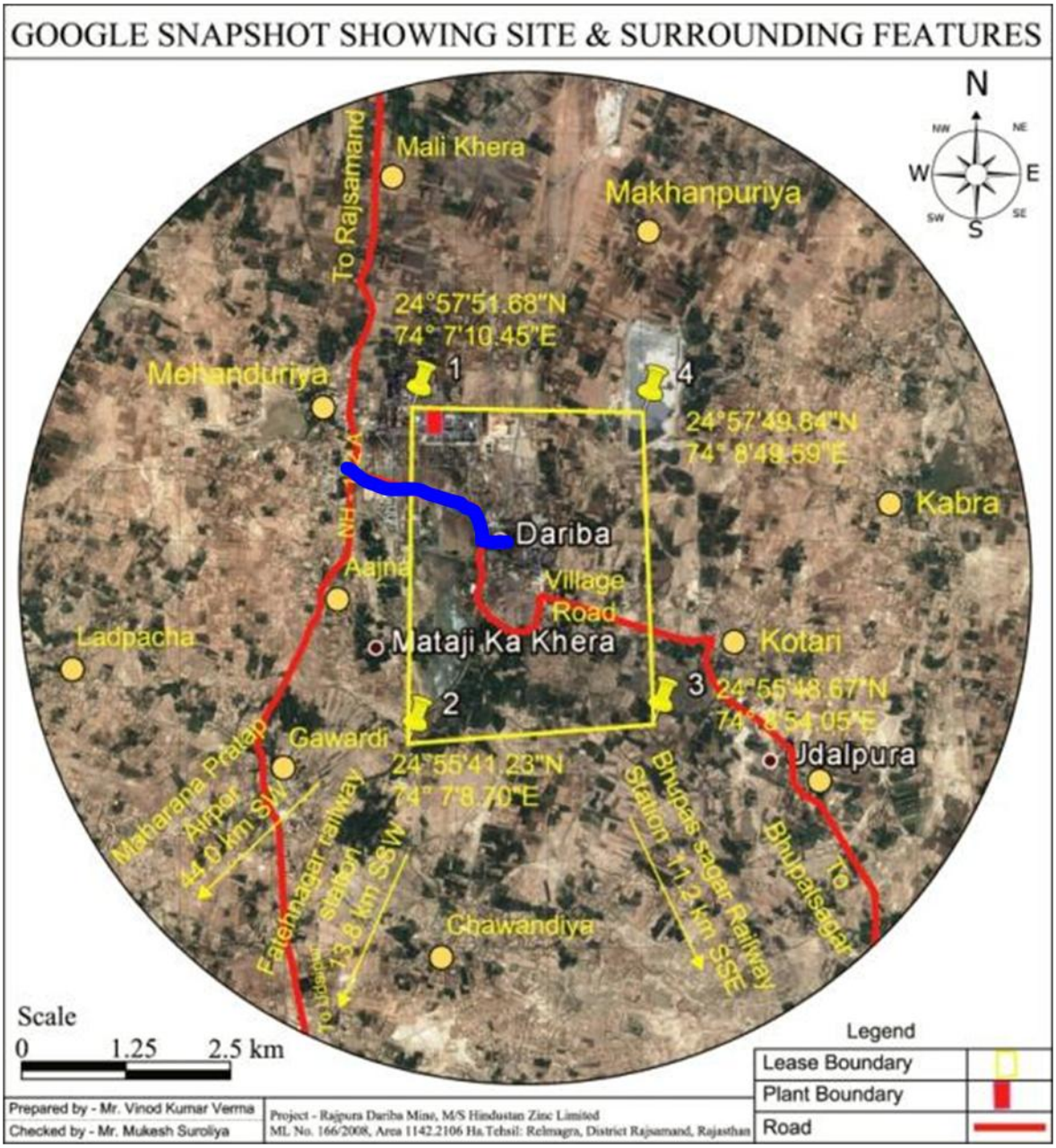

Figure2.3: Google Map

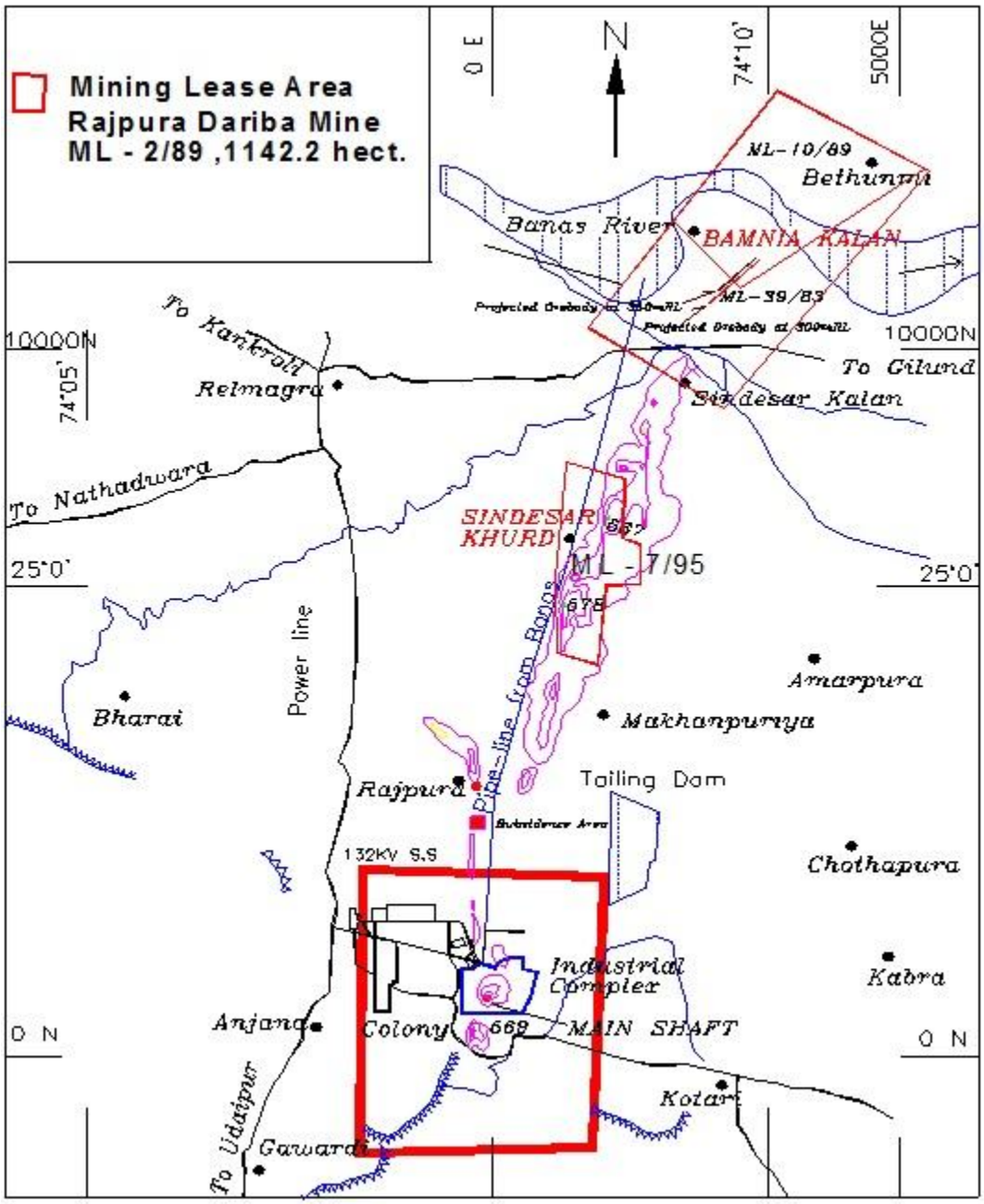

Figure 2.4: Mine Lease Map

2.4 JUSTIFICATION FOR SELECTING PROPOSEDPROJECTSITE

- The RajpuraDariba deposit is located inRelmagra Tehsil of DistRajsamand.
- The reason for an enhancement of production capacity of RajpuraDariba Mine from from 1.08 million TPA to 2.0 million TPA is the availability of reserves and resources estimated at around 60.05million tons with grades of 6.3% Zinc and 1.91% Lead as on 31st March 2018.
- The present proposal is for expansion of Lead – Zinc ore production from underground mine from 1.08 million TPA to 2.0 million TPA (underground mine). The ore concentrate produced shall be processed by the existing HZL smelters for refining of Lead & Zinc metal.
- Environment Clearance was granted by MoEF, New Delhi for 0.9 MMTPA ore production & 1.2 MMTPA ore beneficiation plant for Rajpura Dariba underground mine vide letter no. J-11011/380/2008-IA II(I) dated 4.11.2009 and amended from 0.9 million TPA to 1.08 million TPA ore production vide letter no. J-11015/380/2008-IA.II(M) dated 26.07.2018 under clause 7 (ii) of EIA notification, 2006.
- Valid Consent to Operate is available from Rajasthan State Pollution Control Board (RSPCB), Jaipur for carrying Mining & Beneficiation activities vide letterno.**F(Mines)/Rajsamand(Railmagra)/1(1)/2008- 2009/278-282 dated 23.04.2015**(was valid till 28.02.2018) and same is applied for renewal to RSPCB on 26.10.2017. Acknowledgement receipt is enclosed as **Annexure II**.
- Nearest Airport- MaharanaPratap Airport (~44.0 km aerial distance towards SW) from mine lease boundary and Nearest Railway Station - BhupasSagarRailway Station (11.2 km aerial distance towards South SouthEast) ,Fatehnagar Railway Station (~13.2 km aerial distance towards SSW) from mine lease boundary and Nearest Highway - NH-162A- at a distance of 0.5 km aerial distance towards West from mine lease boundary
- The deposit forms a part of the southern extremity of Rajpura-Dariba-Bethumnimetallogenic belt. A spectacular zone of in situ Gossan is capping the ridge over the deposit at surface. Mining Lease is demarcated

- RajpuraDariba Mine is well equipped with infrastructures like Offices, Canteen, Rest Room, Washrooms, Ambulance, First-aid facilities, Fire Tender, Road Sweeper, residential facilities, school, hospital, bank, post office, police station, shopping market, club, gym, football ground and other recreational facilities etc.

2.5 LAND FORM, LAND USE AND LAND OWNERSHIP

2.5.1 Land Form

The topography of the area is marked by N-S trending linear ridge with highest elevation of 561MRL. This ridge is flanked on either side by gently undulating surface having an average elevation between 490-500MRL. Main shaft is at 501MRL.The area within leasehold does not include any major streams or river across it, hence not prone to any kind of flood. The drainage is mainly sheet flow. The surface water bodies in the area are characterized by the existence of tanks. The Mataji-Ka-Khera is the main tank located southwest of the RajpuraDariba Mine. The main source of drainage is River Banas, which is ephemeral and flows at a distance of 8.2-kmaerial distance towards NNE of the deposit.

2.5.2 Land Use& Ownership

Total Mine lease area is 1142.2ha, out of which 362.66 ha has been acquired within mining lease. There shall be no requirement to acquire land beyond the existing acquired land. The mine area in operational use will suffice the requirement. Breakup of land use of lease area and acquired area is shown as under:

Table2.4: Land Use

Particulars	Land use (ha)
A) MINE & SMELTER Operational use	
a) Mine, beneficiation plant, workshops and other office buildings.)	58.62
b) Old Mine Premise (Sala Mill, incline, vent. Fan)	7.32
c) Main Explosive Magazine	1.56
d)Tailing Dam	3.02

e) Core shed	0.06
f) Tailing pipeline	1.78
g) Zinc Plant	22.64
h) Lead Plant	20.15
i) Captive Power Plant	0
j) Utilities (ETP, RO etc.)	0.42
k) Hazardous Waste Disposal Site	53
l) Others(Open space & internal roads)	3.1
Total (A)	**171.67**
B) Other Use: Residential Colony, Welfare buildings and internal roads	41.41
C)Roads and open spaces	15.58
D) Green Belt (Plantation)	134
Total Acquired Area (A+B+C+D)	**362.66**
E) Khatedari land	578.2
F) Charagah	27.33
G) Govt. Land	131.03
H) Public roads & Others	42.98
GRAND TOTAL(A+B+C+D+E+F+G+H) (lease area)	**1142.2**

Topography - The topography of the area is marked by N-S trending linear ridge with highest elevation of 561MRL. This ridge is flanked on either side by gently undulating surface having an average elevation between 490-500MRL. Main shaft is at 501MRL.

Drainage pattern- The area within leasehold does not include any major streams or river across it, hence not prone to any kind of flood. The drainage is mainly sheet flow. The surface water bodies in the area are characterized by the existence of tanks. The Mataji-Ka-Khera is the main tank located southwest of the RajpuraDariba Mine. The main source of drainage is River Banas, which is ephemeral and flow 8.2-km NNEof the deposit.

Vegetation-Vegetation is limited to very slow growing stunted trees, thorny shrubs and some grasses. The other natural vegetation type is ephemeral, occurring only during the monsoon season. Kejri (*Prosopis cineraria*) is the most prolific and an all purpose tree and its bean shaped fruit, sangri, is eaten as vegetable and used as fodder. The ker fruit is also eaten as

vegetable and it has strong and durable wood. The other prominent trees include akaro (*Calotropisprocera*) and shrubs, the thor (*Euphorbia caduca*), bordi (*Zizypusnummularia*), babul (*Acacia nilotica*) and anwal (*Cassia aureculata*) etc. perennial grasses sewan (*Lasiurussindicus*), dhaman (*Cenchrusciliaris*), boor (*Cenchrusjwarancusa*) and bharut (*Cenchruscatharficus*) are also available.

Climate-The climate is characterized by Sub-tropical dry climate with distinct hot summer, cold winter and rainy monsoon. The highest temperature goes above 47°C in May-June and the lowest up to 2°C in December-January.

Rainfall data - The average rainfall is 800 mm. The rainfall during the period from June-September constitutes about 92% of the annual rainfall.

2.6 GEOLOGY

Dariba-Bethumnimetallogenic 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 Archaeans.

Table 2.5: Summarized Geological Succession

Era	Age	Super Group	Group/ Formations	Rock Types
Quaternary	Sub-Recent to Recent	Fluvial & Colluvium	Alluvium	Sand, silt, clays, graveletc
Unconformity				
Intrusives				Pegmatites, quartz Veins.
		Bhilwara super group	Rajpura-/ Dariba group	Dolomitic marble, Graphitic kyaniteschists,quartzites,
Archaeans			Mangalwar Complex	Migmatite, gneiss, mica, schsits,quartzites
			Banded gneissic complex	Gneisses , schists, etc.

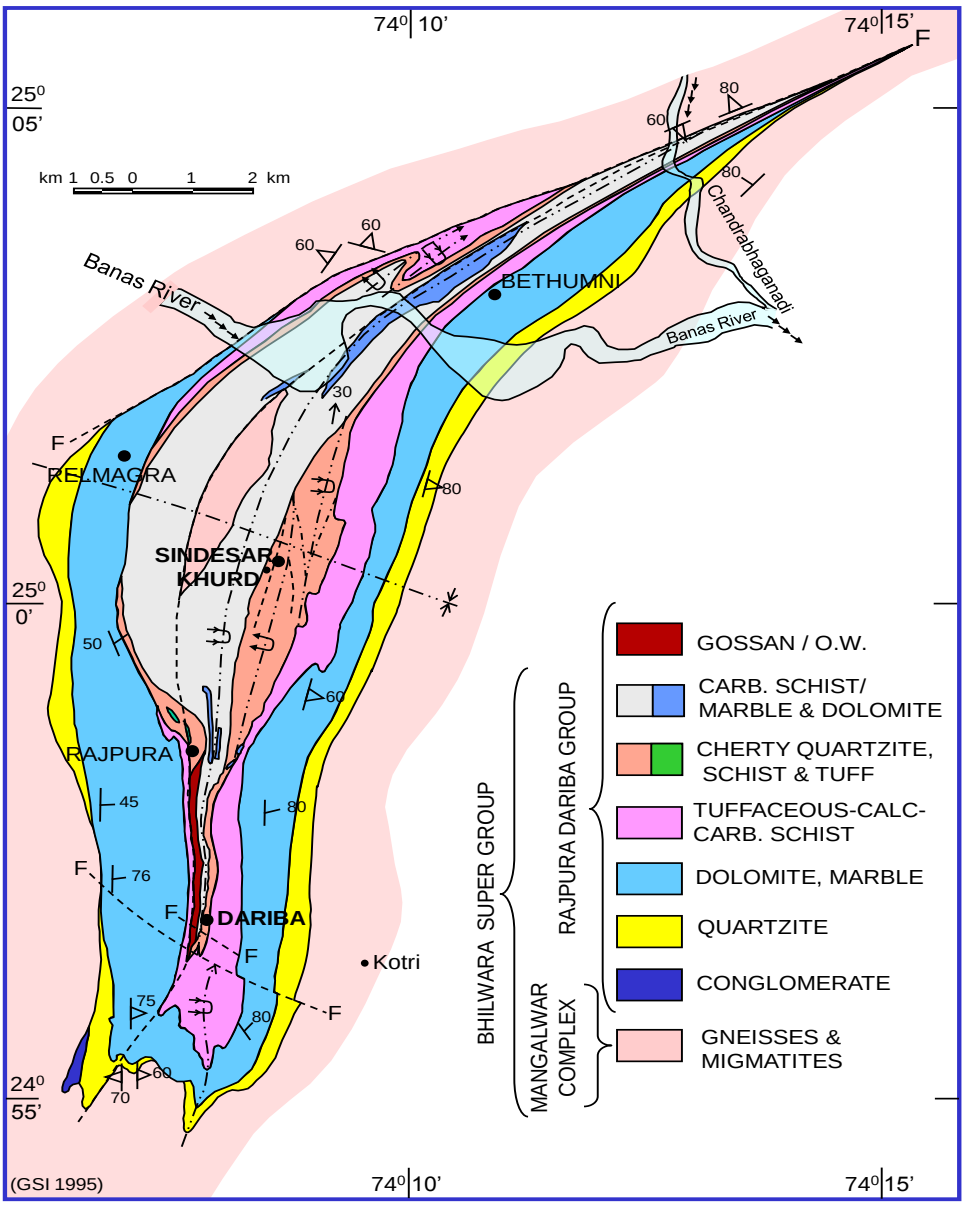

Figure 2.5: Regional Geological Map (GSI) of Dariba-BethumniMineralised Belt

Structure

The structure of the belt is as an isoclinal fold (GSI, 1990) having a synformal closure at Dariba in south and an antiformal closure at Bethumni in north. The synformal closure

exhibits steep plunge (55°-60°) towards ENE and the antiformal 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 having N30°E-S30°W axial trend. Another set of appressed isoclinal 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 SindesarKhurd and SindesarKalan 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 sulphides of large volumes. At the south end of the belt in particular, contains multi-metallic sulpho-salt association. Mineralisation 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.

2.7 ORE BODY AND ITS BEHAVIOR

Geology of the lease area

Dariba Mine is located at the southern extremity of the Dariba – Bethumni belt. The ore bodies are designated as South Lode, Main Lode, North Lode, and East Lode.

Shape and size of the mineral/ore deposit

The Main Ore body extends over a strike length of 2550m and intermediate barren patches into three lodes viz. South, Main and North Lode. The South Lode, striking N-S and dipping 60° to 70° towards east, has a strike length of 500m. The North Lode has a strike length of 900m. It strikes N-S and dips 70° to 75° towards east. The Main Lode has a strike length of 500m. It also strikes N-S and dips 70° to 65° towards east. The East Lode, with a length of 600m, also strikes N-S and dips easterly at 60° to 70°. It is located about 150m away from the hang wall side of the South Lode. The average widths of South, North and East Lodes are about 24m, 18m and 18m respectively and tend to decrease with depth.

Disposition

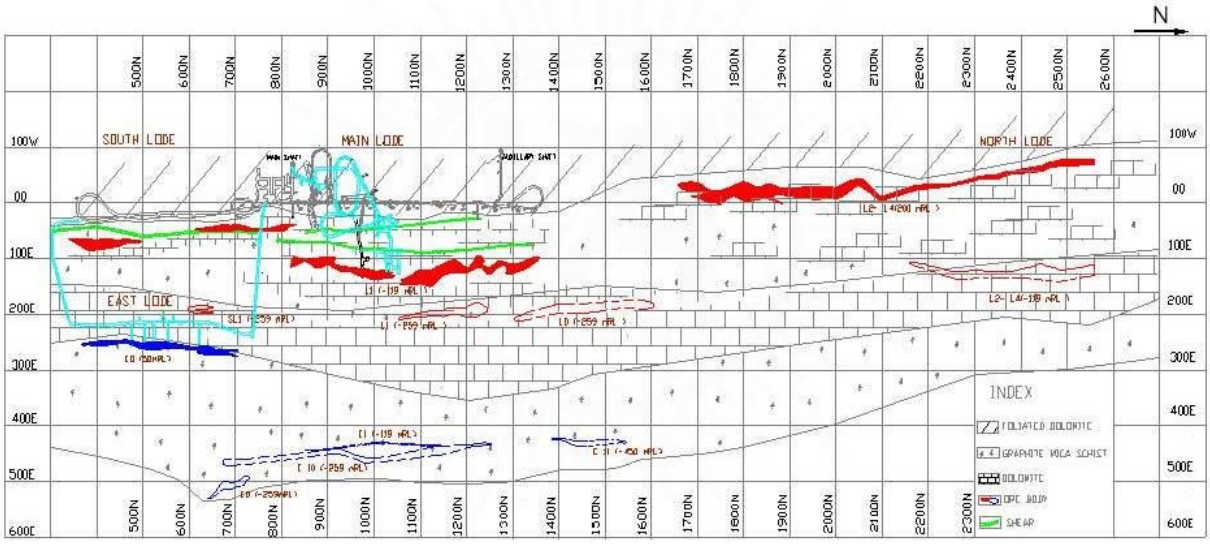

Figure 2.6: Disposition of various lenses

Litho-units

The mine area is constituted mainly by a sequence of meta-sedimentary sequence consisting of Quartz Mica Schist, Calcareous Biotite Schist and Graphite Mica Schist (from footwall to hanging wall). Calc-Silicate bearing Dolomite occurs within the Graphite Mica Schist horizon towards its contact with the Calcareous Biotite Schist. The formations, in general

have N-S strike with moderate to steep easterly dip. Cross-beds and laminations are observed in mineralized Schist and Dolomite bands. The area between South and North Lode (part of Main Lode) is traversed by 2-10m wide meta-basic dykes.

Structural Features

Four sets of joints have developed due to deformation. Shears are represented by narrow zones of crushing, brecciation and gouging, mostly 0.1-2.0m wide. These are highly persistent along strike and dip and occur at the contacts and within the ore bodies. Faults are of reverse type with low south-easterly dipping planes striking N40°-60°E.

Exploration:

Surface Exploration

Pre-1980 historical surface exploration data comprises some 31,146 m of drilling information. The majority of drilling was focused towards underground drilling to target the Main Lode and the East Lode, to provide better resolution for mine-planning. The surface exploration has been undertaken using conventional diamond drilling methodologies.

During FY2016-17, a total 10228 m of drilling was completed in 12 Boreholes. Surface exploration drilling was primarily focused on delineating extensions of the ore bodies both along-strike and down-dip. Main focus of the exploration was on adding Inferred Mineral Resource in the South Lode, Main Lode and in E10 lens.

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.

Underground Exploration

Contemporary to underground development, sub-surface exploration is being done by diamond drilling for precise delineation of ore body and to upgrade resources into reserves. Closed space drilling on 25X25m. grid pattern in main and north lode and 30X30m. grid pattern in east and south lode is being carried out at different levels. Geological mapping is

also a part of underground exploration that's used to define the ore body geometry precisely and to design stope and extraction pattern in various lodes. Based on underground exploration all the litho-contacts and geological disturbances are also updated on geological plans and sections. Over the next five years around 40000-50000m of underground diamond drilling has been planned to upgrade resources into reserves.

2.8 RESERVES & RESOURCE AS PER UNFC CLASSIFICATION

During the period (2015-16 to 2016-17) extensive surface exploration within the leasehold at 100m and/or more close intervals and close spaced definition drilling from underground at 25mX25m was carried out. Resource calculated from surface exploration from 100m and closer Interval kept in Inferred/Indicated category. Reserves obtained from underground DD (25 x 25m) kept in Proved and probable category. Crown/sill pillars kept under measured category. The exploration from surface established further continuity of Main Lode below 0mRL and North Lode in strike extension up to 2500N & below 0mRL up to a depth of (-) 400mRL. There has been substantial increase in reserves and resources and as on 01.06.2017 the reserves & resources stand at 59.24 million tons.The status of category wise and level wise ore reserves and resource is given table below

Table 2.5: Status of Reserves & Resources as on 01.04.2017

Category	UNFC	Million Tonnes	Zn%	Pb%	Ag g/t
A. Mineral Reserve					
1. Proved Mineral Reserve	111	5.85	6.13	1.58	64
2. Probable Mineral Reserve	121 and 122	3.14	6.61	1.48	61
Total Reserve		8.99	6.3	1.55	63
B. Mineral Resources					
1. Feasibility Mineral Resource	211	1.8	7.94	1.27	84
2. Prefeasibility Mineral Resource	221 and 222	5.23	6.34	2.88	77

3. Measured Mineral Resource	331	5.91	7.56	2.04	81
4. Indicated Mineral Resource	332	9.57	6.47	2.51	57
5. Inferred Mineral Resource	333	27.74	6.55	1.84	87
6.Reconnaissance Mineral Resource	334	NIL	NIL	NIL	NIL
Total Resources		50.25	5.55	1.93	79
Total R & R (A + B)		**59.24**	**6.62**	**2**	**77**

As per latest estimation in-situ ore Reserves & Resources computed on 01-04-2018 stands at 60.05 million tons with 1.91% Pb& 6.38% Zn.

Table 2.5a: Status of Reserves & Resources as on 01-04-2018 after addition/fresh estimation

Category	Mt	%Pb	%Zn
A. Mineral Reserve			
1. Proved Mineral Reserve (111)	3.67	1.6	5.87
2. Probable Mineral Reserve (121 & 122)	7.89	1.7	4.29
B. Remaining Resources			
1. Feasibility Mineral Resource (211)	1.2	1.3	7.94
2. Prefeasibility Mineral Resource (221 & 222)	4.11	2.9	6.34
3. Measured Mineral Resource (331)	4.79	2	7.4
4. Indicated Mineral Resource (332)	10.60	2.3	6.5
5. Inferred Mineral Resource (333)	27.8	1.8	6.55
6.Reconnaissance Mineral Resource (334)	NIL	NIL	NIL
TOTAL (R&R)	**60.05**	**6.38**	**1.91**

2.9 MINING

2.9.1 Open Cast Mining

No open cast operation / mining are being done as the ore body is deep seated below the surface cover.

2.9.2 Underground Mining

2.9.2.1Mode of entry

The general surface RL of RDM is around 500mRL. The existing working depth of working is varying from 300m in north lode to 620m in main lode. The mine can be approached by 3 accesses from surface shown as under with details:

- Main Shaft (Surface to -92mRL)
    - Total Depth : 611m (501 to -110mRL)
    - Working Depth : 593m (501 to -92mRL)
    - Purpose & Capacity : Man winding (40 persons) & Ore hoisting (0.9mtpa)
- Auxiliary Shaft (Surface to 0mRL)
    - Total Depth : 509mRL (501 to -8mRL)
    - Working Depth : 501m (501 to 0mRL)
    - Purpose & Capacity : Man winding (14 persons)
- Ramp
    - Total Depth : 658m (501 to -157mRL)
    - Purpose & Capacity : Ore hauling (1.0mtpa) & transportation

2.9.2.2 Description of Mining Methods

(A) Blast Hole Stoping Method (BHS)

This mining method is being applied in the mining blocks where the ore body width is narrow and varying from 8 to 15m. The entire strike length is divided into 20m long panels, designated as primary and pillar stopes. The stopes are mined using DTH (115mm) holes for down drilling from the upper drill level. Blasting is done against a slot raise. The stopes are

back filled with cement fill after removalofore.

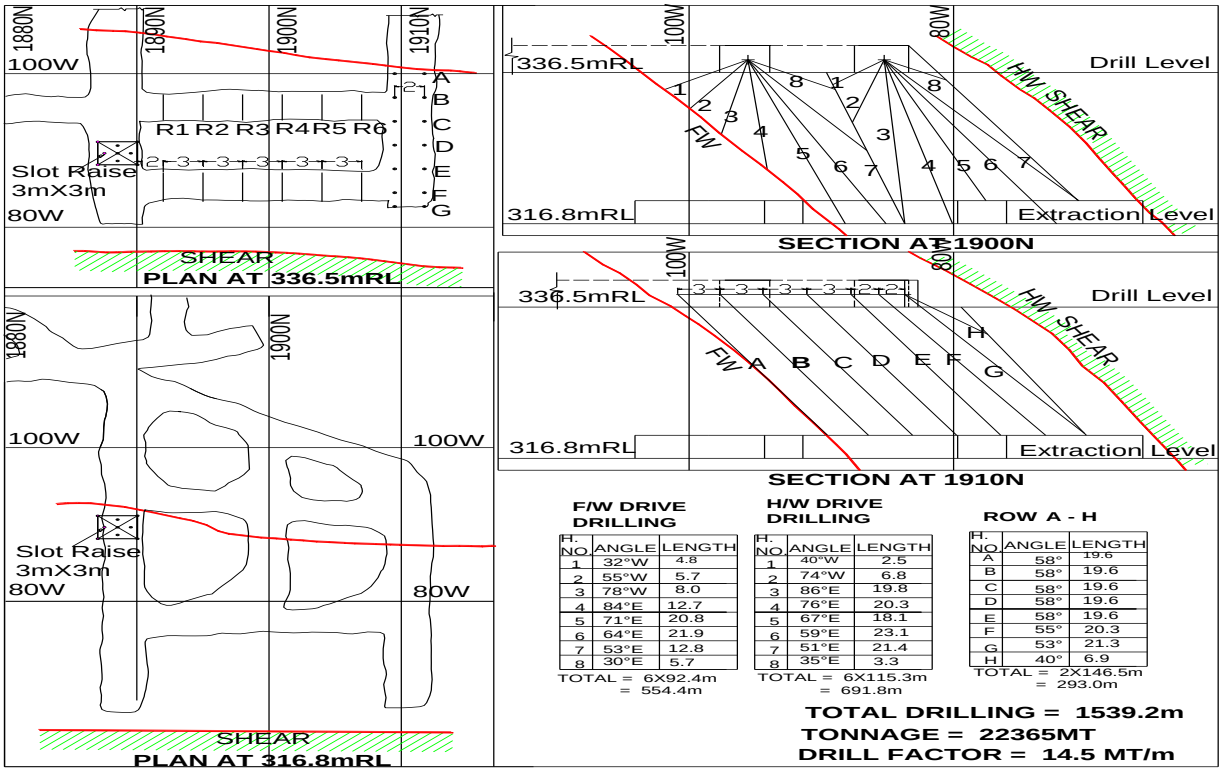

Figure 2.7: Blast Hole Stoping Method

(B) Vertical Retreat Mining (VRM)

Vertical Retreat Mining (VRM) was adopted at RajpuraDariba Mine in consultation with M/s INCO TECH of Canada to increase the safety of man & machineries, high productivity & higher ore recovery compared to Cut & Fill stoping method. This method was first adopted for the stoping of mining block of S-Lode between 212 mRL to 285 mRL. After successful implementation and results this method is being adopted in the current production block of South between 11mRL to 195mRL.The VRM method is being adopted in the ore blocks where the ore body width is more than 25m.

VRMstopes are mined using downward large dia hole (165mm) by ITH drills from upper levels. These holes are charged & blasted using spherical charge technology where L/D ratio

greater than 6 (where L is charging length of the hole & D is the diameter of the hole). A slice of 2.5 to 3.0m blasted at a time, thus retreating in upward direction and mucking is done by electric loader at extraction level. The empty stopes are filled by classified mill tailing &cement.

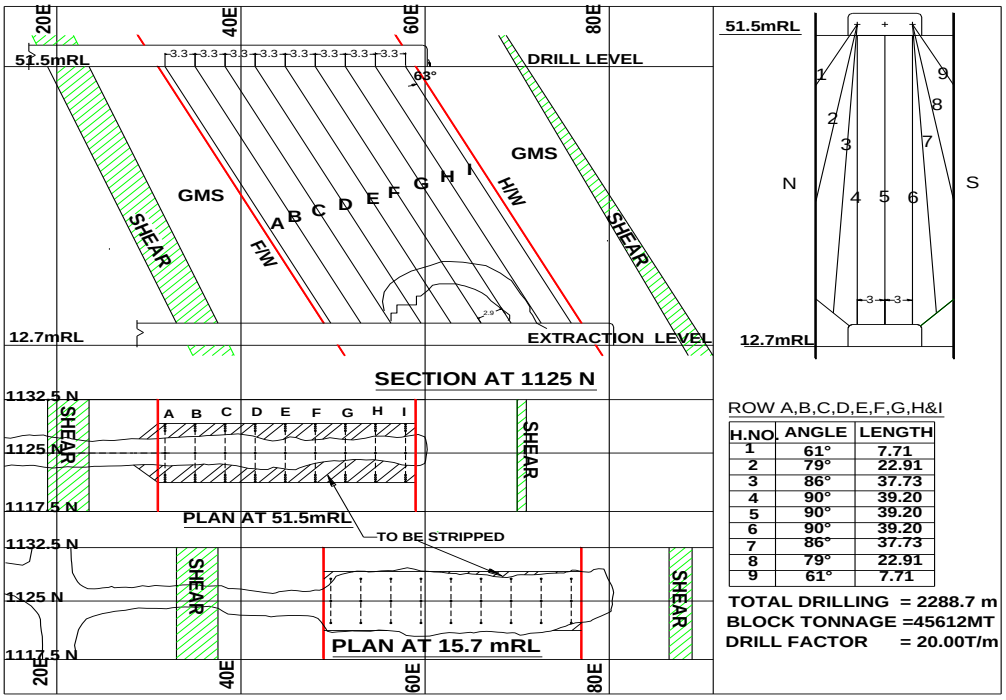

Figure 2.8: Vertical Crater Retreat method (VRM)

2.9.3Development and stopping method

Production blocks are accessed through ramp and also connected with second outlet in terms of shaft, manpass, and ramp. General cross section of drives is proposed from 3m (W) x 3m (H) to 5m (W) x 4m (H) for the various purposes depending upon men/ machine movement.

Underground Layout

Planning Concept

Ore body of Rajpura Dariba deposit is divided into four lodes i.e. Main, South, North & East Lode. East lode is parallel to south lode in upper extremity but in lower depth, it is parallel to Main & North lode. Each lode is further sub-divided into number of blocks with intervening

crown pillar and then further into number of stopes. It is proposed to mine the crown pillars, after complete mining of adjacent block, keeping in view of mineral conservation and overall stope stability & wherever possible optimization of crown pillars will be done to minimize ore blockage in crown pillar.

It is proposed to develop all the blocks with access through ramp and second outlet (man pass/ ramp/ shaft etc.). Detailed ventilation circuit is planned for all the blocks. Stoping operations is carried out in primary-secondary sequence to maximize ore recovery commencing from bottom portion of block progressing towards overlying crown pillar. Block wise detailing is carried out for all the lodes and shown as under:

South Lode

The mine was commenced with the stoping and development operation in south lode with cut and fill mining upto 300mRL (S1-S2 Block). However, looking into safety and productivity, mining method was migrated to VRM (Vertical Retreat Method) in blocks below 300mRL. South lode is divided into number of blocks starting from S1 to S9. S1 to S3 blocks are completely mined out and filled. Currently the operation is being carried out in S4 block (195-11mRL). Within 5 years, it is proposed to commence the ore production from S5 block.

Main Lode

Main lode is broadly divided into blocks from M1 to M9. Stoping operation in M1 to M3 block is completed and all the stopes are backfilled. Currently stoping is under operation in M4 block. Within 5 years it is proposed to commence the production from M5 & M6 block. Existing blast hole mining method is proposed in above blocks. Sublevel interval & strike length is kept from 20-35m respectively.

North Lode

North lode is divided into number of blocks from N0 to N6 (in addition to NU, NA, NB, NL1). Currently mining operation is being carried out in N1, N2 & NL1 block. However, it is proposed to commence the ore production from N0 and NU. Within 5 years it is proposed to

commence the production from NA & NB block. Ground conditions in north lode are challenging in terms of shears in hang wall, cavity in Ore and strata is water-charged in footwall. In order to mine the orebody successfully, it is imperative to dewater the block in advance from lower levels. Therefore, for the purpose, levels in lower blocks are kept advance of upper blocks where stoping is to be carried out and water is discharged through series of boreholes to extract the water from working.

East Lode

East lode is divided into number of blocks from E1 to E8 (in addition to EU, EA, EB, EC). Mining in east lode was started from E2 (50 to 100mRL) block and completed recently. Currently mining operation is being carried out in E1, EA & EB. Within 5 years it is proposed to commence the production from EB, EC & EU block. There is present old working in east lode from surface to around 205mRL level. Detailed exploration & GPR study has been carried out to find out extents of old working. EU block is planned to be mined be keeping in view of distance of 60m from any water logged area.

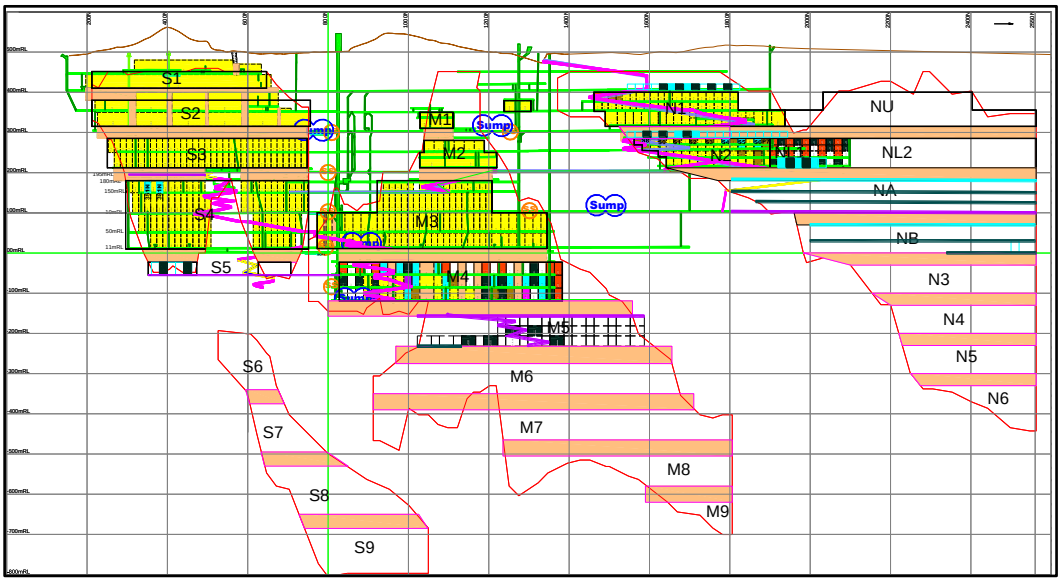

Figure 2.9: LVS of Main Lens

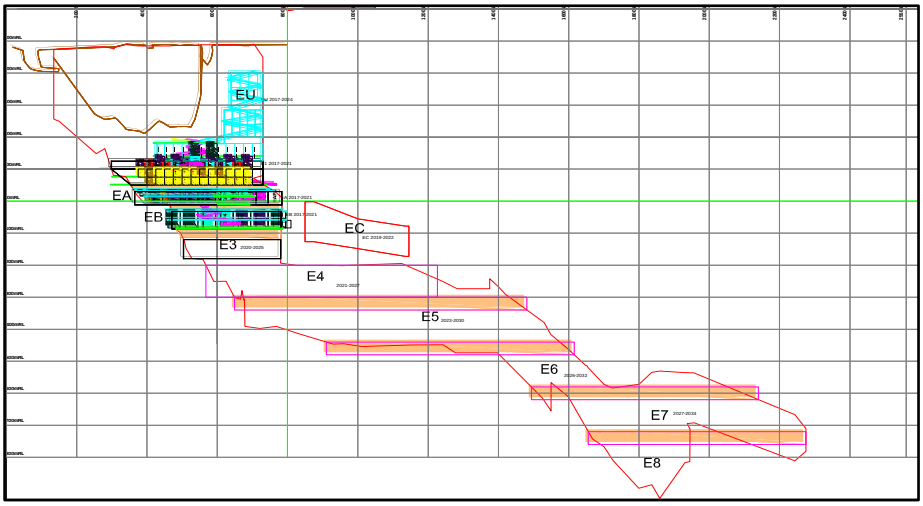

Figure 2.10: LVS of East Lens

Year wise level wise extent of production & Mine development

Within three years, ore production and mine development activities will be carried out in following blocks of different lode shown as under:

South Lode: Currently ore production is going on in S4 block (between 180-150mRL level) and it is proposed to commence the ore production between 195-180mRL level. Method of mining is VRM and Blast-hole stoping method with backfilling. Mining is carried out in primary secondary sequence. Sublevel interval in this block is varying from 15 to 50m. Strike length of stopes in VRM method is kept at 15m and in BHS it is kept at 20-35m.

Main Lode: Ore production is going on in M4 block (between -23mRL to -119mRL). M4 block is well connected with ramp and shaft access. Additional block M5 is currently under development and it is proposed to commence ore production from 2018-19. Method of mining being practiced is blast-hole stoping method with backfilling. Mining is carried out in primary

secondary sequence. Sublevel interval in this block is varying from 25 to 32m. Strike length of stopes in kept between 20 to 35m.

North Lode: Ore production in north lode is going on in N2 block (between 300mRL to 212mRL, 1525 to 1900N). North lode is well connected with main lode accesses, auxiliary shaft and surface ramp. NL1 block is the extension of N2 block beyond 1900N and it is proposed to commence production from the same block. In addition to this production is planned from N0 block (between 406-430mRL), NU block (315 to 406mRL), NA block (180-100mRL) and NB block (70 to 0mRL). Development is under progress for all the proposed block from where ore production is planned. Method of mining being practiced is blast-hole stoping method with backfilling. Mining is carried out in primary secondary sequence. Sublevel interval in this block is varying from 16m to 25m. Strike length of stopes in kept at 20m. In north lode advance dewatering is under progress at 100mRL for NA block.

East Lode: Ore production in east lode is going on in E1 block (between 125mRL to 100mRL) and EA block (30 to -12mRL). East lode is well connected with main lode accesses and a dedicated ramp for the purpose. EU block (400-125) is the upper extension of E1 block and it is proposed to commence production from the same block. In addition to this production is planned from EB block (-32 to -87mRL) and EC (0 to -180mRL). Development is under progress for all the proposed block from where ore production is planned. Method of mining being practiced is blastholestoping method with backfilling. Mining is carried out in primary secondary sequence. Sublevel interval in this block is varying from 17m to 35m. Strike length of stopes in kept at 25-35m.

However, for proposed blocks, based on detailed geotechnical numerical modelling will be carried out for global stability and the level intervals and crown pillar may undergo change. Mining method may be optimized arriving with the numerical modelling study keeping in view of mineral conservation and overall mine stability.

The proposed production for next 3 years in different lodes has been shown in table 25. Details of year on year development schedule have been shown in table 2.6.

Table 1: Proposed Ore Production (MT) in next three years(in MT)

Ore Production Plan from 2017-18 to 2019-20														
Lode	**BLOCK**	**Northing**	**Level**	**Stopes**	**Opening Balance**	**%Pb**	**%Zn**	**TMC**	**Ag-ppm**	**2017-18**	**2018-19**	**2019-20**	**Production**	**Closing Balance**
East	E1	275N to 750N	100mRL to 125mRL	P1 to P8 S8 to S15	390000	1.0	4.4	5.4	82	70000	100000	125000	295000	95000
	EA	350N to 800N	-12mRL to 30mRL	EAP1 to EAP7 EAS1 to EAS7	230000	0.7	3.8	4.5	63	50000	70000	75000	195000	35000
	EB	450N to 800N	-87mRL to -32mRL	EBP1 to EBP7 EBS1 to EBS7	370000	0.9	4.4	5.3	59	15000	100000	150000	265000	105000
	EU	430N to 730N	125mRL to 400mRL	P1 to P10, S1 to S10	1040000	0.9	3.6	4.5	51	5000	50000	80000	135000	905000
	EC	825N to 1475N	-180mRL to 0mRL	P1 to P22, S1 to S22	250000	0.7	3.6	4.2	61			70000	70000	180000
Main	M4	800N to 1400N	-119mRL to -23mRL	P1 to P20, S1 to S20	1640000	1.6	6.0	7.6	52	400000	400000	400000	1200000	440000
	M5	1000N to 1600N	-232mRL to -157mRL	P1 to P20, S1 to S20	1510000	1.4	6.3	7.7	59		50000	150000	200000	1310000
North	N2	1525N to 1900N	212mRL to 300mRL	P1 to P9, S1 to S8	260000	1.4	5.5	7.0	30	150000	30000	30000	210000	50000
	NL1	1900N to 2600N	212mRL to 285mRL	P10 to P36, S9 to S36	1270000	2.2	3.9	6.1	30	70000	150000	150000	370000	900000
	N0	1370N to 1830N	406mRL to 430mRL	P1 to P24, S1 to S24	90000	2.9	7.9	10.8	63	25000	25000	25000	75000	15000
	NU	1800N to 2600N	315mRL to 406mRL	P1 to P34, S1 to S34	610000	6.1	4.1	7.3	34	5000	5000	5000	15000	595000
	NA	1750N to 2600N	100mRL to 180mRL	P1 to P42, S1 to S42	1020000	2.1	3.8	5.9	32		40000	50000	90000	930000
	NB	1950N to 2600N	0mRL to 70mRL	P1 to P32, S1 to S32	950000	2.8	3.0	5.8	36			40000	40000	910000
South	S4	275N to 775N	11mRL to 195mRL	P1 to P6 S1 to S6	240000	1.3	5.3	6.6	50	150000	75000	15000	240000	0
	S5	325N to 750N	-55mRL to -23mRL	P1 to P8, S1 to S8	60000	1.3	4.6	5.9	44		25000	35000	60000	0
Dev						1.0	4.5	5.5	50	60000	80000	100000	240000	
Ore Production (in Tons)										**1000000**	**1200000**	**1500000**	**3700000**	**6470000**
%Pb										1.5	1.5	1.4		
%Zn										5.4	5.0	4.9		
Ag (g/t)										50	52	53		

Table 2: Development Schedule of next 3 years

Lode	Block	Type	Level	Northing	Dev	2017-18	2018-19	2019-20
East	E1	Lateral-Ore	100mRL to 125mRL	275N to 750N	200	200		
		Lateral-Waste			600	200	200	200
	E3	Lateral-Ore	-180mRL to -120mRL	475N to 800N	1350			100
		Lateral-Waste			4000			1000
		Ramp			650		650	
		Vertical			350			100
	E4	Lateral-Ore	-300mRL to -200mRL	550N to 1250N	1000			
		Lateral-Waste			3000			650

Lode	Block	Type	Level	Northing	Dev	2017-18	2018-19	2019-20
		Ramp			700		50	650
		Vertical			400			
	EA	Lateral-Ore	-12mRL to 30mRL	350N to 800N	1000	350	350	300
		Lateral-Waste			2500	800	800	900
		Ramp			200	200		
		Vertical			100	100		
	EB	Lateral-Ore	-87mRL to -32mRL	450N to 800N	1150	350	350	450
		Lateral-Waste			4000	500	1250	1750
		Ramp			200	200		
		Vertical			250	100		
	EC	Lateral-Ore	-180mRL to 0mRL	825N to 1475N	1000			200
		Lateral-Waste			3000			300
		Ramp			1250		250	250
		Vertical			300			
	EU	Lateral-Ore	125mRL to 400mRL	430N to 730N	1500	100	100	100
		Lateral-Waste			2000	100	400	400
		Ramp			1900		250	250
		Vertical			550	100	150	100
Main	M4	Lateral-Ore	-119mRL to -23mRL	800N to 1400N	1500	500	500	500
		Lateral-Waste			2200	750	750	700
		Vertical			150	50	50	50
	M5	Lateral-Ore	-232mRL to -157mRL	1000N to 1600N	1500	100	350	350
		Lateral-Waste			2500	150	500	500
		Ramp			500	500		
		Vertical			300	25	50	50
	M6	Lateral-Ore	-350mRL to -275mRL	875N to 1700N	500			
		Lateral-Waste			1500			
		Ramp			750		200	200
		Vertical			300			
North	N0	Lateral-Ore	406mRL to 430mRL	1370N to 1830N	350	100	150	100
		Lateral-Waste			800	50	400	350
		Ramp			150	150		
		Vertical			100	25	50	25
	N2	Lateral-Ore	212mRL to 300mRL	1525N to 1900N	900	500	250	150
		Lateral-Waste			500	100	200	200
		Vertical			50	25	25	
	NA	Lateral-Ore	100mRL to 180mRL	1750N to 2600N	850		100	150
		Lateral-Waste			2500	50	250	750
		Ramp			400	400		
		Vertical			300		75	100

Lode	Block	Type	Level	Northing	Dev	2017-18	2018-19	2019-20
	NB	Lateral-Ore	0mRL to 70mRL	1950N to 2600N	900			150
		Lateral-Waste			2500			300
		Ramp			650		650	
		Vertical			300			75
	NL1	Lateral-Ore	212mRL to 300mRL	1900N to 2600N	2000	350	350	350
		Lateral-Waste			3000	500	500	500
		Vertical			450	75	100	50
	NU	Lateral-Ore	315mRL to 406mRL	1937N to 2600N	750	50	100	100
		Lateral-Waste			2000	250	350	250
		Vertical			300	50	50	50
South	S4	Lateral-Ore	11mRL to 195mRL	275N to 775N	400	400		
		Lateral-Waste			250	250		
		Ramp			100	100		
	S5	Lateral-Ore	-55mRL to -23mRL	325N to 750N	250		250	
		Lateral-Waste			500		500	
		Vertical			50		50	
	S6	Lateral-Ore	-340mRL to -190mRL	500N to 700N	800			
		Lateral-Waste			2000			
		Ramp			1050			400
		Vertical			600			50
Progress (in m)		Ramp				1550	2050	1750
		Lateral-Ore				3000	2850	3000
		Lateral-Waste				3700	6100	8750
		Vertical				550	600	650
		Linear Meters				**8250**	**11000**	**13500**
		Total				**8800**	**11600**	**14150**
Volume (in cum)		Ramp				31000	41000	35000
		Lateral-Ore				36000	34200	36000
		Lateral-Waste				44400	73200	105000
		Vertical				4950	5400	5850
		Total				**116350**	**153800**	**181850**
Waste Generation						**80350**	**119600**	**145850**

Source: Mining Plan

2.9.5 System of drilling and blasting

Drilling

For extraction of the ore in each stope drilling is carried out by ITH drill rigs equipped with booster compressor for improved drilling performance. Drilling is carried out from upper

level with downward holes. Drill holes of 115mm in diameter are drilled from drill sill at 2.5m burdens & 2.5m spacing. Slot is drilled along with a drop raise at one end of stope & retreated with rings drilled towards another end of stope. Slot is widened against drop raise. Blastholes are drilled downward depending on site suitability for slot drilling and ring drilling is carried out from each ore drives using drill machine. Appropriate skin is left to keeping in view minimizing dilution &stoping stability.

However, looking into the challenge of increasing depth and lower efficiency of compressed air, it is proposed to introduce electro hydraulic drill technology having following advantages:

- Faster drill rates
- Less reliability on compressed air
- Reduced blast vibration
- Self-propelled

Table 2.8: System of Drilling and Blasting

Drilling pattern in Ore Development	Burn Cut drill pattern
Drilling pattern in Rock Development	Burn Cut drill pattern
Drilling pattern in Stopes	Long Hole- Fan Drilling pattern
Maximum number of holes blasted in a round	Stopes - 20 holes; Mechanized Development - 45- 56 holes
Charge per round (kg)	Stopes - 600kg; Mechanized Development - 150kg (Max)
Charge per hole (kg)	Stopes- 50kg (Max); Mechanized Development - 2.5- 3kg (max)
Type of explosive	Stopes- Emulsion Explosive (125/ 83mm dia.); Mechanized Development: Cartridge Emulsion explosive (25/40mm dia.)
Powder factor	Rock development: 1.0 - 1.4kg/t Ore development:1.0 - 1.4kg/t Stope- 0.4 - 0.5kg/t

Blasting

At the strike end of the stope a slot will be opened between sub levels along slot X-cut. After opening of the slot raise, slot will be widened up to full planned width after leaving the skin hangwall of each stope. Charging of the hole will be done by emulsion explosive with suitable delay sequence and maximum charge per delay. The ring drilling from drives are then retreat blasted towards the other end of strike against the free face of the widened slot. Charging process involves following steps:

Blasthole plugging

Each blast hole is blocked at bottom by lowering a wooden plug through a carry-strap. Once lowered to correct depth, carry-strap is tied at suitable point near hole collar. Sand bags followed by drill cuttings (0.7m to 1.0m height) are placed over the plug for effective plugging.

Placing of Charge

Explosive being used in process of charging is non-cap sensitive emulsion explosive (Trade Name: PG2/ PG3; Make-Orica; Dia: 83/ 125mm; VOD: 4000±500m/s; Hole dia: 115mm/ 165mm). To initiate non-cap sensitive explosive, high energy is required which is generated by a booster (high strength explosive with a VOD of around 7000m/s, Weight: 500g) initiated by a detonator. At RDM Non electric detonator (Nonel) is used in stope blasting. However, based on requirement, electronic detonators are also being used.

Post plugging, each blast hole is charged with non-cap sensitive explosive cartridges, detonator and primer cartridge (prepared by attaching booster along with detonator). First of all, two cartridges of explosives are lowered with the carry-straps and then primer is placed over it. Remaining explosives cartridges are placed over the primer. The lead of nonel from each blast hole is then attached to the detonating cord at charging site. The detonating cord is initiated with an electric detonator.

Stemming the hole

Once required quantity of explosive is placed in blast hole, stemming material is placed above the charge. The stemming material consists of 1.0m to 2.0m of drill cuttings/ sand/ aggregates.

Delay Sequence

In order to improve fragmentation, minimizing blast vibrations and controlling over break, delay sequence is followed.

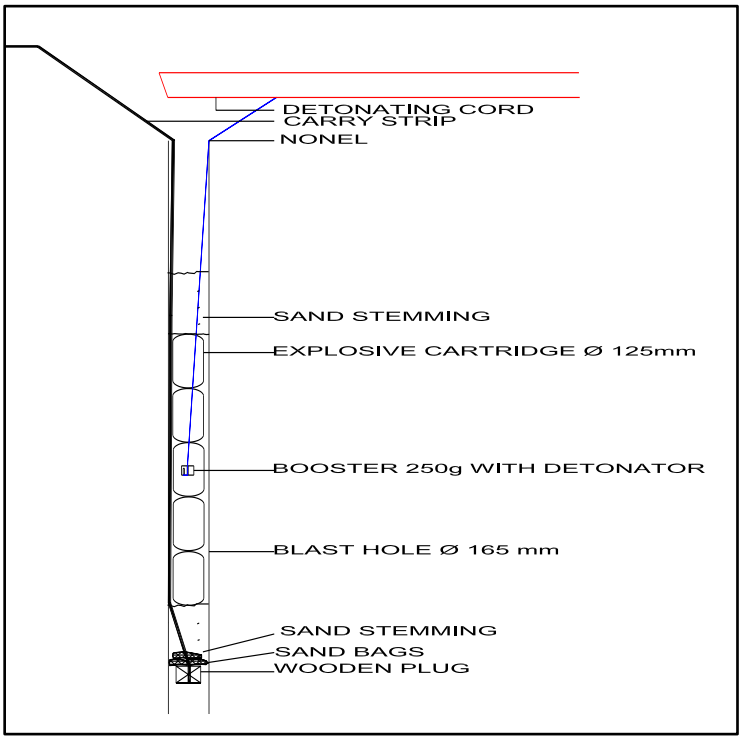

Figure 2.11: Schematic Charging Layout

2.9.6 Method and sequence of stoping

Development

Stope is developed in the form of slot crosscut, drill drive and approach cross cut. Slot crosscut is placed across the widest portion of orebody in stope. A drop raise is opened in the slot and then widened all across the orebody width. Rings drilled in drives and approach crosscut is then fired against free face created by slot opening.

Sequence of stoping

Stoping is followed in primary-secondary sequence to maximize ore recovery commencing from bottom portion of block progressing towards overlying crown pillar. Firstly, primary stopes are mined out and then backfilled with cemented tails. Secondary stopes are mined after complete backfilling of adjacent primary stopes and sufficient time for curing is given in primary stopes.

Drilling & Blasting: (as discussed above)

Mucking & Hauling

After blasting is completed the stope is emptied of broken ore using 2.0m³ to 3.5m³ capacities Diesel LHD. Remote control operation of the LHD is used to recover ore from the hanging wall side of the stope.

The mucking is done by Diesel LHD and hauling by LPDT. Ore is loaded into LPDT at Loading Station and LPDT hauls to surface till at Ore Dump Yard.

In lower sections other than north lode, it is proposed to dump the ore to the orepass from where the ore is fed to underground primary crusher and transported to beneficiation plan through belt conveyor via skip hoisting.

Backfilling

After removal of broken ore, empty stope is hydraulically back filled to provide support to the surrounding walls of stoped out area. The backfill is held in place during pouring by

barricades located in the drawl crosscuts and adequate drainage is ensured along with formation of the cemented plug.

The back filling operation consists of following activities as under:

- Construction of Wooden Barricade
- Installation of drainage & decantation system
- Backfill Reticulation
- Formation of cement plug against the barricade
- Bulk filling
- Requirement of back fill cohesion
- Additional measures are taken while back filling
- Fill Testing

Table 2.8: Stope Parameters

1	**Number of working stopes**	**North Lode**	**East Lode**	**South Lode**	**Main Lode**
2	**Strike length of the Stope***	20m	25m	15-25m	20m
3	**Width of Stope**	Width of the ore Body	Width of the ore Body	Width of the ore Body	Width of the ore Body
3	**Level Interval of Stope***	15-18.	25m	50m	33m
4	**Thickness of crown pillar***	32m	37m	32m	38m (max)
5	**Thickness of Sill Pillar***	-			
6	**Thickness of Rib pillar***	5m (If necessary)			
8	**Size/ shape of Man way**	2mx2m			
9	**Size/ shape of ore pass**	3mx3m			
10	**Method of stowing/ back filling**	Hydraulic cemented Back Filling (tailing, cement & water)			

11	**Method of drainage of stowed water**	Provision of UG sumps at 300, 100 & 0mRL

* All the designed parameters are considered after Geo –Technical study inhouse & conducted by CIMFR/ Scientific agencies/ consultancies.

2.9.7 Filling System

The voids, thus created in the stope, are back filled to provide support to the surrounding wall. For this, barricades are constructed at the entrance of the x-cuts at sill level and intermediate drill level. A decant drainage system is established behind the barricade within the empty block by hanging flexible, perforated PVC pipes from upper levels. To prevent collapse of the filled stope walls, adding cement increases the cohesion of the back fill. An initial pour of 1:10 cement to fill (by weight), stabilizes the barricade & act as a fill plug. Subsequent pours of back fill are made, till the empty void is completely filled. Filling will be started from the bottom level above sill pillar and subsequently the above stope is extracted and filled till the crown pillar.

2.9.8 System of underground transportation

The proposed type and number of machinery for expansion project. All equipment considered with basic safety features like Auto fire suppression system, fall over protection system, rear view camera, spring applied hydraulically release braking system etc.

a. From face to pit bottom or loading point - LHDs are available at draw points and it will transfer the ore to main haulage level through ore passes.
b. From pit bottom to surface - Ore is being hoisted to surface through skips (6t cap) and LPDT of 20 & 30T capacity through Surface decline from North lode.
c. From surface to end use plant - Through conveyors and Dump trucks.
d. Safety features provided on conveyor/ haulage track/ roadway - Pull cord system and alarms in conveyors, warning lights and sign boards in haulage tracks & Roadways

2.9.9 System of Winding/ Hoisting

In terms of infrastructure, existing main shaft will be dedicated for hoisting system and shall be uplifted to 1.5 Mtpa ore production capacity, remaining 0.5 Mtpa ore production will be done from ramp connected on surface. In Main Shaft it is proposed to replace the cage by skips. The Auxiliary Shaft will be dedicated for man winding and it is also proposed to enhance its man winding capacity. Transportation of men, material, machineries and services shall be done through Auxiliary Shaft and Surface Ramp.

a)Hoisting System: It is proposed to continue the existing system of hauling the muck from stope to orepass at 11mRL. From ore pass, ROM is fed to underground crusher from where it is transported from underground to surface via skip loading station. At surface conveyor belt system is available to transport the ore the beneficiation plant for onwards processing. However, it is proposed to increase the hoisting capacity from 0.9 to 1.5 Mtpa by converting Main Shaft into dedicated hoisting shaft. It is proposed to transport man & material through Auxiliary shaft and surface ramp by means of cage, LMVs & personal carrier. It is proposed increase man winding capacity auxiliary shaft. Waste is proposed to be disposed in underground voids.

b) Hauling System: It is proposed to continue the existing system of hauling the muck from stope to surface ore dump via ramp. At ore dump yard, ore is hydraulically broken with hydraulic breaker and the transported to surface crusher for further beneficiation. Ramps shall be developed further for addition of new blocks and transportation of ore, waste, material and manpower. Waste is proposed to be disposed in underground voids.

2.9.10 Subsidence Management

Sufficient intact surface cap is kept. Stable stope geometry is designed based on empirical and numerical modelling analysis. Horizontal crown and rib pillars are left at regular intervals. Stope voids are post filled with cemented classified mill-tailings. Strengthening of crown pillars by interior reinforcement using 10m long cable bolting from drill sills.

Subsidence measurements are regularly done at surface stations above stoping area and record maintained.

Table 2.9: Subsidence Management

1	Whether surface areas being monitored are marked on plan? Details of surface features in the subsidence basin	Monitoring points are marked in the surface plan
2	Whether monitoring points have been marked on plan as well as on ground? Depth of the workings from surface (m) where subsidence is being measured.	Yes, monitoring points are marked on plan and ground and all of them are surface measuring points
3	Maximum subsidence observed at monitoring points (mm)	No subsidence observed
4	At what frequency subsidence monitoring is done?	Monthly
5	Whether results of monitoring are being properly recorded?	yes, results are recorded in a bound page book
6	Angle of draw observed on dip and strike side.	No angle of draw observed
7	Whether critical, sub- critical or super- critical area extracted?	NA

Table 2.10: Location of Pillars:

PILLAR NO.	NORTHING	EASTING	RL
Bench Station (T11C)	**136.987**	**180.779**	**493.135**
P-1	320	290	482.9
P-2	320	260	482.63
P-3	320	230	483.73
P-4	350	290	482.53
P-5	350	260	482.58
P-6	350	230	484.78
P-7	380	290	482.53
P-8	380	260	482.945
P-9	380	230	483.76
P-10	410	290	483.18
P-11	410	260	483.13

P-12	410	230	482.78
Bench Station	**1383**	**-240**	**493.28**
P-1	1404	-115	494.093
P-2	1400	-81	491.368
P-3	1435	-113	494.363
P-4	1432	-81	494.383
P-5	1465	-110	494.318
P-6	1461	-79	494.363
P-7	1495	-108	494.33
P-8	1491	-76	494.593
P-9	1525	-105	494.283
P-10	1521	-74	494.155
P-11	1551	-102	494.275
P-12	1551	-70	494.25
P-13	1582	-101	494.575
P-14	1578	-72	494.589
P-15	1610	-91	494.935
P-16	1610	-66	494.56
P-17	1643	-65	494.808
P-18	1640	-63	494.045
P-19	1672	-92	494.41
P-20	1672	-61	494.508

Source: Mining Plan

2.10 CONCEPTUAL MINE PRODUCTION PLAN

It is proposed to enhance the ore production capacity of the mine from present production rate to 1.80mtpa progressively 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 further number of block spread over in all lodes. It is planned to expand the following blocks as shown as under:

Tentative ore blocks are shown as below:

a. Main Lode

- M4 (-23 to -119mRL)
- M5 (-157 to -232mRL)
- M6 to M9

b. South Lode
- S4 (195 to 180mRL)
- S6 to S9

c. East Lode
- E1 (125-100mRL)
- EU1 (400-315mRL)
- EU2 (285-200mRL)
- EU3 (175-125mRL)
- EA (30 to -12mRL)
- EB (-32 to -87mRL)
- E3 (-120 to -180mRL)
- EC (0 to -180mRL)
- E4 to E8

d. North Lode
- N2 (285-212mRL)
- NL1 (285-212, Beyond 1900N)
- NA (180-100mRL)
- NB (70 to 11mRL)
- N3 to N6

Block wise Conceptual Mining Plan with tentative ore production after 2019-20 is shown as under in table:

Table 2.12:Ore production plan from 2020-21 to 2024-25

(Production in MT)

Ore Production Plan from 2020-21 to 2024-25														
Lode	**BLOCK**	**Northing**	**Level**	**Stopes**	**Opening Balance**	**%Pb**	**%Zn**	**TMC**	**Ag-ppm**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
East	E1	275N to 750N	100mRL to 125mRL	P1 to P7 S8 to S15	95000	1.0	4.4	5.4	82	95000				
	EA	350N to 800N	-12mRL to 30mRL	EAP1 to EAP7 EAS1 to EAS7	35000	0.7	3.8	4.5	63	35000				
	EB	450N to 800N	-87mRL to -32mRL	EBP1 to EBP7 EBS1 to EBS7	105000	0.9	4.4	5.3	59	105000				
	EU	430N to 730N	125mRL to 400mRL	P1 to P10, S1 to S10	905000	0.9	3.6	4.5	51	250000	300000	300000	55000	
	E3	475N to 800N	-300mRL to -120mRL	P1 to P10, S1 to S10	670000	1.0	4.8	5.8	58	50000	150000	200000	200000	70000
	EC	825N to 1475N	-180mRL to 0mRL	P1 to P22, S1 to S22	180000	0.7	3.6	4.2	61	100000	80000			
	E4	550N to 1250N	-300mRL to -200mRL	P1 to P24, S1 to S24	1650000	1.4	5.5	6.9	80		170000	200000	400000	400000
	E5	650N to 1600N	-440mRL to -340mRL	P1 to P32, S1 to S32	2730000	1.8	6.6	8.4	93				45000	230000
Main	M4	800N to 1400N	-119mRL to -23mRL	P1 to P20, S1 to S20	440000	1.6	6.0	7.6	52	400000	40000			
	M5	1000N to 1600N	-232mRL to -157mRL	P1 to P20, S1 to S20	1310000	1.4	6.3	7.7	59	250000	400000	400000	260000	
	M6	875N to 1700N	-350mRL to -275mRL	P1 to P28, S1 to S28	1480000	1.0	5.9	6.9	54		310000	350000	400000	400000
	M7	875N to 1825N	-465mRL to -390mRL	P1 to P32, S1 to S32	1180000	0.8	5.8	6.5	47				90000	350000
North	N2	1525N to 1900N	212mRL to 300mRL	P1 to P18, S1 to S18	50000	1.4	5.5	7.0	30	50000				
	NL1	1900N to 2600N	212mRL to 285mRL	P1 to P36, S1 to S36	900000	2.2	3.9	6.1	30	150000	150000	150000	150000	150000
	N0	1370N to 1830N	406mRL to 430mRL	P1 to P24, S1 to S24	15000	2.9	7.9	10.8	63	15000				
	NU	1800N to 2600N	315mRL to 406mRL	P1 to P34, S1 to S34	595000	6.1	4.1	7.3	34	5000	20000	20000	20000	20000
	NA	1750N to 2600N	100mRL to 180mRL	P1 to P42, S1 to S42	930000	2.1	3.8	5.9	32	90000	90000	90000	90000	90000
	NB	1950N to 2600N	0mRL to 70mRL	P1 to P32, S1 to S32	910000	2.8	3.0	5.8	36	40000	90000	90000	90000	90000
South	S6	500N to 700N	-340mRL to -190mRL	P1 to P10, S1 to S10	230000	1.1	2.3	3.4	67		65000	65000	65000	35000
	S7	575N to 825N	-495mRL to -375mRL	P1 to P12, S1 to S12	340000	1.5	5.4	6.9	80					30000
Dev						1.0	4.5	5.5	50	115000	135000	135000	135000	135000
Ore Production (in Tons)										**1750000**	**2000000**	**2000000**	**2000000**	**2000000**
%Pb										1.4	1.4	1.4	1.4	1.4
%Zn										4.8	4.8	4.9	5.1	5.3
Ag (g/t)										52	54	54	57	59

Source: Mining Plan

Table 2.13: Ore production plan from 2025-26 to 2029-30

(production in MT)

Ore Production Plan from 2025-26 to 2029-30														
Lode	**BLOCK**	**Northing**	**Level**	**Stopes**	**Opening Balance**	**%Pb**	**%Zn**	**TMC**	**Ag-ppm**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**
East	E4	550N to 1250N	-300mRL to -200mRL	P1 to P24, S1 to S24	480000	1.4	5.5	6.9	80	400000	80000			
	E5	650N to 1600N	-440mRL to -340mRL	P1 to P32, S1 to S32	2455000	1.8	6.6	8.4	93	300000	400000	400000	400000	400000
	E6	1375N to 2075N	-580mRL to -480mRL	P1 to P24, S1 to S24	440000	0.7	2.9	3.6	50		220000	220000		
	E7	1575N to 2300N	-720mRL to -620mRL	P1 to P24, S1 to S24	1110000	0.7	3.2	3.9	43			80000	300000	300000
Main	M6	875N to 1700N	-350mRL to -275mRL	P1 to P28, S1 to S28	20000	1.0	5.9	6.9	54	20000				
	M7	875N to 1825N	-465mRL to -390mRL	P1 to P32, S1 to S32	740000	0.8	5.8	6.5	47	400000	340000			
	M8	1225N to 1825N	-580mRL to -505mRL	P1 to P20, S1 to S20	920000	0.6	5.8	6.5	53	330000	260000	300000	30000	
	M9	1625N to 1825N	-700mRL to -620mRL	P1 to P6, S1 to S6	200000	0.6	6.6	7.2	41			200000		
	CPM34	800N to 1375N	-23mRL to 11mRL	P1 to P20, S1 to S20	460000	1.5	5.4	6.9	41			100000	200000	60000
	CPM45	775N to 1575N	-157mRL to -119mRL	P1 to P26, S1 to S26	460000	1.5	6.1	7.6	58				235000	225000
	CPM56	950N to 1675N	-275mRL to -232mRL	P1 to P24, S1 to S24	410000	1.2	6.3	7.5	60					180000
North	NL1	1900N to 2600N	212mRL to 285mRL	P1 to P36, S1 to S36	150000	2.2	3.9	6.1	30	150000				
	NU	1937N to 2600N	315mRL to 406mRL	P1 to P34, S1 to S34	510000	6.1	4.1	7.3	34	20000	20000	20000	20000	20000
	NA	1750N to 2600N	100mRL to 180mRL	P1 to P42, S1 to S42	480000	2.1	3.8	5.9	32	90000	125000	125000	125000	15000
	NB	1950N to 2600N	0mRL to 70mRL	P1 to P32, S1 to S32	510000	2.8	3.0	5.8	36	90000	125000	125000	125000	45000
	N3	2075N to 2600N	-100mRL to -30mRL	P1 to P26, S1 to S26	1090000	3.1	4.9	8.0	43		130000	130000	130000	150000
	N4	2175N to 2600N	-200mRL to -130mRL	P1 to P22, S1 to S22	1250000	2.4	6.0	8.4	41					170000
South	S7	575N to 825N	-495mRL to -375mRL	P1 to P12, S1 to S12	310000	1.5	5.4	6.9	80	65000	100000	100000	45000	
	S8	625N to 1050N	-650mRL to -530mRL	P1 to P22, S1 to S22	400000	1.6	7.0	8.6	133		65000	65000	150000	120000
	S9	725N to 1075N	-800mRL to -685mRL	P1 to P18, S1 to S18	440000	1.6	4.9	6.5	62				105000	180000
Dev						1.0	4.5	5.5	50	135000	135000	135000	135000	135000
Ore Production (in Tons)										**2000000**	**2000000**	**2000000**	**2000000**	**2000000**
%Pb										1.4	1.5	1.4	1.7	1.7
%Zn										5.4	5.2	5.2	5.1	5.4
Ag (g/t)										60	61	59	63	63

Source: Mining Plan

Mine Ventilation

Ventilation Plan is finalized with the ventilation network modeling & simulation study. System is designed to meet both the short and long term ventilation requirement. Standards of ventilation are ensured at underground workings. Regular monitoring of Diesel Equipment Emission is ensured. Ventilation requirement is assessed using the engine power of equipment to be deployed for operation and keeping in view the standards of ventilation described as under:

- Minimum air velocity of 30m/min.
- Relative Humidity & Temperature not to exceed 33ºC DBT & 30.5ºC WBT.
- CO and NOx levels in underground atmosphere below 50 ppm and 5 ppm respectively.

Ventilation Monitoring is done by regular measurement at ventilation monitoring stations to ensure standards of ventilation. Shift Engineers & Mining Mates are equipped with CO meters & multi gas detector to measure any gas buildup in underground working. In development headings, auxiliary & booster fans ranging from 20-45cum/sec (1.5-3.0kPa) with 600/ 900/ 1000mm ducting being used for ventilation at development headings.

Currently, ventilation capacity of RD Mine is around 330cum/sec and the mine ventilated by a dedicated ventilation fans on surface with the following ventilation circuit:

- Intakes
  - Main Shaft (825N)
  - Auxiliary Shaft (1275N)
  - Surface Ramp (1275N)
- Exhaust
  - South Ventilation Raise (100 cum/s exhaust fan)
  - North Ventilation Raise-1 (1900N 70 cum/sec exhaust fan)
  - North Ventilation Raise-2 (1340N 160 cum/sec exhaust fan)

The final ventilation requirement of mine shall be around 600cum/s. Proposed ventilation circuit is shown as under:

- Intakes
  - Main Shaft (825N)
  - Auxiliary Shaft (1275N)
  - Surface Ramp (1275N)
  - North Ventilation Raise-1 (1900N)
  - Central Intake Raise (1000N)
  - South Ventilation Raise (200N)
- Exhaust
  - North Ventilation Raise-2 (1340N, 160 cum/sec fan)
  - East Ventilation Raise (450N, 160 cum/sec fan)
  - North Ventilation Raise-3 (2600N, 280cum/sec)

2.11 EXTENT OF MECHANIZATION

Looking into the production requirement, numbers of equipment are required to be added. Equipment requirement is assessed with the existing level of output and the improvement

Table shows below, the proposed type and number of machinery for expansion project. All equipment considered with basic safety features like Auto fire suppression system, fall over protection system, rear view camera, spring applied hydraulically release braking system etc. in underground HEMMs. Also mechanization is proposed in different areas of supporting & transportation. 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 2.14: List of Mining Machineries in Use

#	Equipment	Nos.			Size /Capacity
		Existing	Proposed	Total	
1	LPDT	10	16	**26**	30t/ 20t payload capacity
2	LHD	13	7	**20**	10t/ 7t loading capacity
3	Drill Jumbo	7	5	**12**	38/45mm diablasthole hole, single/ double boom

4	Production Drill	5	5	**10**	102/115/165mm dia production drill holes. ITH/ EHS
5	Scissors Lift	4	4	**8**	Platform lift upto 5-6m height
6	Personal carrier	3	4	**7**	16 Persons tranport
7	Light Motor Vehicle	2	6	**8**	For underground supervision
8	Road grader	1	1	**2**	For underground road maintenance
9	Explosive carrier	2	1	**3**	3-4t
10	Charmec	0	3	**3**	For mechanized charging of bulk emulsion explosive
11	Spraymec	0	2	**2**	For shotcreting in underground
12	Miller	0	4	**4**	For transportation of shotcrete/ concrete materials
13	Mine pumps	6	6	**12**	50-100cum/hr with different head requirements
14	Compressor	6	4	**10**	1000-2500cfm
15	Ventilation fan	2	2	**4**	90-400 cum/sec

Equipment productivity

1. LPDT: 150000t of hauling/ annum
2. LHD: 125000t of handling/ annum
3. Jumbo: 1200m of development/ annum
4. Production Drilling: 18000m/annum

In the proposed expansion, following are the major technological changes being done:

Table 2.15: major technological changes being done

S. No	Description	Benefits
1	Introduction of road grader	Road graders are being introduced to improve road conditions
2	Mechanization in diesel & explosive transportation	Mechanization is being planned in transportation of diesel dispensing & explosive transportation thereby improving safety, productivity and ergonomics.
3	Leaky feeder communication system	Communication system is being introduced for communication for any breakdown, emergency or unplanned activities in the mine
4	Top hammer drills	Top hammer drills are being introduced in underground so as to improve production drilling in lower levels of the mine and thereby reducing the

		dependency over compressed air. Improved productivities and ergonomics shall also count towards improved safety.
5	Long feed jumbos	In order to improve development rates, it is proposed to introduce long feed jumbo thereby improving advance per blast.
6	Bulk emulsion charging system	In order to improve development rates and mechanizing charging, bulk emulsion charging system shall be introduced. Charmec shall also be introduced for the same.
7	Mud pump	In order to strengthen mud handling system from existing manual to mechanized
8	Underground workshop	A world class underground workshop is to be introduced to improve the maintenance facility and thereby improving
9	Rock breaker & grizzly	In line with trackless mining, a rock breaker & grizzly are being proposed to be installed so as improve crusher performance.
10	High speed exploration rigs	In order to enhance exploration capacity, it is proposed to introduce high capacity exploratory drill rig of smaller dimension.
11	Raise boring	Raises are being developed with raise bores to fasted the raising and thereby improving the ventilation.
12	Advanced Mine Planning techniques	Technical cell is being strengthened to design in advanced sophisticated software helping in scientific mining of minerals.
13	Shotcrete	Shotcreting facility is under development so as to improve development rates in poor ground conditions.
14	Light motor vehicles for underground	For effective supervision, LMVs (Light Motor Vehicles) are proposed to be introduced.
15.	Strengthened dewatering & reticulation system	Standardization of services with detailed engineering and dedicated crews

2.12 MINE DRAINAGE

a) Minimum depth of water table = 10m.

Maximum depth of water table = 20m.

b) Indicate maximum and minimum depth of workings

The upper most level of working proposed is 430mRL and the bottom most is -157mRL. Surface RL is 500mRL, so the minimum and maximum depths of workings are 70m & 657m respectively.

c) All of the mine water of North, South, and East Lode are carried to 100mRL through drainage raises. The water is then carried to 0mRL's Main Sump area. Two Sumps namely Sump A and Sump B have been established there. Now through Pumping, the water is pumped to 300mRL (South), from there it is again pumped to the surface reservoir. Recently, a main sump is also commissioned in North lode at 100mRL which being run successfully and augmented the dewatering capacity of the mine.

Table 2.16: Details of Sump at Different Levels

S.No.	Level	Location	Capacity	Remarks
1	300MRL	720N - 760N	1622 Cu.M.	Main Sump
2	300MRL	760N - 800N	1626 Cu.M.	Main Sump
3	300MRL	1230N - 1265N	870 Cu.M.	North Sump
4	100MRL	750N - 820N	2430 Cu.M.	Main Sump
5	000MRL	750N - 820N	3270 Cu.M.	Main Sump
6	-119MRL	820N - 870N	1200Cu.M.	Main Sump
7	100MRL	1350N - 1400N	2000Cu.M	Main Sump

Source: Mining Plan

d) The drainage pattern in the lease area is dendritic and parallel, radiating in all directions. The area within leasehold does not include any major streams or river across it. The drainage is mainly sheet flow. The surface water bodies in the area are characterized by the existence of tanks. The Mata-Ji-Ka-Khera is the main tank located southwest of Rajpura Dariba Lead Zinc Mine. The main source of drainage is River Banas which is ephemeral and flow about 8.2 km NNE of the mine. Avg. rainfall in the area is about 650mm.

2.13 STACKING OF MINERAL REJECT/SUB GRADE MATERIAL AND DISPOSAL OF WASTE

a) Nature & Quantity of Top Soil: The topsoil available around the RajpuraDariba Mine is black schistose soil around hilly region and sandy soil in flat region. In most of the area it's only 10-20cm thick.

Overburden – NA, since it is an Underground Operation.

Waste - Waste rock, generated by mine development, will be partially used for filling the available mine voids, land reclamation and road construction within the acquired area and rest is being stacked at designated waste dumps in the industrial premises. Due care will be taken for stabilizing the waste dump by plantation in future. Increased waste (16-17 to 19-20) will be hoisted from main shaft (refer plate II, surface plan).

Mineral Reject - The mineralization is strata bound and confined within well-defined limits. The immediate hanging wall & footwall of mineralized zone are totally devoid of mineralization. As the total mineralized zone is stoped out as ore there is no chance of generation of sub-grade minerals.

b) The proposed dumping ground within the lease area be proved for presence or absence of mineral and be outside the UPL unless simultaneous backfilling is proposed or temporary dumping for a short period is proposed in mineralized area with technical constraints & justification: For proposed dumping groundrefer Plate V.

c) It is anticipated that within the period of modified mining plan (2017-18 to 2019-20) waste generation from development faces will be approximately 345000m^3. This waste generated will be used for filling available mine voids in underground by using HEMM.However, if required, the same shall be hoisted through shaft and will be stacked at designated waste dump.

2.14 USE OF MINERAL AND MINERAL REJECT

About 12 million tons of zinc is produced annually worldwide. Half of this amount is used for galvanizing to protect steel from corrosion. Approximately 17% goes into the production of zinc base alloys, mainly to supply the die casting industry and 17% to produce brass and bronze. Significant amounts are also utilized in zinc semi-manufactures applications including roofing, gutters and down-pipes. The remainder is consumed in chemical compounds such as zinc oxide and zinc sulfate. These first-use suppliers then convert zinc

into in a broad range of products. Main application areas include: construction, transport, consumer goods and electrical appliances and general engineering

Since the combined Lead-Zinc ore is separated & enriched into concentrate by beneficiation at RD Mine itself.ML is granted for captive purpose use only.

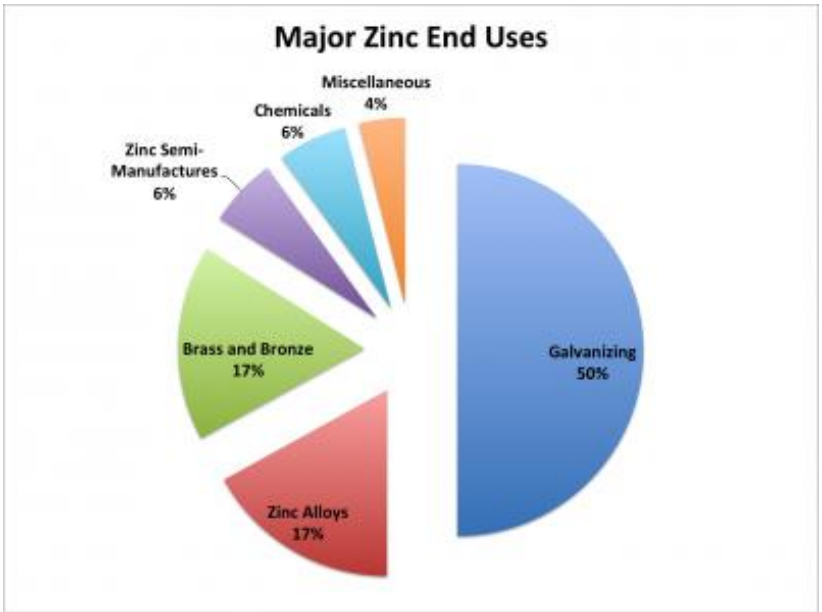

Figure 2.12: Major Zinc end uses

The respective concentrates are dispatched to company's smelters for recovery & refining of Lead, Zinc. There is no issue regarding the quality of the concentrates produced.Hindustan Zinc Limited is having its smelters based on both hydro and pyro metallurgy, where concentrates produced from HZL's other mining operations are suitably blended to get maximum metal values out of the concentrates.

Details of processes adopted to upgrade the ROM to suitthe user requirements-The coarse ore stockpile is of 2500t-3000t (depending upon fragmentation) live capacity. This ore is crushed to (-)16mm size in two stages by one secondary and two tertiary cone crushers in close circuit with a double deck vibrating screen which is then conveyed to a 10,000t live capacity fine ore stockpile. Fine ore is wet ground to 68-72%, (-)74micron size by three 900TPD (3.3m dia. by 4.5m long) and one 400TPD (2.7m by 3.6m) ball mills in close circuit

with hydro cyclone classifiers. After adding flotation chemicals in conditioners, the pulp is initially passed in a series of cells for flotation of galena. Tails from the lead circuit, after addition of further flotation chemicals are pumped through another series of cells for flotation of Sphalerite. Lead and zinc concentrates are taken to separate thickeners for settling. High-density pulp from thickeners is then sent to drum filters for dewatering and then conveyed to separate stockpiles for onward despatch.

2.15 PROCESSING OF ROM AND MINERAL REJECT

Currently, run-of-mine of RD mine is treated at existingbeneficiation plant. The concentrate is sent for metallurgical treatment at captive smelters for recovering final metal. The current beneficiation plant was commissioned in 1980s and is having lower recoveries & productivities as compared to proposed new plant. Therefore, it is proposed to derate the existing plant to 1.0 Mtpa treatment capacity. In addition to the existing plant, it is proposed to commission new beneficiation plant of 1.5Mtpa capacity with advanced technology &improved recovery.Thereby total beneficiation capacity will be 2.5 Mtpa to treat ore of Rajpura Dariba and other mines. The detailed flow sheet & process of beneficiation has been given in further paragraphs:

The Plant will comprise of following major sections—

1. Surface primary crusher
2. Coarse ore Stock Pile (COSP)
3. Crushing
4. Grinding and Classification
5. Flotation Circuit
6. Concentrate Dewatering
7. Vacuum Filtration Circuit
8. Tailings Dewatering
9. Tailings Disposal
10. Back filling system

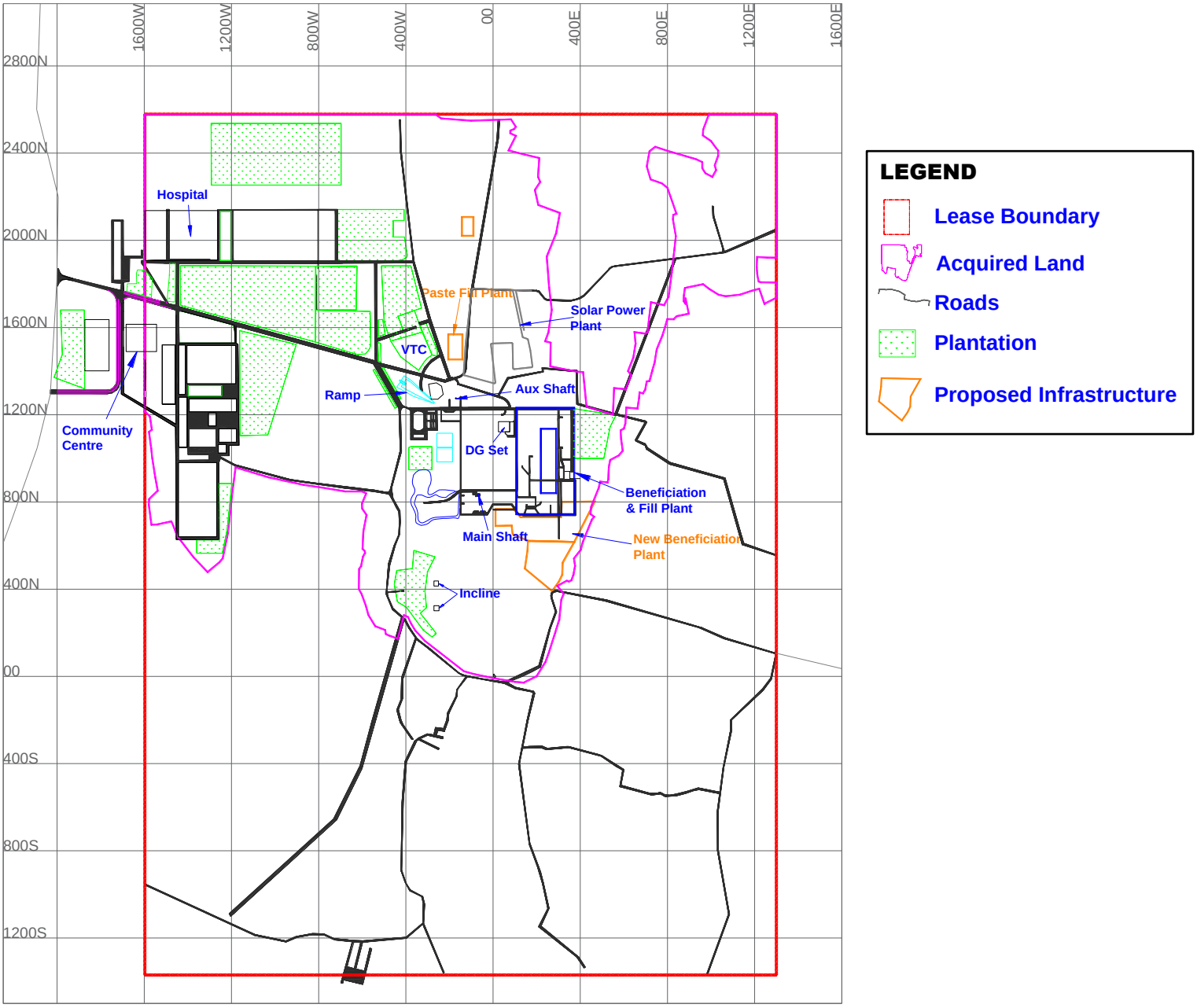

Figure 2.12:Location of existing and proposed Beneficiation plant

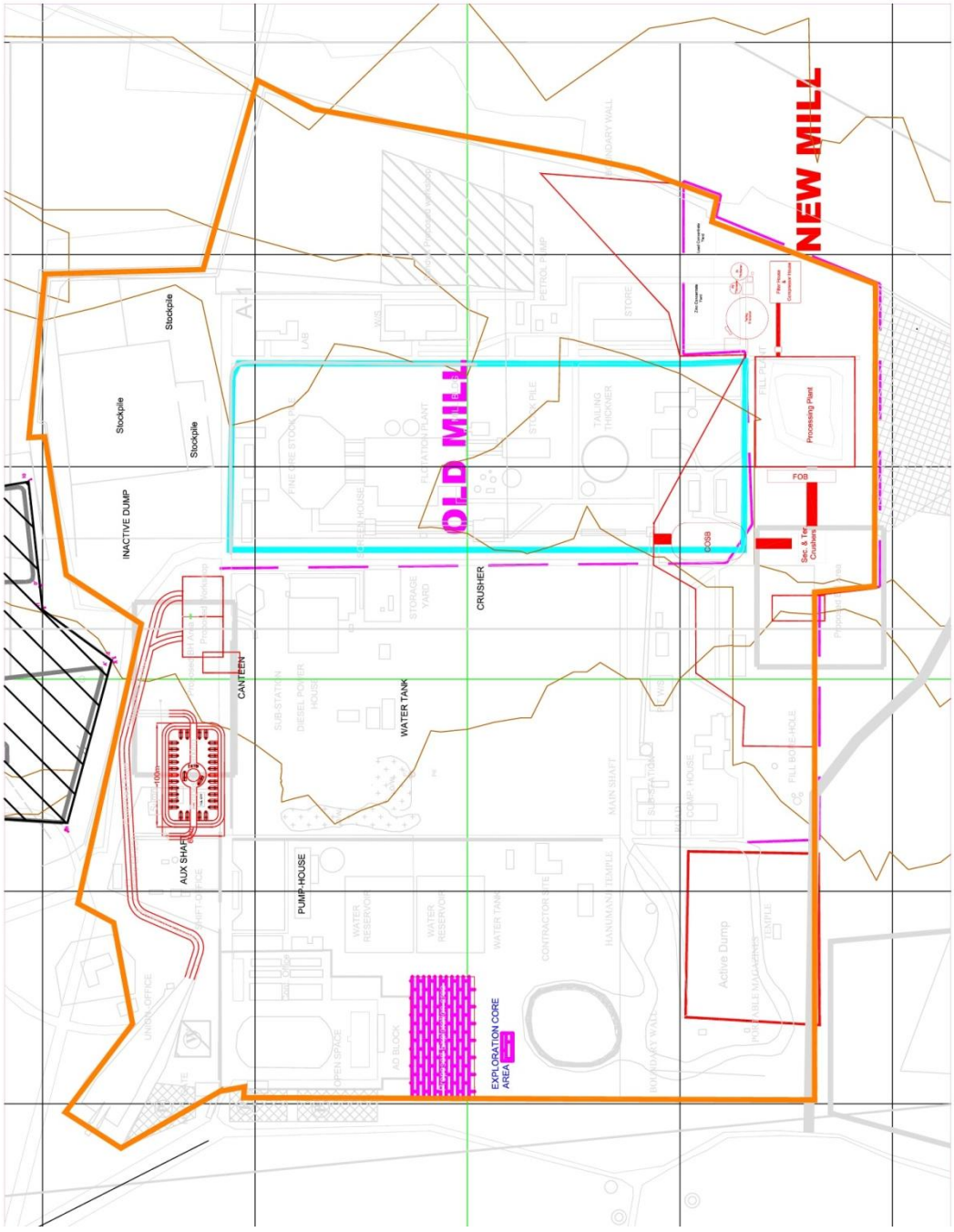

Figure 2.13:Layout of beneficiation plant b Beneficiation plant

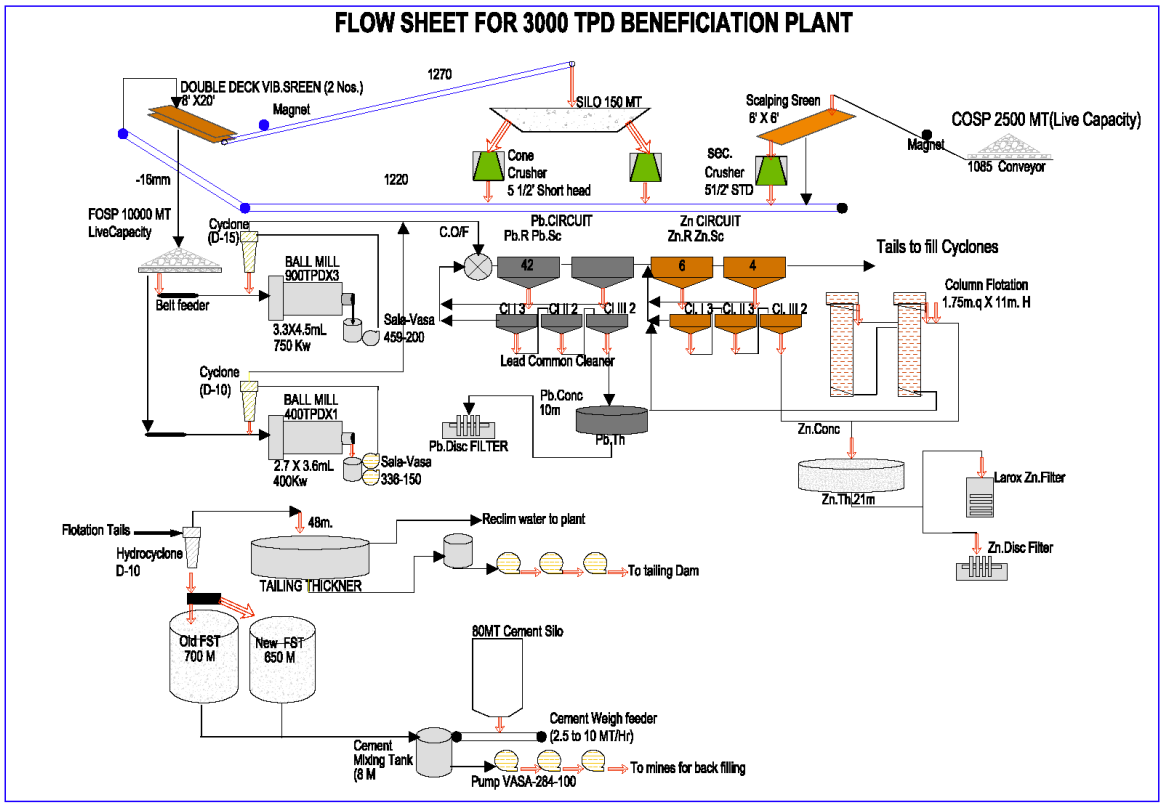

Figure 2.14:Flow sheet for 3000TPD beneficiation plant

TABLE: Mass balance for 2.5MTPA plant

Ore Treatment	2500000	MT
Lead Feed grade	1.2	%
Zinc Feed grade	5.2	%
Lead concentrate grade	50	%
Zinc Concentrate Grade	50	%
Zinc Recovery	91	%
Lead Recovery	85	%
Lead Concentrate Production	51000	MT
Zinc Concentrate production	236600	MT
Tailing production	2212400	MT

Tailing usable as Paste Filling	1375000	MT
Tailing to the tailing dam	837400	MT

The detailed Process Description is given below:

1. **Surface primary crusher**:

Ore big boulders from Ramp are being transported by dumpers & are being dumped into surface primary Jaw crusher & converts the boulders into -150mm size & being dumped to COSP through a belt conveyor.

2. **COSP (Course ore stock pile):**

Ore is being fed at COSP through surface primary crusher conveyor & conveyor from main shaft hoist. There are four reciprocating feeders (with VFD drives) below this COSP to reclaim the coarse ore and discharge the same on a conveying system (45 KW) for feeding the crushing circuit.

3. CRUSHING and conveying to FOSP:

a. From COSP ore is pushed on to the four no. Of reciprocating feeders then by conveyor is ore is fed to scalping vibrating screen of 50 mm aperture
b. Under size from 50mm scalping vibrating screen is sent to next double deck screen of lower deck 16mm and upper deck 25mm.
c. Over size of the 50 mm scalping vibrating screen is fed to secondary crusher which is gyratory cone crusher with 160 kw motor.
d. Secondary crushed ore which is most likely less than 50 mm is then fed to 16 mm screen.
e. 16 mm screen over size in conveyed in the storage silo
f. From storage silo ore is fed to either of the two tertiary crusher which is gyratory cone crusher with 184 kw motor each by conveyor belt feeder which is VFD driven.
g. Tertiary crusher product again fed to 16 mm scalping vibrating screen.
h. 16 mm screen under size conveyed to FOSP (fine ore stock pile) through conveyors and tripper system.

i. Two dust collectors are installed which are started as soon crusher plant starts and stopped after plant stoppage.

4. GRINDING & CLASSIFICATION:

The fine Ore from FOSP through 4 Reciprocating Feeders will be conveyed to four Grinding Circuit, comprising of a Ball Mill, cyclone feed sump and pumps, Conveyor BC-4 will carry the reclaimed ore to mill. The same will be weighed by a Belt load cell to control the throughput. The Cyclone feed pumps, attached to Mill Discharge sump, will feed the slurry to PRE GRAPHITE CELL. The overflow from same will report to Lead & Zinc circuit

5. FLOTATION CIRCUIT:

- The lead & Zinc flotation stream shall comprise of conditioning, roughing, scavenging and 3-stages of cleaning.
- Reagent Addition: -
    a. Sodium iso Propyl Xanthate(Collector)
    b. Methyl iso-butyl Carbinol (Frother)
    c. Sodium Cyanide & Zinc Sulphate (Pyrite & Zinc sulphide Depressant)
    d. Copper Sulphate(Activator for zinc)
- For lead and Zinc Rougher and Scavenger we are using 6.6 M3 flotation machine and for cleaner 2.7m3 flotation machine. Flotation process is monitored by froth camera installed over flotation machine based on the output from froth camera parameters (air, level reagent addition) is controlled by ISA (In stream analyzer) system installed.
    a. Feed to Flotation (Lead Conditioning)
    b. Reagent Addition
    c. Lead Flotation
    d. Zinc Conditioning (Reagent Addition)

e. Zinc Flotation

f. Transfer to thickener

6. CONCENTRATE DEWATERING:

- The lead concentrate from Lead Flotation circuit shall be pumped to Lead Concentrate Thickener (10m ø). The filtrate from Lead Filtration Plant shall also report to the same. Adequate flocculent dozing system shall be installed along with the thickener.
- The thickener overflow will gravitate to Lead Circuit water tank. Lead thickener underflow shall be pumped to Lead vacuum drum filter. The same can also be recirculate back to thickener in case of inadequate density in underflow slurry.
- The zinc concentrate from Zinc Flotation circuit shall be pumped to Zinc Concentrate Thickener (21 m ø). The filtrate from Zinc Filtration Plant shall also report to the same. Adequate flocculent dozing system shall be installed along with the thickener.
- The thickener overflow will gravitate to Zinc Circuit water tank. Zinc thickener underflow shall be pumped to vacuum drum filter. The same can also be recirculated back to thickener in case of inadequate density in underflow slurry.
- The Bulk concentrate from Bulk Flotation circuit shall be pumped to Bulk Concentrate High Rate Thickener. The filtrate from Lead Filtration Plant shall also report to the same. Adequate flocculent dozing system shall be installed along with the thickener.
- All the thickeners will be fitted with following instruments:
  1. Torque Transducer: For measuring torque imparted on rake arms
  2. Bed level detector: it measures the interface of solid & liquid. The interface level sensing is used to control the speed of flocculent dosing pump.
- Generally, the thickener underflow pumps (VFD driven) are run in closed loop of density controller with a provision of overriding by bed mass when the latter goes very high.
- Each of Lead & Zinc thickeners will have catch pit for storage of concentrate, in the event of any breakdown of downstream filter operation and/or Thickener.

- There will be Spillage Pumps in Pb& Zn thickener area for spillage collection. Except spillage pumps, all pumps will be in 1 operating and 1 standby mode. Pb& Zn thickener underflow Pump shall have VFD control.

7. VACUUM DRUM FILTRATION:

- Concentrate will be pumped from thickeners to respective Vacuum Drum Filters. There will be two Zn,onePb& one Bulk Vacuum Drum filters.
- There is drum in vacuum filter in which vacuum created inside drum & concentrate cake deposited on drum due to vacuum and cake discharged by low pressure air to chute & further conveyed to respective stockpile by conveyor.
- There shall be filtrate sumps for both Pb,Zn&Bulk filter systems along with the filtrate pumps. The filtrate shall be pumped to respective thickeners.
- The Pb concentrate cake shall be conveyed via Belt Conveyor to Pb concentrate stockpile, having 1000 T storage capacity. The Zn concentrate cake shall be conveyed via Belt Conveyor Zn concentrate stockpile, having 5000 T storage capacity. The Bulk concentrate cake shall be conveyed via Belt Conveyor to Bulk concentrate stockpile, having 500 T storage capacity All the concentrate stockpiles is covered.
- Blower air for discharging cake from drum is supplied from blower which is also used for flotation.
- There shall be separate 5 T EOT Pendant type crane to service Filter Building.
- There will be Spillage Pumps in Filter area for spillage collection and pumped to respective thickners via SPV pump.
- Pb, Zn & Bulk Filter Feed Pumps shall have VFD control.

8. TAILINGS DEWATERING:

- The Final Tailings from Zn flotation circuit is pumped to desliming hydro cyclones, of which the Overflow shall be fed to Tailings Thickener (50 mø) and underflow shall gravitate to either of two Fill storage Tanks of capacity 750MT and 650MT.
- The Tailings Thickener overflow is connected to plant water line or pump house water storage of 900cum.
- The tailing thickeners is be fitted with following instruments:
- Level sensor for water sump level control which provides reference to sump water pump.
- Proximity sensor which senses the movement of drive arm which provides indication alarm in the plant if rack is stopped.
- Telephone dialing system which senses the rake moment and if rack stops this system calls at the provided list of numbers.

9, TAILINGS DISPOSAL:

- Tailing thickener under flowis maintained at 1.4 g/cc density and through tailing thickener underflow cone tailing flows to tail pump sump by gravity.
- Four no. Of thickener underflow pumps (three VFD driven) are installed and run in closed loop of pump sump level sensor and density meter is also installed in feed line to the pump sump.
- There will be Spillage Pumps in Tailings thickener area for spillage collection two spillage pumps are installed,1 operating and 1 standby mode.
- The tailing dam height shall be increased upto the 23 m, thereafter dry disposal of tailing will be done, after commissioning of new plant.

10. BACKFILLING SYSTEM:

- Cyclone underflow accumulates in fill storage tanks.

- Classified tails comes to mixing tanks (mixing tank level is controlled via pneumatic valve working in close loop with level sensor).
- Back pressure water line is provided for FST cone jamming removal.
- One agitator is provided in mixing tank.
- In mixing tank 5% or 10% cement is added as per mining requirement.
- Cement is added with help of belt feeders which are VFD driven, VFD is controlled by PLC system(PLC creates output on the basis of pulp density and flow being pumped by filling battery of pumps).
- From mixing tank Fill is being pumped to mining bore hole.
- Density meter and Flow meters are fixed in the pump delivery lines.
- Cement tankers are being emptied into silo with the help of compressed air

Quantity of tailing to be disposed: Around 45% tailing generated from the mill will be utilized for mine back fill. The balance quantity will be disposed by pumping through pipe line to tailing dam.

In tailing dam periphery water samples are collected from piezometer wells for monitoring. Presently 6 numbers of piezometer well are installed from where water samples are collected for monitoring purpose.

Embankment height will be increased by 3m each time and it will be raised up to 38m, (ultimate height), present level is 22m so next volume generation due to height raise will be as under:

Particulars	**UoM**	**Qty**
Ore Treatment	t	2000000
Tailing Generation	t	1760000
Tailing Generation after filling	t	968000
Tailing Generation after filling	cum	537778
Plan of tailing dam	sqm	821500
Rise per annum	m	0.7
Tailing Dam Height Requirement for 15 years	m	10

Source: Mining Plan

Quantity and type of chemicals to be used in the processing plant

The main raw materials used for the project will be different chemicals and cement. The details are as following:

As the beneficiation process is physico-mechanical differential froth floatation, the chemicals used only to enhance the physico-mechanical characteristics. Zinc sulphate, copper sulphate, MIBC and Xanthates will be used as depressant, floatation and collectors. Addition of lime will be used to maintain pH of different lead and zinc floatation circuits. The quantities of Chemicals in terms of grams per ton of ore treatment are as follows:

Table 2.16: Quantity and type of chemicals

Chemical	Gram per ton	Qty Per Annum (in tons)
Copper Sulphate	340	680
Zinc Sulphate	184	368
Sodium Isopropyl Xenthates	103	206
MIBC	85	170
Sodium Cyanide	28	56
Lime	50	100

Source: Mining Plan

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.

Table 2.17: Quantity and Type of Chemicalsstored on site/plant

Type of Chemical	Use of chemical	Stored Quantity(in MT)
Copper Sulphate	Activator	25
Zinc Sulphate solution	Depressant	15
Sodium Cyanide	Depressant	2.5
Sodium isopropyl Xanthate (SIPX)	Collector	5
Methyl Isobutyl Carbinol (MIBC)	Froth stabilizer	4

Lime	PH stabilizer	6
Nigrosine	Depressant	2

Source: Mining Plan

Table 2.18: List of Existing and proposed Equipments at Beneficiation Plant

S. No.	Particulars	Existing	Addition	Total
1.	Secondary crusher Tertiary crusher	1 2	1 2	2 4
2.	Ball Mill	4	2	6
4.	Flotation Streams	4	2	6
5.	Drum Filters	4	4	8
6.	Air Blower	3	2	5
7.	Air Compressors	3	3	6
8.	Thickeners	3	3	6

Source: Mining Plan

2.16UTILITIES REQUIRED

2.16.1 Site Services

RajpuraDariba Mine has all the infrastructure facilities including a Central Workshop for any major overhauling, maintenance and fabrication job. The power supply to the mine is received from Ajmer VidyutVitran Nigam Limited. Two 3.5 MW DG sets have been installed at the mine as standby. Water requirement for industrial and township usage is met from Matrikundia dam built on Banas River about 22 km away. A workforce of 320 persons is employed on company roll and 1170 numbers direct contractual labour are engaged to support various operations of the mine. The strength of executives is 87. Besides this large number of persons are supporting the other allied activities. The mine has a well-laid township having marketing, recreational and cultural facilities. A 16 bed hospital fully furnished with modern therapeutic equipment manned by specialized staff attends to the medical requirements of the employees and their families. A well-equipped occupational

health monitoring facility with X-Ray, audiometry, lung function test, & blood lead level monitoring is available in the unit hospital. One Primary and one Senior secondary DAV school cater to the educational needs of the wards of the employees and local population.

2.16.2Water

The water is being drawn from the Matrikundia dam in Banas River through a 22 km pipeline up to the plant. Water consumption of RDM is given below. It is stated that the plant is being operated since last two years on 100% recycle water and it is planned to operate with 100% recycle water in next five years and for future also. In RDM the fresh water is using only for drinking purpose which is supplied for industrial, colony and nearby villages

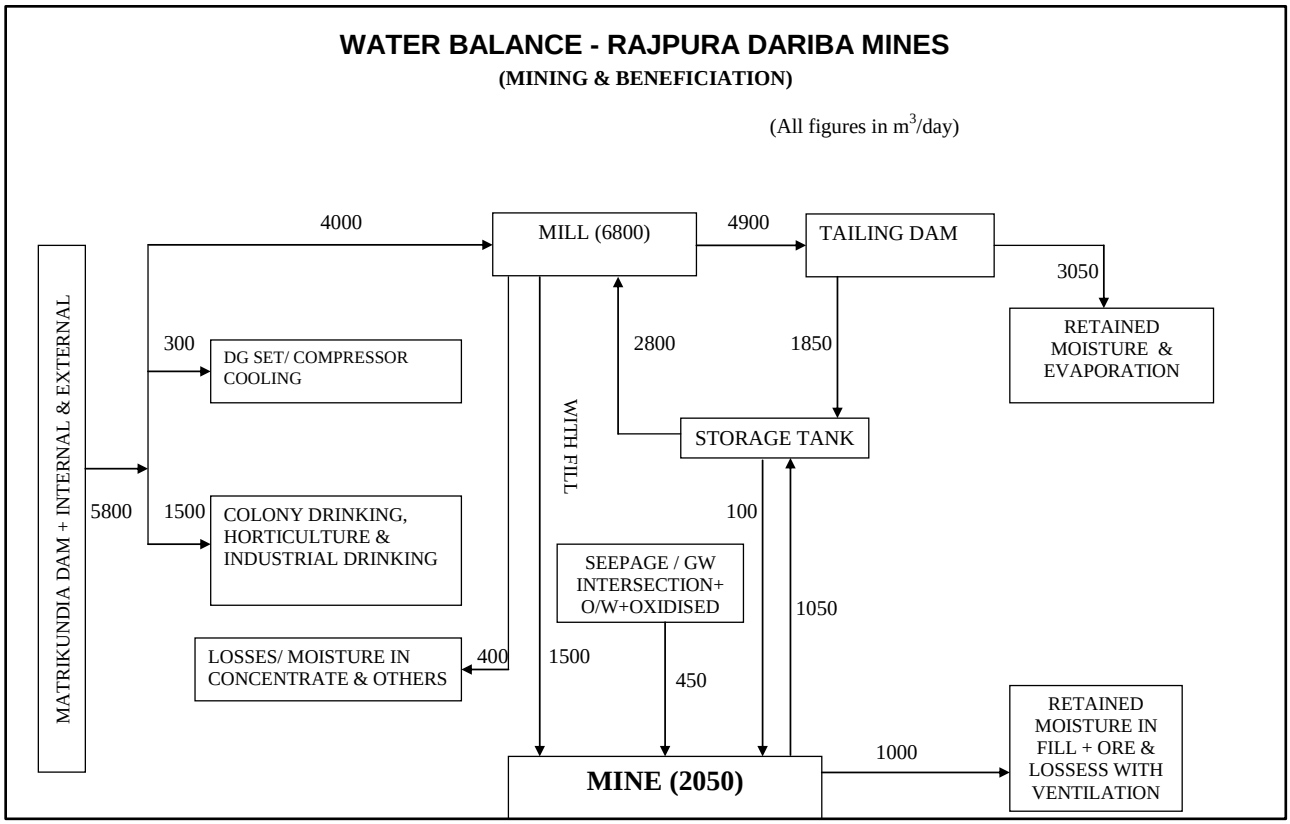

Figure 2.16 (a):Water Balance Diagram Present

For 2.0 MTPA mining &existing beneficiation capacities, additional water of 2200 m^3/d is required for proposed expansion over existing 5800m^3/d requirement. Mine dewatering due to intersection will also be consumed in the process. The main source of water will be from Sewage Treatment Plant at Udaipur, Mansi Wakal, and Matrikundia Dam.

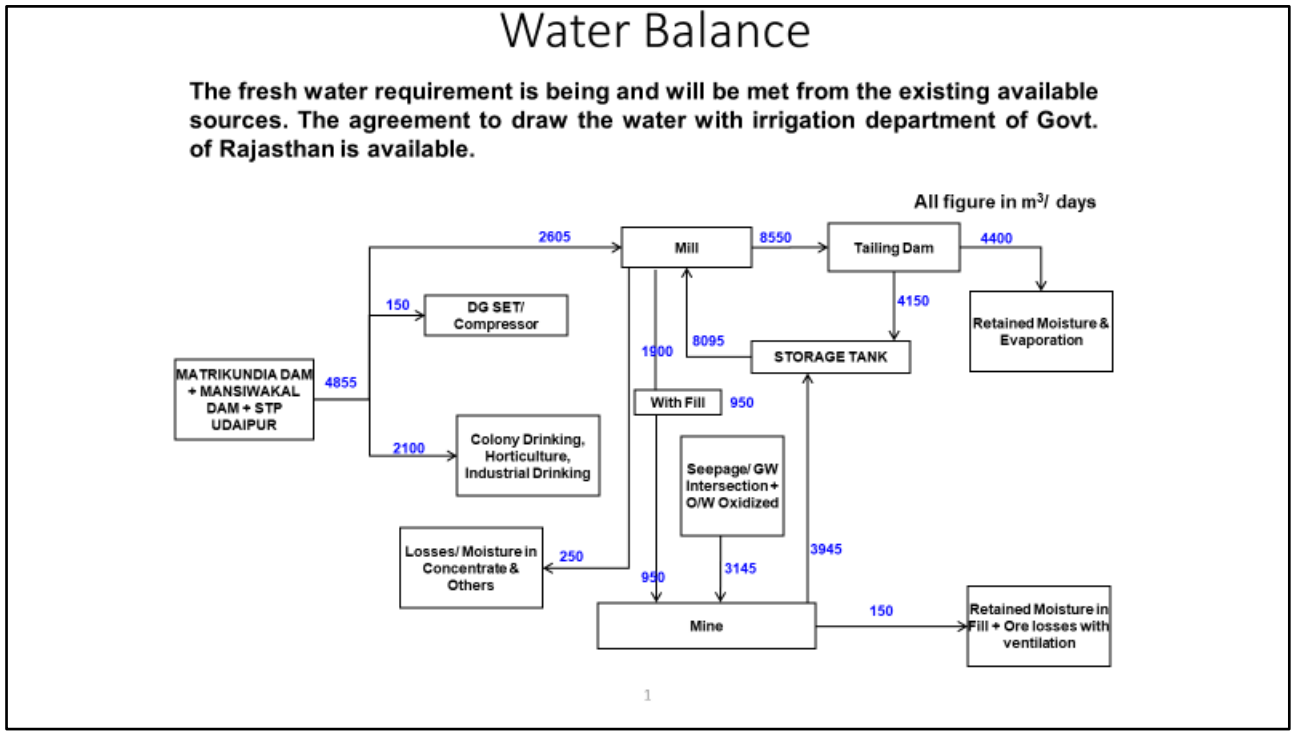

Fig2.16 (b): Water balance after the proposed expansion

2.16.3Power requirement& supply/ source

For 2.0 mtpa mining & beneficiation capacity, additional power of 13MW is required for proposed expansion over existing 12.0 MW requirement and shall be met out from Captive Power Plant, Ajmer VidhyutVitran Nigam Limited and Solar Plant.

Additional DG Sets of total 1.0 MW capacity (2X500 kVA) having acoustic enclosure is proposed for emergency power.

2.16.4 Man power requirement

The existing operation has direct employment of about 1000 persons and proposed expansion will provide additional employment of about 250 persons. There is an ample opportunity for increase in indirect employment due to mining related activities like transport, small workshops, garages, and due to developmentof local area.

Investigations/ consulting have been carried out in different fields related to underground mining. Many Indian experts as well as reputed organizations are working in association to carry out mining operations and expansion.

2.16.5Land

Total Mine lease area is 1142.2ha, out of which 362.66 ha has been acquired within mining lease. There shall be no requirement to acquire land beyond the existing acquired land. The mine area in operational use will suffice the requirement. Breakup of land use of lease area is shown as under:

Table 2.19: Land Use

Particulars	Land use (ha)
A) Mine & Smelter Operational use	171.67
B) Other Use: Residential Colony, Welfare buildings and internal roads	41.41
C)Roads and open spaces	15.58
D) Green Belt (Plantation)	134
E) Khatedari land	578.2
F) Charagah	27.33
G) Govt. Land	131.03
H) Public roads & Others	42.98
GRAND TOTAL	**1142.2**

Source: Mining Plan

2.17 Proposed Schedule and Approval for Implementation

The proposed expansion related activities will commence on receipt of Environmental Clearance (EC) from MoEFCC, New Delhi and Consent to Establish (CTE) from RSPCB.

2.18 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.

2.18.1 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 NOx, 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.

PM/dust particles are emitted during drilling, blasting, excavation, loading and unloading of the ore and developmentburden, 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 & waterspraying) within the mine itself and onlyfiner 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.

2.18.2 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.

2.18.3 Water Pollution

Domestic wastewater from the mine premises shall be treated in a sewage treatment plant, wherefrom 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.

2.18.4 Noise and Vibrations

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 ofthe charge. In the proposed mining, the production blasting will becarried 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.

2.18.5 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 at all the mine just outside the new entries whereas the balance quantity will dump in stope voids. Presently at all the mines, dumping of waste in stope voids is being practiced.

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

Particulars	UoM	Qty
Total waste generation over mine life	cum	42,00,000
Waste disposal planned in underground voids	cum	40,00,000
Total waste to be disposed externally	cum	2,00,000
Waste to be utilized in construction of tailing dam	cum	2,00,000
Surface area required for waste dump	ha	3
Additional area required for existing waste dump	ha	2
Total area of waste dump	ha	5

- Garland drain around the waste dump along with a pond for collection of rain water
- Plantation will be done on inactive waste dump

Presently, there is one waste dump of 3.0ha in lease area. In the proposed expansion, it is proposed to expand the existing waste dump area by additional 2.0 ha totaling to 5.0 ha. Details of waste dump are shown as under:

Particulars	UoM	Qty
Avg Width	m	220
AvgHeigth	m	228
Area	ha	5.02
Height of bench	m	6.0
Waste accommodation per bench	cum	208357
No. of benches	cum	3
Base mRL	cum	491
Maximum mRL	cum	509
Height of waste Dump	cum	18
Waste Dump Capacity	cum	625071

Source: Mining Plan

Tailing Disposal

Tailing generated will be utilized for mine backfill and balance will be disposed to tailing dam. It is also proposed to introduce pastefill which will maximize tailings to underground. The tailing from existing beneficiation plant is being pumped to tailing dam of Rajpura-Dariba Mine. Capacity of tailing dam is sufficient till mine life. Height of the existing tailing dam shall be raised, phase wise. Dry disposal of tailing will be done, after commissioning of new plant.

Used oil and other waste

Used oil generated shall be stored at earmarked area in drums and shall be sold to registered/ authorized recyclers, additionalgenerated used oil will be 100 KL/ Annum.No change in other waste for the proposed expansion.

2.19. Green Belt Development

Time bound Green Belt action plan is already incurred as a part of 1.08 million TPA Mine & 1.2 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 134 ha of green belt has been developed and Gap filling plantation, plantation on inactive dumps, will be carried out in future.

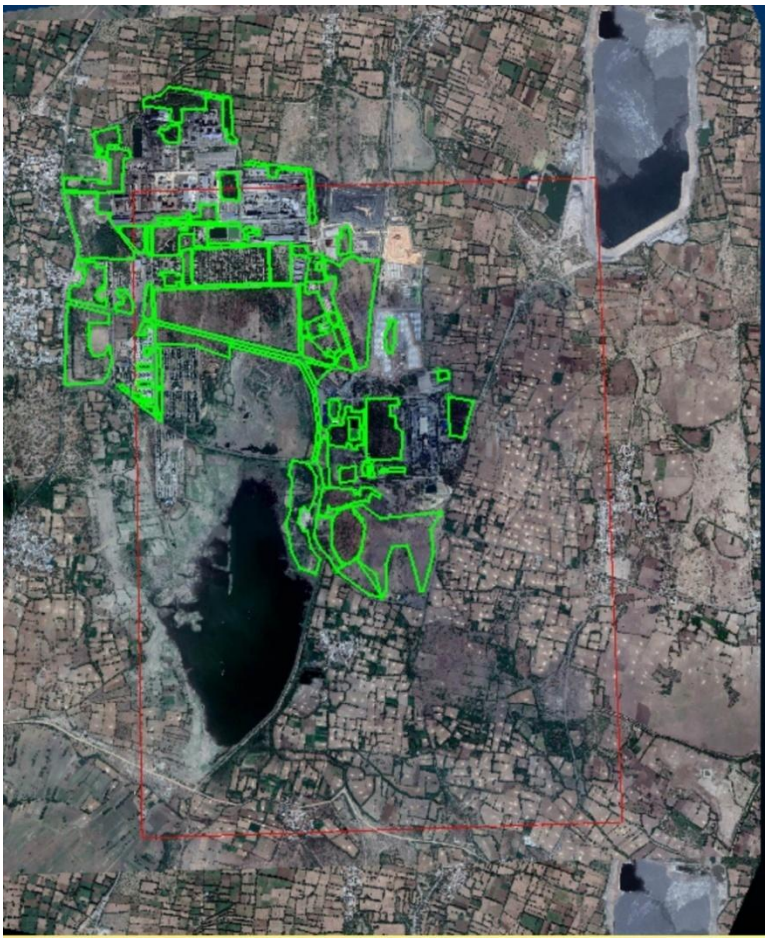

Figure: Layout for Existing Plantation in and around lease area

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CHAPTER-3

DESCRIPTION OF THE ENVIRONMENT

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3.1 INTRODUCTION

The anthropogenic activities related to mining activities cause impacts on environmental components in and around the project site. However, the intensity of environmental impacts vary from project to projects, depends upon several factors like; Physical, Chemical, & other, etc. involved in the project, processing capacity (scale / size of the project), type and extent of pollution control measures, project location surrounding geomorphology etc. To assess environmental impacts from proposed project (specific), it is essential to monitor the environmental quality prevailing in the surrounding area prior to implementation of the proposed project. The environmental status (baseline status) within the study area is used for prediction of anticipated environmental impact assessment study. The impacts from an existing mining project on its surrounding environment are due to the nature of pollutants, their quantities discharged to the environment, existing environmental quality, assimilative capacity of the surrounding environment and topography.

A regional background to the baseline data is being presented at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as air, noise, land, ecological and socio-economic status of the study area.

3.2 BASELINE DATA GENERATION:

Field monitoring studies for collection of primary data to evaluate the base line status of the project site were carried out covering March, April & May' 2017 representing the primary data.

Environmental data has been collected in relation to given mine for:-

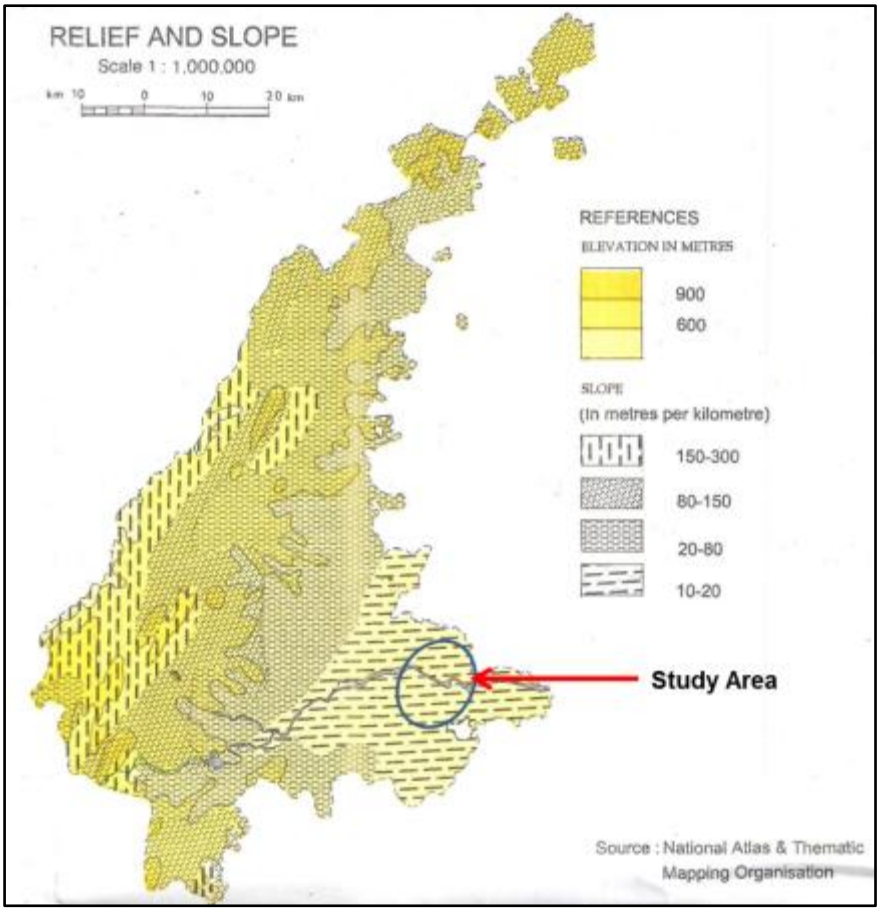
a. Land
b. Water
c. Air
d. Noise
e. Biological
f. Socio-economic

3.3 LAND ENVIRONMENT:

3.3.1 Topography

(a) Regional Topography

The Rajsamand District consists of monotonously rolling topography intersected by shallow valleys. Towards the western part of the district, Aravalli hills and a series of ridges run diagonally in the NE and SW direction. The highest portion of Aravallis occurs South of Kailwara near Kumbhalgarh fort (25°08':73°35') with an altitude of 1293 m above msl towards NW at a distance of about 60 km from mine site. A typical gneissic plain bearing irregularly carved off gneisses and granites without any alluvium cover is observed to the highest altitude of above 600 m amsl. The Central and Eastern part of the district is relatively plain area forming the foot hill of the Aravalli ranges. This plain gently slopes towards the East and Northeast. In the higher and more rugged part towards the west, alluvium is scanty whereas in the eastern flank the alluvium is more continuous and reasonably thick. Regional relief and slope map highlighting the study area is given in Fig 3.1**.** The study area of the project is relatively a plain with intermittent small hillocks including the SK Mines leas area having slope of 10 to 20 m/km.



Source: SOI

Figure 3.1: Regional Relief and Slope Map

(b) Study Area Topography

The topography within the study area of 10 km is generally plain, expect for a small ridge in the central portion, with elevation ranging from 457 m to 528 m. The highest elevation is observed towards WWS of study area near Charana village, whereas lowest elevation of 457 m is observed towards South East of study area near Bari village. The slope of the study area follows the drainage within the study area of 10 km generally towards Banas River located at 8.2 km due NNE from mine lease area and its various tributaries located on the North and NE of the study area. General topography of the study area is shown in Figure 3.2.

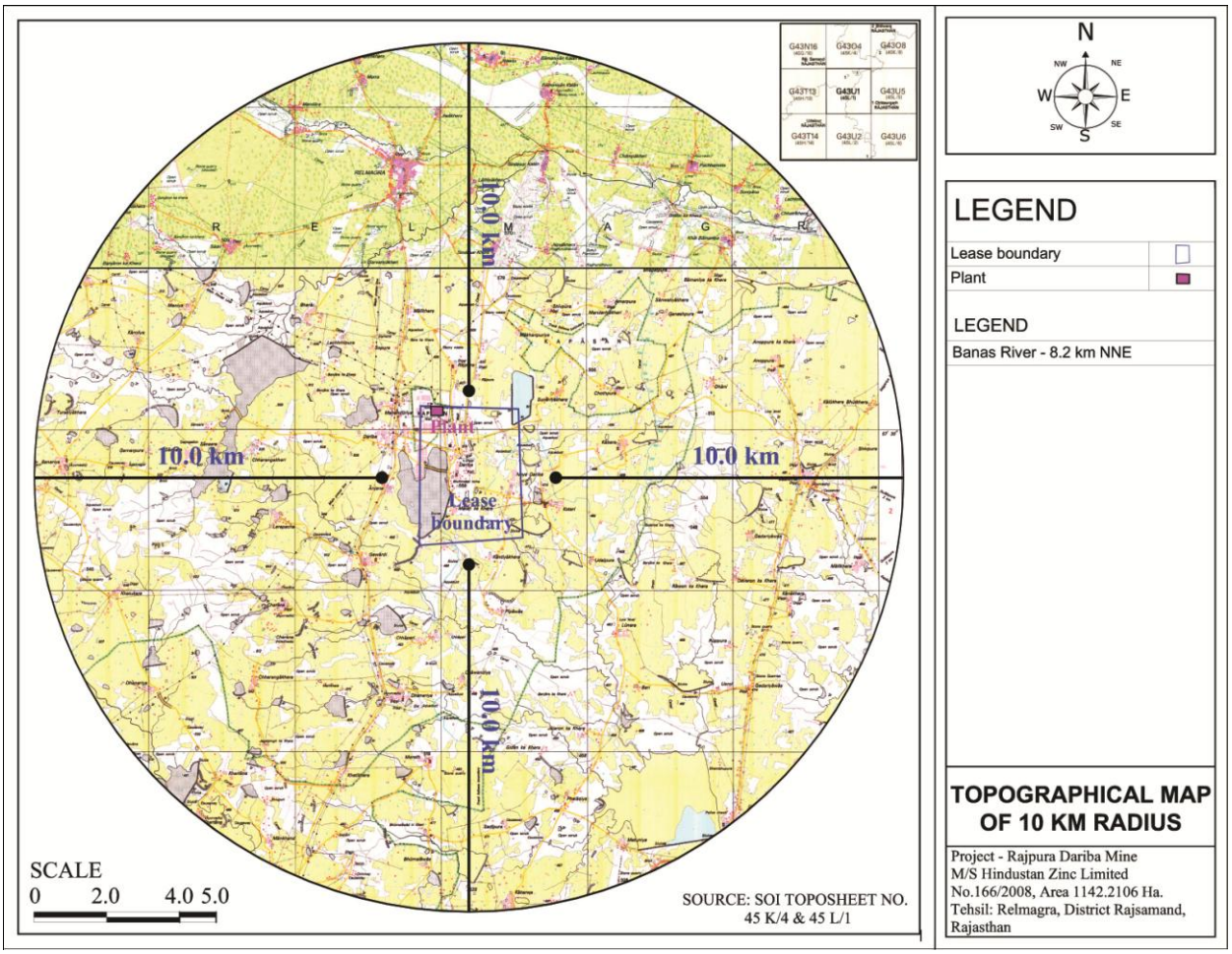


Figure 3.2: Topography Map of Study Area

3.3.2 GEOLOGY:

Regional Geology

The oldest formation exposed in the area belongs to Bhilwara super group of Archean age. The northern, central and western part of the district are occupied by the younger formations of Aravalli super group and Delhi super group of Proterozoic age. Quaternary and recent alluvium overlies most of the formations in isolated pockets, along river courses and in shallow depressions.

Archeans: Archaeans are represented in the district by formations of Bhilwara Super Group comprising younger Rajpura Dariba group overlying the older Mangalwar complex and Sandmata complex. The formations of Bhilwara Super Group are intruded by mafic and ultramafic bodies and synorogenic granites. Mangalwara and Sandmata complexes are

exposed in the eastern part of the district and occupy fairly good area where as formation belonging to Rajpura Dariba Group occurs in isolated pockets. Mangelwar Complex comprises mainly migmatite, gneisses, mica schist, quartzites, impure marble whereas Sandmata Complex Comprises gneisses, biotite schist, marble and quartzites, Rajpura Dariba group comprises mainly dolomitic marble, micaschist and quartzites.

Proterozoics: Proterozoics are represented in the district by formations of older Aravalli Super Group and younger Delhi Super Group. Aravalli Super Group comprising of Bari lake group, Kankroli group, Jharol group, Devda group. Aravalli Super Group in the district is located in the southern part in the form of an inverted cone roughly separated in the east by Bhilwara Super Group along Delwara lineament and from the Western Delhi Super Group by Kali Guman lineament. The younger Bari lake Kankroli, Jharol, Devda and Nathdwara groups are located in the southern part of district, north of Udaipur. Kankroli Group represents garnetiferous schist, marble and quartzites. Jharol group which is exposed along a north-south treading belt consist of chlorite, phyllite, quartzites and micaschists. Devda group located west and north of Kankroli comprises quartzites, dolomitic marble, horn-blende, mica schists and gneisses. Nathdwara group located around Nathdwara comprises dolomitic marble, quartzites, phyllites and schists.

The entire western belt of Rajsamand district extending from the north eastern tip to the South-Western edges are occupied by rocks belonging to Delhi Super Group. The younger Gogunda group consists of quartzites, biotite schists and calc silicates rocks. These formations extend from west of Khamnor to west of Devgarh formatting a continuous elongated belt trending north east south west. Western extremity of the district is occupied by formations belonging to Kumbhalgarh group which are mainly calc schist – calc gneisses, quartzites and marbles.

The study are of 10 km forms the alluvial deposit of recent origin occurs in narrow discontinuous bends along the channel of Banas, Khari, and other rivers in the form of valley fills. They are composed of unconsolidated stream laid sand and gravel and occasionally silt clay and kankars. Their lateral extent is very limited, maximum being about 1 km. from river bank while vertically they do not extend beyond 15 metres depth. Besides, blown sands occur in localised patches.

Recent alluvium in the form of valley fills is found along the Banas River near Relmagra in the study area. The alluvium occupies the buried river channel of Banas River and stream laid unconsolidated deposits are found along the other rivers. This is main valley fill which occurs in the district. The geological map of Rajsamand District with study area marked is presented in Fig. 3.6

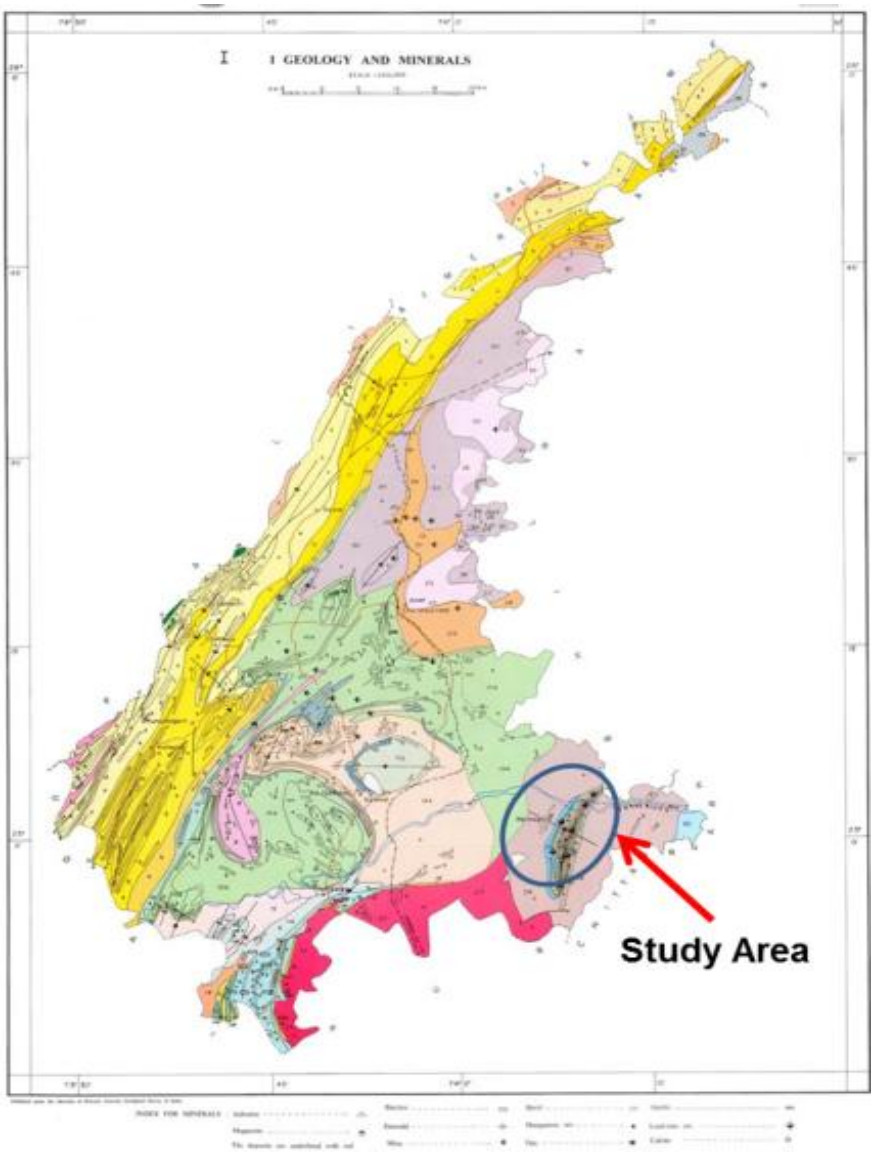


Figure: 3.3: Regional Geology

Geology of Mine Lease Area

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 forms the poor aquifer while alluvium generally thin, remains above water table.

3.3.3 LAND USE:

Material and methods: - The details of study area, collection of relevant satellite images, ground-truth observation, and the use of software and analytical tools used in the current study.

Geographical location of the study area: - The project is for environmental clearance for***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA***at ML No. 166/2008, Village: Rajpura, Dariba Tehsil: Railmagra, District Rajsamand (Rajasthan) to be developed by M/s. Hindustan Zinc Limited. The study area comprising of ML No. 166/2008, Village: Rajpura, Dariba Tehsil: Railmagra, District Rajsamand (Rajasthan). The total geographical area of study area is 1142.2106 Ha Ha). The study area comes under **Vindhya Plateau of the Central Plateau.** it is a Subzone of **Central Plateau and Hills** region **Agro-Climatic Zone** (Zone – VIII) of Rajasthan.

The survey of India Open Series Map (OSM) 45K/4 & 45 L/1 was used for georeferencing the study area.

Materials: - The equipment used during the present investigation includes ground truth hand held GARMIN 12 GPS receiver for ground truth collection, besides the visual observation and analysis.

Garmin 12 GPS receiver: - Global Positioning System is based on a constellation of 24 satellites orbiting the Earth at a very high altitude of 20,200 km, which allows anyone with a GPS receiver to determine the precise 3-D location. It offers advantages of accuracy, speed, versatility and economy while in use as an aid for position based data collection. GPS owes its popularity to the dependable high accuracy with which position and time can be determined. The termination of selective availability from first May

2000 has instantly increased the accuracy of stand-alone mode GPS to at least five fold and things are going to get even better in the near future. The GPS was conceived as a ranging system from known positions of satellites in space to unknown positions on land, sea and space. GPS uses pseudo ranges derived from the broadcast satellites. The pseudo ranges were derived either from measuring the travel time of the (coded) signal and multiplying it by its velocity or by measuring the phase of the signal. The antenna detects the electromagnetic waves arriving from the satellites, converts the wave energy into an electric current, amplifies the signal strength and sends the signals to the receiver electronics. The GARMIN 12 GPS Receiver in stand-alone mode was used to collect the information regarding the geographical location of the ground truth sites during the present investigation.

Satellite data: - The Indian Remote Sensing satelliteIRS-1C/1D/P6 LISS III was used for present analysis. One scene of IRS P6 LISS III covered the entire study area.

Topographical maps of the study area: -The Survey of India Open Series Map (OSM) G43O-04, G43U-01, on 1:50,000 scale covering Rajsamand District of Rajasthan, was used as reference map for geo-referencing of the remote sensing data. These maps helped to select the ground truth collection sites.

Ancillary data: - Information derived from the remotely sensed data can only be verified using field data. Field data is used to improve the information extraction, to calibrate either data or the information and to assess the accuracy of the derived information. Field data used in the study was of different types such as maps of Survey of India, data collected in the field sampling, and information derived from statistical data from revenue department.

Computer hardware and software: - HP P-4 dual core PC with ERDAS IMAGINE 8.5 image analysis software was used for processing and analysis of the remote sensing data. Arc GIS version 10.2 was used for making land use maps.

Spatial observations: - Spatial measurements were made with the help of hand held GPS to get the spatial coordinated along with type of land use.

The raw LISS III spectral information's was collected in the three bands as detailed below:

Band 2: Green region, 520-570 nm

Band 3: Red region, 620-680 nm and

Band 4: Near infrared region, 770-860 nm

Data & Methodology:-

For the present land use study LISS-III sensor data of IRS-P6 satellite has been used which has a spatial resolution of 5.8 m, which is good enough for Level-II classification. National Remote Sensing Centre (NRSC), Hyderabad classification scheme has been followed for present land use study. First of all the .tiff file is imported to .img format, geometric corrections were performed and data prepared for further process was done. Unsupervised classification method has been adopted followed by visual interpretation technique for 10 km radius and a total of 7 classes have been obtained.

Digital image analysis: - The various steps involved in the digital image analysis of remote sensing data area follows.

For digital image processing and analysis, preliminary work like collection of maps, reports, remote sensing images, collection and study of collateral and ground truth data were done first. Among all, ground truth data collection is very important for subsequent digital analysis. The HP P-4 dual core PC with ERDAS IMAGINE 8.5 software was used for processing and analysis of remote sensing data. The toposheets of the study area on1:50,000 scales were scanned and were geometrically corrected in the DATA PREPARATION panel of ERDAS IMAGINE 8.5. The IRS P6 LISS III Image of the study area was loaded into the ERDAS IMAGINE using the IMPORT option. Later, geometric correction of the image was done with the help of the geometrically corrected SOI Toposheets and Ground Control Points (GCPs) collected with the GPS receiver. The raw image data when viewed on the display showed the difficulty in distinguishing all features. Preliminary interpretation of the satellite data was conducted and GCPs, which were distributed randomly throughout the image with minimum root mean square (RMS) error of less than 0.5 were selected. Polynomial transformation of 1st order was used

because the correction program runs faster with it and it also avoids geometric distortion in areas of very few GCPs. After completing geometric correction of the image, study area boundary overlay was done. The study area boundary was digitized from SOI toposheets using AOI tools polygon and vector options, saved as AOI layers. This AOI layer was used as administrative boundary mask and the subsets of the respective blocks was prepared using subset image option of data preparation panel. The unsupervised classification was used to prepare the LULC map of the study area. The LULC map around the 10 Km radius of proposed Expansion.

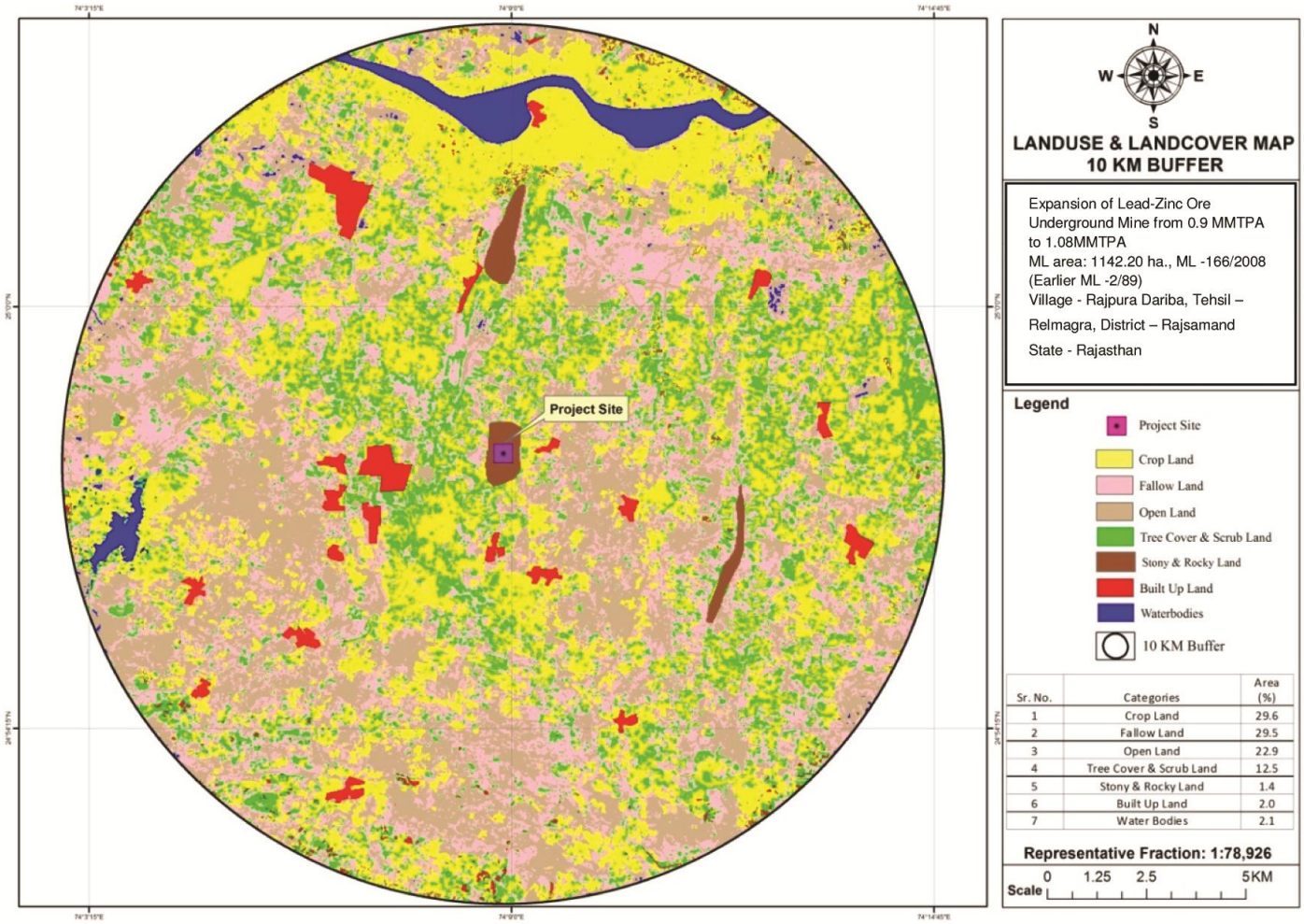


Figure 3.4: Landuse/ Landcover Map of Study area

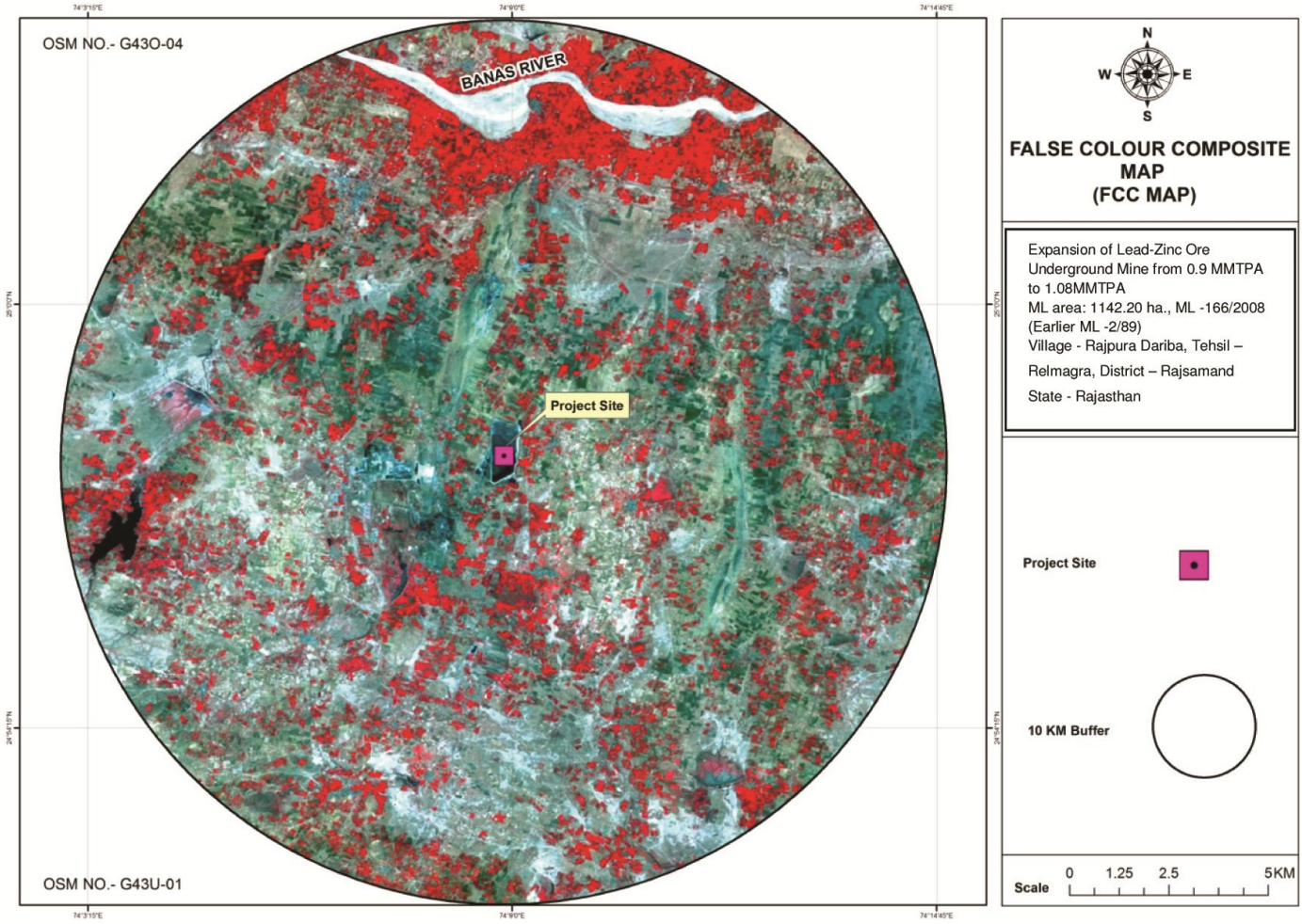


Figure 3.5:False Color Composite Map of Study area

Description of Land use: - 1. Crop Land stands largest category with 9299.31 ha. (29.6 %) this land primarily used for farming and for production of food, fiber and other commercial and horticultural crops followed by Fallow land.

2.Fallow land covers a geographical area with a total of 9260.28 ha. (29.5 %) Agriculture fallow is the lands, which is taken up for cultivation but is temporarily allowed to rest, un-cropped for one or more season, but not less than one year.

3.Open Land covers a geographical area 7183.58 ha (22.9 %)

4.Tree Cover & Scrub Land covers a geographical area 3927.89 ha. (12.5 %) these are areas where the crown density is less than 10 % of the canopy cover generally seen at the fringes of dense forest cover and settlements, where there is biotic & a biotic interference

& Scrub land is generally prone to deterioration due to erosion, with scrubs dominating the landscape.

5.Stony & Rocky Land covers a geographical area 435.3 ha. (1.4 %).

6. Built-up land covers a geographical area 642.7 ha. (2.0 %) this land primarily used for Rural and Urban settlement,it is an area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with that

7. Water bodies cover a geographical area667.8 ha. (2.1 %) Banas River is dominant water body in study area {Refer fig. 3.6} & {table 3.1},

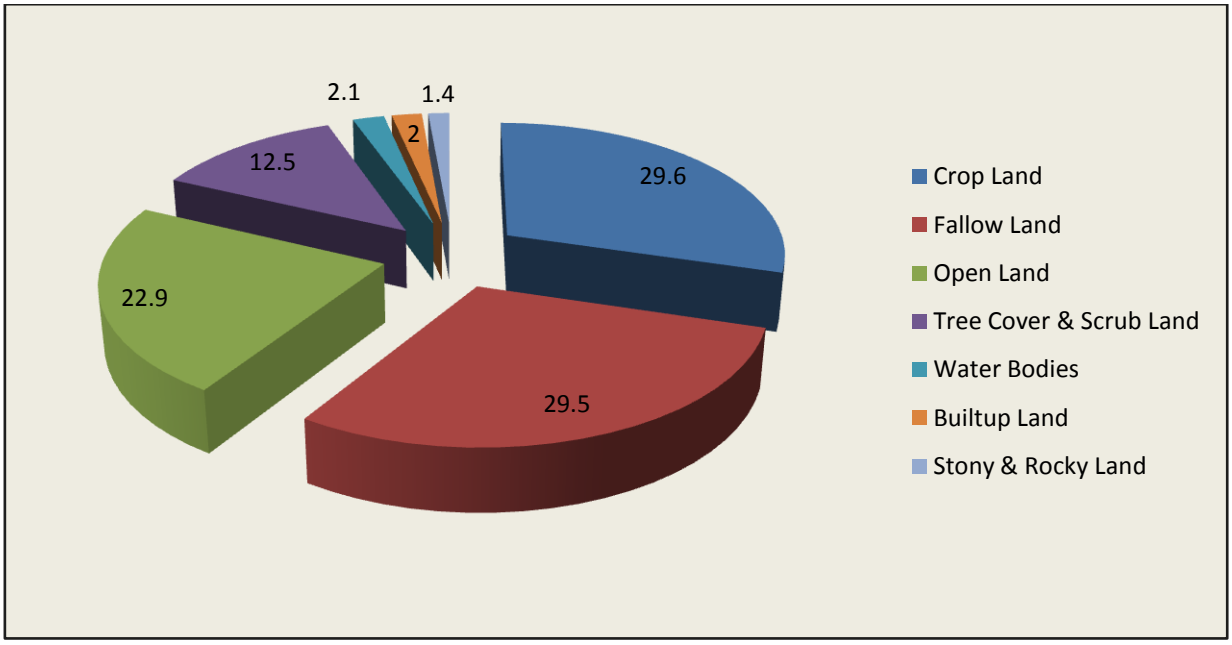


Figure 3.6: Land use pattern in the study area

Table 3.1: Land use pattern in the study area

Classes	Area (HA)	Area (SQ KMS)	Area (%)
Crop Land	9299.31	92.9931	29.6
Fallow Land	9260.28	92.6028	29.5
Open Land	7183.58	71.8358	22.9
Tree Cover & Scrub Land	3927.89	39.2789	12.5
Water Bodies	667.8	6.678	2.1
Built-up Land	642.7	6.427	2
Stony & Rocky Land	435.3	4.353	1.4
Total	**31416.86**	**314.1686**	**100**

3.3.4 SOIL CHARACTERSTICS

Soil may be defined as a thin layer of earth's crust, which serves as a natural medium for the growth of plants. The soil characteristics include both physical and chemical details. The soil survey was carried out to assess the soil characteristics of the area. For studying soil quality of the region four samples were collected to assess the existing soil conditions in and around the area.

The sample was collected by driving an auger into the soil up to the depth of 90 cms. The present studies on the soil quality establish the baseline characteristics and identifies the incremental concentrations if any, due to the expansion project. The objective of the sampling is:-

- To determine the baseline soil characteristics of the study area;
- To determine the impact of proposed activity on soil characteristics and;
- To determine the impact on soil, more importantly from agriculture production point of view.

The soil sample is collected from three different depths viz: 30cm, 60cm and 90cm. The sample was than packed in polythene plastic bags and sealed. The sample from three different depths is homogenized and then is analyzed.

- **BASELINE SOIL STATUS**

Soil Types in the Study Area

The soils of the Rajsamand district vary from sandy loam in Bhim, Deogarh & Amet blocks to heavy clay in Kumbhalgarh block. The types of soil occurring in the district are;

- Sandy loam in Bhim, Deogargh and Amet blocks
- Clay Loam in Rajsamand, Relmagra and Khamnor blocks and
- Heavy clay in Kumbalgarh block.

Broadly, the northern, southern and eastern part of the district possesses loam, foot hill soils and black cotton soil with moderate run off, where as in the western part of the district lithosols and regosols of hills and rocky outcrops having very high run off are prevalent.

Soil infiltration rate varied from 0.6 cm/hr to 4.2 cm/hr with average infiltration rate of 2.35 cm/hr. The cumulative depth to which vertical infiltration took place varied from 3.6 to 16.2 cm by which time, constant infiltration rate was also achieved.

Based on National Bureau of Soil Sciences and Land Use Planning (NBSS & LUP) Regional Centre, Udaipur, the soil of the study area is classified as deep and medium brown loamy soils. The soil map of the district with study area marked on it is shown in Fig below:

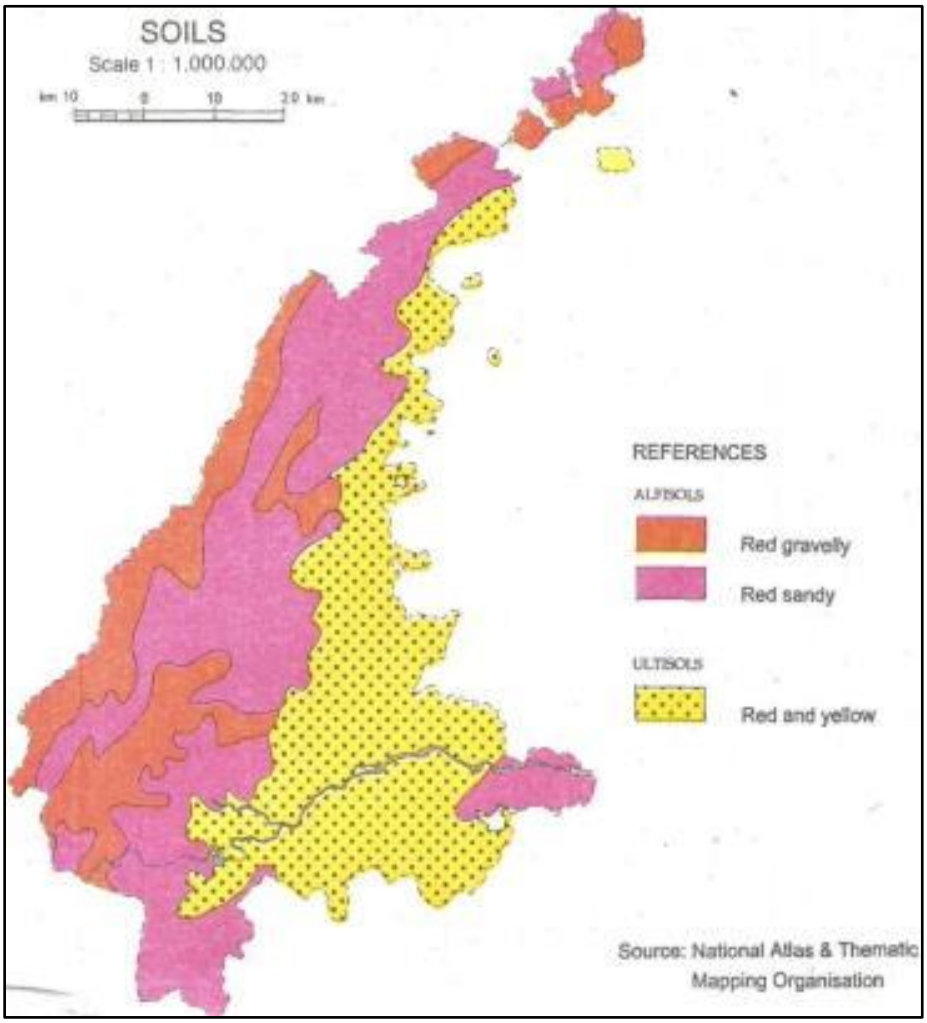


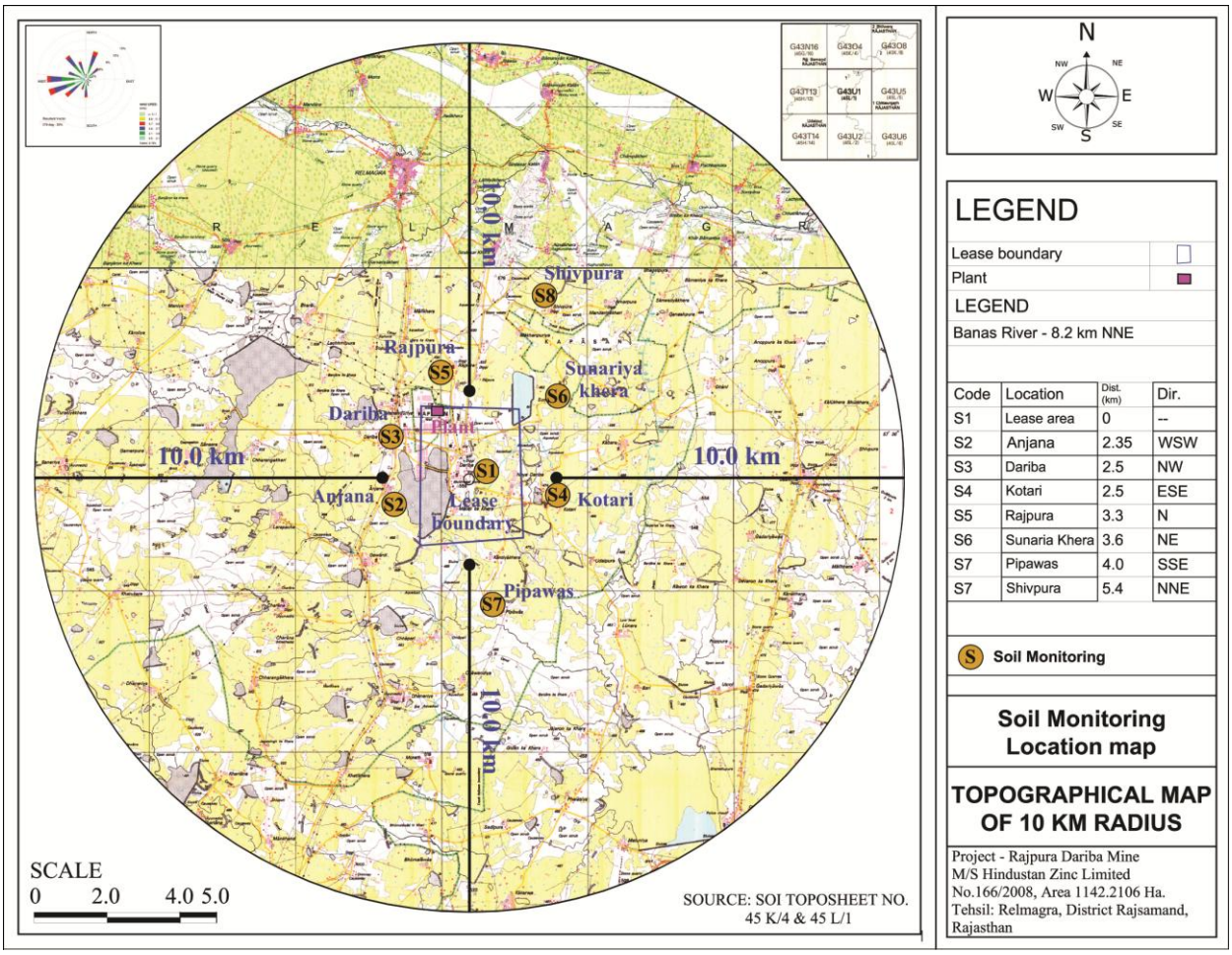
Figure: 3.7: Soil Map of the Rajsamand District

Soil quality analysis (Study Area):

The soil study was carried out to analyze the soil characteristics of the study area. For studying soil quality of the region 8 samples (including site) were collected, description of the same as follows:

Table: 3.2: Details of Soil Sampling Locations

S.N.	Sampling Location	Station Code	Distance w.r.t ML Area	Direction w.r.t ML Area	Landuse
1	Lease Area	S1	Within ML	-	Open area
2	Anjana	S2	2.35 km ;	WSW	Agriculture
3	Dariba	S3	2.5 km ;	NW	Agriculture
4	Kotari	S4	2.5 km ;	ESE	Agriculture
5	Rajpura	S5	3.3 km ;	N	Agriculture
6	Sunaria Khera	S6	3.6 km ;	NE	Agriculture
7	Pipawas	S7	4.0 km ;	SSE	Agriculture
8	Shivpura	S8	5.4 km ;	NNE	Agriculture



Source: Survey of India toposheet and IRS LISS IV dated 09 April 2014

Figure: 3.8:Soil Sampling Locations of the Study Area

Table: 3.3: Results of soil analysis

	PARAMETERS		Unit	Lease Area	Anjana	Dariba	Kotari	Rajpura	Sunaria Khera	Pipawas	Shivpura	Detection Limits
				S1	S2	S3	S4	S5	S6	S7	S8	
1	Particle size distribution	Sand	(%)	72.6	67.2	75.3	80.2	75.5	82.2	84.5	80.4	
		Silt		19.1	26	16.6	14.6	18.3	11	10.1	12.8	
		Clay		8.3	6.8	8.1	5.2	6.2	6.8	5.4	6.8	
2	Texture		-	Sandy Loam	Sandy Loam	Sandy Loam	Loamy Sand	Sandy Loam	Loamy Sand	Loamy Sand	Sandy Loam	
3	pH (1:5 Solution)		-	7.57	7.84	7.21	6.98	7.78	7.26	7.26	7.41	
4	Electrical Conductivity		µS/cm.	119.5	125.3	98.5	285.3	142.2	356	162	112.5	
5	Cation Exchange capacity		meq%	1.10	1.98	1.54	1.5	1.62	1.35	0.88	1.07	
8	Water Holding Capacity		(%)	23.4	30.4	21.2	32.5	35.2	38.3	48.3	46.2	
9	Porosity		(%)	4.4	6.8	6.2	11.5	7.5	8.1	12.8	9.3	
10	Bulk Density		gm/cm^3	1.74	1.86	1.96	1.84	1.62	1.73	1.49	1.48	
11	Nitrite		mg/kg	BDL	0.85	0.57	0.74	0.48	0.52	0.68	2.7	0.2
12	Nitrate		mg/kg	2.4	2.44	2.85	2.45	2.35	1.51	1.85	3.98	
13	Phosphate		mg/kg	1.15	1.45	6.24	1.88	1.56	3.87	2.67	7.12	
14	Sodium (Na)		mg/kg	468.4	746.3	725.4	7453	721	862	745	588.9	
15	Calcium (Ca)		mg/kg	2891	3126	3321	1354	8124	972	3245	3338	
16	Magnesium (Mg)		mg/kg	412	342	2315	7436	6512	3625	8432	6432	
17	Potassium (K)		mg/kg	178.23	542.36	168.30	228.30	3754.00	384.14	4858.32	348.23	

18	Lead (Pb)	mg/kg	30.12	10.30	23.85	21.34	25.31	40.23	43.36	35.23	
19	Iron (Fe)	mg/kg	6812	7145	6432	6532	7432	5132	6832	9832	
20	Arsenic (As)	mg/kg	BDL	BDL	BDL	0.70	BDL	0.68	0.52	BDL	0.2
21	Cadmium (Cd)	mg/kg	2.10	1.25	0.84	0.70	0.64	0.84	1.24	0.78	
22	Total Chromium (Cr)	mg/kg	5.2	8.32	9.12	10.2	9.54	7.63	9.21	12.4	
23	Copper (Cu)	mg/kg	17.3	14.2	13.5	22.3	20.3	12.4	27.3	31.6	
24	Nickel (Ni)	mg/kg	18.3	36.3	17.3	16.3	18.3	30.1	48.3	45.3	
25	Manganese (Mn)	mg/kg	185.3	184.3	178.3	189.3	225.3	183.4	68.3	753.2	
26	Zinc (Zn)	mg/kg	68.2	78.3	45.3	38.3	48.4	58.3	74.3	55.3	
27	Barium (Ba)	mg/kg	78.3	98.3	126.4	134.2	127.3	136.2	152.3	149.2	
28	Selenium (Se)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.25
29	Mercury (Hg)	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.25
30	% Moisture	%	2.1	5.3	4.8	5.1	4.6	8.3	14.9	8.3	
31	Total Alkalinity	%	0.82	0.72	0.55	0.78	0.79	0.51	0.88	0.52	
33	Available Nitrogen	%	3.1	8.4	6.7	16.2	9.5	7.1	9.8	12.3	
34	Available phosphorous	mg/kg	14.3	65.3	58.3	49.3	28.3	29.3	45.3	86.6	
36	Organic Matter	%	2.34	2.54	1.78	3.85	2.6	1.86	3.78	2.75	
37	Boron	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
38	Chloride	%	3.2	2.4	2.45	3.1	2.8	3.12	2.04	3.21	
39	Sulphate	mg/kg	84	78	38	57	32	53	70	51.3	
40	Carbonate	%	9.2	1.14	1.18	9.00	5.20	2.78	3.62	4.08	

Results & Conclusion: The soil analysis results are presented in **Table 3.3.** The result obtained is compared with the standard soil classification given in Agriculture Soil Limits. It has been observed that the soil is sandy loam in texture and neutral in nature. The nutrient and organic matter contents are medium and the soil is normally fertile.

Table: 3.4: Standard Soil pH Classification

pH	Classification	Sample
<4.5	Extremely acidic	-
4.51- 5.00	Very strong acidic	-
5.01- 5.50	Strongly acidic	-
5.51- 6.00	Moderately acidic	-
6.01- 6.50	Slightly acidic	-
6.51- 7.30	Neutral	**S3,S4,S5,S6,S7,**
7.31- 7.80	Slightly alkaline	**S1,S8**
7.81- 8.50	Moderately alkaline	**S2**
8.51- 9.00	Strongly alkaline	-
> 9.00	Very strongly alkaline	-

Source: Agriculture Handbook, 2011

3.4 AIR ENVIRONMENT

Climatology and Meteorology:

The atmosphere is the medium in which air pollution transported away from the source. Meteorology influences the way air pollution is dispersed, including wind direction and wind speed, type of terrain and heating effects. Atmospheric stability affects pollution released from ground level and elevated sources differently.

In unstable conditions, ground level pollution is readily dispersed thereby reducing ground level concentrations. Elevated emissions, however, such as those released from a chimney, are returned more readily to ground level, leading to higher ground level concentrations. Stable conditions mean less atmospheric mixing and therefore higher concentrations around ground level sources, but better dispersal rates, and therefore lower ground level concentrations, for elevated plumes.

The climate of the study area is semi-arid type where seasons can be classified as[1]:

- Summer : March – May;
- Monsoon : June – September;

- Post monsoon : October – December;
- Winter : January – February.

3.4.1 METEOROLOGY

An automated weather monitoring station was installed during the study period to record various meteorological parameters on hourly basis to understand the wind pattern, temperature variation, solar insulation and relative humidity variation etc. Meteorology plays a vital role in affecting the dispersion of pollutants. Since meteorological factors show wide fluctuation with time, meaningful interpretation can be drawn only from long term reliable data.

3.4.2 WIND ROSE DIAGRAM

The hourly average meteorological data is presented below:

Table: 3.5:Hourly Average Meteorological Monitoring Data

Hour	Ambient Air Temperature (°C)	Humidity (%)	Wind Speed (m/s)	Wind Direction (From)
1	30.6	34.3	2.6	SW
2	29.9	35.8	2.8	SSW
3	29.4	37.1	2.8	SW
4	28.7	38.8	2.8	SW
5	28.2	40.3	2.6	SSW
6	28.4	40.8	2.8	SW
7	32.7	34.5	2.7	SSW
8	35.1	31.3	2.9	SSW
9	35.2	30.7	3.2	SSW
10	36.9	27.2	3.5	SSE
11	38.7	23.8	3.7	S
12	39.7	21.3	3.7	SSW

Hour	Ambient Air Temperature (°C)	Humidity (%)	Wind Speed (m/s)	Wind Direction (From)
13	40.3	19.6	3.8	SSW
14	40.7	18.0	3.9	SSW
15	40.6	17.9	3.8	SSW
16	40.1	18.4	4.0	SW
17	39.2	19.3	3.8	S
18	37.7	21.0	3.8	SSW
19	35.7	23.5	2.8	SSW
20	34.2	26.2	2.4	SSW
21	33.4	27.8	2.3	SW
22	32.6	29.3	2.3	SW
23	31.8	31.5	2.7	WSW
24	31.1	33.1	2.8	SW

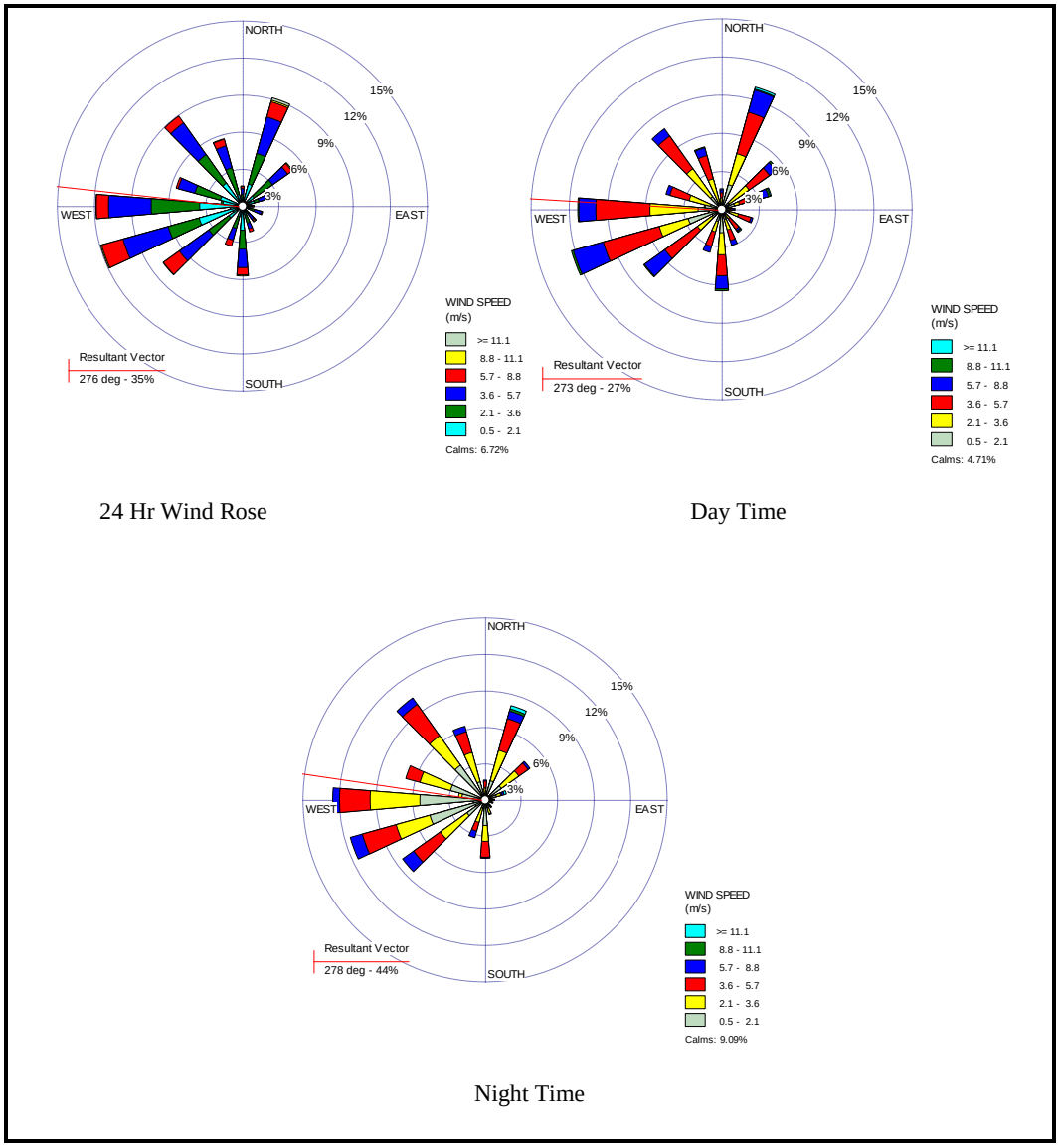


Figure 3.9: Site Specific 24 Hours Wind rose

3.4.3 AMBIENT AIR QUALITY

The prime objective of the baseline air monitoring is to evaluate 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 the mine.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling. The monitoring was carried out during summer session (March-May'2017).

3.4.3.1 METHODOLOGY ADOPTED FOR AIR QUALITY SURVEY

A) SELECTION OF SAMPLING LOCATIONS

The baseline status of the air quality in the study area has been assessed though a scientifically designed ambient air quality monitoring network. The design of monitoring network in the air quality surveillance programme 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; and
- Representatives of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at Fourteen locations with due considerations to above mentioned points. Table 3.6 gives the details of environmental setting around each monitoring stations and their distances with reference to the existing mining lease.

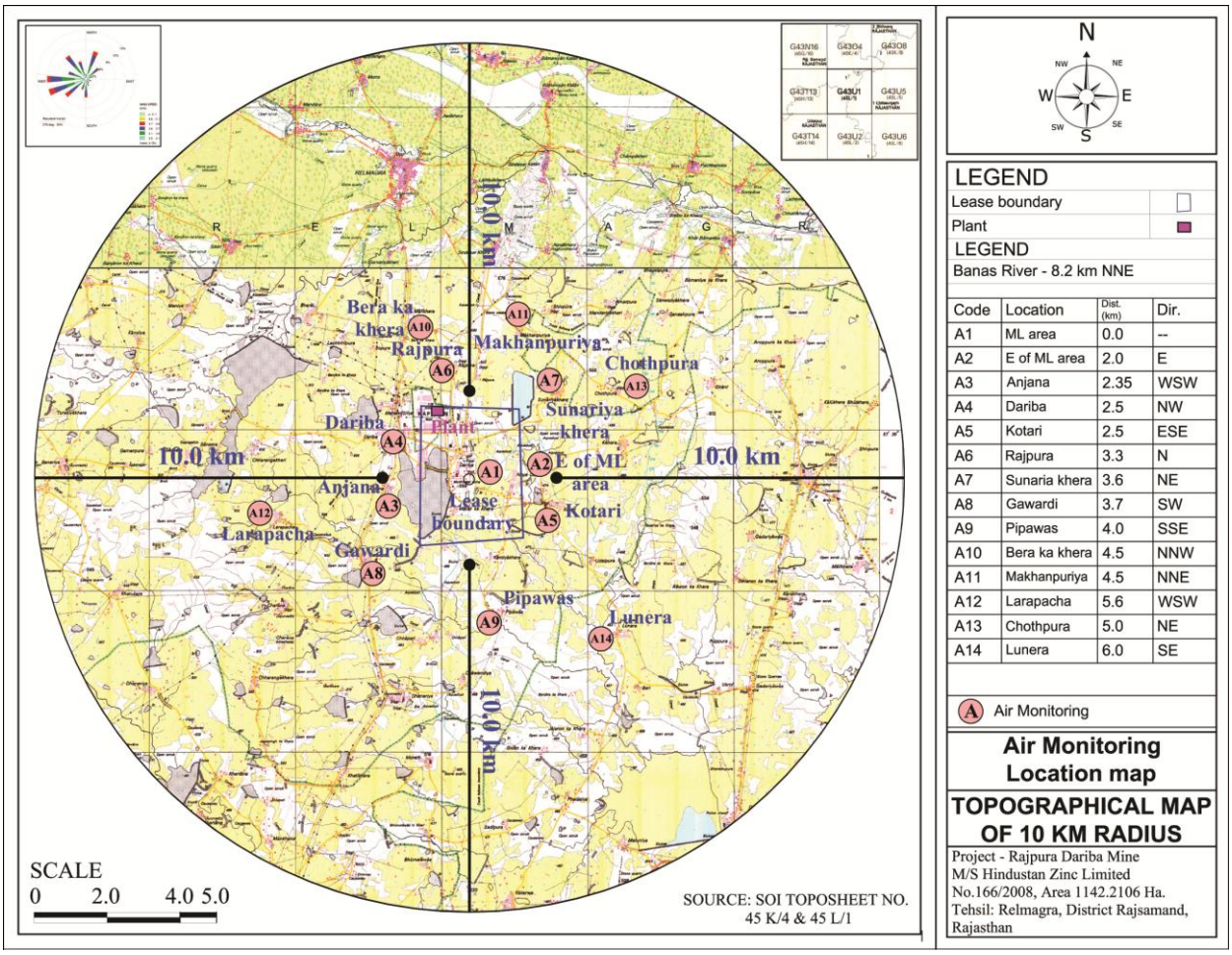
Table 3.6: AMBIENT AIR QUALITY MONITORING STATIONS

S.No.	Sampling Location	Station Code	Distance w.r.t mine lease area	Direction w.r.t mine lease area	Justification for the selection
1	Mine lease area	A1	0.0	within ML	Represent the Project site
2	E of ML area	A2	2.0 km	E	• Downwind of the project site during summer and monsoon months • Baseline for residential location near the project site.

S.No.	Sampling Location	Station Code	Distance w.r.t mine lease area	Direction w.r.t mine lease area	Justification for the selection
3	Anjana	A3	2.35 km	WSW	• Upwind of the project site during summer and monsoon months • Baseline for residential location in close vicinity to project site.
4	Dariba	A4	2.5 km	NW	• Predominant Downwind of the project site during summer and monsoon months • Baseline for residential location near the project site.
5	Kotari	A5	2.5 km	ESE	• Downwind of the project site during summer and monsoon months (May to August) • Baseline for residential location near the project site.
6	Rajpura	A6	3.3 km	N	As per IMD data, this station is 3rd predominant downwind of the project site during monsoon and post monsoon seasons (Jan to March, October to Dec).Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site.
7	Sunaria Khera	A7	3.6 km	NE	As per IMD data, this station is dominant downwind of the project site during post monsoon seasons at evening hrs (January to March, October to Dec) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site towards NE
8	Gawardi	A8	3.7 km	SW	As per IMD data, this station is predominant downwind of the project site during post monsoon seasons at morning hrs (October to Dec) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site

S.No.	Sampling Location	Station Code	Distance w.r.t mine lease area	Direction w.r.t mine lease area	Justification for the selection
9	Pipawas	A9	4.0 km	SSE	As per IMD data, this station is downwind of the project site during summer and monsoon season (June–July) and upwind direction during post monsoon and winter season (Jan-Feb, November- Dec.) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site
10	Bera Ka Khera	A10	4.5 km	NNW	As per IMD data, this station is Predominant upwind of the project site during summer and monsoon season (May – June , July – September) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site
11	Makhanpuriya	A11	4.5 km	NNE	As per IMD data, this station is predominant downwind of the project site during monsoon and post monsoon seasons (Jan to June, October to Dec) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site
12	Larapacha	A12	5.6km	WSW	As per IMD data, this station is upwind of the project site during winter and Post monsoon seasons (Jan to March, October to Dec) Further, this station's AAQ data captures the baseline for residential location located in within the vicinity from the project site

S.No.	Sampling Location	Station Code	Distance w.r.t mine lease area	Direction w.r.t mine lease area	Justification for the selection
13	Chothpura	A13	5.0 km	NE	As per IMD data, this station is Predominant downwind of the project site during winter and Post monsoon seasons (Jan to March, October to Dec) Further, this station's AAQ data captures the baseline for residential location located little away from the project site
14	Lunera	A14	6.0 km	SE	As per IMD data, this station is located upwind of the project site during summer and monsoon seasons (May to June, July to Sep) Further, this station's AAQ data captures the baseline for residential location located little away from the project site



Code	Location	Dist. (km)	Dir.
A1	ML area	0.0	--
A2	E of ML area	2.0	E
A3	Anjana	2.35	WSW
A4	Dariba	2.5	NW
A5	Kotari	2.5	ESE
A6	Rajpura	3.3	N
A7	Sunaria khera	3.6	NE
A8	Gawardi	3.7	SW
A9	Pipawas	4.0	SSE
A10	Bera ka khera	4.5	NNW
A11	Makhanpuriya	4.5	NNE
A12	Larapacha	5.6	WSW
A13	Chothpura	5.0	NE
A14	Lunera	6.0	SE

Source: Survey of India toposheets

Figure 3.10:Map Showing Ambient Air Quality Sampling Locations in the Study Area

B) FREQUENCY AND PARAMETERS FOR SAMPLING

The ambient air quality monitoring has been carried out with a frequency of two days per week at fourteen locations covering one complete season (Summer season). The ambient air quality along with their frequency of sampling is given below:-

Table 3.7: Monitored Parameters, Code of Practise & Detection Limits

S.No.	Parameter	Code of Practice	Detection Limit
1	Particulate matter (PM_{10}) ($\mu g/m^3$)	IS 5182 (Part 23):2006 & CPCB guidelines	4 $\mu g/m^3$

S.No.	Parameter	Code of Practice	Detection Limit
2	Particulate matter ($PM_{2.5}$) ($\mu g/m^3$)	IS 5182 (Part 23):2006 & CPCB guidelines	4 $\mu g/m^3$
3	Sulphur dioxide ($\mu g/m^3$)	IS 5182 (Part 2): 2001 & CPCB guidelines	3 $\mu g/m^3$
4	Oxides of Nitrogen ($\mu g/m^3$)	IS 5182 (Part 6): 2006 & CPCB guidelines	3 $\mu g/m^3$
5	Carbon monoxide ($\mu g/m^3$)	IS: 5182 (Part-X) & CPCB guidelines	0.01 mg/m^3
6	Ozone ($\mu g/m^3$)	IS-5182 (Part-IX):1974 & CPCB Guidelines	1 $\mu g/m^3$
7	Ammonia (NH_3)	Indophenol Blue Method	10 $\mu g/m^3$
8	Benzene (C_6H_6)	IS : 5182 (P-09)1974 – 2009	1 $\mu g/m^3$
9	Banzo-a-pyrene (BAP)	IS : 5182 (P-11)- 2006	0.1 ng/m^3
10	Arsenic (As)	IS : 5182 (P-12)2004 – 2009	1 ng/m^3
11	Nickel (Ni)	IS : 5182 (P-22)2004 – 2009	1 ng/m^3
12	Lead (Pb)	IS : 5182 (P-22)2004 – 2009	0.01 $\mu g/m^3$
13	Free Silica		1 $\mu g/m^3$

3.4.3.2 BASELINE DATA

The ambient air quality data were collected to find the existing regional emissions. The data are stated in Table no. 3.8.

Table 3.8: Ambient Air Quality Status

S. No.	Pollutant	Locations	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98th Percentile	CPCB Standards
1.	SO_2	A1	9	18	13	17.55	80.0
		A2	7	15	10	14.57	
		A3	7	13	9	12.36	
		A4	7	13	9	12.61	
		A5	7	20	10	17.53	
		A6	7	13	9	12.36	
		A7	7	13	9	12.55	
		A8	6	15	10	14.9	
		A9	7	13	9	12.41	
		A10	6	15	9	14.9	
		A11	6	18	10	16.54	
		A 12	7	12	9	11.97	
		A13	7	13	9	11.68	
		A14	7	15	10	13.6	
2.	NO_2	A1	18	25	21	25.12	80.0
		A2	12	23	17	22.17	
		A3	11	24	17	23.35	
		A4	12	24	18	23.14	
		A5	6	34	18	29.98	
		A6	10	30	15	25.61	
		A7	12	22	17	21.35	
		A8	11	32	18	30.45	
		A9	11	27	18	26.6	
		A10	12	28	18	27.38	
		A11	12	32	19	30.79	
		A12	13	22	17	21.51	

		A13	14	27	17	23.79	
		A14	15	26	19	26.3	
3.	**PM_{10}**	A1	68	81	75	80.32	**100.0**
		A2	70	82	78	81.66	
		A3	54	81	68	79.4	
		A4	52	78	64	75.61	
		A5	62	81	73	80.45	
		A6	55	81	72	80.57	
		A7	52	77	64	76.66	
		A8	55	81	68	79.26	
		A9	58	81	71	80.6	
		A10	56	80	69	79.4	
		A11	59	81	73	80.45	
		A12	56	78	68	78.12	
		A13	52	79	63	76.88	
		A14	52	80	66	80	
4.	**$PM_{2.5}$**	A1	27	41	32	39.82	**60.0**
		A 2	26	42	35	40.87	
		A3	22	40	31	39.7	
		A4	25	40	30	39.75	
		A5	26	43	35	41.91	
		A6	25	42	32	42.01	
		A7	25	38	30	37.52	
		A8	26	41	34	40.87	
		A9	24	42	32	41.59	
		A10	22	45	34	43.46	
		A11	22	40	34	39.49	
		A12	25	38	30	37.23	
		A13	23	36	30	36.4	

		A14	24	40	31	39.11	
5.	**CO**	A1	115	460	242	453.1	**2000.0**
		A 2	115	418	227	417.5	
		A3	115	345	201	345	
		A4	4	345	173	345	
		A5	115	490	243	486.92	
		A6	115	345	192	345	
		A7	115	345	188	345	
		A8	115	460	223	423.2	
		A9	0	230	161	230	
		A10	115	460	192	420.9	
		A11	BDL	345	178	334.65	
		A12	115	345	177	317.4	
		A13	115	345	182	345	
		A14	115	460	223	423.2	
6.	**NH_3**	A1	13	23	18	22.34	**400**
		A2	BDL	21	15	20.35	
		A3	10	15	13	14.96	
		A4	10	18	13	17.62	
		A5	10	19	15	18.76	
		A6	12	16	14	15.92	
		A7	10	19	14	18.56	
		A8	10	20	14	20	
		A9	10	16	13	15.92	
		A10	10	20	14	19.77	
		A11	BDL	21	15	20.58	
		A12	11	17	14	16.58	
		A13	10	16	13	15.84	
		A14	10	20	14	20.02	

7.	**O_3**	A1	10	27	17	25.17	**180**
		A2	6.50	24.70	14.80	24.06	
		A3	8	15	10	14.08	
		A4	8	19	11	18.45	
		A5	8	23	15	23.02	
		A6	8	19	12	17.55	
		A7	8	19	13	18.6	
		A8	7	19	10	16.66	
		A9	8	16	11	15.98	
		A10	7	19	10	17.35	
		A11	9	25	13	21.69	
		A12	8	15	11	14.5	
		A13	8	13	10	12.5	
		A14	7	19	10	16.2	
8.	**Pb**	A1	BDL	0.60	0.19	0.558	**1000**
		A2	BDL	0.60	0.28	0.60	
		A3	0.05	0.08	0.07	0.08	
		A4	0.02	0.30	0.08	0.21	
		A5	0.06	0.09	0.07	0.08	
		A6	0.02	0.08	0.05	0.08	
		A7	0.08	0.35	0.19	0.33	
		A8	0.02	0.18	0.06	0.162	
		A9	0.02	0.08	0.05	0.08	
		A10	0.02	0.20	0.07	0.18	
		A11	BDL	0.09	0.06	0.08	
		A12	0	0	0	0.07	
		A13	0.02	0.08	0.05	0.079	
		A14	0.02	0.20	0.07	0.17	
9.	**Ni**	A1	BDL	3	2	2.4	

		A 2	1.40	3.90	2.33	3.72	
		A3	2	3	2	2.776	
		A4	1	3	2	3.35	
		A5	1	3	2	3.05	
		A6	1	3	2	2.55	
		A7	1	2	1	1.78	
		A8	1	4	3	4.23	**20**
		A9	1	3	2	3.04	
		A10	2	3	2	2.77	
		A11	BDL	3	2	2.5	
		A12	1	3	2	2.96	
		A13	1	2	2	2.16	
		A14	2	4	3	4.05	
10.	**As**	A1	BDL	BDL	BDL	BDL	
		A2	BDL	BDL	BDL	BDL	
		A3	BDL	BDL	BDL	BDL	
		A4	BDL	BDL	BDL	BDL	**6**
		A5	BDL	BDL	BDL	BDL	
		A6	BDL	BDL	BDL	BDL	
		A7	BDL	BDL	BDL	BDL	
		A 8	BDL	BDL	BDL	BDL	
		A9	BDL	BDL	BDL	BDL	
		A10	BDL	BDL	BDL	BDL	
		A11	BDL	BDL	BDL	BDL	
		A12	BDL	BDL	BDL	BDL	
		A13	BDL	BDL	BDL	BDL	
		A14	BDL	BDL	BDL	BDL	
11.	**C_6H_6**	A1	BDL	BDL	BDL	BDL	
		A2	BDL	BDL	BDL	BDL	

		A3	BDL	BDL	BDL	BDL	**5**
		A4	BDL	BDL	BDL	BDL	
		A5	BDL	BDL	BDL	BDL	
		A6	BDL	BDL	BDL	BDL	
		A7	BDL	BDL	BDL	BDL	
		A8	BDL	BDL	BDL	BDL	
		A9	BDL	BDL	BDL	BDL	
		A10	BDL	BDL	BDL	BDL	
		A11	BDL	BDL	BDL	BDL	
		A12	BDL	BDL	BDL	BDL	
		A13	BDL	BDL	BDL	BDL	
		A14	BDL	BDL	BDL	BDL	
12.	**BAP**	A1	BDL	BDL	BDL	BDL	**1**
		A2	BDL	BDL	BDL	BDL	
		A3	BDL	BDL	BDL	BDL	
		A4	BDL	BDL	BDL	BDL	
		A5	BDL	BDL	BDL	BDL	
		A6	BDL	BDL	BDL	BDL	
		A7	BDL	BDL	BDL	BDL	
		A8	BDL	BDL	BDL	BDL	
		A9	BDL	BDL	BDL	BDL	
		A10	BDL	BDL	BDL	BDL	
		A11	BDL	BDL	BDL	BDL	

		A12	BDL	BDL	BDL	BDL	
		A13	BDL	BDL	BDL	BDL	
		A14	BDL	BDL	BDL	BDL	
		A15	BDL	BDL	BDL	BDL	
13.	**Free Silica**	A1	BDL	BDL	BDL	BDL	
		A2	BDL	BDL	BDL	BDL	
		A3	BDL	BDL	BDL	BDL	
		A4	BDL	BDL	BDL	BDL	
		A5	BDL	BDL	BDL	BDL	
		A6	BDL	BDL	BDL	BDL	
		A7	BDL	BDL	BDL	BDL	
		A8	BDL	BDL	BDL	BDL	
		A9	BDL	BDL	BDL	BDL	
		A10	BDL	BDL	BDL	BDL	
		A11	BDL	BDL	BDL	BDL	
		A12	BDL	BDL	BDL	BDL	
		A13	BDL	BDL	BDL	BDL	
		A14	BDL	BDL	BDL	BDL	

Presentation of Results:-

The analysis results for the study period are presented in above monitoring tables. Various statistical parameters like 98th percentile, average, maximum and minimum values have been computed from the observed raw data for all the ambient air monitoring stations. These are compared with the standards prescribed by Central Pollution Control Board

(CPCB) for rural and residential zone and it is observed that all values are within the prescribed limit.

3.4.3.4 EXISTING TRAFFIC SCENARIO

Traffic scenario at the existing access road and traffic after the proposed expansion, based on the anticipated increased traffic was compared with volume capacity ratio as per IRC 106-1990 for two lane paved shoulder road.

The same is given below in table 3.11.

Table 3.9: Existing Traffic Scenario

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
Towards SK Mine	225	1500	0.15	A
Towards Fatehnagar	247.8	3000	0.082	A

Capacity as per IRC-106;1990 for guideline, for capacity,for Urban roads page 11 table 3.11

V= Volume in PCU's/hr & C= Capacity in PCU's/ hr LOS = Level of Service

Table3.10: Traffic Scenario Post expansion

Road	Increased PCU	Increased Volume	Capacity of Road	Modified V/C Ratio	LOS
Towards SK Mine	11.6	224.6 +11.6=236.2	1500	0.16	A
Towards Fatehnagar	3.7	247.8 +3.7=251.5	3000	0.083	A

Capacity as per IRC-106;1990 for guideline, for capacity,for Urban roads page 11 table 3.12

V= Volume in PCU's/hr & C= Capacity in PCU's/ hr LOS = Level of Service

Table 3.11: IRC V/C and performance class

V/C	LOS	Performance
0.0 - 0.2	A	Excellent
0.2 - 0.4	B	Very Good
0.4 - 0.6	C	Average
0.6 - 0.8	D	Poor
0.8 - 1.0	E	Very Poor
1.0 & above	F	Worst

The peak traffic level of existing road and after expansion for the both the access road was found to be in the category of excellent to excellent due to current very low traffic. Post expansion will have minimal impact on the current traffic as most of the traffic will be restricted between SK Mine to RD Mine. Detailed Traffic survey is enclosed as annexure-**XXXII**

3.5 WATER ENVIRONMENT

The mining lease is situated in Railmagra Block of Rajsamand District, which is categorized as **"over-exploited"** block as per the CGWA classification. The mine working will intersect the groundwater table.

3.5.1 DRAINAGE:

The hydrology of the area has been studied in order to assess the impact of the mining activities on the water quantity and water quality of the Banas River and tributaries.

The study area is drained by Banas River and its tributaries towards North, North west, East and is drained by Berach River towards South of study area. The river as well as tributaries are ephemeral and flow only in response to heavy precipitation. The Banas rises in Aravalli Hills about 5 km from Kumbhalgarh Fort and flowing Southwards meets the Gogunda Plateau. It flows through Rajsamand and Relmagra Tehsils and crosses into Chittorgarh and Bhilwara Districts. The predominant drainage pattern in the Western hill ranges is rectangular to sub-rectangular and it is dendritic to sub-dendritic in rest of the

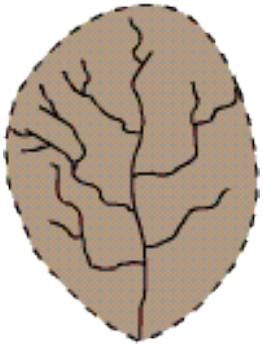
area. Drainage pattern in the Western hill region is controlled by fractures & joints and in rest of the area by subsurface lineaments.

The lease area is devoid of any surface water body such as lake, dam or river. Banas River flows about 8.2 km towards NNE of the lease. Numbers of dug wells exist within the study area with diameter varying from 1 m to 6 m and depth ranging from 5 m to 20 m.

Map showing drainage patterns within 10 km study area is detailed as under:

DENDRITIC DRAINAGE PATTERN:

A dendritic drainage pattern is the most common form and looks like the branching pattern of tree roots. It develops in regions underlain by homogeneous material. That is, the subsurface geology has a similar resistance to weathering so there is no apparent control over the direction the tributaries take. Tributaries joining larger streams at acute angle (less than 90 degrees)



Although there is a well defined drainage system having dendritic drainage pattern in the buffer zone, a major part of drainage has been harnessed by constructing minor irrigation projects and tanks. Whatever runoff is produced by the average annual rainfall of 571 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.

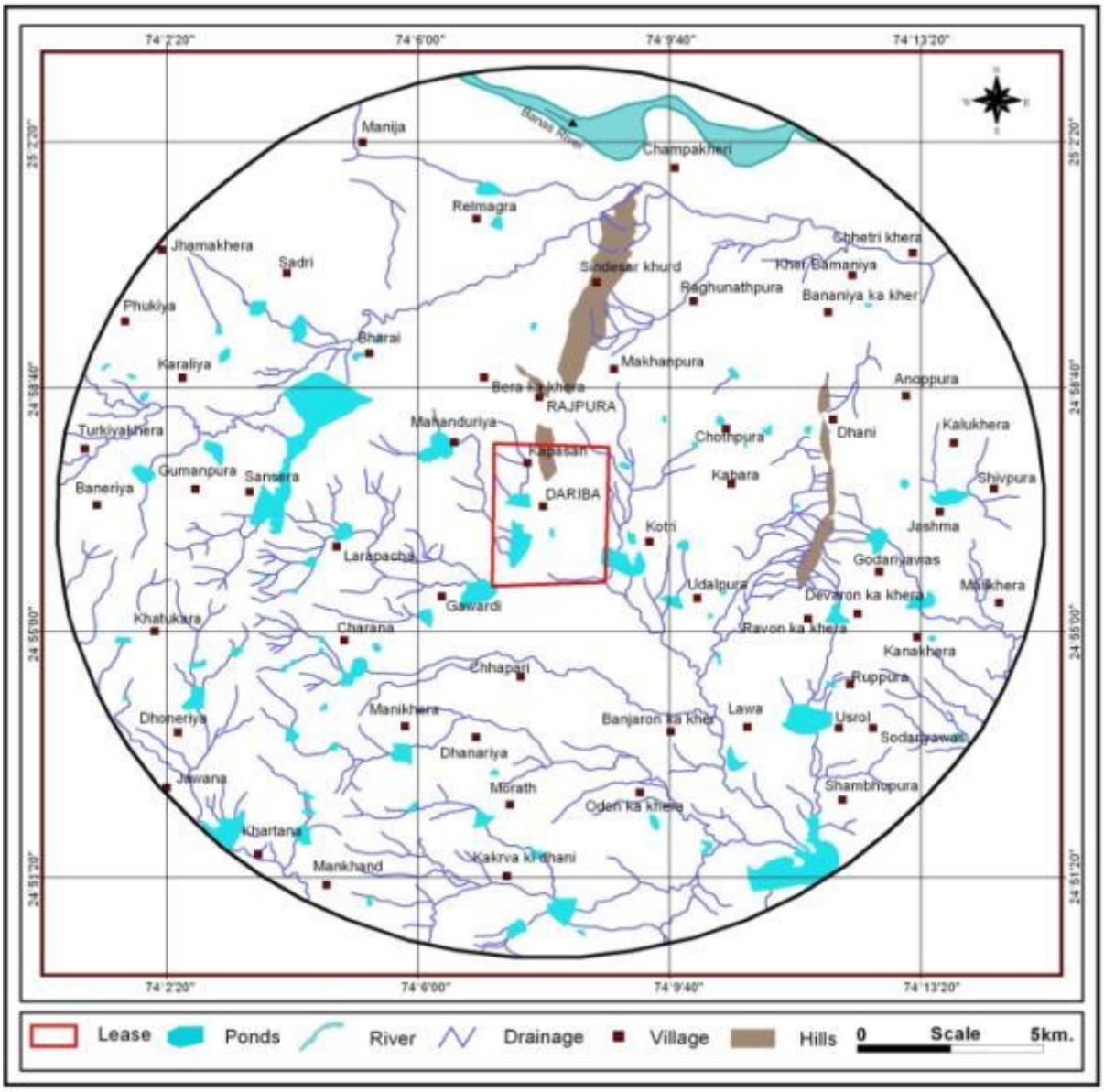


Figure 3.11: Drainage Map

3.5.2 HYDROGEOLOGY:

The principal source of water in the study area is groundwater. Ground water is the accumulation of water below the ground surface, caused by percolation of rainfall through pores and crevices. Percolated water accumulates when it reaches some impervious strata consisting of confined clay or confined rocks. Open wells and hand pumps are the major groundwater source of drinking water and are also used for limited irrigation. Tube wells in

the villages wherever available are used mainly for irrigation purpose and to a limited extent for domestic purpose.

The occurrence of ground water in the study area is mainly controlled by the topographic and structural features present in the geological formations. The principal source of ground water is precipitation. Out of the total rainfall received, a major part of it is lost as run-off and by evapo-transpiration through soil and vegetation. Only a small part of rainfall infiltrates down to reach ground water body. Groundwater occurs mainly under water table conditions in all formations. The important water bearing formation besides alluvium is the granite gneisses,schists, limestone and phyllites. In the hard rocks the occurrence and movement of ground water is controlled through the foliation/bedding planes, fissures, joints, solution cavities and other structural weak planes. The weathered mantle of the hard rocks yields good discharge of water. In alluvium, ground water occurs in the interstices of unconsolidated sand and gravel. Locally semi confined conditions are encountered both in hard rock and alluvium. The hydrogeology of Rajsamand district with study area marked is shown in Fig. 3.14

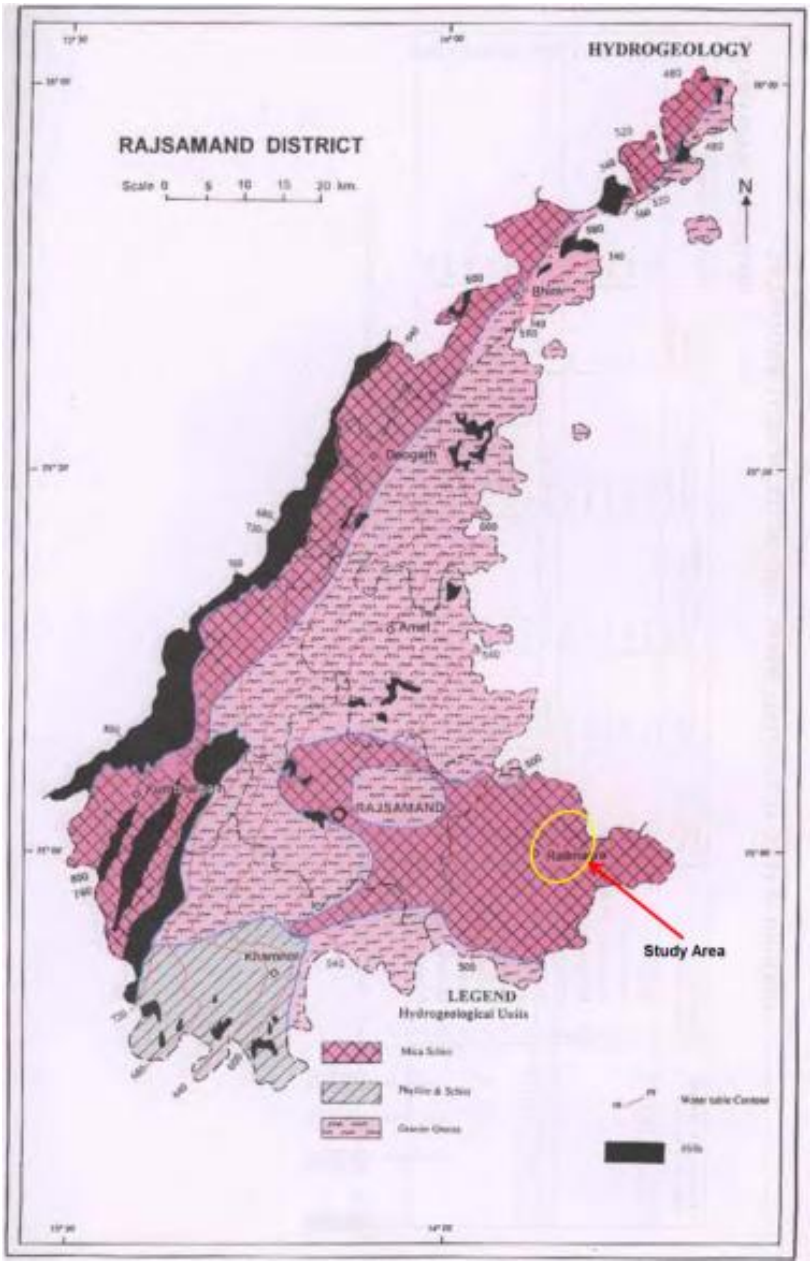


Figure 3.14:Hydrogeology of Rajsamand District

3.5.2.1 GROUND WATER POTENTIAL

Ground water resources availability, utilization stage of development in Railmagra Block of Rajsamand District (as on 2013) is summarized as under:

Table 3.12: Ground water potential

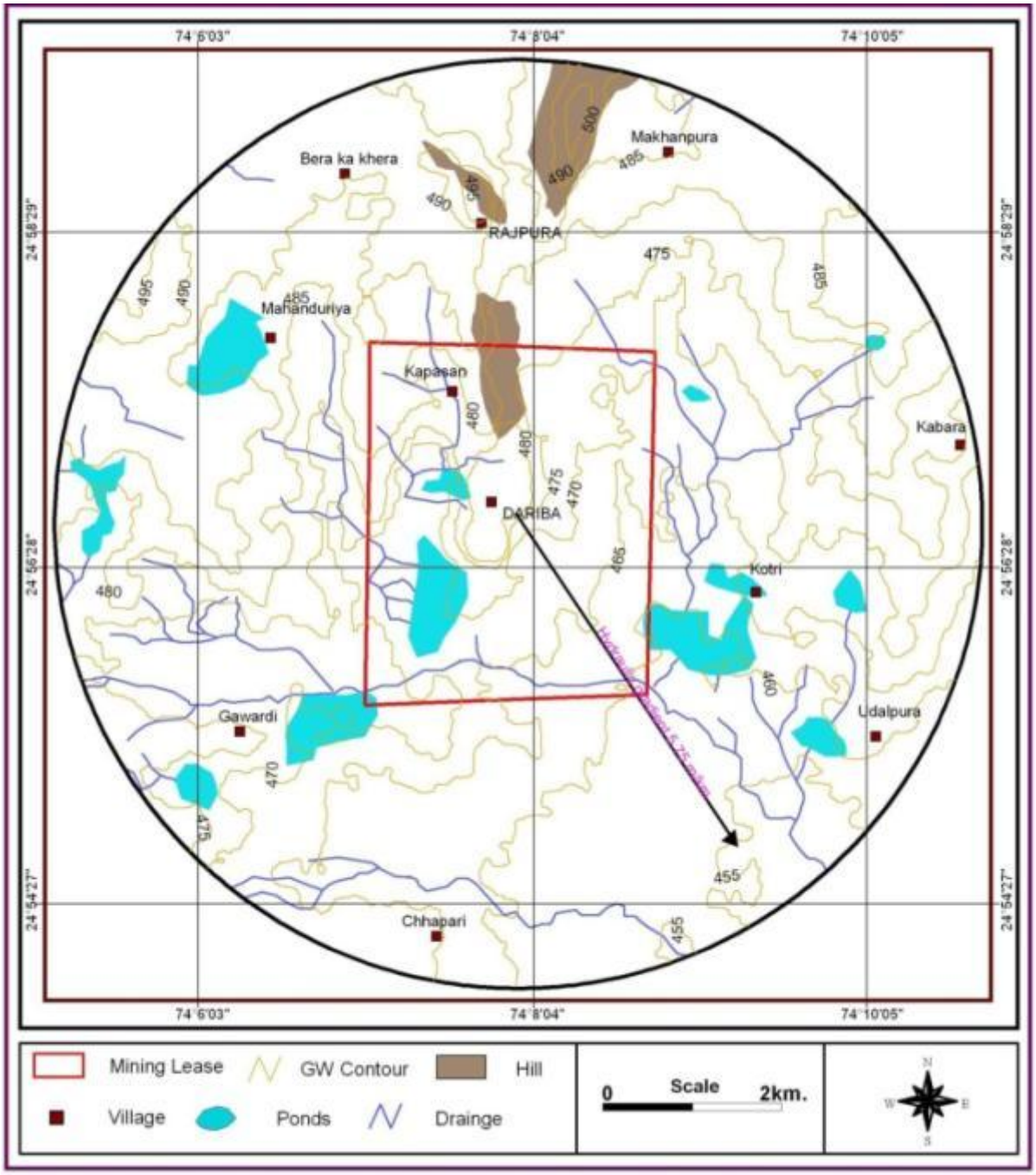
S. No.	Particulars	Details
1.	Net ground water availability	13.0862 MCM
2.	Annual ground water draft:	18.8620 MCM
a.	Irrigation	17.5206 MCM
b.	Domestic & Industrial use	1.3414 MCM
2.	**Total**	
3.	Stage of ground water development (%)	-144%
4.	Category	Over-exploited
(Source: CGWA Publication - 2013)		

3.5.2.2 GROUND WATER MOVEMENT:

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

The ground water movement is controlled mainly by the hydraulic conductivity of aquifer. A review of the topography and drainage pattern reveals that the general slope of the area is towards south east, and ranges from 6 m/km to about 7 m/km. The ground water flow also follows the topography and surface water flow direction and moves in south east direction. However, the hydraulic gradient is moderate and has been observed as 5.75 m/km as calculated from the monitoring of wells of the area.

Figure 3.15:Ground water contour map of the buffer zone showing ground water flow direction and hydraulic gradient



3.5.3 WATER QUALITY:

The baseline water quality in the study area was analysed for ground and surface water samples. The sampling locations were selected based on reconnaissance survey with the considerations of:

- presence of water resource;
- access to water resource; and
- Representative coverage of study area.

The quality of groundwater water was compared with IS: 10500 and surface water was compared with CPCB discharge standard for aquatic resources. Total of 8 groundwater locations and 2 surface water locations were identified. The details of the sampling locations identified in the study area for water quality monitoring are given in Table 3.14.

The water quality was assessed for physical, chemical and bacteriological parameters as per the Bureau of India Standards IS: 10500 specifications with additional parameters such as COD, BOD & DO etc.

Table 3.13: Analytical Protocol followed for Water Quality Monitoring and Analysis

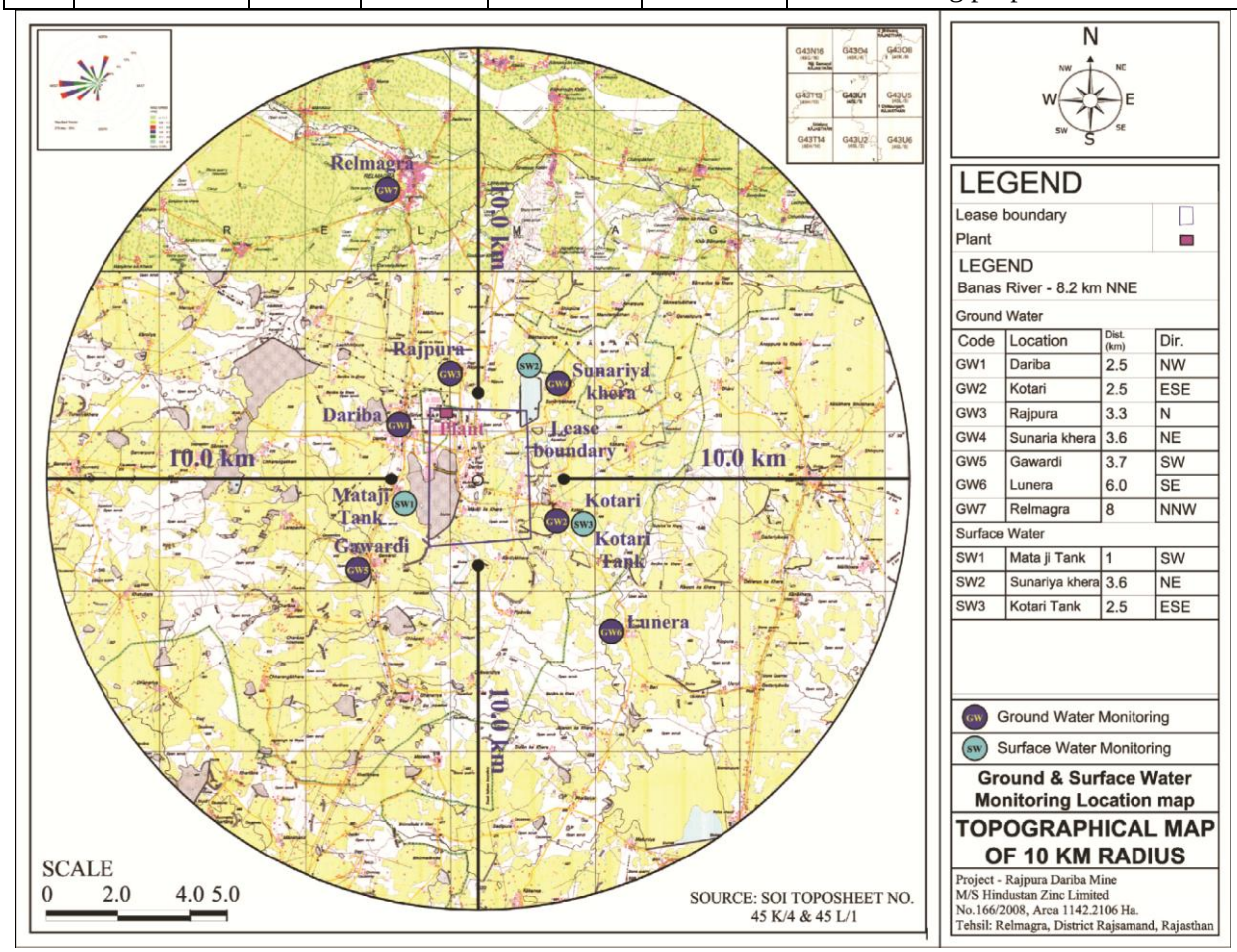
S. N	Parameter	Protocol Followed	Detection Limit
1.	True Colour, Hazen Unit	IS:3025 (Part-4)	1
2.	Odour	IS:3025 (Part-5)	-
3.	Taste	IS:3025 (Part-7&8)	-
4.	Turbidity, NTU	IS:3025 (Part-10)	1
5.	pH	IS:3025 (Part-11)	2
6.	Total Hardness (as $CaCO_3$), mg/l	IS:3025 (Part-21)	6.6
7.	Iron (as Fe), mg/l	IS:3025 (Part-53)	0.3
8.	Chlorides (as Cl), mg/l	IS:3025 (Part-32)	1
9.	Fluoride (as F), mg/l	IS:3025 (Part-23)	0.1
10	Total Dissolved solids, mg/l	IS:3025 (Part-16)	25
11	Magnesi0um (as Mg), mg/l	IS:3025 (Part-46)	10
12	Calcium (as Ca), mg/l	IS:3025 (Part-40	1

S. N	Parameter	Protocol Followed	Detection Limit
13.	Copper (as Cu), mg/l	IS:3025 (Part-42)	0.01
14.	Manganese as Mn, mg/l	IS:3025 (Part-35)	0.01
15.	Sulphate (as SO4), mg/l	IS:3025 (Part-24)	1
16.	Nitrate (as NO3), mg/l	IS:3025 (Part-34)	1
17.	Phenolic Compounds (as C_6H_5OH), mg/l	IS:3025 (Part-43)	0.001
18.	Mercury (as Hg), mg/l	IS:3025 (Part-48) Mercury Analyzer	0.001
19.	Cadmium (as Cd), mg/l	IS:3025 (Part-41)	0.002
20	Selenium (as Se), mg/l	IS:3025 (Part-56)/IS 15303	0.01
21.	Arsenic (as As), mg/l	IS:3025 (Part-37)	0.01
22.	Cyanide (as CN), mg/l	IS:3025 (Part-27)	0.002
23.	Lead (as Pb), mg/l	IS:3025 (Part-47)	0.01
24.	Zinc (as Zn), mg/l	IS:3025 (Part-49)	0.2
25.	Anionic D0etergents (MBAS), mg/l	Annex. K , IS 13428	0.1
26.	Chromium (as Cr+6), mg/l	IS:3025 (Part-52)	0.01
27.	Mineral Oil, mg/l	APHA 5520 C & IS 3025 (Part 39)	0.1
28.	Alkalinity (as CaCO3), mg/l	IS:3025 (Part-23)	0.5
29.	Aluminium (as Al), mg/l	IS:3025 (Part-55)	0.01
30.	Boron (as B), mg/l	IS:3025 (Part-29)	0.01
31.	Barium	Annex. F, IS 13428 / IS 15302	0.01
32.	Molybdenum (as Mo)	APHA Method	0.01
33.	Sulphide (as H_2S)	IS:3025 (Part-29)	0.05
34.	Nickel (as Ni)	IS:3025 (Part-54)	0.01
35.	TPH	ASTM D3921-96-2011	1
37.	MPN Coliform/ 100 ml	IS : 1622, 1981 (2003)	2
38..	Tests for detection of E.Coli	IS : 1622, 1981 (2003)	2
39.	Dissolved Oxygen, mg/l	APHA 4500 O-C	0.1
40.	Salinity, parts per thousand	APHA 2520 B	0.0155
41.	Chemical Oxygen Demand, mg/l	APHA 5220 B	4
42	Biochemical Oxygen Demand (at 20°C for 5 days), mg/l	IS:3024 (Part-44)	0.1

Table 3.14: Water Sampling Locations in the study area

S. N.	Sampling Location	Station Code	Type of Sample	Distance w.r.t boundary of ML	Direction w.r.t lease area	Justification for the selection
Ground water sampling locations						
1	Dariba	GW1	Ground Water	2.5 km	NW	Representing groundwater quality for use in domestic services by village located in close vicinity to the project site.
2	Kotari	GW2	Ground Water	2.5 km ;	ESE	Representing groundwater quality for use in domestic services by village located towards ESE the project site.
3	Rajpura	GW3	Ground Water	3.3 km ;	N	Representing groundwater quality for use in domestic services by village located in close vicinity towards north of the project site.
4	Sunaria Khera	GW4	Ground Water	3.6 km ;	NE	Representing groundwater quality for use in domestic services by village located towards NE of project site.
5	Gawardi	GW5	Ground Water	3.7 km ;	SW	Representing groundwater quality for use in domestic services by village located towards SW of the project site.
6	Lunera	GW6	Ground Water	6.0 km ;	SE	Representing groundwater quality for use in domestic services by village located towards SE of the project site.
7	Relmagra	GW7	Ground Water	8.0 km ;	NNW	Representing groundwater quality for use in domestic services by village located towards NNW of the project site.
Surface water sampling locations						
9	Mata ji Tank	SW1	Surface Water	1.0 km ;	SW	Representing surface water quality in SW portion of the study area. The pond is being used for irrigation and cattle drinking purposes.
10	Sunariya Khera	SW2	Surface Water	3.6 km ;	NE	Representing surface water quality in NE portion of the study area.

11	Kotari Tank	SW3	Surface Water	2.5 km ;	ESE	Representing surface water quality in ESE portion of the study area. The tank is being used for irrigation and cattle drinking purposes.



Source: Survey of India toposheet and DEM

Figure 3.16: Water sampling locations in the Study Area

Table 3.15: Primary Water Quality Criteria for Designated-Best-Use-Classes

Designated-Best-Use	Category	Criteria Description
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20^{o}C 2mg/l or less

Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25^{o}C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Source: CPCB

Table 3.16: Results of GW & SW analysis

S.No	PARAMETERS	Unit	Dariba	Kotari	Rajpura	Sunaria Khera	Gawardi	Lunera	Relmagra	Mata ji Tank	Sunariya Khera	Kotari Tank
			GROUND WATER							SURFACE WATER		
			GW1	GW2	GW3	GW4	GW5	GW6	GW7	SW1	SW2	SW3
1	pH value	-	6.72	7.83	7.12	7.84	7.24	7.18	7.36	7.93	7.38	7.27
2	Temperature	^{0}C	27.2	26.7	27.3	29.1	27.4	29.3	28.3	29.3	28.3	27.9
3	Turbidity	NTU	<1	<1	<1	2.5	3.8	3.2	4.2	<1	6.3	4.3
4	Total Hardness (as CaCO3)	mg/L	900	148	412	48	478	912	537	16	283	233
5	Total Alkalinity (as $CaCO_3$)	mg/L	258	272	388	265	342	357	1152	432	512	446
6	Chlorides (as Cl)	mg/L	412.00	118.70	134.20	235.00	248.00	578.40	910.00	84.30	268.30	157
7	Sulphate (as SO_4)	mg/L	178.3	72.4	37.2	83.2	217.2	262	217.3	8.4	87.3	43.2
8	Nitrite	mg/L	0.43	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9	Nitrate (as NO_3)	mg/L	0.078	0.47	0.66	0.105	0.68	0.64	0.77	1.47	2.46	1.87
10	Fluoride (as F)	mg/L	0.48	1.17	1.6	BDL	BDL	BDL	BDL	0.67	0.63	0.58
11	Sodium (Na)	mg/L	103.12	162.23	60.23	278.32	285.32	645.00	1123.00	12.34	198.32	137.1
12	Potassium (K)	mg/L	8.23	4.87	4.12	8.32	3.23	6.78	7.12	3.12	5.13	4.4
13	Salinity	Ppt	1.4132	0.523	0.645	0.9321	1.4231	2.54321	2.9832	0.5423	0.8732	0.6237
14	Total Nitrogen	mg/L	3.88	1.88	1.78	3.23	2.74	5.3	4.3	3.65	6.21	4.78

15	Total Phosphorus	mg/L	0.84	0.65	0.92	0.8	0.91	1.45	1.68	8.3	8.3	8.1
16	DO	mg/L	4.1	3.2	3.7	2.8	3.6	3.4	3.9	5.0	4.8	4.6
17	BOD	mg/L	0.4	0.3	0.7	0.4	0.6	1.8	0.3	5.2	18	8.3
18	COD	mg/L	16	8	15	12	14	18	12.4	54	180	103
19	Phenolic Compounds (as C_6H_5OH)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Iron (as Fe)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.41	BDL
22	Arsenic(as As)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Total Chromium (as Cr)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Chromium Hexavalnt (as $Cr+^{6}$)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Mercury (as Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Copper (as Cu)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Selenium (as Se)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Oil & grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31	Total Coliform	mg/L	<2	<2	<2	21	<2	<2	10	<2	400	109
32	Faecal Coliform	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
33	Colour	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
34	Odour	mg/L	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
35	TDS	mg/L	2021	680	664	974	1260	2040	3520	175	1120	786

36	RFC	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
37	Boron	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
38	Sulphide	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
39	Cyanide	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Results & Discussions:

Physico-Chemical Parameters

Ground water

- pH of the groundwater samples were found in the range of 6.72 to 7.84 as against the drinking water norm of 6.5 to 8.5.
- The level of dissolved solids in the groundwater samples varied from 664 mg/l to 3520 mg/l. It was observed that at all locations TDS was above the acceptable limit, however within the permissible limit of 2000 mg/l. Except Groundwater sample at GW1 (Dariba),GW6(Lunera) and GW7(Relmagra) was found to have TDS above the permissible limit.
- The chloride concentration ranged from 118.70 mg/l to 910.00 mg/l in the groundwater samples. Most of the groundwater samples had chloride concentration was found to be below the acceptable limits (250 mg/l) except GW1 (Dariba), GW6 (Lunera) and GW7(Relmagra), however these samples were found to have chloride within the permissible limit of 1000 mg/l.
- Alkalinity varied from 258 mg/l to 1152 mg/l in the groundwater samples. Total alkalinity was found to be exceeded the acceptable limit (200 mg/l) in all the water samples, however most of samples except GW7 (Relmagra), were observed to have alkalinity concentration within permissible limit of 600 mg/l..
- The fluoride level in the most of the groundwater samples was observed to be Below Detectable Limit. GW-1(Dariba) have fluoride concentration below the acceptable limit, however, at GW-2 (Kotari) the fluoride concentration is found to have above the acceptable limit, but found within permissible limit of 1.5 mg/l but at GW3 (Rajpura)observed value is slightly above permissible limit i.e. 1.6 mg/l.
- The Sulphate and nitrate concentrations in the groundwater samples was observed to be in the range of 37.2 mg/l to 217.3 mg/l (for Sulphate) and from 0.078 to 0.77 (for nitrate).Sulphate at most of the locations except GW5 (Gawardi), GW7 (Relmagra) were found to be within the acceptable concentration limit of 200 mg/l.
- Level of Phenolic compounds and Heavy Metals was observed to be BDL in all the groundwater samples.

Surface water

SW1 Mata ji Tank

The tank water has limited use in terms of human consumption and is one of the surface water resources where water was observed during the summer season. During monsoon and post-monsoon, when water body receives rain water and runoff, this water body can be utilised as outdoor bathing (Category B) and propagation of wildlife and fisheries (Category D). The monitoring result shows that pH value was 7.93. The COD and BOD level was 54 mg/l and 5.2 mg/l respectively and DO is 5 mg/l. The coliform was <2. The analyzed water quality of the Mata ji Tank sample indicates water was not suitable for outdoor bathing, i.e. Class 'B', however, it is fit for propagation of wildlife and fisheries, i.e. Class 'D'

SW-2 Sunariya Khera

The water is used for irrigation and cattle drinking and is one of the surface water resources where water was available during the summer season. The monitoring result shows that pH value was 7.38. The DO and BOD level was 4.8 mg/l and 18 mg/l respectively. The Coliform contents were observed to be 400 organisms/100ml. The Sodium and chloride content was 198.32 mg/l was 255.50 mg/l respectively. The analyzed water quality of the sample indicates water was not suitable for irrigation purpose, i.e. Class 'E', however, it is fit for propagation of wildlife and fisheries, i.e. Class 'D'.

SW3 Kotari Tank

The tank water has limited use in terms of human consumption and is one of the surface water resources where water was observed during the summer season. During monsoon and post-monsoon, when water body receives rain water and runoff, this water body can be utilised as outdoor bathing (Category B) and propagation of wildlife and fisheries (Category D). The monitoring result shows that pH value was 7.27. The COD and BOD level was 103mg/l and 8.3 mg/l respectively and DO level is 4.6 mg/l. The Coliform contents were observed to be 109 organisms/100ml. The analyzed water quality of theTank

sample indicates water was not suitable for outdoor bathing, i.e. Class 'B', however, it is fit for propagation of wildlife and fisheries, i.e. Class 'D'

3.6 NOISE ENVIRONMENT

3.6.1 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. 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 human ear. The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise.

The main objective of noise monitoring in the study area is to establish the baseline noise level and assess the impact of the total noise expected to be generated during the project operations around the project site.

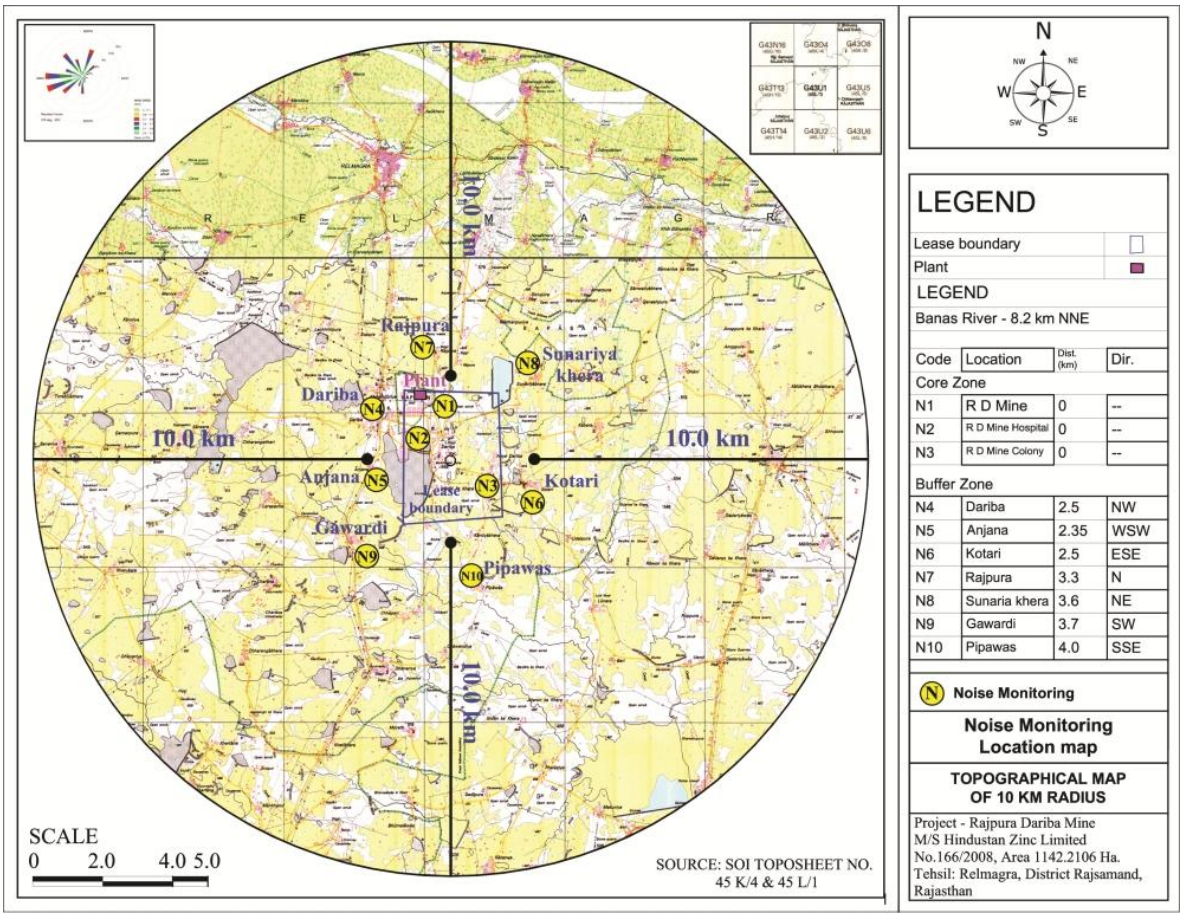
3.6.2 IDENTIFICATION OF SAMPLING LOCATIONS

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Noise at different generating sources has been identified based on the residential, industrial and commercial activities in the area.

The noise monitoring has been conducted for determination of noise levels at ten locations covering both core and buffer zone in the study area. The noise levels at each location were recorded for 24-hrs. The environment setting of each noise monitoring location is given in Table 3.17.

Table 3.17:Details of Noise Monitoring Locations

S N.	Sampling Location	Station Code	Type of Activity	Distance (km) w.r.t border of ML	Direction w.r.t ML	Remarks
1.	R D Mine	NQ 1	Mining (Industrial)	Within ML	0	Represent the Noise level within the Project site
2.	R D Mine Hospital	NQ 2	Mining (Industrial)	Within ML	0	Represent the Noise level within the Project site
3.	R D Mine Colony	NQ 3	Residential	Within ML	0	Represents residential area with in ML.
4.	Dariba	NQ 4	Residential	2.5 km	NW	Represents residential area in NW part of the study area and in close vicinity to the Project site.
5.	Anjana	NQ 5	Residential	2.35 km	WSW	Represents residential area in WSW part of the study area and in close vicinity to the Project site.
6.	Kotari	NQ 6	Residential	2.5 km	ESE	Represents residential area in ESE part of the study area and in close vicinity to the Project site.
7	Rajpura	NQ 7	Residential	3.3 km	N	Represents residential area in N part of the study area and in close vicinity to the Project site.
8	Sunaria Khera	NQ 8	Residential	3.6 km	NE	Represents residential area in NNE part of the study area and in close vicinity to the Project site.
9	Gawardi	NQ 9	Residential	3.7 km ;	SW	Represents residential area in SW part of the study area and in close vicinity to the Project site.
10	Pipawas	NQ 10	Residential	4.0 km	SSE	Represents residential area in SSE part of the study area and in close vicinity to the Project site.



Source: Survey of India Toposheet

Figure 3.17: Map Showing Noise and Traffic Sampling Locations in the Study Area

3.6.3 METHOD OF MONITORING

Instant Sound Level Meter measurements were recorded at eight locations. The readings were taken for every hour for 24 hrs. 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 the study area.

The details of the instrument used for the sampling is mentioned below:-

Instrument	Make	Model No.	Instrument Identification	Detection Limit
Integrated Sound Level measurement Instrument	Lutron	Sl-4001	SAL/ NOISE/ INT/ 01	Lo 30-80 dB Hi 80 – 130 Db

Standard Accessories				

Testing Method to be followed

Particular		Testing Method to be followed
A	Noise level in dB(A) for continuous 24 hours at 1 hour interval	Operational manual of Noise Level Meter, Meter No. DT-805 issued by Mextech

Measured noise level displayed as a function of time provides a useful scheme for describing the acoustical climate of a community. Noise levels recorded at each station are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined as mathematically

$$10 \text{ Log} 1/ T \sum (10^{Ln/10})$$

Where L = Sound pressure level a function of time dB (A)

T = Time interval of observations

Noise levels during the night time generally drop, therefore to compute equivalent noise levels for the night time, noise levels are decreased by 10 dB(A) as the night time highnoise levels are judged more annoying compared to the day time.

Noise levels at a particular station are represented as Day-Night equivalent (L_{dn}). Day – Night equivalent is the single number index designed to rate environmental noise on daily/ 24 hourly basis. Mathematically L_{dn} is given by

L_{eq} (day – night) = $10\log \{1/24 (15x10^{(Ld/10)} + 9 \times 10^{(Ln + 10)/10)}\}$

Where :-

L_{eq} (day) = A weighed equivalent for day time period (6 am to 10 pm)

L_{eq} (night) = A weighed equivalent for night time period (10 pm to 6 am)

3.6.4 BASELINE DATA

The statistical analysis is done for measured noise level at eight locations in the study area. The parameters are analyzed for L_{eq}(Day), L_{eq} (night) and L_{eq} (day-night). The statistical analysis results are given in table 3.20.

Table 3.18: Noise Levels in the Study Area during April 2017

Units – dB (A)

S. N.	Sampling Locations	Land use	Leq Day	Leq Night	Leq Day-Night	CPCB Limits Leq (dBA)	
						Day	Night
1	NQ1	Industrial	53.1	42.3	52.1	***75***	***70***
2	NQ2	Industrial	52.2	41.9	51.6	***75***	***70***
3	NQ3	Residential	53.1	42.3	52.1	***55***	***45***
4	NQ4	Residential	51.7	43.0	50.4	***55***	***45***
5	NQ5	Residential	51.8	42.5	50.8	***55***	***45***
6	NQ6	Residential	52.0	42.7	51.4	***55***	***45***
7	NQ7	Residential	52.2	43.2	51.4	***55***	***45***
8	NQ8	Residential	53.1	42.2	52.1	***55***	***45***
9	NQ9	Residential	52.6	40.8	51.6	***55***	***45***
10	NQ10	Residential	52.2	42.4	51.7	***55***	***45***

The baseline noise monitoring in the study area was carried out at 10 locations during the study period. The day time and night time equivalent noise levels monitored at all the residential receptors were found within the prescribed norms. The noise levels within the ML were observed to be within the prescribed industrial noise limit during day and night time

3.7 BIOLOGICAL ENVIRONMENT

3.7.1 Introduction

The survey was undertaken to determine the sensitivities/activities in the core zone area (Rajpura Dariba Lead-Zinc Mine, M.L. No. 166/2008 area 1142.2106 ha.) and buffer area of 10 km radius from the boundary of the mining lease area. The ground herbaceous flora

was completely parched or only available near the moist areas. The temperature ranged between a maximum of 39-34°C to a minimum of 28-26°C.

3.7.2 Objective of the Study

The study was undertaken with the following objectives

Floral Status

- Identify floral species within the mine lease and area in 10 km radial distances around the core mine area ;
- Assessment of conservation status of species in conformation of the Indian Wildlife Protection Act (1972) and its amendments, IUCN red-list (2014) and endemic status of the flora in the area along with their use by local communities;
- Identification of major vegetation types of the study area;
- Identification of impacts to the vegetation in the study area due to proposed expansion of lead and zinc mining and beneficiation plant;

Faunal Status

- Identification of all faunal species (wild, avian, terrestrial and aquatic) within 10 km radial distances around the core mine area;
- Classification of these fauna based on their conservation status as per IUCN red-list (2014) and Indian Wildlife Protection Act (IWPA), 1972 and its amendments along with their endemic status;
- Identification of impacts to faunal species due to proposed expansion (such as possibility of travel to, foraging in, or breeding in the core mine area by these animals (which may be disrupted by the mining activities), as well as other potential impacts on these fauna);
- Preparation of detailed mitigation measures required, for the identified impacts on flora and fauna within the study area due to proposed expansion of lead and zinc mining.

3.7.3 Approach and Methodology

The ecological survey was conducted to enumerate the floral and faunal status qualitatively and quantitatively.

Floral Status

A total of 10 sampling plots laid across different habitats were surveyed to enumerate the floral species in the study area. The location details of these sample plots are given in ***Table 3.19***.

Table 3.19:Details of Surveyed Sampling Plots

Sampling Code	Sampling Location	Latitude	Longitude	Vegetation Types
SP1	Gawardi	24°55'39.17"N	74° 5'49.86"E	Scrub Vegetation
SP2	Ladpacha	24°56'48.34"N	74° 4'45.43"E	Agricultural Land
SP3	Jeetawas	25° 3'16.30"N	74° 7'57.07"E	Agricultural Land
SP4	Navakhera (Raghunathpura)	25° 0'4.09"N	74° 9'53.94"E	Scrub Vegetation
SP5	Manjhawas	25° 4'19.90"N	74°11'45.32"E	Scrub Vegetation
SP6	Sindesar Khurd	24°59'55.84"N	74° 8'14.11"E	Scrub Vegetation
SP7	Dhani	24°57'45.23"N	74°11'31.81"E	Scrub Vegetation
SP8	Junda	25° 5'29.32"N	74° 9'12.34"E	Scrub Vegetation
SP9	Lunera	24°54'41.72"N	74°10'21.82"E	Agricultural Land
SP10	Mataji Ka Khera	24°56'24.42"N	74° 7'36.33"E	Scrub Vegetation

Phytosociology of floral species was assessed in the representative habitat types; agricultural land, scrub land and water bodies existing within 10 km radius of the project boundary. Quantitative data was collected using standard quadrat methods of sample plot

size 20 m x 20 m for trees, 5 m x 5 m for shrubs and 1 m x 1 m for herbs and grasses. Frequency, density, abundance and Importance Value Index (IVI) were calculated using standard methodologies (1). Sample plot is described *in* ***Figure 3.20.***

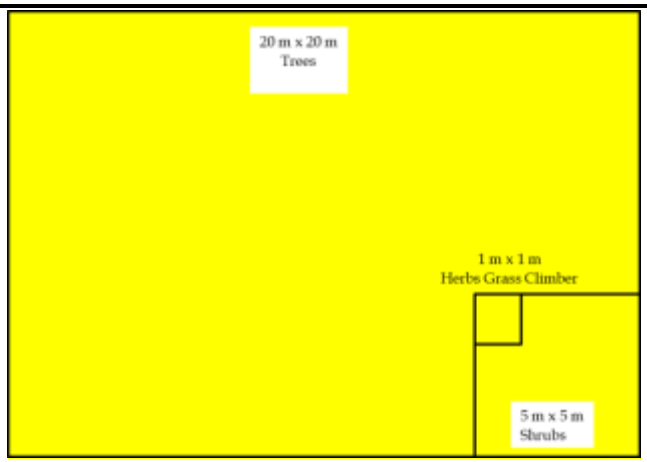


Figure 3.202: Description of Sample Plot

Species richness in the study area was determined by using Margalef's Index (2) and Menhinik's Index (3) and species diversity was calculated based on Simpson's diversity Index (4) and Shannon Weiner Index (5) for the trees, shrubs and herbs.

Faunal Status

Faunal status of different fauna groups was established by using standard methods as described below.

(1) Misra, K.C., 1974, Manual of Plant Ecology, Oxford and IBH Publishing Co., New Delhi.p 376.

(2) Margalef DR 1958, Information theory in ecology. Gen. Sys. 3:36-71

(3) Menhinick EF 1964. A comparison of some species-individual diversity indices applied to samples of field insects. Ecology 45: 859-861

(4) Simpson EH 1949 Measurement of Diversity: Nature, 163:688

(5) Shannon CE & W Weaver 1949 The Mathematical Theory of Communication. University of Illionis Press. Urbana, IL USA.

Herpetofauna

Intensive search was made along the hedges of representative aquatic habitats and open wells located in the study area, were checked to identify and list the amphibians.

Status of reptiles was assessed using Intensive Time Constrained Search Methods [(1) (2)] covering different micro habitats surveyed within the core and buffer zones of the study area.

Avifauna / Birds

Avifauna and aquatic birds were enumerated by different habitat (terrestrial as well as aquatic) surveys within the study area. Avian identification was carried out with standard field guides [(3)].

Mammals

Habitat survey for mammals was conducted. Direct sightings as well as indirect sightings such as presence of pug marks, scats, hairs, and spines were used for identification. Identification of the mammals followed standard literature. [(4)(5)]

Secondary literature from published books and research publications were also consulted for the flora and fauna of the study area. Faunal were assessed using the IUCN Red list (2014) and the species listed in schedule 1-6 of IWPA, 1972 to confirm their conservation status. Consultation with the Forest Department was carried out to confirm the presence of possible wildlife species in the area.

(1)Welsh, H.H., jr. 1987. Monitoring herpetofauna in woodlands of north western California and south west Oregon: a comparative strategy. Pp. 203-213. In. Multiple – Use Management of Califirnia's hardwood resources. T.R. Plumb, N.H. Pillisbury (eds. Gen. Tech. Regional Environmental Planning. PSW – 100) US Department of Agriculture, Forest Service.

(2)Welsh, H.H. Jr. and Lind, A. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and south western Oregon. Pp: 395-411. In: Wildlife and vegetation of unmanaged Douglas-fir forests. (Tech.Coords). L.F. Ruggiero, K.B. Aubry, A.B. Carey and M.H. Huff.Ge.Tech. Rep. PNW-GTR-285. Portland, OR: US. Department of Agriculture, Forest Service.

(3) Birds of India, Srilanka, Pakistan, Nepal, Bhutan, Bangladesh and Maldives. 2000. KrysKazmeierczak and Ber Van `Perlo. Om Field Guides.

(4) Prater. S. H. 2005. The Book of Indian Animals. Bombay Natural History Society and Oxford University press 12th Edn. pp. 316.

(5) Menon, V. 2003. A field guide to Indian Mammals. Dorling Kindersley (India) Ltd. New Delhi. 201 p.

3.7.4 Vegetation Analysis

Vegetation at Mine Lease Area (ML areaorCore Zone)

The natural vegetation at project site is represented by small natural shrubs and herbs such as *Calatropis procera, Tridex procumbens, Solanum nigerum, Euphorbia hirta, Indigofera cordifolia, Parthenium hysterophorum* and *Sida acuta.* The naturally occurring tree species are *Butea monosperma* and *Prosopis juliflora*. As a part of the green belt development plan, many individuals of *Dalbergia sisso, Cassia siamea, Azadirachta indica* and *Leucaena leucocephala* have been planted. The plantation has been raised using drip irrigation as a part of water conservation measures. A view of the green belt plantation in ML area is given in ***Figure 3.21.***

Figure 3.21:Green Belt Plantation at Mining Lease Area

Vegetation at Buffer Zone

The vegetation in the study area can be classified as Dry Deciduous and Thorn. The Dry Deciduous vegetation in the study area is represented by the tree species of *Anogeissus*

pendula, *Lannea coromandelica*, *Boswellia serrata*, *Cassia fistula*, *Albizia odoratssima*, *Wrightia tinctoria*, *Mitragyna parviflora*, *Butea monosperma*, *Dalbergia sissoo* and *Diospyros montana*. The throrn vegetation in the study area is represented by species of *Acacia senegal*, *Acacia luecophloea*, *Prosopis cineraria*, *Prosopis juliflora*, *Anogeissus pendula*, *Grewia tenax* and *Mimosa hamate.*

The various habitats in the buffer zone arebelow.

Figure 3.22:Habitats within the Buffer Area

Euphorbia Royleana

*Acacia Nilotica(*along the road side near projectSite)

Prosopis juliflora growth near Project Site

Dry deciduous vegetation (*Butea monosperma*)

Vegetation fencing (*Azadirachtaindica)* along Agricultural Land

*Albizia lebbeck*growth near Project Site

Dried Bharai Reservoir

Ajana Pond

Pond near Jeetawas Village

Waterbody at Mata jikaKhera with agglomeration of birds.

Source: Secondary Data from ERM Ecological Survey data 12th to 17th May 2014

3.7.5 Floral Assessment

The phytosociology of trees, shrubs herbs and grasses observed/ reported in the study area are given below.

Phytosociology of Tree species

A total of 30 tree species were enumerated from the study area. The highest relative density and IVI is recorded for *Acacia nilotica* (RD-42.2/IVI-42.9). The details of tree species are provided in ***Table 3.20***

Table 3.20: Phytosociology of Tree species

Tree Species	Relative Frequency	Relative Density	Relative Abundance	Important Value Index
Acacia catechu	0.5	19.3	0.03	19.8
Acacia nilotica	0.6	42.2	0.07	42.9
Adina cordifolia	0.6	32.1	0.05	32.8
Alangium salvifolium	0.5	22.0	0.04	22.5
Andina cordifolia	0.6	26.6	0.04	27.3
Anogeissus pendula	0.2	13.8	0.02	14.0
Azadirachta indica	0.5	13.8	0.02	14.3
Bauhenia racemosa	0.5	26.6	0.04	27.1
Bauhenia varigata	0.4	21.1	0.03	21.5
Bombax ceiba	0.2	10.1	0.02	10.3
Boswellia serrata	0.5	8.3	0.01	8.8
Butea monosperma	0.6	25.7	0.04	26.3
Cassia fistula	0.3	4.6	0.01	4.9
Cassia siamea	0.4	19.3	0.03	19.7
Commiphora glieadense	0.6	18.3	0.03	18.9
Cordia mixa	0.5	23.9	0.04	24.4
Dalbergia sisso	0.5	20.2	0.03	20.7
Ficus benghalensis	0.4	16.5	0.03	16.9
Ficus racemosa	0.6	31.2	0.05	31.9
Ficus religeosa	0.6	18.3	0.03	19.0
Lannea coromandelica	0.6	22.0	0.04	22.6
Leucaena leucocephala	0.6	22.0	0.04	22.6
Mangifera indica	0.5	19.3	0.03	19.8
Phoenix sylvestris	0.5	23.9	0.04	24.4
Polyalthia longifolia	0.6	26.6	0.04	27.3
Prosopis cineraria	0.5	22.9	0.04	23.5
Prosopis juliflora	0.3	10.1	0.02	10.4
Tamarindus indica	0.6	26.6	0.04	27.2
Wrightia arborea	0.6	30.3	0.05	31.0
Wrightia tinctoria	0.2	8.3	0.01	8.5

Phytosociology of Shrubs Species

The shrub species in the study area were represented by 25 species. Highest Relative density was recorded for *Calotropis procera* (0.71). The details of shrub species are provided in Table- 3.21.

Table 3.21:Phytosociology of Shrub species

Shrub Species	Relative Frequency	Relative Density	Relative Abundance
Adhatoda zeylanica	0.53	0.83	0.07
Annona squamosal	0.53	0.84	0.07
Argyreia strigose	0.30	0.64	0.05
Barleria cristata	0.41	0.55	0.05
Blepharis linariaefolia	0.47	0.43	0.04
Calotropis procera	0.47	0.71	0.06
Capparis decidua	0.36	0.49	0.04
Carissa spinarum	0.36	0.28	0.02
Cassia auriculata	0.30	0.19	0.02
Cassia spinarum	0.30	0.27	0.02
Elytraria acaulis	0.24	0.30	0.02
Euphorbia cauduefolia	0.41	0.52	0.04
Euphorbia nevulia	0.36	0.33	0.03
Holarrhena pubscens	0.36	0.34	0.03
Jatropha gossypifolia	0.36	0.37	0.03
Lantana camara	0.47	0.47	0.04
Lantana whitiana	0.36	0.41	0.03
Leea indica	0.41	0.59	0.05
Prosopis juliflora	0.47	0.59	0.05
Pupalia lappacea	0.47	0.62	0.05
Ricinus communis	0.47	0.67	0.06
Rungia repens	0.53	0.47	0.04
Thespia lampas	0.47	0.49	0.04
Ziziphus mauritiana	0.36	0.40	0.03
Ziziphus nummularia	0.24	0.30	0.02

Phytosociology of Herbs and Grass species

Herbs and grasses in the study area were represented by 19 species. The highest relative density observed was for *Solanum nigerum (*0.105). Lists of species observed from the study area are given in ***Table 3.22.***

Table 3.22: Phytosociology of Herbs and Grass Species

Shrub Species	Relative Frequency	Relative Density	Relative Abundance
Achyranthes aspera	0.81	0.069	0.07
Ageratum conyzoides	0.51	0.038	0.04
Argemone Mexicana	0.71	0.079	0.08
Borreria pusilla	0.61	0.067	0.07
Cassia tora	0.61	0.046	0.05
Corchorus aestuans	0.71	0.062	0.06
Curcuma aromatic	0.40	0.044	0.04
Cynodon dactylon	0.51	0.067	0.07
Datura stramonium	0.20	0.022	0.02
Desmodium dichotomum	0.71	0.060	0.06
Euphorbia hirta	0.51	0.034	0.03
Grewia tiliifolia	0.40	0.032	0.03
Heteropogon contortus	0.61	0.052	0.05
Indigofera cordifolia	0.51	0.062	0.06
Physalis angulate	0.40	0.067	0.07
Solanum nigrum	0.51	0.105	0.11
Solanum suraentense	0.61	0.026	0.03
Themeda triandra	0.30	0.026	0.03
Tridex procumbens	0.40	0.044	0.04

Species Richness

The species richness in the study area was calculated based on total number of species, Margalef's Index and Menhinik's Index. The species richness observed in terms of number of species from the study area ranged from 40-49 species. Margalef's index calculated for different quadrates studied in the study area ranged from 7.5 to 9.2 while Menhinik's index calculated for different quadrats studied in the study area ranged from. 2.8 to 4.0. The species richness based on these three indicators suggests moderate species richness in the study area. The species richness across each quadrat sampled is given in ***Table 3.23.***

Table 3.23:Species Richness in the Study Area

Sample Plot	Total No. Species	Margalef's Index	Menhinik's Index
SP1	40	7.5	2.9
SP2	48	9.2	3.7
SP3	44	8.3	3.3
SP4	47	8.3	3.0
SP5	49	8.9	3.3
SP6	46	9.2	4.0
SP7	44	8.0	3.0
SP8	48	8.8	3.4
SP9	41	7.5	2.9
SP10	44	7.8	2.8

Species diversity

The species diversity is calculated based on Shannon Weiner Index (H'). The H' values calculated for tree species in *4.5*. H' values for shrub species were 2.71 and for herbs and grasses it was 4.1. These values show moderate diversity of species across the study area.

3.7.6 Aquatic Flora of the Study Area

The majority of water bodies have been dried up due to extreme summer conditions, however, perennial water bodies such as Jeetawas pond have aquatic flora such as *Eichornia crassipes, Typha augustata, Nelumbo nucifera and Ipomea species.*

3.7.7 Faunal Assessment

Faunal species from the study area were recorded based on direct sightings, and indirect evidence such as dung, droppings, scats, pugmarks, scratch signs, burrows, nests etc. and consultation with Forest Department officials and local communities. During consultation with communities, pictorial representations of species in from field guides and other literature of the fauna of India were shown. The species occurring within the study area are discussed in the following sections:

Faunal Species at Project Site

The project site facility is an industrial facility with disturbance such as vehicular movement, industrial noise and movement of industrial labours. Due to these activities, the

faunal species occurring at site are limited to a few reptiles, birds and smaller mammals. The common reptilian species observed from the project site are Garden Lizard (*Calotes versicolor and* Fan-throated lizard *(Sitana ponticeriana)*. The common avifaunal species observed at the project site are House Sparrow, Dusky-crag Martin, Rock Pigeon, Common Myna, Red-wattled Lapwing, Purple-rumped Sunbird, Grey Francolin and Small-green Bee-eater. Among the mammals, five striped squirrel was observed at site.

Faunal Species within Study Area

Faunal species observed/reported in the study area are given in the section below;

Herpetofauna

The Herpetofaunal (amphibian and reptilian) species found in the study area are discussed below and given in ***Figure 3.23***

Amphibians

A total of four (04) species belonging to 2 families were observed from the study area. None of the species have any conservational significance. The details of the species are given in ***Table 3.24.***

Table 3.24: Amphibians observed/recorded from the Study Area

S. No.	Common Name	Zoological Name	Family	Occurrence	WPA Schedule / IUCN Status
1	Indian Skipper Frog	*Euphlyctis cyanophlyctis*	Dicroglossidae	Frequent	LC /Not Listed
2	Common Indian Toad	*Duttaphrynus melanostictus*	Bufonidae	Common	LC
3	Indian Pond Frog	*Euphlyctis hexadactylus*	Dicroglossidae	Common	LC
4	Indian Bull Frog	*Hoplobatrachus tigerinus*	Dicroglossidae	Frequent	LC

Notes: LC-Least Concern,

Indian Skipper Frog in Jeetawas Pond

Indian Flapshell Turtle in Jeetawas Pond

Common Garden Lizard

Rat Snake near Ladpacha Pond

Figure 3.23:Herpetofaunal species observed in Study Area

Reptiles

A total of 11 species of 11 genera belonging to 9 families were observed from the study area. Monitor Lizard (*Varanus bengalensis*) and Indian Flapshell Turtle (*Lissemys punctata*) are listed as Schedule I species in the IWPA, 1972. None of the species are listed in the IUCN red-list (2014). A list of species observed/reported from the study area is given in ***Table 3.25.***

Table 3.25:List of Reptilian species observed/reported in Study Area

S. No.	Common Name	Zoological Name	Family	Occurrence	WPA Schedule / IUCN Status
1	Northern house Gecko	*Hemidactylus frenatus*	Gekkonidae	Observed	-/-
2	Fan-throated lizard	*Sitana ponticeriana*	Gekkonidae	Observed	-/-
3	Indian Garden Lizard	*Calotes versicolor*	Agamidae	Observed	-/-

S. No.	Common Name	Zoological Name	Family	Occurrence	WPA Schedule / IUCN Status
4	Keeled Grass Skink	*Eutropis carinata*	Scincidae	Observed	-/ LC
5	Monitor Lizard	*Varanus bengalensis*	Varanidae	Reported	I/LC
6	John's Earth Boa	*Eryx johnii*	Uropeltidae	Reported	IV/LC
7	Common Rat Snake	*Ptyas mucosa*	Colubridae	Observed	IV/LC
8	Saw-scaled viper	*Echis carinata*	Viperidae	Observed	IV/LC
9	Brahminy Worm Snake	*Ramphotyphlops braminus*	Tylopidae	Reported	IV/LC
10	Checkered Keelback	*Xenchrophis piscator*	Colubridae	Observed	II/ LC
11	Indian Flapshell Turtle	*Lissemys punctata*	Trionychidae	Observed	I/LC
12.	Indian Python	*Python molurus*	Pythonidae	Observed	I/-

Notes: LC-Least Concern, NT-Near Threatened

Avifauna

A total of 69 species from 42 families were observed within the Study area. Wooly-necked Stork (Ciconia episcopus) and Sarus Crane (Grus antigon) observed in the study area are listed as Vulnerable (IUCN Ver. 3.1, 2012) Black headed Ibis (Threskiornis melanocephalus), River Tern (Sterna aurantia) and Great Thick-knee (Esacus recurvirostris) are listed as Near Threatened as per IUCN Ver.3.1,2012). Some of the species were observed in addition to species list provided by the Forest Department.

Indian Peafowl (Pavo cristatus), Indian Grey Hornbill (Ocyceros birostris), White eyed Buzzard (Butastur teesa) and Black-shouldered Kite (Elanus caeruleus) are listed as Schedule I species as per IWPA, 1972. Northern Shovler (Anas clypeata) was the sole migratory bird encountered.

Among the feeding groups of avifaunal species, 32 species were insectivores, 8 species were carnivores, 7 species were piscivores, 5 species were frugivores, 5 species were granivores and 3 species were herbivores. A list of species of avifaunal species observed from the study area are given in ***Table 3.26*** and presented in ***Figure 3.24***

Table 3.26: Avifaunal species observed from the Study Area

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
1	**PHALACROCORACIDAE: Cormorants**						
1	Little Cormorant	*Phalacrocorax niger*	R	LC	IV	P	Freshwater wetland
2	**ARDEIDAE : Herons, Egrets**						
2	India Pond	*Ardeola grayii*	R	LC	IV	I	Freshwater wetland

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
	Heron						
3	Cattle Egret	*Bubulcus ibis*	R	LC	IV	I	Freshwater wetland
4	Little Egret	*Egretta garzetta*	R	LC	IV	P	Freshwater wetland
5	Grey Heron	*Ardea cinerea*	R	LC	IV	P	Freshwater wetland
6	Intermediate Egret	*Mesophoyx intermedia*	R	LC	IV	P	Freshwater wetland
3	**CICONIIDAE : Storks**						
7	Wooly-necked Stork	*Ciconia episcopus*	R	VU	IV	P/I	Freshwater wetland
8	Painted Stork	*Mycteria leucocephala*	R	LC	IV	P	Freshwater wetland
4	**GRUIDAE : Cranes**						
9	Sarus Crane	*Grus antigone*	R	VU	IV	O	Freshwater wetland
5	**THRESKIORNITHIDAE : Ibises**						
10	Black headed Ibis	*Threskiornis melanocephalus*	R	NT	IV	I	Freshwater wetland
11	Red-napped Ibis	*Pseudibis papillosa*	R	LC	IV	I	Freshwater wetland
12	Eurasian spoonbills	*Platalea leucorodia*	R	LC	IV	P/I	Freshwater wetland
6	**STERNIDAE: TERNS**						
13	River Tern	*Sterna aurantia*	R	NT	IV	P/I	Large Inland Waters
7	**ANATIDAE : Ducks, Geese, Teals**						
14	Spot-billed Duck	*Anas poecilorhyncha*	R	LC	IV	H	Freshwater wetland
15	Northern Shovler	*Anas clypeata*	M	LC	IV	H	Freshwater wetland
16	Lesser-Whisling Teal	*Dendrocygna javanica*	R	LC	IV	O	Freshwater wetland
17	Knob-billed duck	*Sarkidiornis melanotos*	R	LC	IV	H	Freshwater wetland
8	**ACCIPITRIDAE : Hawks, Vultures, Eagles**						
18	Black-shouldered Kite	*Elanus caeruleus*	R	LC	I	C	Open Scrub
19	White eyed Buzzard	*Butastur teesa*	R	LC	I	C	Open Scrub
9	**CHARADRIIDAE : Plovers, Lapwings**						
20	Red-wattled Lapwing	*Vanellus indicus*	R	LC	IV	I	Freshwater wetland
21	Little Ringed Plover	*Charadrius dubius*	R	LC	IV	I	Freshwater wetland
10	**COLUMBIDAE : Pigeons, Doves**						

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
22	Laughing Dove	*Streptopelia senegalensis*	R	LC	IV	G	Open scrub
23	Eurasian collared Dove	*Streptopelia decaocto*	R	LC	IV	G	Open scrub
24	Blue Rock Pigeon	Columba livia	R	LC	IV		
11	**PSITTACIDAE : Parakeets**						
25	Rose-ringed Parakeet	*Psittacula krameri*	R	LC	IV	F	Open scrub
26	Plum headed Parakeet	*Psittacula cyanocephala*	R	LC	IV	F	Open Scrub (Endemic to India)
12	**CUCULIDAE : Cuckoos**						
27	Greater Coucal	*Centropus sinensis*	R	LC	IV	O	Open Scrub
13	**CISTICOLIDAE: Prinias**						
28	Ashy Prinia	*Prinia socialis*	R	LC	IV	I	Open Scrub
29	Zitting Citcola	*Cisticola juncidis*	R	LC	IV	I	Open Scrub
14	**RAMPHASTIDAE: BARBETS**						
30	Coppersmith Barbet	*Megalaima haemacephala*	R	LC	IV	F	Arboreal
15	**BUCEROTIDAE: HORNBILLS**						
31	Indian Grey Hornbill	*Ocyceros birostris*	R	LC	I	F/I	Arboreal
16	**APODIDAE : Swifts**						
32	House Swift	*Apus affinis*	R	LC	IV	I	Open scrub
17	**MEROPIDAE : Bee-eaters**						
33	Green Bee-eater	*Merops orientalis*	R	LC	IV	I	Open scrub
18	**CORACIIDAE : Rollers**						
34	Indian Roller	*Coracias benghalensis*	R	LC	IV	I	Open Scrub/Agricultural land
19	**ALAUDIDAE : Larks**						
35	Ashy-crowned Sparrow-Lark	*Eremopterix grisea*	R	LC	IV	I	Open Scrub/Agricultural land
36	Indian Bushlark	*Mirafra erythroptera*	R	LC	IV	I	Open Scrub/Agricultural land
37	Crested Lark	*Galerida cristata*	R	LC	IV	I	Open Scrub
20	**HIRUNDINIDAE : Swallows**						
38	Dusky Crag –	*Hirundo*	R	LC	IV	I	Open Scrub

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
	Martin	*concolor*					
21	**ORIOLIDAE : Orioles**						
39	Indian Golden Oriole	*Oriolus kundoo*	SV	LC	IV	I	Open Scrub
22	**DICRURIDAE : Drongos**						
40	Black Drongo	*Dicrurus macrocercus*	R	LC	IV	I	Open Scrub/ Agricultural land
23	**STURNIDAE : Mynas**						
41	Brahminy Starling	*Sturnus pagodarum*	R	LC	IV	O	Open Scrub
42	Common Myna	*Acriotheres tristis*	R	LC	IV	O	Open scrub
43	Bank Myna	*Acridotheres ginginanus*	R	LC	IV	O	Agricultural Land
44	Rosy Pastor	*Pastor roseus*	PV	LC			Agricultural Land
24	**STRIGIDAE: OWLETS**						
45	Spotted Owlet	*Athena brama*	R	LC	IV	C	Around Habitation and Cultivation
25	**CORVIDAE : Crows, Magpies**						
46	House Crow	*Corvus splendens*	R	LC	V	O	Open Scrub and Agricultural Land
47	Rufous Treepie	*Dendrocitta vagabunda*	R	LC	IV	O	Open Scrub/ Agricultural Land
26	**CAMPEPHAGIDAE: Cuckoo-Shrikes, Minivets**						
48	Small Minivet	*Pericrocotus cinnamomeus*	R	LC	IV	I	Open Scrub
27	**PYCNONOTIDAE : Bulbuls**						
49	Red-whiskered Bulbul	*Pycnonotus jocosus*	R	LC	IV	O	Open Scrub/agricultural land
50	Red-vented Bulbul	*Pycnonotus cafer*	R	LC	IV	O	Open Scrub/agricultural land
28	**MUSCICAPIDAE : Flycatchers and Babblers**						
51	Large Grey Babbler	*Turdoides malcolmi*	R	LC	IV	I	Open Scrub/agricultural land
29	**MOTACILLIDAE : Pipits, Wagtails**						
52	Paddyfield pipit	*Anthus rufulus*	R	LC	IV	I	Open Scrub
30	**NECTARINIDAE : Sunbirds**						
53	Purple Sunbird	*Nectarinia asiatica*	R	LC	IV	N	Open Scrub
31	**PLOCEIDAE : Sparrows**						
54	House Sparrow	*Passer*	R	LC	IV	G	Open

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
		domesticus					Scrub/Agricultural Land
32	**EMBERIZIDAE : Buntings**						
55	Crested Bunting	*Melophus lathami*	R	LC	IV	G	Open Scrub/Agricultural Land
33	**CERILYDAE: KINGFISHERS**						
56	White-throated Kingfisher	*Halcyon smyrnnsis*	R	LC	IV	P/C	Cultivation/Freshwater
57	Pied Kingfisher [a]	*Ceryle rudis*	R	LC	IV	P/C	Still Freshwater, slow-moving River
34	**TURDINAE : Thrushes Chats**						
58	Oriental Magpie Robin	*Copsychus saularis*	R	LC	IV	I	Open Scrub/agricultural land/
59	Indian Robin	*Saxicoloides fulicata*	R	LC	IV	I	Open Scrub/agricultural land
35	**RHIPIDURIDAE: Fantails**						
60	White-browed Fantail	*Rhipidura aureola*	R	LC	IV	I	Agricultural Land
36	**PICIDAE: WOODPECKERS**						
61	Lesser Goldenback Woodpecker	*Dinopium benghalense*	R	LC	IV	I	Plantations
37	**RECURVIROSTRIDAE: STILTS**						
62	Black-winged Stilt	*Himantopus himantopus*	R	LC	IV	P/C	Freshwater wetland
38	**PHOENICOPTERIDAE: Flamingoes**						
63	Greater Flamingo	*Phoenicopterus roseus*	OV	LC	IV	P/C	Freshwater wetland
39	**PHASIANIDAE: Pheasants**						
64	Indian Peafowl	*Pavo cristatus*	R	LC	I	F/I	Near Habitation
65	Grey Francolin	*Francolinus pondicerianus*	R	LC	IV	O	
40	**RALLIDAE-Coots**						
66	Common Coot	*Fulica atra*	R	LC	IV	O	Freshwater wetland
67	White brested WaterHen	*Amaurornis phoenicurus*	R	LC	IV	O	Freshwater wetland
41	**ROSTRATUIDAE: Snipes**						
68	Greater Painted Snipe	*Rostratula benghalensis*	R	LC	IV	I/G	Freshwater wetland
42	**BURHINIDAE: Thick Knees**						

S. No.	Common Name	Scientific Name	Migratory Status	IUCN Status	WPA Sch.	Foraging Guild	Habitats
69	Great Thick-knee	*Esacus recurvirostris*	R	NT	IV	I/C	Freshwater wetland

Notes: IUCN Status: LC-Least Concern, NT-Near Threatened Foraging Guild: C-Carnivore, F-Frugivore, G-Granivores, I-Insectivores, N-Nectarivores, O-Omnivores P-Piscivores, Migratory Status (MS): R-Resident, M- Migratory, SV- Summer Visitor, OV-Occasional Visitor, PV-Partial Visitor

Figure 3.24 Avifaunal and Aquatic Species observed in Study Area

Red-vented Bulbul

Indian Robin

Coppersmith Barbet

Laughing Dove

House Sparrow

Great Thick Knee

Crested Bunting

Purple Heron

Black Headed Ibis

Wooly-necked Stork

Dusky Crag Martin

Great Painted Snipe

Indian Silverbill

Indian Bush Lark

Grey Francolin

Intermediate Egret

Red-wattled Lapwing

River Tern

Black-winged Stilt

Green Bee-eater

Asian Koel (Female)

Small Minivet

Common Ring Plover

Eurasian Collered Dove

Common Coot

Indian Pond Heron

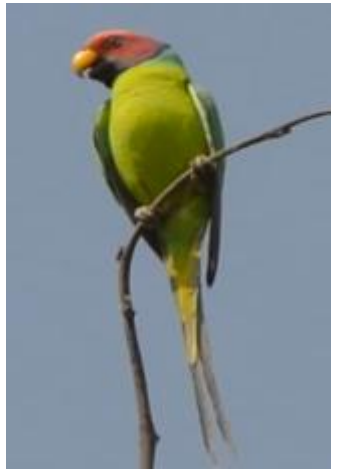
Asian Pied Myna

Indian Peacock

Purple-rumped Sunbird

Sarus Crane

Greator Flamingo



Plum-headed Parakeet

Little Grebe

Large Grey Babler

Eurasian Spoonbill

Spotted Owlet

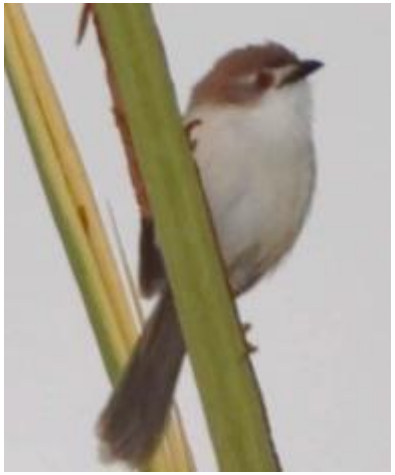
Cattle Egret

Greenish Warbler

Ashy-crown Sparrow Lark

Zitting Citcola

Indian Roller



Yellow- eyed Babler

Rose-ringed Parakeet

Brahminy Starling

Red-napped Ibis

White-breasted Waterhen

Northern Shovler

Grey Heron

Source: secondary Data from ERM Ecological Survey 12th to 17th May 2014

Mammals

A total of 10 species of 10 genera belonging to 9 families were observed/ reported from the study area. One (01) species.

A list of species observed/ reported from the study area are given in ***Table 3.27*** and represented in ***Figure 3.25***.

Table 3.28: Details of Mammals observed/ reported from the Study area

Sn.	English Name	Scientific Name	Family	Occurrence	WPA Schedule / IUCN Status
1	Jackal	*Canis aureus*	Canidae	Observed	II/LC
2	Common Fox	*Vulpes bengalensis*	Canidae	Observed	II/LC
3	Southern plains Gray Langur	*Semnopithecus dussumieri*	Cercopithecidae	Observed	II/LC
4	Blue Bull	*Boselaphus tragocamelus*	Bovidae	Observed	III/LC
5	Indian Grey Mongoose	*Herpestes edwardsii*	Herpestidae	Observed	II/LC
6	Jungle Cat	*Felis chaus*	Felidae	Reported	II/LC
7	Five Striped Squirrel	*Funambulus pennantii*	Sciuridae	Observed	IV/LC
8	Bandicoot rat	*Bandicota indica*	Muridae	Observed	V/LC
9	Indian Flying Fox	*Pteropus giganteus*	Pteropodidae	Observed	V/LC
10	Indian Hare	*Lepus nigricollis*	Leporidae	Observed	IV/LC
11.	Indian Leopard (Baghera)	*Panthera pardus*	Felidae	Observed	Schedule-I, Part- I

Notes: IUCN-International Union for Conservation of Nature, WPA-Wildlife Protection Act, 1972, LC-Least Concern

Southern Plain Grey Langur near BamaniyaKalan

Blue Bull near Bharari reservoir

Source: Secondary Data from ERM Ecological Survey dated 12th to 17th May 2014

Figure 3.25: Mammalian Species observed within the Study Area

The authenticated list of flora and faunal species present in the region was collected from the State Forest Department and the same is provided as **Annexure-V.**

- Schedule I species listed in Wildlife Protection Act, 1972 namely,*Pavo Cristatus (Indian Peafowl),*Indian Grey Hornbill (*Ocyceros birostris),* White eyed Buzzard (*Butastur teesa),* Black Shouldered kite (*Elanus caeruleus)* all avifuna, Indian Monitor Lizard (*Varanus bengalensis),*Indian Flapshell Turtle(*Lissemys punctata),Indian Python* all Reptiles and Baghera *(Panthera pardus)* mammal have their nesting or habitat in the Core and Buffer zone and accordingly species Conservation Plan are implemented by HZL. The same has been enclosed as **Annexure-XVIII.**

3.7.8 Protected Areas in Study Area

The study area of 10 km radius from the mining lease boundary does not have any protected areas such as National Parks or Wildlife Sanctuaries.

The authenticated list of flora and faunal species present in the region was collected from the State Forest Department and the same is provided as **Annexure-5.**

3.8SOCIO-ECONOMIC ENVIRONMENT

This section of the EIA report deals with Socio-Economic Impact Assessment of theProposed***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA***at ML No. 166/2008, Village: Rajpura, Dariba Tehsil: Railmagra, District Rajsamand (Rajasthan) to be developed by M/s. Hindustan Zinc Limited.The broad objectives of the socio-economic impact assessment are as follows:

a) To study the socio-economic status of the people living in the study area of the Proposed Expansion.
b) To assess the impact on socio-economic environment due to Proposed Expansion..
c) To assess the impact of the project on State Gross Domestic Product (SGDP)
d) To evaluate the community development measures proposed to be taken up by the Projectproponent, if any.
e) To suggest Community Development measures needs to be taken for the study area

3.8.1 Methodology

The methodology adopted for impact assessment is as follows:

a) The details of the activities and population structure have been obtained from Census 2011 and analyzed.
b) Primary data was collected by a door-to-door survey in urban area and household's livingtherein. The data collected during the above survey was analyzed to evaluate the prevailingsocio-economic profile of the area.
c) Based on the above data, impacts due to construction operation on the community have beenassessed and recommendations for further improvement have been made.

3.8.2 Concept & Definition

a) Study Area: The study area, also known as impact area has been defined as the sum total ofcore area/project area and buffer area with a radius of 10 Kilometers from the

periphery of thecore area/project is. The study area includes all the land marks both natural and manmade falling herein.

b) Household: A group of persons who normally live together and take their meals from acommon kitchen are called a household. Persons living in a household may be related orunrelated or a mix of both. However, if a group of related or unrelated persons live in a housebut do not take their meals from the common kitchen, then they are not part of a commonhousehold. Each such person is treated as a separate household. There may be one memberhouseholds, two member households or multi-member households.

c) Sex ratio: Sex ratio is the ratio of males to females in a population. It is expressed as number of females per 1000 males.

d) Literates: All persons aged 7 years and above who can both read and write withunderstanding in any language are taken as literate. It is not necessary for a person to havereceived any formal education or passed any minimum educational standard for being treatedas literate. People who are blind but can read in Braille are also treated as literates.

e) Literacy rate: Literacy rate of population is defined as the percentage of literates to the totalpopulation aged 7 years and above.

f) Labour Force: The labour force is the number of people employed and unemployed in ageographical entity. The size of the labour force is the sum total of persons employed andunemployed. An unemployed person is defined as a person not employed but actively seekingwork. Normally, the labour force of a country consists of everyone of working age (around 14to 16) and below retirement (around-65) that are participating workers, that is people activelyemployed or seeking employment. People not counted under labour force are students, retiredpersons, stay-at home parents, people in prisons and discouraged workers.

g) Work: Work is defined as participation in any economically productive activity with orwithout compensation, wages or profit. Such participation may be physical and/or mental innature. Work involves not only actual work but also includes effective

supervision anddirection of work. The work may be part time or full time or unpaid work in a farm, familyenterprise or in any other economic activity.

h) Worker: All persons engaged in 'work' are defined as workers. Persons who are engaged incultivation or milk production even solely for domestic consumption are also treated asworkers.

i) Main Workers: Those workers who had worked for the major part of the reference period(i.e. 6 months or more) are termed as Main Workers.

j) Marginal Workers: Those workers who did not work for the major part of the referenceperiod (i.e. less than 6 months) are termed as Marginal Workers

k) Work participation rate: The work participation rate is the ratio between the labour forceand the overall size of their cohort (national population of the same age range). In the presentstudy the work participation rate is defined as the percentage of total workers (main andmarginal) to total population.

3.8.3 Findings of the study:

Description of the Study Area:

The study area of the Proposed ***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA*** **at** ML No. 166/2008, Village: Rajpura, Dariba Tehsil: Railmagra, District Rajsamand (Rajasthan) to be developed by M/s. Hindustan Zinc Limited.falls in district Rajsamand. RailmagraTehsil of Rajsamand District, Kapasan Tehsil of Chittarugarh District &Mavli Tehsil of Udaipur District area is also falling in the 10 KM radius of the project site. Detailed administrative setup is given in figure 3.26. The study area is involves villages,6 Villages are falling within 2 Km radius of project site and 71villagesare from 2 to 10 Km buffer zone, Total 77 villages within study area.

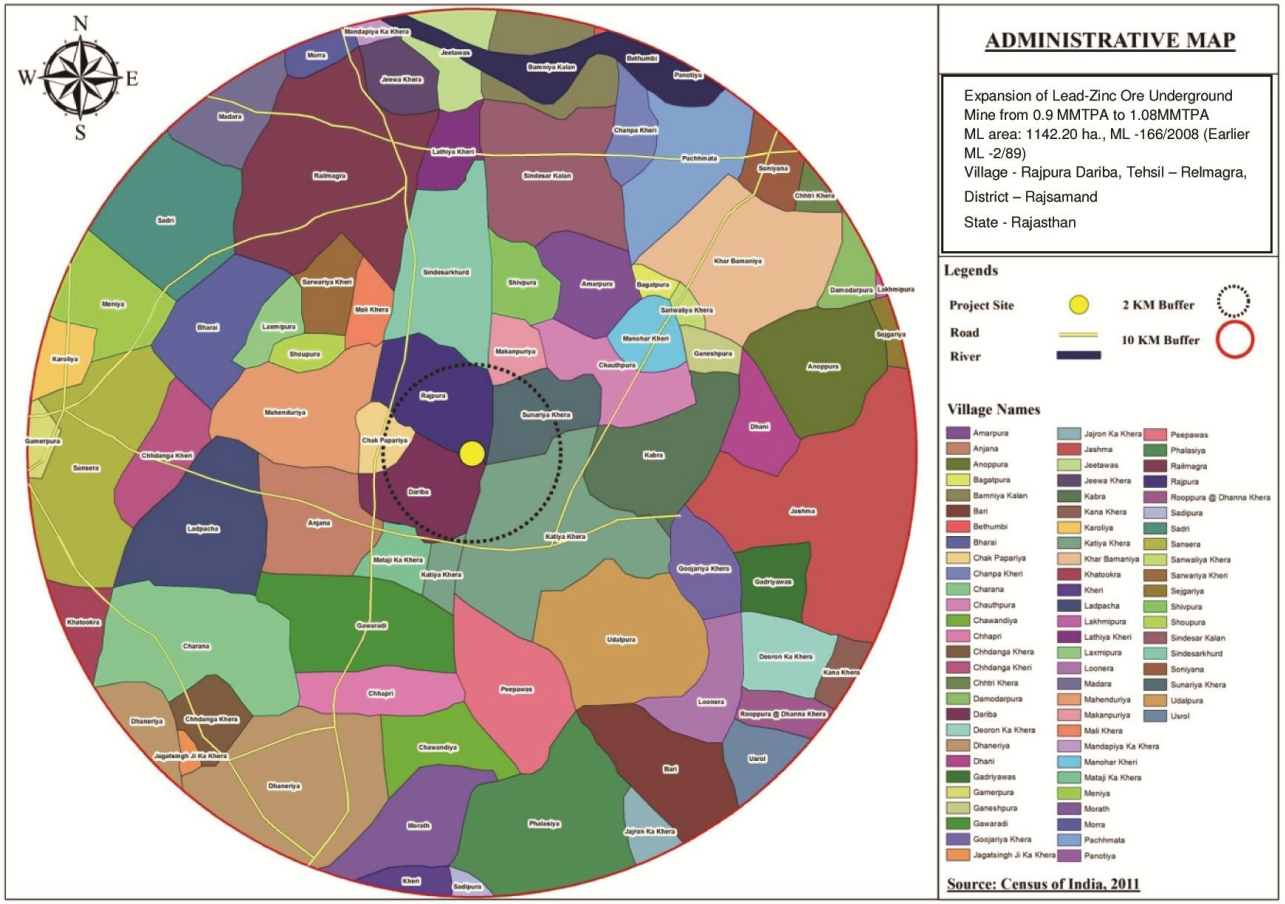


Figure 3.26: Thematic Map depicting Administrative Setup

Table 3.29: Demographic Profile of the Villages in the study area

S/n	Demographic Feature	Study area		
		Core zone (Project area)	0-2 Km Buffer	2-10 Km Buffer
1	Total Population	0	4811	90755
2	Household	0	1133	19154
3	Children	0	513	12614
4	Worker	0	2628	46629
5	Non Worker	0	2183	44126
6	Main Worker	0	2314	38936
7	Cultivator	0	771	23945
8	Agricultural labour	0	62	4068
9	Household worker	0	2	1082
10	Other Worker	0	1479	9841

*****figures in parenthesis represent percent value

Demographic composition:

According to Census 2011, Core zone doesn't have any human habitation however 2 Km buffer and 10km buffer have the total population of 4811Individuals &90755Individuals respectively. The distribution of population is depicted in figure- 3.1. 51 percent of total population is male and 49 percent are female,this creates a gender gap of 2percent. The study area also involves rural villages of Rajsamand District, Rajasthan as depicted in **Figure 3.26.**

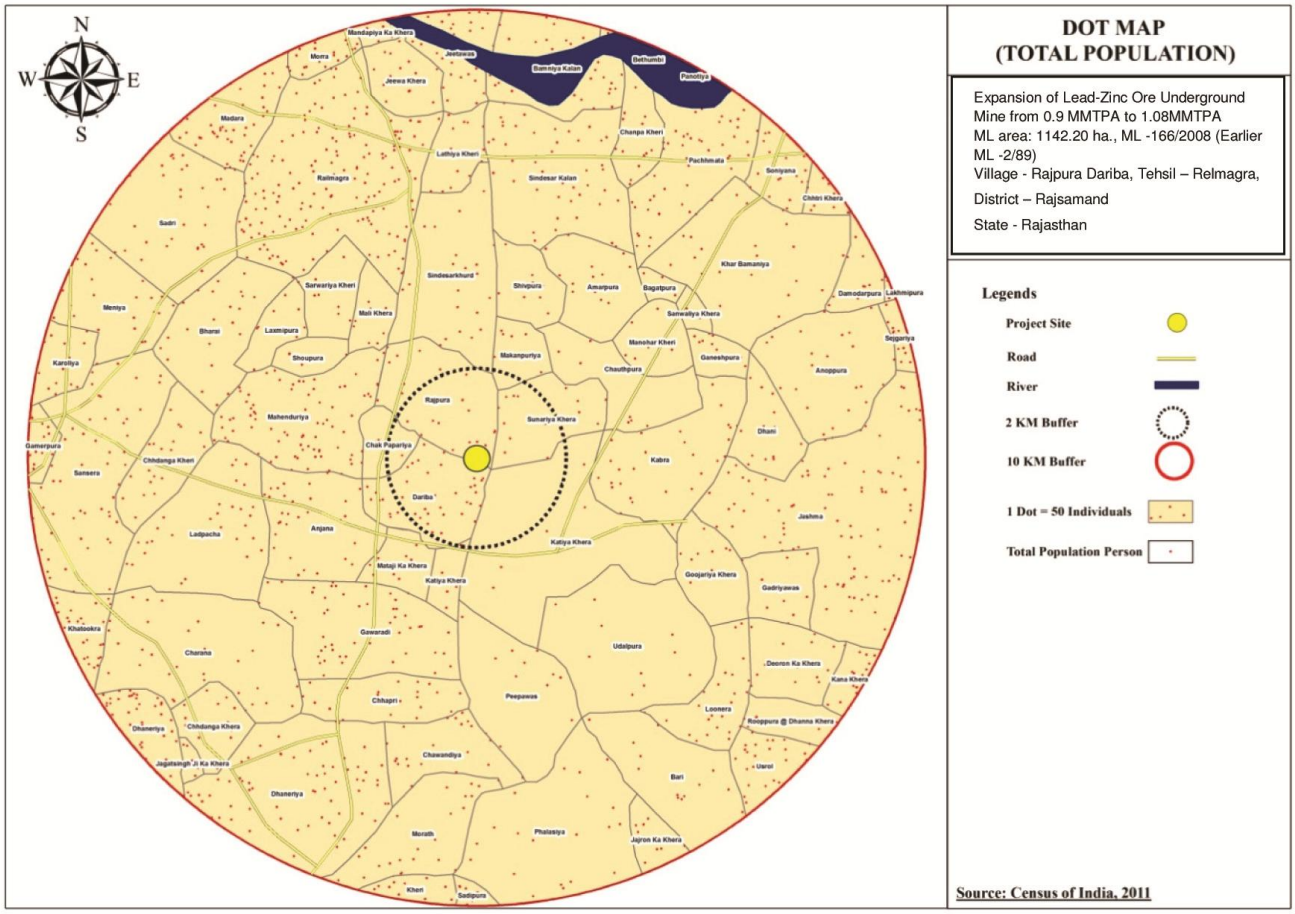


Figure 3.27: Thematic Map depicting Population distribution

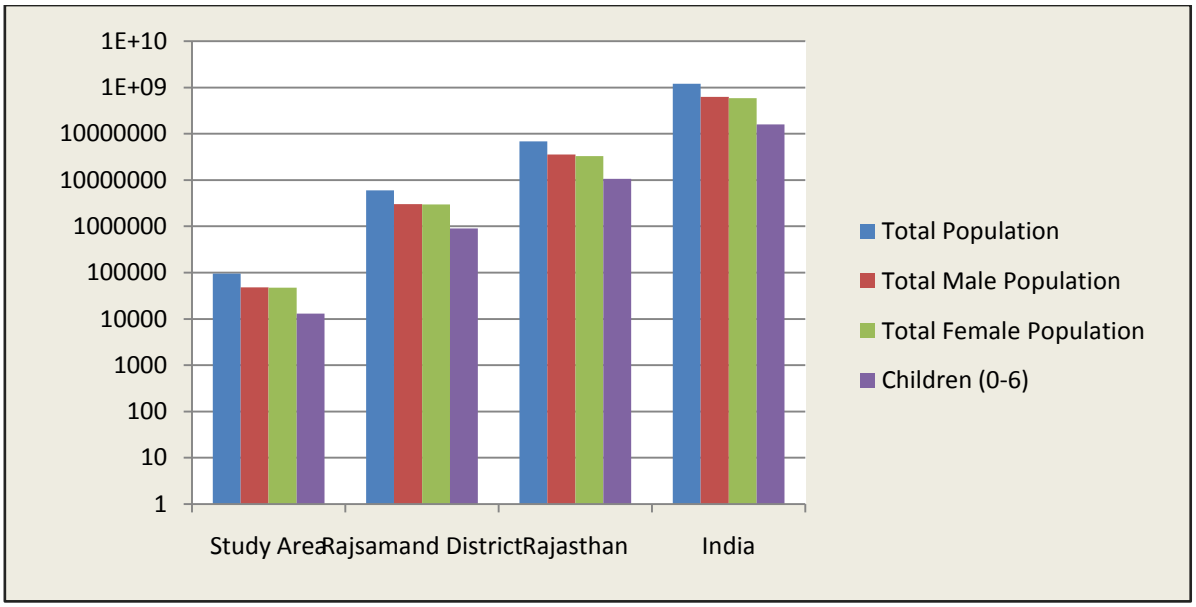


Figure 3.28: Total Populationof Study Area, District, State and India

Sex Ratio: The sex ratio works out to 767 females per 1000 males for 2 Km buffer and 989 for 10 Km buffer.The sex ratio of Rajsamand District is 988&Rajasthan State is 928. The sex ratio less than 912 females per thousand males were in 13villages.

The distribution of sex ratio is given in figure- 3.27& 3.28. The details are given in table 3.30.

Table 3.30 Male & Female of the Villages in the study area

S/n	Demographic Feature	Study area		
		Core zone (Project area)	0-2 Km Buffer	2-10 Km Buffer
1	Male	0	2723	45629
2	Female	0	2088	45126
3	Sex ratio	0	767	989

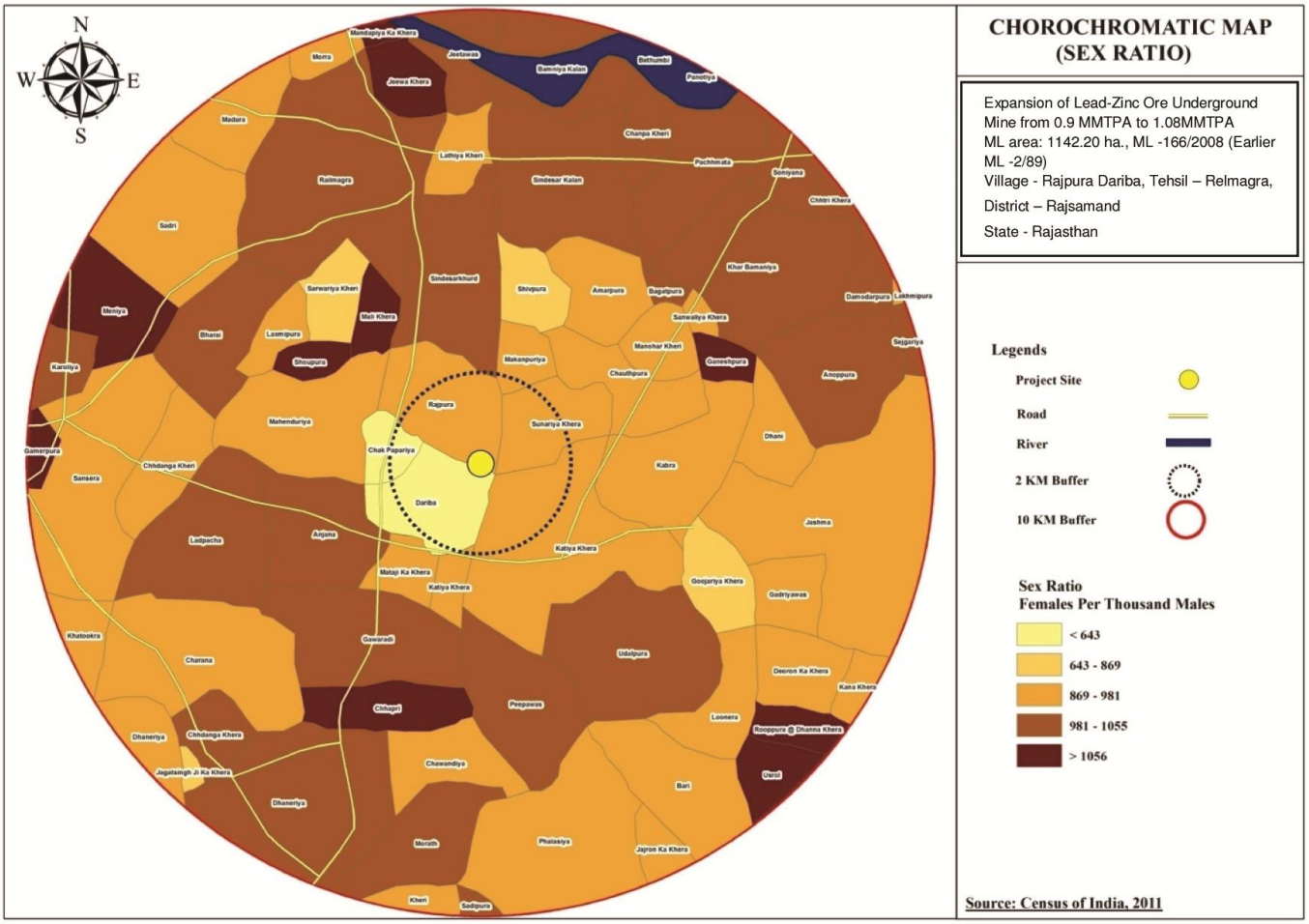


Figure 3.29 Thematic Map depicting Distribution of Sex-ratio

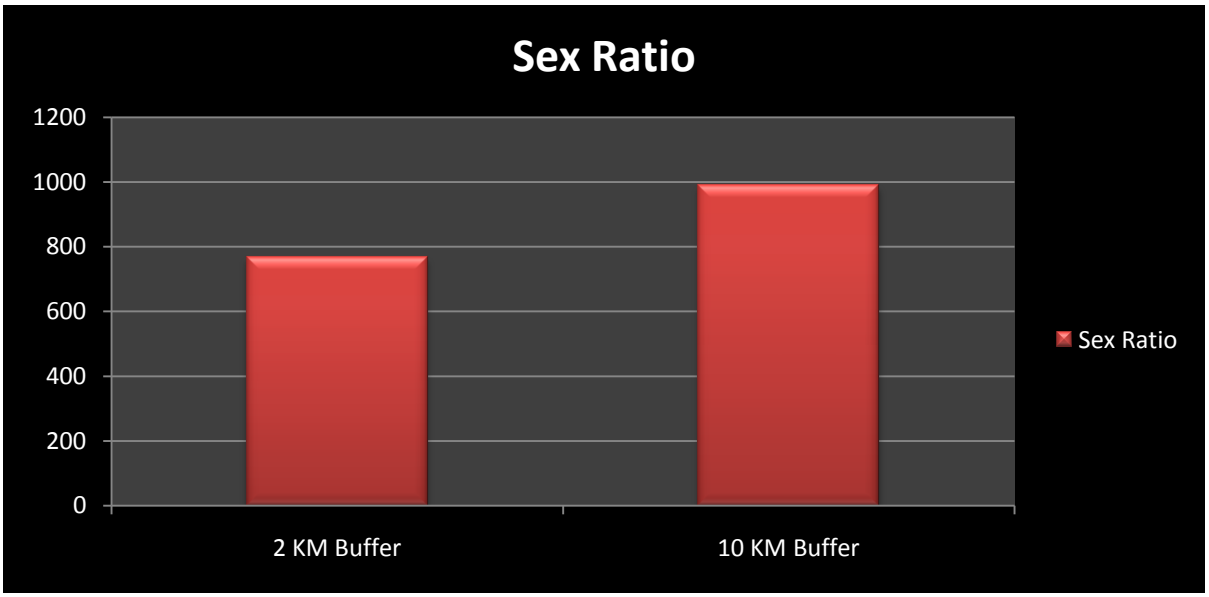


Figure 3.30 Chart Depicting Sex Ratio in 2 & 10 Km Buffer

Literates and literacy rate:

The illiteracy in the 2 Km and 10 Km buffer zone of study area are 34&50 percent respectively, while district Rajsamand and state Rajasthan have illiteracy percentage as 46% and 34 % respectively. The literates 2 Km and 10 Km buffer zone of study area are 66&50percentage respectively. Literates are 54 % in district Rajsamandwhile 66 % in Rajasthan. Distributions of Literates & Illiterates are given in Figure-3.31 & 3.32.

Table 3.31 Literate& Illiterate in the Villages of the study area

S/n	Demographic Feature	Study area		
		Core zone (Project area)	2 Km Buffer	10 Km Buffer
1	Literate	0	3188(66)	45213 (50)
2	Illiterate	0	1623 (34)	45542 (50)

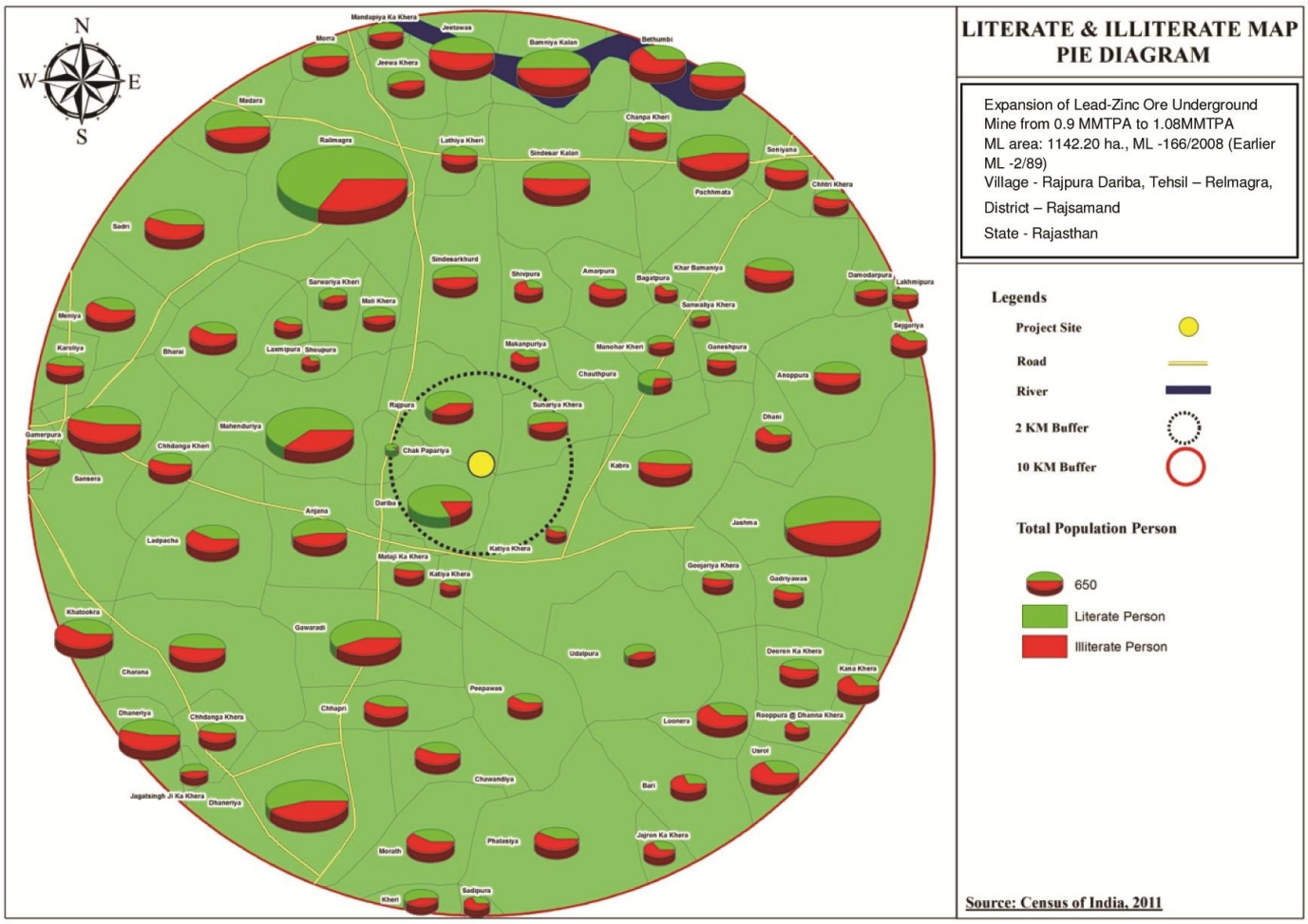


Figure 3.31:Thematic Map depicting Literate & Illiterate

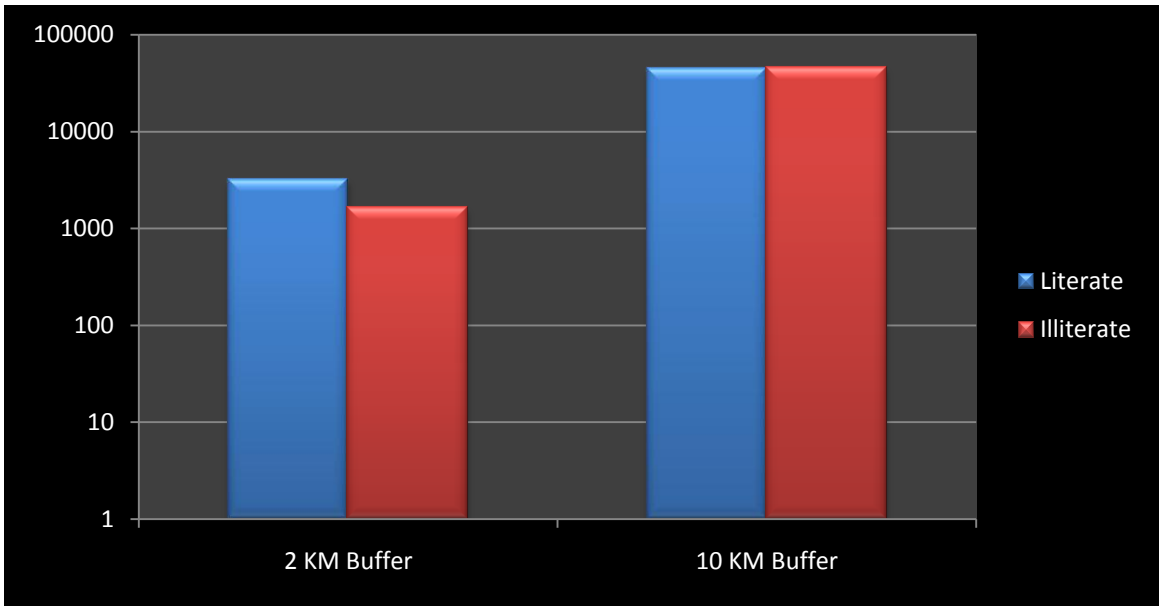
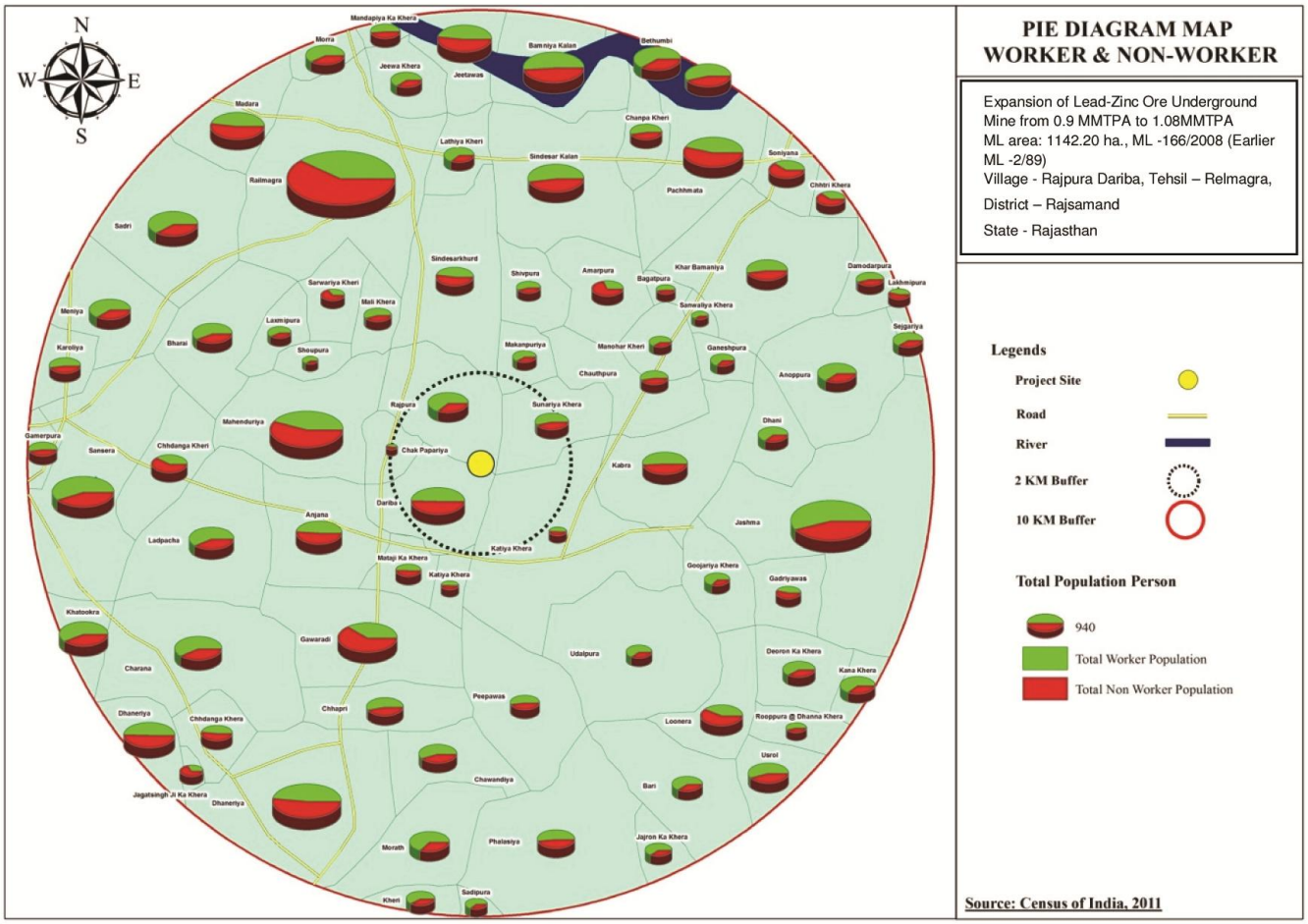


Figure 3.32:Literates& Illiterates in 2 & 10 Km Buffer

Table 3.31: Demography of Study Area, District Rajsamand, Rajasthan, India

S/n	Item	Number of Individuals	%	Number of Individuals	%	Number of Individuals	%	Number of Individuals	%
1	Name of area	**Study area**		**Rajsamand District***		**Rajasthan***		**India***	
2	Type of Population	Rural & Urban							
3	Number of Household	20287		1252590					
4	Total Population	95566		5966805		68548437		1.2×10^9	
5	Total Male Population	48352	51	3001074	50	35550997	52	6.2×10^8	52
6	Total Female Population	47214	49	2965731	50	32997440	48	5.9×10^8	48
7	Persons (0-6)	13127	14	903138	15	10649504	16	1.6×10^8	13
8	Total workers	49257	52	2819039	47				
9	Main workers	41250	84	1868246	66				



10	Non workers	46309	48	3147766	53				

Source: Census of India 2011

Figure 3.33:Thematic Map depicting Distribution of Worker & Non Worker

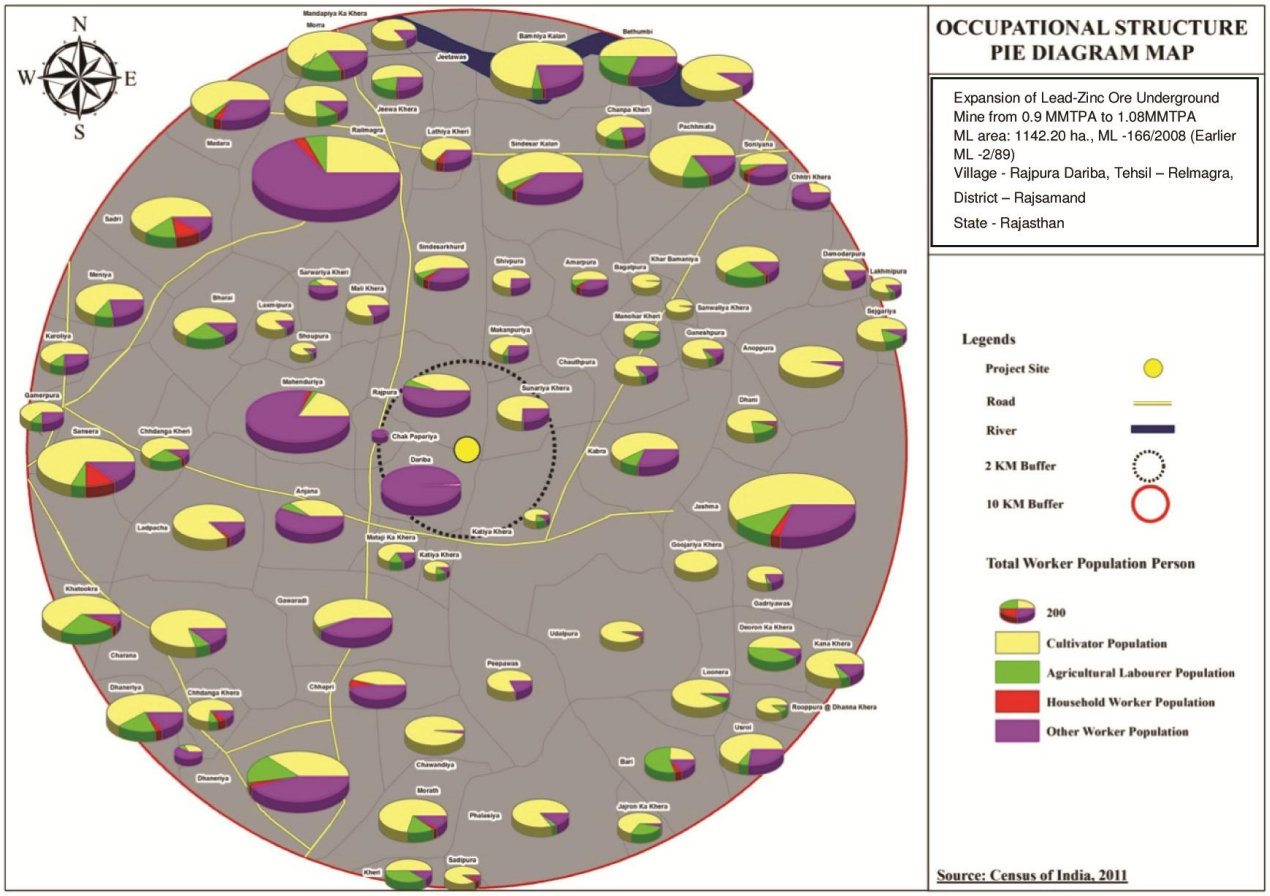


Figure 3.34:Thematic Map depicting Distribution of Occupational Structure

3.8.4 Social Infrastructure Available:

The Proposed ***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA***ML No. 166/2008, Village: Rajpura, Dariba Tehsil: Railmagra, District Rajsamand (Rajasthan) to be developed by M/s. Hindustan Zinc Limited. The project site in district Rajsamand.

Site surroundings and Connectivity details of the proposed project are given in **Table-3.32**.

Table-3.32: Site Surroundings and Connectivity Details

S. No.	Connectivity & Site Surroundings		
	Description		**Distance and Direction**
1.	Nearest Railway Station	Fatahenagar Railway Station Bhupas Sagar Railway Station	13.80km towardsSouthSouth West 11.2 km towards South South East
2.	Nearest Airport	MaharanaPratap Airport	44.00 Km towards South West
3.	Nearest Village	Dariba Mataji ka khera Aajna Kotari Mehanduriya Gawardi Makhanpuriya Uddpura Chawandiya Malikhera Ladpacha	With in lease area With in lease area 0.850 km towards West 1.0 km towards East 1.0 km towards West 1.5 km towards West South West 2.1 km towards North 2.1 km towards South East 2.6 km towards South 2.8 km towards North 4.0 km towards West
4.	State Boundary	Rajasthan - Madhya PradeshBorder	68.50km towards South East.
5.	Nearest Highway	NH-162A Village Road SH-9 SH-12	0.5 km towards West With in core zone 12.5 km towards south 19.0 km toward North
6.	Water Bodies	Banas River	8.30 km North
7.	Nearest School & College	GovtSen Sec School DAV HZL Sen Sec School	2.50 km towards South West 3.15 km towards South West

		Govt Secondary School	3.25km towards East
8.	Nearest Hospital	H Z LHospital Railmagra General Hospital	2.70 km towards West 7.00km towards North West
9.	Places of worship	Shree SankatMochan Hanuman Mandir Masjid	2.75km towards South West 3.60 km towards West

Source: Google EarthThe socio economic data from all the study villages is given in table ***3.32***

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CHAPTER - 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 GENERAL

Environmental impacts both direct and indirect on various environmental attributes due to existing as well as proposed mining and beneficiation activity will be created in the surrounding environment, during the pre-operational, operational and post–operational phase. Insight of which is given below.

Table 4.1: Environmental Impact Assessment for mining & beneficiation

Parameters	Proposals, as per approved Mining Plan (2015-16 to 2019-20)	Position at the end FY 2017-2018	Proposals for the next 3 years as per mining Scheme
Top soil storage, preservation and utilization	No change, anticipated in top soil due to underground mining	No change. Partially utilized for plantation	No change. No topsoil because no activity at surface
Land reclamation and rehabilitation	10 hectare of plantation to build green belt in acquired area	Plantation done in existing plantation area	Covered in the Afforestation programme.
Waste dump management	Waste used for filling voids in the mine, leveling and other construction work within acquired area	Implemented Waste is being disposed-off in underground partially. Wastes were also used in filing to make haul roads from mine portals to primary crushers	Major portion of waste proposed for filling in underground voids, stacking at waste dump yard at surface. Waste dump at surface will remain active in next 5 year. (refer Plate IIB Surface Plan)
Afforestation Programme with pre-cautions	Plantation will be done to build green belt in acquired area. Regular monitoring	31000 nos. of plantation done	15000 trees are proposed to be planted. The area near school,

proposed for survival and protection of plantation	and protection of plantation		residential colony, open space near hospital etc are covered under afforestation program
Quality of air	As such the emissions are well within the norms, thus Mining activity of this mine is not adversely affecting the quality of air. The emissions are monitored regularly for keeping the level within permissible limits	Particulate matter is monitored regularly including SO_2, NO_x, CO is within permissible limits	There is likely marginal increase in particulate matter values in case the excavation enhances, but the same will remain within permissible limits. Refer the recent base line analysis. Particulate matter is monitored regularly in core and buffer zones
Quality of water including surface & ground	No effect of mining activity on source of water. Quality is regularly monitored	Monitored regularly at affected points	Implemented. No adverse effect on quality of water noticed Same shall be followed
Noise level	Very low and within permissible limits	Implemented. No adverse effect noticed	With the proposed excavation and introduction and upkeep of latest mining equipments no adverse impact will be there. The same will be Monitored regularly at affected points.
Blast Vibration	No impact of Blast vibration on ground due to mining activity	No impact recorded at the time of monitoring	Crown blast vibrations are monitored regularly at station on surface Near Annapurna maa temple at (0, 0). Control measures taken by

			introducing advanced blast techniques and maintaining max charge per delay.
Treatment of mine water and effluent/ toxic substances before discharge.	Re-circulation of mill and mine water after lime treatment. Extra water is collected in a nearby tank after treatment	Implemented	Re-circulation of mill & mine water for beneficiation plant and maintained zero discharge of industrial water

The impacts due to mining operations commence from the exploration activities, extend through extraction and processing of minerals, may continue up to post closure of the operation, with the nature and extent of impacts varying throughout the stages of project development.

Identification of possible impacts specific to an activity is an important task since this helps in focusing attention upon relevant environmental parameters and relating them with the activities involved. The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail.

1. Land Environment
2. Water Environment
3. Air Environment
4. Noise Environment
5. Biological Environment
6. Socio-Economic
7. Occupational Health Impacts

4.2 LAND ENVIRONMENT

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 Land use

Total Mine lease area is 1142.2106 ha, out of which 362.66 ha has been acquired within mining lease. There shall be no requirement to acquire land beyond the existing acquired land. The mine area in operational use will suffice the requirement. Breakup of land use of lease area is shown as under:

Table 4.2: Land Use

Particulars	Land use (ha)
A) Mine & Smelter Operational use	171.67
B) Other Use: Residential Colony, Welfare buildings and internal roads	41.41
C)Roads and open spaces	15.58
D) Green Belt (Plantation)	134
E) Khatedari land	578.2
F) Charagah	27.33
G) Govt. Land	131.03
H) Public roads & Others	42.98
GRAND TOTAL	**1142.2**

Source: Mining Plan

Table 4.2: Land Use breakup acquired land

Particulars	Within Lease Area (ha)	In Acquired Land outside Lease Area (ha)	Total Area (ha)
A) Operational Use			
Mine			
a) Mine/ Industrial Area (Mine, Infrastructure, beneficiation plant, workshops and other office buildings.)	58.62	0.00	58.62
b) Old Mine premise (Sala Mill, incline, vent. Fan etc.)	7.32	0.00	7.32
c) Main Explosive Magazine	1.56	0.00	1.56
a) Old Tailing Dam	3.02	0.00	3.02
b) Core shed	0.06	0.00	0.06
c) Tailing pipeline	1.78	0.05	1.83
d) Tailing Dam (Main)	0.00	82.00	82.00
Smelter Complex			
a) Zinc Plant	22.64	11.36	34.00
b) Lead Plant	20.15	8.43	28.58
c) Captive power plant	0.00	15.72	15.72
d) Utilities (ETP, RO etc.)	0.42	6.04	6.46
e) Hazardous Waste Disposal Site	53.00	0.00	53.00
f) Others (Open space & internal roads)	3.10	8.00	11.10
Total-A	**171.67**	**131.60**	**303.27**
B) Other Use			
Residential Colony, welfare buildings and internal Roads	41.41	0.00	41.41
C) Public Roads and open spaces	15.58	3.93	19.51

D) Green Belt (Plantation in residential, tailing dam and mine/industrial premise areas.)	134.00	56.00	190.00
Grand Total (A+B+C+D)	**362.66**	**191.53**	**554.19**

4.2.4 Impact on Soil

Rajpura Dariba 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.

Table. 4.3: Summarized table of Anticipated Impacts and its Mitigation

Parameter	Anticipated Impact	Mitigation Measures
Topography and drainage	The mining activities in the mine will have very limited impact on topography of the mine lease area due to underground workings and hence alteration of the surface topography is not expected. The areas affected on the surface will be only the entry points to the underground mine, facilities at surface and the	Precautions will be taken by partial extraction, if required, to protect them from any damage from subsidence. Suitable drainage will be made to avoid and water logging in the center of subsidence. During extraction of panels, the ground subsidence will be monitored

	dump area created for the disposal of waste generated from drivages of underground drifts/ inclines in rock. **Drainage** There is no perennial source of water like pond, river, stream or nallah running through the lease area..The area is drained by Banas River, an ephemeral river, which flows at distance of 8.2 km towards NNE direction of the lease area. No major impact is envisaged, as the proposed expansion will be achieved by increasing the efficiency of the existing infrastructure of the mine.	over at least one panel each in forestland to know the actual impact by an external agency. The facilities and entry points will be fenced and free access prevented for both man and animal. No adverse impact of the streamlets is anticipated as the peak flow will be of low magnitude and for very short duration under natural gradient. As underground mining is being carried out, any streams will not be affected and will continue to flow undisturbed by the mining. So, no diversion is required and there will not be any impact on the surface drainage system and surface water resources of the lease area and on any existing users
Land	Existing land use pattern indicating the area already degraded due to mining, roads, processing plant, workshop, township etc.: The total land use in the lease area is 356.5 hectares. Since this is an underground mine, hence there is no significant effect of mining activity on the environment. Though infrastructural activities degraded land area earlier, No further land degradation in next 5 years proposal, because the voids created due to mining of ore, are back filled with classified mill tailing	No further land degradation in next 5 years proposal, because the voids created due to mining of ore, are back filled with classified mill tailing. Gross area under green belt will be around 134 hectares.
Soil	Since, Hindustan Zinc Limited is an underground mine, there will be no net loss of soil during the operation of mine. Contamination of soil quality, to some extent,	The topography of the lease area is undulating surface and it is an underground mine. Hence, top soil will not be disturbed but at the places of

	is possible in the core zone near workshop and beneficiation plant for which adequate mitigating measures have been taken. In spite of these, no significant impact on soil quality has been observed.	dumps etc if it is encountered, it will be stacked and will be used for plantation purpose.

4.3 WATER ENVIRONMENT

Water plays a very important role in preserving life. It is also vital for the growth of flora, fauna and agriculture. Aquatic life fully depends on the quality and quantity of water. Rain cycle is an important activity of nature which fully depends on water, plantation, air, hills and other features. The mining activity in general is considered as creating negative impacts on this system. However, all mitigation measures have been envisaged to nullify these negative impacts, in this project, as detailed below: -

4.3.1 Impact on Water Environment

4.3.1.1 Impacts of Mining on Drainage

As the underground mining is being carried out, the surface drainage is not going to be disturbed. River Banas which crosses the buffer area in its northern side at a distance 8.2 km from village Jitawas to Panotia is flowing without being disturbed by the mining activity. In the lease area, there are few village roads and th village houses which are not affecting the surface drainage which is controlled by streamlets.

4.3.1.2 Impact of Mining on Surface Water

It has been indicated that Rajpura Dariba 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 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.

4.3.1.3 Impact of Mining on Ground Water

The environment department of HZL at Rajpura Dariba mine 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 Rajpura Dariba 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.

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 Rajpura Dariba mine, otherwise it is an underground water mine having no impact on water regime.

4.3.1.4 Impacts of Beneficiation Plant on Drainage

The beneficiation plant is located almost in the middle of the mine lease slightly toward eastern side of mine lease boundary and is mostly in the plain area where there is no natural drainage.

4.3.1.5 Impact of Beneficiation Plant on Surface Water

There are already one units of beneficiation plant in operation in the mining lease area having total beneficiation capacity of 1.0 million TPA and 2nd unit of the 1.5 million TPA 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.

It has been indicated that Rajpura Dariba 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.

4.3.1.6 Impact of Beneficiation Plant on Ground Water

At present, the quality of ground water within the lease area, where a beneficiation plant of 1.0 million TPA capacity is in operation along with underground mining and its dumps, has been studied by collecting 7 ground water samples from core and buffer zone. A review of the chemical analysis reveals that ground water within the lease area and buffer zone has not been contaminated by the pollutants which are likely to be released from the plant/mine area.

Table 4.4: Summarized table of Anticipated Impacts and its Mitigation

S.No.	Anticipated Impacts	Mitigation/ Conservation Measures
1	Domestic wastewater and industrial waste water	➢ Septic tank followed by soak pit is already provided for the treatment of domestic waste water. ➢ Tailings will be stored in tailing dam. ➢ Garland drains around waste dumps are constructed to channelize rainwater. ➢ Tailings generated from beneficiation mill plant will be pumped to tailing dam, where it will be allowed to settle; the clear water will be reclaimed on continuous basis and pumped to the water reservoir for re-use in the process. ➢ No water will be allowed to discharge outside the tailing dam to maintain zero discharge, as the suitable garland drain has been constructed around the waste dump to collect the run-off water from the dump and to prevent contamination of land, surface and groundwater of the surrounding area. The water collected will be pumped and reused in beneficiation plant.
2	Ground Water (i) Mine dewatering The total dewatering done from R-D mine amounted to **1,58,245 m^3** with daily average abstraction of **433.55 m^3/day** against the permission of **446.50**	➢ Development of ground water recharge management system around the ML area; ➢ Implementation of recharge measures proposed in the hydrological and hydrogeological study; ➢ Monitoring of groundwater level and quality around Tailing dam area shall be carried out regularly to ensure no groundwater contamination and seepage; ➢ Construction of garland drains of suitable size around waste dump and

	m^3/day (0.169 mcm) issued by CGWA. Fluctuation of water levels during the one year period, from Post - monsoon 2015 to Post-monsoon, 2016 has indicated that all the five piezometers and all the 8 key wells, have indicated increment in the ground water storage ranging from 0.41 m (K-8) to 9.13 metres (K-3). The increment in the ground water storage during the year 2015-16 was due to much higher rainfall of 1180 mm against the low rainfall of 577 mm during the year 2015 and against the average annual rainfall of 640 mm The inflow of the ground water in the mine however remained around the permitted value of 446 m^3/day	tailing dam with proper gradients to prevent rain water descent into ML area and other surface activity area; ➢ Garland drains will be connected to siltation tank of appropriate size and will be de-silted at regular intervals. The water collected will be utilized for watering the mine area, roads, green belt development etc; ➢ Labour deputed onsite will be instructed for optimal use of water; ➢ Minimum use of water in cleaning/washing of equipment's and vehicles; ➢ Garland drains (size, gradient and length) and sump capacity will be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site; ➢ Settling ponds capacity will provide adequate retention period to allow proper settling of silt material; ➢ Use of silt/sediment traps to reduce the sediment load from the disturbed area to the natural drainage; ➢ The waste dump will be provided with garland drains. The dump top sand sides of inactive areas will be progressively reclaimed with grasses and shrubs to prevent erosion. ➢ Rainwater harvesting measures undertaken for artificial recharge ground water basin will also help in restoring the water levels in the area.

4.3. Rainwater Harvesting

4.3.1 Need for Rain Water Harvesting for Buffer Zone of Rajpura Dariba 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 Rajpura Dariba 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.

4.3.2 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 Rajpura Dariba 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 meters to 10 m during post monsoon period so on an average, about 3m to 5m 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 which has been partly utilized by the villagers by constructing tanks are proposed to be deepened to store more water for ground water recharge which will percolate faster with the removal of clays deposited in the past in the bottom of the tank bed.

4.3.3 Surface Runoff Utilization

After reviewing the area around the mines and nearby villages, seventeen 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 will 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 will be 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-4.1.**The detailed report on recharge of percolation tanks has been elaborated in hydrogeological report which is enclosed as **Annexure-X.**

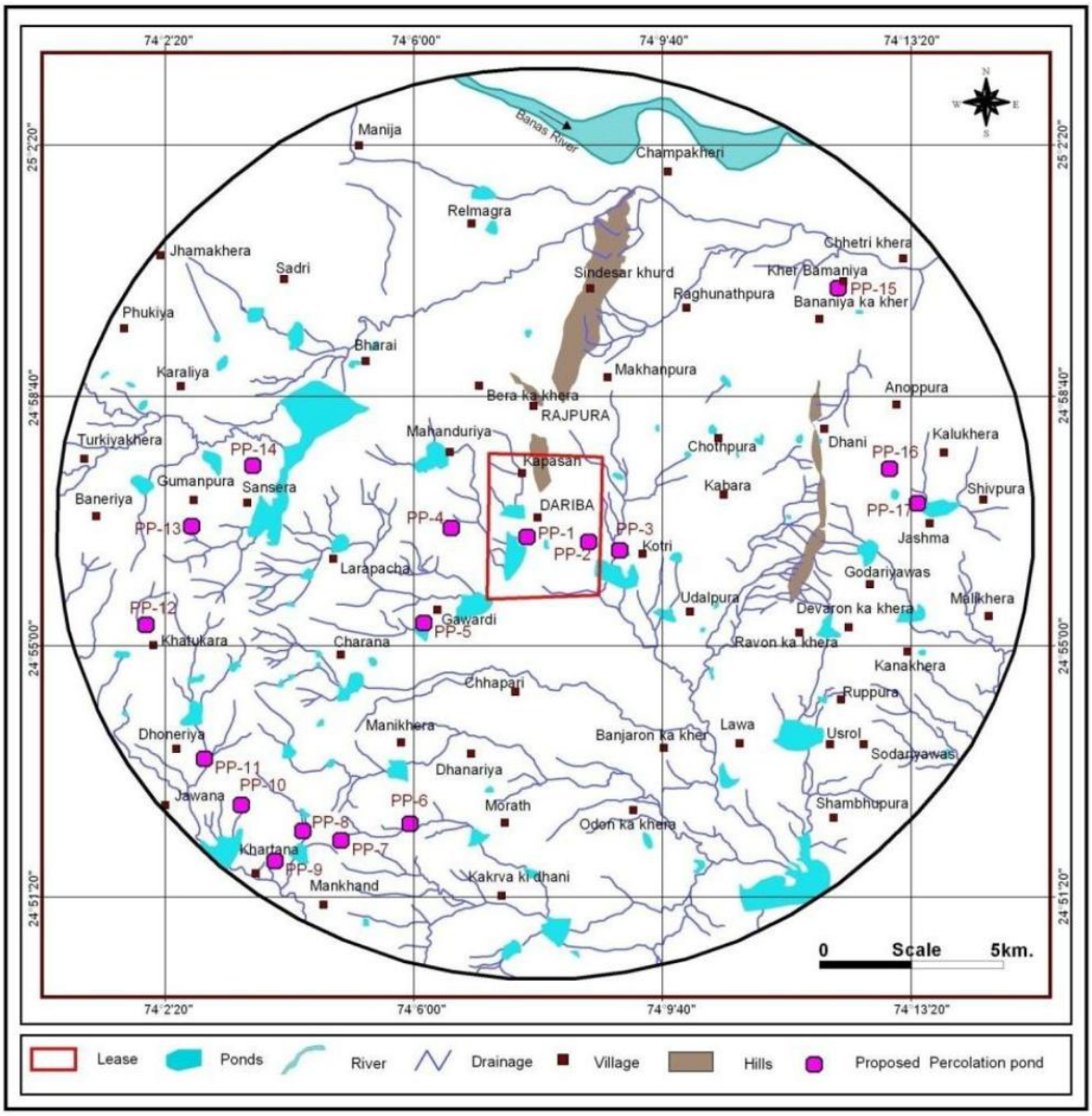

Figure-4.1. Map showing location of existing village tanks proposed for deepening to function as percolation tanks in the buffer zone of the mine

4.4 AIR ENVIRONMENT

4.4.1 Impact on Air Quality

The emissions from the proposed expansion activity depend on the intensity of ore extraction operations, mode of transportation and processing / beneficiation. Particulate matter is the primary pollutant in the mining and beneficiation industry. However, the vehicular traffic and diesel generator sets contributed to the pollutants like nitrogen oxides, sulphur dioxide carbon monoxide and hydrocarbon.

The major sources of particulate matter include:

- Secondary crusher,
- Tertiary crusher,
- Grinding, and
- Material handling and transfer.

The critical step for conducting air dispersion modelling is to quantify the emissions from the various sources at the facility. The emission rates from the sources identified were estimated in accordance with the recommendation outlined in the guideline document. The emission sources in the proposed expansion of beneficiation plant are due to the following sources:

1) DG set as point source emission; (In the event of power failure)
2) Secondary and tertiary crushers, and material handling and transfer as volume source, and
3) Vehicular emissions due to ingress of Heavy Cargo Vehicle (HCV) as line source emissions.

Diesel Generator is the only point source of emission in the proposed project. The DG is operated only in the event of power failure. The emission details of point sources and emission factors are provided in **Table 4.5** below.

Table 4.1: Emission Factors - Point Sources

S. No.	Particulars	Capacity of each DG Set	Fuel Consumption	Emission Factors #			
				SO2	PM	NOX	CO
					g/kw-hr		
1	DG Set x 2 No.	500 kVA	220 lit/hr	0.05 % of Sulphur in HSD	0.3	9.2	3.5
# Emission Factors considered from and calculated based on The Environment (Protection) Third Amendment Rules 2002, at serial No. 95 & 96, under the Environment (Protection) Act, 1986							

The trucks used to transport the raw materials from source and finished products are the line sources in the proposed project. The details of line sources and emission factors are provided in **Table 4.6** below

Table 4.2 Emission Factors - Line Sources

Details	Unit	Quantity
Number of Trucks (Raw Material and Finished Product)	Nos	14
Emission Rate of CO	g/km/vehicle	6.0
Emission Rate of NOX	g/km/vehicle	9.30
Emission Rate of PM	g/km/vehicle	1.24
Emission rate based On "Emission Factor Development For Indian Vehicles by The Automotive Research Association Of India" Type of Truck - HCV Diesel Truck > 6000 CC – Post 2000		

The volume sources in the proposed project are emission during crushing operation and transfer of material. The details of volume sources are given below in **Table 4.7.**

Table 4.3 Emission Factors - Volume Sources

S. No	Emission Source	Emission Factor	
		lb/ton	Kg/ton
1	Secondary Crusher	1.2	0.54
2	Tertiary Crusher	2.7	1.22
3	Wet grinding	Negligible	Negligible
3	Material handling and transfer	0.12	0.05
Total		**4.02**	**1.81**
Emission factors are based upon United States Environmental Protection Agency - Air Pollution 42 Manual – Chapter 11			

Emission Estimates for Point Sources

HSD as fuel was considered to run DG sets and the emissions were calculated for full load. The sulphur content in the fuel is assumed to be 0.05%.

Emission estimates from point source emissions are tabulated below in **Table 4.8.**

Table 4.4 Emission Estimates - Point Sources

Stack Attached to	Required Stack Ht (m)	Stack Ht. to be provided (m)	Stack Dia. (m)	Stack Exit Velocity (m/s)	Stack Exit Temp (^oK)	Stack Flow rate (m^3/s)	Pollutant Emissions from each DG set (g/sec)				
							SO_2	PM_{10}	NO_x	CO	HC / NMHC
DG Set – 2 x 500 kVA	3.2	5	0.12	12	373	0.13	0.06	0.066	2.04	0.778	0.28
Required Stack height is based on The Environment (Protection) Third Amendment Rules 2002, at serial No. 95 & 96, under the Environment (Protection) Act, 1986											

Emission Estimates for Line Sources

The emission estimates for the vehicular sources are considered for the distance travelled to and from the Dariba Beneficiation project site to the following places:

1) From Dariba mine
2) SKM/BKM
3) To Chanderiya
4) To Deriba
5) To Debari

The emission estimates were calculated only upto a distance of 10 km from the project boundary.

The existing baseline traffic emissions were assumed to be obtained in the baseline ambient air quality data. The details are provided in **Table 4.9.**

Table 4.5: **Emission Estimates - Line Sources**

Incremental Qty (MT)	From/ Destination	Distance (Km.)	Mode of Transportation and Vehicle Capacity	Vehicles per day	Emission Estimate (g/sec)		
					CO	PM	NOX
Ore							
920000	From Dariba Mine to Dariba Beneficiation Plant	Inside Lease	Truck 30 MT		0.003	0.005	0.0007
500000	From SKM/ BKM to Dariba Beneficiation Plant	6		56			
Concentrate							
85200	Chanderiya	80	Truck 30 MT	9	0.001	0.002	0.0002
51120	Dariba	2		6			
34080	Debari	50		4			

Emission Estimates for Volume Sources

The emission estimates of volume sources are at crusher and material transfer. The emission rates for inputs to air dispersion modelling were calculated considering air

pollution control device with a removal efficiency of 99%. . The details are provided below in **Table 4.10.**

Table 4.6: Emission Estimates – Volume Sources

S. No	Emission Source	Production Capacity (Tonnes per Hour)	Emission Factor (kg/Tonne)	Uncontrolled Emission Rate (g/sec)	Controlled Emission rate with APCD (g/sec) (99% efficiency)
1	Secondary Crusher	400	0.54	60	0.6
2	Tertiary Crusher	2 x 400	1.22	271	2.71
3	Wet grinding	1200	Negligible	0	0
3	Material handling and transfer	1200	0.05	10	0.1
4	Drying	1200	19.7	2900	2.9
Emission factors are based upon United States Environmental Protection Agency - Air Pollution 42 Manual – Chapter 11					

Air dispersion modeling methodology - Modelling approach

The assessment methodology for the air dispersion modeling exercise follows the guidance by

- Central Pollution Control Board in their Programme Objective Series: PROBES/70/1997 -98, Guideline Document - Assessment of Impact to to Air Environment: Guidelines for Conducting Air Quality Modelling.
- Conceptual Guidelines and Common Methodology for Air Quality Monitoring, Emission Inventory & Source Apportionment Studies for Indian Cities. (Obtained from CPCB Website as on Feb 18th 2018)

The detailed model recommended in the guidelines is AERMOD/ ISC 3 Prime. The model of selection was the commercially available AERMOD Ver 8.8.0. view dispersion model, developed by Lakes Environmental. AERMOD is a regulatory steady state plume modelling system with three separate components:

i. AERMOD (AERMIC Dispersion Model)

ii. AERMAP (AERMOD Terrain Processor)

iii. AERMET (AERMOD Meteorological Processor)

Prediction of impacts on air environment has been assessed by employing, USEPA approved AERMOD.

Meteorological Data

The AERMOD model requires hourly surface data values for wind speed, wind direction, temperature, rainfall, relative humidity, pressure, cloud cover and ceiling height and solar radiation and at least once daily mixing height data.

Wind data (direction and speed), temperature, rainfall, relative humidity, pressure were obtained from "Climatological Normals: 1980 – 2000" issued by Indian Meteorological Department. The data of ceiling height is sourced from "Spatial Distribution of Hourly Mixing Depth Over Indian Region" by Dr. R.N.Gupta, published by Central Pollution Control Board.

The AERMET programme has three stages to process the data. The first stage extracts meteorological data and assesses data quality through a series of quality assessment checks. The second stage merges all data available for 24-hour periods and writes these data together in a single intermediate file. The third and final stage reads the merged meteorological data and estimates the necessary boundary layer parameters for dispersion calculations by AERMOD. The meteorological pre-processed data was used to determine its corresponding Wind Rose plot (see Figure 2). The Wind rose show that the most predominant wind direction blows from the west, with the secondary wind direction being from the North West. This means that the emissions plume will be dispersed mainly in the east direction, and secondarily in the south east direction from the proposed plant site.

Model Domain, Receptor Network and Terrain Consideration

The selected domain was 12.68 km in both east-west, 12.32 km in north, and 12.46 in south direction, with the centre of the domain being the centre of the proposed

cement manufacturing plant site, with coordinates 412262.00 m UTME and 2759321.00 m UTMN (Latitude 24°56'47.94"N and Longitude 74° 7'51.33"E). Figure 4 shows the model domain that was utilized in the project, including the receptor grid and the plant boundary. The model domain is over laid on the Survey of India 1:20,000 topographic map.

The selection and location of the receptor network are important in determining the maximum impact from a source and the area where there is significant air quality impact. The receptor locations were selected as a multi-tier grid that is defined by uniform and non uniform Cartesian receptors. Certain special receptor locations as discrete Cartesian were also defined at the locations were ambient air quality was assessed as part of the baseline environmental monitoring. The plant boundary is marked as Cartesian plant boundary. A total of 904 were considered, and these are graphically depicted in Figure 4. The details of special receptors considered are given below in Table 4.11.

Table 4.11: Details of Special Receptors

Receptor/ Location	UTM Co ordinates		Elevation	Receptor Type
	X	Y	aMSL	
AAQ 1	412908.7	2759454	487	Within mine Lease
AAQ 2	414299.6	2759712	481	Adjacent to mine Lease boundary
AAQ 3	409817.9	2758476	493	Habitation
AAQ 4	409920.9	2760330	491	Habitation
AAQ 5	414454.1	2758012	474	Habitation
AAQ 6	411363.3	2762442	498	Habitation
AAQ 7	414505.6	2762030	490	Habitation
AAQ 8	409405.8	2756518	485	Habitation
AAQ 9	412857.2	2755127	473	Habitation
AAQ 10	410693.6	2763627	498	Habitation
AAQ 11	413681.4	2763936	502	Habitation
AAQ 12	406108.9	2758269	501	Habitation
AAQ 13	417081.3	2761927	494	Habitation
AAQ 14	415999.5	2754818	463	Habitation

The classification of the land use in the vicinity of the proposed facility is needed because dispersion rates differ between urban and rural areas. For the proposed facility

rural dispersion coefficient is selected for the modelling purpose, since majority of the area within the 5 km radius of the project is barren/cultivable land and has no building and structures which causes increased turbulent and buoyancy induced mixing.

Additionally, the topography in the region of the proposed expansion facility is defined as complex terrain (terrain lying above the stack top elevation). The topography from north east to south west directions has terrain elevation above 30 m only.

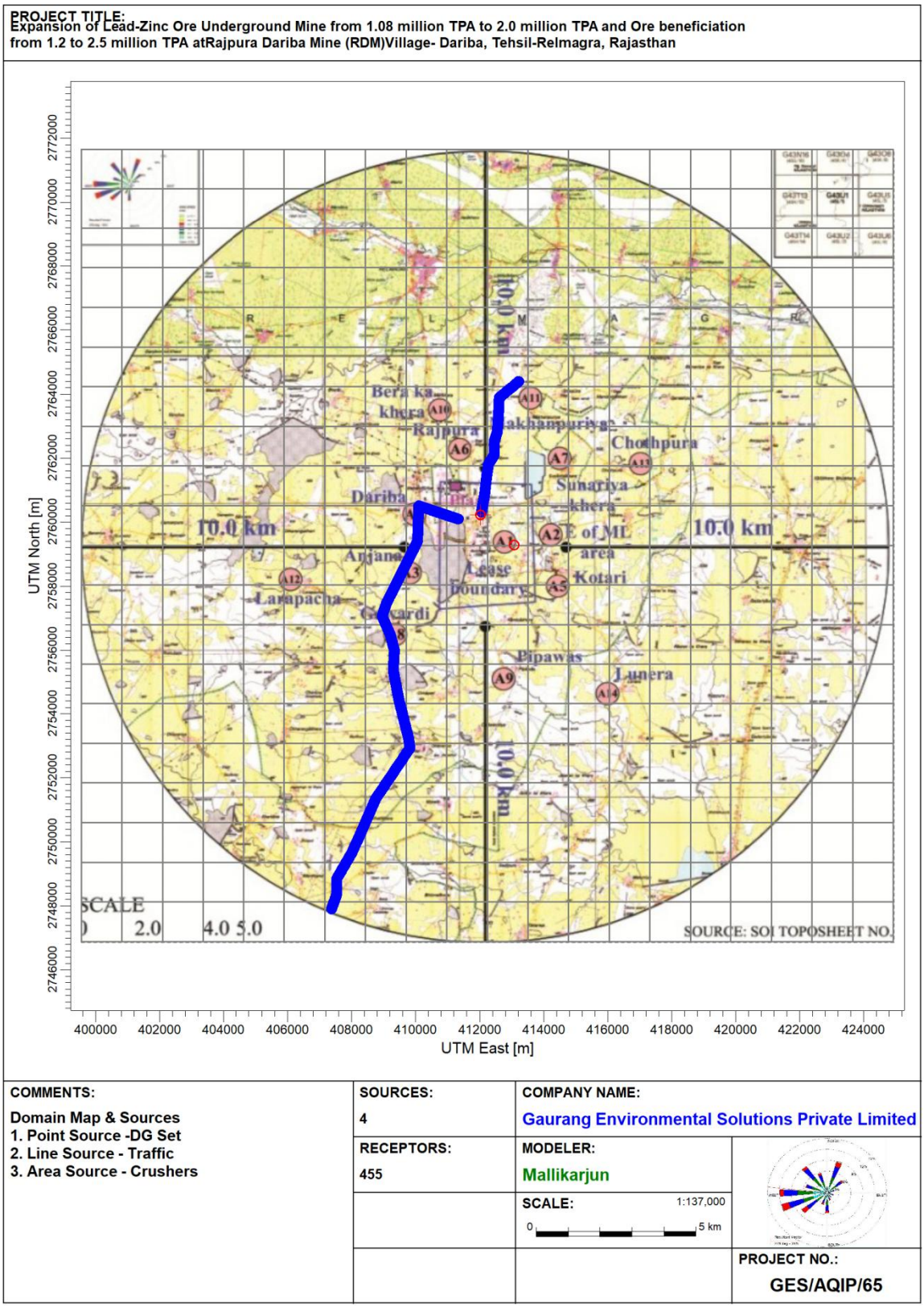

Figure 4.2: Domain Ma

Dispersion Modelling Results

With the various sources identified, a model domain established in the east-west direction and north-south direction and centred in the middle of the proposed expansion facility, and the necessary input files created, model predictions were made for the pollutants SO_2, NOx, PM_{10} and CO for averaging periods for which there are National Ambient Air Quality Standards. Model runs were conducted for the proposed cement facility's air pollutant sources only.

Incremental Ground Level Concentration

In the present case, model simulations have been carried out for the pre monsoon season period. The Ground level concentrations are computed for 24-hr average for PM, SO_2, NO_X, and 1-hr average for CO. Maximum Ground level concentrations of various parameters due to all the sources are tabulated in **Table 4.12.**

Table 4.7 Maximum Ground Level Concentration

S. No.	Parameter	Maximum GLC (µg/ m^3)	Distance (m) wrt Project Site	Direction wrt Project Site
1	Particulate Matter (considering all PM as PM_{10})	5.88	Within the lease area	NE
2	Sulphur Dioxide (SO_2)	0.130	Within the lease area	NE
3	Oxides of Nitrogen (NO_x)	5.22	577 m from lease boundary	NE
4	Carbon Monoxide (CO)	0.167	Within the lease area	NE

The isopleths and results of incremental ground level concentrations for PM, SO_2, NOX, & CO of the proposed project are given in **Figure 4.3 to Figure 4.6.**

Final Incremental GLCs on Baseline AAQM

The maximum incremental GLCs due to the proposed project for various parameters are superimposed on the maximum baseline concentrations recorded during the study period. The cumulative concentrations (baseline + incremental) after implementation of the project are tabulated below in **Table 4.13.**

Table 4.8: Incremental Ground Level Concentrations

S. No.	Parameter	Baseline Levels (µg/ m^3)	Maximum GLC (µg/ m^3)	Incremental GLCs (µg/ m^3)	NAAQS (µg/ m^3)
1	Particulate Matter (PM_{10})	82	5.88	87.88	100
2	Sulphur Dioxide (SO_2)	20	0.130	20.13	80
3	Oxides of Nitrogen (NO_x)	34	5.22	39.22	80
4	Carbon Monoxide (CO)	490	0.167	490.167	4000 (1 Hr)

The ground level concentrations at various special receptors considered e are provided in **Table 4.14.**

Table 4.9: Concentrations at Various Locations within 10 km Boundary

Receptor/Location	UTM Co Ordinates		Ground Level Concentration (µg/m^3)			
	Easting	Northing	CO	NOX	PM	SO2
AAQ 1	412908.7	2759454	0.04	1.15289	0.04201	0.03382
AAQ 2	414299.6	2759712	0.00438	0.08602	0.15446	0.00251
AAQ 3	409817.9	2758476	0.01093	0.24739	0.02712	0.00724
AAQ 4	409920.9	2760330	0.0041	0.05208	0.00612	0.00151
AAQ 5	414454.1	2758012	0.00448	0.10321	0.01931	0.00302
AAQ 6	411363.3	2762442	0.01249	0.32065	0.01397	0.0094
AAQ 7	414505.6	2762030	0.05196	1.52909	0.09948	0.04487
AAQ 8	409405.8	2756518	0.00951	0.23001	0.02283	0.00674
AAQ 9	412857.2	2755127	0.00734	0.21181	0.00852	0.00621
AAQ 10	410693.6	2763627	0.00296	0.08103	0.00321	0.00238
AAQ 11	413681.4	2763936	0.01598	0.24558	0.02141	0.00715
AAQ 12	406108.9	2758269	0.00519	0.13716	0.00709	0.00402
AAQ 13	417081.3	2761927	0.00622	0.14667	0.09028	0.0043
AAQ 14	415999.5	2754818	0.00133	0.01074	0.00242	0.00031

Isopleths of Particulate Matter

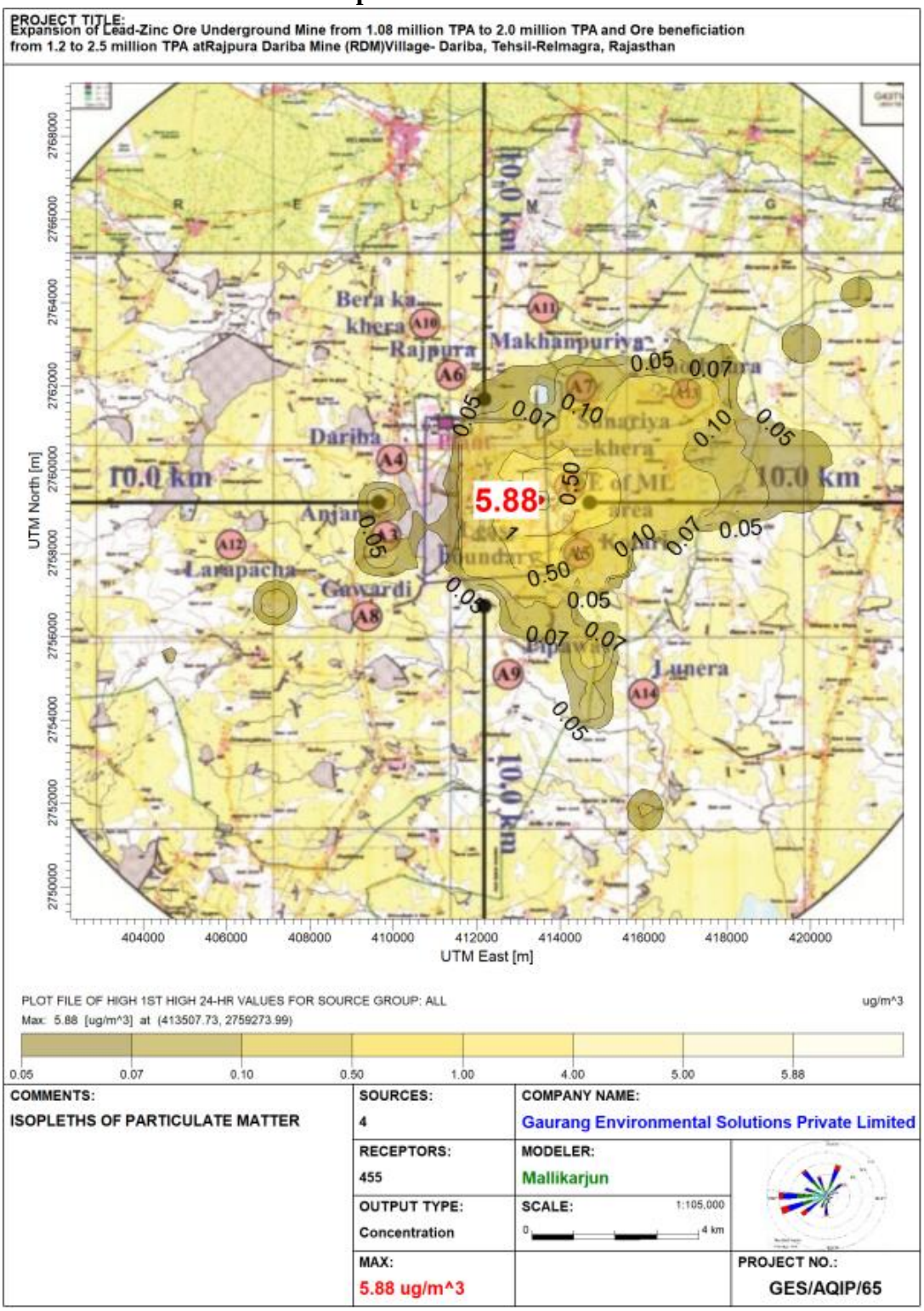

FIGURE-4.3 Equal Concentration Contour Plot For Particulate Matter

Isopleths of Sulphur Dioxide

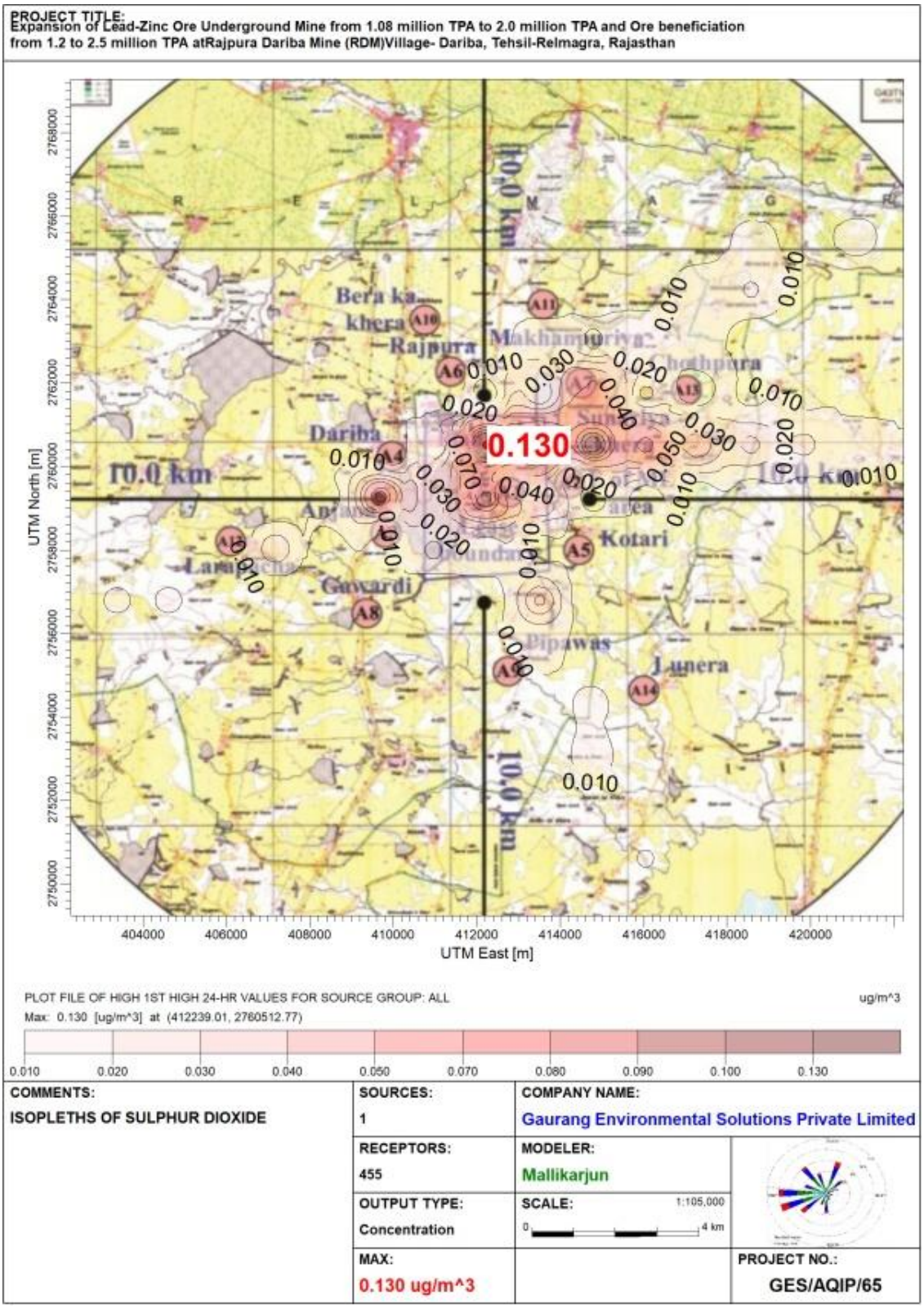

Figure-4.4: Equal Concentration Contour Plot For Sulphur Dioxide

Isopleths Of Nitrogen Oxides

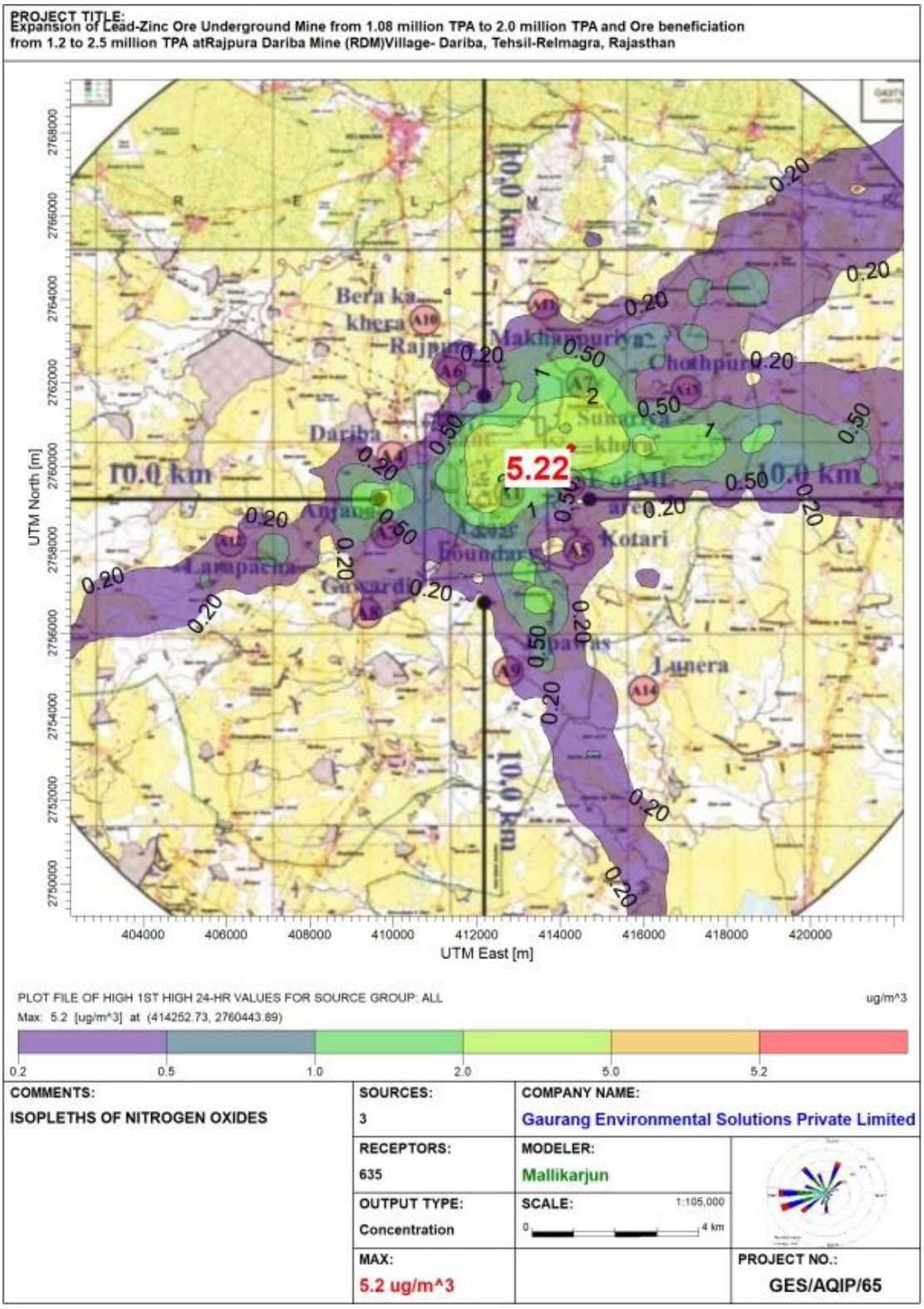

Figure-4.5: Equal Concentration Contour Plot For Nitrogen Oxides

Isopleths of Carbon Monoxide

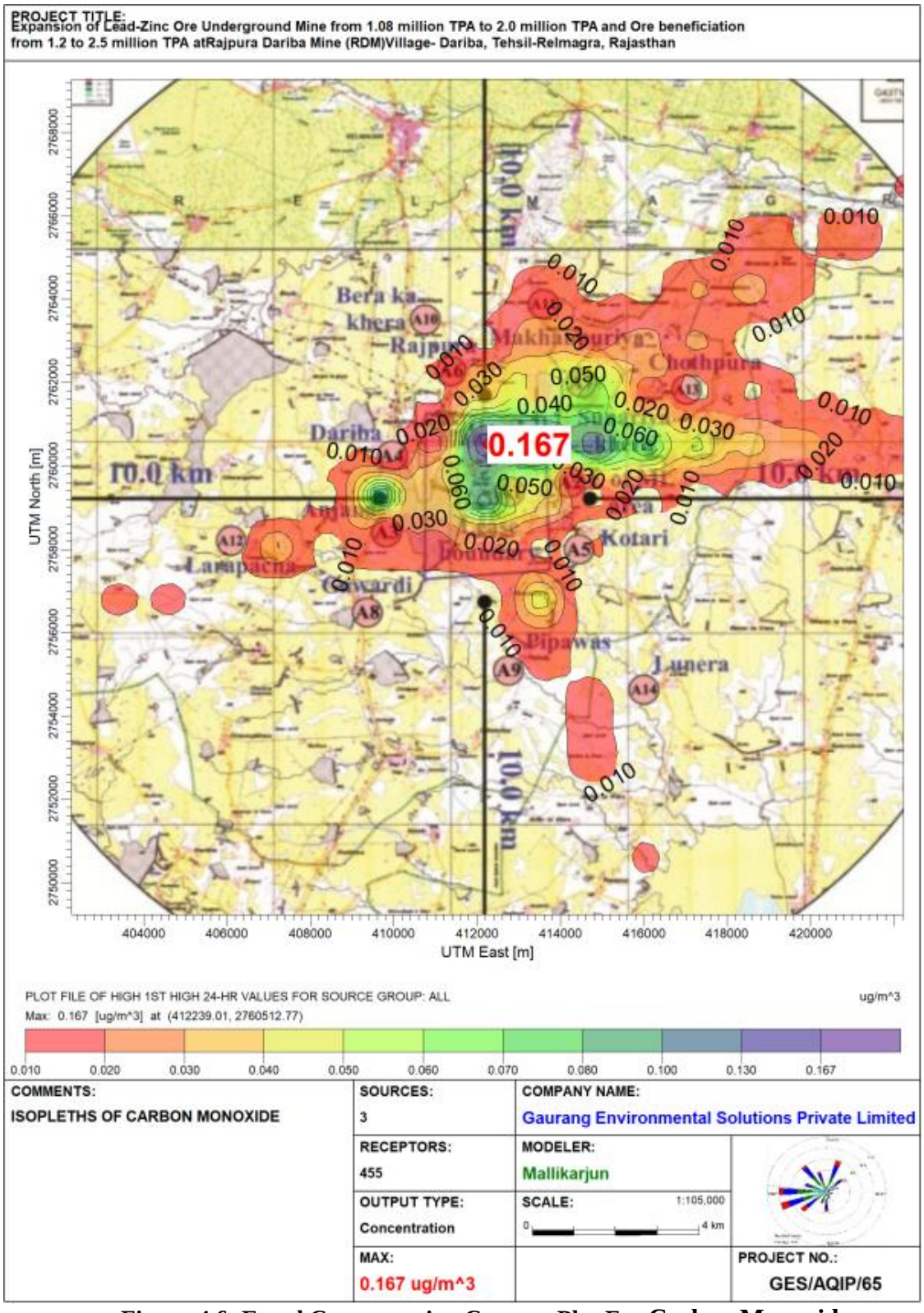

Figure-4.6: Equal Concentration Contour Plot For Carbon Monoxide

Table. 4.15: Summarized table of Anticipated Impacts and its Mitigation

Anticipated Impact	Mitigation Measures
This is an underground mine, dust producing activities are only a few. Ore from mine is to be loaded to conveyor and Granby cars. Material transfer points will be source of dust pollution. Material handling by heavy equipment as well as ore handling plant will release considerable amount of dust if no action is taken for suppressing it at source, while the immediate effects will be poor visibility and intake of dust through inhalation can have health impacts. Point source emissions considered through stacks will be consisting of mainly PM, SO_2 and NO_X. The three most predominant wind directions observed during the study period towards E, NNE and NE directions for with average wind speed during this period (March, April & May 2017) is 0.45m/s.	The mine site has mechanical ventilator. Emanation of dust during working will be minimized by adoption of dust suppression systems (like water spraying) at working faces before and after blasting and during loading. Wet drilling will be adopted in drill machines. Transport of material will be done by covered conveyor belt of km length to minimize the dust generation. The transfer points will be provided with sufficient water sprinkling system. Dust generation will also be reduced by using sharp drill bits for drilling holes with flushing system. To mitigate the NOx generation beyond necessity, quantity of explosives will be used. Greenbelt will be developed in and around the facilities. Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/ unloading points, material handling etc. Transfer points of ore will be provided with appropriate hoods/ chutes to prevent fugitive dust emissions.

Air Quality Index

Air Quality Index is a tool for effective communication of air quality status to people in terms, which are easy to understand. AQI is an initiative intended to enhance public awareness and involvement in efforts to improve air quality. It transforms complex air quality data of various pollutants into a single number (index value), nomenclature and colour. The AQI system is based on by selecting the maximum of sub indices of various pollutants as over all AQI. Ideally, eight parameters (PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, O_3, NH_3 and Pb) having short term standards should be considered for near real time dissemination of AQI.

The Air Quality Index for various ambient air quality monitoring stations was calculated for 3 scenarios:

- Present;
- Post project – Baseline and GLC (The sum of baseline ambient air quality and ground level concentration at the particular ambient air quality monitoring station); and
- Post Project – Baseline and Maximum GLC (The sum of baseline ambient air quality and maximum ground level concentration due to the proposed cement manufacturing facility).

The AQI is calculated based on the maximum value obtained during the monitored period. The details are present below in **Table 4.16.**

Code	Location	Distance / Direction		Present (Baseline)	Post Project (Baseline + Max GLC)
AAQ 1	Mine lease area	0.0	within ML	81	87
AAQ 2	E of ML area	2.0 km	E	82	88
AAQ 3	Anjana	2.35 km	WSW	81	87
AAQ 4	Dariba	2.5 km	NW	78	84
AAQ 5	Kotari	2.5 km	ESE	81	87
AAQ 6	Rajpura	3.3 km	N	81	87
AAQ 7	Sunaria Khera	3.6 km	NE	77	83
AAQ 8	Gawardi	3.7 km	SW	81	87
AAQ 9	Pipawas	4.0 km	SSE	81	87
AAQ 10	Bera Ka Khera	4.5 km	NNW	80	86
AAQ 11	Makhanpuriya	4.5 km	NNE	81	87
AAQ 12	Larapacha	5.6km	WSW	78	84
AAQ 13	Chothpura	5.0 km	NE	79	85
AAQ 14	Lunera	6.0 km	SE	80	86

The results obtained were compared with AQI Category range provided below in **Table 4.16.**

Table 4.10: AQI Category – Range

Good (0–50)	Minimal Impact	**Poor (201–300)**	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	**Very Poor (301–400)**	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	**Severe (>401)**	Respiratory effects even on healthy people
Source: CPCB			

The AQI at the project study area after expansion of the project would be Satisfactory and may cause minor breathing discomfort sensitive people.

4.2.2 Impact on Air Quality due to Additional traffic

There will be an increase in traffic for ore transport of about 0.5 MTPA for beneficiation plant. Impact assessment has been estimated for ore transportation of vehicles used about 56 per day by road(SK Mine to Dariba beneficiation plant), and further using trucks about 13 per day for transportation of concentrate generated during the beneficiation to Chanderiya and Debari.

4.2.2.1 Traffic Density Survey

The traffic study details were discussed in the previous Chapter i.e. Chapter-3 in Section-3.9.

4.2.2.3 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-4.17.**

Table-4.17: Recommendations on Capacity-IRC

Sr.No	Category of road	Maximum PCU/day
1	Two lane roads (7 m) with earthen shoulders	1500
2	4- lane highway with earthen shoulders	3000

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

4.5 NOISE ENVIRONMENT

4.5.1 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.

4.5.2 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). In addition to the existing plant, it is proposed to commission new beneficiation plant of 1.5MTPA capacity with advanced technology &improved recovery. Thereby total beneficiation capacity will be 2.5 MTPA to treat ore of Rajpura Dariba and other mines by enhancing capacities of various equipments. The details of noise generating sources are presented in **Table-4.18** and these are considered as input to the noise model.

Table-4.18: Designed Noise Levels from the Beneficiation Plant

Sr. No.	Sources	Noise Level in dB(A)
1	Ball mill	85
2	Flotation stream	85
3	Rotary vacuum drum filter	85
4	Secondary crusher	85
5	Tertiary crusher	85
6	Air blower	85

4.5.3 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-4.8.**

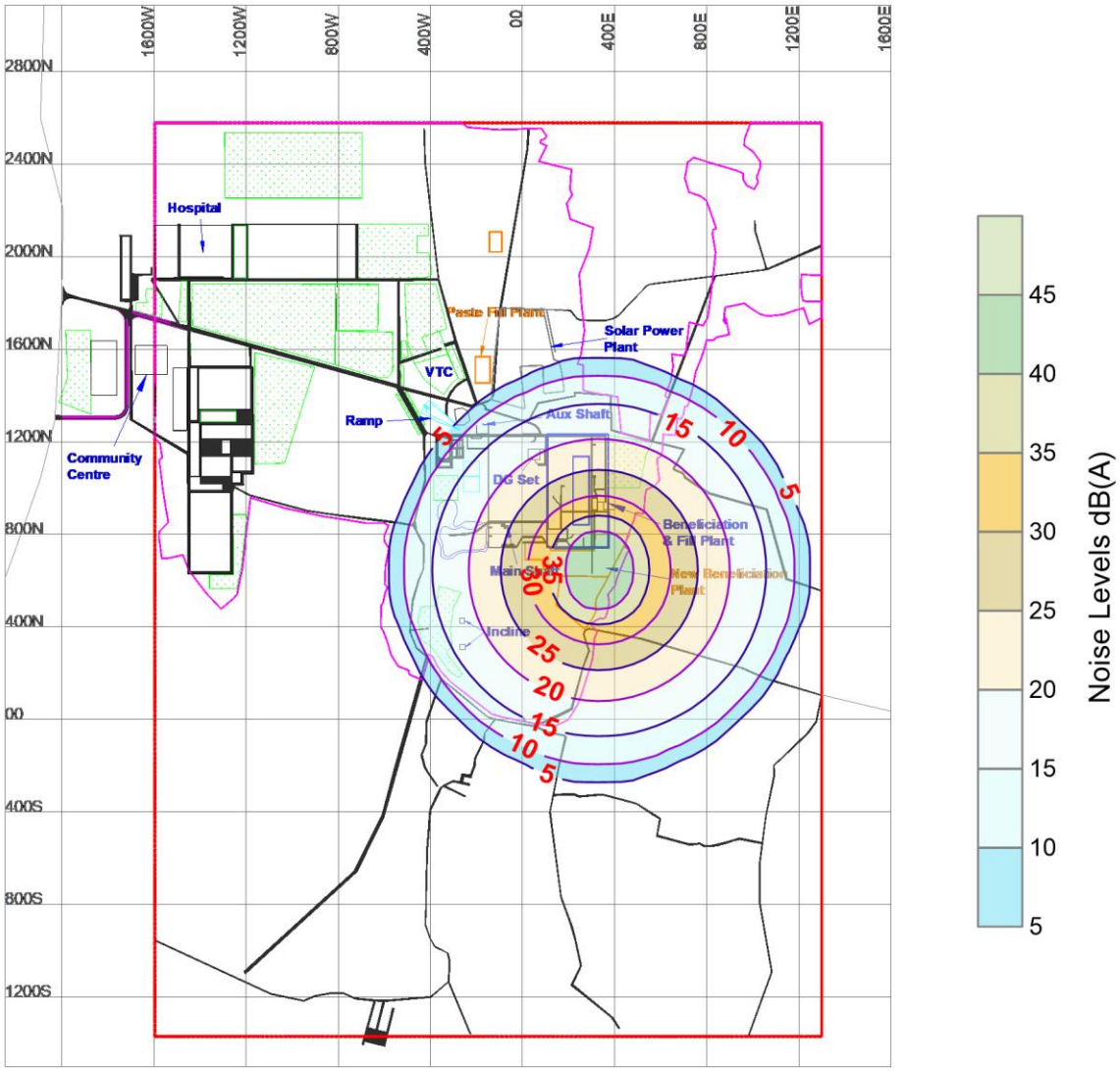

Figure-4.8: Incremental Noise Levels for Proposed Project

Table 4.19: Summarized table of Anticipated Impacts and its Mitigation

Sources	Anticipated Impact	Mitigation Measures
➢ Drilling and Blasting ➢ Operation of Machinery	**Physical structure** Vibration can cause varying degrees of damage in buildings and affect vibration sensitive machinery or equipment **Human** Effects on the body, psychological reactions, attitude, interference with communication and concentration, sleeping disturbance and	➢ Particle velocities of less than 51mm/s (2.0 in./s) show little probability of causing structural damage ➢ If there is at least 8 ms (millisecond) separation between detonations, the vibration effects of individual explosions are not cumulative. Particle velocity is still the best single

	inspiring fear. **Animals** Adversely affect wildlife by interfering with communication, masking the sounds of predators and prey, cause "stress" and result in temporary or permanent hearing damage. Exposure to noise impulses throughout the night-time sleep period resulted in poorer daytime task performance by animals *(Fletcher &Busnel, 1978).*	ground motion description ➢ Controlled blasting is a technique for the purpose to reduce the amount of overbreak and to control the ground vibrations. ➢ In the management of noise and blast emissions is to implement a monitoring and audit program. ➢ Additional sound proof enclosures of fixed and mobile plant and mine ventilation fans. ➢ Acoustic enclosures around process plant and optimizing mine layout to shield noise generating plant and haul roads. ➢ Providing bund walls for acoustical screening and acoustic treatment of dwellings. ➢ Altering the blast drilling pattern and delay layout. ➢ Using alternative rock breaking techniques. ➢ Blasting at times that suit local conditions. ➢ Conduct blasts at a set time or use a pre-warning system.

4.6 BIOLOGICAL ENVIRONMENT

Potential or likely impacts due to the proposed mining activity may be, loss of adjacent forest habitats and biodiversity, loss of vegetation cover and biodiversity, loss of aquatic ecosystem and biodiversity, effects of heavy transportation on habitats

and faunal groups, Impact on water and land components, Changes in ambient air quality and degradation of vegetation, Impact of Noise on faunal groups, Accidental mortality of faunal groups, Impact to threatened floral species, Impact to threatened faunal species, Impact on Animal movement. Keeping all this in mind the following mitigations have been suggested under environmental management plan.

With the above understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species.

Table 4.20: Summarized table of Anticipated Impacts and its Mitigation

Impact	Evaluation	Mitigation
Loss of adjacent forest habitats and biodiversity	The expansion is coming up in the same lease area. The increase in the production capacity may affect the surrounding habitats & biodiversity.	As the expansion is coming in the same mine lease area (core zone) is not consists of any critical / unique habitat or designated forest land vulnerable to the fragmentation or isolation. Therefore the proposed expansion project activities will not have any impacts like loss of true forest habitat, floral species and associated faunal diversity. However 33% area of the existing mine site is already covered under the green belt.

Impact	Evaluation	Mitigation
Loss of vegetation cover and biodiversity (core zone)	The expansion is coming up in the same lease area. So there will no impact on	There is no any clearing of existing sparse vegetation within the lease area so no major impact on floral composition and associated faunal species at local level. The mine area is already having 35 % green belt and now

	associated biodiversity of the core zone area.	it is further suggested that approx6000 trees (Local trees species like: *Cassia fistula, Delbergiasissoo, Delonixregia, Polyalthialongifoliaetc*) will be planted in the mine area and nearby villages, to reduce the impact of expansion activities in the surroundings of the existing mine site.

Table 4.21:List of plant species suggested to plant and improve green belt in and around the existing mine

S. No.	Species Name	Local Name	Species Characters
1.	*Acacia nilotica*	Desi Babul	*WT, ST*
2.	*Albizzialebbek*	Shiris	*WT*
3.	*Annonasquamosa*.	Sitafal	*CT, FT, ST*
4.	*Azadirachtaindica*	Neem	*CT, MT*
5.	*Dalbergiasissoo*	Sisam	*WT, ST*
6.	*Pongamiapinnata*	Karanj	*MT, CT*
7.	*Emblicaofficinalis*	Ambla	*CT, ST, FT*
8.	*Ficusbengalensis*	Bad or Vad	*CT, LT, FT*
9.	*Ficusreligiosa*	Piplal	*CT, LT, FT*
10.	*Holopteleaintegrifolia*	Churel	*WT, LT*
11.	*Lawsoniainermis*	Mehndhi	*Sh*
12.	*Mangiferaindica*	Aam	*CT, LT, FT*
13.	*Pithecellobiumdulce*	JungalJalebi	*CT, MT*
14.	*Syzygiumcumini*	Jamun	*WT, FT*
15.	*Tamarindusindica*	Emli	*CT,MT, FT*
16.	*Terminaliaarjuna*	Arjun	*WT, LT*

Species Characters: SH=Shrub; WT sp= Wild Tree species; CT sp= Common Tree species; = Fruit Tree; ST = Small Tree; LT = Large Tree and MT = Medium Tree.

Overall 16 plants species have been suggested to grow in and around the mine lease area.

Table 4.22: Summarized table of Anticipated Impacts and its Mitigation

Impact	Evaluation	Mitigation
Changes in ambient air quality (dust & gases) and degradation of vegetation	Due to the proposed mining project transportation of material with the movement vehicles will increase and Dust concentration is expected to increase because of Heavy vehicle movements in the area.	Greenbelt development program with specific plant species which can act as bio-filters can further reduce the level of pollutant concentration and also will improve the overall ambient air quality in and around the project environment. Provision of spraying water can help to reduce dust emission on roads. Moreover, the following tabulated plant species suggested includes few shrubs and trees species of wild, common and species of ornamental values for effective dust control. The level of dust control efficiency of these species ranges from minimum of 6.12% by *Acacia nilotica* to maximum of 35.39% by *Holopteleaintegrifolia*. The area of plantation suggested mainly focused along the road side where the vehicle pressure is likely to increase during the mining activities especially during sand transportation. In each location, a wider range plant species are suggested to maintain the floral diversity and improve the survival rate. Therefore, the species list includes predominately wild and few common tree species with high rate of dust control efficiency *(Cassia fistula-23.03%, Azadirachtaindica -25.54. Polyalthialongifolia-29.84%, Terminalia arjuna-30.54% and Holopteleaintegrifolia 35.39%).* The location 2 includes the stretches of all the roads passing through the village area which are under the influences of project related activities mainly vehicle pressure due to transporting sand. A list of 11 species has been recommended to develop avenue plantation along the road sides. This list includes mainly common

		species of aesthetic values with colorful flowers and also fruit trees to attracts birds

Table 4.23: List of Plant Species to Control Dust (Particulate matter) in and around the mine area

S. No.	Scientific Name	Common & Local Name	%of DC	Location		
				1	2	3
1.	*Annonasquamosa*	Sitafal	12.09	*	*	
2.	*Magiferaindica*	Aam	12.25			*
3.	*Thevetiaperuviana (sh)*	PeeliKaner	12.56	*	*	*
4.	*Ipomeacarnea (sh)*	Beshram/Behaya	14.87	*	*	*
5.	*Hibiscus rosa- sinensis(Sh)*	Gurhal, Jasund,	21.09	*	*	
6.	*Bougainvillieaglavra(St)*	--	21.35			
7.	*Ficusreligiosa*	Peepal	12.94	*	*	*
8.	*Syzygiumcumini*	Jamun	14.39			*
9.	*Citrus limon*	Nimboo	15.96			
10.	*Delbergiasissoo*	Shesham	17.02	*	*	
11.	*Delonixregia*	Gulmohar	18.05			*
12.	*Moringaolieifera*	Sahajan	18.79			*
13.	*Aeglemarmelos*	Bel	18.9	*	*	
14.	*Pithecolobiumdule*	Jungle Jalebi	19.21	*	*	
15.	*Cassia fistula*	Amaltas	23.03	*	*	*
16.	*Buteamonosperma*	Palas, Dhak	24.44	*	*	*
17.	*Azardirachtaindica*	Neem	25.54	*	*	*
18.	*Polyalthialongifolia*	Ashoka	29.84	*	*	*
19.	*Terminaliacatappa*	DesiBadam	30.12			*
20.	*Terminaliaarjuna*	Arjun	30.54	*	*	

Locations: 1- both sides of the mining area, 2- Roads connecting mine lease, 3- Roa passing through nearest villages. Sh- shrub, St – Straggler. %DC – Percent of D Control efficiency

Table 4.24: Summarized table of Anticipated Impacts and its Mitigation

Impact	Evaluation	Mitigation
Impact of Noise on faunal groups: **Increase in noise level in the project area may affect the faunal groups in term of their normal behaviors like; feeding, resting and breeding/nesting (especially avifauna).**	The main sources of noise in the mining activities will be of mining equipment and vehicular movement associated. The standard prescribed by the Occupational Safety and Health Administration (OSHA) is 90 db not more than 8 hrs. Exposures for the worker However, no such conditions and any standard limitations have been available for any animal group. However, intensive afforestation program with appropriate plant species can take care of this localized and short term disturbance in the long run.	1.Some of the plants species listed in above different table also perform vital role in control noise pollution due to their thick and fleshy leaves and vibrating nature (Sexena 1991). A total of seven species were identified as species which are able to absorb So_2 emission also. 2.Therefore those species listed below are suggested to grow in and around the villages and other public places like schools, hospitals, health Centre and temples of nearby villages. 3.In addition, following the afforestation programs suggested above in different locations in and around the mining sites, road sides, village and other area in different phases will further minimize the noise level and also provide habitat for many avifauna & other faunal groups and improve the overall faunal diversity of the surrounding area.

Table 4.25: List of plant species to control Noise pollution and absorb gas (SO_2 emission)

S. No.	Scientific Name	Common & Local Name	Performance		Location	
			CN	OGE	1	2
1.	*Aeglemarmelos*	Bel	*			*
2.	*Azardirachtaindica*	Neem	*	+	*+	*+
3.	*Diospyrosmelanoxylon*	Tendu	*		*	
4.	*Ficusbengalensis*	Banyan, Vad	*		*	*
5.	*Ficusreligiosa*	Peepal	*	+	*+	*+
6.	*Polyalthialongifolia*	Ashoka	*	+	+	*+
7.	*Terminaliacatappa*	DesiBadam	*		*	*
8.	*Terminaliaarjuna*	Arjun	*	+	*+	+

*** CN –Control Noise level, OGE – Absorb Gas emission (+ So_2), Locations: 1- roads crossing villages, 2 – Public places (schools, hospitals, health centre and temples)**

Details of existing plantation: -

S.No.	Particulars	Existing	Proposed	Total
1	Acquired Area (ha)	554.19	0	554.19
2	Area under plantation (ha)	190	0	190
3	No. of Plants	190000	20000 (For Gap Filling)	190000
4	% Area	34.28 %		
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 varigata*), Shisham (*Delbergia sisso*), Dhaak (*Butea monosperma*), Amaltas (*Cassia fistula*), Bauhnia (*Bauhinia purpurea*) etc**		

S.No.	Particulars	2018 -19	2019-20	2020-21	2021-22	2022-23

1	No. of Plants	4000	4000	4000	4000	4000
2	Area to be covered in plantation (in ha)	Gap filling				
3	Total Area (ha)	190	190	190	190	190

Fig; photographs showing existing plantation at site

Fig; photographs showing existing plantation at site

4.7 SOCIO ECONOMIC IMPACT

4.7.1 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 250 persons, which will help to raise the standard of living of the people.

4.7.2 Socio-Economic Development

Based on the requirement of the people in the area the development activities need 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 250persons.

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

Table 4.26: CSR Expenditure FOR NEXT 3 Years (2019- 2021)

S. No.	Focus Area	Initiative	FY 2018-19	FY 2019-20	FY 2020-21	Total
Proposed Budget in Lacs						
1	Health & Hygiene	Free medical facilities provided at company run hospitals, Mega specific Camps	100	100	100	300
2	Education	Khushi Project, Nandghar Projec, Siksha sambal Project, Child care Center, Support to school & other education initiative	1004.85	385	385	1774.85
3	Sustainable Development	Sakhi Project under Women Empowerment & Skill Development (Mining Academy)	434.62	95	100	629.62
4	Social Mobilisation	Drinking water, Promotion to Rural Sports and Culture	160	160	160	480
5	Infrastructure Development	Improving the basic infrastructure facilities in nearby villages, community assets creation	2167	1650	2150	5967
6	Agriculture & Animal Husbandry	SAMADHAN-Integrated Agriculture and	131.40	140	150	421.40

		Livestock Development Project				
7	Environment Management & Misc.	Bio-investment, Mega Plantation, Admin Expenses	100	100	100	300
	Grand Total		4097.87	2630.00	3145.00	9872.87

TABLE 4.28: Impact on Community Demographics

S. No.	Existing variables/situations of Socio-economic Issues	Predict (adverse/ favorable) impacts (reasons for variations & bias of representative data).	Mitigation measures. In numbers.
1	Habitation in the Core Zone There is no habitation in the core zone.	**Zero (0)** Loss of habitation. No displacent due to the proposed mine expansion project.	The nearest habitation is 600 m away from the mine boundary and all necessary measures are being taken to ensure safety.

TABLE 4.29: PUBLIC HEALTH IMPLICATION

S. No.	Existing variables/situations of Socio-economic Issues :	Predict (adverse/ favorable) impacts (reasons for variations & bias of representative data).	Mitigation measures. In numbers.
2.	Loss/ gain of health & fitness in short term (>1) or long term (<1)	The deterioration in health & fitness of the habitation will be negligble. The nearest habitation in the west Direction may be effected with the long term impact of the mining activities in the long run.	Regular health camps to trace the develeopments and control any ill-consequences due to any mining pollution.
3.	The unit has provided following health facilities in the study area: • 5 days Camp benefitting more than 4500 patients • Naturopathy, Neuropathy, Physiotherapy, Beautician, Physician,	The proposed project is an underground expansion mine and air pollution control measures will be as per standards. The unit has spent on improving the health facilities.	The PP proposes to continue further expenditure on health care facilitiesand adoption of various health facilities in government run Primary Health Centre and Community health centers.

	Dietician, Exhibition, Jaloka treatment etc.		
4.	Health impacts – on mental, physical, and social well being.	The proposed expansion project will not adversely impact the mental, physical and social well being.	Expectations in Fair pay, employee care, social responsibility commitments etc. will be timely met. Greivance redressal mechanism is made to handle complaints from the study area.
5	Loss/gain of self esteem Less developed areas like The local residents have high self esteem due to the Hindustan zinc mine and associated economic growth in the region.	A rise in the self esteem due to incresing rate of economic growth in the region. Higher degree of self satisfation and contentment.	--
6.	Loss/gain of view by study area inhabitants	The project concerned is an underground mine.	Plantation will be done, Cleanliness will be maintained in and around the mine premises.
7.	Loss/gain of culture and religion: It is clearly stated in as per the Human Rights, that the obligation of States is to promote universal respect for, and observance of, culture & religion.	The proposed project will follow universal respect for, and observance and protection of, human rights and fundamental freedoms for all.	The proposed project expansion will promote neither selective, nor relative, but universal respect through contribution in various festivities, equal observance and protection among employees and societies at large in all CSR activities.

4.8 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 1.0 MTPA beneficiation plant. The major risk associated with beneficiation operations involve Working at height, working in confined spaces, working with Power infrastructures etc.

4.8.1 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.

4.8.2 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.

4.8.3 Poor Ventilation

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

Mitigation Measures

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

4.8.4 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;

4.8.5 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.

4.8.6 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.

4.8.7 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.

4.8.8 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.

4.8.9 Safety Risk Associated with Failure of Machineries/Equipment:

Machinery failure and accidents from the mining machinery.

Mitigation Measures

- 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.

4.8.10 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:

Mitigation Measures

- 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.

Table 4.30 : Occupational Health Action Plan for Community along with budgetary aspects

Sr. No	Actions Proposed	Budget	Timeline
1	Periodical Monitoring of Ambient Air, Ground and Surface Water, Soil, Pond Sediment, Crops, Vegetables, Aquatic life for lead contamination.	Rs. 25 Lakhs /Annum	• Ambient Air Monitoring – Monthly • Ground /Surface water, Soil Quality –Pre & Post Monsoon. • Pond Sediment, Crops, Vegetables, Aquatic life - Yearly
2	Community environmental health survey	Rs. 15 Lakhs	• Mar.'19
3	Awareness program on following 1. Increase frequency of Hand washing 2. Discourage from putting their hand to mouth 3. Adopting proper hygienic measures to keep oneself clean 4. To eliminate lead based/ containing articles from household	Rs. 5 Lakhs /Annum	First awareness campaign shall be conducted by Mar.'19.

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CHAPTER -5

ANALYSIS OF ALTERNATIVES

(TECHNOLOGY & SITE)

CHAPTER -5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1. ANALYSIS OF ALTERNATIVE SITE

Rajpura-Dariba mine is located at the southern extremity of Rajpura-Dariba Bethumnimetallogenic belt in Rajsamand district, Rajasthan, at a distance of 76 km NNE of Udaipur.

Rajpura Dariba deposit extends over a lease area of 1142.2106 ha with estimated in-situ ore reserves & resources in Rajpura Dariba deposit is 60.05million tons with grades of 6.3% Zinc and 1.91% Lead as on 31st March 2018 and as on 01.06.2017 the reserves & resources stand at 59.24 million tons as per approved Scheme of Mining with PMCP. The present proposal is for Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA from Rajpura Dariba underground mine. The proposed expansion will not require any acquisition of additional lease area. Thus, No alternate site analysis was required since it is a site specific project and no additional lease acquisition is envisaged since it is an underground mining brown field expansion.

5.2 ANALYSIS OF ALTERNATIVE TECHNOLOGY

a. Mining:-

The general surface RL of RDM is around 500mRL. The existing working depth of working is varying from 300m in north lode to 620m in main lode. The mine can be approached by 3 accesses from surface shown as under with details:

- Main Shaft (Surface to -92mRL)
  - Total Depth : 611m (501 to -110mRL)

- Working Depth : 593m (501 to -92mRL)
- Purpose & Capacity : Man winding (40 persons) & Ore hoisting (0.9mtpa)

- Auxiliary Shaft (Surface to 0mRL)
  - Total Depth : 509mRL (501 to -8mRL)
  - Working Depth : 501m (501 to 0mRL)
  - Purpose & Capacity : Man winding (14 persons)
- Ramp
  - Total Depth : 658m (501 to -157mRL)
  - Purpose & Capacity : Ore hauling (1.0mtpa) & transportation

Development and stopping method

Production blocks are accessed through ramp and also connected with second outlet in terms of shaft, manpass, and ramp. General cross section of drives is proposed from 3m (W) x 3m (H) to 5m (W) x 4m (H) for the various purposes depending upon men/ machine movement. The proposed method of mining for Rajpura Dariba Lead Zinc Mine shall be Blast Hole Stoping & Vertical Retreat Mining (VRM). However, predominant mining method shall be BHS only.

Description of Mining Methods

(A) Blast Hole Stoping Method (BHS)

This mining method is being applied in the mining blocks where the ore body width is narrow and varying from 8 to 15m. The entire strike length is divided into 20m long panels, designated as primary and pillar stopes. The stopes are mined using DTH (115mm) holes for down drilling from the upper drill level. Blasting is done against a slot raise. The stopes

are back filled with cement fill after removal of our.

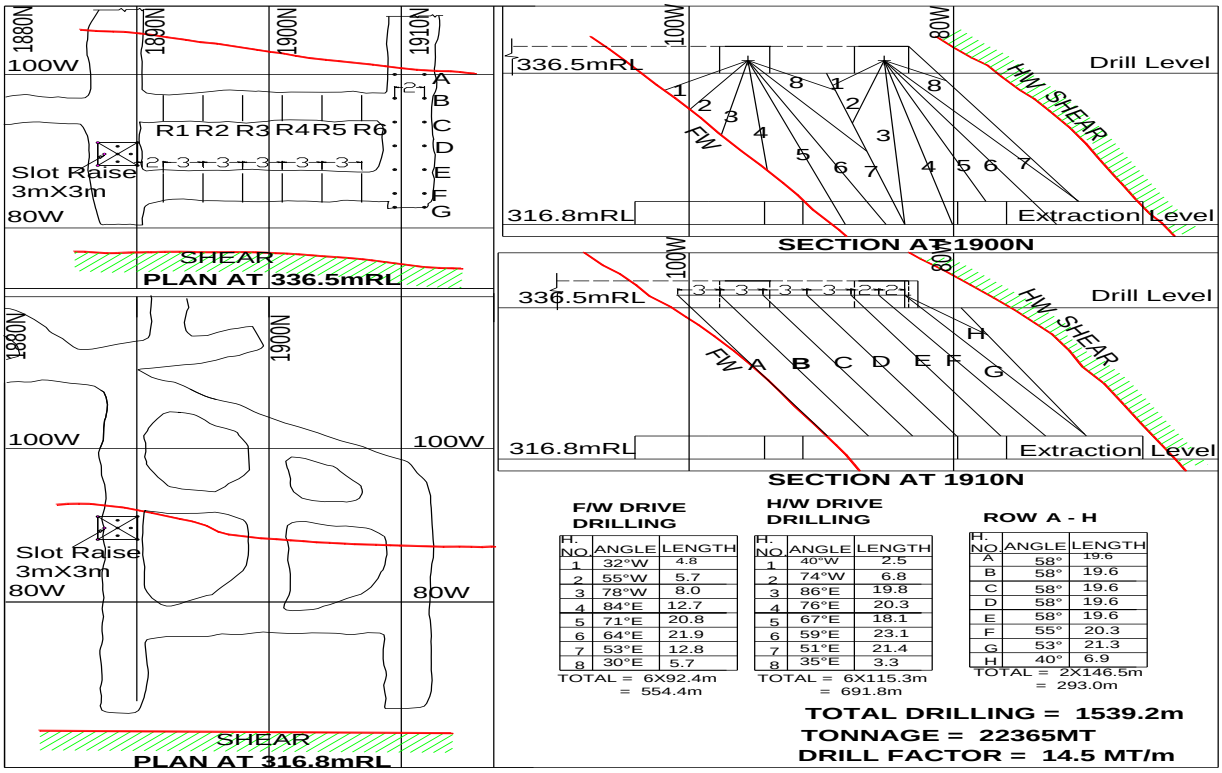

Figure 5.1: Blast Hole Stoping Method

(B) Vertical Retreat Mining (VRM)

Vertical Retreat Mining (VRM) was adopted at Rajpura Dariba Mine in consultation with M/s INCO TECH of Canada to increase the safety of man & machineries, high productivity & higher ore recovery compared to Cut & Fill stoping method. This method was first adopted for the stoping of mining block of S-Lode between 212 mRL to 285 mRL. After successful implementation and results this method is being adopted in the current production block of South between 11mRL to 195 mRL. The VRM method is being adopted in the ore blocks where the ore body width is more than 25m. However, looking into the higher vibration generation in this method, it is proposed in limited scope.

VRM stopes are mined using downward large dia hole (165mm) by ITH drills from upper levels. These holes are charged & blasted using spherical charge technology where L/D ratio greater than 6 (where L is charging length of the hole & D is the diameter of the hole).

A slice of 2.5 to 3.0m blasted at a time, thus retreating in upward direction and mucking is done by electric loader at extraction level. The empty stopes are filled by classified mill tailing &cement.

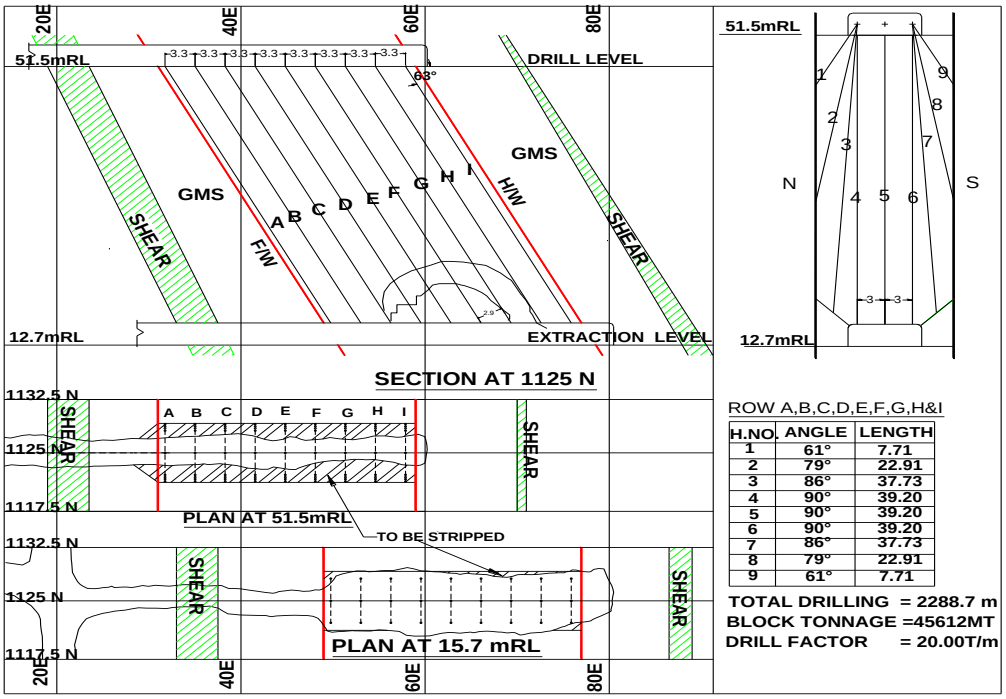

Figure 5.2: Vertical Crater Retreat method (VRM)

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 using the best technology thus no alternative technology is required. But to increase the Productivity, efficiency, automation, eases of operation in the proposed expansion, following are the major technological changes being done:

Table no. 5.1: Major technological changes being done in the proposed expansion

S. No	Description	Benefits
1	Introduction of road grader	Road graders are being introduced to improve road conditions
2	Mechanization in diesel & explosive transportation	Mechanization is being planned in transportation of diesel dispensing & explosive transportation thereby improving safety, productivity and ergonomics.
3	Leaky feeder communication system	Communication system is being introduced for communication for any breakdown, emergency or unplanned activities in the mine
4	Top hammer drills	Top hammer drills are being introduced in underground so as to improve production drilling in lower levels of the mine and thereby reducing the dependency over compressed air. Improved productivities and ergonomics shall also count towards improved safety.
5	Long feed jumbos	In order to improve development rates, it is proposed to introduce long feed jumbo thereby improving advance per blast.
6	Bulk emulsion charging system	In order to improve development rates and mechanizing charging, bulk emulsion charging system shall be introduced. Charmec shall also be introduced for the same.
7	Mud pump	In order to strengthen mud handling system from existing manual to mechanized
8	Underground workshop	A world class underground workshop is to be introduced to improve the maintenance facility and thereby improving
9	Rock breaker & grizzly	In line with trackless mining, a rock breaker & grizzly are being proposed to be installed so as improve crusher performance.
10	High speed exploration rigs	In order to enhance exploration capacity, it is proposed to introduce high capacity exploratory drill rig of smaller dimension.
11	Raise boring	Raises are being developed with raise bores to fasted the raising and thereby improving the ventilation.
12	Advanced Mine Planning techniques	Technical cell is being strengthened to design in advanced sophisticated software helping in scientific mining of minerals.
13	Shotcrete	Shotcreting facility is under development so as to improve development rates in poor ground conditions.
14	Light motor vehicles for underground	For effective supervision, LMVs (Light Motor Vehicles) are proposed to be introduced.
15.	Strengthened	Standardization of services with detailed engineering and dedicated crews

	dewatering & reticulation system	

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 a Brownfield 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.

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CHAPTER- 6

ENVIRONMENTAL MONITORING PROGRAMME

CHAPTER- 6

ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Environmental monitoring can be defined as the systematic sampling of air, water, soil, and biota in order to observe and study the environment, as well as to derive knowledge from this process. Post Project Monitoring is an essential part to check the impact of any project activity. Hence, monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- Status of Pollution within the mine site and in its vicinity.
- Generate data for predictive or corrective purpose in respect of pollution control.
- Examine the efficiency of pollution control system adopted at the site.
- To assess environmental impacts.

Monitoring will be carried out at the site as per the norms of CPCB. Environmental Monitoring Programme will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MOEF & Consent to Operate issued by SPCB. Six monthly compliance reports will be submitted every year to Regional office of MoEF on 1st of June & 1st of December. Quarterly compliance Report for conditions stipulated in Consent to Operate will be submitted to SPCB on regular basis.

Monitoring will ensure that commitments are being met with. This will take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/ biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The preventive approach by management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc.

The key aims of monitoring are, first to ensure that results/ conditions are as per forecast during the planning stage and where they are not, to pinpoint the cause and implement action to remedy the situation. A second objective is to verify the evaluations made during the planning process, in particular with risk and impact assessments and standard & target setting and to measure operational and process efficiency. Monitoring will also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results provide the basis for auditing.

6.2 ENVIRONMENTAL MONITORING CELL

A centralized environmental monitoring cell is established for monitoring of important and crucial environmental parameters, which are of immense importance to assess the status of environment during mine operation. With the knowledge of initial parameters, deviations in environmental conditions due to operation of the mine can be assessed and suitable mitigation steps will be taken in time to safeguard the environment. The following routine monitoring program will be implemented under the post – project monitoring as per CPCB guidelines.

Environmental monitoring schedules are prepared covering various phases of project advancement, such as constructional and regular operational phase.

6.2.1 Responsibilities of EMC

The responsibilities of the EMC include the following:

i. Environmental monitoring of the surrounding area.

ii. Commissioning of pollution control equipment.

iii. Specification and regulation of maintenance schedules for pollution control equipment.

iv. Ensuring that standards are maintained.

v. Developing and maintenance of green belt.

vi. Ensuring water use is minimized.

vii. Carrying out the Environmental Management Plan.

6.3. MEASUREMENT METHODOLOGIES

6.3.1 Instruments to be used

The following instruments will be used for data collection work in the monitoring schedule:

1. Respirable Dust Sampler,
2. Fine Particulate Matter Sampler (FPS),
3. Digital D.O. Meter Model.
4. Hygrometer
5. Sound Level Meter
6. Micro Meteorological Station Model Enviro
7. Water Level Indicator
8. Global Positioning System (GPS)

6.3.2 Monitoring Programme

The post project monitoring will include details of any major/ minor impact in the core zone and area within buffer zone for the following parameters: -

- Micro - Meteorological data
- Ambient Air Quality Monitoring
- Noise Level Monitoring
- Routine Medical Check-up – as per DGMS guidelines.

6.3.3 Monitoring schedule

The major attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:-

- Source emission and ambient air quality;
- Ground water levels and ground water quality;
- Water and waste water quality (water quality, effluent & sewage quality etc);
- Soil quality;
- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels); and

- Ecological preservation and afforestation.

Details of the Environmental Monitoring schedule, which will be undertaken for various environmental components, are detailed below:

Table 6.1: Post Project Monitoring Schedule

S. No.	DESCRIPTION	FREQUENCY OF MONITORING
1	Meteorological Data	Daily
2	Ambient Air Quality at mine site	Monthly
3	Water Quality	Monthly
4	Noise Level Monitoring	Monthly
5	Soil Quality	Once in Six Months

6.4 ENVIRONMENT MONITORING PROGRAMME

The following routine monitoring programme as detailed under will be implemented at mine site. Besides to this monitoring, the compliances to all Environmental Clearance conditions and permissions from SPCB/ MoEF&CC will be monitored and reported periodically.

Table 6.2: Environmental Monitoring

S. No.	Particulars		Monitoring Frequency	Method of Sampling	Important Monitoring Parameters
I	**Air Pollution & Meteorology**				
	Air Quality				
	B	**Ambient Air Quality Monitoring**			
		1. At Mine area/Industrial area 2. At Residential area	Twice in a week	24 hr. continuously	PM_{10}, $PM_{2.5}$, SO_2, NO_x and CO.
		Dustfall At ambient air quality locations	One month in every season	One month continuously	Dust, Lead, Zinc and Cadmium in dust.
	C Meteorology				
		Wind speed, direction, temperature, relative humidity, atmospheric pressure etc shall be monitored on hourly basis at one location.			
II	**Water and Wastewater Quality**				
	A	**Domestic**			
	1	Sewage effluents	Once in a month	24 hr composite	As per EPA Rules, 1986.

S. No.	Particulars				Monitoring Frequency	Method of Sampling	Important Monitoring Parameters
	B	**Industrial Effluents**					
		Tailing Dam water, Garland drain water around tailing dam and mine water			Once in a month	24 hr composite	As per consent order, and compiling to EPA Rules, 1986
		Surface Water 1) Matrikundia dam at the intake point **Ground Water** 1) Piezo wells around tailing dam			once in a month	Grab	Parameters specified consent order, and under IS:2296 (Class C) and IS:10500, 2012, Heavy metals
III	**Industrial Noise Levels**						
	1	Near AD block	Once in a months	8 hr continuous with 1 hr interval			Noise levels in dB(A)
	2	Near Mine Office	Once in a months	8 hr continuous with 1 hr interval			Noise levels in dB(A)
	3	Near Canteen	Once in a months	8 hr continuous with 1 hr interval			Noise levels in dB(A)
IV		**Soil Quality**					
		1)Agricultural field soil samples around tailing dam area			Once in every six months	Grab	Physico-chemical parameters as per the parameters prescribed by MoEF.

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.

6.5 REPORTING SCHEDULES OF THE MONITORING DATA

It is proposed that voluntary reporting of environmental performance with reference to the EMP will be undertaken.

The Environmental Monitoring Cell will co-ordinate all monitoring programmes at site and data thus generated will be furnished as per statutory conditions.

The frequency of reporting will be on six monthly basis to the State PCB and to Regional Office of MoEFCC, New Delhi. The Environmental Audit reports will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

6.6 INFRASTRUCTURE FOR MONITORING OF ENVIRONMENTAL PROTECTION MEASURES

Following equipments and consumable items will be provided at the project site to implement the monitoring program as given in Table 6.3.

Table 6.3: Proposed Equipment for Environmental Monitoring

Name of Equipment	Purpose
Fine dust samplers/ Respirable dust samplers	AAQ monitoring
Automatic weather monitor	Meteorological data collection at site
Sound level meter	Noise levels
UV-Spectro photo meter	Chemical analysis
Micro balance	Chemical analysis

Refrigerator	Preserving samples
Oven	Heating
Thermometer/ Dry & wet bulb	Temperature/ relative humidity
pH meter	pH analysis
DO analyzer	DO analysis
Pipette box	Chemical analysis
Titration set up	Chemical analysis
Relevant chemicals	Chemical analysis

6.7 POST PLANTATION CARE

The post plantation care is an important aspect to be taken care of for better survival rate of plantation. The following care is being taken:-

(i) PROTECTION FROM GRAZING AND FIRE

Fencing will be provided around the area where mass plantation has been proposed. These fencing will comprise of 1.5 m high and 0.60 m thick stone wall. This will help in preventing cattle from entering in to such area and will protect unauthorized entry of out-side person and fire. Due care will be taken to protect plantation as well as the fencing by the guards to be appointed for supervision.

(ii) WATER IN DURING DRY SPELL

During dry spell, water is provided /sprinkled by water tankers provided with 5-10 m long 2" diameter hose pipes.

(iii) MANURING

Initially fertilizer/ manure will be given to the pits before and after plantation. Thereafter, manuring will be continued on reduced scale till the plant attains growth of 2 to 3 m height. Provision of utilizing bio-manure will also be made within the lease area.

(iv) WEEDING AND SOIL WORKING

Man power will be engaged in mulching the soil frequently along with removal of weeds.

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CHAPTER- 7

ADDITIONAL STUDIES

CHAPTER- 7

ADDITIONAL STUDIES

This chapter describes the public consultation for the proposed project, Risk Assessment, Disaster Management Plan, and Corporate Social Responsibility.

7.1 PUBLIC CONSULTATION

Public Consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category 'B' projects or activities under Schedule II of the EIA Notification, dated 14th September 2006 shall undertake public consultation.

The proposed project falls under **'Category-A'** with project as per EIA Notification 2006. Which requires EIA studies as well as public consultation.

Public hearing for the project was conducted on 29.10.2018.

Ponts raised in Public hearing

Sr. No.	Name	Query/Concerns Raised
1	Shri H L Menaria, Village - Gawardi	Shri H L Menaria, village Gawardi, told it is well known fact that Hindustan Zinc Limited, has earned its name in the whole world in production and the company is always ready for the CSR activity and many development works have also been carried out in the nearby villages by the company, which is well known to the people of the area. The Samadhan Project is being run by Hindustan Zinc Ltd in the nearby villages through which money has been distributed to the people. The company is also providing medicines for the cattle of the villages and in many ways the farmers of the area are encouraged. Seed and organic manure is also distributed free of cost to the farmers for the crops from time to time, so that farmers can use DAP and Urea fertilizers at a minimum. The company has also inspired many farmers to set up fruit trees on their fields.

Sr. No.	Name	Query/Concerns Raised
		He suggested that the company should also provide electric spray machine for the farmers to spread pesticides on their crops and farmers of the area should be encouraged for dairy, organic farming and solar energy.
	Shri Bhagwanlal Meena, Village NayaDariba	The resident of NayaDariba village, Shri Bhagwanlal Meena said that the details given and told by the Company Location Head Shri Meena are happening in their village, but he wanted to tell some more things. He said that his village is a displaced village which has been displaced due to the company. He said they keep informing the company officials from time to time about their problems, but today he also wanted to tell some things through the hearing. They wanted that the company should get the approval for expansion but the company officials should pay a little more attention to the problem of village- water facilities, air and problem of dust in their village. There is a major problem of unemployment. What was the mistake done by the people of Dariba, not known, due to which the people of the village have not been given employment by the company for the last several years? Although the assurance has been given for equal opportunity from the officials of the Co., it may be possible to solve the problem during future employment. Today, the land that the company has, which belong to them. Today their village is not a revenue village but the revenue looked after by village Mehnduria and their village falls in panchayat Kotadi. They cannot work in MNREGA because the village is not revenue village. There is a tank in his village but there is a problem of drinking water, due to fluoride in the water though his age is 40 years, all his teeth are getting abraded and the feet of my wife got bend like a bow. This problem is also for the people of other villages, because water is not potable. Therefore, the officials of the Co. should arrange for drinking water. He said that their fields are also adjacent to the boundary of the mines, the dust, from mines due to wind, ruin their crops. Right now, 35 people have been given jobs in Mines, none of them belonged from Dariba. Therefore, instead of doing comparisons with other villages, their village and village people should be given more priority benefit than others. Their leaders have taught them that if this company is alive then they will be alive so that the company should get an opportunity to further increase its production. The villagers have never done any violence or demonstration against the company, but this does not mean that they are not able to do this, they just want to say that the company officials take full care of their villagers. There are no sufficient rooms in our village school, so at least 2 rooms should be constructed by the company. About 50 educated boys in our village are roaming unemployed who should be given jobs in time and on priority because first right on this company is from the people of Dariba, therefore, it is requested through the District Collector that to fulfill the things they have been told.

Sr. No.	Name	Query/Concerns Raised
3.	Shri UdaiKaliya, Village Kotadi	Shri Udalal Kalia resident of village Kotadi said that he has a lot of environmental grievances, water is not available to drink, due to the poisonous dust that blow in the air due to wind, fall on their fields and ruin the crops. Due to the high levels of fluoride in the water, people are becoming sick in almost all the houses of the village, they have knee problems. Therefore, they should be given water from Matrikundiya, they will get the arrangement for pipes from other sources. Though the RO, which had been installed by the company, they will drink pure water but what will happen to their cattle. No facility for eyes test in the camp orgainsed by the Company, whether eye test could be done by using a torch. Therefore, eye test should be done with new machines and medicines, spectacles etc. should be given to the needy. Local youth should be given maximum employment.
4.	Shri Daulat Singh, Village SuneriyaKheda	Shri Daulat Singh, village SunariyaKheda thanked the District Collector to listen to the grievances. As told by Shri Meenaji of the Company, he agreed that the facilities are being provided to the people of the area. He wanted to tell the problem which is common to village Kotadi too. They have been giving request letter to Hindustan Zinc Ltd, District Administration and the State Government regarding the problem of environment, water and soil for last two years, but no action is being taken on it. Therefore, we want that the district collector, in today's meeting, should resolve them. Their village SuneriayKheda has water problem which is known to all the people and the company's officials, they had been screaming about this for the past 3 years. RO was installed by the company, which has also been removed for the past few days. Shri Meena Saheb said that within 15 days RO will be put back, which needs to be adhered and in the next 3 months, pipe line should be laid separately for SunariaKheda, Makanpuria and Kotadi. The road from here to SuneriyaKheda is 3 km, the condition of road is very bad, due to which they have difficulty in coming to the village, some days back the ballast was laid by the company due to which more accidents are happening, hence the road should be repaired. A school building in their village is empty, where Medical Center should be opened. The company officials should get the arrangement for the doctor / compounder so that the people of the village do not have to go out for small illness. There is no road to go to Gram Panchayat Kabra from their village, which should be built and repaired and Amarpura -SunariaKheda road should also be done.
5.	Smt. Jyoti Meena, Village NayaDariba	Smt. Jyoti Meena resident of NayaDariba said that Zinc people have done very good work for the prosperity of the people and women of the village. Zinc officials have linked the women of the area through the Samadhan project and SHG ladies were sent to visit other place. Loans and jobs are

Sr. No.	Name	Query/Concerns Raised
		provided for the Sewing Center, women are also given safety training. Drinking water problem in the village, so as soon as possible to solve the problem of water, local youth should be given maximum employment.
6.	Shri KhubilalToshniwal, Ex-Sarpanch, village Kotari	Shri KhubilalToshniwal, Ex- Sarpanch, Gram Panchayat Kotadi said that due to Hindustan Zinc, the environment pollution in the surrounding villages. There should be investigation on the pollution .Lot of damage due to the smoke from the chimney. The sound of the ventilation fan reaches up to 3-4 km in the surrounding area, due to that a bad effect in the ears, so noise pollution should be reduced. The plantation which done by the company are removed for new construction and at first instance only plantation should be done in right place so that they will not be removed later. As far as today's public hearings are concerned about the NOC of the environment, the company needs to give first something to the people of the area, then only talk about the NOC. People of NayaDariba should be given employment. Some educated girls in the company are coming from outside to work while in their village there are well-educated girls who should get jobs according to their qualifications. The things mentioned under CSR, but some other work are being done, only photography is done, the work done are not adequate on the ground. The location Head of the company is not coming to the village, and if he had coming anytime, he came quietly. Therefore, before making a visit of nearby village by him, the villagers should be informed first and then only a meeting should be held in the villages so that the villagers can make aware of their problems. The people of our village have no work, the earlier few contracts were given, they have been taken back now because they have set a condition of turnover of Rs 10 crore nobody in the village qualify the conditions. Therefore, the work of small contracts should be given to the local people.
7.	Shri Kishan Lal Gadri, Village - KhadBamnia	Shri KishanlalGadari resident of KhadBamania, said that for the past 10 years he had been seeing that the loss to the people belonging to this area is 1 percent due to this company and the profit is 99 percent. Good works have been done by the company for the development of the area. It is true that due to the company there has been some loss but loss also happens in our house, if the fire burns, then there will also be smoke in the house. Good work is being done by the company, so they should get NOC for expansion.
8.	Shri Gopal KishanJat, Advocate, Village Mathaji	Shri Gopal KishanJat, Advocate, Village MatajiKhera said that today's meeting is not meant to give training to anyone, but, it has been organized to discuss the loss to their locality due Hindustan Zinc Limited. He said that no ITI or training is being given to the people of the area by the

Sr. No.	Name	Query/Concerns Raised
	ka kheda	Hindustan Zinc, neither the activities to prevent the environment nor adequate work of social development is being done, which should be done in priority. The company should develop green belt and should not discharge Waste Water in the area, noise pollution should be controlled, Engineering college of the Vedanta should be opened where local people will be able to study and get eligibility and employment also be given to the local people. Farmers' income should be increased, for that the seeds of advanced variety should be provided to the farmers. People should not be invited for plantation, but the company itself should come forward and plant more and more in the area. The children scoring 90/95 percent marks are also sitting unemployed, so make the list of children of locality, their qualifications and based on their qualification employment should be given first 5 km of the radius, then the radius of 10 km and then 15 km of the periphery on priority basis. The budget set for social development should be used on the development of villages of 5 km periphery area.
9.	Smt. Tara Begam Mirza, village Sindesar kala	Smt. Tara Begum Mirza Village Sindesar Kala said that in her villages lot of accident happens, there is no facility for source of energy and drinking water in our village, the houses which have been constructed in her village by adding Rs 10-15 lakh, cracks are developed from the blasting caused of Hindustan Zinc. The poisonous dust is accumulating on our crops, due to which grains cannot be grown. This Mine is running due to their village. Many children have done MA / BA and ITI, but they are not being given employment. Therefore, the company should make all the facilities available to the people of the area.
10.	Shri Laxman Vaishanv, Ex-Dy.-Sarpanch, Mehanduria	Shri Laxman Vaishnav Ex-Dy. Sarpanch, Village Mehanduria said that the saplings which are planted by the company are not surviving. Last year, 200 plants were planted by the company on the pond, but not a single plant is alive today. Due to the deep Mine and the drain being not pakka, the dirty water is going underground, due to which the drinking water in well is not potable. Today no man can drink water from any hand pump. In the year 2008, the NOC issued by the company was said to develop green belt in the area, but today no green belt is seen anywhere. Even for panchayat meeting information is given, but no information was given by the company on the public hearing, but the information sent to some people by the company wherever they found appropriate. If propaganda done in all the villages, there would be crowds of lakhs of people today. No development work is being done in the area by Zinc. No one in our village can sleep on the roof of his house, and if ever he falls asleep, he has to go to the hospital as soon as he gets up. Earlier, the soil and water of our village were monitored every month, but now no monitoring been done as the company has nothing to do with them. His village is 50 meters away from here, there should be a machine installed and monitor how much pollution is in place. Plants of 5-6

Sr. No.	Name	Query/Concerns Raised
		ft tall are planted by the company which are not survived, but they take photos and tell that they had planted so many plants. Under the supervision of the District Collector, CSR and women's development / self-employment work should be done and all the reporting of the works done by the company should be through some officer of the State Government. 1300 Bigha of our village farmers land have been taken by Hindustan Zinc but people are not being employed, in our village MA / BA students are roaming unemployed. They want the environment of nearby area to improve and drinking water to be supplied. Water should be supplied from Bagheri Ka Naka or Mathriakundia dam for the area. When the green belt is not developed in the area in 10 years, how much time will take to develop it. First the pollution level of air, water and soil should be reduced, after which the NOC should be issued to the company to further expansion.
11.	Shri Panna Lal Sukhwal, village Mahenduria	Shri PannalalSukhwal resident Mehanduria said that with the expansion of mining, there will be a profound impact on pollution. Now the water level of the area has gone quite below / deep due to the mining work, due to expansion, water level will go further down. The trees which are now planted will also be get destroyed. What distance should be maintained between plant and habitated area? Now the plant is just 10 mts from the populated area, because of this, the pollution of water, air, and soil in the population area is increasing but no precaution are being taken by the company. The gases released during night hours by the company, falls on nearby crops and the yield is being destroyed, no compensation is being paid to farmers for their crop loss. Our fields and crops will get spoiled due to expansion, but no compensation will be paid. First of all, the administration should tell that how the pollution is going to be compensated. According to the earlier agreement, unemployed people of the area within 5 km be given and then 10 km of the local unemployed people of the area, they should be given employment on the basis of their merit. Zinc should construct a pond in the village through which pure drinking water should be provided or supply of drinking water from Bagheri Naka or Mathrikundia dam should be ensured. Hindustan Zinc is not discharging responsibility in the area. Waste water being discharged in the Mataji Ka Kheda, should be resolved. He requested district collector to inspect the plant once, people working there are suffering with breathing problems, air pollution, they do not get full salary and bonuses. Therefore, all effort should be made to compensate the loss due to whatever is happening on the ground. Due to the blast, there are cracks in house near Mataji'sKheda which should be resolved.
12.	Shri Jagdish Chandra Dadhich, village	Shri Jagdish Chandra Dadhich village Mehanduria said that today all the brothers are present here for the NOC of the company. This means that Hindustan Zinc wants to double its production and the pollution of the area

Sr. No.	Name	Query/Concerns Raised
	Mahenduria	is also going to be doubled. Monitoring of Water, air and soil should be done in nearby villages, a respected person of the village should be taken during the monitoring so that there will not be any question on this. If the plant is expanded, the number of people working in it, will also increase, but the company does not have any security arrangements in nearby villages. Because of noise pollution, children are unable to study in the school. Water is polluted due to the gas emission, so people of the area and schools should be provided free drinking water. Due to mining operations of the company, farmers should be compensated for damaged crops.
13.	Shri Devi Lal Jat, Village Kesarpura, NayaDariba	Shri DevilalJat village KesarpuraNayaDariba said that they requested for employment but no action has been taken. Many people of nearby villages are unemployed but they are not provided with employment. Due to the pollution of the company, at the age of 37, he is having problem in feet and crops are also being destroyed. Therefore, the employment with priority to be given to people. Villagers should also get the facility of manure and fertilizer.
14.	Shri Shankar lalJat, village Rajpura	Shri ShankarlalJat resident Rajpura said that all the village people are provided with seeds as per their requirement through Samadhan Project by Hindustan Zinc. Fertilizers, seeds, plants, etc. should be given on free of cost and adequate measures should be taken to safeguard the plants.
15.	Smt. K Vijaya Stalin, village Rajpura	Smt. K. Vijaya Stalin Village Dariba said that there is no facility of tap and drinking water in their village, children are sitting unemployed, there is no road light in the village. With lots of garbage in the village, mosquitoes are spreading and the disease is spreading, which has no cure. For treatment, they have to go to Udaipur, there is no doctor in the local hospital due to which treatment is not done.
16.	Shri Laxmilal Suthar village Mataji ka Kheda	Shri Laxmilal Suthar of village Mataji said that people from all over the India is working with peace in Hindustan Zinc. The district administration should appreciate them. All the work explained by Mr. Meena ji are being done in the village. Hindustan Zinc should also work in development of villages through GPDP scheme in collaboration with the administration.
17.	Shri ManojJat, village Anjana	Shri ManojJat Gram Ajanja said that the monitoring work told by Shri Meena Sahib that soil, air and water are being monitored in every three months, is wrong. Mataji'sKheda pond is full of chemicals. The company is releasing the waste and poisonous water so the pollution is spreading. 70% of our people are unemployed in the village. When they went to Company Gate to demand for employment, but no response. RO should be installed in their village.

Sr. No.	Name	Query/Concerns Raised
18.	Shri Mohan Lal Jat, village Mataji ka Kheda.	Many request letters have been given to Hindustan Zinc Officials and District Administration regarding pollution but no hearing is being done. Near their village the company had installed ventilation fan, through which gases and smokes are been released, which mix with air and are proving to be very dangerous. Please check the released gases because around 60-70 people had heart attack. Most of the land have been given to the company but there is no benefit to the villagers. No work have been done at Nandgarh and school. No child is getting educated and not progressing. It is requested to District Collector to do a survey and address to the problems.
19.	Shri Shankar laljat village Mataji ka Kheda	Shri Shankar Lal Jat Gram Mataji said that when the first plant was installed by Hindustan Zinc, we had given NOC without thinking, but now we are not going to give NOC ahead. With the village pond about of 25 villages fields were irrigated but now crops is getting destroyed due to polluted water. First of all, the company should stop discharge of chemical water into the pond. Due to the ventilation fan, noise pollution occurs. Due to blast, cracks are developed in the houses and rain water seeps from the roof, stone slabs develop cracks. First solve all the problems of villages then NOC to be given.
20.	Smt. Prembai, Village Kotadi	Smt. Prembai, resident of Kotadi said that due to the abundance of pigs in our village, the crops are getting spoiled due to which safety measures should be taken, R.O. Water is available only after putting money in it, which should be given free of cost and educated children should be given good employment.
21.	Smt. Ganga Bai Village Kotadi	Smt. Gangabai village Kotadi said that only one RO is in their village. More ROs should be installed. They pay for RO water but it should be free. Drinking water should also be arranged for animals as well. Measures should be taken to protect crops from animals, good work should also be done for the development of women.
22.	Smt. Kesarbai, Village Pipawas	Smt. KesharabaiGurjar village Pipawas said that there is no road in their village which should be constructed, crops are getting spoiled and compensation should be given. In her house, only one bulb and a fan is used but the bill for electricity comes to 6-7 thousand rupees, which should be investigated and corrected. Her husband is suffering from tuberculosis for the last 20 years, all money goes for treatment, they are not getting any facilities.
23.	Smt. Manju bai, Village Dariba	Smt. Manju bai resident of village dariba they are getting good response and help from the Company. Many women of their group are unemployed, some have lost husband and some don't have children so employment should be given.

Sr. No.	Name	Query/Concerns Raised
24.	Smt. … Village Udalpura	She told that in their village RO should be installed as hand pumps are not working. No water comes in the tap. The educated women should be given employment.
25.	Smt. Nisha Solanki, Village Mora	As facilities given to the Nandgarh, same facilities to be extended to their Aganwadi. Plantation to be done at Aganwadi. The village road need to be repaired and plantation to be done on both side of the road.
26.	Smt. DurgaSukhwal village Mahenduria	Smt. Durgasukhwal resident of Mahenduria said that the water in her village is very bad because of that malnourished child birth so RO to be installed.
27.	Smt. Lalita Vijayvargiya, Village Mahenduria	Smt. Lalita vijayvargiya, resident of Mahenduria said that almost construction of Nandghar is completed but no water connection so RO to be installed. Due to that it could not be started.
28.	Smt. Karma Salvi, Village Ajana	Smt. Karma Salvi village Ajana for controlling the pollution, more plantation to be done. For Drinking water more RO to be installed. There is no College for B.Sc and parents do not send their children to distance so B.Sc college to be opened.
29.	Smt. Prema Vaishnav	SmtPreamvaishnav install RO in their village and the road should be repaired.
30.	Shri Shankar Lal Jat, Village - Kotadi	Shri Shankar lalJat resident of Kotadi said that there is problem for drinking water and due to bad quality of water the yield of the farm is less. Company gives the seeds and manure to selected farmers only. It should be given to all farmers. For RO water for 20 litres Rs. 5/ to be paid, which cannot be afforded by everyone. So per family upto 40 to 50 liter water no charges to be taken.
31.	Shri Kishan Lal JatAdvocte, Village Railmagra	Shri Kishan Lal jat from Railmagra said that his opinion is that immediately NOC for expansion should be given and Hindustan Zinc should resolve all grievances on priority basis because without money no work happens so with expansion company will generate revenue and development of the local area improves. Immediately enquiry of all pollution should take place

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		and wherever pollution is identified should be mitigated immediately.
32.	Shri Jagdish Chanda village Mata ji Ka Kheda	Shri Jagdish chandra resident of village Mataji Ka Kheda told that the environment near to his village is very poor, road condition is bad. It is the responsibility of Hindustan Zinc to rectify all the grievances of the area. At the village Pond, good quality plantation should be done. No benefit is being given to the villages. The quantity of manure and seed to be increased. Unemployed person should be given employment according to their eligibility. Children of their village should be given admission in Company's School.
33.	Shri Sohan Lal village Raghunathpura	Shri sohan Lal village Raghunathpura lot of dust accumulated in the field and due to that yield in the farm is destroyed. There is lot of unemployment so employment should be provided.
34.	Shri Babulal village Pipawas	Shri Babulal village Pipawas told that Hindustan Zinc should open a Gau Shala and water facility should be provided for cattle.
35.	Shri Naval Singh Ranawat, Member of Panchayat Samiti	Shri Naval Singh Ranawat member of Panchayat Samiti todays Public Hearing is for Environment. Till now all have talked about the water pollution. They said from last 10 years they were drinking water from wells and handpumps then why the RO water now. For 10 years when there was less TDS, how come more TDS now. It is clear that the polluted water from the mine is polluting the water and so TDS is increased. The company has not put the right efforts to control the TDS. He told that beyond Beda kheda, there is change in the atmosphere and temperature changes, there is difficulty in breathing, but the administration of Hindustan Zinc has not imparted their responsibility in true sense to control by plantation in more numbers. Now for expansion, they will cut the old trees and plant new saplings and this is the reason for increase in pollution. Earlier the farmers used to take two yields in a year but now they are not able to take even a single one. It is true that wherever there is industry there will be increase in pollution but it is the responsibility of the Industries to mitigate. Day by Day the pollution of water, air and soil is increasing but no facilities provided to the farmers. New-new technology is being introduced in the mine so the employment is decreasing. The management should put efforts to mitigate the pollution and also given preference to the local unemployed person in employment or else anger of the local will take a dangerous turn and have big consequence. He said there is no issue in giving the NOC but all mitigation of pollution should be done according to the policy and plan.
36.	Shri RamlalJat, Advocate, Village -	Shri RamlalJat, advocate Rajpura resident, said that for the environmental Public hearing of any industry, the letter is sent to the Industries Department of the district and the documents related to the industry

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	Rajpura	department are made available to the people of the area. But no documents have been made available to them by Hindustan Zinc Ltd or other concerned authorities, whereas he himself through RTI demanded for the documents for expansion of the company which is going to take place and make a difference to the people of the area but there is no document made available to him. Now the code of conduct has been started due to Vidhan Sabha election in the state, but why the management of Hindustan Zinc was in hurry and conducted Public Hearing during the code of conduct. He said that since 1960, the work is being done by Hindustan Zinc Limited. At that time there was so much greenery on this place that this area was called by the name of Ganganagar, but today in this area there are no trees and plants seen besides the roadside. Whereas the industry should have planted trees in at least 30-40% of the area which have not been planted with trees and shrubs. Therefore, production capacity cannot be increased in the absence of this. Currently where Lead Plant, Power Plant and Zinc Plant are installed. Earlier, in 1985 and 1990, there were large and large trees which were cut with whose permission and report of this may be produced. There after only NOC may be given. Because for an ordinary person if he wants to cut the tree in his farm, he has to take approval from the Tehsildar. Hindustan Zinc limited cannot buy land belonging to SC/ST for their industrial purpose but mediating through them paid even less than the DLC to the poor farmers and bought in the name of ex-employees of the company Along with this, they were allocated about 355 bigha land for the tailing dam of Rajpura-Dariba mine by the Department of Revenue. At the same time, the height of the dam should not be more than 4-5 meters, while the company is now planning to raise its height to 25 meters, which is incorrect according to the rules. After 25 meters of height, how much water will be filled in it, and if it breaks down, then who will be responsible for it? If any land is being purchased from the farmer by the Company, the permission from the Revenue Department need to be taken for conversion of land. In How many cases the company has taken the permission and converted the land and if no conversion is being done, then this act is considered as illegal.

Sr. No.	Name	Query/Concerns Raised
		Around 200 meter from the Hindustan zinc Limited Tailing dam he wanted to put a crusher plant. Whether he can put the crusher plant and whether he has to take permission from the authority. By Hindustan Zinc around 300 biga land acquired from SC/ST farmers, they are using for Tailing Dam but the company has not taken any permission which is an act of illegal. In fodder land of 5 biga in village Makanpuria, is being used for the ramp of the tailing dam. No permission is taken for the same. By the Company in the village of Rajpura Arjee No: 859 for 28 bigas around 20-25 mtr deep excavation been done for which the Sarpanch had many time in written communication given to Officers and Tehsildar but no action been taken against them nor stopped the act. In the lands of village makanpuriya and Kabra, the company is dumping the chemical contained waste which need to be physical verification to be done by the responsible officer there after NOC to be given for expansion. Without permission soil from Arjee No: 523, 524 and 525 of SuneriaKheda are been utilized in the embankment of Tailing Dam, which comes under the act of illegal act. Even the land of a farmer in his villages also been purchased in the name of the Contractor and thereafter soil is being utilized for embankment of Tailing Dam. Whether a private party need to take permission form the authority for excavation of soil, which has not been taken by them. The land at Makanpuria having Arjee No: 271, 272 and 273 belongs to the Fodder Land which comes inside the embankment of dam. Whether permission have been taken from Tehsildar. In the route to village Rampura, Lead Plant of Hindustan Zinc is installed

Sr. No.	Name	Query/Concerns Raised
		which is only 400 meter away from his village and also more villages are there within the vicinity of 200-500 meter. He requested the Env. Officer to tell what is the safe distance for installation of Lead Plant from the populated area and also whether the Plant is installed according to the required laid down norms. The villagers do not want this Lead Plant to be there. Only after the decision, the NOC for expansion may be given. Sometime back, due to gas leakage from the company, 4 fatality of the local people took place for which case had been registered against Hindustan Zinc Limited but till now no action has been taken. For ladies from the Saki Project, the Hindustan Zinc Limited had deployed vehicle to bring them which is wrong and against the rules. Hindustan Zinc has encroached on many Bigha lands and fodder land of nearby villages. Therefore, the action should be taken to demarcate the company's land. What all CSR activity done by the Company is well known to the people of this locality. Before 2000 around 1000 permanent workers and around 1000 contractor workers were employed. After that the production of the company had doubled but as on date how many permanent workers from local and contractor labours employed are known to all. Here foreign contractor from China and Australia are working, whether there is no Indian contractor to work where the Prime Minister is propagating adopt Swadeshi, here company is engaging the foreign company which is not correct. If the Environmental Public Hearing fails, then Management will definitely transfer the existing executives to other place. Whether any executives from Hindustan Zinc can drink the water from their village wells, if yes then he will himself will bring water for them. If not, then who is responsible for contaminated water. Because of the waste and discharged contaminated water, the well water of the area had become

Sr. No.	Name	Query/Concerns Raised
		poisonous. Is to correct to give Environmental permission to the company before answering to the question put forth by him. When company is talking about the expansion of production twice or more but development of the area, employment and protection of environment there is no solution then how can environmental clearance could be given. As the Company's location head told that the monitoring water, air and soil of the nearby area got done and all the results are within the desired parameters this is confirmed that these samples are not from the nearby area. The chairman of DMFT Fund is the District Collector. The ratio is 60:40 for development of the local area is allotted but no amount had been sanction for their village whereas max amount need to be allotted to the villages adjacent to the mine. They are facing the problem due to this mine and the amount is being spend somewhere else. That is the reason environment NOC should not be given for expansion to this mine. Today's Public Hearing no had told that the water is potable or good. Whereas after taking the payment the local people of the area are provided with RO water. Mine has reached around 700 meter in dept. due to that water in the mine is poisonous. Water from Matrikunda are been brought by the Company and are supplied to 25-30 villages why because water is poisonous. The smoke from the chimney reaches the sky and mix with the atmosphere and contaminate/poisonous air and that is the reason for fields of farmers are destroyed.

Sr. No.	Name	Query/Concerns Raised
		The land allotted by the Collector for the purpose of Tailing Dam for Rajpura Dariba, in that waste of SK Mines is been dumped. Sindesar Khurd is another mine, whose ML number is different, where is the Tailing dam. If there is no Tailing dam then how Environment Clearance given. The land of village Rajpura panchayat had been spoiled and illegally laid the pipe and due to that the fields of the farmers are destroyed for that reason FIR had been lodged but no case had been lodged and any compensation paid to the victims. Due to breakage of these line, water spread in the nearby field of the village and the land becomes spoiled. These all come under the illegal act and penalty should be imposed on the executives of the company. Should stop addition of chemical contaminated water in the Tailing Dam or not. Where the residue of the plant is dumped need to be investigate and physical verification done. The route to Rajpura, one big hill type waste of the chemicals from the plant is dumped which is called as acidic. Before dumping the plastic sheet is laid so that poisonous water is not seeped to the ground. Whether these norms are followed by the company. From this hill like dump, the chemical dust fly and settled down in the fields around the 20-25 km area and destroy the yield. And during rainfall, chemical contaminated water from all 5 plants of the company flow out and sediment in the nearby point. So the water from their village pone bought by the company for their use. The half of the hillock had been cut and stones removed, this is an illegal act and what the District Administration have taken against the same be appraised. From this Mine around 200 meter is his house and 400 meter is his farm.

Sr. No.	Name	Query/Concerns Raised
		Due to this mine, they are victim so the is a common opinion that the Public Hearing be cancelled. Due to the above points, todays environmental public hearing is not valid and it qualify to be cancelled. If the preceding officer are not cancelling, then he himself take the plea to High Court and get it cancelled.
37.	Shri Ratan Singh village KhadBamina	Shri Ratan Singh from KadBamina told that he agrees to the points told by shriRatan Lalji Jat, advocate but the company should take a note that around 10000 work force, but less number of persons from the nearby village. The company should take assistance of village representative or patwari for development of the local area. Here so many unemployed persons are there that company and need not have to bring from outside. Alongwith the Sarpanch a list of unemployed person need be prepared and provide employment. The Plan for development of villages which are affected and polluted need to be done. DMFT Fund is not been sanctioned for development of their area where as maximum fund is been deposited from this region.
38.	Smt. MamtaPrajapat village Railmagra	Smt. MamtaPrajapat village railmagre told that many people present here are opposing the mines. But she said that only Mines people cannot do everything, for any work they need the support of the local people. If this mine is closed where the people around this mines will go for employment.
39.	Shri Omprakash Singh village Banedia	Shri Omprakash Singh Banedia told that with the help of Hindustan Zinc, many people of this area have been benefited, but he desired that management of Mines should take care of the local people. Maintenance of the school building to be done and CSR acitivity zone to be extended upto10 Km and they should be given he priority for development should be done.

PUBLIC HEARING ACTION PLAN

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
1	Shri H L Menaria, Village - Gawardi	Shri H L Menaria, village Gawardi, told it is well known fact that Hindustan Zinc Limited, has earned its name in the whole world in production and the company is always ready for the CSR activity and many development works have also been carried out in the nearby villages by the company, which is well known to the people of the area. The Samadhan Project is being run by Hindustan Zinc Ltd in the nearby villages through which money has been distributed to the people. The company is also providing medicines for the cattle of the villages and in many ways the farmers of the area are encouraged. Seed and organic manure is also distributed free of cost to the farmers for the crops from time to time, so that farmers can use DAP and Urea fertilizers at a minimum. The company has also inspired many farmers to set up fruit trees on their fields. He suggested that the company should also provide electric spray machine for the farmers to spread pesticides on their crops and farmers of the area should be encouraged for dairy, organic farming and solar energy.	Breed improvement in cow and buffalo through Artificial Insemination is being done in all the surrounding villages. Organic fertilizers are provided through Farmer Groups in core villages. Govt. is giving 80 % subside in solar irrigation pumps. Agriculture and livestock project is being implemented in surrounding villagers for increased production and breed improvement.	Budget of Rs. 421.40 Lakh for 3 years.
2	Shri Bhagwanlal Meena, Village Naya Dariba	The resident of Naya Dariba village, Shri Bhagwanlal Meena said that the details given and told by the Company Location Head Shri Meena are happening in their village, but he wanted to tell some more things. He said that his village is a displaced village which has been displaced due to	HZL is monitoring the environmental parameters of water, ambient air & soil and being submitted as a part of the EC	Approx. cost of one RO is Rs.50 Lakh. Pipe line and Solar budget 25 Lakh. Will

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		the company. He said they keep informing the company officials from time to time about their problems, but today he also wanted to tell some things through the hearing. They wanted that the company should get the approval for expansion but the company officials should pay a little more attention to the problem of village- water facilities, air and problem of dust in their village. There is a major problem of unemployment. What was the mistake done by the people of Dariba, not known, due to which the people of the village have not been given employment by the company for the last several years? Although the assurance has been given for equal opportunity from the officials of the Co., it may be possible to solve the problem during future employment. Today, the land that the company has, which belong to them. Today their village is not a revenue village but the revenue looked after by village Mehnduria and their village falls in panchayat Kotadi. They cannot work in MNREGA because the village is not revenue village. There is a tank in his village but there is a problem of drinking water, due to fluoride in the water though his age is 40 years, all his teeth are getting abraded and the feet of my wife got bend like a bow. This problem is also for the people of other villages, because water is not potable. Therefore, the officials of the Co. should arrange for drinking water. He said that their fields are also adjacent to the boundary of the mines, the dust, from mines due to wind, ruin their crops. Right now, 35 people have been given jobs in Mines, none of them belonged from Dariba.	compliance. As on date there is no contamination of pollutant recorded due to the mitigation measures in place. 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. High capacity community RO has been installed for Safe Drinking water. Solar water pump has been installed for water facility at Naya Bariba. GI pipe line is also being installed. . We have initiated different Skill Development initiatives which will make them Employable. Few youth are undergoing free ITI programme by Maruti through HZL.	be completed in March 2019.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		Therefore, instead of doing comparisons with other villages, their village and village people should be given more priority benefit than others. Their leaders have taught them that if this company is alive then they will be alive so that the company should get an opportunity to further increase its production. The villagers have never done any violence or demonstration against the company, but this does not mean that they are not able to do this, they just want to say that the company officials take full care of their villagers. There are no sufficient rooms in our village school, so at least 2 rooms should be constructed by the company. About 50 educated boys in our village are roaming unemployed who should be given jobs in time and on priority because first right on this company is from the people of Dariba, therefore, it is requested through the District Collector that to fulfill the things they have been told.		
3.	Shri Udai Kaliya, Village Kotadi	Shri Udalal Kalia resident of village Kotadi said that he has a lot of environmental grievances, water is not available to drink, due to the poisonous dust that blow in the air due to wind, fall on their fields and ruin the crops. Due to the high levels of fluoride in the water, people are becoming sick in almost all the houses of the village, they have knee problems. Therefore, they should be given water from Matrikundiya, they will get the arrangement for pipes from other sources. Though the RO,	Fluoride in water is a common issue in Rajasthan. It has no correlation with Mining/Smelting operations. High capacity community RO is installed in all core villages to provide Safe drinking water.	Each RO cost Rs.50 lakh

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		which had been installed by the company, they will drink pure water but what will happen to their cattle. No facility for eyes test in the camp orgainsed by the Company, whether eye test could be done by using a torch. Therefore, eye test should be done with new machines and medicines, spectacles etc. should be given to the needy. Local youth should be given maximum employment.		
4.	Shri Daulat Singh, Village Suneriya Kheda	Shri Daulat Singh, village Sunariya Kheda thanked the District Collector to listen to the grievances. As told by Shri Meenaji of the Company, he agreed that the facilities are being provided to the people of the area. He wanted to tell the problem which is common to village Kotadi too. They have been giving request letter to Hindustan Zinc Ltd, District Administration and the State Government regarding the problem of environment, water and soil for last two years, but no action is being taken on it. Therefore, we want that the district collector, in today's meeting, should resolve them. Their village Suneriay Kheda has water problem which is known to all the people and the company's officials, they had been screaming about this for the past 3 years. RO was installed by the company, which has also been removed for the past few days. Shri Meena Saheb said that within 15 days RO will be put back, which needs to be adhered and in the next 3 months, pipe line should be laid separately for Sunaria Kheda, Makanpuria and Kotadi. The road from here to Suneriya Kheda is 3 km, the condition of road is very bad, due to which they have difficulty in coming to the village, some days back the ballast was laid by the company due to which more accidents are happening, hence the road should be repaired. A school	HZL is taking utmost care to control any type of pollution in the area. Regular monitoring and analysis are being done for air, water, soil etc. environment.All parameters are within the prescribed limites. Community RO is being installed. Pipeline from River Banas in collaboration with PHED Deptt is under discussion.	Rs. 25 lacs for environmental monitoring

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		building in their village is empty, where Medical Center should be opened. The company officials should get the arrangement for the doctor / compounder so that the people of the village do not have to go out for small illness. There is no road to go to Gram Panchayat Kabra from their village, which should be built and repaired and Amarpura -Sunaria Kheda road should also be done.		
5.	Smt. Jyoti Meena, Village Naya Dariba	Smt. Jyoti Meena resident of Naya Dariba said that Zinc people have done very good work for the prosperity of the people and women of the village. Zinc officials have linked the women of the area through the Samadhan project and SHG ladies were sent to visit other place. Loans and jobs are provided for the Sewing Center, women are also given safety training. Drinking water problem in the village, so as soon as possible to solve the problem of water, local youth should be given maximum employment.	Community RO installed. Different Skilling initiative are taken to make local youth Employable.	RO worth Rs. 50 lakh installed multi skilling centre to be developed at Railmagra budget Rs. 634 lakh
6.	Shri Khubilal Toshniwal, Ex-Sarpanch, village Kotari	Shri Khubilal Toshniwal, Ex- Sarpanch, Gram Panchayat Kotadi said that due to Hindustan Zinc, the environment pollution in the surrounding villages. There should be investigation on the pollution Lot of damage due to the smoke from the chimney. The sound of the ventilation fan reaches up to 3-4 km in the surrounding area, due to that a bad effect in the ears, so noise pollution should be reduced. The plantation which done by the company are removed for new construction and at first instance only plantation should be done in right place so that they will not be	Monitoring and sample analysis are conducted for noise, water, soil and air regularly and no such abnormality have been found However, Management is committed to mitigate environmental impacts, due to this project, as per Environmental	Ongoing CR Budget Rs.9873 lakhs till March, 2021. Rs. 25 lacs for environmental

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		removed later. As far as today's public hearings are concerned about the NOC of the environment, the company needs to give first something to the people of the area, then only talk about the NOC. People of Naya Dariba should be given employment. Some educated girls in the company are coming from outside to work while in their village there are well-educated girls who should get jobs according to their qualifications. The things mentioned under CSR, but some other work are being done, only photography is done, the work done are not adequate on the ground. The location Head of the company is not coming to the village, and if he had coming anytime, he came quietly. Therefore, before making a visit of nearby village by him, the villagers should be informed first and then only a meeting should be held in the villages so that the villagers can make aware of their problems. The people of our village have no work, the earlier few contracts were given, they have been taken back now because they have set a condition of turnover of Rs 10 crore nobody in the village qualify the conditions. Therefore, the work of small contracts should be given to the local people.	Management Plan (EMP) in the EIA report. Plantation has been done on the land already demarcated for plantation and planted trees are not being cut for development work. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skilling initiative are taken to make local youth Employable. Many youths are already undergoing training programme. CSR activities are done regularly. Management visits done with prior information to Sarpanch.	monitoring

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
7.	Shri Kishan Lal Gadri, Village - Khad Bamnia	Shri Kishanlal Gadari resident of Khad Bamania, said that for the past 10 years he had been seeing that the loss to the people belonging to this area is 1 percent due to this company and the profit is 99 percent. Good works have been done by the company for the development of the area. It is true that due to the company there has been some loss but loss also happens in our house, if the fire burns, then there will also be smoke in the house. Good work is being done by the company, so they should get NOC for expansion.		
8.	Shri Gopal Kishan Jat, Advocate, Village Mathaji ka kheda	Shri Gopal Kishan Jat, Advocate, Village Mataji Khera said that today's meeting is not meant to give training to anyone, but, it has been organized to discuss the loss to their locality due Hindustan Zinc Limited. He said that no ITI or training is being given to the people of the area by the Hindustan Zinc, neither the activities to prevent the environment nor adequate work of social development is being done, which should be done in priority. The company should develop green belt and should not discharge Waste Water in the area, noise pollution should be controlled, Engineering college of the Vedanta should be opened where local people will be able to study and get eligibility and employment also be given to the local people. Farmers' income should be increased, for that the seeds of advanced variety should be provided to the farmers. People should not be invited for plantation, but the company itself should come forward and plant more and more in the area. The children scoring 90/95 percent marks are also sitting unemployed, so make the list of children of locality, their qualifications and based on their qualification employment should be given first 5 km of the radius, then the radius of 10 km and	Different skill development projects are being implemented. Free ITI training given through Maruti. New skill development centre is being stablised. CSR projects continued. 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. Zero discharge is maintained and regular	Skill Centre budget is Rs 634 lakhs.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		then 15 km of the periphery on priority basis. The budget set for social development should be used on the development of villages of 5 km periphery area.	monitoring for noise, water, air and soil conducted. All parameters are within prescribed limits. Zero Effluent Discharge is maintained from plant and mine premises.	
9.	Smt. Tara Begam Mirza, village Sindesar kala	Smt. Tara Begum Mirza Village Sindesar Kala said that in her villages lot of accident happens, there is no facility for source of energy and drinking water in our village, the houses which have been constructed in her village by adding Rs 10-15 lakh, cracks are developed from the blasting caused of Hindustan Zinc. The poisonous dust is accumulating on our crops, due to which grains cannot be grown. This Mine is running due to their village. Many children have done MA / BA and ITI, but they are not being given employment. Therefore, the company should make all the facilities available to the people of the area.	Following actions are being taken at Sindesar Khurd (SK) Mine for management and control of Blast & Vibration. • Blast design parameters based on extensive studies by CSIR-CMIFR. Regular analysis, monitoring & validation. • Every blast monitoring at surface. • Total charge and Maximum Charge per delay (MCPD) for each stope is decided based on its location derived from predictor equation. • Use of Nonel (shock tube) /electronic delay detonator. • Ground vibrations are kept within statutory limits.	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			Following actions are being taken for management of dust emission. • Regular water sprinkling on roads. • Real time monitoring of AAQ through CAAQMS. • Conveyors and Crushing equipment's established with effective water sprinkling /Dust suppression system in transfer point, loading and unloading points. • Use of special additives for dust suppression on haul roads. • Transportation of concentrate in covered trucks. 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	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			development of nearby villages.	
10.	Shri Laxman Vaishanv, Ex- Dy.-Sarpanch, Mehanduria	Shri Laxman Vaishnav Ex-Dy. Sarpanch, Village Mehanduria said that the saplings which are planted by the company are not surviving. Last year, 200 plants were planted by the company on the pond, but not a single plant is alive today. Due to the deep Mine and the drain being not pakka, the dirty water is going underground, due to which the drinking water in well is not potable. Today no man can drink water from any hand pump. In the year 2008, the NOC issued by the company was said to develop green belt in the area, but today no green belt is seen anywhere. Even for panchayat meeting information is given, but no information was given by the company on the public hearing, but the information sent to some people by the company wherever they found appropriate. If propaganda done in all the villages, there would be crowds of lakhs of people today. No development work is being done in the area by Zinc. No one in our village can sleep on the roof of his house, and if ever he falls asleep, he has to go to the hospital as soon as he gets up. Earlier, the soil and water of our village were monitored every month, but now no monitoring been done as the company has nothing to do with them. His village is 50 meters away from here, there should be a machine installed and monitor how much pollution is in place. Plants of 5-6 ft tall are planted by the company which are not survived, but they take photos and tell that they had planted so many plants. Under the supervision of the District Collector, CSR and women's development / self-employment work should be done and all the reporting of the works done by the company should be through some officer of the State Government. 1300	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. As and when the plant saplings do not survive due to different reasons same is being replaced to maintain the survival rate. RO installed and also new RO planned. Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited Lab & RSPCB and no such abnormality have been found. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality	CSR hudget of Rs. 9873 lkah till FT 2021.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		Bigha of our village farmers land have been taken by Hindustan Zinc but people are not being employed, in our village MA / BA students are roaming unemployed. They want the environment of nearby area to improve and drinking water to be supplied. Water should be supplied from Bagheri Ka Naka or Mathriakundia dam for the area. When the green belt is not developed in the area in 10 years, how much time will take to develop it. First the pollution level of air, water and soil should be reduced, after which the NOC should be issued to the company to further expansion.	Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. The notice of the said environmental public hearing was published in the Udaipur edition of the Rajasthan Patrika dated 28.09.2018 and the Times of India, New Delhi edition, dated 28.09.2018 and copy of the EIA/EMP report was provided at concerned offices. CSR works is being done in surround 32 villages.	Rs. 25 lacs for environmental monitoring
11.	Shri Panna Lal Sukhwal, village Mahenduria	Shri Pannalal Sukhwal resident Mehanduria said that with the expansion of mining, there will be a profound impact on pollution. Now the water level of the area has gone quite below / deep due to the mining work, due to expansion, water level will go further down. The trees which are now planted will also be get destroyed. What distance should be maintained	Pond deepening done. Dariba Smelter Complex has been installed in 2009-10, with prior approvals from concerned statutory authorities considering suitable	Budget Rs. 400 lakhs for FY 2019

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		between plant and habitated area? Now the plant is just 10 mts from the populated area, because of this, the pollution of water, air, and soil in the population area is increasing but no precaution are being taken by the company. The gases released during night hours by the company, falls on nearby crops and the yield is being destroyed, no compensation is being paid to farmers for their crop loss. Our fields and crops will get spoiled due to expansion, but no compensation will be paid. First of all, the administration should tell that how the pollution is going to be compensated. According to the earlier agreement, unemployed people of the area within 5 km be given and then 10 km of the local unemployed people of the area, they should be given employment on the basis of their merit. Zinc should construct a pond in the village through which pure drinking water should be provided or supply of drinking water from Bagheri Naka or Mathrikundia dam should be ensured. Hindustan Zinc is not discharging responsibility in the area. Waste water being discharged in the Mataji Ka Kheda, should be resolved. He requested district collector to inspect the plant once, people working there are suffering with breathing problems, air pollution, they do not get full salary and bonuses. Therefore, all effort should be made to compensate the loss due to whatever is happening on the ground. Due to the blast, there are cracks in house near Mataji's Kheda which should be resolved.	distance from habitats. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. Greenbelt of adequate width have been developed between Dariba Smelter Complex and Mahenduriya Village to improve aesthetic view and mitigate environmental impacts, if any. Zero Effluent Discharge is maintained by the plant & mine premises. Project Samadhan has helped increase in productivity of agriculture. Farmers of Mahenduriya are also being benefited from it. Water supply done in selected villages through pipe line. Water Tankers provided during summer. Project Samadhan has helped increase in productivity of agriculture. Farmers of Mahenduriya are also being	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			benefited from it. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skilling initiative are taken to make local youth Employable. Many youths are already undergoing training programme. Suitable actions are in place and described in previous point for management and control of Blast & Vibration.	Budget of Rs. 421 lakhs till for 2021 Ongoing.
12.	Shri Jagdish Chandra Dadhich, village Mahenduria	Shri Jagdish Chandra Dadhich village Mehanduria said that today all the brothers are present here for the NOC of the company. This means that Hindustan Zinc wants to double its production and the pollution of the area is also going to be doubled. Monitoring of Water, air and soil should be done in nearby villages, a respected person of the village should be taken during the monitoring so that there will not be any question on this. If the plant is expanded, the number of people working in it, will also increase, but the company does not have any security arrangements in nearby villages. Because of noise pollution, children are unable to study in the school. Water is polluted due to the gas emission, so people of the area and schools should be provided free drinking water. Due to mining	Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited Lab and RSPCB. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server.	Rs. 25 lacs for environmental monitoring

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		operations of the company, farmers should be compensated for damaged crops.	People are employed at HZL after proper scrutiny and verification from respective police station to ensure security of nearby communities. Community RO installed, Agriculture project implemented.	
13.	Shri Devi Lal Jat, Village Kesarpura, Naya Dariba	Shri Devilal Jat village Kesarpura Naya Dariba said that they requested for employment but no action has been taken. Many people of nearby villages are unemployed but they are not provided with employment. Due to the pollution of the company, at the age of 37, he is having problem in feet and crops are also being destroyed. Therefore, the employment with priority to be given to people. Villagers should also get the facility of manure and fertilizer.	For sustained production increased and for long term soil fertility, organic fertilizer is being provided to farmers of core village. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different skill development initiatives are taken to make local youth employable. Many youths are already undergoing training programme. Monitoring and sampling of water, soil, noise and air done regularly are being done and all parameters are under permissible limits.	Ongoing agriculture budget Rs. 421 lakh till March 2021.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
				Rs. 25 lacs for environmental monitoring
14.	Shri Shankar lal Jat, village Rajpura	Shri Shankarlal Jat resident Rajpura said that all the village people are provided with seeds as per their requirement through Samadhan Project by Hindustan Zinc. Fertilizers, seeds, plants, etc. should be given on free of cost and adequate measures should be taken to safeguard the plants.	RO installed. New RO planned covering all core villages. For plantation, tree guard along with plants area provided for safety from animals.	Budget of Rs. 300 lakhs
15.	Smt. K Vijaya Stalin, village Rajpura	Smt. K. Vijaya Stalin Village Dariba said that there is no facility of tap and drinking water in their village, children are sitting unemployed, there is no road light in the village. With lots of garbage in the village, mosquitoes are spreading and the disease is spreading, which has no cure. For treatment, they have to go to Udaipur, there is no doctor in the local hospital due to which treatment is not done.	Free of cost treatment at Zinc and nearby Government hospitals.	Ongoing annual budget of RS100 lakh in medical
16.	Shri Laxmilal Suthar village Mataji ka Kheda	Shri Laxmilal Suthar of village Mataji said that people from all over the India is working with peace in Hindustan Zinc. The district administration should appreciate them. All the work explained by Mr. Meena ji are being done in the village. Hindustan Zinc should also work in development of villages through GPDP scheme in collaboration with the administration.		

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
17.	Shri Manoj Jat, village Anjana	Shri Manoj Jat Gram Ajanja said that the monitoring work told by Shri Meena Sahib that soil, air and water are being monitored in every three months, is wrong. Mataji's Kheda pond is full of chemicals. The company is releasing the waste and poisonous water so the pollution is spreading. 70% of our people are unemployed in the village. When they went to Company Gate to demand for employment, but no response. RO should be installed in their village.	Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited Lab and RSPCB. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. Effluent Treatment Plant (ETP) of 9000 KLD followed by two stage Reverse Osmosis (RO) plant and Multiple Effect Evaporator (MEE) Plant has been installed to maintain Zero discharge from Dariba Smelter Complex. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skilling initiative are taken to make local	Each RO cost Rs. 50Lakhs. Will be completed by March. 2019.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			youth Employable. Many youths are already undergoing training programme. RO installed. New RO planned in 5 panchayats	
18.	Shri Mohan Lal Jat, village Mataji ka Kheda.	Many request letters have been given to Hindustan Zinc Officials and District Administration regarding pollution but no hearing is being done. Near their village the company had installed ventilation fan, through which gases and smokes are been released, which mix with air and are proving to be very dangerous. Please check the released gases because around 60-70 people had heart attack. Most of the land have been given to the company but there is no benefit to the villagers. No work have been done at Nandgarh and school. No child is getting educated and not progressing. It is requested to District Collector to do a survey and address to the problems.	Monitoring and sample analysis are done by MoEF accredited Lab and RSPCB for noise, water, soil & air regularly and no such abnormality have been found. 110 Nandghar with state of the art facilities, i.e. learning through LED TV, Solar system, RO, independent boring, artistic painting, toilets, kitchen garden, etc. has been constructed. Additional teachers along with study material has been provided in 8 surrounding government schools.	Ongoing Budget Rs.880 Lakhs. Ongoing Budget of Education project 222 Lakhs. Till FY21
19.	Shri Shankar lal jat village Mataji ka Kheda	Shri Shankar Lal Jat Gram Mataji said that when the first plant was installed by Hindustan Zinc, we had given NOC without thinking, but now we are not going to give NOC ahead. With the village pond about of 25 villages fields were irrigated but now crops is getting destroyed due to polluted water. First of all, the company should stop discharge of chemical water into the pond. Due to the ventilation fan, noise pollution	Effluent Treatment Plant (ETP) of 9000 KLD followed by two stage Reverse Osmosis (RO) plant and Multiple Effect Evaporator (MEE) Plant has been installed to maintain Zero discharge from Dariba Smelter Complex.	Budget of Rs.400 lakh during FY2018-19

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		occurs. Due to blast, cracks are developed in the houses and rain water seeps from the roof, stone slabs develop cracks. First solve all the problems of villages then NOC to be given.	Monitoring and sample analysis are done by MoEF accredited Lab and RSPCB for noise, water, soil & air regularly and no such abnormality have been found. Suitable actions are in place and described in previous point for management and control of Blast & Vibration. Due to deepening of village ponds a significant improvement in crops production in surrounding area with good productivity is seen.	Rs. 25 lacs for environmental monitoring
20.	Smt. Prembai, Village Kotadi	Smt. Prembai, resident of Kotadi said that due to the abundance of pigs in our village, the crops are getting spoiled due to which safety measures should be taken, R.O. Water is available only after putting money in it, which should be given free of cost and educated children should be given good employment.	RO plants installed and functional.	
21.	Smt. Ganga Bai Village Kotadi	Smt. Gangabai village Kotadi said that only one RO is in their village. More ROs should be installed. They pay for RO water but it should be free. Drinking water should also be arranged for animals as well. Measures should be taken to protect crops from animals, good work should also be done for the development of women.	RO-1 installed, 2 under installation, 3 under process in 6 panchayats.	Total budget Rs. 300 lakhs by March, 2019

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
22.	Smt. Kesarbai, Village Pipawas	Smt. Kesharabai Gurjar village Pipawas said that there is no road in their village which should be constructed, crops are getting spoiled and compensation should be given. In her house, only one bulb and a fan is used but the bill for electricity comes to 6-7 thousand rupees, which should be investigated and corrected. Her husband is suffering from tuberculosis for the last 20 years, all money goes for treatment, they are not getting any facilities.		
23.	Smt. Manju bai, Village Dariba	Smt. Manju bai resident of village dariba they are getting good response and help from the Company. Many women of their group are unemployed, some have lost husband and some don't have children so employment should be given.	Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skill Development Initiatives are taken to make local youth Employable. Many youths are already undergoing training programme.	
24.	Smt. … Village Udalpura	She told that in their village RO should be installed as hand pumps are not working. No water comes in the tap. The educated women should be given employment.	Hand pumps will be repaired through help of PHED. Deptt.	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
25.	Smt. Nisha Solanki, Village Mora	As facilities given to the Nandgarh, same facilities to be extended to their Aganwadi. Plantation to be done at Aganwadi. The village road need to be repaired and plantation to be done on both side of the road.	Nandghar constructed as per selection criteria	
26.	Smt. Durga Sukhwal village Mahenduria	Smt. Durga sukhwal resident of Mahenduria said that the water in her village is very bad because of that malnourished child birth so RO to be installed.	Community RO is being installed at Mahenduria and surrounding villages.	Costing. Rs. 50 lakh per RO by March 2019.
27.	Smt. Lalita Vijayvargiya, Village Mahenduria	Smt. Lalita vijayvargiya, resident of Mahenduria said that almost construction of Nandghar is completed but no water connection so RO to be installed. Due to that it could not be started.	It will be done.	Jan 2019
28.	Smt. Karma Salvi, Village Ajana	Smt. Karma Salvi village Ajana for controlling the pollution, more plantation to be done. For Drinking water more RO to be installed. There is no College for B.Sc and parents do not send their children to distance so B.Sc college to be opened.	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. Training Centre being developed	Budgets Rs. 50Lakh. Budget Rs. 634 lakhs for skill dev.
29.	Smt. Prema Vaishnav	Smt Pream vaishnav install RO in their village and the road should be repaired.	Will be done	Till march 2019
30.	Shri Shankar Lal Jat, Village - Kotadi	Shri Shankar lal Jat resident of Kotadi said that there is problem for drinking water and due to bad quality of water the yield of the farm is	High capacity community RO with capacity of 1500 Lts/ Hr. is being installed with chiller facility.	Ongoing.

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		less. Company gives the seeds and manure to selected farmers only. It should be given to all farmers. For RO water for 20 litres Rs. 5/ to be paid, which cannot be afforded by everyone. So per family upto 40 to 50 liter water no charges to be taken.	Through project Samadhan Agricultural support is provided to farmers. Farmers are provided seeds and agricultural support by forming Farmers groups in village which does not have any biasness RO installed. Agriculture support project implemented.	
31.	Shri Kishan Lal Jat Advocte, Village Railmagra	Shri Kishan Lal jat from Railmagra said that his opinion is that immediately NOC for expansion should be given and Hindustan Zinc should resolve all grievances on priority basis because without money no work happens so with expansion company will generate revenue and development of the local area improves. Immediately enquiry of all pollution should take place and wherever pollution is identified should be mitigated immediately.		
32.	Shri Jagdish Chanda village Mata ji Ka Kheda	Shri Jagdish chandra resident of village Mataji Ka Kheda told that the environment near to his village is very poor, road condition is bad. It is the responsibility of Hindustan Zinc to rectify all the grievances of the area. At the village Pond, good quality plantation should be done. No benefit is being given to the villages. The quantity of manure and seed to be increased. Unemployed person should be given employment according to their eligibility. Children of their village should be given admission in Company's School.	More than 15000 nos. of fruit bearing plant saplings have been planted in surrounding villages and same shall be done in future. Fullfledged CSR implemented in surround villages More than 70% students in DAV are from surrounding villages.	DAV budget Rs. 350 Lakh per year. Rs. 1050 lakh still FY 2021
33.	Shri Sohan Lal village	Shri sohan Lal village Raghunathpura lot of dust accumulated in the field and due to that yield in the farm is destroyed. There is lot of	Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited	Rs. 25 lacs for environmental

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
	Raghunathpura	unemployment so employment should be provided.	Lab and RSPCB. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skill Development Initiatives are taken to make local youth Employable. Many youths are already undergoing training programme.	monitoring
34.	Shri Babulal village Pipawas	Shri Babulal village Pipawas told that Hindustan Zinc should open a Gau Shala and water facility should be provided for cattle.	As such no plan but shall explore the possibility in future.	
35.	Shri Naval Singh Ranawat, Member of Panchayat Samiti	Shri Naval Singh Ranawat member of Panchayat Samiti todays Public Hearing is for Environment. Till now all have talked about the water pollution. They said from last 10 years they were drinking water from wells and handpumps then why the RO water now. For 10 years when there was less TDS, how come more TDS now. It is clear that the	Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited Lab and RSPCB. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous	Rs. 25 lacs for monitoring

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		polluted water from the mine is polluting the water and so TDS is increased. The company has not put the right efforts to control the TDS. He told that beyond Beda kheda, there is change in the atmosphere and temperature changes, there is difficulty in breathing, but the administration of Hindustan Zinc has not imparted their responsibility in true sense to control by plantation in more numbers. Now for expansion, they will cut the old trees and plant new saplings and this is the reason for increase in pollution. Earlier the farmers used to take two yields in a year but now they are not able to take even a single one. It is true that wherever there is industry there will be increase in pollution but it is the responsibility of the Industries to mitigate. Day by Day the pollution of water, air and soil is increasing but no facilities provided to the farmers. New-new technology is being introduced in the mine so the employment is decreasing. The management should put efforts to mitigate the pollution and also given preference to the local unemployed person in employment or else anger of the local will take a dangerous turn and have big consequence. He said there is no issue in giving the NOC but all mitigation of pollution should be done according to the policy and plan.	Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. Phase wise plantation has been done in mine area at the designated locations and also planned in future. Through project Samadhan Aggricultural support is provided to farmers. Farmers are provided seeds and agricultural support by forming Farmers groups in village. Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skill Development Initiatives are taken to make local youth Employable. Many youths are already undergoing training programme	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
36.	Shri Ramlal Jat, Advocate, Village - Rajpura	Shri Ramlal Jat, advocate Rajpura resident, said that for the environmental Public hearing of any industry, the letter is sent to the Industries Department of the district and the documents related to the industry department are made available to the people of the area. But no documents have been made available to them by Hindustan Zinc Ltd or other concerned authorities, whereas he himself through RTI demanded for the documents for expansion of the company which is going to take place and make a difference to the people of the area but there is no document made available to him. Now the code of conduct has been started due to Vidhan Sabha election in the state, but why the management of Hindustan Zinc was in hurry and conducted Public Hearing during the code of conduct. He said that since 1960, the work is being done by Hindustan Zinc Limited. At that time there was so much greenery on this place that this area was called by the name of Ganganagar, but today in this area there are no trees and plants seen besides the roadside. Whereas the industry should have planted trees in at least 30-40% of the area which have not been planted with trees and shrubs. Therefore, production capacity cannot be increased in the absence of this. Currently where Lead Plant, Power Plant and Zinc Plant are installed.	Permission from the concerned authority had been taken before conducting the PH. Phase wise plantation has been done in mine area at the designated locations and also planned in future.	85-90 Crores. Time Frame- 6-8 months

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		Earlier, in 1985 and 1990, there were large and large trees which were cut with whose permission and report of this may be produced. There after only NOC may be given. Because for an ordinary person if he wants to cut the tree in his farm, he has to take approval from the Tehsildar.	Required percentage of plantation have been maintained in the acquired land. And maintain the survival rate.	
		Hindustan Zinc limited cannot buy land belonging to SC/ST for their industrial purpose but mediating through them paid even less than the DLC to the poor farmers and bought in the name of ex-employees of the company Along with this, they were allocated about 355 bigha land for the tailing dam of Rajpura-Dariba mine by the Department of Revenue. At the same time, the height of the dam should not be more than 4-5 meters, while the company is now planning to raise its height to 25 meters, which is incorrect according to the rules. After 25 meters of height, how much water will be filled in it, and if it breaks down, then who will be responsible for it? If any land is being purchased from the farmer by the Company, the permission from the Revenue Department need to be taken for conversion of land. In How many cases the company has taken the permission and converted the land and if no conversion is being done, then this act is considered as illegal.	Dariba Smelter Complex has been installed in 2009-10, with prior approvals from concerned statutory authorities considering suitable distance from habitats All land issue regarding conversion excavation fodder land etc had already been taken up and are with concerned authority.	
		Around 200 meter from the Hindustan zinc Limited Tailing dam he wanted to put a crusher plant. Whether he can put the crusher plant and whether he has to take permission from the authority. By Hindustan Zinc		

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		around 300 biga land acquired from SC/ST farmers, they are using for Tailing Dam but the company has not taken any permission which is an act of illegal. In fodder land of 5 biga in village Makanpuria, is being used for the ramp of the tailing dam. No permission is taken for the same. By the Company in the village of Rajpura Arjee No: 859 for 28 bigas around 20-25 mtr deep excavation been done for which the Sarpanch had many time in written communication given to Officers and Tehsildar but no action been taken against them nor stopped the act. In the lands of village makanpuriya and Kabra, the company is dumping the chemical contained waste which need to be physical verification to be done by the responsible officer there after NOC to be given for expansion. Without permission soil from Arjee No: 523, 524 and 525 of Suneria Kheda are been utilized in the embankment of Tailing Dam, which comes under the act of illegal act. Even the land of a farmer in his villages also been purchased in the name		

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		of the Contractor and thereafter soil is being utilized for embankment of Tailing Dam. Whether a private party need to take permission form the authority for excavation of soil, which has not been taken by them. The land at Makanpuria having Arjee No: 271, 272 and 273 belongs to the Fodder Land which comes inside the embankment of dam. Whether permission have been taken from Tehsildar. In the route to village Rampura, Lead Plant of Hindustan Zinc is installed which is only 400 meter away from his village and also more villages are there within the vicinity of 200-500 meter. He requested the Env. Officer to tell what is the safe distance for installation of Lead Plant from the populated area and also whether the Plant is installed according to the required laid down norms. The villagers do not want this Lead Plant to be there. Only after the decision, the NOC for expansion may be given. Sometime back, due to gas leakage from the company, 4 fatality of the local people took place for which case had been registered against Hindustan Zinc Limited but till now no action has been taken.	Not related to RDM	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		For ladies from the Saki Project, the Hindustan Zinc Limited had deployed vehicle to bring them which is wrong and against the rules. Hindustan Zinc has encroached on many Bigha lands and fodder land of nearby villages. Therefore, the action should be taken to demarcate the company's land. What all CSR activity done by the Company is well known to the people of this locality. Before 2000 around 1000 permanent workers and around 1000 contractor workers were employed. After that the production of the company had doubled but as on date how many permanent workers from local and contractor labours employed are known to all. Here foreign contractor from China and Australia are working, whether there is no Indian contractor to work where the Prime Minister is propagating adopt Swadeshi, here company is engaging the foreign company which is not correct. If the Environmental Public Hearing fails, then Management will definitely transfer the existing executives to other place.	Dariba Smelter Complex has been installed in 2009-10, with prior approvals from concerned statutory authorities considering suitable distance from habitats	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		Whether any executives from Hindustan Zinc can drink the water from their village wells, if yes then he will himself will bring water for them. If not, then who is responsible for contaminated water. Because of the waste and discharged contaminated water, the well water of the area had become poisonous.	The matter relation to judiciary.	
		Is to correct to give Environmental permission to the company before answering to the question put forth by him.	PH was open a forum, anyone can attend. No vehicle deployed.	
		When company is talking about the expansion of production twice or more but development of the area, employment and protection of environment there is no solution then how can environmental clearance could be given.		
		As the Company's location head told that the monitoring water, air and soil of the nearby area got done and all the results are within the desired parameters this is confirmed that these samples are not from the nearby area.	Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skill Development Initiatives are taken to make local youth Employable. Many youths are already	
		The chairman of DMFT Fund is the District Collector. The ratio is 60:40		

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		for development of the local area is allotted but no amount had been sanction for their village whereas max amount need to be allotted to the villages adjacent to the mine. They are facing the problem due to this mine and the amount is being spend somewhere else. That is the reason environment NOC should not be given for expansion to this mine. Today's Public Hearing no had told that the water is potable or good. Whereas after taking the payment the local people of the area are provided with RO water. Mine has reached around 700 meter in dept. due to that water in the mine is poisonous. Water from Matrikunda are been brought by the Company and are supplied to 25-30 villages why because water is poisonous. The smoke from the chimney reaches the sky and mix with the atmosphere and contaminate/poisonous air and that is the reason for fields of farmers are destroyed. The land allotted by the Collector for the purpose of Tailing Dam for	undergoing training programme. Monitoring and sample analysis are conducted for noise, water, soil and air regularly by MoEF accredited Lab and RSPCB. Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server. -as above.	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		Rajpura Dariba, in that waste of SK Mines is been dumped.		
		Sindesar Khurd is another mine, whose ML number is different, where is the Tailing dam. If there is no Tailing dam then how Environment Clearance given.	Matter relates to Administration.	Rs. 25 lacs for environmental monitoring
		The land of village Rajpura panchayat had been spoiled and illegally laid the pipe and due to that the fields of the farmers are destroyed for that reason FIR had been lodged but no case had been lodged and any compensation paid to the victims. Due to breakage of these line, water spread in the nearby field of the village and the land becomes spoiled. These all come under the illegal act and penalty should be imposed on the executives of the company. Should stop addition of chemical contaminated water in the Tailing Dam or not.	Continuous Emission & Effluent Monitoring Systems (CEMS) and Continuous Ambient Air Quality Monitoring System (CAAQMS) have been installed at Dariba Smelter Complex for real time monitoring and data are transmitted to RSPCB & CPCB server.	
		Where the residue of the plant is dumped need to be investigate and physical verification done.		
		The route to Rajpura, one big hill type waste of the chemicals from the plant is dumped which is called as acidic. Before dumping the plastic	Matter not related to this Mine.	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
		sheet is laid so that poisonous water is not seeped to the ground. Whether these norms are followed by the company. From this hill like dump, the chemical dust fly and settled down in the fields around the 20-25 km area and destroy the yield. And during rainfall, chemical contaminated water from all 5 plants of the company flow out and sediment in the nearby point. So the water from their village pone bought by the company for their use. The half of the hillock had been cut and stones removed, this is an illegal act and what the District Administration have taken against the same be appraised. From this Mine around 200 meter is his house and 400 meter is his farm. Due to this mine, they are victim so the is a common opinion that the Public Hearing be cancelled. Due to the above points, todays environmental public hearing is not valid and it qualify to be cancelled. If the preceding officer are not cancelling, then he himself take the plea to High Court and get it cancelled.	Tailing dam deposed as per the approval Matter not related to RDM Pipe is laid in the acquired land. And No leakage happened.	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			Matter not related to this Mine Matter not related to this Mine	

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
			Matter not related to RDM	
37.	Shri Ratan Singh village Khad Bamina	Shri Ratan Singh from Kad Bamina told that he agrees to the points told by shri Ratan Lalji Jat, advocate but the company should take a note that around 10000 work force, but less number of persons from the nearby village. The company should take assistance of village representative or patwari for development of the local area. Here so many unemployed persons are there that company and need not have to bring from outside. Alongwith the Sarpanch a list of unemployed person need be prepared and provide employment. The Plan for development of villages which are affected and polluted need to be done. DMFT Fund is not been sanctioned for development of their area where as maximum fund is been deposited from this region.	Employment opportunities will be created due to the proposed expansion, HZL will give preference to the locals, based on their eligibility, requirement and company policy. Different Skill Development Initiatives are taken to make local youth Employable. Many youths are already undergoing training programme. Matter relates to Administration	
38.	Smt. Mamta Prajapat village Railmagra	Smt. Mamta Prajapat village railmagre told that many people present here are opposing the mines. But she said that only Mines people cannot do everything, for any work they need the support of the local people. If this mine is closed where the people around this mines will go for employment.		

Sr. No.	Name	Query/Concerns Raised	Response/ Action plan	Budget & Time Frame
39.	Shri Omprakash Singh village Banedia	Shri Omprakash Singh Banedia told that with the help of Hindustan Zinc, many people of this area have been benefited, but he desired that management of Mines should take care of the local people. Maintenance of the school building to be done and CSR acitivity zone to be extended upto 10 Km and they should be given the priority for development should be done.	Infrastructure development taken under CSR	Rs. 9872.87lakhs is budget till FY 2021

7.2 RISK ANALYSIS AND DISASTER MANAGEMENT PLAN

Mining is an ancient occupation, long recognized as being arduous and liable to injury and disease. The lifecycle of mining consists of exploration, mine development, mine operation, decommissioning and land rehabilitation. Mining is a multi-disciplinary industry, drawing on several professions and trades. To ensure precision in clinical and epidemiological work, it is important to enquire about the details of tasks, as the term 'miner' is relatively non-specific. Mining is traditionally classified as metalliferous or coal, and as surface or underground. Metalliferous mining can also be classified according to the commodity being mined.

Unsafe conditions and practices in mines lead to a number of accidents and causes loss and injury to human lives, damages the property, interrupt production etc. Risk assessment is a systematic method of identifying and analysing the hazards associated with an activity and establishing a level of risk for each hazard. The hazards cannot be completely eliminated, and thus there is a need to define and estimate an accident risk level possible to be presented either in quantitative or qualitative way. Because of the existing hazards of mining as an activity and the complexity of mining machinery and equipment and the associated systems, procedures and methods, it is not possible to be naturally safe. Regardless of how well the machinery or methods are designed, there will always be potential for serious accidents. It is not possible for an external agency to ensure the safety of an organisation such as a mining company nor of the machinery or methods it uses. The principal responsibility for the safety of any particular mine and the manner in which it is operated rest with the management of that mine.

Hazard identification and risk analysis involves identification of undesirable events that leads to a hazard, the analysis of hazard mechanism by which this undesirable event could occur and usually the estimation of extent, magnitude and likelihood of harmful effects.

7.3 NEED FOR RISK ASSESSMENT

Risk assessments will help the mine operators to identify high, medium and low risk levels. Risk assessments will help to prioritise risks and provide information on the probability of harm arising and severity of harm by understanding the hazard, combine assessments of probability and severity to produce an assessment of risk and it is used in the assessment of

risk as an aid to decision making. In this way, mine owners and operators will be able to implement safety improvements. Different types of approaches for the safety in mines various tools and appropriate steps have to be taken to make mining workplace better and safer. A Hazard Identification and Risk (HIRA) analysis is a systematic way to identify and analyse hazards to determine their scope, impact and the vulnerability of the built environment to such hazards and its purpose is to ensure that there is a formal process for hazard identification, risk assessment and control to effectively manage hazards that may occur within the workplaces.

7.4 OBJECTIVE

Keeping the afore mentioned problems in mind, the project work has been planned with the following objectives

Review of literature on Hazard Identification and Risk Assessment

- Review of accidents in mines and their analysis.
- Study of risk assessment methodologies.
- Application of Hazard Identification and Risk analysis for improvement of workplace safety in mines.

7.5 HAZARDS IN UNDERGROUND WORKING

1. Fall of roof and sides
2. Collapse of pillar in mines
3. Air blast
4. Rock burst and bumps
5. Rope haulage
    - Runaway of tubs due to breakage of rope, failure of attachment to rope, failure of couplings and drawbars.
    - Non functionality of safety devices.
    - Travelling along haulage roadway
    - Uncontrolled movement of tubs.
    - Derailment of tubs.
    - Poor construction of curves.

6. Electrical hazards
   - Electric shock and/or burn.
   - Ignition of firedamp or coal dust.
   - Fire arising from electric defects.
7. Fire hazard
8. Inundations
9. Ventilation
   - Failing of cooling system.
   - Oxygen deficiency (<19%)
   - Gas evolution
   - Presence of CO >50ppm
   - Presence of CO2 > 1%
   - Presence of H2S > 20ppm
   - Presence of NOX
   - Increase in temperature due to rock temperature and heats from machines

10. Illumination
    - Insufficient illumination system

11. 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.

7.6 METHODOLOGIES FOR RISK ANALYSIS

The objective of risk analysis is to produce outputs that can be used to evaluate the nature and distribution of risk and to develop appropriate strategies to manage risk. Events or issues with more significant consequences and likelihood are identified as higher risk and are selected for higher priority mitigation actions to lower the likelihood of the event happening and reduce the consequences if the event were to occur. Qualitative methods use descriptive terms to identify and record consequences and likelihoods of the events and resultant risk. Quantitative methods identify likelihoods as frequencies or probabilities.

They identify consequences in terms of relative scale (orders of magnitude) or in terms of specific values (for example estimate of cost, number of fatalities or number of individuals lost from a rare species). For both qualitative and quantitative methods it is important to invest time in developing appropriate rating scales for likelihood, consequence and resultant risk. The full range of risk situations likely to be encountered within the scope of the exercise should be considered when developing rating scales.

7.6.1 SEMI QUANTITATIVE METHODS

Semi-quantitative approaches to risk assessment are currently widely used to overcome some of the shortcomings associated with qualitative approaches. Semi-quantitative risk assessments provide a more detailed prioritised ranking of risks than the outcomes of qualitative risk assessments. Semi-quantitative risk assessment takes the qualitative approach a step further by attributing values or multipliers to the likelihood and consequence groupings. Semi-quantitative risk assessment methods may involve multiplication of frequency levels with a numerical ranking of consequence. Several combinations of scale are possible.

Risk Matrix

Consequences 1= Minor 6= Severe	1					
	2					
	3					
	4					
	5					
	6					
		Rare I	Unlikely (U)	Possible (P)	Likely (L)	Almost Certain (Ac)
Likelihood (L)						

From the above Risk Assessment Matrix, risks I are assigned a risk ranking that is used to determine their priority for management. The risk rankings are:

A	Critical Risk
B	High Risk
C	Moderate Risk
D	Low Risk

Table 7.1: Risk and Hazard analysis for different phases of Project

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
1	Interaction with vehicles, machinery and equipment (Physical).	Refer Section 10 ESMP	1	L		2	U	
2	Interaction with onsite and offsite traffic	Implementation of traffic management plan	4	P		6	U	
3	Fugitive Dust Emission	Refer Section 10 ESMP	3	U		1	U	
4	Fatigue	Work rosters that include rest between shifts; training and awareness; and Health and well-being improvement program.	1	P		4	P	
5	Food Hygiene	Provision and supply of food to be undertaken in accordance with relevant food and hygiene legislation.	1	R		6	R	
6	Physical injuries from manual handling.	Documented standard operating procedure; education and training; education and awareness program; Job Hazard Analysis covering manual handling; and Effective pre-employment fitness for work screening and	1	R		2	L	

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
		health and well-being improvement program.						
7	Leaks of oil, fuel or chemicals from vehicles during transport and/or at designated fuelling stations	Provision of auto-shut off nozzles; Follow SOP of fuelling procedures; Provision of impervious containment and bunding of stationary / fixed tanks; overfill protection; prompt reporting and clean-up; major equipment maintenance to be conducted in dedicated facilities; clean up equipment; and storage and handling in accordance with AS 1940	1	P		1	P	
8	Ventilation failure	The underground mining area will be provided with good ventilation as per the DGMS guidelines; Provision of backup ventilation provision, in case of failure of ventilation equipment's; Provision CO, NOx, O_2 and Methane level detectors;	NA	NA	NA	6	U	
9	Chemical release – liquid from leaks,	Storm water is directed away from potentially contaminated areas;	3	U		4	U	

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
	ruptures, overflows, spillage or pooling.	site drainage system designed to allow retention of spills on site; Hazard and Operability (HAZOP) reviews conducted during detailed design; Personnel trained in use, appropriate storage, handling and incident response; Material Safety Data Sheets (MSDS) available on site; appropriate personal protective equipment and adequate supply of spill materials; Chemical incidents included in Emergency Management Plan; and effective preventative maintenance.						
10	Natural Flooding and ground water interception and associated flooding	Site is not prone to flood; and Pumping will be done at regular interval; Provision of	5	U		5	U	
11	Noise and vibrations	explosive materials handled only by competent authorised personnel; induction and training of all staff on safety procedures during blasting; strict control of ignition	1	R		1	R	

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
		sources; advise surrounding neighbours, where appropriate; personal protective equipment (PPE) provided; and storage of explosives and accessories in accordance with the Explosives Act						
12	Failure of waste dumps		6	U		6	U	
13	Failure of tailing storage dams		6	P		6	P	
14	Hazards due to poor illuminations	The work area will be kept well lighted. Lightening in different areas will be provided as per DGMS guidelines; Energy efficient light sources with minimum heat emission will be used in underground mining activities and mine office;	3	P		5	P	
15	Hazard due to Blasting associated activities	Protective devices will be provided to workers during handling explosives; lasting will be carefully planned and executed under supervision of a responsible officer to avoid any accident;	2	P		5	P	

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
		xplosives will be handled as per guidelines of DGMS; Strict prohibition of smoking in fuel and hazardous chemical storage area; Signage in hazardous and risky areas; lasting sites will be checked post blast by qualified personnel for malfunctions and any unexploded blasting material prior to resumption of work in the area; Provision of storage of magazine at separate area at safe distance from ML area with necessary security arrangements; Provisions of fire fighting in the mine area and beneficiation plant with sufficient number of fire extinguishers at fuel storage area, mine office, electrical substation and other strategic locations to take care of any eventuality; Following Emergency Response Plan in case of any accident at site;						

S.N	Risk and Hazard	Control Measures	Environment and Land			Human Health		
			C	L	R	C	L	R
16	Storage of fuel and hazardous chemicals	pecific warning siren will be blown before each blasting activity to alert all the workers and local people residing in the surrounding areas; Material Safety Data Sheet (MSDS) for hazardous chemicals will be maintained and followed to ensure safety of workers; Eye wash and emergency shower system will be provided in hazardous chemical storage area; Signage in hazardous and risky areas;	5	P		5	P	

Note: C= Consequences, L = Likelihood and R = Risk

7.7 MITIGATION MEASURES FOR POSSIBLE RISK AND HAZARDS IDENTIFIED

1. Fire and Explosions

- Identify the sources of fire and fire hazards at regular intervals;
- Undertake regular training and awareness programmes on dos/ don't on in-case of fires; use of fire distinguishers; handling flammables;
- Develop well established emergency exit plan showing emergency exits,
- The boundaries of each explosion risk zone at the mining operation are clearly indicated by signage at each boundary;
- Inflammable material shall not be stored in underground;
- Underground mining infrastructure's such as shaft, ventilation systems, Ramp, incline etc will be made of noncombustible materials;

- Proposed underground workshop, surface workshop, HSD filling station, compressor house and electrical sub-station shall be provided with adequate firefighting equipment's and the functioning status of the same shall be verified at periodic intervals as per the supplier requirement;
- Regular inspection/audit will be done to check the accumulation of greasy material cotton waste, old conveyor pieces, waste hose pipes, wooden scrap, wood cuttings etc. Regular removal of the same shall be ensured;
- A proper communication 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 firefighting;
- There is appropriate signage at the entrance to fuel storage areas advising:
  - Flammable materials are stored inside;
  - Access to experienced mine workers only;
  - No flames or naked lights;
  - No hot work;
  - Engines will shut down before firefighting;
  - Emergency procedures in the event of fire;
- Mock drills will be conducted periodically
- All fuel transfer systems are constructed with non-flammable materials, brass, or non-metallic components and have automatic sealing using fast fill couplings.

2. Failure of Ventilation systems

- Ventilation levels to be monitored as per statutory guidelines;
- Measures the quantity of air being delivered to every working place in the underground parts of the mining operation;
- Determines whether air is being recirculated in the underground parts of the mining operation and takes suitable action to stop any such recirculation;
- The mine management must ensure, in respect of any underground parts of a mining operation where a mine worker is doing work or may travel, that the air in that part is provided at an adequate quantity and velocity to ensure the mine worker will not be exposed to a concentration of dust that is likely to cause harm to the mine worker;

- The emergency supply of electricity to the underground parts of the mining operation, other machineries and equipment's that does not require power supply will be isolated as soon as reasonably practicable;
- The supply of electricity will not be restored until after the ventilation system has been safely restored and a competent person considers it is safe to restore the supply of electricity to the remaining machineries and equipment's.
- The mine operator will ensure regularly the air supplied to every underground place where mine workers are working meets the requirements of the applicable Regulations, and safe levels, in relation to:
    - Air velocity, quantity and composition.
    - Fire.
    - Methane or noxious gases.
    - Humidity.
    - Diesel emissions.
    - Radon.

3. Entrapment of miners

- To prevent premature collapse of any workings, effective supports will be erected based upon the geotechnical mapping;
- All workings will be systematically supported to safeguard against any possibility of premature collapse;
- Numerical modelling techniques will be used to determine the stable spans of stopes, safe locations of developments and stable pillars;
- The hang wall and crown pillar will be instrumented with multi point boreholes extensometer and stress meter for ground monitoring on regular basis;
- The rescue mode and methods are clearly identified and communicated and shall be continued and adequately extended in mine expansion;

4. Transportation, Storage and Handling of Hazardous substance

- Containers or systems in which hazardous materials are contained will be labelled.
- Storage and Disposal of hazardous substance containers is carried out as per Hazardous and Other Waste Management Rule(HoWMR) 2016;

- Requirements for storage, handling and disposal are determined before a chemical is purchased.
- All personnel handling these substances are trained in the associated procedures, including clean-up.
- Essential safety equipment will be made available at all times.

5. Fuel and Oil

- Ignition sources will be monitored and managed to avoid fire;
- Training will be provided in the safe operation of equipment and knowledge of emergency response procedures in the event of diesel leakage
- Equipment inspection and testing programs will be undertaken to ensure reliable performance of fuel tanks and bunds;
- Spill containment equipment (e.g. bunds) will be built to contain any spillage of liquids
- Clean storm water will be diverted away from the bunded fuel storage areas
- Sumps will be constructed to collect any spillage and allow recovery
- Standard operating procedures will be developed for operators
- Spill kits will be available at all fill/transfer points
- Appropriate firefighting facilities and suppression systems will be installed, maintained and available to extinguish fires
- An approved fire protection system is to be installed and maintained around new storage area

6. Irruption of Water

- The position of the workings below ground;
- Every borehole and shaft (with depth) drive, crosscut, winzes, raise, excavation and air passage connected therewith;
- The position of every dyke fault and other geological disturbance, with the amount and direction of throw;
- 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;

- 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;
- 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;
- Surface contour lines drawn at vertical intervals shall not exceed five meters; and
- Mine entries shall be developed above the highest flood level of the area.

7. Working at height

- Perform the task on the ground if possible;
- Use a passive fall prevention device;
- Use a work positioning system to ensure employees work within a safe area;
- Install a fall arrest system to limit the risk of injuries in the event of a fall;
- Use a fixed or portable ladder incorporating a risk assessment, safe work procedures and training; and if you are not able to work on the ground or on a solid construction prior to working at height then;
- Establish emergency procedures and First Aid provision prior to undertaking the task;
- Review documented safe systems of work for contractors who are required to work at height; and
- Monitor the work at height practices of all employees and contractors to ensure they are working safely.

8. 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-7.1.

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 (817^0C)
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 (21^0C)
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 Rajpura Dariba 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 Rajpura Dariba mines was prepared by NEERI and details are as follows:

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 Rajpura Dariba 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.

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.

i) 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.

ii) 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.

iii) 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-7.1 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.

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 Rajpura Dariba 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 SO2, 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 Rajpura Dariba 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.

f) 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.

g) 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.

h) 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.

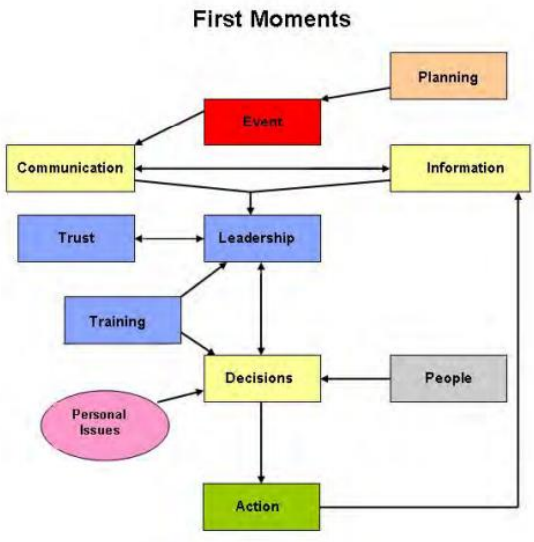
i) Depending on the concentration of cyanide remaining in the containers and the requirement of chlorine for oxidation of various intermediate compounds formed during

decontamination process, actual requirement of sodium hypochlorite should be worked out.

j) 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.

7.8 DISASTER MANAGEMENT PLAN

An underground mine is an inherently dangerous workplace. The safety of workers depends upon many interrelated factors, including knowledge of the dynamic, ever-changing environment, the ability to recognize and respond to hazards, training, experience, and communication. During an emergency, these factors can be crucial to response. When something goes awry in an underground mine, seconds count and the initial response can be critical to the outcome. Understanding the behaviors and issues present in the initial moments of a response to mine emergency may enhance escape, facilitate rescue, and be helpful for training miners and decision-makers.



Framework of first moments in mine emergency escape

(a) Identification of potential emergencies

- Personal Injury

- Unplanned Explosion
- Fires, Including For Tyres And Explosives
- Strata or Ground Failure
- Entrapped Or Missing Workers
- Inundation or Inrush
- Outburst
- Irrespirable or Noxious Atmospheres
- Hazardous Material Incident
- Explosives Incident
- Vehicle or Machinery Accidents
- Air Blast or Wind Blast
- Significant Ventilation Failure
- Mechanical or Electrical Equipment out of Control
- Natural Disasters, Such As Bushfires, Flooding, Earthquakes, Cyclones
- Medical Emergencies E.G. Stroke
- Spontaneous Combustion
- Structural Failure (Plant)
- Loss of Radiation Sources
- Intersection of Utilities (Gas Pipeline, Underground Water/Power).

(b) Mine Emergency Planning

All miners should be trained to understand and follow the mine emergency plan where they work. A response plan is only one piece of the continual, dynamic process of emergency response planning. Identifying threats and their associated risks will help establish planning process priorities. As a first critical step in emergency response planning, a thorough hazard analysis and risk assessment should be conducted. This will help in keeping emergency response plans simple and easy to use.

The Mine Safety Technology & Training Commission report (2006) recommends developing a comprehensive emergency response plan that is riskbased and mine specific. A risk-based plan is targeted for the most likely threats and assumes that preparing for them also prepares for unrecognized hazards.

Competencies required for successful escape include:

- Technical knowledge : understanding and proficiency in the use of emergency breathing apparatus (self-contained self-rescuers), lifelines, refuge chambers, etc.
- Mine specific knowledge : knowledge of the mine maps, the escapeways, the ventilation system, the mine emergency response plan, and familiarity with escape capsules.
- Escape conceptual knowledge : ability to think and adapt to changing conditions, to be resilient, to be able to problem solve and make decisions, and to understand the dynamic of human behavior in escape, including leadership and other psycho-social issues.

(c) Communication

Information about the situation affects the initial response and defines the first moments of an incident. NIOSH studies indicate that the effectiveness of a mine's communication system is a key factor in the initial response. Research has suggested that effective communication will reduce confusion, increase confidence in decisions, stop rumors and incorrect information, and improve the likelihood of success.

(d) Training

Training is considered to be one of the most essential elements in the emergency response planning process. Training, in the form of drills, mock disasters, and even tabletop simulations, affords the opportunity for planners to identify and resolve problems, examine and evaluate the utility of developed procedures, refine plans, and train individuals who will be responding to emergency events.

(e) Decision-making

Decision-making directly relates to communications issues. In an emergency, decision-making relies on :

- The quality of the information received by everyone immediately following the incident
- The technical communication system in place in the mine.

- The process is iterative, meaning that one choice leads to another until the incident is resolved. Decision-making is also affected by the experience level of the people involved.

(f) Personal protective equipment for first aid and rescue

People entering the mine as part of first aid and rescue procedures should have the appropriate personal protective equipment (PPE).

Considerations for ensuring capacity to provide PPE include:

- Potential or actual atmospheric contaminants
- Potential or actual inundation or inrush
- availability of the appropriate equipment
- availability of persons trained in the equipment
- specific protocols for use of the equipment
- procedures for any specialist emergency response team who may enter the mine.

7.9 PROTECTIVE MEASURES TO BE TAKEN

(i) Measures taken to avoid mine gases are as follows:-

- The quantity of inflammable gas given out in each ventilation district will be determined at least once in a month and similarly borehole samples once in three months.
- The quantity of air sent into each district will be such as to keep the percentage of inflammable gases in the district return airway below a percentage of 0.75 to 1.25 at any place in the mine.
- The state of atmosphere near the stopping will be continuously monitored by flame safety lamps, air sampling and analysis.
- There should be strict adherence to latest safety manuals and statutory acts.
- Working will be ventilated by a suitable mechanical ventilator installed on the surface.
- The Manager will be assisted by a ventilation officer in each and every operative area.
- Adequate quantity of air will be coursed to well within meters of the working face, and
- Air samples will be frequently collected of the roof of the working face and analyzed timely for the presence of CH_4.

(ii) Measures to avoid fires in the underground mine are as under:-

- Check the workers, before the proceed underground, for matchbox, lighters and other contrabands,
- Do not allow burning of fire inside the mine and also within 15m of an incline/pit,
- Avoid welding of headgear pulley or the headgear frame unless adequate timely precautions are taken,
- Avoid welding in underground repair shops without adequate precautions.
- Restrict the storage of inflammable and combustible material like oil, grease, timber etc.
- Remove all wood cuttings as also oily and greasy cotton wastes out of the mine.
- Install the electrical cables and equipment with due care and maintain them properly with regular inspections.
- Use only approved safety lamps, which should be taken underground in locked condition.
- Machinery to be used underground should be meticulously assembled and properly operated so as to ascertain that during use it does not cause any dangerous sparks or for that matter generate any hot surface.
- Break blocks of underground machinery like haulage engines, locomotives, etc., should be adjusted periodically to avoid their overheating and
- Avoid at any cost accumulation of dangerous static electric charges on the equipment using air by earthing.

(iii) Measures to avoid Subsidence

- Long faces: Long faces or longer width of panel are to be preferred to reduce the number of rib-sides, where differential movements occur resulting in high subsidence.
- Rapid face Advantage: Temporary interruptions in face advance should be scrupulously avoided as the rapid face advance necessarily aims at diffusing the rib side conditions to control the subsidence.

(iv) Measures to avoid Inundation

- Working place approached within a distance of 60m of any other working (likely to contain accumulation of water) shall not be extended further unless it is examined physically and found to be free from accumulation of water.

- Whenever seepage of water is noticed at any place of working, such working shall be immediately stopped. The height of such working shall not extend 2.4m and at least one borehole near the center of working place shall be maintained with sufficient number of flank holes. The boreholes drilled above and below the workings at intervals of not more than 5m. Such boreholes constantly maintained 3m in advance of the working.

7.10 EMERGENCY PLAN

Emergency is any unplanned event that causes serious injuries or loss of life; causes extensive property damage; shuts down or disrupts the mining operations; or threatens the operation's financial standing or public image.

Emergency preparedness is a well designed and executed plan that can eliminate or control hazards so they don't become a disaster; or if this isn't possible, it can turn a potential disaster into a well managed situation with minimal effect on the miners and property of the mining operation.

➢ **Emergency Management**

Emergency management is the collective arrangement of personnel to plan for, mitigate/control, respond to and recover from an emergency. It provides for a structured framework for completing all perceived activities in an emergency situation. Emergency management ensures a solid, complete and collaborative arrangement of personnel, resources and services. An emergency preparedness plan is not to be confused with an emergency response plan. Emergency response is just one of the key elements of the emergency preparedness plan. Emergency preparedness plans include risk management activities, prevention and/or control measures, response procedures and guidelines, and recovery efforts. Each of these components requires training, drills and periodic revisions.

➢ **A well-developed, implemented and maintained emergency preparedness plan can:**

- Help mining companies fulfill their moral responsibility of protecting their miners, property and possibly the public and environment.
- Ensure compliance with federal and state mining regulations.
- Enhance a company's liability to recover more quickly from financial loss, regulatory fines, loss of market, and damages to property and equipment.

- Reduce exposure to civil or criminal liability.
- Provide employees, customers and suppliers with a sense of security.
- Reduce insurance premiums.

➢ **Emergency Response Organization**

The purpose of the Emergency Response teams at Rajpura Dariba 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-7.1.**

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.

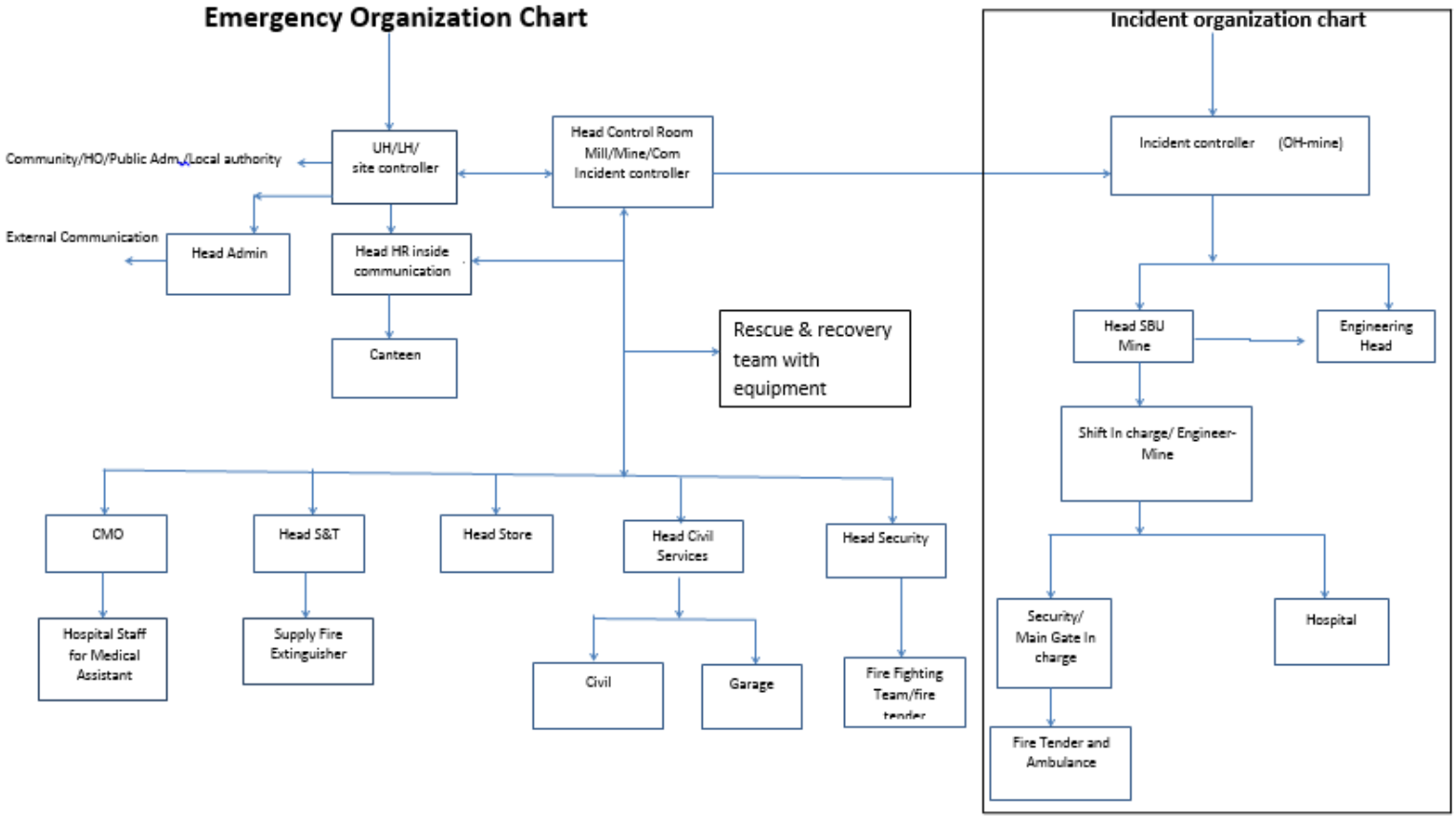


Figure-7.1 : Emergency Organisation Chart

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).

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 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.

Roles and function of Emergency Team

I) 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 Rajpura Dariba 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.

II) 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	External threat by nuisance attack/lightening	Lightening/thunderstorms

Factors	Emergency Scenario	Locations	Level-1 Incident	Level-2 Emergency	Level-3 Crisis
			of explosives		
	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 crane structure, Rupture of pipelines in shaft, etc	Property damage	Persons entrapped in mine	Catastrophic

Factors	Emergency Scenario	Locations	Level-1 Incident	Level-2 Emergency	Level-3 Crisis
	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 Rajpura Dariba 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.

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 Rajpura Dariba 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)

- 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: Rajpura Dariba Mine

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:

- 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

- 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

- 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

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

He will make all necessary arrangements and organisation for the additional food supplies to meet out the Emergency.

l) In-charge of Garage

- 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

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.

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

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).

7.11 INFRASTRUCTURE

Following infrastructure and operational system will be provided to meet any emergencies.

(a) Emergency Control Room

This will be situated in an area away from the places of fire and will be provided with the following facilities:-

1. Master plan of the mines.
2. First aid boxes.
3. Gas masks.
4. Telephone line with STD facility.
5. Emergency lighting system

6. Stretchers.
7. Transport facility.
8. Emergency control room will function as control base.
9. Lifebuoys

(b) Assembly Points

Assembly points are to be set up farthest from the location of likely hazardous events, where pre-designated persons from the works, contractors and visitors would assemble in case of emergency. Up-to-date list of pre-designated employees of various departments must be available at these points so that roll call could be taken. Pre-designated persons would take charge of these points and mark presence as the people come into it.

(c) Warning System and Control

The Control Centers will be located at an area of minimum risk or vulnerability in the premises concerned, taking into account the areas which might be affected by fire/explosion, toxic releases, etc. For promptness and efficiency, the premises/storage sites may be divided into number of zones, which should be clearly marked on the site plan.

(d) Emergency Services

This includes the fire-fighting system, first aid center, hospital etc. Alternate sources of power supply for operating fire pumps, communication with local bodies, fire brigade etc., will also be clearly identified. Adequate number of external and internal telephone connections will be installed.

(e) Fire Protection System

The fire protection system for the proposed mine will consist of:-

a. Hydrant system for all the areas of the mine.
b. Portable hand appliances of suitable types/ capacities for extinguishing small fires in selected areas of the mine/storage areas.

7.12 OCCUPATIONAL HEALTH AND SAFETY

The main areas of concern for ensuring adequate occupational health and safety are:-

- All working places will have safe means of access, safe working platform and exit. Persons working in hazardous dust prone area will be provided with dust mask.
- Personal protective equipments like respirators, ear plug, noise muff, helmet etc. will be provided to the workers.
- Proper unit design and engineering controls in order to protect workers, including by control of process and fugitive emissions.
- Adequate arrangement of drinking water will be done.
- Education & training will be provided to the workforce about facilities, protective equipment, risk associated, potential health effects, etc.
- Display board will be provided showing the hazards associated and recommended precautionary measures.

❖ **MEDICAL SURVEILLANCE**

Following are the proposed Medical Surveillance will be conducted as per DGMS guidelines for all employees:-

➢ Pre-employment medical check-up.

* Pulmonary Function Test
* Complete Physical Examination
* Blood Test
* Urine Test
* Chest X ray
* Audiometry Test

➢ Form 27A Fitness Certificate will be obtained every year from certified surgeon.

➢ Form 17 Health Register of each employee will be obtained every year from certified surgeon.

➢ Individual medical record will be maintained.

❖ OCCUPATIONAL HEALTH

Occupational health needs attention both during construction and operation phases. However, the problem varies both in magnitude and variety in the above phases.

Construction

The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV's, necessary protective equipments will also be supplied to workers.

Operation and Maintenance

The problem of occupational health, in the operation and maintenance phase is primarily due to dust and noise which could affect the workers from respiratory and hearing problems. The necessary personal protective equipments will be given to all the workers. The working personnel will be given the following appropriate personnel protective equipments.

- Industrial Safety Helmet;
- Crash Helmets;
- Face shield with replacement acrylic vision;
- Zero power plain goggles with cut type filters on both ends;
- Zero power goggles with cut type filters on both sides and blue color glasses;
- Welders equipment for eye and face protection;
- Cylindrical type earplug;
- Ear muffs;
- Dust mask;
- Self contained breathing apparatus;
- Leather apron;
- Safety belt/ line man's safety belt;
- Leather hand gloves;
- Asbestos hand gloves;
- Acid/ Alkali proof rubberized hand gloves;
- Canvas cum leather hand gloves with leather palm;
- Lead hand glove;

- Electrically tested electrical resistance hand gloves; and
- Industrial safety shoes with steel toe.
- Lifebuoys

Full-fledged hospital facilities will be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least once in every year and at the end of his term of employment. This is in addition to the pre-employment medical examination.

7.13 SAFETY PLAN

The planning stage in the continuous improvement cycle is made up of the following four elements:

1. Policy
2. Legal and Other Requirements
3. Hazard Identification and Risk Management
4. HSEQ Management Improvement Planning

Underground Mine safety Management Plan must include but may not limited to :

- Ventilation
- Spontaneous combustion
- Gas management
- Innudation
- Emergency evacuation
- Transportationm machinery
- Starata control

Safety of both men and materials during construction and operation phases is of concern. Safety plan will be prepared and implemented in the proposed site. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster is possible due to collapse of rock structures and fire/ explosion etc.

Keeping in view the safety requirement during construction, operation and maintenance phases a safety policy will be formulated with the following regulations:-

- To allocate sufficient resources to maintain safe and healthy conditions of work;

- To take steps to ensure that all known safety factors are taken into account in the construction, operation and maintenance of men, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/ notify regulations, instructions and notices in the common language of employees;
- To prepare separate safety rules for each type of occupation/processes involved in at site; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

(a) SAFETY ORGANIZATION

A qualified and experienced safety officer will be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers

and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions in accordance with the requirement of Factories Act / DGMS and their duties and responsibilities will be as defined thereof.

(b) SAFETY MEETING

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety group would be constituted in each area of work. The group would consist of 5-6 employees from that area. The group normally will meet for about an hour every week.

(c) SAFETY TRAINING

A full-fledged training center will be set up at the plant. Safety training will be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors will also be provided safety training. To create safety awareness safety films will be shown to workers and leaflets will be distributed. Some precautions and remedial measures proposed to be adopted to prevent fires are:-

- Spread of fire in horizontal direction would be checked by providing fire stops;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and
- Proper fire watching by all concerned would be ensured.

(d) HEALTH AND SAFETY MONITORING PLAN

The health of all employees will be monitored once in a every five year for early detection of any ailment due to exposure of dust, heat and noise.

7.14 REHABILITATION & RESETTLEMENT (R&R)

The proposed expansion will be through underground mining operations within existing mine, hence no resettlement or rehabilitation is envisaged.

7.15 CORPORATE SOCIAL RESPONSIBILITY (CSR)

7.15.1 Socio-Economic Development

Based on the requirement of the people in the area the development activities need 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 250persons.

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

7.15.2 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 thousands of lives in 77 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**

  RD mines have successfully touched thousands of lives living in 77 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**

  RD 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 2015 to 2018 are shown in **Table 7.3**

TABLE 7.3 CSR EXPENDITURE LAST 3 YEARS (2015- 2018)

Thematic Areas	Outcome	Expenses 2014-2017 (INR Lacs)		
		2015-16	2016-17	2017-18
Education	Reached out to more than 20000 students in High school area and covered approx. 40000 children through anganwadi project	1681	1087	1730
Sustainable Livelihoods	Reached out to more than approx. 5000 farmers through improved livestock & agriculture development program. Provided vocational training support to more than 500 rural youth in different marketable trades	465	121	221
Women's Empowerment	Associated with approx. 200 self help groups, trainings provided in tailoring, candle making, masala, papad etc.	271	78	152

Health, Water & Sanitation	Benefitting local populace through regular medical and awareness camps & upgraded Vedanta Heart hospital for economically weaker ones. Providing access to drinking water through tankers, pipelines, overhead tanks Constructed approx. 11000 household toilets & 318 school toilets	1769	2276	1402
Sports & Culture	Support to various local sports & culture programs every year	205	319	492
Environment (including STP)	Support of plantation at local level and for greening & beautification of Udaipur city & STP	109	137	76
Community Assets Creation	Constructed roads, community centers, repairs renovation at places, water conservation structures etc.	1114	1608	452
Miscellaneous Supports	One time supports	-	154	84
Promotion & Admin (incl. Campaigning)	-	315	544	331
Total	-	5928	6325	4940

TABLE 7.4: HZL CSR PLAN FOR 2 YEARS (2018-20)

Thematic Areas	Target	CSR Plan 2018-2020 (INR Lacs)	
		2018-19	2019-20
Education	Goal is to reach out to 3055 AWCs covering about 60000 children in Khushi anganwadi project improving preschool education In Shiksha Sambal, target to cover & support about 100 Govt. school in order to reduce dropout rates in these career building years Support for technical education & Co. run Schools	9619	9619
Sustainable Livelihoods	To touch the lives of 15000 families of operational area through Agriculture & Livestock development Vocational training to more than 200 rural youths	1513	1513
Women's Empowerment	Reach to 20000 women through program Support to 500 women in income generation program	521	521

Health, Water & Sanitation (incl. STP)	Sustainable Health & drinking water solution for 65 villages STP	2020	2020
Sports & Culture	Promotion of sports & culture among rural and urban folks	2600	2600
Environment	Big support in beautification & greening of Udaipur city in partnership with UIT	983	983
Community Assets Creation	To create community assets for providing accessibility to community	1078	1078
Miscellaneous Supports	-	125	125
Promotion & Admin (incl. Campaigning)	-	506	506
Total	-	**18965**	**18965**

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CHAPTER- 8

PROJECT BENEFITS

CHAPTER- 8

PROJECT BENEFITS

8.1 INTRODUCTION

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. In India, zinc demand growth continues to remain strong at around 7%, and is expected to leverage support from the automotive and the white goods sectors. Other major uses for Zinc include its utility in brass and bronze among many alloys; die casting, batteries, chemical compounds such as paints, ceramics, pharmaceuticals and fertilizers. Over the medium term, growth in consumption is projected to average 7% a year which is also likely to remain stable till Year 2020. Global zinc demand continues to be driven mainly by galvanizing sector in the emerging economies 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.

The mining and associated activities in the mineral bearing areas bring about gains in gross domestic product, i.e. there is though a small contribution by the proposed expansion project but will add to the gains in the G.D.P.

The proposal of M/s Hindustan Zinc Limited is for the expansion of Rajpura Dariba Lead – Zinc underground mine with production capacity from 1.08 million TPA to 2.0 million TPA (ROM) and Lead - Zinc ore beneficiation from 1.2 million TPA to 2.5 million TPA..

Zinc is a very volatile metal and small movements in its demand may produce price fluctuations. The mining industry has witnessed continuous modernization and adoption of new technologies in recent years for the excavation of mineral like Zinc. The proposed expansion of mine will cater to the huge market demand presently, which can be analyzed by the demand and supply gap as shown below:-

The proposed expansion will bridge the gap between supply and demand of zinc not only in the region but also at national level. This will also generate much needed employment to the local people. Economy of the area will get a boost and there will be overall growth of the region in terms of education, health, training, transport, automobile, industry. The standard of living accordingly will also get an upliftment on the positive side.

8.2 IMPROVEMENTS IN PHYSICAL AND SOCIAL INFRASTRUCTURE

The proposed project will enhance the socio-economic activities in the adjoining areas. This will result in following benefits:-

1. Improvements in physical infrastructure.
2. Improvements in social Infrastructure.
3. Increase in employment potential
4. Contribution to the exchequer.
5. Post-mining enhancement of green cover.

8.3 IMPROVEMENTS IN PHYSICAL INFRASTRUCTURE

This project will have numerous induced impacts on society such as growth in schools (as part of CSR), hospitals, and transport etc.

8.4 EMPLOYMENT POTENTIAL –SKILLED; SEMI-SKILLED AND UNSKILLED

The proposed debottlenecking will be managed by the existing resources.The existing project has already provided huge opportunity for development of the area and the proposed expansion project is also anticipated to provide additional indirect employment opportunities to number of people from the Railmagra tehsil and its surrounding area. The proposed expansion project will also bring in people for secondary employment like transporters, vendors, local canteen and tea stall operators etc. Sourcing of consumable will be carried out from local region which will also provide considerable opportunity for local economy.

8.5 IMPROVEMENTS IN SOCIAL INFRASTRUCTURE

The proposed expansion project will bring in people from different cultures for secondary employment like transporters, vendors, local canteen and tea stall operators etc. such as:

- Generate indirect employment opportunities;
- Real estate development;
- Increase in purchasing power;

- Development of ancillary small scale supporting electro mechanical services for automobile's, civil, electrical and mechanicals etc. as part of CSR.
- Agriculture marketing and increased demand for locally produced farm products for large number of employees existing in the project;
- Access to high quality health care facilities;
- Women empowerment;

8.6 VARIOUS TANGIBLE SOCIAL BENEFITS IN THE STUDY AREA

As part of existing project, HZL has initiated many developmental activities for the surrounding area. A brief description of each of the activities and details are given below in table

Table 8.1: Ongoing CSR Activities

S. No	Focus Area	Activities	Particulars
1	Education	• School Adoption Program • Adoption of Anganwadi Centers • Scholarship, • SikshaSambal Project (Remedial classes for board students) • Help for Higher Education to Rural Girls	• Adopted 300 AWCs of Rajsamand district, benefiting 6700 children with ICDS and providing preschool education and nutritional supplements; • Adopted 20 Govt. Schools for improving basic infrastructure and quality of education; • Sponsored Poor Girls for Higher Education; and • Covered 1400 students of 24 schools under ShikshaSambal Project (Rs.50 lac)
2	Health and Nutrition	• Mobile Medical Camps • General Health Camps • Eye camps • Blood Donation camps • Immunization Camp • Drinking Water	• Installed 5 Nos. 500 LPH RO plants at Gawardi, Kotri, Mehanduria, Dariba and SunariaKhera villages and 10 mini RO plants in nearby schools. • 161 Medical & other camps at village level benefitted 15000 people. • Eye screening of all school going children of Railmagra block and 12 Cataract camps benefitting 22000 persons.

S. No	Focus Area	Activities	Particulars
3	Sustainable Livelihood	• Providing training in different market driven trades viz; Computer, Housekeeping, Driving, Mining, Drilling, Electrician, House wiring, Plumbing, Motor Rewinding, Welder, Mobile repairing, etc.	• Providing training in different market driven trades viz; Computer, Housekeeping, Driving, Mining, Drilling, Electrician, House wiring, Plumbing, Motor Rewinding, Welder, Mobile repairing, etc.
4	Infrastructure	• Providing Link roads Community halls, Village roads, Additional class rooms, Drainage system, Overhead tanks, Pipeline and bore wells, Vedanta stadium, Sports complex, Renovation of school building etc.	• Vedanta Indoor Stadium in Rajsamand (Rs.2.5 Cr) • Widening of 38 KM road from Fatehnagar to Khandel on PPP Model. (Rs.20.00 Cr) • Bus Stand in Railmagra Block (Rs.1 Cr) • Vedanta Stadium in Railmagra block (Rs.1.50 Cr) • 105 Solar Lights. (Rs.15.00 lacs) • Constructed 10 Km Cement Concrete roads and 7 Km Bitumen roads in Rajpura, SindesarKhurd, SindesarKalan, Amarpura, Makanpuria, SunariaKhera, NayaDariba, Kotri, Anjana, ManoharKheri&Chouthpura villages, benefitting more than 12000 people (Rs.1.20 Cr) • Constructed 6 Water Tanks & 7 Pipelines for drinking water in Kabra, SunariaKhera, NayaDariba, SindesarKhurd, Dariba, MatajikaKhera, SarvariaKheri and Mali Khera villages, benefiting more than 10000 people.(1.5 cr)

S. No	Focus Area	Activities	Particulars
5	Agriculture and Animal husbandry	• Farmers Training &exposure Visits • Distribution of Hi-yield seeds • Orchard Development • Establishment of Green House • Artificial Insemination • Veterinary Camps • Distribution of Fodder seeds	• Covered more than 10,000 farmers in joint collaboration with BAIF for Kharif/Rabi season, Production enhancement of cereal crops, orchard development, and vegetable & commercial crop cultivation. • Established 162 orchards; • 14000 Artificial Insemination, breed improvement • Yield Improvement (Milk), • Veterinary Camps/ vaccination, Covered more than 145000 cattle (Rs.1.30 Cr)
6	Women Empowerment	• Formation & meetings of SHG's, • SHG Training, • Artisan based training • Micro Enterprises etc.	• Formed 272 SHGs covering 2990 women • 640 SHG women trained in various market driven trades (Meenakari, tailoring, Quilt utility items, Embroidery, Hand Block with Appliqué Embroidery and Tie & Dye, Paper bag & washing powder.

Various activities listed above will be continued for the lifetime operation of the project and any other similar or different activities, which are required for the further improvement of the surrounding area, will be carried out in consultation with the villagers, district and state administration.

Support for Formal Education at Sansera

Renovation of Sr. Sec. School Kotri

Rural medical camp at village level

Eye cataract Camps

Vocational Trainings on Tailoring

Vocational Trainings on Electrician

Vedanta Stadium at Railmagra

OHT at NayaDariba

Bus Station at Railmagra block

Green house initiative

Hand Block printing initiative at NayaDariba

Adult Literacy Initiative

Figure 8.1: CSR Activities carried out by HZL

Table 8.2: HZL CSR PLAN FOR 2 YEARS(2019-2021)

S. No.	Focus Area	Initiative	FY 2018-19	FY 2019-20	FY 2020-21	Total
Proposed Budget in Lacs						
1	Health & Hygiene	Free medical facilities provided at company run hospitals, Mega specific Camps	100	100	100	300
2	Education	Khushi Project, NandgharProjec, Siksha sambal Project, Child care Center, Support to school & other education initiative	1004.85	385	385	1774.85
3	Sustainable Development	Sakhi Project under Women Empowerment & Skill Development (Mining Academy)	434.62	95	100	629.62

4	Social Mobilisation	Drinking water, Promotion to Rural Sports and Culture	160	160	160	480
5	Infrastructure Development	Improving the basic infrastructure facilities in nearby villages, community assets creation	2167	1650	2150	5967
6	Agriculture & Animal Husbandry	SAMADHAN-Integrated Agriculture and Livestock Development Project	131.40	140	150	421.40
7	Environment Management & Misc.	Bio-investment, Mega Plantation, Admin Expenses	100	100	100	300
	Grand Total		4097.87	2630.00	3145.00	9872.87

8.6 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

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CHAPTER - 9

ENVIRONMENTAL COST-BENEFIT ANALYSIS

CHAPTER - 9

ENVIRONMENTAL COST-BENEFIT ANALYSIS

NOT RECOMMENED AT SCOPING STAGE

CHAPTER – 10

ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER – 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

An Environmental Management Plan (EMP) is drawn up after an EIA has been conducted as per the requirement of Terms of Reference. EMP is then implemented throughout the project life cycle.

An EMS (Environment Management System) provides a systematic framework and approach to minimize risk and manage environmental aspects (i.e. activities that cause impact) and impacts (i.e. affect change to the environment from activities).

10.1.1 METHODOLOGY

The system is depicted graphically as follows:-

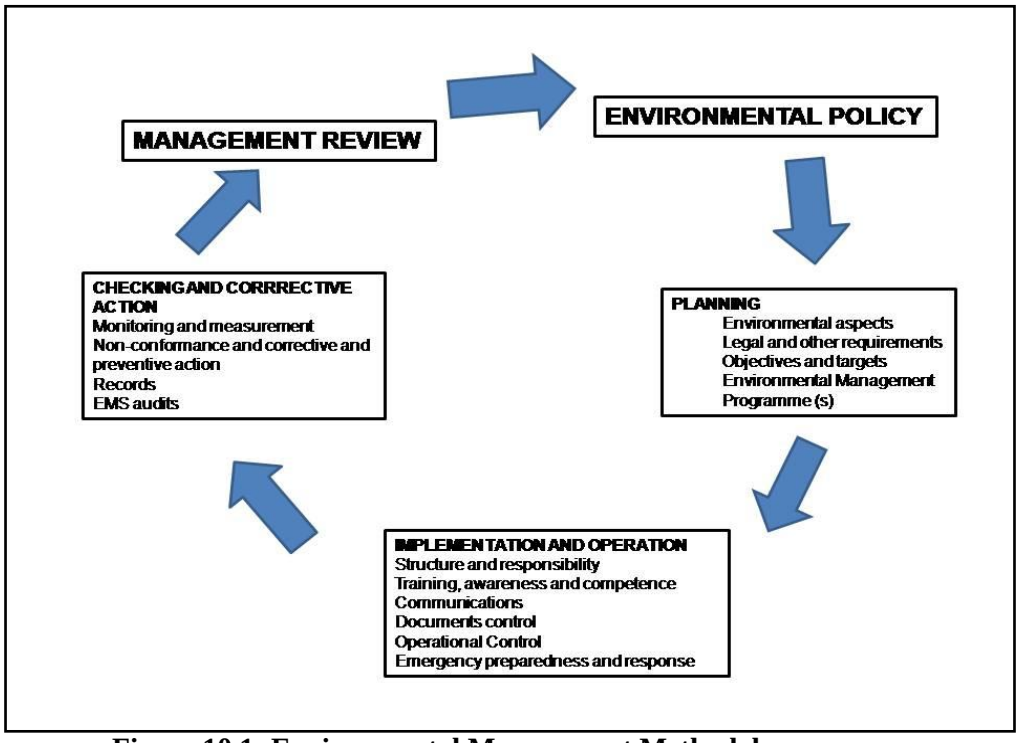


Figure 10.1: Environmental Management Methodology

10.1.2 Corporate Governance

Project proponent is responsible for the development and implementation of the EMP and, where relevant, ensuring that the conditions in the Term of Reference and approved Environment Clearance are satisfied.

Roles and responsibilities of proponent/ stakeholder's will depend on the scale and scope of the EMP.

10.2 MANAGEMENT STRUCTURE

HZL, Rajpura Dariba Mine 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 Rajpura Dariba 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, Heath Safety and 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-10.2 to Figure-10.6.**

10.3 MECHANISM FOR ADDRESSING ENVIRONMENTAL ISSUES

Rajpura Dariba Mine of Hindustan Zinc Limited is certified for Quality Management Services (ISO 9001:2015), Environment Management System (ISO 14001:2015), Occupational Health and Safety (OHSAS 18001:2007) and energy 50001:2011, SA 8000:2014. 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.

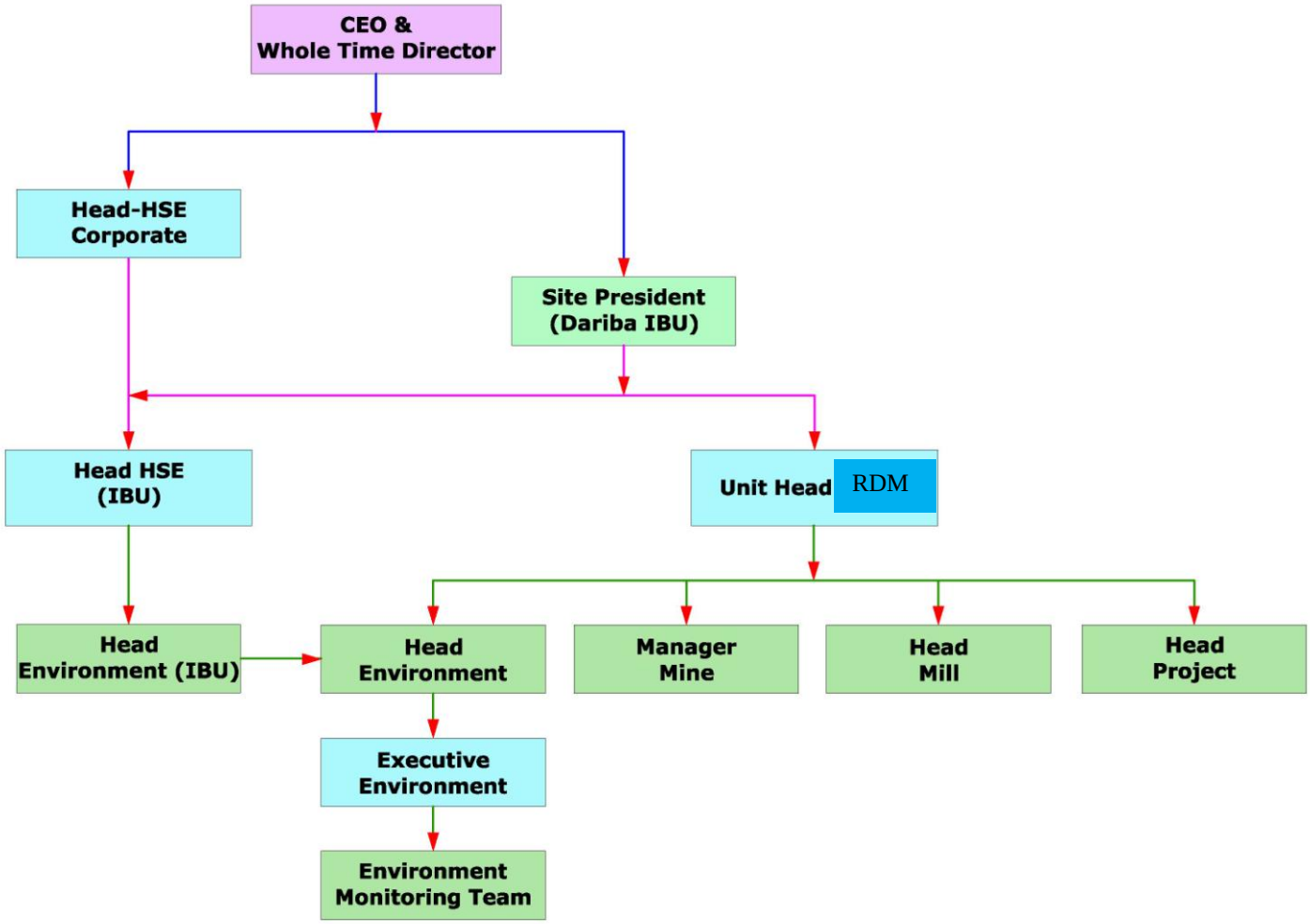
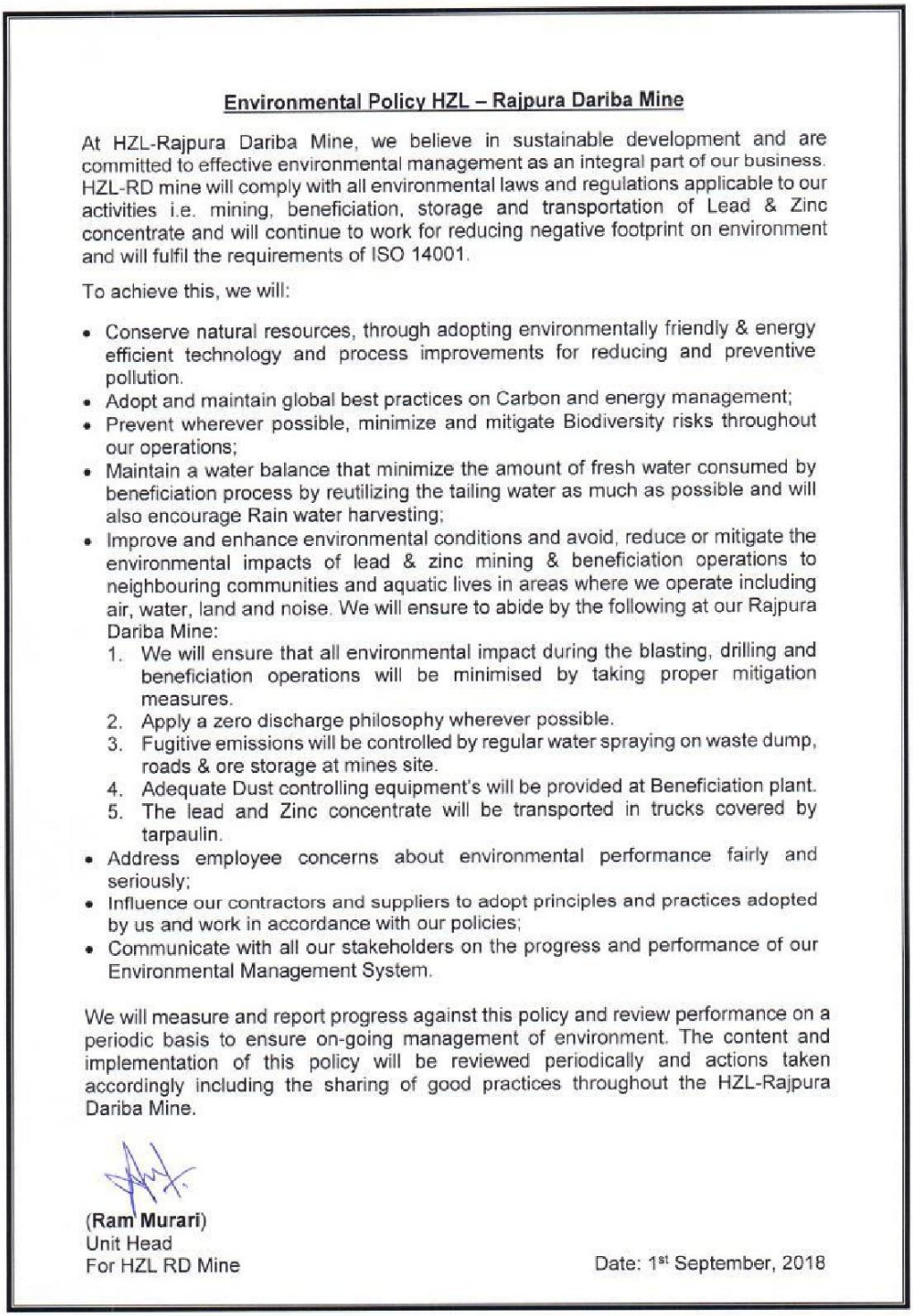


Figure-10.2: Organizational Structure of Environment Management



Environmental Policy HZL – Rajpura Dariba Mine

At HZL-Rajpura Dariba Mine, we believe in sustainable development and are committed to effective environmental management as an integral part of our business. HZL-RD 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 Rajpura Dariba 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-Rajpura Dariba Mine.

(**Ram Murari**)
Unit Head
For HZL RD Mine

Date: 1st September, 2018

Figure-9.3: Environmental Policy (Unit)

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HINDUSTAN ZINC

HINDUSTAN ZINC
Zinc of India

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 the Hindustan Zinc.

Date: 1st July, 2018

Sunil Duggal
Chief Executive Officer & Whole–Time Director

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Figure-9.4: Biodiversity Policy

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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 innovatory 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

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HINDUSTAN ZINC

HINDUSTAN ZINC
Zinc of India

Energy and Climate Change Management Policy

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- 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 innovatory 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 the Hindustan Zinc.

Date: 1st July, 2018

Sunil Duggal
Chief Executive Officer & Whole–Time Director

www.hzlindia.com

Figure-9.5: Energy and Climate Change Management Policy

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HINDUSTAN ZINC

HINDUSTAN ZINC
Zinc of India

HIV/AIDS Policy

Hindustan Zinc recognises the significant and growing impact that HIV/AIDS has on communities, families and employees in the areas in which we operate. HIV/AIDS has profound human, social, economic and developmental costs. Both as a business and a good corporate citizen, Hindustan Zinc commits to a comprehensive HIV/AIDS policy which aims to protect the human rights of its workforce, promote non-discrimination and improve the quality of lives for the affected employees and their families. The Company's programme includes education, prevention, treatment, and general employee health and wellness.

Hindustan Zinc strives to:

- Prevent the incidence of HIV/AIDS through the provision of accessible, accurate, gender-specific and culturally appropriate education and awareness programmes to all employees and contractors. This education includes an understanding on the risks, impacts, prevention, and control measures as well as counselling, testing and support options available to employees. This programme shall be extended to families and communities wherever possible.
- Provide counselling and testing to prevent further infections and prompt early and proactive treatment. This service is made available to all employees through reputable third party providers. HIV/AIDS tests are classified as confidential and are not required as part of any pre-employment medical. Employees shall, therefore, not be obliged to disclose their status.
- Ensure care, support and treatment is made available to all employees to help to improve the quality of life of those living with HIV/AIDS.
- Ensure that HIV/AIDS status does not affect employment, employee rights, development opportunities, benefits or sick leave by committing to the elimination of stigma and discrimination through non-discriminatory policies and practices. No employee shall be isolated or dismissed due to their status. If HIV/AIDS status affects an employee's fitness to work or ability to carry out their duties safely, alternative duties or options such as shorter working hours shall be considered in strictest confidence and in agreement with the individual. Any prejudice or victimisation shall not be tolerated and shall result in disciplinary action.
- Undertake collaboration and community investment to share knowledge and form alliances with diverse stakeholders including employees, communities, civil society, government and non-government agencies, strengthening local community health systems to achieve a sustainable and effective broad-reaching HIV/AIDS programme.

We will measure and report progress against this policy and review performance on a periodic basis to ensure ongoing management of HIV/AIDS. The content and implementation of this policy shall be reviewed periodically and actions taken accordingly including the sharing of good practices throughout the Hindustan Zinc.

Date: 1st July, 2018

Sunil Duggal
Chief Executive Officer & Whole–Time Director

www.hzlindia.com

Fig: 9.6 HIV/AIDS Policy

Figure-9.7: Human Rights Policy

Figure-9.8: Supplier and Contractors policy

10.4 CRITICAL ACTIVITIES FOR EMP IMPLEMENTATION

1) Training and Environmental awareness;
2) Documentation and record keeping;
3) Reporting procedures;
4) Stakeholder/ project proponent engagement;
5) Auditing;
6) Responding to non-compliance;

10.5 MANAGEMENT OF VARIOUS FACTORS OF ENVIRONMENT

Environmental Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the existing site. Some of the major criteria governing the environmental measures will be adopted.

Sustainable development in the study area needs to be intervened with judicious utilization of non-renewable resources of the study area and within the limits of permissible capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion and removal due to physico-chemical and biological processes. The EMP is required to ensure sustainable development in the study area of 10 km radius of the mining site; hence it needs to be an all encompassive plan for the existing activity. Government regulating agencies like Pollution Control Board working in the region and more importantly the people living in the study area need to extend their co-operation and contribution.

It has been evaluated that the study area has not been affected adversely with the existing activity and likely to get new economical fillip, not only for the study area but also for the region as a whole. Mitigation measures at the source level and an overall management plan at the study area level are elicited so as to improve the supportive capacity of the receiving bodies. The EMP aims at controlling pollution at the source

level to the possible extent with the available and affordable technology followed by treatment before they are discharged.

Environmental management for the existing mining activity is discussed for the environmental impact pertains to the operational phase. Even though reversible in nature - all the impacts will be visible only during operational phase. It is planned to take corrective measures to ensure that these effects are kept to bare minimum. The EMP will therefore, be initiated during planning stage itself.

Table 10.1: Critical Activities for EMP Implementation for Various Factors

<table>
<tr><th>S. No.</th><th>Particulars</th><th>Proposed Activities</th></tr>
<tr><td>1.</td><td>Top Soil storage, preservation and utilization</td><td>The topography of the lease area is undulating and is an underground mine. Hence, top soil will not be disturbed.</td></tr>
<tr><td>2.</td><td>Land reclamation and rehabilitation</td><td>This is an underground mine situated in an undulating terrain. Land will be disturbed only to a small extent. Mine has large potential and will therefore be continued to work for a long time. Exploration work being carried out may further enhance the reserves and there by the life of the mine will increase. However dumping area will be gradually reclaimed due to the disposal of waste by selling for use in construction industry. Reclaimed area will be utilized for plantation, which will help in improving the vegetal cover of the region.</td></tr>
<tr><td>3.</td><td>Waste dump management</td><td>Additional waste generation due to development activities is envisaged to 4,80,000 TPA as compared to existing 35,000 TPA. The development waste generated shall be disposed in underground voids</td></tr>
<tr><td>4.</td><td>Afforestation programme with precautions proposed for survival and protection of plantations.</td><td>Plantation will be carried out in and nearby lease area. Proposed plantation programme is given as below:-
<table>
<tr><th>Species Name</th><th>Local Name</th></tr>
<tr><td>Acacia nilotica</td><td>Desi Babul</td></tr>
<tr><td>Albizzia lebbek</td><td>Shiris</td></tr>
<tr><td>Annona squamosa.</td><td>Sitafal</td></tr>
<tr><td>Azadirachta indica</td><td>Neem</td></tr>
<tr><td>Dalbergia sissoo</td><td>Sisam</td></tr>
<tr><td>Pongamia pinnata</td><td>Karanj</td></tr>
</table>
</td></tr>
</table>

		<table><tr><td>Emblica officinalis</td><td>Ambla</td></tr><tr><td>Ficus bengalensis</td><td>Bad or Vad</td></tr><tr><td>Ficus religiosa</td><td>Piplal</td></tr><tr><td>Holoptelea integrifolia</td><td>Churel</td></tr><tr><td>Lawsonia inermis</td><td>Mehndhi</td></tr><tr><td>Mangifera indica</td><td>Aam</td></tr><tr><td>Pithecellobium dulce</td><td>Jungal Jalebi</td></tr><tr><td>Syzygium cumini</td><td>Jamun</td></tr><tr><td>Tamarindus indica</td><td>Emli</td></tr><tr><td>Terminalia arjuna</td><td>Arjun</td></tr></table> About 134 ha (33%) of the total acquired area comes under mine has been already developed as green belt. Further about 5000 trees will be planted for gap filling and greenery. **Post plantation care** **Protection from grazing:** Suitable protection by way of fencing and tree guards. **Watering during Plantation:** watering fortnightly from Oct to March and once in 10 days between April and June. **Soil working, Manuring, Mulching:** Twice in a year.
5.	Air Environment	Following standards in ambient air quality of mining area will be achieved:- <table><tr><th>Parameter</th><th>Standard Ambient Air</th></tr><tr><td>$PM_{2.5}$ ($\mu g/m^3$)</td><td>60.0 max</td></tr><tr><td>PM_{10} ($\mu g/m^3$)</td><td>100.0 max</td></tr><tr><td>NO_X ($\mu g/m^3$)</td><td>80 max</td></tr><tr><td>CO ($\mu g/m^3$)</td><td>2000 max</td></tr><tr><td>SO_2 ($\mu g/m^3$)</td><td>80 max</td></tr></table> Operations of mining activities such as transportation, ore handling, crushing will generate dust which usually gets air borne. Dust is controlled by adopting following practices:- ➢ Effective water spraying arrangements in underground working places as well as at ore loading/ unloading at surface. ➢ Effective water spraying at all transfer points.

		➢ Water spraying arrangement along ore transport route within the mine premises. ➢ Plantation within the premises and also along the transportation route. ➢ Proper periodic maintenance of vehicles. ➢ Trucks carrying ore will be covered with tarpaulin sheets. Underground workings of the mine are ventilated by adequate ventilation arrangements. The requirements and standards specified by Director General of Mines Safety (DGMS) are adhered to. To control radon, radon daughters, dust and diesel engine fumes in underground workings the following provisions have been made. ➢ Water spraying in freshly broken rock. ➢ Maintenance of adequate ventilation throughout all working points. ➢ Wet drilling will be practiced.
8.	Noise Control	Duct fan operation, drilling & mucking operations are the sources of noise generation in underground workings. ➢ Noise generated by blasting is momentary and isolated in nature. ➢ Blasting is done at underground n between shifts; hence exposure to high noise level is restricted. ➢ All operators, helpers and persons nearby the machine operations producing noise more than 85 dB (A) are being provided with PPE's. ➢ Regular maintenance of equipment is done to reduce the noise levels. ➢ Leakage of compressed air which produces noise is restricted. ➢ All transfer points will be lined with hard rubber to reduce noise generation. ➢ The prime movers / diesel engines will be of proper design maintained. ➢ Noise level monitoring will be carried out as per CCOM' circular 3/92. ➢ As it is an underground mine and use of explosive is not on a large scale, vibrations will be contained. **At Surface** The mine ventilation fans and compressor are the main sources of noise mining activities. Other sources of noise on surface are not substantial. The following measures has been taken up:- ➢ The ventilation fans are located at remote paces from mine entry hence

		impact of noise is not anticipated. ➢ During normal maintenance, being lubrication and fastener tightness is checked regularly to limit undue noise and vibration. ➢ Compressors are installed in isolated building and sound protective cubicles are provided for operators. However, to reduce the noise further, acoustic enclosures will be provided. ➢ Regular noise level monitoring is practiced for taking corrective action. ➢ Drill machine operators and pneumatic loaders drivers are issued ear plugs and ear muffs. Duty hours of operators of noisy machinery are regulated to keep their noise exposure levels within limits. ➢ Plantation will be carried out all around the mine boundary to reduce the noise level exposure. ➢ Board has been displayed at defined locations of noisy are to use PPE's.
9.	Ground Vibrations	**BLASTING HAZARDS** Blasting in mining areas may give rise to ground vibrations. Fly rock is another problem area. However the magnitude of blast is not high. Proper precautions will be taken during blasting operations for controlling the ground vibrations.
9.1	Blast vibrations & Control measures	Controlled blasting technique will be adopted in this project in order to reduce blast vibrations. Further, charge per delay will be regulated to minimize blast vibrations. Proper hook-up will be adopted while firing the drill holes. Moreover the experience gained in other open cast mines will be gainfully utilized to limit the ground vibration levels within the prescribed limit. In practice, this is kept much less to about 10mm/ sec or even 8mm/sec. In addition, the following guidelines will be adopted wherever required to check the ground vibrations:- ➢ The maximum charge per delay will be so as to limit the PPV values below 8mm/ sec. ➢ Design of optimum blast hole geometry considering bench height, diameter of hole, type of explosive, nature of rock, level of fragmentation required etc.
10	Socio-Economic Environment	➢ Non workers and unskilled workers (local within 10.0 km) will be trained to work in mines.

		➢ A proper direction given to the villagers would help route the income and savings for growth. ➢ Ensure the optimum use of excavated material for domestic market from the mine. ➢ Vocational training camps for various stages. ➢ People will find indirect employment / income opportunities in the region. ➢ Regular health camps to trace the develeopments and control any ill-consequences due to any mining pollution. ➢ Greivance redressal mechanism is made to handle complaints from the study area. ➢ The proposed project expansion will promote neither selective, nor relative, but universal respect through contribution in various festivities, equal observance and protection among employees and societies at large in all CSR activities.
11.	Occupational Health and Safety	The following measures relating to Occupational health and safety will be practiced:- ➢ Safety officer look after the safety aspect. ➢ Dedicated safety & Environmental committees in mine review the safety and environmental aspect of industrial operations on monthly basis. ➢ Safety Committee comprises of Engineers, Geologists, Surveyor, Environmental Engineer, Medical officer, Training Officer, Occupational health In0Charge, Workmen, Union representative etc. ➢ Minutes of the Meeting of safety committee communicated to Directors/ officials and concerned regulatory authorities. ➢ Recommendations of safety committee are implemented. ➢ Provision of rest shelters for mine workers with amenities like canteen, drinking water etc. ➢ Provision to use of safety appliances, safety awards, display of posters, slogans etc. Celebration of safety week on annual basis. ➢ First – aid organization in mines including training and retraining of first – aider's. ➢ Use of personal dosimeters, dust samplers

		Prevention of Injury. ➢ Training in safety measure. ➢ Use of PPE's e.g. uniforms, helmet, earplugs, ear seals, earmuffs, safety goggles, respirators, hand gloves, rubber canvas shoes, gum boots etc. ➢ Regular monitoring of work environment.
12.	Environmental Protection Measures	Rs.110.00 Crores will be spent on Environmental Protection Measures.

- Schedule I species listed in Wildlife Protection Act, 1972 namely, *Pavo Cristatus (Indian Peafowl),* Indian Grey Hornbill (*Ocyceros birostris),* White eyed Buzzard (*Butastur teesa),* Black Shouldered kite (*Elanus caeruleus)* all avifuna, Indian Monitor Lizard (*Varanus bengalensis),*Indian Flapshell Turtle(*Lissemys punctata)* both Reptiles and Baghera *(Panthera pardus)* mammal have their nesting or habitat in the Core and Buffer zone and accordingly species Conservation Plan are implemented by HZL. The same has been enclosed as **Annexure-XVIII.**

10.6BUDGETARY ALLOCATION FOR ENVIRONMENTAL PROTECTION

Estimated cost of the Proposed Expansion is about Rs. 660 Crores. The cost proposed for environment protection measures will be about Rs. 110 Crores with a recurring cost of about Rs. 6.95 Crores. The cost towards environmental protection measures is shown in Table-10.1.

Table-10.1: Cost towards Environment Protection Measures

All Figures are in (Rs. Cr.)

#	Particulars	Existing		Additional		Total	
		Capital	Recurring	Capital	Recurring	Capital	Recurring
1	Dust control/suppression systems	0.5	1	0.3	0.5	0.8	1.5
2	Tailing Dam management/ Dry Tailing Disposal	4.5	1	11.5	1	16	2
3	Tailing thickener	0.5	0.2	-	-	0.5	0.2
4	Surface water sprinkler	0.25	0.05	0.5	0.05	0.75	0.1
5	Mechanical road sweeper	0.25	0.05	0.5	0.05	0.75	0.1
6	Ventilation System	3	0.5	3	0.5	6	1
7	Rainwater harvesting measures/ Deepening of existing Village Tanks	0.1	0.01	55	0.1	55.1	0.11
8	Plantation/Green belt development with drip irrigation system	2	0.1	1	0.1	3	0.2
9	Different Environmental Monitoring equipment	0.1	0.02	0.2	0.02	0.3	0.04
10	Automation in Environment Monitoring (CAAQMs)	0	0	2.5	0.2	2.5	0.2
11	Construction of Garland drain and silt settling tank and recycle system for waste dump management	0.25	0.05	-	-	0.25	0.05
12	Schedule-I fauna conservation plan cost	0	0	2	0.05	2	0.05

13	Installation of Oil grease trap system & Sewage treatment plant	0.05	0	3	0.2	3.05	0.2
14	Water hydrant system	0.25	0.05	-	-	0.25	0.05
15	High density/ Paste Fill	1.5	0.1	15	1	16.5	1.1
16	Hazardous waste storage facility	0	0	0.5	0	0.5	0
17	Bag filters/ dedusting system	0.5	0	1.5	0	2	0
18	Mobile Water tankers	0.25	0.05	-	-	0.25	0.05
	Grand Total (Rs. in cr.)	**14**	**3.18**	**96.5**	**3.77**	**110.5**	**6.95**
19	Enterprise Social Commitment (ESC) & CER @2.5%			16.5			

10.7 CONCLUSION

Environmental Management plan will be dynamic, flexible and subject to periodic review. For project where the major environmental impacts are associated, EMP will require regular review. Senior management responsible for a project should conduct a review of EMP and its implementation to ensure that the EMP remains effective and appropriate.

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CHAPTER -11
SUMMARY & CONCLUSION

CHAPTER -11

SUMMARY & CONCLUSION

11.1 INTRODUCTION

Hindustan Zinc Limited (HZL) intends to enhance Lead and Zinc ore production and beneficiation capacities from the Expansion of Rajpura Dariba mine from 1.08 million TPA to 2.0 million TPA Ore Production (Total Excavation 2.48 million TPA) and Beneficiation from 1.2 million TPA to 2.5 million TPA, located at 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.

11.2 PROJECT LOCATION & CONNECTIVITY

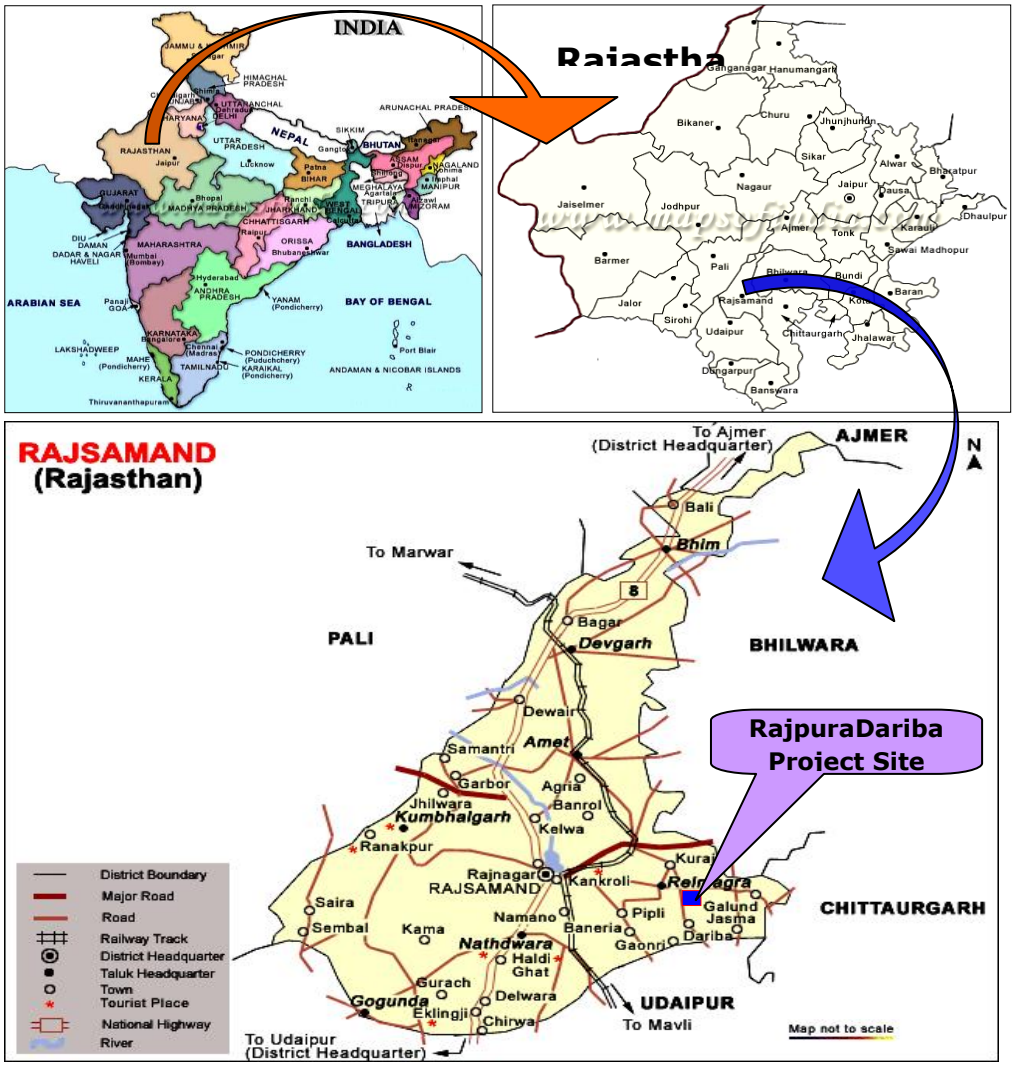
Rajpura-Dariba mine is located at the southern extremity of Rajpura-DaribaBethumnimetallogenic belt in Rajsamand district, Rajasthan, at a distance of 76 km NNE of Udaipur. The deposit is well connected by a metalled road from Udaipur, Chittorgarh, Bhilwara and District headquarters Rajsamand. The deposit falls in Survey of India Toposheet No. 45/L1.It lies between Latitudes 24°55'40.8"N-24°57'49.0"N and Longitudes 74°06"57.7"E-74°08'41.4"E.Lead – Zinc mineral deposit has been explored at this site.

The nearest connectivity details are given as under:-

- **Nearest Airport**- Maharana Pratap Airport (~44.0 km aerial distance towards SW) from mine lease boundary and

- **Nearest Railway Station** - BhupasSagarRailway Station (11.2 km aerial distance towards South SouthEast) , Fatehnagar Railway Station (~13.2 km aerial distance towards SSW) from mine lease boundary and
- **Nearest Highway** - NH-162A- at a distance of 0.5 km aerial distance towards West and SH-9 (Udaipur-Cittorgarh via Mavli) at a distance of 12.5 km aerial distance towards towards south from mine lease boundary.

Figure:11.1 Location Map



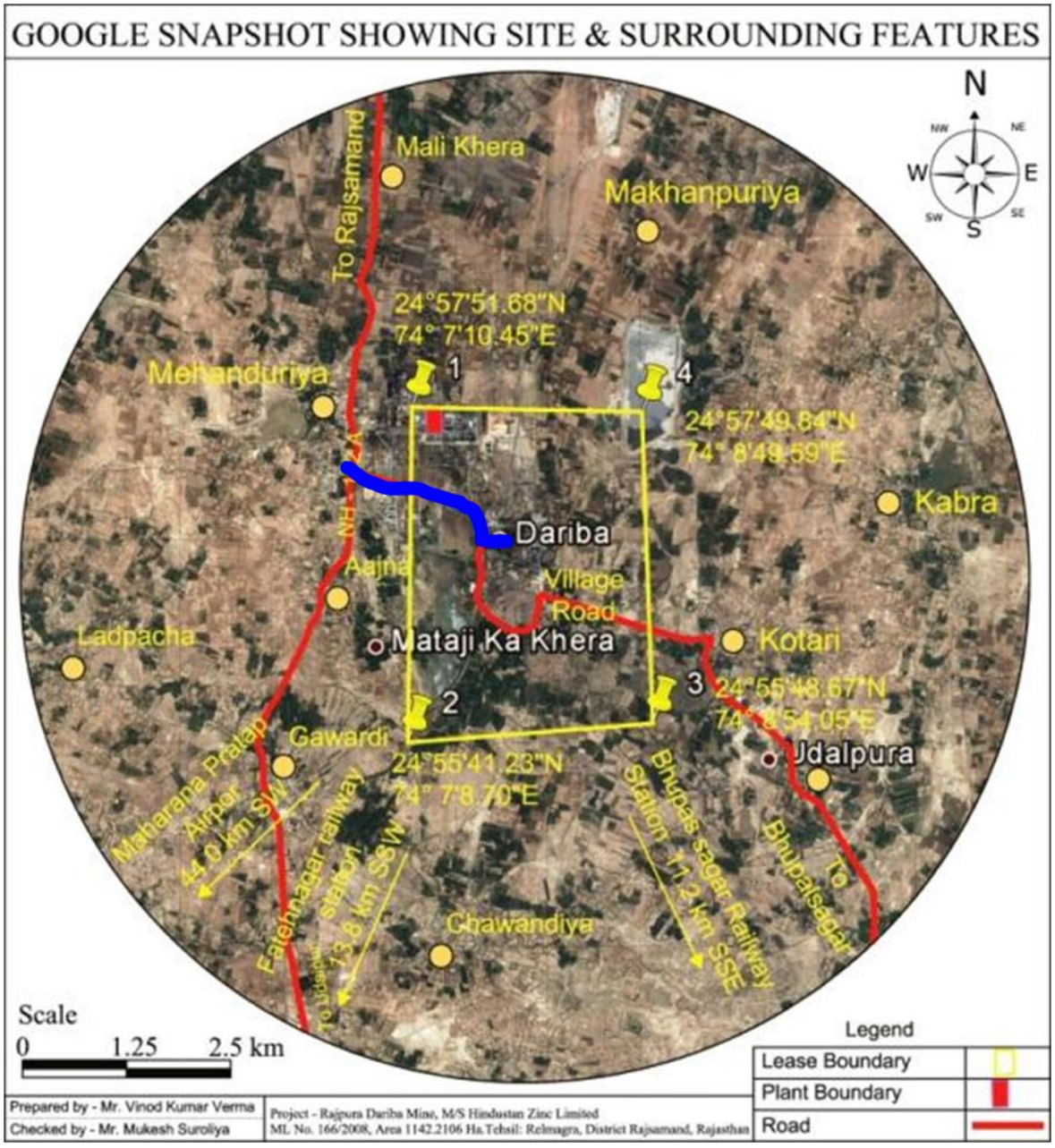


Figure: 11.2 Google Map

11.3 PROTECTED AREAS IN STUDY AREA

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.

11.4 PROJECT DESCRIPTION

The present capacity is 1.08 MTPA of ore production. The proposed enhancement is intended for raising ore production capacity from 1.08 MTPA to 2.0 MTPA and Beneficiation from 1.2 MTPA to 2.5 MTPA. The present Vertical Retreat Method (VRM) & Blast hole Stoping method is proposed to be continued for raising the ore production capacity.

Table 11.1: Salient Features of existing and proposed capacity enhancement

S.no	Description	Existing	Additional Proposed	After Proposed Expansion
1.	Mine lease area (ha)	1142.20	0	No Change
2.	Acquired Land (ha)	554.19	0	No Change
3.	Ore mineral	Sphalerite & Galena		
4.	Reserves & Resources	60.05 million tons, 6.38 % Zn, 1.91 % Pb as on 31-Mar-18		
5.	Mode of Entry	2 Shafts & 1 Decline		
6.	Method of Mining	Vertical Retreat Method & Blast hole Stoping with filling		
7.	Ore Production (Mtpa)	1.08	0.92	2.0
8.	Total Excavation (Mtpa)	1.15	1.33	2.48
9.	Ore Beneficiation (Mtpa)	1.20	1.30	2.5
10.	Waste dump area (ha)	3.0	2.0	5.0
11.	Power requirement (MW)	12.0	13.0	25.0
12.	Power Source	Captive generation/ AVVNL/ Solar Power		
13.	Water requirement (m^3/day)	5800	2200	8000
14.	Water Source	Matrikundia+STP+MansiWakal+Gosunda+Mine Water		
15.	Manpower (Nos.)	1000	250	1250
16.	Project Cost (Rs. in cr.)	300	660	960
17.	EMP Cost (Rs. in cr.)	14	96	110

11.4 METHOD OF MINING

No open cast operation / mining are being done as the ore body is deep seated below the surface cover. The general surface RL of RDM is around 500mRL. The existing working depth of working is varying from 300m in north lode to 620m in main lode. The mine can be approached by 3 accesses from surface.

Currently, the mining method is BHS (blast hole stoping) & VRM (Vertical Retreat Method)with filling and it is planned to followthe same in the proposed mining blocks.

11.7 RESOURCE REQUIREMENT & SOURCES

Water requirement& its sources

For 2.0 Mtpa mining &existing beneficiation capacity, additional water of 2200 m^3/d is required for proposed expansion over existing 5800m^3/d requirement. Mine dewatering due to intersection will also be consumed in the process. The main source of water will be from Sewage Treatment Plant at Udaipur, Mansi Wakal, and Matrikundia Dam.

Power Requirement & its sources

For 2.0 mtpa mining & beneficiation capacity, additional power of 13mW is required for proposed expansion over existing 12.0 MW requirement and shall be met out from Captive Power Plant, Ajmer VidhyutVitran Nigam Limited and Solar Plant.

Emergency Power

Additional DG Sets of total 1.0 MW (2x 500 kVA) having acoustic enclosure is proposed for emergency power.

Land requirement

Total Mine lease area is 1142.2ha, out of which 362.66 ha has been acquired within mining lease. There shall be no requirement to acquire land beyond the existing acquired land. The mine area in operational use will suffice the requirement.

Manpower requirement

The existing operation has direct employment of about 1000 persons and proposed expansion will provide additional employment of about 250 persons. There is an ample opportunity for increase in indirect employment due to mining related activities like transport, small workshops, garages, and due to development of local area

Resource Optimization/ Recycle

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

11.8 MINE WASTE GENERATION AND MANAGEMENT

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

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

Particulars	UoM	Qty
Total waste generation over mine life	cum	42,00,000
Waste disposal planned in underground voids	cum	40,00,000
Total waste to be disposed externally	cum	2,00,000
Waste to be utilized in construction of tailing dam	cum	2,00,000
Surface area required for waste dump	ha	3
Additional area required for existing waste dump	ha	2
Total area of waste dump	ha	5

- Garland drain around the waste dump along with a pond for collection of rain water
- Plantation will be done on inactive waste dump

Presently, there is one waste dump of 3.0ha in lease area. In the proposed expansion, it is proposed to expand the existing waste dump area by additional 2.0 ha totaling to 5.0 ha.

11.9 ENVIRONMENT BASELINE

As part of expansion plant, Environmental, Ecological and social baseline study was conducted during the period March to May 2017 representing the pre-monsoon/summer season. Brief findings of the same is given below

11.9.1 Landuse

As per Satellite Imagery, the Crop Land is about 29.6%, Water Body is 2.1%, Built-up Land is 2.0 % and remaining land is either area available for cultivation or cultivable waste land. There are no wildlife sanctuary, national park and migratory routes of fauna within study area.

11.9.2 Soil Quality

For the eight soil sample under consideration the pH ranges between 6.98 to 7.84 indicating soils are neutral to moderately alkaline. The EC of eight soil samples is between 98.5 to 356 µs/cm and are below the limits to be called as saline and hence the soils are normal for crop growth. It has been observed that the soil is sandy loam in texture and neutral in nature. The nutrient and organic matter contents are medium and the soil is normally fertile.

11.9.3 Ambient Air Quality

Fourteen ambient air quality monitoring stations were selected in and around project site. The minimum and maximum values of PM10 and PM2.5 were observed in the range of 52 µg/m3 to 82 µg/m3 and 22 µg/m3 to 45 µg/m3 respectively. Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards.

11.9.4 Ambient Noise Level

The noise monitoring has been conducted for determination of noise levels at ten 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.

11.9.5 Water quality

The baseline water quality status in the region is established by analysing samples at 10 locations consisting of seven ground water samples and three surface water samples. The ground and surface water samples were analysed and surface water has been found to be suitable for drinking after the conventional treatment followed by disinfection. Total Dissolved Solids, Total Hardness, Total Alkalinity were found above the permissible limit in some of the ground water samples. Iron, Copper, Mercury, Lead, Zinc and Chromium concentration in all ground water samples was observed BDL.

11.9.6 Ecological Environment

Primary survey carried-out with respect to flora in the study area revealed about 74 species of plants, of which 30 species comprise of trees, 25 shrub species and 19 species of herbs including climbers and grass. About 69 species of birds, 10 species of mammals, 11 species of reptiles and 4 species of amphibians 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.

11.9.7 Social Environment

The study area (10-km radius) area has a total population of 95566 according to 2011 census. Total male population is about 50.59 % and total female population is around 49.40%. The average literacy rate 50.65 % in the region.

11.10 ANTICIPATED IMPACTS

Anticipated key environment, ecological and social issues associated with proposed capacity enhancement are listed below :

11.10.1 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.

11.10.2 Land Use

The impact on land use in buffer zone due to mining activities are limited to the acquired leasehold area would be insignificant. Presently 554.19 ha land has already been acquired for the present mine and proposed expansion would be within the premises only.

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

11.10.3 Solid Waste

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

Tailing from Beneficiation Plant

Tailings from existing beneficiation plants is pumped to the existing lined tailing dam and it is proposed to continue the same for the expansion project as the capacity of lined tailing dam is sufficient till the mine life. Height of the existing tailing dam shall be raised, phase wise up to 523 mRL. Dry disposal of tailing is being proposed as the part of this expansion project. Tailings generated are utilized in filling the underground mine voids. Paste fill plant is proposed in the expansion project.

Water contained in the tailing slurry is reclaimed from the tailing dam and same is being reused in process. 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.

11.10.4 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, three crushing system in mine have been planned at surface. Further, the crushers in beneficiation plant shall be provided with dust extraction/suppressions with outlets connected to stacks. Three nos of continuous ambient air quality monitoring stations (CAAQMS) are proposed 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.

11.10.5 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.

11.10.6 Water Quality

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

An additional 2,200 m^3/d of water is required for proposed expansion, in addition to approved 5,800 m^3/d water requirement for 1.08 MTPA mining & 1.2 MTPA Beneficiation capacity. Additional requirement will be met out from Udaipur Sewage Treatment Plant, Mansiwakal Dam &Matrikundia dam. Zero discharge is being maintained. Mine dewatering due to intersection will also be consumed in the process.

11.10.7 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 Indian Peafowl, Indian Grey Hornbill, White Eye buzzard and Black Shouldered Kite, along with Indian monitor lizard, Indian Python, Indian flap shell turtle and 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.

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

11.11 ENVIRONMENTAL MANAGEMENT PLAN

11.11.1 Air Pollution Management

Rajpura Dariba 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 at five locations considering the predominant wind direction and in consultation with RSPCB. Same will be continued for the expansion. Continuous Ambient Air Quality Monitoring Stations (CAAQMS) shall be installed at 3 locations in core zone for continuous monitoring of PM10, PM2.5, SO2, NOX and CO.

11.11.2 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.
- Compressors are installed in isolated building.
- Ventilation fans are provided with dampers.
- 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 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.

11.11.3 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 5800 KLD for existing operations. Additional requirement will be 2200 KLD making total water requirement after capacity enhancement to 8000 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. Water generated from in-house STP will be used for horticulture.

11.11.4 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.

11.11.5 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 RD mine and Dariba complex and to the tailing dam to some extent.

11.11.6 Solid Waste Management

In the proposed expansion of RD Mine, waste dump area shall be increased from existing 3 Ha to 5 Ha. Maximum waste generation will be 0.48 million TPA. The increased waste generated will be disposed off into the underground voids and height rising of tailing dam.

11.12 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. 96 crores have been allotted for cost towards pollution control measures.

11.13 RISK ASSESSMENT AND DISASTER MANAGEMENT STUDIES

The mining operations at Rajpura Dariba mines are fairly mechanized. In underground mining operations, hazardous situation may arise leading to accidents. In the Metalliferous 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; and
- Air blast.

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

11.14 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 in the form of tax, royalty, dividend etc. About 250 nos of persons would get direct employment in the operations and maintenance of the project.

In addition to the direct and indirect employment opportunity, HZL is already, 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 through the CSR initiatives, The project proponent kept 2.5% 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.

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CHAPTER 12

DISCLOSURE OF CONSULTANT ENGAGED

CHAPTER -12

DISCLOSURE OF CONSULTANT ENGAGED

Declaration by Experts contributing to the Project: **"Rajpura Dariba Mine-** ***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA*****"**

Site Address : (ML -166/2008 (Earlier ML -2/89) Village- Rajpura Dariba, Tehsil- Relmagra, District-Rajsamand, Rajasthan

Promoter : M/s Hindustan Zinc Limited

I, hereby, certify that I was part of the EIA team in the following capacity that developed the above project for grant of Environmental Clearance.

EIA coordinator : **Mining of minerals including Underground mining [1 (a) (i)]**

Name : **Mr. MukeshSuroliya**

Signature and Date :

Contact information:

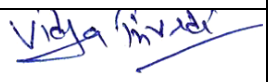
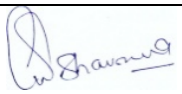
Address : Gaurang Environmental Solutions
#501 , Soni's Paris Point, Near Collectorate Circle
Bani Bark, Jaipur-302016.

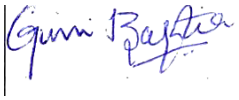
Mobile No. : 9782074776

E-mail : gaurangenviro@gmail.com

Functional area experts:

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	• Ms. Ginni Barotia • Mr. Yogendra Krishna Yadav -FAA	• Selecting parameters for monitoring. • Suggesting measures of reducing emission. • Identifying and assessing quantum of emissions. • Identification of probable impacts of the different air emissions from the project • Identification of suitable control device	
2	WP*	• Mr. Pradyumna Arvind Deshpande • Ms. Pooja Bunker-FAA	• Designing of water balance. • Identification of probable impacts of effluent/ waste water discharges in to the receiving environment/ water bodies.	
3	SHW*	• Ms. Ginni Barotia	• Suggesting Methodologies for segregation and collection of Solid waste as per Applicable Rules. • Suggesting measures for handling waste.	
4	SE*	• Mr. Kapil Sharma • Mr. Vinod Kumar Verma-FAA	• Conducting baseline socio-economic survey. • Conduct social needs assessment studies. • Preparing need-based CSR plan.	
5	EB*	• Mr. Abhishek Gautam • Mr. Yogendra Krishna	• Survey of flora – fauna. • To identify ecologically important	

		Yadav-FAA	areas around project location. • To identify threatened species in the project area. • To identify impact of project on flora – fauna. • To recommend mitigations / greenbelt development.	
6	HG*	• Mr. Vidya Bhushan Trivedi	• Analysis of surface hydrological data. • Computation of ground water recharge, flow rate and direction.	
7	GEO*	• Mr. Vidya Bhushan Trivedi	• Field Survey for assessing the regional and local geology of the area. • Geological Reserves Estimation. • Geological Sampling & Analysis.	
8	SC*	Mr. Pradyumna Arvind Deshpande	• Assessment of fertility/ productivity of soil, nutrient availability. • Controlling degradation of soil/soil conservation	
9	AQ*	• Mr. Mallikarjuna Murthy Guttula	• Analyzing micro meteorological data for use in modeling. • Collecting and using secondary data on meteorology like cloud cover, inversion related data, mixing heights etc., for modeling • Application of relevant air quality models in prediction of dispersion of pollutants.	
10	NV*	• Mr. Pawan Sut Sharma • Mr. Mallikarjuna Murthy Guttula(Noise)	• Probable impacts of noise and vibration on communities, buildings, structures etc. • Impacts of noise and vibration on fauna from projects in ecologically sensitive areas. • Control of noise emanating from project activities.	 

11	LU*	• Mr. Kapil Sharma • Mr. Vinod Kumar Verma-FAA	• Generation and analysis of data related to land use pattern. • Assessment of land use and land cover. •	
12	RH*	Ms. Ginni Barotia	• Assessment and mitigation of probable impacts. • Suggesting PPE for workers. • Measures for risk assessment. • Preparation of DMP.	

*One TM against each FAE may be shown

**Please attach additional sheet if required

Declaration by the Head of the accredited consultant organization/authorized person

I, **Vipul Khandelwal** hereby confirm that the above mentioned experts prepared the EIA/EMP report of **"Rajpura Dariba Mine-** ***Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA*****" promoted by M/s Hindustan Zinc Limited** for Environmental Clearance. I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.

Signature: 

Name : **Mr. Vipul Khandelwal**

Designation : **CEO/Proprietor**

Name of the EIA consultant organization : **Gaurang Environmental Solutions Pvt. Ltd.**

NABET Certificate No. & Issue Date : NABET/EIA/1720/IA0026: June 12, 2017

F. No. J-11011/380/2008- IA II (I)

Government of India

Ministry of Environment and Forests

(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003

E-mail : pb.rastogi@nic.in
Telefax : 011: 2436 7668

Dated 4th November, 2009

To,

M/s Hindustan Zinc Limited
Yashad Bhawan
Udaipur-313 001
Rajasthan

E-mail : csr.mehta@vedanta.co.in ; Fax. No: ??? ;

Subject : Zinc smelter (5,00,000 TPA), Lead smelter (1,25,000 TPA), Captive power plant (255 MW) and expansion of Rajpura Dariba Mine (6,31,000 to 9,00,000 TPA) alongwith Beneficiation Plant (9,00,000 to 12,00,000 TPA) at Village Dariba, Tehsil Relmagra, District Rajsamand, Rajasthan by M/s Hindustan Zinc Limited Environment clearance - reg.

Ref. : Your letter no. AVP/RD Complex/ENV/2009 dated 2nd June, 2009.

Sir,

This has reference to your letter no. AVP/RD Complex/ENV/2009 dated 2nd June, 2009 along with application, EIA/EMP, public hearing report and related project documents for environmental clearance of the above mentioned project.

2.0 The Ministry of Environment and Forests has examined your application. It is noted that the proposal is for the Zinc smelter (5,00,000 TPA), Lead smelter (1,25,000 TPA), Captive power plant (255 MW) and expansion of Rajpura Dariba Mine (6,31,000 to 9,00,000 TPA) alongwith Beneficiation Plant (9,00,000 to 12,00,000 TPA) at Village Dariba, Tehsil Relmagra, District Rajsamand, Rajasthan by M/s Hindustan Zinc Limited. Total land acquired for mines is 554.19 ha. and no additional land will be required. Proposed smelter complex will be built in 162 ha. located adjacent to the HZL mining facilities and is already owned by HZL. At present, only mining and beneficiation plant exist and no Zn and Pb smelter plants exist. About 106 ha of land will be acquired for railway line and railway siding. The site is located at the intersection of longitude 74°07' and latitude 24°57'. No forest land is involved. No rehabilitation & resettlement (R & R) is involved. No national park / wildlife sanctuary / reserve forest is located within 10 km radius. Total cost of the proposed project including mining and beneficiation plant is Rs. 3,852.00 Crores. Following will be the products and by-products from the proposed smelter complex:

S. N.	Products	Proposed Production Capacity (TPA)
Zn Smelter :		
	Zinc (SHG)	5,00,000 (2 x 2,50,000)
	Continuous Galvizing Grade (CGG) Zinc	80,000
Lead Smelter :		
	Lead	1,25,000 (1x1,25,000)
	Lead Alloy (Pb-Sb & Pb-Ca) (Out of 1,25,000 TPA Lead)	50,000
Captive Power Plant :		
	Power	255 MW (3x85 MW)
Mines & Beneficiation Enhancement :		
	Pb-Zn Ore Production	6,31,000 to 9,00,000
	Pb-Zn Ore Beneficiation	9,00,000 to 12,00,000
By-Products :		
1	Sulphuric acid	7,44,000
2	Lead-Silver compound	80,000
3	Zinc Oxide compound	20,000
4	Lead concentrate (Oxide)	5,000
5	Anode slime	4,000
6	Copper as copper cement/sulphate/matte/concentrate (equivalent metal)	1,900
7	Cadmium metal / Sponge (equivalent metal)	1,600
8	Antimony as Antimony compounds (equivalent metal)	850
9	Silver	400
10	Calomel	44
11	Bismuth as Bismuth compounds	16

3.0 Zinc will be produced from the Zinc concentrate received from RD mines through hydro-metallurgical smelting process comprising of roast-leach-electro winning operations. Lead will be produced by using SKS technology. SO_2 generated during Zn and Pb smelting process will be converted into H_2SO_4 by DCDA process. Slag from the furnace will be treated to recover lead in blast furnace and Lead bullion will be sent to refinery for further processing. Slag will be further processed in electric arc furnace (EAF) followed by slag fuming furnace to recover Zinc and lead in the fumes. Copper dross produced at the lead refinery shall be treated for converting the same to the saleable copper compounds. Slime from the refinery will be further processed to recover Silver, Antimony and Bismuth. Coal based captive power plant (255 MW) will be installed.

4.0 Underground mining will be carried out in existing mine using Vertical Retreat Mining (VRM) and Blast Hot Stoping (BHS) with back filling. Blast vibration will be assessed and ground subsidence and mine stability will be monitored. The ore will be treated in the beneficiation plant for concentration and separation of Lead and Zinc minerals. Life of the mine will be 18 years. Mining Lease of Rajpura Dariba Lead Zinc deposit (ML-2/89) is in 1142.2 ha in Rajsamand, Rajasthan. and Govt. of Rajasthan has granted mining lease of Rajpura Dariba Lead Zinc deposit to HZL vide letter no. F-3(2)/Khanij/68 dated 30th May, 1970 for a period of 20

years with first renewal vide order no. P/2/36/khan/Gr-2/90 dated 17th September, 1992. Validity of mining lease is upto 29th May, 2010 only.

5.0 Electrostatic precipitators (ESPs), bag filters, fume extraction and dust suppression systems to be installed to control particulate matters from various plants. SO_2 emissions from sulphuric acid plant will be restricted to 1.5 kg/ton of acid. Off gas from the sulphuric acid plant, blast and fuming furnace plant, copper recovery plant will be treated in the ETP followed by two-stage RO Plant. Zinc sulphate solution from the scrubbing process will be treated in the leaching section of the Zinc smelter. Acid mist emission from the stack will be within 50 mg/Nm^3. NOx emissions will be restricted to 750 mg/Nm^3 by using low NOx burners. In the mine area, water spraying will be used for reducing the dust. Total water requirement from all the 3 sources viz. existing water supply from Matrikundia dam, Gosunda dam and Mansiwakal dam will be 42,050 m^3/day and agreements have been signed between the Govt. of Rajasthan for the supply of water. All the effluents from different plants will be treated in effluent treatment plant (ETP) and recycled in the process and/or for de-dusting and green belt. 'Zero' discharge will be maintained. The mine seepage will be used/recycled in mining & beneficiation process. Decanted water from tailing dam will be recycled in the beneficiation plant to ensure 'zero' discharge. Tailings from beneficiation plant will be sent to tailing thickener for dewatering. ETP cake, spent catalyst, cooler cake and lead silver will be disposed in the captive secured landfill (SLF). Jarosite will be treated to produce Jarofix and disposed in dedicated disposal yard. Anode mud, cobalt cake and purification cake will be recycled back in the process and, if surplus, will be sold to authorized recyclers or disposed in SLF after treatment. Lead smelter slag after fuming will be stored in designated area. The fly ash will be sold to cement manufacturers. Bottom ash and mine waste will be suitably disposed. Overburden will be dumped at a designated place. Tailings from the beneficiation plant will be disposed off in tailing dam. Out of 554.19 ha, green belt will be developed in 33 %.

6.0 The public hearing / public consultation meeting was held on 12th February, 2009.

7.0. The Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 27th January, 1994 as amended subsequently subject to strict compliance of the following specific and general conditions.

A. SPECIFIC CONDITIONS:

i) No construction work related to expansion at the proposed project site shall be started without obtaining prior clearances / approvals for the linked mining component from the Indian Bureau of Mines (IBM) and State Govt. of Rajasthan. A copy of the mining lease approval from the Indian Bureau of Mines (IBM) and State Govt. of Rajasthan shall be submitted to the Ministry and its Regional Office at Lucknow before initiating any construction work at site related to mining.

ii) The project proponent shall obtain 'Consent to Establish' and 'Consent to Operate' from the Rajasthan State Pollution Control Board (RSPCB) and effectively implement all the conditions stipulated therein.

iii) The environmental clearance is subject to approval of the State Landuse Department, Government of Rajasthan for diversion of agricultural land for non-agricultural use.

iv) The project proponent shall develop fodder plots in the non-mineralized area in lieu of use of grazing land. Monitoring of land use pattern shall be carried out once in three years by digital processing of the area using multi-data computer compatible tape.

v) The gaseous emissions from various process units shall conform to the standards prescribed by the concerned authorities from time to time. The State Board may specify more stringent standards for the relevant parameters keeping in view the nature of the industry and its size and location. At no time the emissions level shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit should not be restarted until the control measures are rectified to achieve the desired efficiency.

vi) High efficiency electrostatic precipitators (ESPs) of not less than 99.87 % efficiency shall be provided to captive power plant to limit particulate matter within 50 mg/Nm^3. The height of the stacks shall be as per the standards prescribed under the Environment (Protection) Act, 1986. Low NOx burners shall be provided to control NOx emissions. NOx emissions shall be restricted to 750 mg/Nm^3 by using low NOx burners. On-line stack emission monitoring equipments for continuous monitoring of SO_2, NO_X, SPM and O_2 shall be provided to the stacks of captive power plant and sulphuric acid plant and all the pollution control measures shall be inter-locked. The company shall install fume extractors and bag filters to control the emissions from all melting and casting units. Off gas from the sulphuric acid plant, blast and fuming furnace plant, copper recovery plant shall be treated in the calcine based scrubbing plant where the SO_2 shall be removed before letting out to the atmosphere. Adequate stack height shall be provided for proper dispersion of pollutants like SO_2, NO_x etc.

vii) As reflected in the EIA/EMP, Double Conversion Double Adsorption (DCDA) plant for sulphuric acid recovery from SO_2 shall be provided. The company shall ensure that SO_2 emissions from the Zn and lead smelter plant are taken to existing sulphuric acid plant properly and converted to sulphuric acid. The stack from the Sulphuric acid plant shall be provided with on-line stack emission monitoring equipment for continuous monitoring of SO_2.

viii) SO_2 emissions shall be controlled less than 1.5 kg/ton of Sulphuric acid (H_2SO_4) produced. Acid mist emissions from the stack shall conform to the statutory limit of 50 mg/Nm^3 by providing candle filter system and reports submitted to the Ministry including its Regional Office at Lucknow, CPCB and RSPCB.

ix) The critical parameters such as SPM, RSPM, NO_X, SO_2 and acid mist in the ambient air within the impact zone, peak particle velocity at 300 m 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. Analysis reports for the ambient, stack and fugitive emission shall be submitted to the Ministry's Regional Office at Lucknow, CPCB and RSPCB.

x) Ash content in the coal shall not exceed 12 %. Sulphur content in coal shall be restricted to 2% to contain SO_2 emissions.

xi) The company shall install continuous air quality monitoring stations. Data monitored shall be submitted to the Ministry and CPCB/SPCB once in six months.

xii) Fugitive dust emissions in the Zinc, Lead and Copper concentrate handling area and at various transfer points shall be minimized by provision of dust suppression system. The trucks carrying concentrate shall be fully covered. The Company shall improve overall house keeping by asphalting the internal roads and to reduce the generation of fugitive dust from vehicle movements.

xiii) Fugitive emissions, acid mist vapours, fumes and SO_2 shall be controlled and work environment monitored for prevailing contaminants regularly. Bag filters shall be provided to calcine handling plant, zinc dust plant, melting plant, dross milling plant, each coal transfer point, crushers and fly ash silos to control dust emissions. Bag filters shall be provided in fume extraction and melting and casting operations of smelter. SPM emissions from crusher house in beneficiation plant shall be controlled. Covered coal conveyors with water sprinkling system using wastewater to avoid dust emissions. Coal storage area shall be provided with water sprinkling stem to arrest dust. Dust extraction system shall be provided to mineral handling area, loading and unloading areas including all the transfer points. Black top paves roads shall be made within the mine boundary. The trucks carrying concentrate shall be fully covered. Asphalting/concreting of roads and water spray all around the critical areas prone to air pollution and having high levels of SPM and RPM shall be ensured.

xiv) The project proponent shall carry out conditioning of the ore with water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas. Water sprinkling shall be done to minimize the dust during transportation.

xv) Secondary fugitive emissions (particularly below 5 micron) from all the sources including Roaster plant shall be controlled, regularly monitored alongwith ambient dust in dry day and still air condition on 24 hour basis and data submitted to the Regional Office of the Ministry at Lucknow, RSPCB and CPCB. It shall be ensured that the ambient air quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.

xvi) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral. The vehicles carrying the mineral shall be covered with a tarpaulin and shall not be overloaded.

xvii) Total water requirement for the proposed smelter complex including the mining and beneficiation plants from Matrikundia dam, Gosunda dam and Mansiwakal dam shall not exceed 42,050 m^3/day as per the agreements signed with Govt. of Rajasthan. As proposed, water requirement shall not exceed 184 litre/ton of Sulphuric acid produced. No ground water shall be used. Closed circuit cooling system with cooling towers shall be provided to captive power plant. All the effluent generated from gas cleaning plant, sulphuric acid plant, anode and cathode washing, lead smelter, DM

plant, cooling towers and power plant shall be neutralized and metallic elements present shall be precipitated and removed. Effluents from the proposed smelters, acid plant and other associated services shall be treated in effluent treatment plant (ETP). Zinc sulphate solution from the scrubbing process shall be treated in the leaching section of the Zinc smelter. Cooling tower blow down and boiler blow down from CPP shall be neutralized and reused in dust suppression, green belt development etc. The treated effluent shall conform to the prescribed standards and recycled in the process i.e. in gas cleaning plant, preparation of lime milk, dust suppression and green belt development. The effluents from sulphuric acid plant, scrubber, general floor washings of electro-refinery plant shall also be sent to ETP for further treatment followed by two-stage Reverse Osmosis (RO) Plant. Sewage shall be treated in septic tank followed by soak pit. The rejects from the RO plant shall be evaporated in a solar evaporation pond to be constructed within smelter premises. 'Zero' discharge shall be maintained and no effluent shall be discharged outside the premises. Sewage generated shall be treated in septic tank followed by soak pit.

xviii) The mine seepage water shall be collected in underground sumps and reused/recycled in mining and beneficiation process to minimize the fresh water consumption. Decanted water from the tailings dam shall be recycled in the beneficiation plant to ensure 'zero' discharge. Tailings from beneficiation plant after recovery of Lead and Zinc concentrates shall be sent to tailing thickener for dewatering. Water recovered from tailing thickener shall be recycled to beneficiation plant for use in the process. Tailing thickener underflow shall be partly used as backfill for mines and remaining part shall be disposed to tailing dam. Water in the tailing dam shall be allowed to settle out and pumped to the water reservoir for reuse in the process.

xix) Acid mine water, if any, has to be treated and use in plantation and existing mining activity after conforming to the standard prescribed by the competent authority.

xx) Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the mine workshop for the wastewater generated.

xxi) The effluent from the ore beneficiation plant shall be treated to conform to the prescribed standards and the tailings slurry shall be transported through a closed pipeline to the tailing dam. The decanted water from the tailing dam shall be re-circulated and there shall be 'zero' discharge from the tailing dam. Acid mine water, if any, shall be neutralized and reused within the plant.

xxii) Detailed hydrological study shall be carried out and implementation of recommendations of the detailed hydrological study shall be ensured.

xxiii) The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations.

xxiv) The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.

xxv) Regular monitoring of ground water level and quality shall be carried out in and around the project area(mine lease, beneficiation plant and tailing dam) by establishing a network of existing wells and installing new piezometers during the operation. The periodic monitoring [(at least four times in a year- pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office Lucknow, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.

xxvi) Groundwater and surface water in and around the mine shall be regularly monitored at strategic locations for heavy metals such as Ni, Co, Cu, Pb, Zn and Cd. Data shld be reviewed and analyzed time to time to detect changes in the quality of ground water and surface water, if any. The monitoring stations shall be established in consultation with the Regional Director, Central Ground Water Board and the Rajasthan Pollution Control Board.

xxvii) The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water required for the project.

xxviii) Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, Central Ground Water Board.

xxix) Catch drains and siltation ponds of appropriate size shall be constructed around the mineral and over burden dumps to prevent run off of water and flow of sediments directly into the Banas River and other water bodies. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after the monsoon and maintained properly.

xxx) Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mineral and over burden dumps to prevent run off of water and flow of sediments directly into the Banas River and other water bodies and sump capacity shall be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity shall 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.

xxxi) Underground mining shall be carried out using Vertical Retreat Mining (VRM) and Blast Hot Stoping (BHS) with back filling. Concentration and separation of Lead and Zinc minerals shall be carried out in the beneficiation plant.

xxxii) Controlled blasting practice shall be adopted. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders shall be implemented.

xxxiii) Wet drilling blasting method and provision for the control air emissions during blasting using dust collectors etc. shall be used.

xxxiv) Blast vibration shall be assessed from proposed operation. Ground subsidence and mine stability shall also be monitored on regular basis.

xxxv) Regular monitoring of subsidence movement on the surface over working area and impact on water bodies/vegetation/ structures/ surrounding shall be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil/suitable material.

xxxvi) All the mine entries shall be above the highest flood level to avoid any anticipated flooding of mine from the surface water during the rainy season.

xxxvii) In areas where subsidence is anticipated in shallow mineral occurrence, such areas be identified and provided with garland drains to ensure draining of water and avoid ingress of the same in to the underground mine.

xxxviii) The project authorities shall check the possibility of existence of fault(s) before deciding about the thickness of safe barrier required to be maintained between the working face and the water bodies, if any, in consultation with the Director General Mines & Safety (DGMS). De-pillaring shall also be carried out after taking prior approval of the DGMS.

xxxix) All the fly ash shall be utilized as per Fly Ash Notification, 1999 subsequently amended in 2003. Fly ash shall be provided to cement / brick manufacturing units for further use in making Pozollona Portland Cement (PPC).

xl) Mine waste shall be dumped in mine voids. Overburden due to mine expansion shall be dumped at a designated place. Waste rocks generated due to mining activity shall be utilized in construction and enhancement of tailing dam. In beneficiation plant, existing tailing dam shall be used for disposal of tailings.

xli) The solid waste generated in the form Jarosite shall be stabilized as Jarofix and disposed off in Jarofix disposal yard inside the plant premises. Cobalt cake, cooler cake, anode mud, enrichment cake, ETP sludge and spent catalyst etc. shall be disposed off in secured landfill (SLF). Waste/used oil shall be sold to registered recyclers.

xlii) ETP Sludge in the form of cake shall be disposed to the captive SLF. Jarosite shall be treated by mixing lime and cement to produce Jarofix, a stable product. After stabilization, Jarofix shall be disposed in dedicated disposal yard. Cooler cake and part of lead silver residue shall be neutralized and stabilized before disposal in SLF. Anode mud, cobalt cake and purification cake shall be recycled back in the process and, if surplus, shall be sold to authorized recyclers or disposed in SLF after neutralization. Spent catalyst shall be disposed in SLF after neutralization. Lead smelter slag after fuming shall be stored in designated area and alternatives shall be explored for usage in road construction and cement manufacturing.

xliii) Column Leachate Studies of the stock piles of Run-of the-mine (ROM) ore, crushed ore, tailings, Zarofix shall be carried out to ascertain the pollution potential as per details given below :

- Temperature fluctuation and sunlight exposure under confined and unconfined conditions.
- Buried conditions
- Air circulation.
- Dry – wet conditions in both confined and unconfined situations.
- Temperature episodes and leachate release conditions.
- Leachate environmental residence study.

The leachate shall be measured for heavy metals for cations viz. As, St, Ni, Cu, Sb, Cr, Hg, Fe, Al, Pb, Zn, Au and Ag and anions viz. Sulfate, Chloride, Fluorine, Carbonate, Bicarbonate, Phosphate. The primary and secondary organics (Poly Aromatic Hydrocarbons) shall also be monitored in Zarofix and fresh tailings. Reports prepared shall be submitted to the Ministry within 6 months of operation of the plant.

xliv) The tailing dam shall be provided with HDPE lining. Tailing dam stability, risk assessment and disaster risk mitigation & planning studies shall be conducted in the likely affected zone.

xlv) A complete hazards and risk assessment, and mitigation studies of the areas where hazardous substances are stored shall be carried out by approved agencies having qualified personnel. All plants identifiable hazardous areas like Sulfuric acid plants shall be color coded in "Red" and shall be made safe from any eventual spill or leakage. Regular inspection of the site shall be carried out.

xlvi) In the mine sites, proper delineation of the confined and unconfined aquifers, permanent surface water bodies (having more than 1 ft standing water for at least 240 days in a year) within the lease hold area and within 3 kms radius of any potential mine site have to be shown in a map. Action plan shall be prepared for the protection of aquifers in the mine area during process of mining and submitted to the Ministry and its Regional Office at Lucknow.

xlvii) The top soil, if any, shall temporarily be stored at earmarked site(s) only and it shall not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation.

xlviii) The over burden generated during the mining operation shall be stacked at earmarked dump site(s) only and it shall not be kept active for a long period of time and its phase-wise stabilization shall be carried out. There shall be one external over burden dump. Proper terracing of the OB dump shall be carried out so that the overall slope of the dump shall be maintained to 28°. The over burden dump shall be scientifically vegetated with suitable native species to prevent erosion and surface run off. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional Office located at Lucknow on six monthly basis.

xlix) Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers shall be drawn and followed accordingly.

l) As proposed, plantation shall be raised in an area of 33 % ha. including a 7.5 m wide green belt in the safety zone around the mining lease, over burden dump, around beneficiation plant, around tailing dam, roads etc. as per Central Pollution Control Board guidelines by planting the native species around the periphery of plant and township, canopy based green belt shall be developed in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 1,500 plants per ha.

li) Action plan for the mining, management of over burden (removal, storage, disposal etc.), reclamation of the mined out area etc. shall be submitted to the Ministry and its Regional Office at Lucknow. A final mine closure plan alongwith details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

lii) Conservation Plan for Schedule-I animals as per Wildlife Protection Act, 1972, if found in the study area shall be prepared and implemented on priority before commission the project for the conservation of wild fauna in consultation with the State Forest & Wildlife Department.

liii) Regular medical examination and health monitoring of all the employees for Lead (Pb) and Cadmium (Cd) shall be carried out and if cases of presence of Lead (Pb) and Cadmium (Cd) are detected, necessary compensation shall be arranged under the existing laws. A competent occupational health physician shall be appointed to carry out medical surveillance. Occupational health of all the workers shall be monitored for relevant parameters and records maintained for at least 40 years from the beginning of the employment or 15 years after the retirement or cessation of employment whichever is later.

liv) All the recommendations made in Charter for Corporate Responsibility for Environment Protection (CREP) for Zinc smelters shall be implemented.

lv) Overall proper house keeping shall be ensured in all the plant areas viz. Zinc and Lead smelter, Beneficiation plant, Captive power plant and other processing plant areas. The Company shall improve overall house keeping by asphalting the internal roads and to reduce the generation of fugitive dust from vehicle movements.

lvi) Adequate funds shall be earmarked towards capital cost and recurring expenditure per annum and a break up shall be submitted to the Ministry covering all aspects of the environment pollution control measures including extensive tree plantation on the mine and plant sites with an objective to achieve 33 % green cover within 3 years of project completion and recurring expenditure/annum for adequate pollution control measures with on-line motoring systems, ETPs, SWTPs, sound and vibration control, social forestry, rain water harvesting, occupational health, employment of environmental cadre personnel for continuous improvement etc.

lvii) Rehabilitation and Resettlement Plan for the project affected population including tribals, if applicable, as per the policy of the State Govt. in consultation with the State Govt. of Rajsthan shall be implemented. Compensation paid in any case shall not be less than the norms prescribed under the National Resettlement and Rehabilitation Policy, 2007.

lviii) All the safety norms stipulated by the Director General, Mine & Safety (DGMS) shall be implemented.

lix) All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Smelters, thermal power plants and mining shall be implemented.

lx) The company shall comply with the commitments made during public hearing / consultation meeting held.

lxi) No change in mining technology and scope of working shall be carried out without prior approval of the Ministry.

lxii) The company shall provide housing for construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

B. GENERAL CONDITIONS:

i. The project authorities must strictly adhere to the stipulations made by the Rajasthan State Pollution Control Board (RSPCB) and the State Government.

ii. No expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests.

iii. Adequate number of ambient air quality-monitoring stations shall be established in the downward direction as well as where maximum ground level concentration of SPM, SO_2 and NOx are anticipated in consultation with the Rajasthan State Pollution Control Board. Data on ambient air quality and stack emission shall be regularly submitted to this Ministry including its Regional Office at Lucknow and the State Pollution Control Board/Central Pollution Control Board once in six months.

iv. Industrial wastewater shall 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 form time to time. The treated wastewater should be recycled in the plant as well as utilization for plantation purposes.

v. The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collection, storage, treatment and disposal of hazardous wastes.

vi. The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).

vii. Occupational Health Surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

viii. The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA / EMP /risk analysis and DMP report.

ix. As proposed, Rs. 230.00 Crores and Rs. 1.20 Crores shall be earmarked towards total capital cost and recurring cost/annum for environmental pollution control measures to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided should not be diverted for any other purposes.

x. A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad / Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.

xi. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF at Lucknow, the respective Zonal Office of CPCB and the RSPCB. The criteria pollutant levels namely; SPM, RSPM, SO_2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

xii. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the RSPCB. The Regional Office of this Ministry at Lucknow / CPCB / RSPCB shall monitor the stipulated conditions.

xiii. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company alongwith the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.

xiv. The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the RSPCB and may also be seen at Website of the Ministry of Environment and Forests at http:/envfor.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.

xv. Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

9.0 The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.

10.0 Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.

11.0 The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Wastes (Management and Handling) Rules, 2003 and the Public (Insurance) Liability Act, 1991 along with their amendments and rules

(Dr. P. B. Rastogi)
Director

Copy to :-

1. Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 110032.
2. Chairman, Rajasthan State Pollution Control Board, 4, Institutional area, Jhalana, Doongri, Jaipur, Rajasthan.
3. Chief Conservator of Forests (Central), Ministry of Environment and Forests, Central Region, Kendriya Sadan, Sector H, Aliganj, Lucknow – 226 024, U.P.
4. Secretary, Department of Environment and Forests, Government of Rajasthan, Jaipur, Rajasthan.
5. Joint Secretary (CCI-I), Ministry of Environment and Forests, Paryavaran Bhawan, CGO Complex, New Delhi.
6. Monitoring Cell, Ministry of Environment and Forests, Paryavaran Bhawan, CGO Complex, New Delhi.
7. Guard File.
8. Monitoring File.
9. Record File.

4/11/09

(Dr. P. B. Rastogi)
Director

Speed Post/Online

No. J-11015/380/2008-IA.II (M)
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division
****

Indira Paryavaran Bhavan,
Aliganj, Jor Bag Road,
New Delhi-110 003

Dated: 26th July, 2018

To,

M/s Hindustan Zinc Limited
Sindesar Khurd Mine
P.O. Dariba, Tehsil-Relmagra
District- Rajsamand
Rajasthan - 313 211
Tel. No. 0294 6604000 – 02; Fax No. 0294 2427734
Email: rajeev.bora@vedanta.co.in

Sub.: Expansion of Lead-Zinc Ore Production from 0.9 Million TPA to 1.08 Million TPA at Rajpura - Dariba Mine by M/s Hindustan Zinc Limited in mine lease area of 1142.2106 Ha, located at Village Panchayat-Mahenduria, Tehsil - Relmagra, District - Rajsamand, Rajasthan under clause 7(ii) of the EIA Notification, 2006-Environmental Clearance regarding.

Reference: File No. J-11015/380/2008-IA.II (M) dated 4th November, 2009.

Sir,

This has reference to above mentioned proposal of M/s Hindustan Zinc Limited for expansion of Lead-Zinc Ore Production Rajpura Dariba underground mine with enhancement of production capacity from 0.9 Million TPA to 1.08 million TPA (ROM) of Lead–Zinc ore i.e. 20% of the existing capacity. The mine lease is located near village Panchayat- Mahenduria, Tehsil – Relmagra, Dist - Rajsamand, Rajasthan. The latitudes and longitudes of the mine lease are 24°55'40.8"N to 24°57'49.0"N and 74°06"57.7"E to 74°08'41.4"E respectively. The lease area falls on Survey of India topo sheet no. 45 L/1 and 45 K/4. The PP also presented the KML file during the presentation to indicate the location of mine lease on Google Earth/ DSS.

2. The Project Proponent had obtained earlier EC vide letter no J-11011/380/2008-IA.II(I) dated 4th November, 2009 for Zinc smelter(5,00,000TPA), Lead Smelter (1,25,00TPA), Captive power plant (255MW) and expansion of Rajpura Dariba Mine (6,31,000TPA) along with Beneficiation Plant (9,00,000 to 12,00,000 TPA) at village – Dariba, Tehsil-Relmagra, District- Rajsamand, Rajasthan.

3. The Project Proponent had submitted EIA/EMP report online to the Ministry seeking expansion in production capacity under clause 7 (ii) of EIA notification, 2006. The Proposal was considered by the Expert Appraisal Committee for expansion of earlier EC capacity of 0.9 Million TPA of Lead–Zinc ore production granted vide letter no. J-11011/380/2008-IA-II(I) dated 4.11.2009 to 1.08 Million TPA in the instant meeting. The Committee observed that the clause 7 (ii) of EIA Notification, 2006 states as below:-

"7(ii).Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product -mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance".

4. The project was considered in Expert Appraisal Committee (EAC) meeting held during October 23, 2007 wherein the Committee recommended the proposal for grant of Environmental Clearance for enhancement of production from 0.9 Million TPA to 1.08 Million TPA (ROM) of Lead –Zinc Ore with exemption from public hearing under clause 7(ii) of EIA notification,2006 subject to submission of undertaking to the effect that it shall inform the Ministry once demand is raised by State Government and adhere to the orders of the State Government, directions of the Hon'ble Supreme Court or any other court of law/ Tribunal. The PP was also advised to submit authenticated past production details and a statement of Consent & EC obtained since start of mining operations. Accordingly, the Ministry vide letter of even no. dated 09.11.2017 requested the project proponent to submit the requisite information.

5. It is mentioned that as per the Hon'ble Supreme Court, judgment dated 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India & Ors., has passed a detailed order interpreting Section 21(5) of the MMDR Act and directing payment of 100% penalty for illegal mining operations with reference to the relevant statutes, which inter-alia, include the Environment (Protection) Act 1986, the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Forest (Conservation Act, 1980 and the Mines and Minerals (Development & Regulation) Act, 1957. Based on the production details provided by the PP, it is observed that they had enhanced the production from 2002-2003 to 2007-2008 as per the above mentioned judgement. As per the Apex Court Order dated 2nd August 2017, the base year to decide the annual production capacity is 1993-94, it would be treated as expansion and it require prior EC at the time of expansion.

5. Further, the Ministry has issued the Office Memorandum no. 3-50/2017-IA.III(Pt) dated 30th May, 2018 for consideration of mining proposals involving violation of the EIA Notification, 2006 under the provision of S.O.804 (E) dated 14.03.2017 and additionally comply with the directions given by the Hon'ble Supreme Court, Judgment dated 2nd August, 2017 and it has been decided that the Project Proponent shall give an undertaking by way of affidavit to comply with all the statutory requirements by way of affidavit to comply with all the statutory requirements and judgment of Hon'ble Supreme Court dated 2nd August, 2017. The matter has been examined in the Ministry and it has been decided that since PP has not enhanced the production capacity after grant of EC in 2009 but PP has enhanced the production capacity before grant of EC and attracting the compliance of the Hon'ble Supreme Court Order dated 2nd August 2017. Accordingly, the PP, vide letter no. UH(RDM)/ENV/2018, dated 12.06.2018 has submitted the affidavit dated 12.06.2018 in compliance of Ministry's OM dated 30.05.2018 which *inter-alia* mentioned that all the statutory requirement shall be comply w.r.t. judgment of Hon'ble

Supreme Court dated 2nd August, 2017 in WP(C) No. 114 of 2014 in the matter of Common Cause Vs Union of India & Ors.

6. The PP explained that this expansion under 7(ii) has been considered in many cases in the EAC (Industry). It also cited reference to the OM with regard to 25% expansion for Coal Mining Projects, past projects of M/s Uranium Corporation India Limited and M/s NALCO which were given approval for expansion without EIA/EMP studies and Public hearing. Further, the PP stated that the EAC (Non-Coal) in October, 2016 had considered and recommended similar expansion proposal for its Sindesar-Khurd Lead-Zinc mines for 20% increase in lead-zinc ore production from 3.75 Million TPA to 4.5 Million TPA. The Ministry issued EC to the expansion proposal vide letter no. J-11015/10/2014-IA-II(M) dated 21.12.2016

7. The PP submitted that to achieve enhanced production of 1.08 Million TPA it has carried out changes in the mining operations with respect to infrastructure/ technology improvement or modernization and explained the impact of these changes to the Committee (comprising of mining experts) which will eventually help it in achieving enhanced production:

S.No.	Description	Benefits
1.	Introduction of road grader	Road graders are being introduced to improve road conditions
2.	Mechanization in diesel & explosive transportation	Mechanization is being planned in transportation of diesel dispensing & explosive transportation thereby improving safety, productivity and ergonomics.
3.	Leaky feeder communication system	Communication system is being introduced for communication for any breakdown, emergency or unplanned activities in the mine
4.	Top hammer drills	Top hammer drills are being introduced in underground so as to improve production drilling in lower levels of the mine and thereby reducing the dependency over compressed air. Improved productivities and ergonomics shall also count towards improved safety.
5.	Long feed jumbos	In order to improve development rates, it is proposed to introduce long 16 feed jumbo thereby improving advance per blast.
6.	Bulk emulsion charging system	In order to improve development rates and mechanizing charging, bulk emulsion charging system shall be introduced. Charmec shall also be introduced for the same.
7.	Mud pump	In order to strengthen mud handling system from existing manual to mechanized.
8.	Underground workshop	A world class underground workshop is to be introduced to improve the maintenance facility.
9.	Rock breaker & grizzly	In line with trackless mining, a rock breaker & grizzly are being proposed to be installed so as improve crusher performance.
10.	High speed exploration rigs	In order to enhance exploration capacity, it is proposed to introduce high capacity exploratory drill rig of smaller dimension.
11.	Raise boring	Raises are being developed with raise bores to fasted the raising and thereby improving the ventilation.
12.	Advanced Mine Planning techniques	Technical cell is being strengthened to design in advanced sophisticated software helping in scientific mining of minerals.
13.	Shotcrete	Shotcreting facility is under development so as to

S.No.	Description	Benefits
		improve development rates in poor ground conditions.
14.	Light motor vehicles for underground	For effective supervision, LMVs (Light Motor Vehicles) are proposed to be introduced.

8. The PP reported that the project is a fully mechanised underground Lead-Zinc mine and mined out with Blast hole Stopping method with back filling. The mine workings are approached by two shafts viz. Main shaft (surface to -110MRL) & Auxiliary shaft (Surface to 0MRL) and by a surface decline (surface to 200MRL). At present the Main shaft connects all the working levels from surface to -92MRL. The Main Shaft bottom is at -110MRL. The auxiliary shaft connects all the working levels from surface to 0MRL. Underground levels are also connected by ramps. In future, the deeper levels are proposed to be accessed by ramps. The Main Shaft is utilized for men & material hoisting by cage winding and for ore hoisting by skip winding. Auxiliary Shaft is utilized for men & material hoisting via cage only. A separate access (Surface Decline) is also developed for transportation of man, material, machinery, ore & waste. The cross section of surface decline is 4.7m (w) × 3.7m (h) suitable for hauling 30 ton capacity LPDTT. The additional water requirement of 7 KLD for the project is for drinking purpose only which would be sourced from Matrikundiya dam. The plant is reportedly running on 100% recycling basis for the last two years

9. PP submitted that in view of the above technological improvements, supplemented with construction of decline for movement of mining machinery, ore & waste and personnel, it is feasible to extract 1.08 Million TPA of lead-zinc ore without significant impact on baseline environmental scenario. The EIA studies for the instant proposal have also reportedly been carried out and data was collected for March - May, 2017 period wherein the impacts and mitigation measures with respect to the existing expansion proposal have been enumerated. All the parameters for water and soil quality were within permissible limits. The ambient air quality was also within permissible limits as this was underground mine and there were no significant emission sources near the site. The Committee deliberated the baseline data collected by the Project Proponent. The Committee noted that the PP is already carrying out its activity in the said mine lease area of 1142.2106 Ha and bound to implement the EMP as per the terms and conditions of EC granted by the Ministry and Consent conditions prescribed by the State Pollution Control Board. The mine lease core and buffer zone reportedly does not have any protected areas such as National Parks or Wildlife Sanctuaries, Reserve and/ or Protected forest. The additional waste generation due to development activities is envisaged to be 4,80,000 TPA from existing 35,000 TPA. The Committee noted that there would be significant increase in waste generation; however, the PP informed that the waste is proposed to be disposed off in underground voids through filling method. PP also informed that while filling back the waste into the voids, it has successfully achieved high consistency leading to low moisture content and ultimately less water consumption for waste management.

10. The Regional Office of the Ministry located at the Lucknow has submitted the certified compliance report vide dated 08.09.2017. The Committee deliberated on the compliance of earlier EC conditions. The Proponent explained the status of various conditions. The Committee noted the submissions made PP status and observed that PP has complied with the EC conditions. PP submitted that it possesses/ has applied for required permissions and clearances as mentioned below:

a) **M.L. validity** - The mine lease is valid till 29th May 2030.
b) **Approved mining plan** - The Scheme of Mining with progressive mine closure plan has been approved for 1.2 Million TPA of ore production vide letter no. 682(23) (773)/ 2011-kha nikha san. (Uttar)Udai dated 22.07.2015 under rule 12(3) and rule 23B of MCDR, 1988.

c) **Environmental Clearance**– The EC was granted by MoEF, New Delhi for 0.9 Million TPA of lead-zinc ore production from Rajpura Dariba underground mine & 1.2 Million TPA of ore beneficiation vide letter no. J-11011/380/2008-IA II(I) dated 4.11.2009.

d) **Consent to Operate –** The Consent to Operate was granted by Rajasthan State Pollution Control Board (RSPCB), Jaipur for carrying Mining & Beneficiation activities vide letter no. F (Mines)/ Rajsamand (Railmagra)/ 1(1)/2008- 2009/278-282 dated 23.04.2015 and the same is valid till 28.02.2018.

e) **Permission from CGWA –** The NOC from CGWA for mine dewatering (446.50 KLD) was been obtained vide letter no. 21-4(315)/WR/CGWA/2008-212 dated 14.07.2009 and renewed vide letter dated 06.06.2012. Application for renewal for the same was submitted vide letter dated 27.05.2015. The application for obtaining NOC from CGWA for additional ground water dewatering (2698.5 KLD) has been submitted on dated 27.01.2017.

11. PP reported that the beneficiation plant is within the mining lease, hence, there shall be no external traffic associated with ore transportation to the smelter. However, concentrate will be transported through road and then to Fatehnagar. The concentrate will be transported through covered trucks/dumpers. The topography of the area is marked by N-S trending linear ridge with highest elevation of 561 aMSL. This ridge is flanked on either side by gently undulating surface having an average elevation between 490-500aMSL. Main shaft is at 501 aMSL. The area within leasehold does not include any major streams or river across it, hence not prone to any kind of flood. The existing depth of working is 700m and the proposed additional working depth is 800m making total depth of working as 1500m. The Project Proponent reported that there is no Schedule –I species in the core and buffer zone of the M.L.area.

12. The PP mentioned that it has made provision for Personal Protective equipment's to mine workers with necessary training and awareness programs. The Occupational Health measures were also explained and the Committee noted that proponent has monitored lead in blood. The Project Proponent reported that the workers were provided Self Rescuer in addition to basic PPEs like gum boot, helmet with cap lamp, dust mask, goggles, ear plug etc. Refuge chamber is installed at strategic locations to work as assembly points underground to support workers in during emergency in underground mine. The cost of the project is ₹700 Crores including additional cost of ₹400 Crores for instant proposal. The cost for Environmental Protection measures is proposed as ₹40 Crores including additional cost of ₹26 Crores for instant proposal. PP submitted that no R&R Plan is applicable for the instant proposal. The additional manpower requirement for the project is about 150. Project Proponent reported that there is no court case pending against the project.

13. The proposal was appraised before the EAC in its meeting held during October 24-25, 2016 wherein the Committee **recommended** the proposal for Expansion of Lead-Zinc Ore Production from 0.9 Million TPA to 1.08 Million TPA at Rajpura – Dariba Mine by M/s Hindustan Zinc Limited in mine lease area of 1142.2106 Ha, located at Village Panchayat – Mahenduria, Tehsil – Relmagra, District – Rajsamand, Rajasthan under clause 7(ii) of the EIA Notification, 2006.

14. The Ministry of Environment, Forest and Climate Change has examined the proposal in accordance with the provision of clause 7 (ii) of Environmental Impact Assessment Notification, 2006 and hereby amended the Environmental Clearance no. dated 4th November 2009 of M/s Hindustan Zinc Limited w.r.t. "Expansion of Lead-Zinc Ore Production from 0.9 Million TPA to 1.08 Million TPA at Rajpura – Dariba Mine in mine lease area of 1142.2106 Ha, located at Village Panchayat – Mahenduria, Tehsil – Relmagra, District – Rajsamand, Rajasthan under clause 7(ii) of the EIA Notification, 2006". **PP shall also comply the following conditions.**

(i) **This Environmental Clearance will not be operational till such time the Project proponent complies with all the statutory requirements and Judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors, if any, applicable to this project.**

(ii) **The Department of Mines and Geology, Government of Rajasthan shall ensure that mining operation shall not commence till the entire compensation levied, if any, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment of Hon'ble Supreme Court dated the 2nd August 2017 in writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.**

15. All other Specific and General conditions mentioned in this Ministry's EC letter no.J-11015/380/2008-IA. II (M) dated 04.11.2009 shall remain the same.

16. This issues with the approval of the Competent Authority.

Yours faithfully,

(Dr. R. B. Lal)
Scientist "E"

Copy to:

1). **The Secretary**, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.
2). **The Secretary,** Department of Mines & Geology, Government of Rajasthan, Secretariat, Jaipur.
3). **The Secretary**, Department of Environment, Government of Rajasthan, Secretariat, Jaipur.
4). **The Addl. Principal Chief Conservator of Forests**, Ministry of Environment, Forest and Climate Change, Kendriya Bhawan, 5th Floor, Sector "H", Aliganj, Lucknow-226020.
5). **The Chief Wild Life Warden,** Government of Rajasthan, Secretariat, Jaipur
6). **The Member Secretary**, Central Ground Water Authority, A-2, W3, Curzon Road Barracks, K.G. Marg, New Delhi-110001.
7). **The Chairman**, Rajasthan State Pollution Control Board, 4, Institutional area, Jhalana, Doongri, Jaipur.
8). **The Controller General**, Indian Bureau of Mines, Indira Bhavan, Civil Lines, Nagpur - 440 001.
9). **The District Collector**, District- **Rajsamand**, State of Rajasthan.
10). **Guard File.**
11). **MoEFCC website.**

(Dr. R. B. Lal)
Scientist "E"

By Speed Post/Online

No. J-11015/84/2018-IA. II (M)
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division
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Indira Paryavaran Bhavan,
Vayu Wing, 3rd Floor, Aliganj,
Jor Bagh Road, New Delhi-110 003

Dated: 27th September, 2018

To,

M/s Hindustan Zinc Ltd.
Rajpura Dariba Mines
P.O. Dariba, Tehsil – Relmagra,
Rajsamand District, Rajasthan – 313 211
Email:- Ram.Murari@vedanta.co.in

Sub.: Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA)& Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA at Rajpura Dariba Mine of M/s Hindustan Zinc Ltd., located at Tehsil Relmagra, Dist: Rajsamand, Rajasthan (ML No. 166/2008, Area 1142.2106 ha) -Prescribing TOR regarding.

Ref.:- Online proposal no. IA/RJ/MIN/75956/2018.

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. The proposal was considered by the Expert Appraisal Committee in its meeting held on **August 24, 2018** wherein the Committee prescribed the **Standard TOR** for mining and beneficiation project for the preparation of EIA/ EMP report with additional study.

2. The proposal is for the expansion of Rajpura Dariba Lead – Zinc underground mine with production capacity from 1.08 million TPA to 2.0 million TPA (ROM) and Lead - Zinc ore beneficiation from 1.2 million TPA to 2.5 million TPA in the mine lease area of 1142.2106 ha. The mine is located at Tehsil Relmagra, District Rajsamand, Rajasthan. The Mining Lease area falls in Survey of India Topo-sheet No. 45K/4 and 45L/1 and lies between Latitudes 24°55'40.8" N - 24°57'49.0" N and Longitudes 74°06"57.7" E-74°08'41.4" E. The PP presented the KML file during the presentation to indicate the location of mine lease on Google Earth/ DSS.

3. The PP submitted that proposal is for the expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA and rock waste generation of 0.48 million TPA Total Excavation will be 2.48 million TPA. After proposed expansion, production capacity of Beneficiation will be 2.5 million TPA, of which 2.0 million TPA ore will be beneficiated from Rajpura Dariba Mine and 0.5 million TPA from other mines of Hindustan Zinc Ltd.

4. The Committee noted that the Ministry has earlier accorded the EC for 0.9 million TPA ore production & 1.2 million TPA ore beneficiation for Rajpura underground mine vide letter no. J-11011/380/2008-IA II(I) dated 04.11.2009, and expanded the capacity from 0.9 million TPA to 1.08 million TPA of ore production vide letter no. J-11015/380/2008-IA. II(M) dated 26.07.2018 under clause 7 (ii) of EIA notification, 2006.

5. The Mining lease was granted on 31.03.1970 and registered on 30.05.1970 for a period of 20 years which was subsequently renewed on 16.09.1993 and 12.06.2012 for additional 20 years by Government of Rajasthan under the MMDR 1957. The lease is now valid up to 29.05.2030. The PP had presented the proposal before the EAC and submitted that the estimated in-situ ore reserves & resources in Rajpura Dariba deposit is 60.05million tons with grades of 6.3% Zinc and 1.91% Lead as on 31st March 2018.The PP has reported that 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 location of the project has been verified from the KML file submitted by the project proponent on Google Earth/ DSS.

6. Project is a mechanised underground Lead-Zinc mine project and the mining method is Vertical Retreat Method (VRM) and blast hole stoping method with back filling. The expansion project needs additional 2200 m^3 per day of water in addition to approved 5800 m^3 per day water requirement for 1.08 MTPA mining & 1.2 MTPA Beneficiation capacity. The additional requirement is proposed to be met out from Udaipur Sewage Treatment Plant, Matrikundia and Mansi Wakal dam. The PP indicated that Zero discharge is being maintained in the operating mine. There is no process effluent at the current beneficiation plant and no effluent is envisaged in the proposed expansion project. The Mine dewatering water due to intersection is also consumed in the project.

7. PP has informed that there is no court case/litigation pending against the Project. The PP has earmarked EMP implementation cost as ₹110 Crores as against the total project cost of ₹ 960 Crores. PP reported that Compliance Status along with Affidavit has been submitted to MoEFCC as per the MoEFCC OM No.3-50/2017-IA.III(Pt.), dated 30.05.2018 w.r.t. judgment of Hon'ble Supreme Court the 2ndAugust 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors. No demand has been raised by Dept. of Mines & Geology, State Govt and no payment has been made to Dept. of Mines & Geology, State Govt. Based on the DMG authenticated past production details, the PP has not enhanced the production capacity after grant of EC in 2009.PP has also mentioned that they have collected the baseline

data from March 2017 to May 2017 and requested to consider the baseline data for preparation of EIA/EMP report. The Committee deliberated the issues and accepted the request of PP.

8. The proposal of TOR was earlier considered by the Expert Appraisal Committee in its meeting held during **August 24, 2018** wherein the Committee prescribed the **Standard TOR for mining and beneficiation conditions for the preparation of EIA/ EMP report with additional study.**

9. 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 expansion of Rajpura Dariba Lead – Zinc underground mine of **M/s Hindustan Zinc Ltd.** with production capacity from 1.08 million TPA to 2.0 million TPA (ROM) and Lead - Zinc ore beneficiation from 1.2 million TPA to 2.5 million TPA in the mine lease area of 1142.2106 ha. located at Tehsil Relmagra, District Rajsamand, Rajasthan. Accordingly, the Project Proponent is requested to prepare and submit the EIA/EMP report based on the TOR prescribed which are as under:-

A. STANDARD TOR FOR MINING PROJECT

1) The TOR will not be operational till such time the Project Proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors..
2) Department of Mining & Geology, State Government shall ensure that mining operation shall not commence till the entire compensation levied, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.
3) Year-wise production details since 1993-94 should be given, clearly stating the highest production achieved in any one year prior to 1993-94. 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 to1994. The production details need to submit since inception of mine duly authenticated by Department of Mines & Geology, State Government.
4) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
5) 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.
6) 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).

7) 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.

8) 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.

9) 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 proposed safeguard measures in each case should also be provided.

10) 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.

11) 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.

12) 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.

13) 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.

14) 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

15) issued. In all such cases, it would be desirable for representative of the State

Forest Department to assist the Expert Appraisal Committees.

16) 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.

17) 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.

18) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

19) 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.

20) 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.

21) 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.

22) 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.

23) 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).

24) 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.

25) 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.

26) 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.

27) 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.

28) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

29) 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.

30) 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.

31) 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.

32) 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.

33) 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.

34) 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.

35) 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.

36) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

37) 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.

38) 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.

39) 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.

40) 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.

41) 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.

42) 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.

43) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

44) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
45) A Disaster Management Plan shall be prepared and included in the EIA/EMP Report.
46) 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.
47) The activities and budget earmarked for Corporate Environmental Responsibility (CER) shall be as per Ministry's O.M No 22-65/2017-IA. II (M) dated 01.05.2018 and the action plan on the activities proposed under CER shall be submitted at the time of appraisal of the project included in the EIA/EMP Report.
48) The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA.I (M), dated 25.10.2017 needs to be submitted at the time of appraisal of the project and included in the EIA/EMP Report.
49) Compliance of the Ministry's Office Memorandum No. F: 3-50/2017-IA.III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.

B. ADDITIONAL STUDIES

50) Details of Dry disposal of tailings.
51) Details of Ground Control Management Plan and Emergency Response Plan.
52) Project Proponent should generate base line data for subsidence monitoring by way of subsidence monitoring stations on surface upto the extent of conceptual mining (underground mining) limits projected on surface. These monitoring stations shall be connected to base stations which shall be erected on ground (surface) sufficiently away from underground mining. Besides above geo technical monitoring with other appropriate technique like numerical modelling etc. shall be carried out.

C. STANDARD TOR FOR BENEFICIATION PROJECT

1) The alternate sites considered, the relative merits and demerits and the reasons for selecting the proposed site for the Beneficiation Plant should be indicated.
2) Details of the technology and process involved for beneficiation should be given.
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 should be justified.
4) Treatment of run of mine (ROM) and or of the fines/waste dump should be spelt out.
5) Estimation of the fines going into the washings should be made and its management described.
6) Details of the equipment, settling pond etc. should be furnished.
7) Detailed material balance should be provided.

8) Sources of raw material and its transportation should be indicated. Steps proposed to be taken to protect the ore from getting air borne should be brought out.
9) Management and disposal of tailings and closure plan of the tailing pond, if any after the project is over, should be detailed in a quantified manner.
10) 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 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).
14) It should be clearly indicated 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.
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 should be described.
18) Location of Railway siding with its handling capacity and safety measures should be indicated.
19) Option to provide only silo for storage of minerals instead of open stacking to avoid fugitive dust should be explored and arrangements finalized justified.
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.
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, 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 scheduledI 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/CPCBshall be secured and furnished to the effect that the proposed activitiescould 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(s) located in the 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.

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 ofwater for the Project should be secured and copy furnished.

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 should be detailed.
43) Public health implications of the Project and related activities for the population inthe 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 be clearly spelt out.
48) A brief background of the Project, its financial position, Group Companies and legal issues etc should be provided with past and current important litigations if any.
49) Benefits of the Project, if the project is implemented should be outlined. The benefits of the projects shall clearly indicate environmental, social, economic, employment potential, etc.

10. Besides the above, the below mentioned general points are also to be followed:-

a) All documents to be properly referenced with Index and continuous page numbering.
b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
c) 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.
d) Where the documents provided are in a language other than English, an English

translation should be provided.

e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.

f) 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.

g) 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.

h) 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.

11. 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.

12. 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) (Part) dated 29.08.2017. **The instant TOR is valid up to 26.09.2021.**

13. 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.

14. This issues with the approval of Competent Authority.

Yours faithfully,

(Dr. R. B. Lal)
Scientist 'E'/Addl. Director

Copy to:

1). **The Secretary**, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi

2). **The Secretary**, Department of Mines & Geology, Government of Rajasthan, Secretariat, Jaipur

3). **The Secretary**, Department of Environment, Government of Rajasthan,

Secretariat, Jaipur

4). **The Secretary**, Department of Forest, Government of Rajasthan, Secretariat, Jaipur
5). **The Secretary**, Irrigation Department of Government of Rajasthan, Secretariat, Jaipur
6). **The Chief Wildlife Warden** of State Government of Rajasthan, Jaipur.
7). **The Additional Principal Chief Conservator of Forests**, Ministry of Environment, Forest & Climate Change, Regional Office (CZ), Kendriya Bhawan, 5th Floor, Sector "H", Aliganj, Lucknow-226020.
8). **The Chairman**, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
9). **The Chairman**, Rajasthan State Pollution Control Board, 4, Institutional area, Jhalana, Doongri, Jaipur.
10). **The Member Secretary**, Central Ground Water Authority, 18/11, Jamnagar House, Man Singh Road, New Delhi-110011.
11). **The District Collector**, District- **Rajsamand**, Rajasthan.
12). **Guard File.**
13). **MoEF&CC Website.**

(Dr. R. B. Lal)
Scientist 'E'/Additional Director

राजस्थान सरकार
कार्यालय खनि अभियन्ता, राजसमंद खण्ड–द्वितीय

क्रमांक : खअ/राज–।।/सीसी /मेजर/एमएल–166/2008/ दिनांक :

–: ज्ञापन :–

विषय :– जिला राजसमंद में द्वितीय नवीनीकरण खनन पट्टा वास्ते खनिज लेड, जिंक निकट ग्राम राजपुरा– दरीबा तहसील रेलमगरा जिला राजसमंद में सर्वश्री हिन्दुस्तान जिंक लिमिटेड राजपुरा दरीबा तहसील रेलमगरा जिला राजसमंद के पक्ष में।

प्रसंग :– शासन के आदेश संख्या प–5(47)खान/ग्रुप–2/2011 दिनांक 12.6.2012

चूँकि उक्त अनुदानी द्वारा उक्त खनिज के लिये खनन पट्टा का संविदा निष्पादन दिनांक 30.8.2012 को खनिज रियायती नियम 1960 एवं एम0एम0डी0आर0 एक्ट 1957 के अन्तर्गत किया जाकर संविदा का पंजीयन दिनांक 14.9.2012 को किया गया। वित्तीय आश्वासन के रूप में रू0 एक लाख एफ.डी.आर. प्रस्तुत कर दी है। माईनिंग प्लान एवं प्रोग्रेसिव माईन क्लोजर प्लान का अनुमोदन भारतीय खान ब्यूरो, उदयपुर के पत्र दिनांक 26.5.2009 से हो चुका है। संविदा के अन्तर्गत समस्त सुविधाओं एव उपयोग के लिये निम्न शर्तो अनुबंधों एवं प्रतिबन्धों के आधार पर खनन पट्टा स्वीकृत किया गया हैं :–

1. खनिज का नाम	:	लेड, जिंक
2. क्षैत्रफल	:	1142.2106 हैं0 निकट ग्राम राजपुरा–दरीबा तहसील रेलमगरा जिला राजसमंद (राज0)
3. अवधि	:	30.5.2010 से 20 वर्ष
4. प्रतिभूति	:	रूपये 10,000/– राष्ट्रीय बचत पत्र के रूप में।
5. स्थिर भाटक	:	खान एवं खनिज (विकास एंव विनियमन) एक्ट 1957 की तृतीय अनुसूची के अनुसार एवं समय समय पर संशोधन हो के अनुसार ।
6. भूतल भाटक	:	जैसा कि राजस्व अधिकारी निर्धारित करें ।
7. अधिषुल्क	:	एम.एम.आर.डी. एक्ट 1957 के अनुसार एवं समय समय पर संशोधन हो उस अनुसार।
8. प्रतिबंध	:	राज्य सरकार द्वारा प्रचलित एवं लागू किये गये नियमों के अनुसार तथा समय समय पर संशोधन हो, उसके अनुसार।
9. अन्य प्रतिबंध	:	खनिज रियायत नियम, 1960 एवं खान एवं खनिज रेग्यूलेशन डवलपमेन्ट एक्ट, 1957 के अनुसार व समय समय पर संशोधन हो, के अनुसार।

खनि अभियंता, राजसमंद
खण्ड द्वितीय

क्रमांक : समसंख्यक / 2481 दिनांक : 3-10-2012

प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित है :–

1. शासन सचिव महोदय, खान (ग्रुप–2) विभाग, राजस्थान–जयपुर को उनके आदेश संख्या प–5(47)खान / ग्रुप–2 / 2011 दिनांक 12.6.2012 के कम में मय संविदा के प्रेषित है।
2. निदेशक महोदय, खान एवं भू विज्ञान विभाग, राजस्थान उदयपुर को संविदा की मूल प्रति मय स्टाम्प के रू0 4462000/–एवं संविदा की एक फोटो प्रति के प्रेषित हैं।
3. अधीक्षण खनि अभियंता महोदय, खान एवं भू विज्ञान विभाग, उदयपुर वृत उदयपुर को संविदा के एक फोटो प्रति के साथ अभिलेख हेतु ।
4. जिला कलेक्टर महोदय, राजसमंद संलग्न प्लान व विवरण सूची के प्रेषित है ।
5. तहसीलदार, रेलमगरा जिला राजसमंद संलग्न प्लान व विवरण सूची के प्रेषित है ।
6. उप वन संरक्षक, राजसमंद संलग्न प्लान व विवरण सूची के प्रेषित है ।
7. महानिदेशक, खान सुरक्षा, विभाग धनबाद (झारखण्ड)
8. महानियंत्रक, भारतीय खनिज संस्थान, नागपुर
9. निदेशक, खान सुरक्षा विभाग, उदयपुर क्षैत्र उदयपुर, झामरकोटडा मैन रोड, सेक्टर–6, हिरणमगरी उदयपुर

10– उप मुख्य श्रम आयुक्त,(केन्द्रीय) अजमेर–राजस्थान।

11. वाणिज्य कर अधिकारी, राजसमंद

12–मांग लिपिक कार्यालय हाजा

13–मानचित्रकार कार्यालय हाजा

14 संगणक कार्यालय हाजा

15 अधिशुल्क निर्धारण शाखा कार्यालय हाजा

16 खनिकार्यदेशक कार्यालय हाजा ।

17 सर्वश्री हिन्दुस्तान जिंक लिमिटेड राजपुरा दरीबा तहसील रेलमगरा जिला राजसमंद।

18–क्षैत्रिय अधिकारी राजस्थान प्रदूषण नियंत्रण मण्डल, 18, आजाद नगर, पन्नाधाय सर्किल, भीलवाडा।

19– गार्ड फाईल ।

खनि अभियंता, राजसमंद
खण्ड द्वितीय

भारतीय गैर न्यायिक INDIA NON JUDICIAL

भारत

रु. 25000 पच्चीस हजार रुपये

Rs. 25000 TWENTY FIVE THOUSAND RUPEES

INDIA

राजस्थान RAJASTHAN

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संविदा

एम.एल. नं. 166/2008

प्रधान खनिज

यह नोन ज्यूडिशियल स्टाम्प राशि रूपये 4,46,200/–(अक्षरे रूप्या चार लाख छियालीस हजार दो सौ मात्र) खनन पट्टा वास्ते खनिज लेड, जिंक निकट राजपुरा–दरीबा तहसील रेलमगरा जिला राजसमंद में क्षेत्रफल 1142.2106 है0 हेतु शासन के आदेश संख्या प–5(47)खान/ग्रुप–2/2011/दिनांक 12.6.2012 द्वारा सर्वश्री हिन्दुस्तान जिंक लिमिटेड यशद भवन, उदयपुर के पक्ष में खननपट्टा का द्वितीय नवीनीकरण अवधि दिनांक 30.5.2010 से 29.5.2030 तक 20 वर्ष के लिए खनिज रियायत नियमावली 1960 एवं एम0एम0 डी0आर0 एक्ट 1957 तथा समय–समय पर होने वाले संशोधनानुसार संविदा की शर्तो एवं अनुबन्धों के अनुसार लागू होगा के तहत स्वीकृत किया गया है। यह स्टाम्प पेपर स्वीकृत द्वितीय नवीनीकरण खनन पट्टा की संविदा के साथ संलग्न है ।

उक्त द्वितीय नवीनीकरण खनन पट्टा की अवधि दिनांक 30.5.2010 से 29.5.2030 तक 20 वर्ष है, खनन पट्टे का वार्षिक स्थिर भाटक खान एवं खनिज (विकास एवं विनियम) एक्ट 1957 की तृतीय अनुसूची के अनुसार एवं समय समय पर संशोधन हो उसके अनुसार होगा, प्रतिभूति राशि रू0 10,000/–अक्षरे रू0 दस हजार मात्र राजकोष में एफ0डी0आर0 के रूप में जमा है ।

यह संविदा आज दिनांक ....3.1.8.12....को पट्टेधारी एवं राज्य सरकार के मध्य निष्पादित किया गया।

हस्ताक्षर पट्टेधारी

(R. PANDWAL)
COMPANY SECRETARY
HINDUSTAN ZINC LTD.
YASHAD BHAWAN, UDAIPUR

(हिन्दुस्तान जिंक लिमिटेड)

खनि अभियन्ता
हस्ताक्षर राजस्थान राज्यपाल की ओर से
उदयपुर

गवाह नं. (1) :–

गवाह नं. (2):–

खनि अभियन्ता
खान एवं भूविज्ञान विभाग
खण्ड–द्वितीय, राजसमन्द

उप पंजीयक रेलमगरा

CHAPTER - I

1.0 INTRODUCTION

Hindustan Zinc Ltd., Udaipur (HZL) is carrying out underground mining for lead-zinc ore near villages Rajpura – Dariba, tehsil Railmagra, district Rajsamand, since 1982. The mining lease covers an area of 1142.20 hectares and lies between the latitudes of N 24º55'39.66'' to 24º57'49.70'' and E 74º07'05.42" to 74º08'44.67" and falls under Survey of India toposheet No.45 L/1. HZL got the Environmental Clearance from the Ministry of Environment & Forests, (MoEF) on 4th November, 2009 for increasing the production of base metal ores from 6.31 lac TPA to 9.00 lac TPA along with mineral beneficiation from 9 lac TPA to 1.20 MTPA. HZL decided to raise the production by 20 % in the year 2017 from next 3 years from 0.90 MPTA to 1.08 MTPA and got the EC from MOEF&CC on 26th July,2018. Now it has been decided by HZL to raise the production from 1.08 MTPA to 2.00 MTPA to be commenced from the 2019-20 for next five years for which a mining plan has been approved. It has also been proposed by HZL to increase the capacity of beneficiation plant from 1.2 MTPA to 2.5 MTPA.

As a large quantity of water was being pumped from the underground mine after the intersection of ground water, HZL obtained the NOC from Central Ground Water Authority (CGWA) in the year 2009 for daily mine dewatering permission of 446.50 m^3/day vide letter No. letter No. 21-4 (315) WR/CGWA/2008-212 dated 14.7.2009 when the annual production of ore was around 5 lac tones and was again allowed to continue to dewater the accumulated ground water in the mine @ 446.50 m^3/day due to seepage and intersection of water table vide letter No. 21-4(315)/WR/CGWA/2008-3744 dated 6th June, 2012. HZL has

again filed the On Line application for increased production of 20 % when additional inflow of ground water of 208 m^3/day , calculated by modeling ,will take place.

With the increased production of RD mine from 1.08 MTPA to 2.00 MTPA, there will be additional excavation leading to increased inflow of ground water .The increased inflow has been estimated by modeling for which an Online application is being filed.

HZL retained the services of Hydro-Geosurvey Consultants Pvt. Ltd. Jodhpur (HCPL), who had earlier conducted the impact studies of Rajpura –Dariba mine and estimated the inflow of ground water of 446.50 m^3/day for getting NOC in the year 2009, for estimating the present inflow of ground water in the mine as per its mining scheme and at conceptual stage along with rain water harvesting program for artificially recharging the ground water basin and 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 (mining lease area) and buffer zone (10 km radius area) and impact of mining on the water regime by collecting hydrogeological data of key wells 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 2018. 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 Mining Scheme for the period 2018-19 to 2022-23 along with

geological sections for each year. This report is being attached with the CGWA application. 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. All the mine discharge is being used and will be used till 2022-23 for mineral beneficiation of increased capacity of 2.5 MTPA. A water balance analysis has been included which reveals against dewatering being done from the mine of 3,145 m^3/day (1148 mcm) , the inputof water in the mine from five sources is 3395 m^3/day (1239 mcm) and the balance remains in mine sumps.

CHAPTER – II

2.0 HYDROLOGY

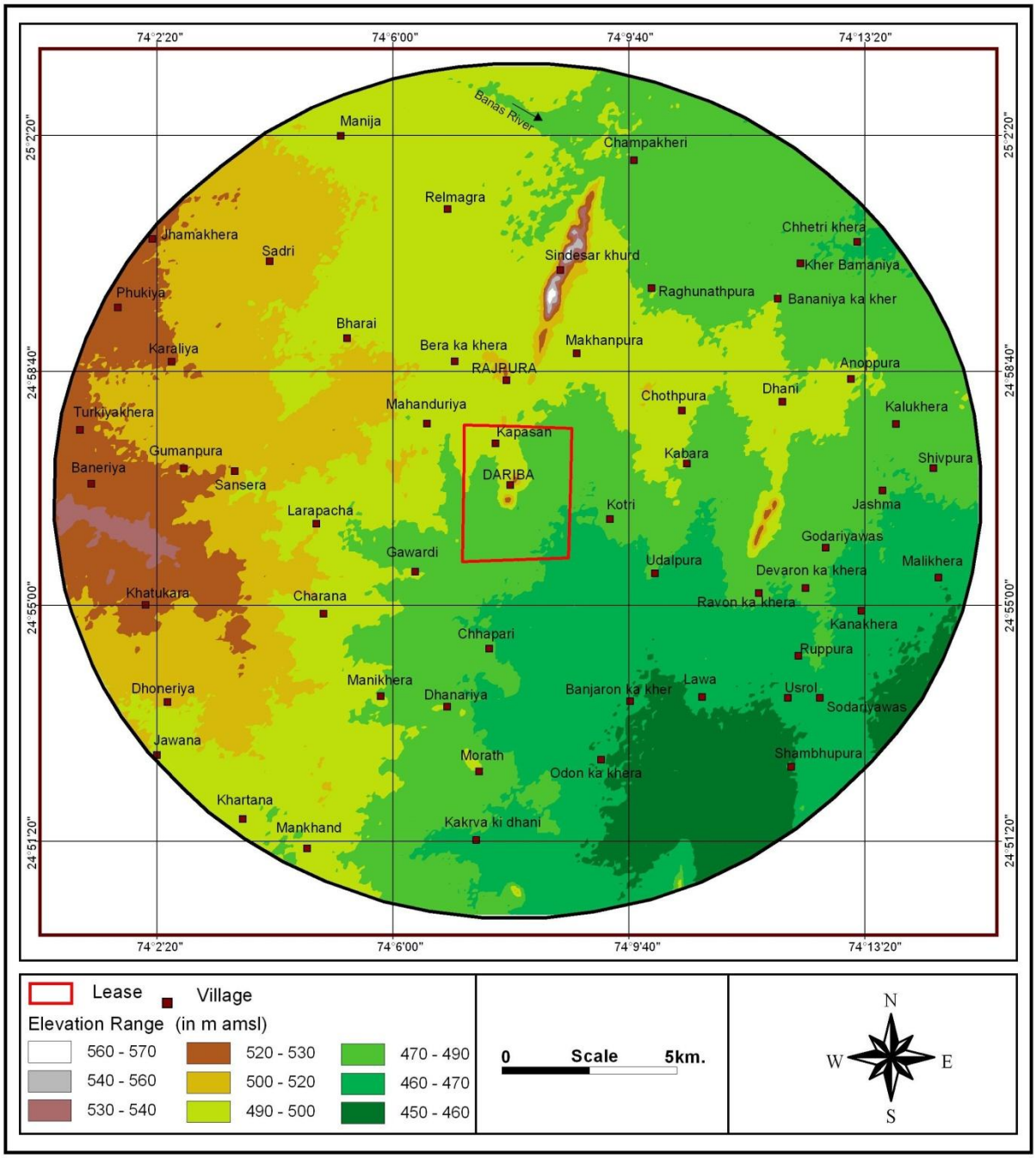
2.1 Physiography of Banas river basin

The buffer zone of Rajpura- Dariba mine falls in the catchment area of Banas river, which flows through the northern boundary of 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 covers an area of 47,052 sq.km .The 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 afterwards dry till monsoon.

Physiography of the lease area is characterized by almost flat country with isolated few low ridges. The mineralized fault zone from Dariba to Rajpura is marked by yellowish brown gossan, which forms a conspicuous physiographic feature of the terrain. Similarly, the NNE-SSW quartzitic ridge, south of Sindesar Kalan is a prominent feature of the area achieving the elevation of 579 metres above msl. There are few tanks near Chokri, Mandara, Relmagara, Jitwas and Armi which get filled up during rainy season and dry up by the summer. There is big size tank near mine known as Mataji Ka Khera and another near village Pipawas.

Figure-2.1. Digital Elevation Model (DEM) of buffer zone



2.2 Major surface water reservoirs of Banas river upstream of Railmagra

The surface water resources of Banas river and its tributaries have been harnessed at many locations by constructing major and medium irrigation projects. The major irrigation projects (having CCA more than 10,000 ha.) and medium irrigation projects (having CCA from 2,000 to 10,000 ha) upstream of Railmagra are shown as under.

Table-2.1. Major surface water reservoirs of Banas river upstream of Railmagra

S. No.	Project Name	River	Catchment Area (km^2)			Live Storage Mm^3	CCA Ha.
			Total	Intercepted	Free		
1.	Rajsamand	Banas	523	93	432	98.7	10441
2.	Matrikundia	Banas	3415	2472	943	50	9500
3.	Badgaon	Banas	1699	1300	398.9	30.2	9400
4.	Bhopalsagar	Banas	215	38.6	176.4.	18.4	3870
5.	NandSamand	Banas	839.2	217	622	19.5	7881

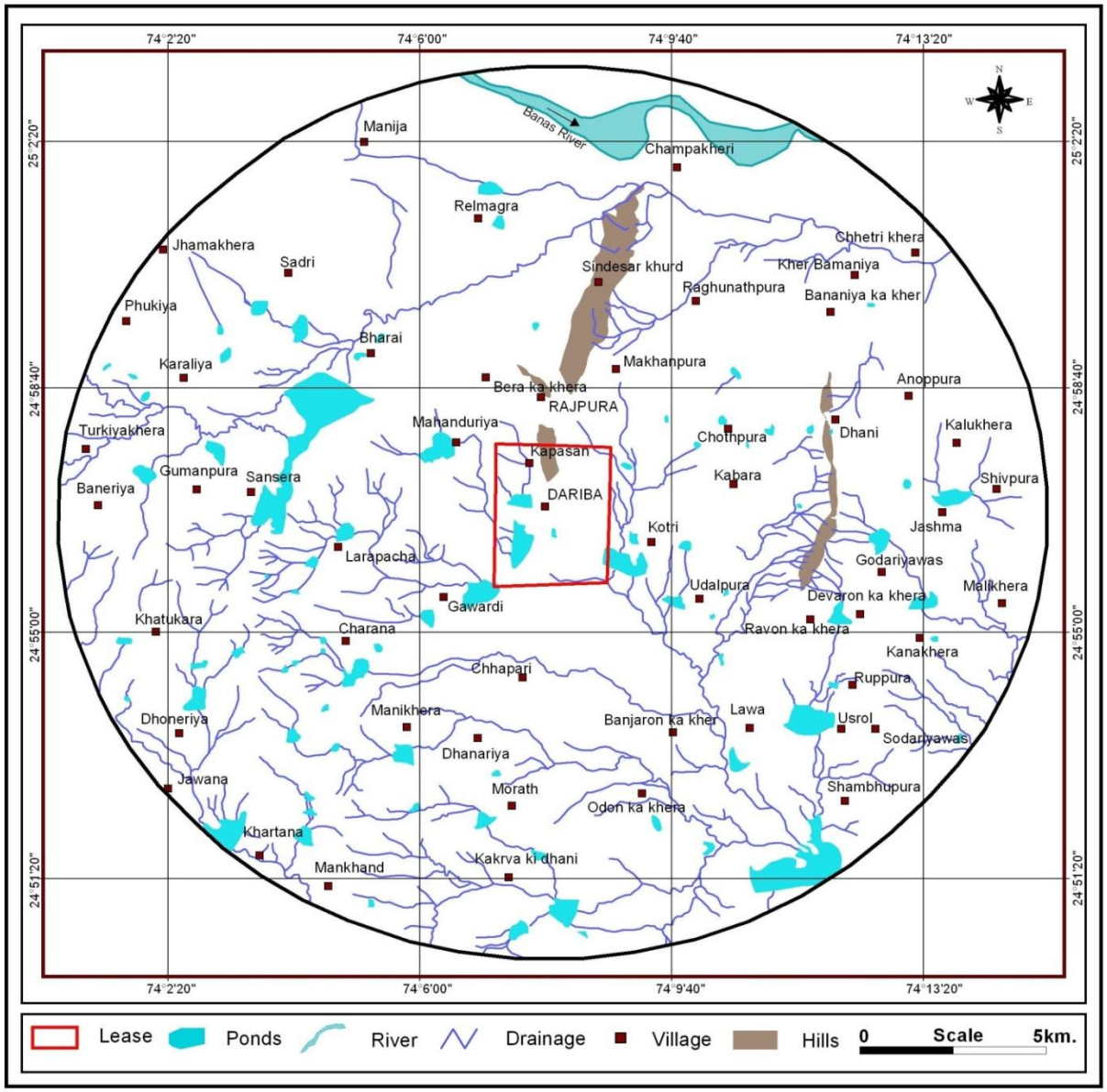
CCA- Culturable Command Area
Source – Irrigation department, 1996

There are few minor irrigation tanks constructed on tributaries of Banas river basin. These tanks when completely filled provide irrigation to command area developed in nearby villages. However, this year due to exceptionally high rainfall, the tanks were full providing irrigation to the area of buffer zone.

2.3 Drainage pattern

Although there is a well defined drainage system having dendritic drainage pattern in the buffer zone, a major part of drainage has been harnessed by constructing minor irrigation projects and tanks. Whatever runoff is produced by the average annual rainfall of 636.66 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.

Figure-2.2. Drainage map of buffer zone



2.4 Run -off

Average annual rainfall in the buffer zone of Rajpura- Dariba mine is 571 mm out of which 90 % happens to be during monsoon period from June to October. Winter monsoon is low,

hardly contributing any surface runoff. The rainfall during the year 2018 was recorded as 463 mm at the mine which is less than the average annual rainfall of 637 mm (72% below the average annual rainfall). The surface run -off in Banas river basin has been computed as 15 to 18% based on the storage of minor irrigation dams.

2.5 Climate

The nearest IMD meteorological station in Banas river basin 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 Rajpura- Dariba 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, the sub-basin 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 observatory 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 39.5°C and 27.3°C respectively. Night temperatures in June are relatively higher than the May. With the onset of southwest monsoon by about mid-June, the temperatures go down considerably. From November onwards, both the day and night temperatures decrease and January, the coldest month, with daily maximum and minimum temperatures of 22.2°C and 7.3°C.

2.5.2 Rainfall

Average annual rainfall based on rainfall data recorded at Rajpura- Dariba mine for last 24 years has been observed as 616 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 1994

Table-2.2. Rainfall recoded at Rajpura- Dariba mines

Year	Rain fall (mm)	Year	Rain fall (mm)
1994	710.50	2007	586.75
1995	479.75	2008	619.50
1996	690.00	2009	562.50
1997	609.50	2010	858.00
1998	590.50	2011	632.00
1999	440.50	2012	723.00
2000	324.00	2013	861.00
2001	593.00	2014	635.00
2002	254.00	2015	585.00
2003	450.00	2016	1180.00
2004	624.00	2017	640.00
2005	780.00	2018	463.00
2006	1025.00		

Average annual rainfall = 636.66 mm

2.5.3 Humidity

Relative humidity during the southwest 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 65.4 % and 37.6 % in the evening.

2.5.4 Winds

Winds are generally light to moderate, except during the south west monsoon season, when these are moderate to strong. From May to September, winds blow mostly from direction from northwest to southwest. In the post monsoon and winter months, winds are mostly from direction lying between northeast and northwest. Mean wind speed is highest in June (7.4 km / hour) and lowest in November & 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 evenings than the mornings.

Table-2.3. Meteorological data as recorded at Udaipur

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.

CHAPTER – III

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 Cenozoic Era 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
Archaeans		Bhilwara Super Group	Rajpura-Dariba Group	Dolomitic marble, Graphitic kyanite schist, quartzite,
			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 forms the poor aquifer while alluvium generally thin, remains above water table.

3.2 Hydrogeology of 10-km area (Buffer zone)

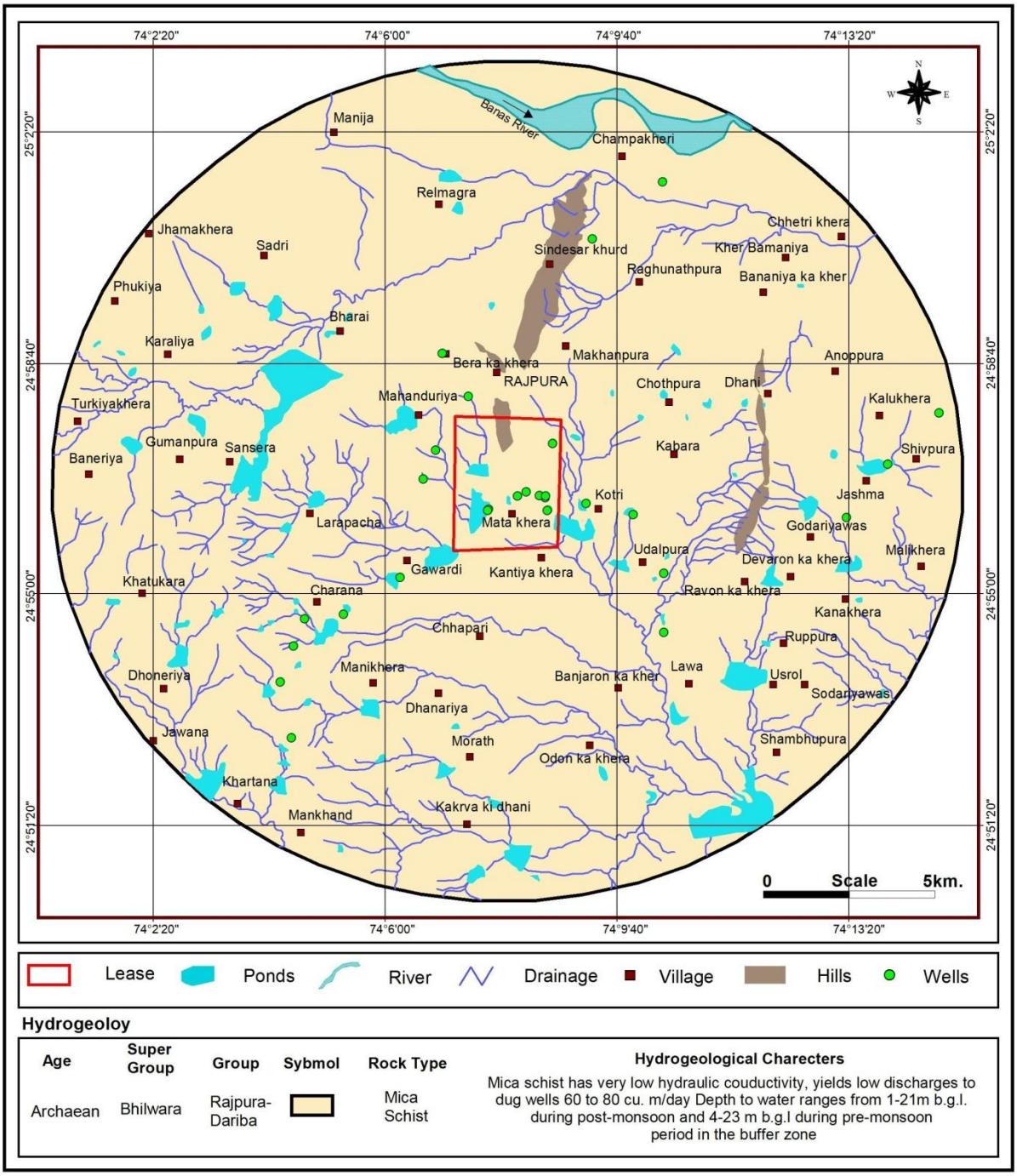
Mica schist is the main rock exposed in the buffer zone. Mica schist is intruded by pegmatite and quartz veins. The general strike of the rocks is NNE-SSW to NE-SW with steep dips towards east. The hydrogeological map of the buffer zone has been prepared **(Figure-3.1)** which shows that mica schist is the principal aquifer in the entire buffer zone.

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 schist is 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 the lease area (core zone) during post monsoon period ranges from 8 metres to 21 metres below the land surface while it ranges from 10 to 23 metres below the land surface during pre-monsoon period. The depth to water in buffer zone ranges from 1 metres to 21 metres during post monsoon period and 4 metres to 23 metres during pre-monsoon period. It is shallow near the river courses, surface water reservoirs and ponds while it is deeper in the area away from these sources. The fluctuations due to rainfall and ground water withdrawal are significant as the rocks have very low fracture porosity and hydraulic conductivity.

Figure-3.1. Hydrogeological map of buffer zone



Hydrogeoloy

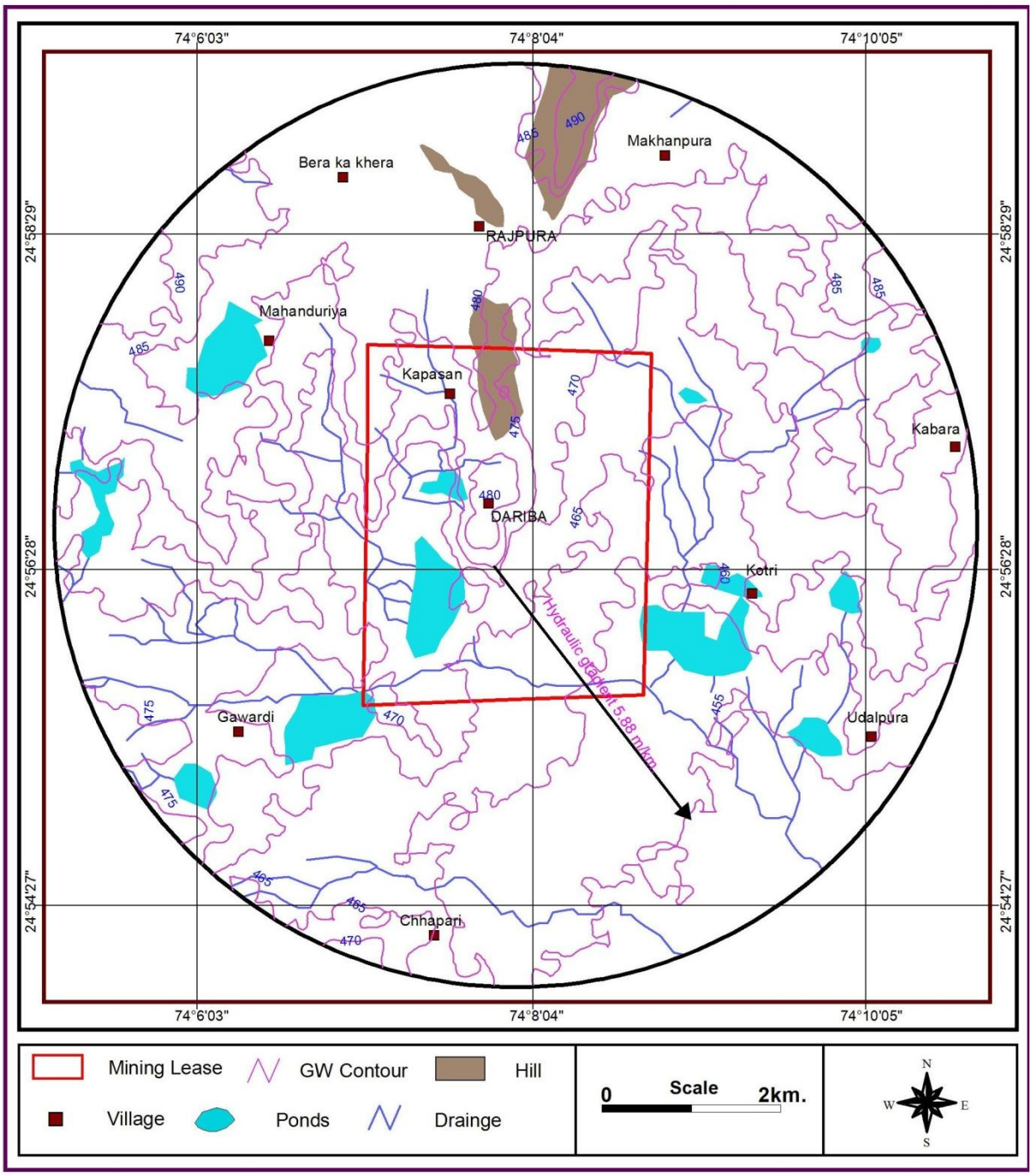
Age	Super Group	Group	Sybmol	Rock Type	Hydrogeological Charecters
Archaean	Bhilwara	Rajpura-Dariba		Mica Schist	Mica schist has very low hydraulic couductivity, yields low discharges to dug wells 60 to 80 cu. m/day Depth to water ranges from 1-21m b.g.l. during post-monsoon and 4-23 m b.g.l during pre-monsoon period in the buffer zone

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.

The ground water movement is controlled mainly by the hydraulic conductivity of aquifer. A review of the topography and drainage pattern reveals that the general slope of the area is towards south east, and ranges from 6 m/km to about 7 m/km. The ground water flow also follows the topography and surface water flow direction and moves in south east direction. However, the hydraulic gradient is moderate and has been observed as 5.88 m/km as calculated from the monitoring of wells of the area.

Figure-3.2. Ground water contour map of the buffer zone showing ground water flow direction and hydraulic gradient



CHAPTER – IV

REMOTE SENSING STUDIES FOR GOSSANS

4.1 Methodology

4.2 Data source

For delineating the gossan area located in the northern side of the plant and lease area along with other required thematic layers, satellite data for cloudless day for pre monsoon period, 2018 was asked from NRSA, Hyderabad. The NRSA could provide the imagery available with it for pre-monsoon, 2018. The details of imagery are as below:

Table-4. Imagery specification

S. No.	Specification:	
1.	Satellite ID	IRS-R2
2.	Sensor	L4FX
3.	Sub Scene	C
4.	Gen Agency	NRSC
5.	Path	094
6.	Row	054
7.	Date Of Pass	06-MAY-2018
8.	No Of Bands	3
9.	Band Numbers	234
10.	Pass Type	PLD
11.	Date Of Dump	06-MAY-2018
12.	Dumping Orbit No	036559
13.	Imaging Orbit No	036559
16.	Bytes Per Pixel	2
17.	Bits Per Pixel	10
18.	Generation Date Time	06-MAY-2018 14:02:12
19.	Prod Code	STUC00GTV
20.	Prod Type	GEOREF

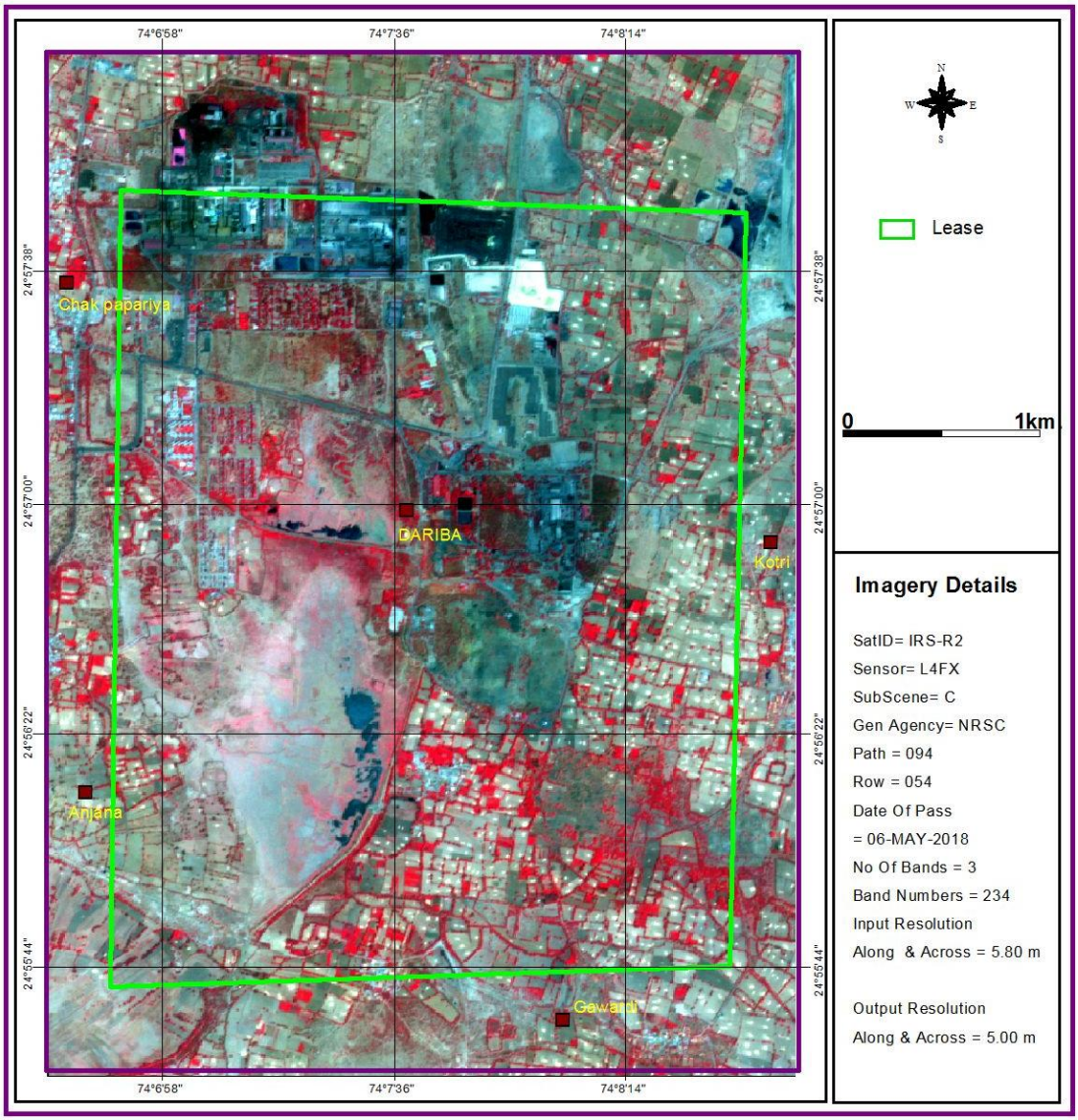
21.	Input Resolution Along	5.80
22.	Input Resolution Across	5.80
23.	Output Resolution Along	5.00
24.	Output Resolution Across	5.00
25.	Season	MAY
26.	Image Format	GEOTIFF
27.	Map Projection	UTM
28.	Ellipsoid	WGS 84
29.	Datum	WGS 84

This digitized data has been used for delineating the gossan area by Land use /Land cover mapping of the area. Satellite imagery of the area is shown as **Figure-4.1.**

4.3 Approach for preparing different themes

The base map of the area was prepared, which included all the important features like lease area, villages, main roads collected from the toposheet of the area keeping common marks for each theme. This base map was used for mapping different themes by digital and visual interpretation of satellite data which was procured from NRSA. These maps were converted to digital mode in GIS form and then checked in field for respective details and finalized.

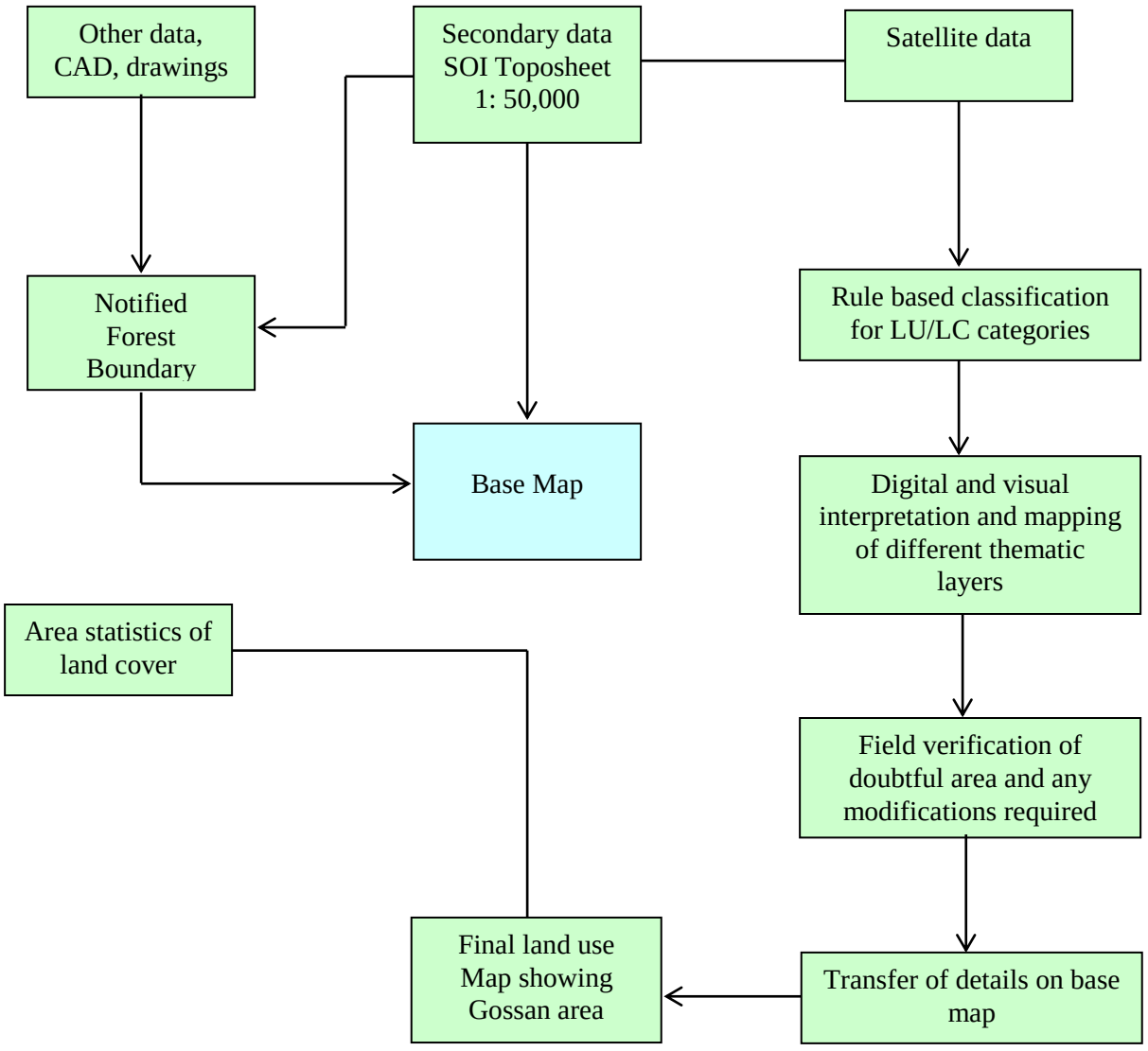
Figure-4.1. Satellite imagery of buffer zone of lease area (LISS-4)



4.4 Procedure followed

For preparing land use/ land cover map of study area and its respective thematic layers, the procedure as shown in the following Flow diagram was adopted. The procedure adopted for preparing each thematic layer is discussed as under.

Flow diagram showing the methodology adopted for land use mapping



4.5 Land use / Land cover map

After proper registration of satellite data, the satellite data was digitally interpreted and different categories of land use units were marked using standard digital techniques.

4.6 Thematic mapping

By adopting the methodology as mentioned above, thematic layers on gossan area was specially prepared along with drainage and drainage in the lease and its surrounding area. As shown in **Figure-4.3**

4.7 Approach for delineating gossan area

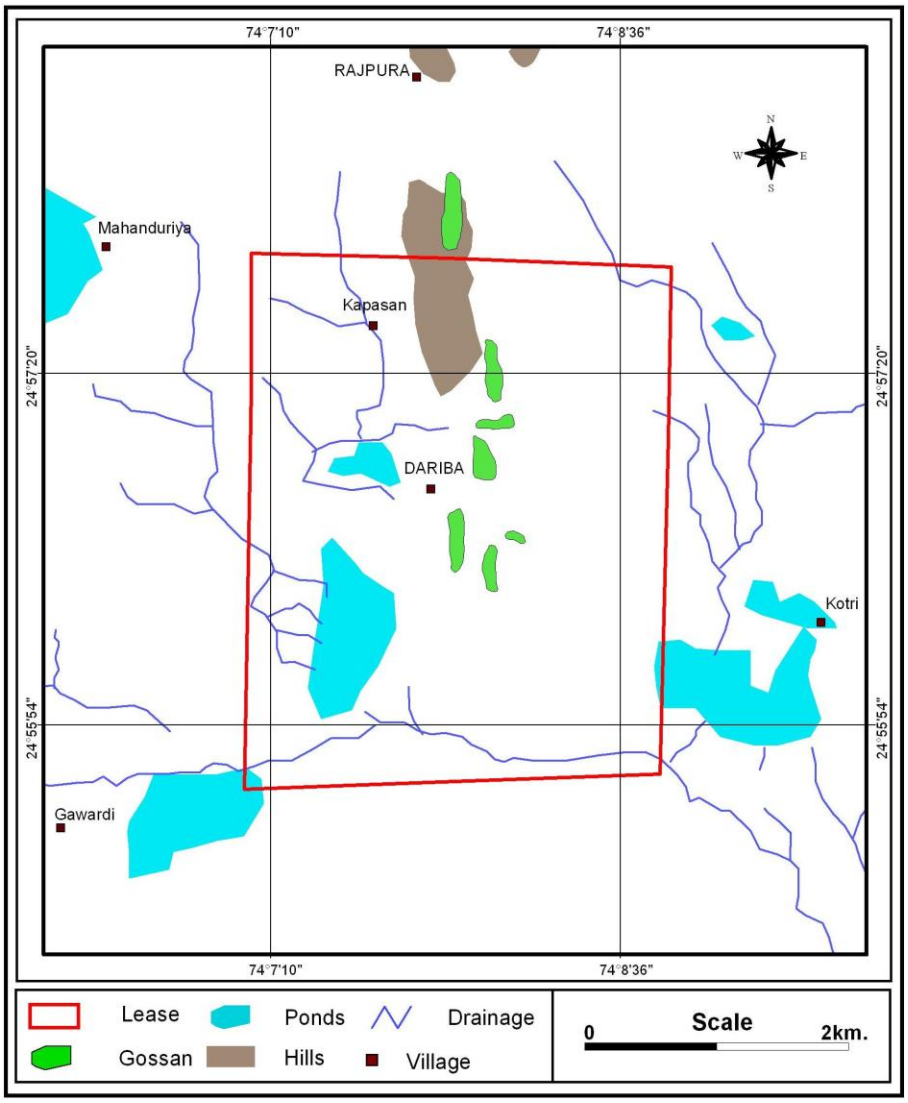
The spatial resolution and the spectral bands in which the sensors collect the remotely sensed data are two important parameters for any land use survey. Appropriate remote sensing data were processed to investigate land use pattern through digital image processing techniques. SOI toposheets were geo-referenced to superimpose on orthorectified satellite image. Mosaicing was performed for the geo-referenced toposheets to form a continuous frame. A base map was generated from the mosaic of SOI toposheet comprising features such as administrative boundaries major roads, railways and river drainage. IRS-R2, L4FX data offers spatial resolution of 5m x 5m. The shapes, sizes and colours of several geomorphic features are visible in the IRS data. Three spectral bands provide high degree of measurability through band combinations including False Colour Composites (FCC) generation, bands ratioing, classification etc. These features of the IRS data are particularly important for better comprehension and delineation of the land use classes. Hence IRS-R2, L4FX data has been used for land use mapping. The standard FCC is generated by assigning blue, green and red colours to visible green, visible red and near Infrared bands respectively. Image processing and Ortho rectifications was done in ERDAS IMAGINE (V.8.5) software and spatial data

was created in Arc view GIS (Ver.3.2a) software. Area of interest comprising the study area was then selected and extracted from the satellite image. Suitable image enhancements were the applied on the extracted area on interest. A visual interpretation followed by supervised classification (digital image processing approach) was adopted to classify areas land use-cover features. Several training sets/signatures for classification were collected prior to applying supervised classification.

After evaluating the statistical parameters of trainings sets, the training areas were rectified by deleting non-congruous training sets and creating new ones. Mask of mine area was superimposed on the final output to generated area statistics for different land use categories. Classification accuracy estimation was done on the supervised classified image for further rectification. Based on this, final estimation and results for delineating gossan area within the study area was done.

After integrating the geological thematic layer of land use units and drainage, an integrated map has been prepared showing the gossan area which is shown as **Figure-4.2.**

Figure-4.3. Integrated land use /land cover map of study area showing the gossan area



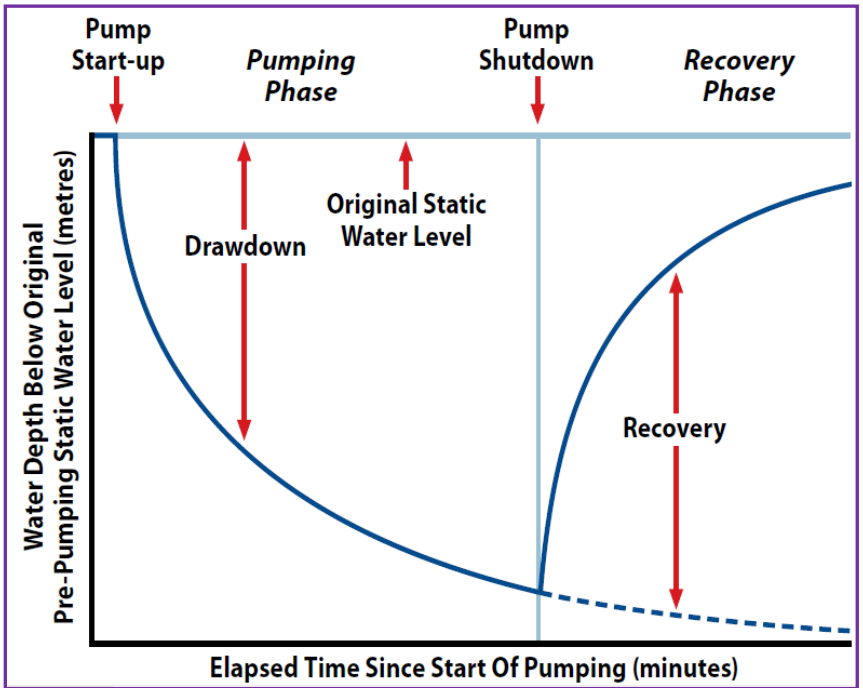
It is observed that the gossan area, which has old workings, occupies an area of 26.5 hectares. Rainfall on this area percolates fast and joins the mineralized body through old workings which are connected to the present workings. Thus there is additional quantity of water joining the mine and has to be pumped along with inflow of ground water in the mine due to excavation done for the recovering the base metal ores. The part of the water of rainfall which meets the mine at different depths of particular year has been included in the model. The inflow of ground water has been estimated for four seasons including 120 days of monsoon period (Mid–June to Mid–October). Few days of October have been included as the rain water will take some time during percolation to join the depth of mine which is almost 800 metres below the ground level of the gossan. It has been found that gossan will contribute 97.12 m^3/day for 120 days during the year monsoon period of the year 2018-19 to 217.08 m^3/day during the year 2020-21 and 222.21 m^3/day during 2022-23. This happens to be a significant part of the total inflow of the ground water in the mine and therefore has to be estimated separately to get it excluded from the NOC from the CGWA for net ground water inflow in the by mining for base metal ores..

CHAPTER – V

AQUIFER PERFORMANCE TEST

The basic aim of conducting aquifer performance test (APT) is to establish the fundamental aquifer properties like hydraulic conductivity (K), transmissivity (T) and storage coefficient (S). Various methods for determining K, T and S were developed long back for equilibrium and non-equilibrium conditions in confined and unconfined aquifers.

During an APT, the hydraulic head in the aquifer declines as the time of pumping increases. Analysis of hydraulic head decline, or drawdown, allows for the estimation of aquifer hydraulic properties.



5.1 Analysis methods:

There are many pumping test solution methods but most commonly used for different aquifers and conditions are: Theis, Theis with Jacob Correction, Hantush-Jacob, Neuman, Double Porosity, Papadopulos – Cooper, Warren Root - Double Porosity, Boulton, Hantush (Leaky, with storage in aquitard), Moench (Fractured flow, with skin), Agarwal Recovery, Theis Recovery, Cooper Jacob etc.

These methods are based on some general assumptions:

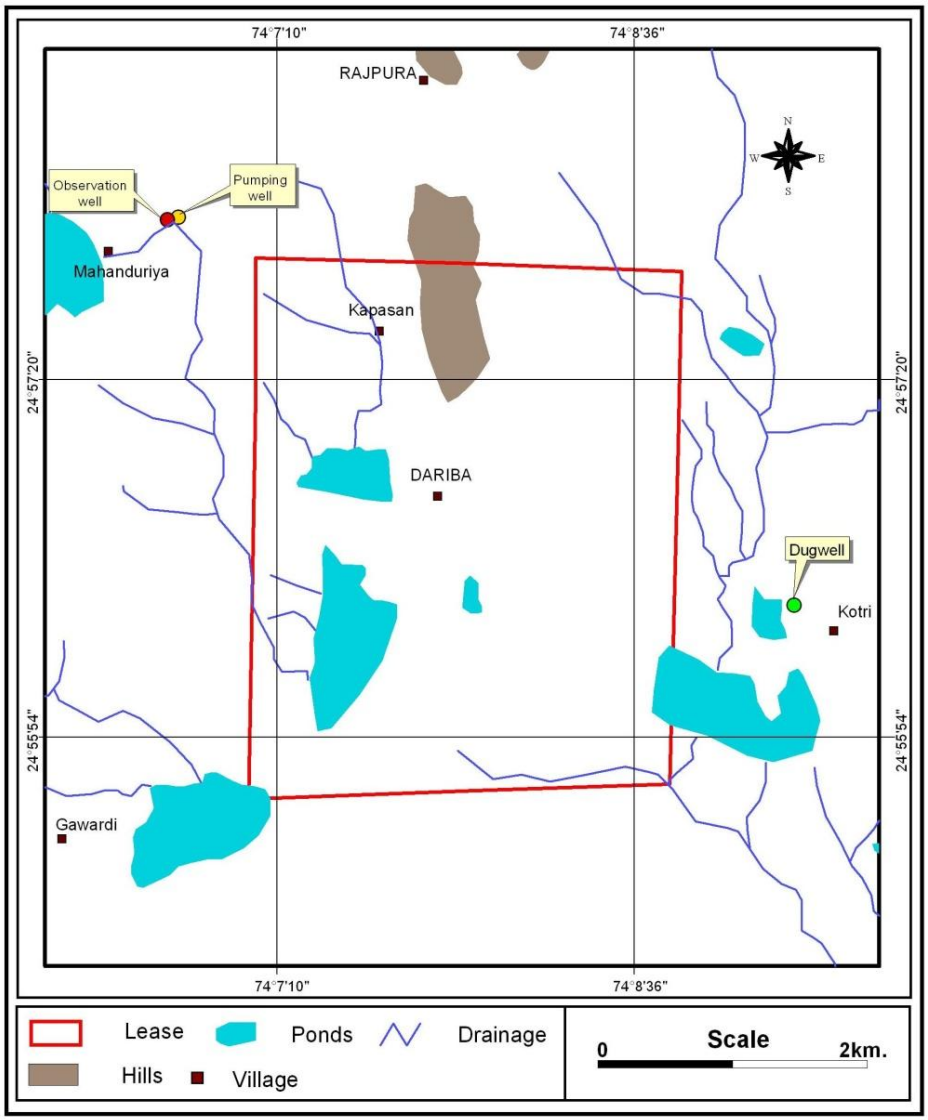
- Aquifer extends radially and infinitely
- Single pumping well
- Constant pumping rate
- Fully penetrating well (except for the Neuman method)

The methods adopted for the present pump tests conducted at Rajpura-Dariba site are: Agarwal Recovery and Double Porosity as these two methods are applicable to the hydrogeological conditions of the area having metamorphic rocks having fracture or secondary porosity.

5.2 Pumping and recuperation data

The aquifer performance test was conducted in borewell located at the north-west corner of the RD mining lease **(Figure-5.1)** for determining the aquifer properties of the pheratic as well as the deeper aquifers.

Figure-5.1. Map showing the location of the wells where the pump tests were conducted



5.2.1 APT conducted on bore well tapping deeper aquifer

The APT was conducted on a working bore well in village Mahanduria which was used as pumping well and another bore well, which was close by, was used as an observation well. A

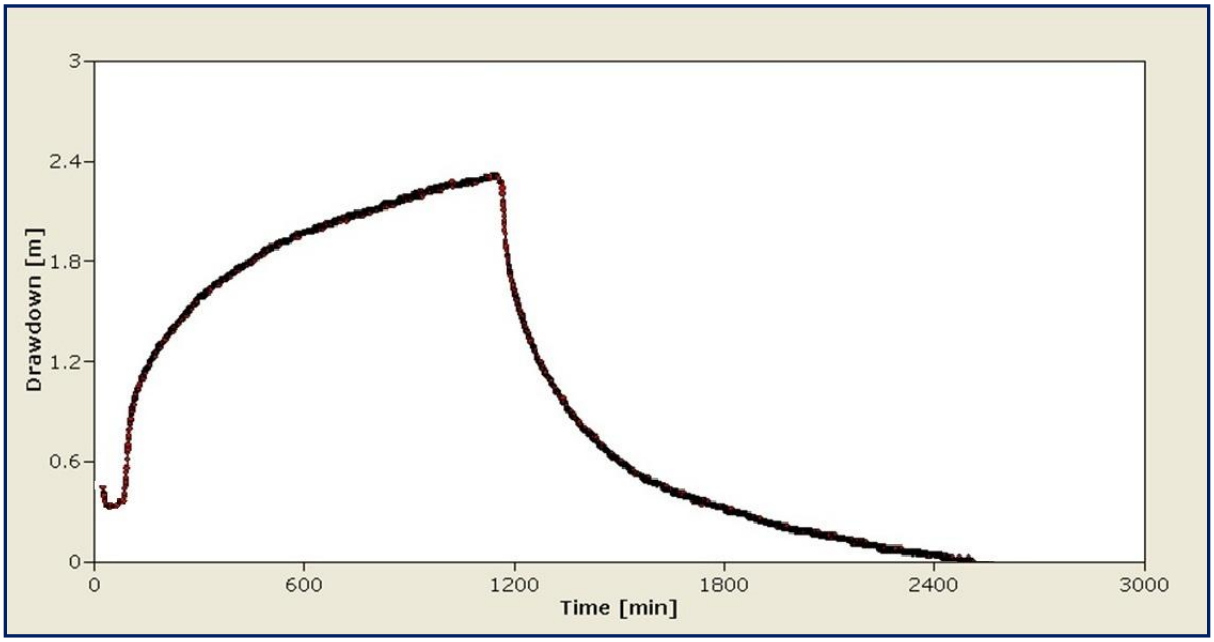
20 hour constant-rate pumping test was conducted at well BW-1 at an average pumping rate of 14.0 m^3/hr. Water-level responses were monitored in the nearby observation well BW-2, during the pumping test and during the following 22 hours recovery period.

A cursory examination of barometric-corrected well water-level responses indicates that the 20 hour pumping test imposed a moderate hydrologic response within the surrounding unconfined aquifer. The details of the pump test are as given below:

Table-5.1. Pumping test data

	Pumping well (BW-1)	**Observation well (BW-2)**
Date of testing	15th to 16th Oct, 2018	15th to 16th Oct, 2018
Depth of tube well	155 m.	155 m.
Diameter of pumping well	165 mm	165 mm
Aquifer	Weathered and fractured to hard and compact Gneisses	Weathered and fractured to hard and compact Gneisses
SWL	13.60 m. bgl.	13.55 m. bgl.
Discharge	14.0 m^3/hour (Av.)	-
Distance of observation well from pumping well	-	16.5 m.

Figure-5.2. Barometric-corrected observation well (BW-2) water-level responses to pumping from BW-1



Equipment used:

The bore well (BW-1) had a 3.0 HP submersible pump set installed with 90 metres head and 51 mm delivery line. The bore well is used frequently by the owner/farmer and had an electric connection with backup power system arranged by HCPL. Similarly the dug well also had a 3.0 HP motor pump installed but was operated only for 6.7 hours as per the electric supply.

Mini Diver water level logger by “Schlumberger Water Services” was installed in BW-2 to measure the water levels during pumping and recovery tests.

Soft wares used:

The aquifer test data were analyzed utilizing "AquiferTest Pro, Version-4.2.0.2" groundwater software developed by Schlumberger Water Services. The divers were operated and data compensated using "Diver Office- V 1.0.0.13"

Diver-Office is a software package to read and program. Diver groundwater data loggers, download Diver monitoring data, and process and display Diver data. In combination with one or more Diver data loggers, Diver-Office constitutes a complete and flexible measurement system

5.3 Interpretation of pump test data

The interpretation of pumping test data is based on mathematical models that relate drawdown response to discharge in the abstraction borehole. The results obtained from the test can then be used to project the borehole's performance over a long period of time.

In fractured-rock aquifers, the geometry and permeability of the system have a large influence on the drawdown. The scale of heterogeneity in a fractured rock system may be large in relation to the scale of the test. Two kinds of models are applied in fractured-rock aquifers, namely the Moench fracture flow model and the double porosity model. However, the methods for porous media (i.e. Theis and Cooper-Jacob) are still applied for parameter estimation in fractured aquifers.

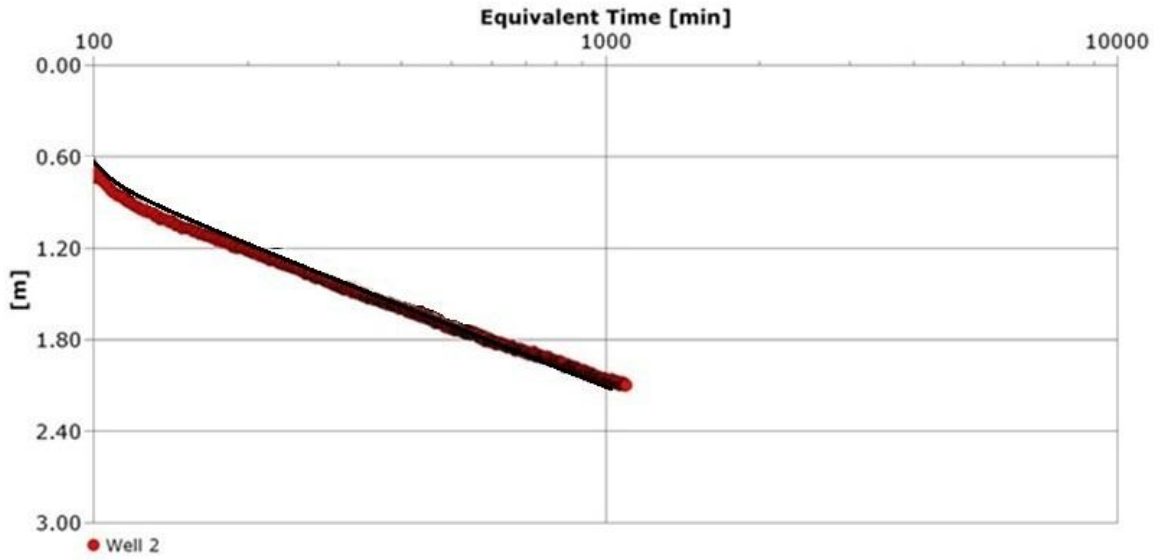
The following methods are used here to analyze fractured-rock pumping test data and the results given below:

- Double Porosity
- Agarwal with Theis Recovery

Figure-5.3. APT calculation based on Double Porosity Fracture Flow

HYDRO-GEOSURVEY CONSULTANTS (P) LTD., JODHPUR	Pumping Test Analysis Report
	Project: RAJPURA-DARIBA MINES
	Number: 2018/15
	Client: HZL

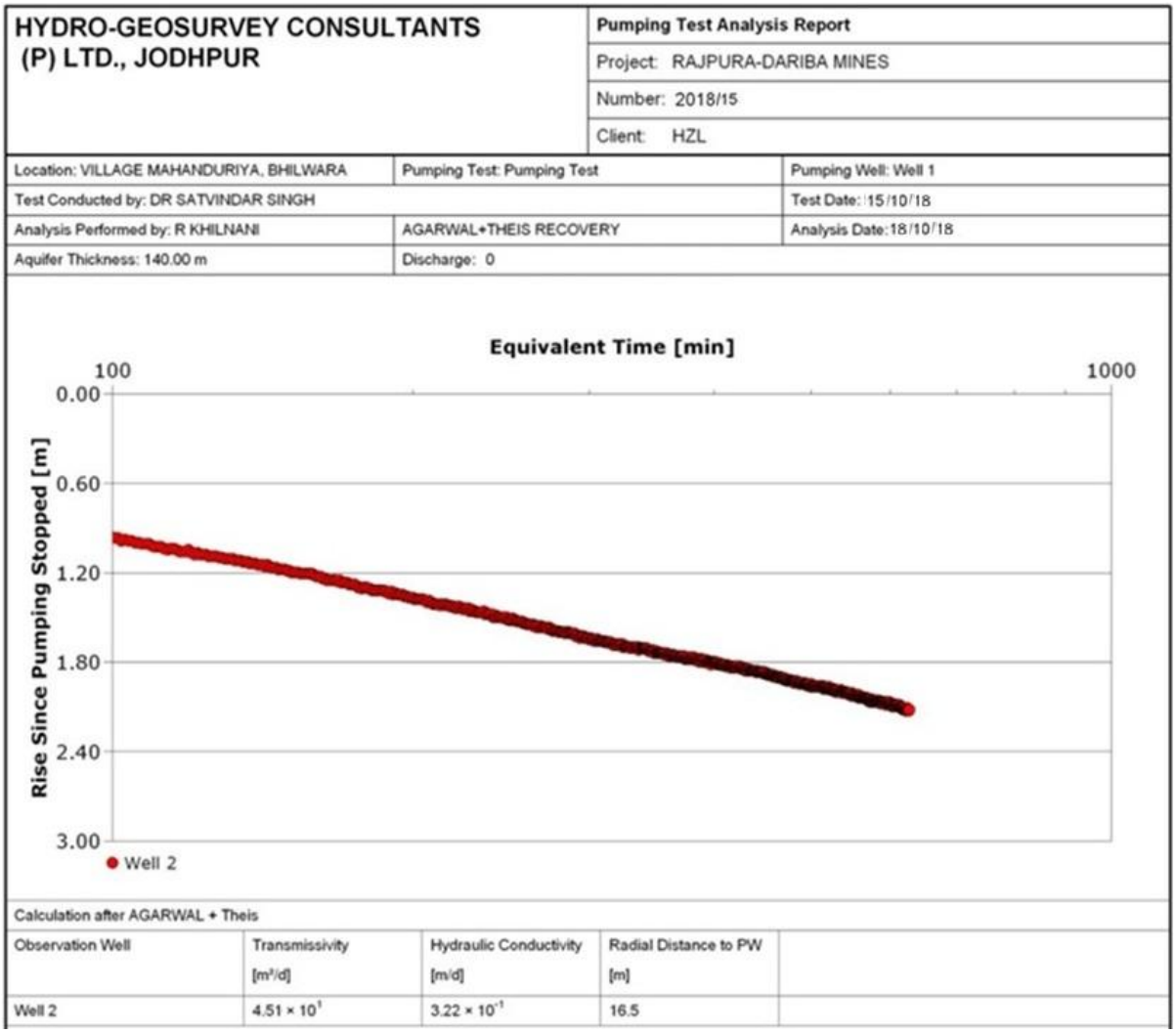
Location: VILLAGE MAHANDURIYA, BHILWARA	Pumping Test: Pumping Test	Pumping Well: Well 1
Test Conducted by: DR SATVINDAR SINGH		Test Date: 15/10/18
Analysis Performed by: DR R KHILNANI	DOUBLE POROSITY	Analysis Date: 18/10/18
Aquifer Thickness: 140.00 m	Discharge Rate: 14.0 [m³/h]	



Calculation after Double Porosity

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Specific storage	Sigma	Lambda	Radial Distance to PW [m]
Well 2	4.49×10^{1}	3.21×10^{-1}	$1.05 \ 10^{-3}$	5.90×10^{2}	1.00×10^{1}	16.5

Figure-5.4. APT calculation based on Agarwal & Theis Recovery method



Based on the values derived from the pump test by two different methods, which are most suitable to the hydrogeological setting of RD mine area, the aquifer parameters are shown in **Table-5.3**. These values of aquifer parameters have been used in the model for determination of inflow of ground water in RD mine.

Table-5.3. Values of aquifer parameters derived by different methods

Aquifer Parameter	APT-I	
	Double Porosity	Agarwal+Theis Recovery
Transmissivity (m^2/day)	4.49×10^{1}	4.51×10^{1}
Hydraulic conductivity (m/day)	3.21×10^{-1}	3.22×10^{-1}
Storativity	1.05×10^{-3}	-

CHAPTER-VI

COMPREHENSIVE HYDROGEOLOGICAL ASSESSMENT STUDIES

6.1 GROUND WATER RECHARGE

The main source of ground water recharge is by the rainfall by direct percolation to the zone of saturation. 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.

6.2 Ground water recharge of lease area (Core zone)

The core zone covers 1142.20 hectares area of mining lease, mostly composed of mica schist. There are ten open wells owned by private cultivators in operation 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.

6.2.1 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 2018 **(Annexure-I)**. Average rise of water level in the mica schist due to rainfall was found as 2.60 m. Taking the specific yield value of 1.75% for the mica schist, the ground water recharge is estimated as under:

$$11.42 \times 1000 \times 1000 \times 2.60 \times 0.0175 = 0.52 \text{ mcm}$$

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 463 mm of the year 2018 amounts to 0.52 mcm which when adjusted to average rainfall of 637 mm, amounts to **0.715 mcm**.

6.2.2 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 cannot 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.

$$11.42 \times 1000 \times 1000 \times 0.637 \times 0.1 = 0.727 \text{ mcm}$$

Area of core zone x rainfall x infiltration = Recharge

6.3 Ground water recharge of 10 km area (Buffer zone)

Buffer zone has mainly mica schist as principal aquifer occupying an area of 302.58 km^2 (314 – 11.42 km^2 of core zone) **(Figure-6.1)** in the tehsil of Railmagra, district Rajsamand.

The ground water fluctuation of water table during pre and post monsoon periods were recorded for the year 2018 from the 30 key wells (Annexure - 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:

6.3.1 Increment in ground water storage

Ground water recharge from rainfall for the year 2018, which was less rainfall year for the area, has been calculated by measuring the rise of water levels in the key wells of the 302.58 km^2 area of buffer zone. The water levels were recorded during post-monsoon period and again during pre monsoon period of the year 2018. The rise of water level indicates the quantity of water percolated to zone of saturation due to recharge from rainfall.

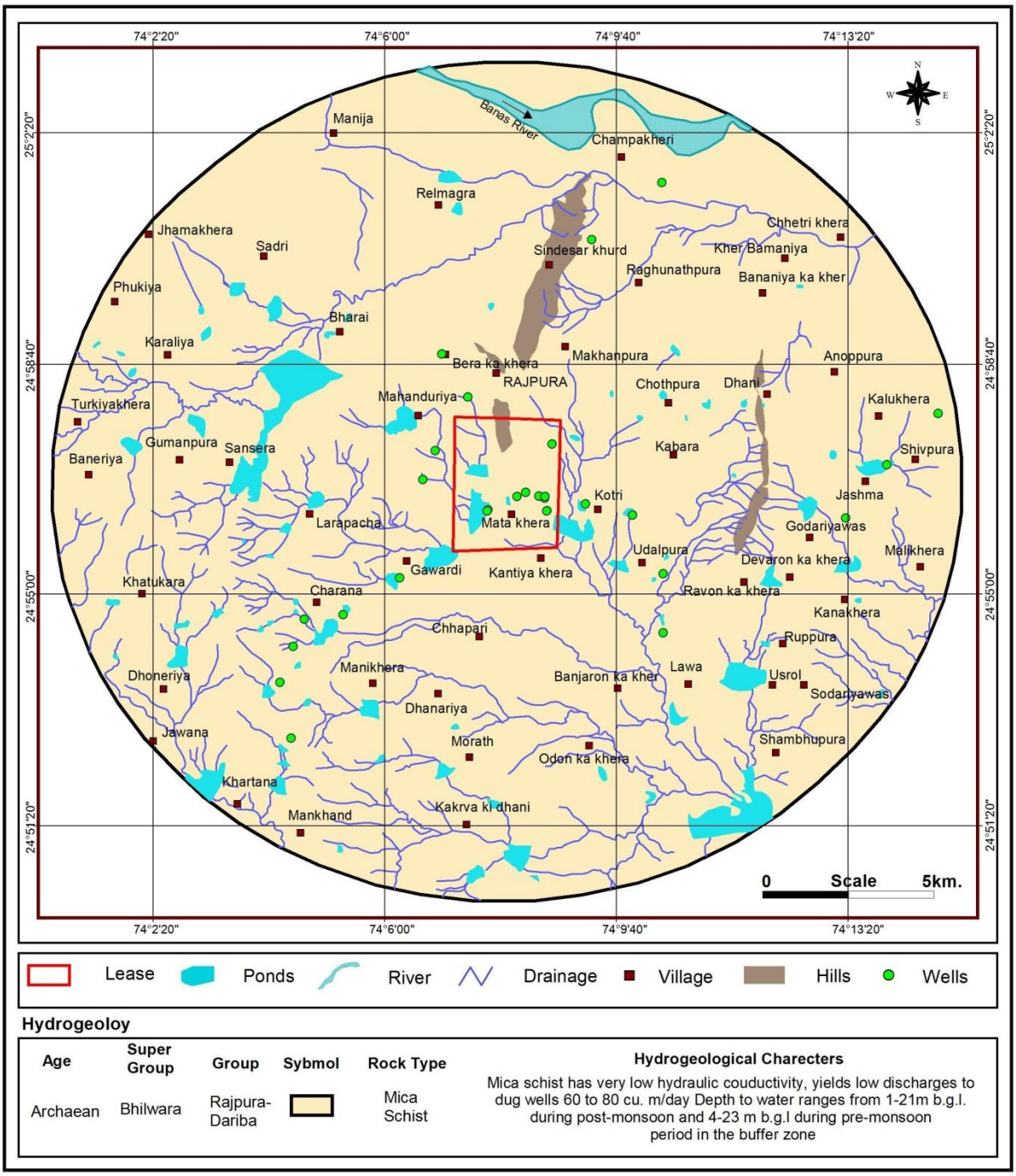
The aerial rise of water has been computed by contour method for water bearing formation and rise was noted as 2.60 m in mica schist. Such value of rise of water level is due to rainfall of 2018. Taking specific yield value of 1.75% for mica schist, the ground water recharge has been calculated for the area covered by water bearing formation. The mica schist covers an area of 302.58 km^2.

$$302.58 \times 1000 \times 1000 \times 2.60 \times 0.0175 = 13.77 \text{ mcm}$$

Area of mica schist x Rise of water level x Specific Yield = Recharge

The ground water recharge for the year 2018 by rainfall of 463 mm when measured as increment in ground water storage amounts to 13.77 mcm which when adjusted for a average annual rainfall 637 mm amounts to **18.95 mcm.**

Figure-6.1. Hydrogeological map of buffer zone



6.3.2 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.

302.58 x 1000 x 1000 x 0.637 x 0.1 = 19.27 mcm

Area of buffer zone x rainfall x infiltration = Recharge

6.3.3 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 21.17 mcm and from surface reservoirs is 3.04 mcm (1520 hectares). The total water applied for irrigation amounts to 24.21 mcm, of which 20% joins ground water storage as return flow of irrigation, amounting to 4.84 mcm.

24.21 x 0.20 = 4.84 mcm

Water applied for irrigation x Return seepage = Recharge

The total ground water recharge of buffer zone from all the sources therefore amounts to **23.79 mcm**.

6.4 GROUND WATER DISCHARGE

6.4.1 Ground water discharge of core zone

The ground water abstraction in the core zone comprising lease area of 11.42 km^2 is by ten open wells operated for irrigation during Rabi period yielding 0.084 mcm of water.

10 x 70 x 120 = 0.084.

No. of wells x yield/day x No. of days of operation = Annual withdrawal

In addition, inflow of ground water in the mine due to intersection of ground water table at 473 mRL has been estimated as 122.46 m^3/day (0.045 mcm) during 2018-2019. The main productive zone, releasing the ground water in the mine is up to -119 mRL. The total discharge from private wells and from mine amounts to **0.129 mcm**.

6.4.2 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 2520 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:

2520 x 70 x 120 = 21.17 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 1,20,122 is met by bore wells, open dug wells and hand pumps and is around

3.29 mcm considering 75/litre/capita/day consumption. The total ground water discharge therefore amounts to **24.46 mcm.**

6.5 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 23.79 mcm, including recharge from return flow of irrigation water, the ground water discharge is 24.30 mcm indicating the status of ground water development of buffer zone as 103%. The buffer zone therefore appears in over exploited category. Similarly, against ground water discharge of 0.129 mcm (including ground water seepage) and the core zone receives ground water recharge of 0.715 mcm indicating present status of ground water development as 18%. The core zone falls in the safe category.

CGWB report is published once in two years and last report has been released in June, 2017 for the dynamic ground water reserves as on 31.03.2013. 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 Railmagra block and Rajsamand district is more than 100% and there is a long term decline of water levels. CGWB therefore has placed

Railmagra block and Rajsamand district under over-exploited category. The status of ground water development of Rajsamand district has been reported by CGWB in its report released in June,2017 as 106 %. The findings of this study for the buffer zone matches with the assessment done by the CGWB for Railmagara block, although the findings of the CGWB are for the assessment year 2013.

CHAPTER – VIII

RAIN WATER HARVESTING FOR ARTIFICIAL GROUND WATER RECHARGE

8.1 Need for ground water recharge

HZL obtained the NOC from Central Ground Water Authority (CGWA) in the year 2009 for daily mine dewatering permission of 446.50 m^3/day vide letter No. letter No. 21-4 (315) WR/CGWA/2008-212 dated 14.7.2009 when the annual production of ore was around 5 lac tones and was again allowed to continue to dewater the accumulated ground water in the mine @ 446.50 m^3/day due to seepage and intersection of water table vide letter No. 21-4(315)/WR/CGWA/2008-3744 dated 6th June, 2012. However, CGWA has now decided that 2nd renewal would be issued for 3 years and then once in every 5 years. As per this decision, it has been decided to apply for its renewal for next 3 years as per the latest guide lines of CGWA by submitting the application of renewal for increased mine discharge by modeling using MODFLOW along with comprehensive hydrogeological assessment studies and artificial ground water recharge program as the annual production is to be increased up-to 9 lac tonnes which increase the excavation and thereby increased inflow of ground water.

With the average dewatering of 794.85 m^3/day or 0.290 mcm /year of 5 years period of the Mining Scheme which is ground water inflow in the mine due to intersection of ground water table, it is mandatory to artificially recharge the ground water basin of the lease area and its buffer zone. As there is one aquifer system in the metamorphic of the area, any dewatering done will ultimately will have impact on the phreatic aquifer causing the water

level to decline by the reduction in the static ground water reserves. This requires to be supplemented by artificial ground water recharge.

Knowing that the present the status of ground water development of Railmagra block and Rajsamand district is more than the long term ground water recharge and accordingly it has been declared as an over-exploited area by the CGWB and also by the comprehensive hydrogeological assessment studies done by HCPL, it is mandatory to recharge the ground water by double the quantity of the annual dewatering or 0.58 mcm as per the latest guidelines of the CGWA. HZL also realizing its national obligation proposes to utilize the surface runoff of the buffer zone of Rajpura- Dariba mine by deepening of existing village tanks so that these function as percolation tanks. Recharge of the buffer zone by way of percolation tanks by around 3.0 mcm/year will help in arresting the long term trend of declining of water table.

8.2 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 Rajpura-Dariba 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 can not 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 to 10 metres during post monsoon period so on an average, about 3 to 7 metres of unsaturated zone comprising of alluvium and weathered schist is available which can be recharged.

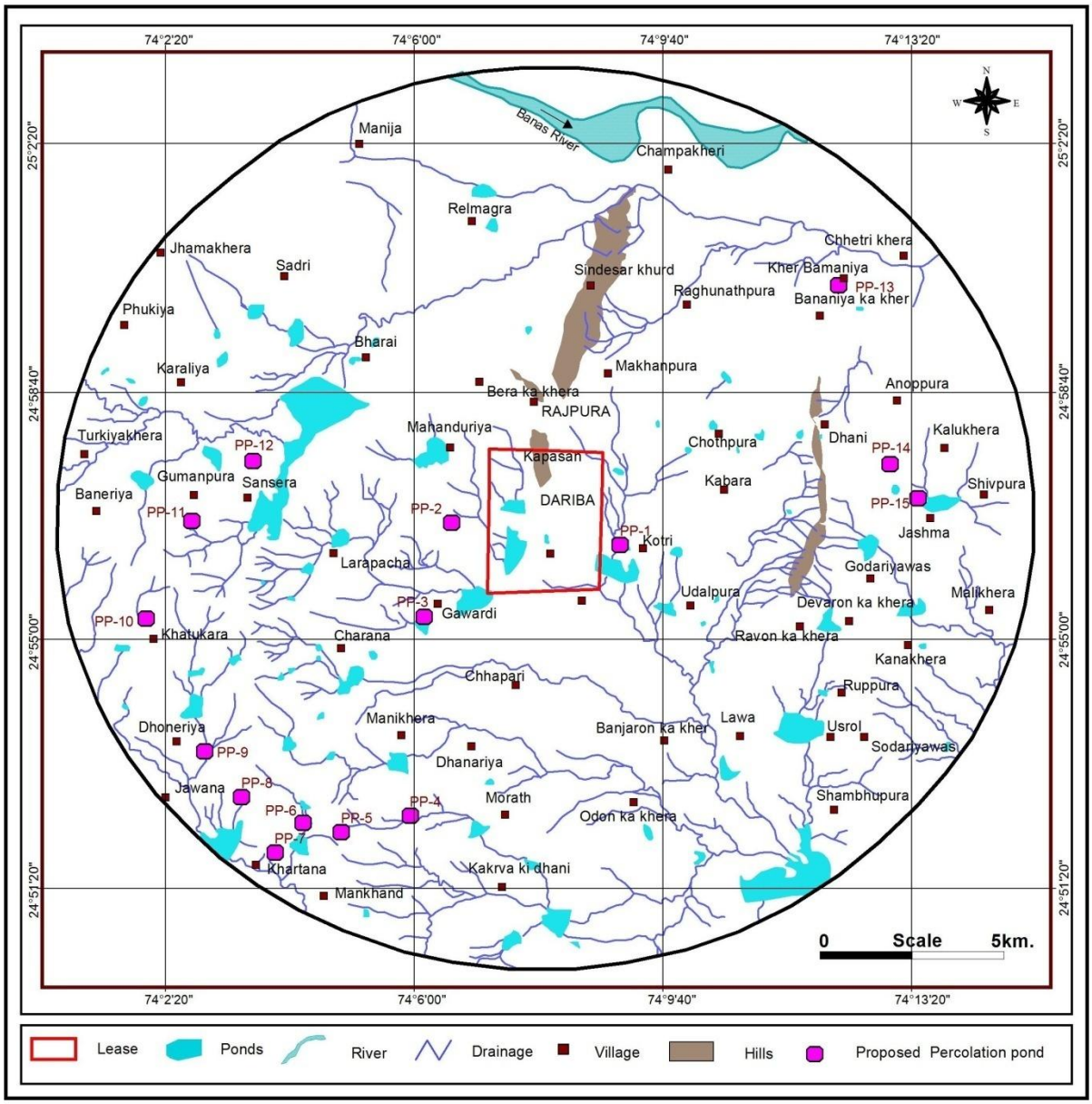
Keeping these considerations in view, surface runoff of the buffer zone which has been partly utilized by the villagers by constructing tanks is proposed to be harnessed and the existing village tanks are proposed to be deepened to store more water for ground water recharge which will percolate faster with the removal of clays deposited in the past in the bottom of the tank bed.

8.3 Surface runoff utilization

After reviewing the area around the mines and nearby villages by studying the satellite imagery and toposheet of Survey of India on scale 1:50,000, seventeen existing village tanks have been identified, which have more catchment yield than the present water storage capacity of village tanks and are proposed to be deepened to accommodate major part of the surface runoff available. The percolation tanks are mainly for ground water recharge and will 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 will be increased, keeping the same evaporation loss thereby retaining water during summer for their cattle.

Figure-8.1. Map showing location of existing village tanks proposed for deepening to function as percolation tanks in the buffer zone of the mine



8.3.1 Percolation tank (PP-1) near village Kotri

An existing tank (PP-1) near village Kotri (N 24° 56' 22.5", E 74° 09' 04.6") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.3).** At present, the tank has storage capacity of 1,20,000 m^3 with water column of 0.5 metre in 600 m x400 m area. The catchment area of the tank has been measured as 2.76 km^2 which will provide 8,57,143 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.0 metres. The additional storage capacity of this tank of 24,0000 m^2 area, if deepened up to average depth of 2.0 metres will be **4,80,000 m^3.**

$$600 \times 400 \times 2.0 = 4,80,000\ m^3$$

As the tank, will have the total water storage capacity of 6,00,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 2,40,000 m^3 will be lost as evaporation and by stray cattle . The ground water recharge from proposed percolation tank (PP-1) near village Kotri will be 2,40,000 m^3. There is an unsaturated zone, about >5 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.1. Proposed percolation tank (PP-1) near village Kotri

8.3.2 Percolation tank (PP-2) near village Anjana

An existing tank (PP-2) near village Anjana (N 24° 56' 42.5", E 74° 06' 31.3") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.4).** At present, the tank has storage capacity of 1,00,000 m^3 with water column of 1.0 metre in 400m x250 m area. The catchment area of the tank has been measured as 1.38 km^2 which will provide 4,28,571 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.0 metres. The additional storage capacity of this tank of 1,00,000 m^2 area, if deepened up to average depth of 2.0 metres will be **2,00,000 m^3.**

$$400 \times 250 \times 2.0 = 2,00,000\ m^3$$

As the tank, will have the total water storage capacity of 3,00,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,00,000 m^3 will be lost as evaporation and by stray cattle . The ground water recharge from proposed percolation tank (PP-2) near village Anjana will be 1,00,000 m^3. There is an unsaturated zone, about >10 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.2. Proposed percolation tank (PP-2) near village Anjana

8.3.3 Percolation tank (PP-3) near village Gawardi

An existing tank (PP-3) near village Gawardi (N 24° 55' 17.2", E 74° 06' 06.3") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.5).** At present, the tank has storage capacity of 1,20,000 m^3 with water column of 1.0 metre in 400 m x300 m area. The catchment area of the tank has been measured as 1.66 km^2 which will provide 5,14,286 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.0 metres. The additional storage capacity of this tank of 1,20,000 m^2 area, if deepened up to average depth of 2.0 metres will be **2,40,000 m^3.**

$$400 \times 300 \times 2.0 = 2,40,000\ m^3$$

As the tank, will have the total water storage capacity of 2,25,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,20,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-3) near village Gawardi will be to 1,20,000 m^3. There is an unsaturated zone, about >10 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.3. Proposed percolation tank (PP-3) near village Gawardi

8.3.4 Percolation tank (PP-4) near village Khetikhera

An existing tank (PP-4) near village Khetikhera (N 24° 52' 16.8", E 74° 05'53.8") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.6).** At present, the tank has storage capacity of 67,500 m^3 with water column of 0.50 metre in 450 m x 300 m area. The catchment area of the tank has been measured as 1.86 km^2 which will provide 5,78,571 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 1,35,000 m^2 area, if deepened up to average depth of 2.5 metres will be **3,37,500 m^3.**

$$450 \times 300 \times 2.5 = 3,37,500\ m^3$$

As the tank, will have the total water storage capacity of 4,05,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,68,750 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-4) near village Khetikhera will be 1,68,750 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.4. Proposed percolation tank (PP-4) near village Khetikhera

8.3.5 Percolation tank (PP-5) near village Mankhand

An existing tank (PP-5) near village Mankhand (N 24° 52' 01.6", E 74° 04' 51.2") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.7).** At present, the tank has storage capacity of 60,000 m^3 with water column of 0.50 metre in (400 m x300 m area. The catchment area of the tank has been measured as 1.66 km^2 which will provide 5,14,286 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 1,20,000 m^2 area, if deepened up to average depth of 2.5 metres will be **3,00,000 m^3.**

$$400 \times 300 \times 2.5 = 3,00,000\ m^3$$

As the tank, will have the total water storage capacity of 3,60,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,50,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-5) near village Mankher will be 1,50,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.5. Proposed percolation tank (PP-5) near village Mankhand

8.3.6 Percolation tank (PP-6) near village Mankhand

An existing tank (PP-6) near village Mankhand (N 24° 52' 10.4", E 74° 04' 16.3") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.8).** At present, the tank has storage capacity of 18,750 m^3 with water column of 0.25 metre in 300 m x 250 m area. The catchment area of the tank has been measured as 1.12 km^2 which will provide 3,48,214 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 75,000 m^2 area, if deepened up to average depth of 3.0 metres will be **2,25,000 m^3.**

$$300 \times 250 \times 3.0 = 2,25,000 \text{ m}^3$$

As the tank, will have the total water storage capacity of 2,43,750 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,12,500 m^3 will be lost as evaporation and by stray cattle . The ground water recharge from proposed percolation tank (PP-6) near village Mankher will be 1,12,500 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.6. Proposed percolation tank (PP-6) near village Mankhand

8.3.7 Percolation tank (PP-7) near village Khartana

An existing tank (PP-7) near village Khartana (N 24° 51' 43.3", E 74° 03' 50.9") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.9).** At present, the tank has storage capacity of 37,500 m^3 with water column of 0.50 metre in 300 m x 250 m area. The catchment area of the tank has been measured as 1.21 km^2 which will provide 3,75,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 75,000 m^2 area, if deepened up to average depth of 3.0 metres will be **2,25,000 m^3.**

$$300 \times 250 \times 3.0 = 2,25,000\ m^3$$

As the tank, will have the total water storage capacity of 2,62,500 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,12,500 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-7) near village Khurtar will be 1,12,500 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.7. Proposed percolation tank (PP-7) near village Khartana

8.3.8 Percolation tank (PP-8) near village Khartana

An existing tank (PP-8) near village Khartana (N 24°52'33.7", E 74°03'20.5") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.10).** At present, the tank has storage capacity of 50,000 m^3 with water column of 0.50 metre in 400 m x 250 m area. The catchment area of the tank has been measured as 1.61 km^2 which will provide 5,00,000 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 1,00,000 m^2 area, if deepened up to average depth of 3.0 metres will be **3,00,000 m^3.**

$$400 \times 250 \times 3.0 = 3,00,000\ m^3$$

As the tank, will have the total water storage capacity of 3,50,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,50,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-8) near village Khurtar will be 1,50,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.8. Proposed percolation tank (PP-8) near village Khartana

8.3.9 Percolation tank (PP-9) near village Dhaneriya

An existing tank (PP-9) near village Dhaneriya (N 24° 53' 15.1", E 74° 02' 46.8") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.11).** At present, the tank has storage capacity of 45,000 m^3 with water column of 0.25 metre in 450 m x 400 m area. The catchment area of the tank has been measured as 2.25 km^2 which will provide 7,07,143 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 1,80,000 m^2 area, if deepened up to average depth of 2.5 metres will be **4,50,000 m^3.**

$$450x400 \times 2.5 = 4,50,000\ m^3$$

As the tank, will have the total water storage capacity of 4,95,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 2,25,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-9) near village Dhaneriya will be 2,25,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.9. Proposed percolation tank (PP-9) near village Dhaneriya

8.3.10 Percolation tank (PP-10) near village Khatukara

An existing tank (PP-10) near village Khatukara (N 24° 55' 15.7", E 74°01'53.7") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.12).** At present, the tank has storage capacity of 40,000 m^3 with water column of 0.25 metre in 400 m x 400 m area. The catchment area of the tank has been measured as 2.39 km^2 which will provide 7,42,857 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 1,60,000 m^2 area, if deepened up to average depth of 3.0 metres will be **4,80,000 m^3.**

$$400 \times 400 \times 3.0 = 4,80,000\ m^3$$

As the tank, will have the total water storage capacity of 5,20,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 2,40,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-10) near village Khatukara will be 2,40,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.10. Proposed percolation tank (PP-10) near village Khatukara

8.3.11 Percolation tank (PP-11) near village Sansera

An existing tank (PP-11) near village Sansera (N 24° 56' 44.1", E 74° 02' 35.3") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.13).** At present, the tank has storage capacity of 30,000 m^3 with water column of 0.25 metre in 400 m x 300 m area. The catchment area of the tank has been measured as 1.52 km^2 which will provide 4,71,429 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 1,20,000 m^2 area, if deepened up to average depth of 2.5 metres will be **3,00,000 m^3.**

$$400 \times 300 \times 2.5 = 3,00,000\ m^3$$

As the tank, will have the total water storage capacity of 3,30,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,50,000 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-11) near village Sansera will be 1,50,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.11. Proposed percolation tank (PP-11) near village Sansera

8.3.12 Percolation tank (PP-12) near village Sansera

An existing tank (PP-12) near village Sansera (N 24° 57' 41.4", E 74° 04' 05.4") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.14).** At present, the tank has storage capacity of 56,250 m^3 with water column of 0.25 metre in 500 m x 450 m area. The catchment area of the tank has been measured as 2.85 km^2 which will provide 8,83,929 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 2,25,000 m^2 area, if deepened up to average depth of 2.5 metres will be **5,62,500 m^3.**

$$500 \times 450 \times 2.5 = 5,62,500 \text{ m}^3$$

As the tank, will have the total water storage capacity of 6,18,750 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 2,81,250 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-12) near village Sansera will be 2,81,250 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.12. Proposed percolation tank (PP-12) near village Sansera

8.3.13 Percolation tank (PP-13) near village Bamnia Ka Khera

An existing tank (PP-13) near village Bamnia ka khera (N 25° 00' 18.4", E 74° 12' 23.3") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.15).** At present, the tank has storage capacity of 26,250 m^3 with water column of 0.25 metre in 350 m x 300 m area. The catchment area of the tank has been measured as 1.57 km^2 which will provide 4,87,500 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 1,05,000 m^2 area, if deepened up to average depth of 3.0 metres will be **3,15,000 m^3.**

$$350 \times 300 \times 3 = 3,15,000\ m^3$$

As the tank, will have the total water storage capacity of 3,41,250 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,57,500 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-13) near village Bamnia ka khera will be 1,57,500 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.13. Proposed percolation tank (PP-13) near village Bamnia ka khera

8.3.14 Percolation tank (PP-14) near village Jasma

An existing tank (PP-14) near village Jasma (N 24° 57' 36.0", E 74° 13' 10.1") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.16).** At present, the tank has storage capacity of 30,000 m^3 with water column of 0.25 metre in 400 m x300 m area. The catchment area of the tank has been measured as 1.59 km^2 which will provide 5,57,143 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 3.0 metres. The additional storage capacity of this tank of 1,20,000 m^2 area, if deepened up to average depth of 3.0 metres will be **3,60,000 m^3.**

$$400 \times 300 \times 3 = 3,60,000\ m^3$$

As the tank, will have the total water storage capacity of 3,90,000 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 1,80,000 m^3 will be lost as evaporation and by stray cattle.. The ground water recharge from proposed percolation tank (PP-14) near village Jasma will be 1,80,000 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.14. Proposed percolation tank (PP-14) near village Jasma

8.3.15 Percolation tank (PP-15) near village Jasma

An existing tank (PP-15) near village Jasma (N 24° 57' 05.0", E 74° 13' 35.2") is proposed for recharging the ground water basin and will function as percolation tank **(Photoplate-8.17).** At present, the tank has storage capacity of 50,625 m^3 with water column of 0.25 metre in 450 m x 450 m area. The catchment area of the tank has been measured as 2.56 km^2 which will provide 7,95,536 m^3 of water taking 50% as runoff coefficient after compaction of soil of catchment area and desilting of streams. The storage capacity of the existing tank can be increased by deepening the tank by 2.5 metres. The additional storage capacity of this tank of 2,02,500 m^2 area, if deepened up to average depth of 2.5 metres will be **5,06,250 m^3.**

$$450 \times 450 \times 2.5 = 5,06,250\ m^3$$

As the tank, will have the total water storage capacity of 5,56,875 m^3 which will be received in four to five spell of rainfall during monsoon months, it is expected that almost 50% of the additional storage capacity will be recharged as the tank bottom has a alluvial zone followed by weathered mica schist. The balance quantity of water of 2,53,125 m^3 will be lost as evaporation and by stray cattle. The ground water recharge from proposed percolation tank (PP-15) near village Jasma will be 2,53,125 m^3. There is an unsaturated zone, about >8 metres thick during post -monsoon period which would get recharged from this tank.

Photoplate-8.15. Proposed percolation tank (PP-15) near village Jasma

8.4 Total rainwater harvested

With the proposed program of deepening of seventeen existing village tanks by storing the available catchment yield, the ground water basin of the buffer zone will be recharged by **28,95,625 m^3/year (2.90 mcm/year)** taking 50% of the ground water recharge of the additional water storage capacity created by deepening. This is more than the mandatory requirement of 2.296 mcm. The details of ground water recharge of each village tank by deepening are shown in table below.

Table-8.1. Details of additional water storage created by deepening of existing village tanks

S. No.	Location of ponds	Recharge
1.	Proposed percolation tank (PP-1) near village Kotri	2,40,000 m^3
2.	Proposed percolation tank (PP-2) near village Anjana	1,00,000 m^3
3.	Proposed percolation tank (PP-3) near village Gawardi	1,20,000 m^3
4.	Proposed percolation tank (PP-4) near village Khetikhera	1,68,750 m^3
5.	Proposed percolation tank (PP-5) near village Mankhand	1,50,000 m^3
6.	Proposed percolation tank (PP-6) near village Mankhand	1,12,500 m^3
7.	Proposed percolation tank (PP-7) near village Khatukara	1,12,500 m^3
8.	Proposed percolation tank (PP-8) near village Khatukara	1,50,000 m^3
9.	Proposed percolation tank (PP-9) near village Dhaneriya	2,25,000 m^3
10.	Proposed percolation tank (PP-10) near village Khatukara	2,40,000 m^3
11.	Proposed percolation tank (PP-11) near village Sansera	1,50,000 m^3
12.	Proposed percolation tank (PP-12) near village Sansera	2,81,250 m^3
13.	Proposed percolation tank (PP-13) near village Bamnia ka khera	1,57,500 m^3
14.	Proposed percolation tank (PP-14) near village Jasma	1,80,000 m^3
15.	Proposed percolation tank (PP-15) near village Jasma	2,53,125 m^3
	Grand Total	**28,95,625 m^3**

Although, the mandatory requirement of ground water recharge is only 2.295 mcm, it has been proposed to augment the ground water storage by artificial ground water recharge by 2.895 mcm/year by deepening 15 existing village tanks. Few additional village tanks have been identified so that in case there is any problem with any village tanks, such tanks may be excluded from the deepening program without affecting the mandatory requirement of 2.295 mcm/year.

CHAPTER – IX

9.0 IMPACT OF MATAJI KA KHERA POND ON THE INFLOW OF WATER IN THE MINE

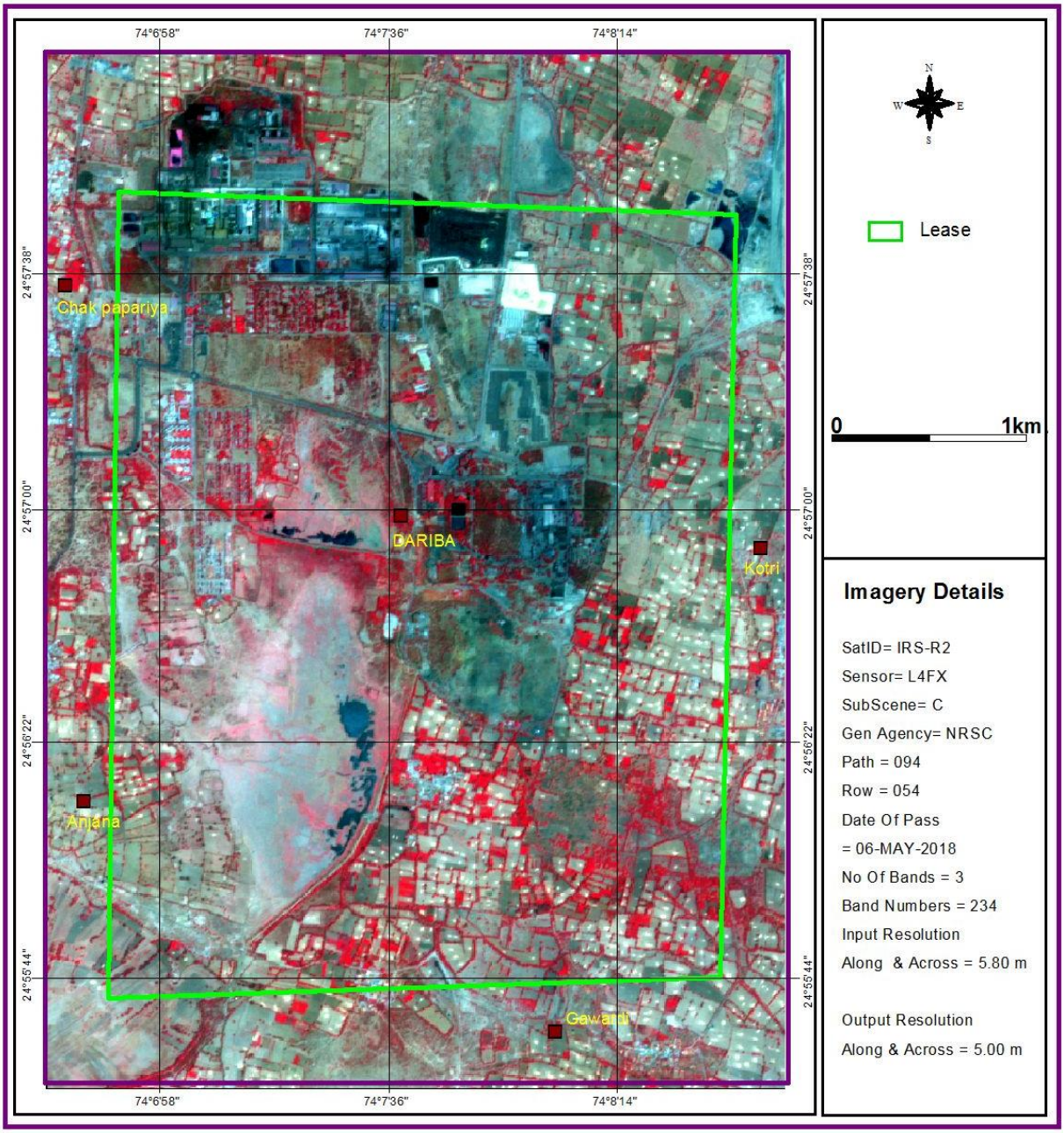
9. 1 Impact of Mataji Ka Khera pond on the inflow of water in the mine

There is a pond within the lease area known as Mataji Ka Khera. This pond is located in the low lying area of the lease and is located in the south –western side of the lease area. The pond, when fully filled during a normal rainfall year covers an area of 187 hectares during September-October, (Figure-9.1) and stores 1.87 mcm of water. The catchment area of the pond is 787 hectares which provides 2.00 mcm of water taking 40 % as surface runoff coefficient of rocky and thorny vegetation and annual average rainfall of 636 mm.

This ponds retains water for major part of the year but stores only a limited quantity of water during May-June. **(Figure-9.2)**. Taking an average size of the water spread area of pond as 32 hectares for six months, November to April, the evaporation losses from water surface area will be 0.33 mcm taking 1050 mm as total evaporation for six months against the annual evaporation of 2750 mm/year in Rajsamand district. Out of total water storage capacity of 1,87 mcm, the evaporation losses will be 0.33 mcm during the winter period. The 50% of the balance quantity of 1.54 mcm gets percolated in the mine and it amounts to 0.77 mcm which enters in the mine. This much quantity of water is the contribution of Mataji Ka Khera in the mine and therefore is major impact on the mine.

Figure-9.1. Water retained in Mataji Ka Khera pond during October,2017

Figure-9.2. Satellite imagery of buffer zone of lease area (LISS-4) showing the water retained in Mata ji Ka Khera during May, 2018



9.2 Water balance of the mine

At present, the average dewatering from the mine has been measured as 3145 m^3/day , (1.148 mcm/year) which is fully utilized for beneficiating the ore in the beneficiation plant. Against this output, there are mainly five inputs of water which enter in the mine and is being pumped out .

The first major input is 0.77 mcm is direct percolation from Mataji Ka Khera pond which happens to be 50 % of the water storage capacity (1.54 mcm) less evaporation losses.

The second input is from the inflow of water due to intersection of ground water table in the mine is 446.50 m^3/day (01.63 mcm) when the production of mine was 0.9 MTPA and for which NOC from CGWA was obtained in the year 2009 .

The third input is also from the inflow of ground water due to intersection of ground water table when the production was proposed to be increased by 20 % to 1.08 MTPA. With the additional excavation to raise the production, additional inflow was estimated by modeling which amounted to 208 m^3/day (0.076 mcm).

The fourth input is from the old workings excavated in the historical past to recover ore and through them the rainfall enters in the mine .The area of old workings had been determined as 10.42 hectares which contributes 90 % of the rain falling on the old pits , as water percolates directly in the mine like a pipe flow and amounts to 0.06 mcm taking average annual rainfall of 636 mm.

The fifth input is from the recharge from gossans (oxidized zone) surrounding the mine and covers an area of 54 hectares. The it is mostly oxidized and highly cavernous zone, almost 50

% of the rainfall recharges the ground water and enters in the mine and amounts to 0.17 mcm taking average annual rainfall of 636 mm.

So, the total input of the water entering the mine from five sources amounts to 1.239 mcm and against this .the dewatering is 1.148 mcm /year taking 3145m^3/day indicating that total entry of water in the mine is more than the dewatering and the balance remains in the mine sumps.

CHAPTER-X

Beneficiation plant- Water conservation, its drainage and impact on water regime

10.1 Water conservation for the plant

With a view to maintain the Zero discharge from the Beneficiation plant and from lease area, all efforts are being made to conserve the water used in the process. The following water conservation measures are being adopted for the existing beneficiation plant having capacity of 1.2 MTPA and the same conservation measures will be adopted for the new beneficiation plant of 1.3 MTPA.

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 nearby having HDPE lining 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. A regular monitoring system is being undertaken by the Environment Division of RD 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.

5. The main issue of undertaking the only remedial measure is to see that Zero discharge concept is maintained and it should be a top priority and main concern of the mine /plant management.

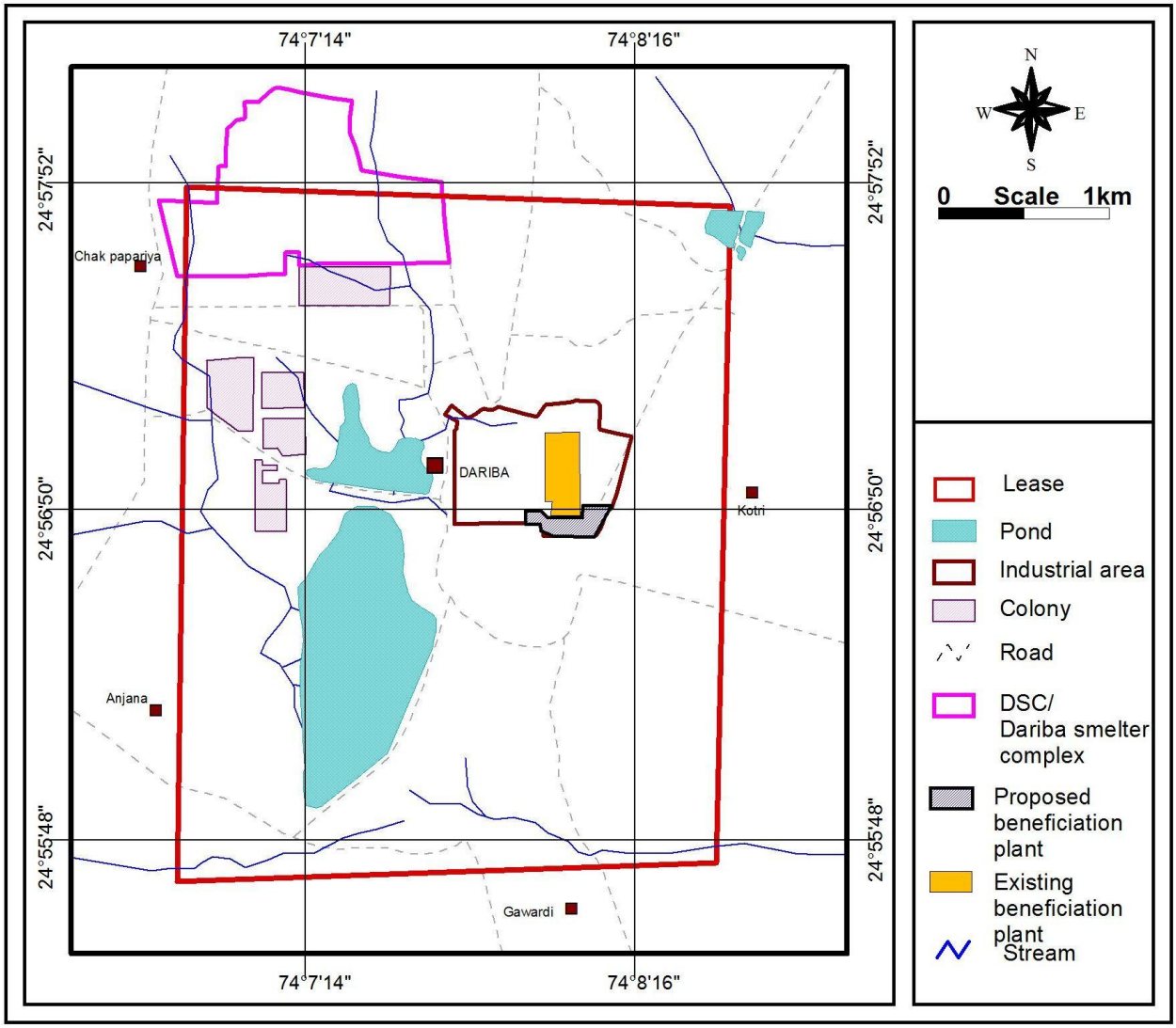
10.2 Hydrology and drainage pattern around beneficiation plant

The drainage map of lease area is shown in **Figure- 10.1** where the existing beneficiation is located in the central part of the lease area while proposed beneficiation plant of 1.3 MTPA is to be constructed just south of the existing plant. The beneficiation plant is located in the central – southern part of the Industrial area which comprises the Administration block and beneficiation plant and its Lab.

There is a hill, covering about 35 hectares **(Figure-2.1 DEM)** located in the south eastern part of the lease area and beneficiation plant. It highest elevation is 521 m amsl and works as drainage divide. The drainage on the southern side of the hill takes easterly course and leaves the mining lease area while the drainage on the western side of the hill and industrial area takes westerly course joining northern part of the Mataji Ka Khera pond. There is a road between northern and southern part of the Mataji Ka Khera . The southern part of Mataji Ka Khera stores much more water than the northern part .There is another first order stream in south-western part of the lease area which takes westerly course.

So the drainage of the lease area as well as of the beneficiation plant is not disturbed and takes it natural course. There is therefore no need to divert any stream in the lease area and in the area surrounding the beneficiation plant. Roof top rainwater and water from the paved roads of the industrial area is collected in cemented drains and is discharged in the natural plantation in the south eastern and north eastern directions. The natural plantation was also getting the surface runoff of this area prior to construction of industrial area.

Figure-10.1 Drainage map of lease and beneficiation plant area



10.3 Impact of beneficiation plant on surface water

While issuing the Environmental Clearance for Sindesar Khurd mine, MoEF had asked the HZL to conduct the comprehensive studies indicating the impact due to mining on surface and ground water, aquatic life and on plantation during the year post-monsoon period, 2016. While conducting the EC compliance studies, HCPL collected 20 surface water samples from 10 km buffer zone of Sindersar Khurd mine which included RD mine also. Just to have an idea about the quality of surface water surrounding the beneficiation plant, the chemical analysis of earlier study conducted for Sindesar Khurd mine is being used for knowing the impact of beneficiation plant on surface water regime.The results of chemical analysis of 6 surface water samples

surrounding the RD mine from streams and ponds were collected during post –monsoon period, 2017 which were analyzed by NABL accredited Lab. The results of 6 surface water samples, collected from streams and ponds surrounding RD mine are shown in **Figure- 10.2** and results of chemical analysis are shown in **Table No.10.1**

Figure-10.2 Map showing the location of surface water samples collected and analyzed from the surrounding area of beneficiation plant.

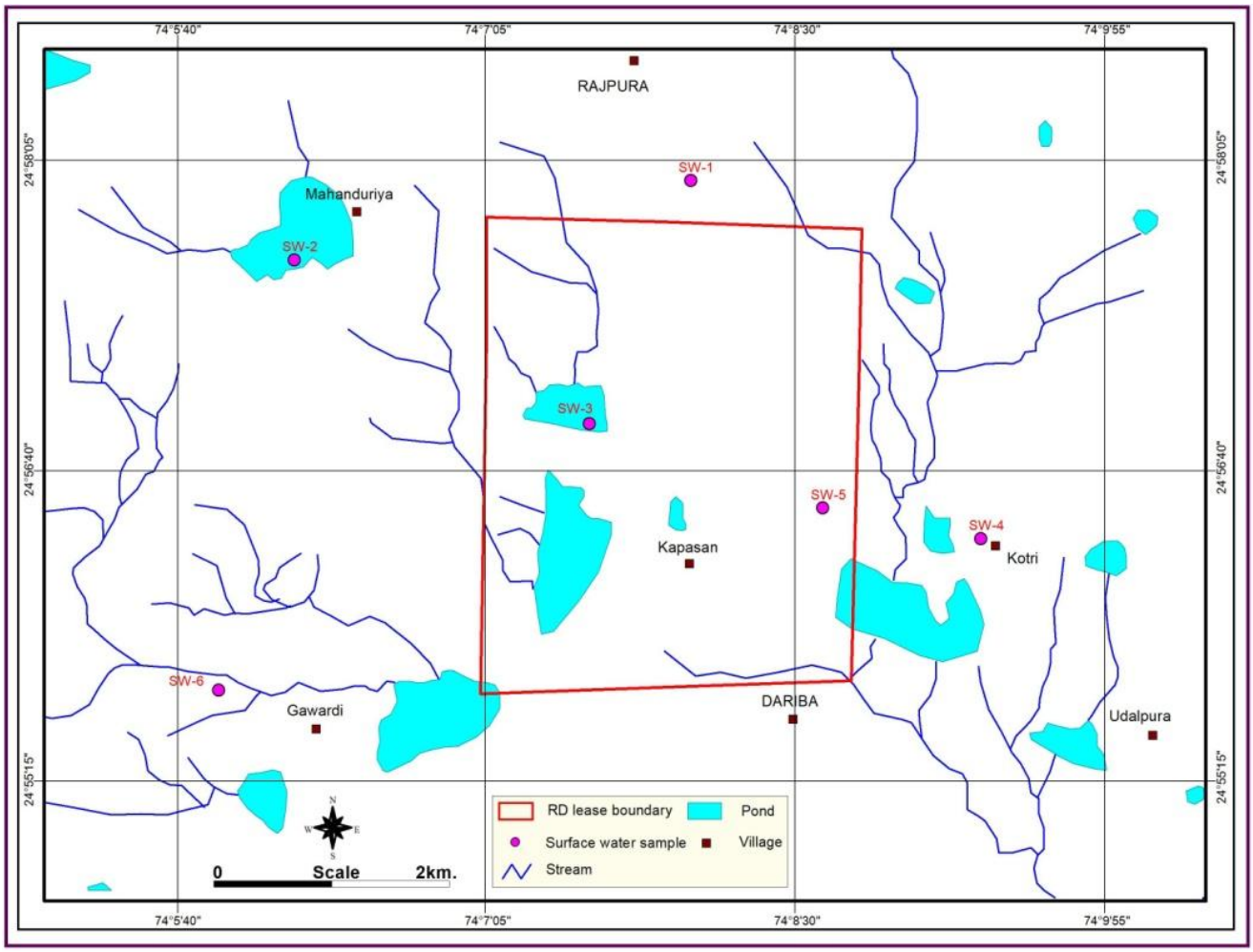


Table 10.1 Results of chemical analysis of surface water samples analyzed by NABL accredited Lab.

S.No.	Parameter	Unit	SW1	SW2	SW3	SW4	SW5	SW6	Acceptable limit as per IS 10500, 2012	Permissible limit as per IS10500, 2012
1	pH	-	7.81	7.84	8.05	7.92	8.05	7.81	6.5 to 8.5	No relaxation
2	TDS	mg/L	320	656	510	690	425	214	500, Max	2000
3	EC at 25oC	µS/cm	536	1020	908	1069	728	348	…	…
4	Total Hardness as CaCO3	mg as CaCO3/l	112	286	193	282	190	106	200.0	600.0
5	Calcium, Ca	mg/L	25	80	41	70	45	21	75.0	200.0
6	Magnesium, Mg	mg/L	12	21	22	26	19	13	30.0	100.0
7	Total Alkalinity	mg as CaCO3/l	124	132	116	128	170	84	200, Max	600.0
8	Chlorides, Cl	mg/L	70	130	121	140	96	51	250, Max	1000
9	Sulphate, SO4	mg/L	46	38	37	42	30	17	200, Max	400
10	Nitrate, NO3	mg/L	13	22	18	19	11	11	45, Max	No relaxation
11	Fluoride, F	mg/L	0.80	0.62	0.55	0.20	0.21	0.20	1.0	1.5
12	Manganese, Mn	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.1	0.3
13	Copper, Cu	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.05	1.5
14	Lead, Pb	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No relaxation
15	Cadmium, Cd	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.05	No relaxation
16	Zinc, Zn	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	5	15
17	Iron, Fe	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	0.30	No relaxation
18	D.O.		4.92	3.85	3.90	4.12	3.25	4.12		

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 standard and is also suitable for irrigation and industrial purposes. The surface water is mostly the rain water, falling in the surrounding area of beneficiation plant and RD mine is being worked on the concept of Zero discharge and tailings from the beneficiation plant is fed directly to the tailing pond , so there is no possibility of any contamination of any heavy metals from the beneficiation on the surface water.

It is therefore concluded that all the surface water samples do not 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).** Other common constituents are also either in acceptable limits and few in permissible limits of Indian Drinking Water Standards (IS 10,500-2012).

10.4 Impact of beneficiation plant on ground water

As per the guidelines of the CGWA, effective from 16.11.2015, (Annexure-VI), it is mandatory to monitor the monthly water levels and bi-annual chemical analysis of the piezometers and key wells surrounding the lease area and submit the annual report to CGWB showing the impact of mining and beneficiation plant on ground water regime. HZL has been submitting the annual report to CGWB, Jaipur every year. Under this program, the ground water samples were collected from piezeomters and key wells of RD mines and were analyzed for 23 consituents and parameters for Pre-monsoon and Post-monsoon period, 2018.

Just to know the impact of existing beneficiation plant of 1.2 MTPA , working from the initiation of mining at RD mine , on the ground water quality in its surrounding area, the chemical analysis of four ground water samples , **(Table-10.2)** , located in the surrounding area of beneficiation plant **(Figure -10.3)** have been selected and are discussed as under.

Figure-10.3 Map showing the location of ground water samples collected and analyzed from the piezometers and key wells from surrounding area of beneficiation plant.

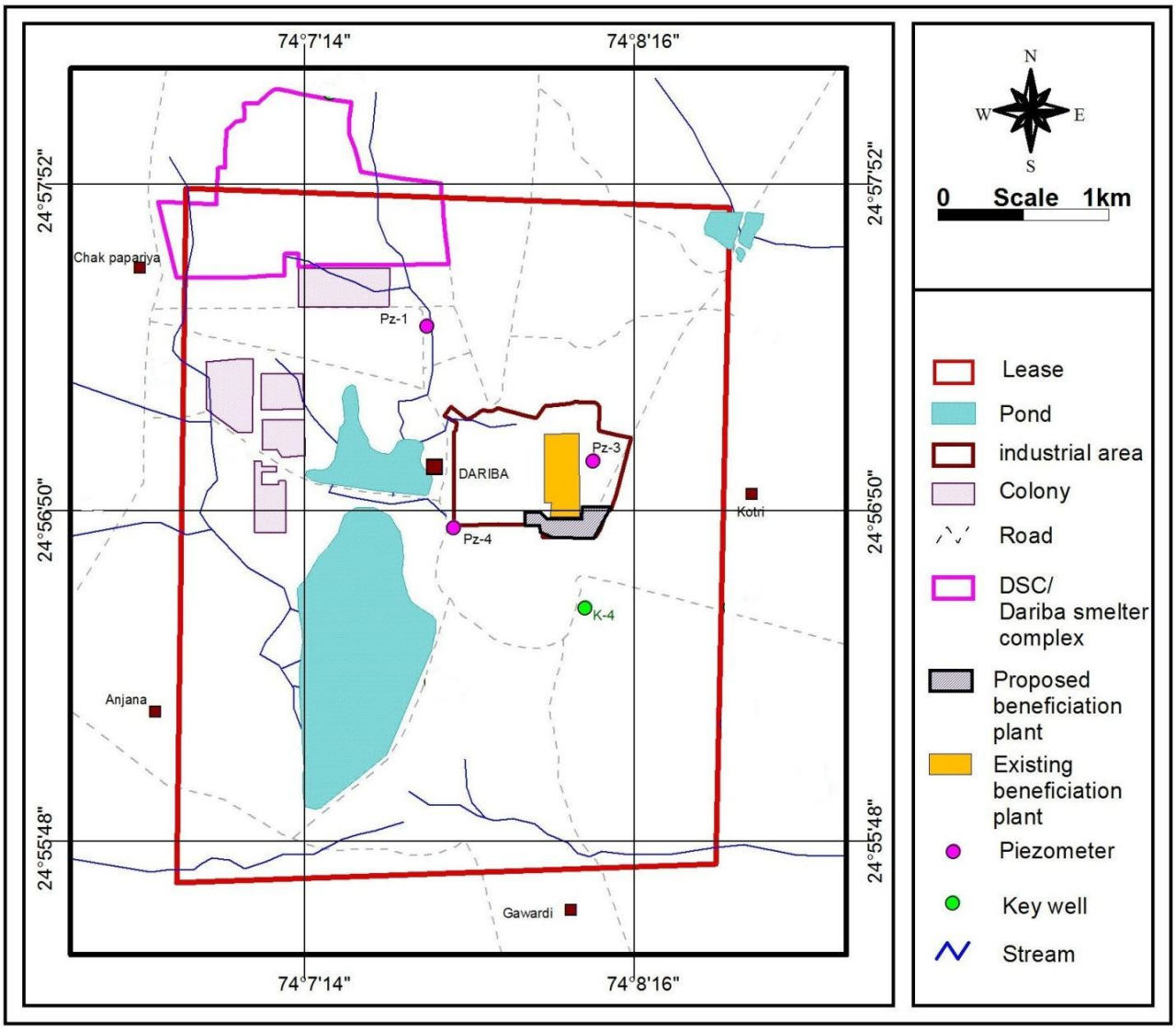


Table 10.2 Results of chemical analysis of ground water samples collected from piezometers and key wells during the Pre-monsoon,2018 analyzed by NABL accredited Lab.

S. No.	Parameter	Unit	RD-1 (Pz-1)	RD -3 (Pz-3)	RD -4 (Pz-4)	RD -9 (K-4)	Acceptable limit as per IS 10500, 2012	Permissible limit as per IS10500, 2012
1	pH	-	7.50	7.35	7.8	7.47	6.5 to 8.5	No relaxation
2	EC at 25oC	µS/cm	2065	1634	2470	1365	…	…
3	TDS	mg/L	1342	1121	1466	891	500, Max	2000
4	Colour	Hazan	<1	<1	<1	<1	5	15
5	Turbidity	NTU	0.7	0.7	0.9	0.7	1.0	5.0
6	Total Alkalinity	mg as CaCO3/l	432	460	564	316	200, Max	600.0
7	Calcium, Ca	mg/L	135.2	114.8	129.2	140.8	75.0	200.0
8	Magnesium, Mg,	mg/L	60.02	76	64.38	16.12	30.0	100.0
9	Sodium as Na	mg/L	99.1	107.8	319	91.8	-	-
10	Potassium as K	mg/L	7.5	13.4	18.3	17.5	-	-
11	Total Hardness	mg as CaCO3/l	584	600	587	420	200.0	600.0
12	Chlorides, Cl	mg/L	192	171	328	180	250, Max	1000
13	Sulphate, SO4	mg/L	145.4	89	143.7	127.4	200, Max	400
14	Nitrate, NO3	mg/L	2.7	18.9	23.1	1.8	45, Max	No relaxation
15	Iron, Fe	mg/L	0.29	0.38	0.23	0.27	0.30	No relaxation
16	Fluoride, F	mg/L	1.10	1.45	1.40	1.50	1.0	1.5
17	Lead, Pb	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	No relaxation
18	Cadmium, Cd	mg/L	<0.003	<0.003	<0.003	<0.003	0.003	No relaxation
19	Zinc, Zn	mg/L	1.04	0.52	0.59	0.04	5	15
20	Copper, Cu	mg/L	<0.01	<0.01	<0.01	<0.01	0.05	1.5
21	Chromium, Cr+6	mg/L	<0.01	<0.01	<0.01	<0.01	0.05	No relaxation
22	Nickel, Ni+	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	No relaxation
23	Manganese, Mn	mg/L	0.16	0.13	0.08	0.23	0.1	0.3

Table 10.3 Results of chemical analysis of ground water samples collected from piezometers and key wells during the Post -monsoon,2018 analyzed by NABL accredited Lab.

S. No.	Parameter	Unit	RD-1 (Pz-1)	RD -3 (Pz-3)	RD -4 (Pz-4)	RD -9 (K-4)	Acceptable limit as per IS 10500, 2012	Permissible limit as per IS10500, 2012
1	pH	-	6.92	7.04	7.16	7.05	6.5 to 8.5	No relaxation
2	EC at 25oC	µS/cm	2400	2074	1481	2020	…	…
3	TDS	mg/L	1609	1296	1006	1260	500, Max	2000
4	Colour	Hazan	<1	<1	<1	<1	5	15
5	Turbidity	NTU	1	0.9	1	1	1.0	5.0
6	Total Alkalinity	mg as CaCO3/l	444	256	336	392	200, Max	600.0
7	Calcium, Ca	mg/L	123.2	118.6	59.2	126.4	75.0	200.0
8	Magnesium, Mg,	mg/L	76.39	60.67	32.07	36.08	30.0	100.0
9	Sodium as Na	mg/L	156	150.1	156	202	-	-
10	Potassium as K	mg/L	7.69	11.7	23.52	24.33	-	-
11	Total Hardness	mg as CaCO3/l	621	545	280	464	200.0	600.0
12	Chlorides, Cl	mg/L	336	190	170	262	250, Max	1000
13	Sulphate, SO4	mg/L	168.28	93.3	270.2	138	200, Max	400
14	Nitrate, NO3	mg/L	3.8	3.12	11.43	20.14	45, Max	No relaxation
15	Iron, Fe	mg/L	.05	0.19	0.09	0.05	0.30	No relaxation
16	Fluoride, F	mg/L	1.29	1.2	1.55	1.64	1.0	1.5
17	Lead, Pb	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	No relaxation
18	Cadmium, Cd	mg/L	<0.003	<0.003	<0.003	<0.003	0.003	No relaxation
19	Zinc, Zn	mg/L	0.89	0.05	0.17	0.04	5	15
20	Copper, Cu	mg/L	<0.01	<0.01	<0.01	<0.01	0.05	1.5
21	Chromium, Cr+6	mg/L	<0.01	<0.01	<0.01	<0.01	0.05	No relaxation
22	Nickel, Ni+	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	No relaxation
23	Manganese, Mn	mg/L	0.22	0.21	0.13	0.02	0.1	0.3

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 acceptable and permissible limits of drinking water standards and is also suitable for irrigation and industrial purposes. The ground water, being shallow, is recharged from the rain fall, falling in the surrounding area of

beneficiation plant and RD mine which is being worked on the concept of Zero discharge and tailings from the beneficiation plant is fed directly to the tailing pond, so there is no possibility of any contamination of any heavy metals from the beneficiation on ground water regime. A marginal variation on the quality of ground water has been observed during the Pre and Post – monsoon periods. Normally, the quality of ground water improves during the post-monsoon period as compared to pre-monsoon period due to recharge from the fresh quality of rain water. However, much improvement is not observed during the year 2018 as the rainfall was much less, 463 mm as compared to average annual rainfall of 636 mm.

It is therefore concluded that all the ground water regime in the surrounding area of beneficiation plant does not show any impact as ground water of 4 samples do not have the toxic and heavy metals like Lead, Zinc, Manganese, Copper, Cadmium and Iron. All these are mostly in such a quality that these could not be determined as they were all below detection level (BDL) as per Indian Standards. Other common constituents are also either in acceptable limits and few in permissible limits of Indian Drinking Water Standards (IS 10,500-2012).

Annexure-I. Hydrological data of key wells of buffer zone of Rajpura-Dariba mines monitored during Pre and Post monsoon 2018

S. No.	VILLAGE	LATITUDE	LONGITUDE	DEPTH OF WELL (M)	PRE MONSOON WATER LEVEL (M)	POST MONSOON WATER LEVEL (M)	AQUIFER	YIELD (M^3/day)	PUMP CAPACITY (HP)	PURPOSE
1	Sindesar	25°00'42.7"	74°09'19.4"	30.00	21.33	18.22	Mica Schists	45.00	5HP/EM	Irrigation
2	Mata ji ka kheda	24°56'19.3"	74°07'38.1"	30.00	14.14	10.12	Mica Schists	40.00	10HP/EM	Irrigation
3	Mata ji ka kheda	24°56'30.4"	74°08'33.4"	15.00	9.45	6.61	Mica Schists	70.00	5HP/EM	Irrigation
4	Mata ji ka kheda	24°56'18.4"	74°08'35.8"	30.00	6.12	1.54	Mica Schists	75.00	5HP/EM	Irrigation
5	Kotri	24°56'25.0"	74°09'13.5"	15.00	8.24	1.09	Mica Schists	90.00	5HP/EM	Irrigation
6	Kotri	24°56'14.1"	74°09'59.2"	30.00	6.41	2.81	Mica Schists	50.00	3HP/EM	Irrigation
7	Udalpura	24°55'16.8"	74°10'06.8"	51.00	4.62	2.00	Mica Schists	75.00	5HP/EM	Irrigation
8	Lawa	24°54'19.2"	74°10'29.0"	30.00	5.64	3.58	Mica Schists	90.00	7HP/EM	Irrigation
9	Usrol	24°53'28.5"	74°12'21.0"	30.00	7.28	4.80	Mica Schists	75.00	5HP/EM	Irrigation
10	Jushma	24°56'11.2"	74°13'27.4"	30.00	13.41	12.40	Mica Schists	15.00	2HP/EM	Irrigation
11	Jushma	24°57'03.0"	74°14'07.4"	30.00	12.12	10.30	Mica Schists	80.00	5HP/EM	Irrigation
12	Bhagwanpura	24°57'53.1"	74°14'57.7"	30.00	18.21	15.80	Mica Schists	70.00	5HP/EM	Irrigation
13	Champakhari	25°01'38.5"	74°10'28.1"	36.00	5.12	1.80	Mica Schists	75.00	5HP/EM	Irrigation
14	Bera ka khera	24°58'51.0"	74°06'53.1"	30.00	9.84	8.59	Mica Schists	20.00	2HP/EM	Irrigation
15	Khartana	24°52'36.3"	74°04'26.2"	30.00	10.14	8.02	Mica Schists	80.00	5HP/EM	Irrigation
16	Manikhera	24°53'31.0"	74°04'15.3"	15.00	11.12	9.00	Mica Schists	75.00	5HP/EM	Irrigation
17	Manikhera	24°54'06.0"	74°04'28.2"	8.00	10.28	9.25	Mica Schists	70.00	5HP/EM	Irrigation
18	Charana	24°54'32.6"	74°04'39.1"	35.00	9.30	7.35	Mica Schists	60.00	3HP/EM	Irrigation
19	Charana	24°54'37.0"	74°05'17.0"	32.00	8.41	5.10	Mica Schists	70.00	3HP/EM	Irrigation
20	Gawardi	24°55'12.9"	74°06'12.0"	33.00	8.78	6.20	Mica Schists	75.00	5HP/EM	Irrigation
21	Mata ji ka kheda	24°56'36.0"	74°08'15.1"	31.00	8.94	6.55	Mica Schists	90.00	5HP/EM	Irrigation
22	Mata ji ka kheda	24°56'32.4"	74°08'27.7"	30.00	8.64	5.80	Mica Schists	75.00	5HP/EM	Irrigation
23	HZL, Plant	24°57'16.7"	74°06'46.9"	26.00	10.48	8.61	Mica Schists	--	--	Peizometer
24	Rajpura	24°58'09.3"	74°07'18.5"	18.00	23.24	21.10	Mica Schists	60.00	3HP/EM	Irrigation
25	Mata ka Kheda	24°56'18.1"	74°07'37.6"	30.00	18.40	16.20	Mica Schists	65.00	3HP/EM	Irrigation
26	Mata ji ka kheda	24°56'32.1"	74°08'06.6"	32.00	13.22	10.00	Mica Schists	70.00	5HP/EM	Irrigation
27	Mata ji ka kheda	24°56'32.2"	74°08'34.0"	27.00	12.97	11.21	Mica Schists	75.00	3HP/EM	Irrigation
28	Sunariya ka kheda	24°57'23.5"	74°08'40.8"	28.00	11.28	9.29	Mica Schists	70.00	5HP/EM	Irrigation
29	Mata ji ka kheda	24°56'18.0"	74°08'35.5"	29.00	11.78	9.66	Mica Schists	60.00	3HP/EM	Irrigation
30	Aajana	24°56'48.8"	74°06'34.7"	31.00	20.84	18.90	Mica Schists	70.00	5HP/EM	Irrigation

Compliance Status

Reference: File no. F(Mines)/Rajsamand(Railmagra)/1(1)/2008-

2009/ 278 - 282/ 23.04.2015

RAJPURA DARIBA MINES, HINDUSTAN ZINC LIMITED, DARIBA - 313211

<table>
<tr><th>S. No.</th><th>Consent Condition</th><th>Status</th></tr>
<tr><td>1.</td><td>That this consent is being granted in favour of M/s Hindustan Zinc Limited, a Mine of Major Mineral having M.L. No. 02/89 – R – 166/08 in an area measuring 1142.2106 Hectares at/near village-Rajpura Dariba, Tehsil-Railmagra, District-Rajsamand.</td><td>Noted</td></tr>
<tr><td>2.</td><td>That his consent is valid for a period from 1/03/2015 to 28/02/2018.</td><td>Noted.

Application for the renewal of Consent to Operate has been submitted on 26.10.2017.</td></tr>
<tr><td>3.</td><td>That this consent to operate is valid only for following mining activities –
<table>
<tr><td>Mineral</td><td>Permitted Mining Capacity</td></tr>
<tr><td>Lead zinc Ore Mining</td><td>900000 TPA</td></tr>
<tr><td>Lead Zinc Ore Beneficiation</td><td>1200000 TPA</td></tr>
<tr><td>DG Set</td><td>3.5200 MW</td></tr>
<tr><td>DG Set</td><td>3.5000 MW</td></tr>
</table></td><td>Noted.</td></tr>
<tr><td>4.</td><td>That you shall achieve following standards in ambient air in mine area/ mining activities:
<table>
<tr><td>Standards for ambient air</td><td>Standards for Mining activity</td></tr>
<tr><td>SPM – 500 ug/M^3</td><td rowspan="4">SPM – 600 ug/M^3
(To be measured between 3 to10 meters from mining activity)</td></tr>
<tr><td>SO_2 – 120 ug/M^3</td></tr>
<tr><td>NO_x – 120 ug/M^3</td></tr>
<tr><td>CO – 5000 ug/M^3</td></tr>
</table></td><td>Being complied.

Ambient Air Quality Monitoring report conducted by MoEF approved lab is attached as Annexure I</td></tr>
<tr><td>5.</td><td>That the mining effluent shall be treated before disposal so as to confirm to the standards</td><td>Zero discharge is being maintained. Waste water</td></tr>
</table>

<table>
<tr><td></td><td>prescribed by the Board viz general standards for discharge of the industrial effluent under the Environment(Protection) Act 1986 for Disposal into Inland Surface Water. The main parameters for regular monitoring shall be as under:<table><tr><td>S.No.</td><td>Parameters</td><td>Limits</td></tr><tr><td>1.</td><td>Total Suspended Solids</td><td>Not to exceed 100 mg/l</td></tr><tr><td>2.</td><td>pH Value</td><td>Between 5.5 to 9.0</td></tr><tr><td>3.</td><td>Oil and Grease</td><td>Not to exceed 10 mg/l</td></tr><tr><td>4.</td><td>Biochemical Oxygen Demand (3 days at 27^0c</td><td>Not to exceed 30 mg/l</td></tr><tr><td>5.</td><td>Chemical Oxygen Demand</td><td>Not to exceed 250 mg/l</td></tr></table></td><td>generated is recycled/ reused for wet drilling and dust suppression in underground and Mill.Annexure-II</td></tr>
<tr><td>6.</td><td>That the occupier/operator of mine shall ensure that all the conditions imposed in the permission of Central Ground Water Authority granted vide its letter No. 21-4(315)WR/ CGWA/2008- 3744 dated 06/06/2012 shall be strictly complied.</td><td>Noted for compliance. Compliance report is regularly submitted to CGWB with a copy to your good office. Compliance report dated 17.01.2018.</td></tr>
<tr><td>7.</td><td>That this Consent to Operate is for mining/processing/beneficiation of product as mentioned above in M.L.No.02/89 – R –166/08 and a separate Consent to Operate is required to be taken for any other Mineral mining/ processing/ beneficiation Plant/process if any and for any addition/ modification/ alteration or change In process.</td><td>Noted</td></tr>
<tr><td>8.</td><td>That shall comply with all the conditions imposed by Ministry of Environment & Forests, Government of India., vide letter No. J-11011/380/2008-IA II (I) dated 04.11. 2009 while issuing EC to your mine project.</td><td>Noted for compliance. The half yearly compliance report is being regularly submitted to MoEF with a copy to your good office.</td></tr>
<tr><td>9.</td><td>That plantation shall be developed in at least 33% of the total lease area i.e. 554.19 Hectares within a period of 3 years to maintain ambient air quality around the mine and the action plan for plantation</td><td>At present plantation in 34.28% area. Presently 190 Hectare under plantation of 554.19</td></tr>
</table>

	submitted to the board, shall be implemented	acquired area.
10.	That you will implement all the pollution control measures as per EIA / EMP Report.	Complied
11.	That no trade effluent shall be discharged inside/ outside mine premises.	Zero discharge is being ensured. Complied
12.	That suitable measures for rain water harvesting for artificial recharge of ground water shall be taken.	Complied
13.	That the water meters shall be installed at bore well & logbook shall be maintained to record daily water consumption.	Not applicable. Water is sourced from Matrikundia Dam and water meter has been provided. No bore well has been constructed to draw ground water.
14.	That the artificial recharge proposal shall be vetted by the competent authority viz Regional Director , Central Ground Water Board (WR), Jaipur/ State Ground Water Development, Jaipur	Complied. Site has been visited by Regional Director, CGWB Jaipur and NOC for ground water withdrawal for mine intersection has been renewed on 16.11.2017. Copy of the letter No: 21-4(315)/WR/CGWA/2008-1905 dated 16.11.2017
15.	That recycled and / or treated water shall not be used for recharge to ground water.	Noted
16.	Project proponent shall submit with the compliance report of consent conditions, the analysis report of the ground water along with a statement showing the trends/ variation of the parameters at each source / well during past three years.	We are regularly submitting quarterly compliance report of consent conditions along with analysis report of ground water to the board. Annexure-III
17.	That all other general conditions enclosed as Annexure shall be strictly complied with.	Noted
18.	That.this Consent is subject to the conditions as stated above and general conditions as stated in Annexure. Further, the mining unit will comply with the provisions of the Air(Prevention & Control of Pollution) Act, 1981 & Water (Prevention & Control of Pollution) Act, 1974 and any such conditions as may be specified from time to time by the State Board under the provisions of the aforesaid Acts.	Noted
19.	That the grant of this Consent to Operate is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law	Noted

	or any other instrument in force. The sole and complete responsibility, to comply with the conditions laid down in all other laws for the time – being in force, rests with the industry/unit/project proponent	
20.	That the grant of this Consent to Operate shall not, in any way, adversely affect or jeopardize the legal proceedings, if any, instituted in the past or that could be instituted against you by the State Board for violation of the provisions of the Act or the Rules made there under.	Noted
	General Conditions :	
1.	That this consent shall be subject to the conditions that you shall operate the mining activities in the area as per the mining right allowed by the Mining Department in the Mining Lease only.	Mining is being carried out according to the Mine Plan duly approved by IBM.
2.	That this consent shall be subject to the directions/orders passed in various mining/ Environmental related Writ Petitions by Hon'ble High Court and the Ho'ble Supreme Court.	Noted
3.	That you shall provide the necessary infrastructure facilities including equipment for the monitoring of ambient air in accordance with the directions given to you by the Rajasthan State Pollution Control Board.	Noted. Ambient Air monitoring is being carried out once every month.
4.	That Mining Unit shall undertake the phased restoration, reclamation and rehabilitation of lands as per established practices & procedures (provisions of Mine Closure Plan in case of Major Minerals) affected by the prospecting or mining operations and shall complete this work before the conclusion of such operations and the abandonment of prospects or mines.	Noted
5.	That overburden shall be stored in a systematic manner that it does not obstruct the natural drainage pattern of the area. It may be used for back filling. The land shall be identified for disposal of overburden at environmentally compatible site.	The overburden is being disposed at earmarked place only.
6.	That Mining unit shall strictly comply with the Mining Plan and Eco Friendly Mining Plan as submitted to & approved by the competent authority. (Eco Friendly Mining Plan for Minor mineral & mining plan for Major minerals & Marble, granite Mines).	Mining is being carried out according to the Mine Plan duly approved by IBM.
7.	That the water spray and sprinkling system so installed should always be maintained in order to	Sprinkling system are installed and maintained

	utilize the same for dust suppression.	at different points wherever required for dust suppression. Water spraying also done for dust suppression
8.	That the domestic effluent, if any, shall be treated and disposed of with properly designed septic tank followed by soak pit as per prescribed standard.	The domestic effluent is being treated using a septic tank and soak pit.
9.	That the responsibility for performance evaluation of Pollution Control Measure shall be of Mining unit and Mining unit will not commence production unless the satisfactory operation of the Pollution Control Measures is done by the Mining unit in the presence of concerning Regional Officer of Board and is duly certified by him before commencement of production.	Noted
10.	That Air Emission shall confirm to the standards prescribed under the Environment (Protection) Act, 1996.	Noted
11.	That noise level shall be kept as detailed below and under no circumstances, it shall exceed the prescribed limit: a. Day time (6.0 am to 9.0pm) - 75 dB A (leq) b. Night time (9.0 pm to 6.0am) - 65 dB A (leq)	Monitoring Report Enclosed Annexure-IV
12.	That Mining unit shall also conduct ambient air quality monitoring for SPM and noise level in the mining area once in six months and monitoring results shall be submitted to that State Board regularly.	Complied (Report for the quarter Jan 2018 to March 2018 is attached)
13.	That for Diesel Generator Set, acoustic enclosure/ acoustic treatment shall be provided to meet the prescribed norms w.r.t. noise as per the Gazette Notification of Ministry of Environment & Forests dated 02.01.99. Adequate stack height with D.G. Sets shall also be provided and maintained. Noise from the Diesel Generator Sets shall be controlled by providing an acoustic enclosure or by treating the room acoustically. The Acoustic enclosure/ acoustic treatment of room should be designed for minimum 25 dB (A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher. The measurement for Insertion Loss may be done at different points at 0.5 metre from the acoustic enclosure/ room and then averaged. The Diesel Generator Sets should also be provided with proper exhausts muffler with Insertion Loss of minimum 25 dB (A). The stack height for the Diesel	Noted for compliance. The DG Set room is acoustic room ensuring insertion loss.

	Generator Sets shall be as notified under the EP Act, 1986.	
14.	The industry shall submit Environmental statement for the period April to March latest by the following September every year.	Complied. The Environmental Statement for the year 2016-17 was submitted to your good office vide our letter No. HZL/ RD / Env / 2017 / 6077-78 / 20.07.2017
15.	That this consent should not be treated as NOC or approval for mining in forest area, If any, failing in the lease and relevant permission under provision under provisions of the Forest (Conservation) Act, 1980 shall be obtained from the competent authority.	Noted
16.	That the industry shall submit a fresh application for Consent to Operate in the prescribed form in triplicate along with the requisite fee at least 120 days in advance of expiry of the consent period for its renewal.	Noted. The application has been applied on 26.10.20117, along with requisite fee before 120 days in the portal.
17.	That the mining unit shall comply with provisions of the manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and the Hazardous Waste (Management & Handling), Rules, 1989 and related amendments, as applicable.	Noted for compliance.
18.	That this consent is valid, subject to fulfillment of all the other statutory requirements in other Law/Act/Rules, as applicable.	Noted
19.	That the industry shall submit quarterly compliance of all the above stated conditions to this office.	Noted
20.	That the mining unit shall submit Water Cess returns in case the water consumption is more than 10 KLD under provisions of the Water (Prevent & Control of Pollution) Cess Act, 1977 and as amended from time to time.	Complied. Payment toward Water Cess of Rs. 10,33,580/- for the period 1.11.2014 to 30.6.2017 had been made vide DD No: 049285 dated 26.12.2017. (letter no: HZL/RDM/ENV/RPCB/WCP/2017-18/8394/ dated 28.12.2017)
21.	That notwithstanding anything contained in this letter of consent, the State Board hereby reserves to it, the right and power under section 21(6) of the Air (Prevention & Control of Pollution) Act, 1981 & under section 27(2) of the Water (Prevention & Control of Pollution) Act, 1974 to review anyone/ or	Noted

	all the conditions imposed here-in-above and to make such variations as deemed fit for the purpose of Air Act & Water Act.	
22.	That this consent, under no circumstances, be constructed as conferment of any property or any interest in the lease area. It is only confined for the purpose of regulation of provisions of the Air Act.	Noted
23.	That any incorrect information submitted in the consent application form shall make the industry liable for legal action under the provisions of the Air Act & the Water Act.	Noted
24.	That in case of failure to comply with any of the consent conditions stated as above, the consent issued to the industry shall automatically stand revoked without any notice.	Noted
25.	That this Consent will not exempt you from any legal action for the past violations, if any, of the Act/Rules/Notification/ Circulars, etc.	Noted
26.	That the drills shall be operated with water injection system i.e. wet drilling be carried out during mining or the drills shall be operated with dust extractors.	Complied
27.	The garland drains, settling tanks and check dams of appropriate size , gradient and length shall be constructed around the mineral and overburden dumps to prevent runoff water and flow of sediments.	Noted for compliance. Garland drain with check dam constructed.
28.	That the project proponent shall construct retaining wall & siltation pond of appropriate size around the overburden dumps.	Noted for compliance. Retaining walls with siltation pond constructed.
29.	That the controlled blasting shall be practiced. The mitigative measures for control of ground vibrations & to arrest fly rocks & boulders should be implemented& permission from the Director General Mines Safety and Director Explosives.	Complied

राजस्थान सरकार
कार्यालय खनि अभियन्ता, खण्ड–द्वितीय राजसमन्द

कमांक :– खअ–II/राज/सीसी–मेजर/एमएल–2/89/ दिनांक 1.12.07

प्रेषितिः–

श्री ईकाई प्रबन्धक ,
सर्वश्री हिन्दुस्तान जिंक लि0
राजपुरा–दरीबा तहसील रेलमगरा जिला राजसमंद ।

विषयः–खननपट्टा वास्ते खनिज लेड जिंक निकट ग्राम राजपुरा–दरीबा तहसील एवं जिला राजसमन्द ।

महोदय,

उपरोक्त विषयान्तर्गत लेख है कि खननपट्टा में स्वीकृत 1142.20 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

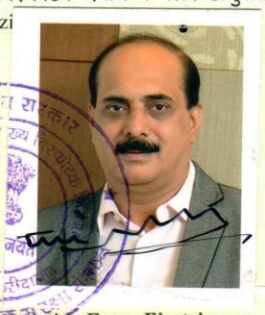
खनि अभियन्ता राजसमन्द
खण्ड–द्वितीय

4788

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्फोटक रखने के लिए अनुज्ञप्ति
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazi



अनुज्ञप्ति सं. (Licence No.) : E/NC/RJ/22/213(E9829)
वार्षिक फीस रुपए (Annual Fee Rs): 5400/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Sh. Sunil Duggal),
DISTRT. RAJASMAND (RAJ), Town/Village - DARIBA, District-RAJASMAND, State-Rajasthan,
Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Nitrate Mixture, Detonating Fuse, Electric and/or Ordinary Detonators, Cast Booster,** - के उपयोग के लिए
Licence is valid only for the following purpose.

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Nitrate Mixture	2 ,0	0	1400 Kg.
2.	Cast Booster	3 ,2	0	100 Kg.
3.	Detonating Fuse	6 ,2	0	10000 Mtrs
4.	Electric and/or Ordinary Detonators	6 ,3	0	20000 Nos.

(ख) किसी एक कलैंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **15 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/NC/RJ/22/213(E9829)
The licensed premises shall conform to the following drawing(s): . दिनांक (Dated) 18/07/2016

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Survey No(s). 131 , ग्राम (Town/Village) : **DARIBA** **पुलिस थाना (Police Station) : RAILMAGRA**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode)
दूरभाष (Phone) ई. मेल (E-Mail) फैक्स (Fax)

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **one explosives magazine and one lobby room and detonator room.**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय – समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधो, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबध्दों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी व्दारा हस्ता.क्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्ति शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 1998** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 1998.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरूप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां यह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 04/02/1997

संयुक्त मुख्य विस्फोटक नियंत्रक | **Joint Chief Controller of Explosives**

North Circle, Faridabad

Amendments :

- Amendment in Drawings/Facilities/Premises dated : 24/02/2011
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 31/01/2014
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 02/02/2016
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 18/07/2016
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 18/07/2016

नवीनीकरण के पृष्ठांकन के लिए स्थान
Space for Endorsement of Renewal

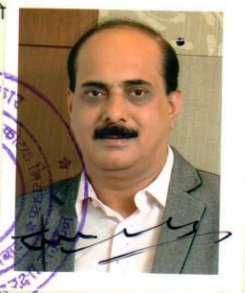
नवीकरण की तारीख Date of Renewal	समाप्ति की तारीख Date of Expiry	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प Signature of licensing authority and stamp
17/03/2015	31/03/2020	Sd/- Dy. Chief Controller of Explosives, Jaipur

कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।
Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्फो
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazine



अनुज्ञप्ति सं. (Licence No.) : E/NC/RJ/22/217(E9843)
वार्षिक फीस रुपए (Annual Fee Rs): 4200/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Sh. Sunil Duggal), RAJPURA DARIBA MUNES P.O. DARIBA DISTT. RAJASMAND (RAJ), Town/Village - , District-, State-, Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Nitrate Mixture, Cast Booster, Detonating Fuse,** - के
Licence is valid only for the following purpose. उपयोग के लिए

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Nitrate Mixture	2 ,0	0	1200 Kg.
2.	Cast Booster	3 ,2	0	100 Kg.
3.	Detonating Fuse	6 ,2	0	6000 Mtrs

(ख) किसी एक कलैंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **10 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/NC/RJ/22/217(E9843)
The licensed premises shall conform to the following drawing(s): . दिनांक (Dated) 18/07/2016

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Khasra No. 131 , ग्राम (Town/Village) : **DARIBA** पुलिस थाना **(Police Station) : RAILMAGRA**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode)
दूरभाष (Phone) ई. मेल (E-Mail) फैक्स (Fax)

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **NA**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय – समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधो, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबध्दों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी व्दारारा हस्ता.क्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्ति शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 1998** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 1998.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरुप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां वह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 04/02/1997

संयुक्त मुख्य विस्फोटक नियंत्रक | **Joint Chief Controller of Explosives**
North Circle, Faridabad

Amendments :

- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 30/07/2010
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 30/01/2014
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 02/02/2016
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 18/07/2016
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 18/07/2016

नवीनीकरण के पृष्ठांकन के लिए स्थान

Space for Endorsement of Renewal

नवीकरण की तारीख Date of Renewal	समाप्ति की तारीख Date of Expiry	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प Signature of licensing authority and stamp
17/03/2015	31/03/2020	Sd/- Dy. Chief Controller of Explosives, Jaipur

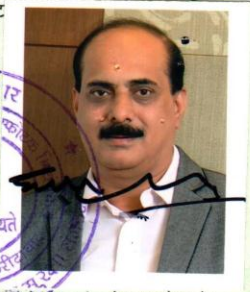
कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।
Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

5837

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्फोट
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazine



अनुज्ञप्ति सं. (Licence No.) : E/NC/RJ/22/584(E24292)
वार्षिक फीस रुपए (Annual Fee Rs): 4500/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Sh. Sunil Duggal), RAJPURA DARIBA MINES, M/S HINDUSTAN ZINC LTD. P.O. DARIBA DISTT. RAJASMAND (RAJ), Town/Village - Dariba, District-RAJASMAND, State-Rajasthan, Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Electric and/or Ordinary Detonators,** - के उपयोग के लिए
Licence is valid only for the following purpose.

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Electric and/or Ordinary Detonators	6 ,3	0	300000 Nos.

(ख) किसी एक कलैंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **3 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/NC/RJ/22/584(E24292)
The licensed premises shall conform to the following drawing(s): . दिनांक (Dated) 12/07/1985

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Survey No(s). N/A , ग्राम (Town/Village) : **DARIBA** पुलिस थाना (Police Station) : **RAJASMAND**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode)
दूरभाष (Phone) ई. मेल (E-Mail) फैक्स (Fax)

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **A MAIN MAGAZINE ROOM FOR STORAGE OF DETONATORS**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय – समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधो, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबध्दों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी व्दारा हस्ताक्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्ति शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 1990** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 1990.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरूप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां वह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 12/07/1985

संयुक्त मुख्य विस्फोटक नियंत्रक | **Joint Chief Controller of Explosives**
North Circle, Faridabad

Amendments :
- Change in Postal Address dated : 11/06/2010
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 02/02/2016
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 25/07/2016

नवीनीकरण के पृष्ठांकन के लिए स्थान
Space for Endorsement of Renewal

नवीकरण की तारीख	समाप्ति की तारीख	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प

Date of Renewal	Date of Expiry	Signature of licensing authority and stamp
17/03/2015	31/03/2020	Sd/- Dy. Chief Controller of Explosives, Jaipur

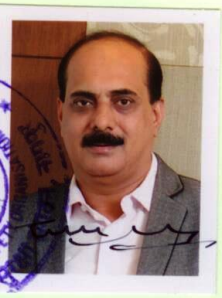
कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।
Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

Transfered from M/s. Hindustan Zinc Limited, Rajpura Dariba Mines

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्फोटक रर
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazine



अनुज्ञप्ति सं. (Licence No.) : E/HQ/RJ/22/189(E24494)
वार्षिक फीस रुपए (Annual Fee Rs): 10800/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Shri Sunil Duggal S/o. Shri Jagat Ram Duggal), Rajpura Dariba Mine, P. O. Dariba, Tehsil Railmagra, Town/Village - , District-RAJASMAND, State-Rajasthan, Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Nitrate Mixture, Detonating Fuse, Detonators, Cast Booster, -** के उपयोग के लिए
Licence is valid only for the following purpose.

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Nitrate Mixture	2 ,0	0	4400 Kg.
2.	Cast Booster	3 ,2	0	300 Kg.
3.	Detonating Fuse	6 ,2	0	30000 Mtrs
4.	Detonators	6 ,3	0	30000 Nos.

(ख) किसी एक कलैंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **14 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/HQ/RJ/22/189(E24494)
The licensed premises shall conform to the following drawing(s): . दिनांक (Dated) 08/12/2015

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Survey No(s). N/A , ग्राम (Town/Village) : **DARIBA** **पुलिस थाना (Police Station) : RELMAGRA**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode)
दूरभाष (Phone) इ. मेल (E-Mail) फैक्स (Fax)

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **A MAIN MAGAZINE ROOM, A LOBBY AND A DETONATORS STORE ROOM**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय –समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधो, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबन्धों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी द्वारारा हस्ताक्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्त शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 2009** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 2009.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरूप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां वह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 15/11/1989

मुख्य विस्फोटक नियंत्रक | Chief Controller of Explosives

Amendments :
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 11/02/2010
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 15/12/2010
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 07/02/2013

Transfers :
- Change in Licensee Name/Address/Status dated : 08/12/2015

नवीनीकरण के पृष्ठांकन के लिए स्थान
Space for Endorsement of Renewal

नवीकरण की तारीख Date of Renewal	समाप्ति की तारीख Date of Expiry	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प Signature of licensing authority and stamp
27/03/2014	31/03/2019	Sd/- Dy. Chief Controller of Explosives, Jaipur

कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।
Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

(सेट VIII | Set VIII)

मैगजीन में वर्ग 1,2,3,4,5,6, और 7 के विस्फोटकों को बिक्री या प्रयोग हेतु रखने के लिए प्ररूप एल.ई. 3 [अनुच्छेद 3 (ख) से (ग)] में मुख्य विस्फोटक नियंत्रक या विस्फोटक नियंत्रक व्दारा प्रदान किए जाने वाले अनुज्ञप्ति सं. E/HQ/RJ/22/189(E24494) की शर्तें निम्नलिखित हैं।

The following are the conditions of licence number E/HQ/RJ/22/189(E24494) to possess for sale or use, explosives of Class 1,2,3, 4, 5, 6 and 7 in a magazine in Form LE-3 (articles 3(b) to (c)) granted by Chief controller of Explosives or Controller of Explosives

1. परिसर में किसी भी समय विस्फोटकों की मात्रा अनुज्ञापन योग्य सामर्थ्य से अधिक नहीं होगी ।
The quantity of explosives on the premises at any one time shall not exceed the licensable capacity.
2. विस्फोटकों के भंडारण के लिए प्रयुक्तर होने वाली मैगजीन अनुसूची III और अनुज्ञप्ति के उपबंध में विनिर्दिष्ट सुरक्षा दूरी बनाए रखना होगा।
The magazine used for storage of explosives shall maintain safety distance specified in Schedule III and annexure to the licence.
3. मैगजीन का प्रयोग उन सभी विस्फोटकों के, जो इस अनुज्ञप्ति में विनिर्दिष्ट है, रखे जाने के लिए और ऐसे रखे जाने से संबध्द आधान या औजार या उपकरणों के रखे जाने के लिए ही किया जाएगा, अन्यथा नहीं ।
The magazine shall be used only for keeping all explosives specified in this licence and of receptacles for, or tools or implements for work connected with the keeping of such explosives.
4. पैकजों को खोलने का कार्य और विस्फोटकों को तौलने तथा पैक करने का कार्य मैगजीन में नहीं किया जाएगा ।
The opening of packages and the weighing and packing of explosives shall not be carried on in the magazine.
5. दो या दो से अधिक वर्णन के विस्फोटकों को, जिन्हें मैगजीन में रखे जाने की अनुज्ञा दी जा सकती है, मैगजीन में तभी रखे जाएंगे जब उनमें से प्रत्येक को, ऐसे पदार्थ या स्वरूप का कोई मध्यवर्ती विभाजक लगाकर या उनके बीच ऐसा मध्यवर्ती स्थान छोड़कर, परस्पर पृथक कर दिया जाए कि किसी वजह से विस्फोटक में लगने वाली आग या होने वाला विस्फोट किसी अन्य वर्णन के विस्फोटक तक न पहुंच सके : परंतु - वर्ग 6 प्रभाग 2 के अंतर्गत आनेवाले विस्फोटक प्रेरक पलीते, जिनमें कोई खुला लोहा या इस्पात नहीं है, एक दूसरे के साथ बिना किसी मध्यवर्ती
(घ) 2 (नाइट्रेट मिश्रण), वर्ग 3 (नाइट्रो यौगिक) के विभिन्न विस्फोटक, वर्ग 6 प्रथम प्रभाग के अंतर्गत आने वाले सुरक्षा पलीते और
विभाजक या स्थायन के रखे जा सकते हैं ।
(ङ) वर्ग 6 प्रभाग 3 के अंतर्गत आनेवाले विस्फोटक प्रेरक अलग रखे जाएंगे ।
(च) वर्ग 1 के अंतर्गत आने वाले बारूद को अलग रखा जाएगा ।
Two or more description or explosives which may be permitted to be kept in the magazine shall be kept only if they are separated from each other by an intervening partition of such substance or character, or by such intervening space, as will effectually prevent explosion or fire in the one communicating with the other; Provided that—
(d) the various explosives of Class 2 (nitrate-mixture), Class 3 (nitro-compound), safety fuses belonging to Class 6 Division 1and detonating fuses belonging to Class 6 Division 2 as do not contain any exposed iron or steel, may be kept with each other without any intervening partition or space ;
(e) Detonators belonging to Class 6 Division 3 shall be kept separately.
(f) Gun powder belonging to Class 1 shall be kept separately.
6. वर्ग 3 (नाइट्रो यौगिक) के विस्फोटकों को, उनके विनिर्माण की तारीख से एक वर्ष बीत जाने के पश्चात सिवाय अनुज्ञापन प्राधिकारी की विशेष मंजूरी के मैगजीन में नहीं रखा जाएगा ।
Explosives of Class 3 (nitro compound) shall not be kept in the magazine after the expiration of one year from the date of their manufacture except with the special sanction of licensing authority.
7. वर्ग 3 (नाइट्रो यौगिक) के विस्फोटकों को, उनके विनिर्माण की तारीख से एक वर्ष बीत जाने के पश्चात मैगजीन में तभी रखा जाएगा जब कि किसी विस्फोटक नियंत्रक ने इसके लिए विशेष मंजूरी दे दी हो ।
(i) जब ऐसी मंजूरी दे दी गई हो तो प्रत्येक निरीक्षण पर किसी विस्फोटक नियंत्रक से ऐसा लिखित प्रमाणपत्र अभिप्राप्त कर लिया जाए जिसमें दी गई मंजूरी के अंतर्गत आनेवाली अवधि दर्शित की गई हो और ऐसे प्रमाणपत्र के अनुज्ञप्तिधारी अपने पास रखेगा और मांग की जाने पर प्रस्तुरत करेगा ।
(ii) जब कोई विस्फोटक मानक शुध्दता का न रह जाने के कारण या द्रवणीकरण या नाइट्रो ग्लीअसरीन या द्रव नाइट्रो यौगिक के निकल जाने के चिन्ह प्रकट होने के कारण मैगजीन में भण्डारित किए जाने के उपयुक्त नहीं रह जाता है तो अनुज्ञप्तिधारी अपने ही व्यय पर ऐसे विस्फोटक के निपटारे के लिए ऐसे निदेशों का अनुपालन करेगा जो मुख्य नियंत्रक या विस्फोटक नियंत्रक जारी करे ।
Explosives of Class 3 (nitro compound) shall not be kept in the magazine after the expiration of one year from the date of their manufacture except with the special sanction of the Controller of Explosives.
(i) When such sanction has been given, a written certificate showing the period covered by the sanction shall be obtained from the Controller of Explosives at each inspection, and shall be kept by the licensee and produced on demand.
(ii) When an explosive owing to its being no longer of standard purity or owing to signs of liquefaction or of exuded nitro-glycerin or liquid nitro-glycerin or liquid nitrocompound is no longer fit for storage in the magazine or store house the licensee shall comply, at his own expense, with such directions as to its disposal as the Chief Controller or Controller of Explosives may issue.
8. मैगजीन के भीतरी भाग या उसमें लगी बैंचो, शेल्फों और उसकी फिटिंग का इस प्रकार सन्निर्माण किया जाएगा या उन्हें इस प्रकार अंतरित या अवतरित किया जाएगा कि विस्फोटक का किसी लोहे या इस्पात के साथ संपर्क रोका जा सके । भीतरी भाग में लगी बैंचे, शैल्फे और फिटिंग यथासाध्य ग्रिट से मुक्त एवं साफ रखे जाएंगे तथा ऐसे विस्फोटक, जो जल से खतरनाक रूप में प्रभावित हो सकते हैं, इस बाबत सम्यक सावधानी बरती जाएगी कि वहां कोई जल मौजूद न रहे : परंतु किसी लोहे या इस्पात के खुले होने के विरुध्द सावधानी से संबंधित इस शर्त का वह भाग ऐसे किसी भवन में बाध्येकर नहीं होगा जिसमें वर्ग 6 (गोला बारूद) के प्रथम के विस्फोटक से भिन्न कोई विस्फोटक रखा गया है ।
The interior of the magazine and the benches, shelves and fittings therein shall be so constructed or so lined or covered as to prevent the exposure of any iron or steel contact with the explosives. Such interior, benches, shelves and fittings shall so far as is reasonably practicable, be kept free from grit and shall otherwise be clean; and in the case of any explosives liable to be dangerously affected by water, due precautions shall be taken to exclude water there from;
Provided that so much of this condition as relates to precautions against the exposure of any iron or steel shall not be obligatory in a building in which no explosive other than explosive of the 1st Division 6th (Ammunition) Class is kept.
9. यदि तडित चालक का परीक्षण विस्फोटक नियंत्रक करता है तो अनुज्ञप्तिधारी ऐसे परीक्षण के लिए विहित फीस का संदाय करेगा यदि परीक्षण असमाधानकारी साबित होता है तो उतनी ही फीस अनुज्ञप्तिधारी व्दारा पश्चात्वर्ती प्रत्येक परीक्षण के लिए तब तक दी जाती रहेगी जब तक कि परीक्षण अधिकारी तडित चालक को समाधानप्रद घोषित नहीं कर देता :
परंतु किसी एक परीक्षण के लिए देय फीस किसी एक दिन के दौरान किसी चालक के किए गए सभी परीक्षणों के लिए प्रभार्य होगा :
परंतु यह और कि यदि दो या अधिक तडित चालक एक ही मैगजीन से संबध्द हैं तो ऐसे सभी चालकों के परीक्षण के लिए फीस ऐसी किसी फीस से अधिक नहीं होगी जो किसी एक तडित चालक के परीक्षण के लिए हर स्थिति में विहित की गई है ।
If the lighting conductor is tested by the Controller of Explosives, the licensee shall pay the fees prescribed for test. In the even of the test proving unsatisfactory, the same fees shall be payable by the licensee for each subsequent test until the lighting conductor is passed by the testing officer as satisfactory:
Provided that the fees payable for a single test shall be charged for all tests made on a conductor during any one day :
Provided further that where two or more lighting conductors are attached to one and the same magazine, the fee for the testing of all such conductors shall not exceed the fee prescribed in this condition for testing a single lighting conductor.
10. उपयुक्त तथा जेब रहित कार्यकरण वस्त्रों , उपयुक्त जूतों के प्रयोग व्दारा तथा तलाशी लेकर या अन्यथा अथवा ऐसे किन्हीं साधनों व्दारा इस बाबत सम्यक उपबंध किया जाएगा कि फैक्ट्री परिसर में अग्नि, दियासलाई अथवा ऐसी कोई वस्तुएं या पदार्थ, जिससे विस्फोट हो सकता है या आग लग सकती हो, किन्तु इस शर्त के कारण ऐसी संरचना, स्थिति या स्वरूप में किसी कृत्रिम बत्ती का प्रवेश वर्जित नहीं है जिससे आग लगने या विस्फोट होने का खतरा न हो :
परंतु इस शर्त का वह भाग, जो लोहे या इस्पात के अपवर्जन को लागू होता है, ऐसे किसी भवन के संबंध में बाध्य कर नहीं होगा जिससे भिन्न कोई विस्फोटक नहीं रखा गया है ।
Due provisions shall be made, by the use of suitable working clothes without pockets, suitable shoes and by searching or otherwise or by such means, for preventing the introduction into danger area of the factory premises of fie, Lucifer matches or any substance or article likely to cause explosion or fire, but this condition shall not prevent the introduction of an artificial light of such construction, position or character as not to cause any danger of fire or explosion:
Provided that so much of this condition as applies to the exclusion of iron or steel, shall not be obligatory in a building in which no explosive other than an explosive of the 1st Division of the 6th (Ammunition) Class is kept.
11. अनुज्ञप्तिधारी प्ररूप आर.ई.-3 और आर.ई.-4 या आर.ई.-5, जैसी स्थिति हो, में सभी विस्फोटकों का अभिलेख और लेखा रखेगा और विस्फोटक नियम, 2008 के अधीन प्राधिकृत किसी भी अधिकारी के समक्ष उसके व्दारा ऐसा करने की मांग की जाने पर स्टाक पुस्तक और अभिलेख प्रस्तुत करेगा । स्टाक पुस्तक विहित प्रोफार्मा में पृष्ठ संख्यांकित होगी ।
The licensee shall keep records and accounts of all explosives in Forms RE-3 and RE-4 or RE-5, as the case may be, and exhibit the stock books and records to any of the officers authorised under the Explosives Rules, 2008 whenever such officer may call upon him to do so.
The stock books in the prescribed proforma shall be page numbered.
12. परिसरों में कोई परिवर्तन या तबदीली अनुज्ञापन प्राधिकारी के पूर्वानुमोदन बिना नहीं की जाएगी और अनुज्ञप्तिधारी ऐसी किसी शर्त का अनुपालन करेगा जो इस निमित्त अनुज्ञापन प्राधिकारी विनिर्दिष्ट करे ।
No changes or alterations shall be carried out to the premises without prior approval of the licensing authority and the licensee shall comply with any condition that may be specified by the licensing authority in this behalf.
13. मैगजीन सभी समयों पर अच्छी मरम्मत की स्थिति में बनाई रखी जाएगी (या अच्छी हालत में बनाई रखी जाएगी) । यदि किसी करणवश किसी विस्फोटक के भण्डारण के लिए मैगजीन अनुपयुक्त हो जाती है तो अनुज्ञप्तिधारी इस बात की सूचना अनुज्ञापन प्राधिकारी को तुरंत देगा ।
Magazine shall at all times be kept in state of good repair (or maintained in good condition). The licensee shall report to licensing authority forthwith, if the magazine becomes unfit for storage of any explosives for any reason whatsoever.
मैगजीन का अनुज्ञप्तिधारी इन नियमों के नियम 24 के उप-नियम 3 के अनुसार त्रैमासिक विवरणी प्रस्तुत करेगा ।
The licensee of the magazine shall submit quarterly return as per sub-rules (3) and (4) of rule 24 of these rules.
14. यदि सुरक्षा दूरी का कोई अधिक्रमण होता है तो उसकी सूचना अनुज्ञापन प्राधिकारी को आवश्यक सलाह और कार्यवाही के लिए तुरंत दी जाएगी ।
Any encroachment of the safety distance shall be immediately communicated to the licensing authority for necessary advice and action.
15. यदि कोई विस्फोटक विनष्ट हुआ अथवा अनुपयोगी जाया जाता है तो उसकी सूचना अनुज्ञापन प्राधिकारी को, सलाह प्राप्त करने के लिए, तुरंत दी जाएगी ।
The licensing authority shall be immediately informed for advice if any explosive is found deteriorated or unserviceable.
16. विस्फोटकों के पैकेटों के चट्टे इस प्रकार लगाए जाएंगे कि कम से कम एक व्यक्ति भण्डार किए गए सभी पैकजों की हालत की जांच करने और प्रत्येक पैकेज की विनिर्माण विशिष्टियों को पढ़ने के लिए उनके बीच से होकर आ जा सके ।
The explosive packages shall be stocked in such a way so as to allow movement of at least one person to check the condition of all packages stored and to read the manufacture particulars of each package.
तडित चालकों की भूमि के लिए प्रतिरोध यथासंभव न्यूनतम होगा और किसी भी दशा में 10 ओहम से अधिक नहीं होगा ।
The resistance of the lightning conductor to earth shall be as low as possible and in no case be more than 10 ohms.
17. मैगजीन के चारों ओर 15 मीटर की दूरी के अंतर्गत कोई शुल्क घास या झाड़ी या ज्वलनशील सामग्री नहीं रहने दी जाएगी ।
A distance of 15 meters surrounding the magazine or store house shall be kept clear of dried grass or bush or flammable materials.
18. विस्फोटकों के प्रत्येक पैकेट की, जब उसे मैगजीन के भीतर लिया जा रहा हो, ठीक दशा जानने के लिए परीक्षा की जाएगी ।
Every package of explosive at the time of bringing inside the magazine shall be examined for its sound condition.
19. किसी मैगजीन / भंडारगृह में किसी एक समय में चार व्यक्तियों से अधिक को नहीं रहने दिया जाएगा ।
Not more than 4 persons shall be allowed inside the magazine or store house at any one time.
20. विस्फोटकों के खाली पैकजों को शीघ्रतिशीघ्र वहां से हटा दिया जाएगा और नष्ट कर दिया जाएगा ।
Empty packages of the explosives shall be removed at the earliest and destroyed. \
21. अनुज्ञप्तिधारी और कर्मचारियों को परिसर के भीतर आपातकाल के दौरान की जाने वाली प्रक्रियाओं से अवगत होना चाहिए ।
The licensee and the employee shall be conversant with procedure to be taken during the emergency within the premises.
22. निरीक्षण या नमूना अधिकारी को सभी युक्तियुक्त समयों पर अनुज्ञत परिसर में अबाध रूप से पहुंचने दिया जाएगा और यह सुनिश्चित करने के लिए कि अधिनियम और इन नियमों के उपबंधों और सुरक्षा स्थितियों को सम्यकत: अनुपालन किया जा रहा है, अधिकारी को प्रत्येक सुविधा प्रदान की जाएगी ।
Free access to the licensed premises shall be given at all reasonable times to any inspecting or sampling officer and every facility shall be afforded to the officer for ascertaining that the provisions of the Act and these rules and the safety conditions are duly observed.
23. यदि अनुज्ञापन प्राधिकारी या विस्फोटक नियंत्रक अनुज्ञप्तिधारक को अनुज्ञात परिसरों या मशीनरी, टूल या उपकरण में ऐसी कोई मरम्मत या परिवर्धन या परिवर्तन करने या सिफारिशों को लागू करने को लिखित रूप में सूचित करता है जो परिसर के अंदर या बाहर या व्यक्तियों की सुरक्षा के लिए आवश्यक है, अनुज्ञप्तिधारक सिफारिशों को निष्पादित करेगा और विनिर्दिष्ट अवधि के भीतर अनुपालन रिपोर्ट ऐसे प्राधिकारी को देगा ।
If the licensing authority or a Controller of Explosives informs in writing, the holder of the licence to execute any repairs or to make any additions or alterations to the licensed premises or machinery, tools or apparatus or carry out recommendations, which are in the opinion of such authority may pose unacceptable risk and so necessary for the safety of either on-site or off-site of the premises or persons, the holder of the license shall execute the recommendations and report compliance within the period specified by such authority.
24. अनुज्ञप्तिधारी मैगजीन में रखने और बिक्री के लिए प्राधिकृत विस्फोटक सूची में उल्लिखित अनुज्ञत फैक्टरी या कंपनी से प्राधिकृत विस्फोटक / आतिशबाजी या सुरक्षा पलीते खरीदेगा ।
The licensee shall purchase authorised explosives/ fireworks or safety fuse as mentioned in the list authorised explosives from a licensed factory or company for possession and sale from the magazine.
25. निम्न से अधिक ध्वनि स्तर उत्पादित करने वाले आतिशबाजियों पटाखों की बिक्री और रखने के लिए –
(क) जो फटने की जगह से चार मीटर की दूरी पर है, 125 डी.बी.(ए1) या 145 डी.बी.(सी)पी.के. प्रतिबंधित होंगे,
(ख) श्रृंखला (जुड़े हुए पटाख) को गठन करने वाले व्यक्तिगत पटाखों के लिए उपर्युक्त उल्लिखित सीमा 5 लॉग.10(एन) डी.बी. (सी) पी.के. प्रतिबंधित होंगे ;
The possession and sale of fire-crackers generating noise level exceeding;
a) 125 dB(AI) or 145 dB(C)pk at 4 meters distance from the point of bursting shall be prohibited;
b) For individual fire-cracker constituting the series (joined fire-crackers), the above mentioned limit be reduced by 5 log10 (N) dB, where N = number of crackers joined together.
26. आग या विस्फोट व्दारा दुर्घटना या नुकसान पटाखों की कमी या चोरी, तुरंत पास के पुलिस थाने और अनुज्ञापन प्राधिकारी और अनुज्ञापन प्राधिकारी के स्थानीय कार्यालय को रिपोर्ट की जाएगी ।
Accidents by fire or explosion and losses, shortage or theft of explosives shall be immediately reported to the nearest police station and the licensing authority and local office of the licensing authority.

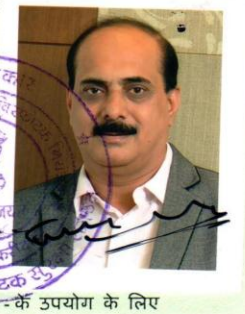
कृते मुख्य विस्फोटक नियंत्रक
For Chief Controller of Explosives

5833

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्प
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazine



अनुज्ञप्ति सं. (Licence No.) : E/NC/RJ/22/644(E24549)
वार्षिक फीस रुपए (Annual Fee Rs): 1800/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Sh. Sunil Duggal), RAJPURA DARIBA MINES
P.O.DARIBAN DISTT:- RAJSAMAND, Town/Village - , District-, State-, Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Nitrate Mixture, Detonators,** - के उपयोग के लिए
Licence is valid only for the following purpose.

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Nitrate Mixture	2 ,0	0	400 Kg.
2.	Detonators	6 ,3	0	2500 Nos.

(ख) किसी एक कलैंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **10 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/NC/RJ/22/644(E24549)
The licensed premises shall conform to the following drawing(s): . दिनांक (Dated) 04/02/1986

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Survey No(s). N/A. , ग्राम (Town/Village) : **DARIBA** **पुलिस थाना (Police Station) : RELMAGRA**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode)
दूरभाष (Phone) ई. मेल (E-Mail) फैक्स (Fax)

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **2 portable magazines**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय – समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधो, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबध्दों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी व्दारा हस्ताक्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्ति शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 1987** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 1987.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरूप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां वह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 04/02/1986

संयुक्त मुख्य विस्फोटक नियंत्रक | Joint Chief Controller of Explosives
North Circle, Faridabad

Amendments :
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 29/07/2013
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 02/02/2016
- Amendment in Drawings/Facilities/Premises dated : 13/05/2016
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 25/07/2016

नवीनीकरण के पृष्ठांकन के लिए स्थान
Space for Endorsement of Renewal

नवीकरण की तारीख Date of Renewal	समाप्ति की तारीख Date of Expiry	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प Signature of licensing authority and stamp
27/03/2014	31/03/2019	Sd/- Dy. Chief Controller of Explosives, Jaipur

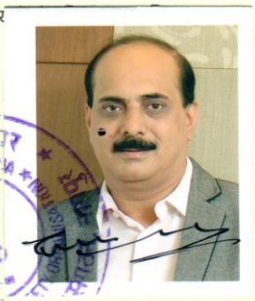
कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।

Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

अनुज्ञप्ति प्ररुप एल. ई.-3 | LICENCE FORM LE-3

(विस्फोटक नियम, 2008 की अनुसूची 4 के भाग 1 के अनुच्छेद 3(क) से (घ) देखिए।)
(See article 3(a) to (d) of Part 1 of Schedule IV of Explosives Rules, 2008)

(ग) उपयोग के लिए एक समय पर वर्ग 1,2,3,4,5 या वर्ग 7 के विस्फोटक या किसी मैगजीन में वर्ग 6 के विस्फोटक रर
Licence to possess : (c) for use,explosives of class 1, 2,3,4,5,6 or 7 in a magazine



अनुज्ञप्ति सं. (Licence No.) : E/HQ/RJ/22/310(E24935)
वार्षिक फीस रुपए (Annual Fee Rs): 20000/-

1. Licence is hereby granted to

M/s. Hindustan Zinc Limited, Rajpura Dariba Mines (अधिभोगी / Occupier : Shri Sunil Duggal S/o. Shri Jagat Ram Duggal), P.O. Dariba, Distt. Rajsamand - 313 211 (Rajasthan), Town/Village - , District-RAJASMAND, State-Rajasthan, Pincode - 313211

को अनुज्ञप्ति अनुदत्त की जाती है।

2. अनुज्ञप्तिधारी की प्रास्थिति | Status of licensee : **Company**

3. अनुज्ञप्ति निम्नलिखित प्रयोजनों के लिए विधिमान्य है। : possess for use of **Nitrate Mixture, -** के उपयोग के लिए

Licence is valid only for the following purpose.

4. अनुज्ञप्ति विस्फोटकों के निम्नलिखित किस्मों, प्रकार और मात्रा के लिए विधिमान्य है।
Licence is valid for the following kinds and quantity of explosives: -- (क) (a)

क्र Sr. No.	नाम और विवरण Name and Description	वर्ग और प्रभाग Class & Division	उप-प्रभाग Sub-division	मात्रा किसी एक समय में Quantity at any one time
1.	Nitrate Mixture	2.0	0	35000 Kg.

(ख) किसी एक कलेंडर मास में खरीदे जाने वाले विस्फोटक की मात्रा [अनुच्छेद 3(ख) और (ग) के अधीन अनुज्ञप्ति के लिए] : **10 times as above.**
(b) Quantity of explosives to be purchased in a calendar month[applicable for licence under article 3(b) and (c)] :

5. निम्नलिखित रेखाचित्र (रेखाचित्रों) से अनुज्ञप्त परिसर की पुष्टि होती है। : रेखाचित्र क्र. (Drawing No.) E/HQ/RJ/22/310(E24935)
The licensed premises shall conform to the following drawing(s): दिनांक (Dated) 07/02/1979

6. अनुज्ञप्ति परिसर निम्नलिखित पते पर स्थित हैं। The licensed premises are situated at following address:
Survey No(s). Mines No. 5 , ग्राम (Town/Village) : **Dariba (Rajpur Dariba Mines)** **पुलिस थाना (Police Station) : Railmagra**
जिला (District) **RAJASMAND** राज्य (State) **Rajasthan** पिनकोड (Pincode) **313211**
दूरभाष (Phone) **02952 265275 265151** ई. मेल (E-Mail) **praveen.jain@vedanta.co.in** फैक्स (Fax) **02952 265143 265157**

7. अनुज्ञप्ति परिसर में निम्नलिखित सुविधाएं अंतर्विष्ट हैं। : **A Main High Explosives Storage Room & A Lobby**
The licensed premises consist of following facilities.

8. अनुज्ञप्ति समय – समय पर यथासंशोधित विस्फोटक अधिनियम, 1884 और उनके अधीन विरचित विस्फोटक नियम, 2004 के उपबंधों, शर्तों और अतिरिक्त शर्तों और निम्नलिखित उपाबध्दों के अधीन रहते हुए अनुदत्त की जाती है।
The licence is granted subject to the provision of Explosives Act 1884 as amended from time to time and the Explosives Rules, 2008 framed there under and the conditions, additional conditions and the following Annexures.

1. उपर्युक्त क्रम सं. 5 में यथा कथित रेखाचित्र (स्थान, सन्निर्माण संबंधी और अन्य विवरण दर्शित करते हुए)।
   Drawings (showing site, constructional and other details) as stated in serial No. 5 above.
2. अनुज्ञप्ति प्राधिकारी व्दारा हस्ता.क्षरित इस अनुज्ञप्ति की शर्तें और अतिरिक्ति शर्तें।
   Conditions and Additional Conditions of this licence signed by the licensing authority.
3. दूरी प्ररूप DE-2 | Distance Form DE-2.

9. यह अनुज्ञप्ति तारीख **31 मार्च 2006** तक विधिमान्य रहेगी। This licence shall remain valid till **31st day of March 2006.**

यह अनुज्ञप्ति, अधिनियम या उसके अधीन विरचित नियमों या अनुसूची V के भाग 4 के प्रति निर्दिष्ट सेट-VII के अधीन तथा उपवर्णित इस अनुज्ञप्ति की शर्तों का अधिक्रमण करने या यदि अनुज्ञप्त परिसर योजना या उससे संलग्न उपबंध में दर्शित विवरण के अनुरूप नहीं पाए जाने पर निलंबित या प्रतिसंहृत की जा सकती है, जहां वह लागू हो।
This licence is liable to be suspended or revoked for any violation of the Act or Rules framed there under or the conditions of this licence as set forth under Set VIII, wherever applicable, referred to in Part 4 of Schedule V or if the licensed premises are not found conforming to the description shown in the plans and Annexure attached hereto.

तारीख | The Date - 07/02/1979

मुख्य विस्फोटक नियंत्रक | Chief Controller of Explosives

Amendments :
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 15/12/2010
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 15/03/2012
- Amendment of Quantity of Explosives/Monthly Purchase Limit dated : 08/08/2013

Transfers :
- Change in Authorized Signatory/Occupier/Partners/Directors dated : 08/12/2015

नवीनीकरण के पृष्ठांकन के लिए स्थान
Space for Endorsement of Renewal

नवीकरण की तारीख Date of Renewal	समाप्ति की तारीख Date of Expiry	अनुज्ञापन प्राधिकारी के हस्ताक्षर और स्टाम्प Signature of licensing authority and stamp
17/03/2015	31/03/2018	Sd/- Dy. Chief Controller of Explosives, Jaipur

कानूनी चेतावनी : विस्फोटकों को गलत ढंग से चलाने या उनका दुरूपयोग विधि के अधीन गंभीर दांडिक अपराध होगा।
Statutory Warning : Mishandling and misuse of explosives shall constitute serious criminal offence under the law.

(सेट VIII | Set VIII)

मैगजीन में वर्ग 1,2,3,4,5,6, और 7 के विस्फोटकों को बिक्री या प्रयोग हेतु रखने के लिए प्ररूप एल.ई. 3 (अनुच्छेद 3 (ख) से (ग)) में मुख्य विस्फोटक नियंत्रक या विस्फोटक नियंत्रक द्वारा प्रदान किए जाने वाले अनुज्ञप्ति सं. E/HQ/RJ/22/310(E24935) की शर्तें निम्नलिखित हैं ।
The following are the conditions of licence number E/HQ/RJ/22/310(E24935) to possess for sale or use, explosives of Class 1,2,3, 4, 5, 6 and 7 in a magazine in Form LE-3 (articles 3(b) to (c)) granted by Chief controller of Explosives or Controller of Explosives.

1. परिसर में किसी भी समय विस्फोटकों की मात्रा अनुज्ञापन योग्य सामर्थ्य से अधिक नहीं होगी ।
The quantity of explosives on the premises at any one time shall not exceed the licensable capacity.
2. विस्फोटकों के भंडारण के लिए प्रयुक्तर होने वाली मैगजीन अनुसूची III और अनुलग्नक के उपबंध में विनिर्दिष्ट सुरक्षा दूरी बनाए रखना होगा।
The magazine used for storage of explosives shall maintain safety distance specified in Schedule III and annexure to the licence.
3. मैगजीन का प्रयोग उन सभी विस्फोटकों के, जो इस अनुज्ञप्ति में विनिर्दिष्ट हैं, रखे जाने के लिए और ऐसे रखे जाने से संबद्ध आधान या औजार या उपकरणों के रखे जाने के लिए ही किया जाएगा; अन्यथा नहीं ।
The magazine shall be used only for keeping all explosives specified in this licence and of receptacles for, or tools or implements for work connected with the keeping of such explosives.
4. पैकजों को खोलने का कार्य और विस्फोटकों को तौलने तथा पैक करने का कार्य मैगजीन में नहीं किया जाएगा ।
The opening of packages and the weighing and packing of explosives shall not be carried on in the magazine.
5. दो या दो से अधिक वर्णन के विस्फोटकों को, जिन्हें मैगजीन में रखे जाने की अनुज्ञा दी जा सकती है, मैगजीन में तभी रखे जाएंगे जब उनमें से प्रत्येक को, ऐसे पदार्थ या स्वरूप का कोई मध्यवर्ती विभाजक लगाकर या उनके बीच ऐसा मध्यवर्ती स्थान छोड़कर, परस्पर पृथक कर दिया जाए कि किसी वजह से विस्फोटक में लगने वाली आग या होने वाला विस्फोट किसी अन्य वर्णन के विस्फोटक तक न पहुंच सके : परंतु –
(घ) 2 (नाइट्रेट मिश्रण), वर्ग 3 (नाइट्रो यौगिक) के विभिन्न विस्फोटक, वर्ग 6 प्रथम प्रभाग के अंतर्गत आने वाले सुरक्षा फलीते और वर्ग 6 प्रभाग 2 के अंतर्गत आनेवाले विस्फोटक पैरक फलीते, जिनमें कोई खुला लोहा या इस्पात नहीं है, एक दूसरे के साथ बिना किसी मध्यवर्ती विभाजक या स्थायन के रखे जा सकते हैं ।
(ङ) वर्ग 6 प्रभाग 3 के अंतर्गत आनेवाले विस्फोटक पैरक अलग रखे जाएंगे ।
(च) वर्ग 1 के अंतर्गत आने वाले बारूद को अलग रखा जाएगा ।
Two or more description or explosives which may be permitted to be kept in the magazine shall be kept only if they are separated from each other by an intervening partition of such substance or character, or by such intervening space, as will effectually prevent explosion or fire in the one communicating with the other; Provided that—
(d) the various explosives of Class 2 (nitrate-mixture), Class 3 (nitro-compound), safety fuses belonging to Class 6 Division 1and detonating fuses belonging to Class 6 Division 2 as do not contain any exposed iron or steel, may be kept with each other without any intervening partition or space ;
(e) Detonators belonging to Class 6 Division 3 shall be kept separately.
(f) Gun powder belonging to Class 1 shall be kept separately.
6. वर्ग 3 (नाइट्रो यौगिक) के विस्फोटकों को, उनके विनिर्माण की तारीख से एक वर्ष बीत जाने के पश्चात सिवाय अनुज्ञापन प्राधिकारी की विशेष मंजूरी के मैगजीन में नहीं रखा जाएगा ।
Explosives of Class 3 (nitro compound) shall not be kept in the magazine after the expiration of one year from the date of their manufacture except with the special sanction of licensing authority.
7. वर्ग 3 (नाइट्रो यौगिक) के विस्फोटकों को, उनके विनिर्माण की तारीख से एक वर्ष बीत जाने के पश्चात मैगजीन में तभी रखा जाएगा जब कि किसी विस्फोटक नियंत्रक ने इसके लिए विशेष मंजूरी दे दी हो ।
(i) जब ऐसी मंजूरी दे दी गई हो तो प्रत्येक निरीक्षण पर किसी विस्फोटक नियंत्रक से ऐसा लिखित प्रमाणपत्र अभिप्राप्त कर लिया जाए जिसमें दी गई मंजूरी के अंतर्गत आनेवाली अवधि दर्शित की गई हो और ऐसे प्रमाणपत्र के अनुज्ञप्तिधारी अपने पास रखेगा और मांग की जाने पर प्रस्तुत करेगा ।
(ii) जब कोई विस्फोटक मानक शुध्दता का न रह जाने के कारण या द्रवणीकरण या नाइट्रो ग्लीअसरीन या द्रव नाइट्रो यौगिक के निकल जाने के चिन्ह प्रकट होने के कारण मैगजीन में भण्डारित किए जाने के उपयुक्त नहीं रह जाता है तो अनुज्ञप्तिधारी अपने ही व्यय पर ऐसे विस्फोटक के निपटारे के लिए ऐसे निदेशों का अनुपालन करेगा जो मुख्य नियंत्रक या विस्फोटक नियंत्रक जारी करें ।
Explosives of Class 3 (nitro compound) shall not be kept in the magazine after the expiration of one year from the date of their manufacture except with the special sanction of the Controller of Explosives.
(i) When such sanction has been given, a written certificate showing the period covered by the sanction shall be obtained from the Controller of Explosives at each inspection, and shall be kept by the licensee and produced on demand.
(ii) When an explosive owing to its being no longer of standard purity or owing to signs of liquefaction or of exuded nitro-glycerin or liquid nitro-glycerin or liquid nitrocompound is no longer fit for storage in the magazine or store house the licensee shall comply, at his own expense, with such directions as to its disposal as the Chief Controller or Controller of Explosives may issue.
8. मैगजीन के भीतरी भाग या उसमें लगी बेंचों, शेल्फों और उसकी फिटिंग का इस प्रकार सन्निर्माण किया जाएगा या उन्हें इस प्रकार अंतरित या अवतरित किया जाएगा कि विस्फोटक का किसी लोहे या इस्पात के साथ संपर्क रोका जा सके । भीतरी भाग में लगी बेंचे, शेल्फे और फिटिंग यथासाध्य रिट से मुक्त एवं साफ रखे जाएंगे तथा ऐसे विस्फोटक, जो जल से खतरनाक रूप में प्रभावित हो सकते हैं, इस बाबत सम्यक सावधानी बरती जाएगी कि वहां कोई जल मौजूद न रहे : परंतु किसी लोहे या इस्पात के खुले होने के विरुध्द सावधानी से संबंधित इस शर्त का वह भाग ऐसे किसी भवन में बाध्यकर नहीं होगा जिसमें वर्ग 6 (गोला बारूद) के प्रथम के विस्फोटक से भिन्न कोई विस्फोटक रखा गया है ।
The interior of the magazine and the benches, shelves and fittings therein shall be so constructed or so lined or covered as to prevent the exposure of any iron or steel contact with the explosives. Such interior, benches, shelves and fittings shall so far as is reasonably practicable, be kept free from grit and shall otherwise be clean; and in the case of any explosives liable to be dangerously affected by water, due precautions shall be taken to exclude water there from;
Provided that so much of this condition as relates to precautions against the exposure of any iron or steel shall not be obligatory in a building in which no explosive other than explosive of the 1st Division 6th (Ammunition) Class is kept.
9. यदि तडित चालक का परीक्षण विस्फोटक नियंत्रक करता है तो अनुज्ञप्तिधारी ऐसे परीक्षण के लिए विहित फीस का संदाय करेगा यदि परीक्षण असमाधानकारी साबित होता है तो उतनी ही फीस अनुज्ञप्तिधारी द्वारा पश्चात्वर्ती प्रत्येक परीक्षण के लिए तब तक दी जाती रहेगी जब तक कि परीक्षण अधिकारी तडित चालक को समाधानप्रद घोषित नहीं कर देता :
परंतु किसी एक परीक्षण के लिए देय फीस किसी एक दिन के दौरान किसी चालक के किए गए सभी परीक्षणों के लिए प्रभार्य होगा :
परंतु यह और कि यदि दो या अधिक तडित चालक एक ही मैगजीन से संबध्द हैं तो ऐसे सभी चालकों के परीक्षण के लिए फीस ऐसी किसी फीस से अधिक नहीं होगी जो किसी एक तडित चालक के परीक्षण के लिए हर स्थिति में विहित की गई है ।
If the lighting conductor is tested by the Controller of Explosives, the licensee shall pay the fees prescribed for test. In the even of the test proving unsatisfactory, the same fees shall be payable by the licensee for each subsequent test until the lighting conductor is passed by the testing officer as satisfactory.
Provided that the fees payable for a single test shall be charged for all tests made on a conductor during any one day :

Provided further that where two or more lighting conductors are attached to one and the same magazine, the fee for the testing of all such conductors shall not exceed the fee prescribed in this condition for testing a single lighting conductor.
10. उपयुक्त तथा जेब रहित कार्यकरण वस्त्रों , उपयुक्त जूतों के प्रयोग द्वारा तथा तलाशी लेकर या अन्यथा अथवा ऐसे किन्हीं साधनों द्वारा इस बाबत सम्यक उपबंध किया जाएगा कि फैक्ट्री परिसर में अग्नि, दियासलाई अथवा ऐसी कोई वस्तुएं या पदार्थ, जिससे विस्फोट हो सकता है या आग लग सकती हो, किन्तु इस शर्त के कारण ऐसी संरचना, स्थिति या स्वरूप में किसी कृत्रिम बत्ती का प्रवेश वर्जित नहीं है जिससे आग लगने या विस्फोट होने का खतरा न हो :
परंतु इस शर्त का वह भाग, जो लोहे या इस्पात के अपवर्जन को लागू होता है, ऐसे किसी भवन के संबंध में बाध्य कर नहीं होगा जिससे भिन्न कोई विस्फोटक नहीं रखा गया है ।
Due provisions shall be made, by the use of suitable working clothes without pockets, suitable shoes and by searching or otherwise or by such means, for preventing the introduction into danger area of the factory premises of fie, Lucifer matches or any substance or article likely to cause explosion or fire, but this condition shall not prevent the introduction of an artificial light of such construction, position or character as not to cause any danger of fire or explosion:
Provided that so much of this condition as applies to the exclusion of iron or steel, shall not be obligatory in a building in which no explosive other than an explosive of the 1st Division of the 6th (Ammunition) Class is kept.
11. अनुज्ञप्तिधारी प्ररूप आर.ई.-3 और आर.ई.-4 या आर.ई.-5, जैसी स्थिति हो, में सभी विस्फोटकों का अभिलेख और लेखा रखेगा और विस्फोटक नियम, 2008 के अधीन प्राधिकृत किसी भी अधिकारी के समक्ष उसके द्वारा ऐसा करने की मांग की जाने पर स्टाक पुस्तक और अभिलेख प्रस्तुत करेगा । स्टाक पुस्तक विहित प्रोफार्मा में पृष्ठ संख्यांकित होगी ।
The licensee shall keep records and accounts of all explosives in Forms RE-3 and RE-4 or RE-5, as the case may be, and exhibit the stock books and records to any of the officers authorised under the Explosives Rules, 2008 whenever such officer may call upon him to do so.
The stock books in the prescribed proforma shall be page numbered.
12. परिसरों में कोई परिवर्तन या तबदीली अनुज्ञापन प्राधिकारी के पूर्वानुमोदन बिना नहीं की जाएगी और अनुज्ञप्तिधारी ऐसी किसी शर्त का अनुपालन करेगा जो इस निमित्त अनुज्ञापन प्राधिकारी विनिर्दिष्ट करे ।
No changes or alterations shall be carried out to the premises without prior approval of the licensing authority and the licensee shall comply with any condition that may be specified by the licensing authority in this behalf.
13. मैगजीन सभी समयों पर अच्छी मरम्मत की स्थिति में बनाई रखी जाएगी (या अच्छी हालत में बनाई रखी जाएगी) । यदि किसी व्यवनवश किसी विस्फोटक के भण्डारण के लिए मैगजीन अनुपयुक्त हो जाती है तो अनुज्ञप्तिधारी इस बात की सूचना अनुज्ञापन प्राधिकारी को तुरंत देगा ।
Magazine shall at all times be kept in state of good repair (or maintained in good condition). The licensee shall report to licensing authority forthwith, if the magazine becomes unfit for storage of any explosives for any reason whatsoever.
मैगजीन का अनुज्ञप्तिधारी इन नियमों के नियम 24 के उप-नियम 3 के अनुसार त्रैमासिक विवरणी प्रस्तुत करेगा ।
The licensee of the magazine shall submit quarterly return as per sub-rules (3) and (4) of rule 24 of these rules.
14. यदि सुरक्षा दूरी का कोई अधिक्रमण होता है तो उसकी सूचना अनुज्ञापन प्राधिकारी को आवश्यक सलाह और कार्यवाही के लिए तुरंत दी जाएगी ।
Any encroachment of the safety distance shall be immediately communicated to the licensing authority for necessary advice and action.
15. यदि कोई विस्फोटक विनष्ट हुआ अथवा अनुपयोगी जाया जाता है तो उसकी सूचना अनुज्ञापन प्राधिकारी को, सलाह प्राप्त करने के लिए, तुरंत दी जाएगी ।
The licensing authority shall be immediately informed for advice if any explosive is found deteriorated or unserviceable.
16. विस्फोटकों के पैकेटों के चाहे इस प्रकार लगाए जाएंगे कि कम से कम एक व्यक्ति भण्डार किए गए सभी पैकजों की हालत की जांच करने और प्रत्येक पैकेज की विनिर्माण विशिष्टियों को पढ़ने के लिए उनके बीच से होकर आ जा सके ।
The explosive packages shall be stocked in such a way so as to allow movement of at least one person to check the condition of all packages stored and to read the manufacture particulars of each package.
तडित चालकों की भूमि के लिए प्रतिरोध यथासंभव न्यूनतम होगा और किसी भी दशा में 10 ओहम से अधिक नहीं होगा ।
The resistance of the lightning conductor to earth shall be as low as possible and in no case be more than 10 ohms.
17. मैगजीन के चारों ओर 15 मीटर की दूरी के अंतर्गत कोई शुष्क घास या झाड़ी या ज्वलनशील सामग्री नहीं रहने दी जाएगी ।
A distance of 15 meters surrounding the magazine or store house shall be kept clear of dried grass or bush or flammable materials.
18. विस्फोटकों के प्रत्येक पैकेट की, जब उसे मैगजीन के भीतर लिया जा रहा हो, ठीक दशा जानने के लिए परीक्षा की जाएगी ।
Every package of explosive at the time of bringing inside the magazine shall be examined for its sound condition.
19. किसी मैगजीन / भंडारगृह में किसी एक समय में चार व्यक्तियों से अधिक को नहीं रहने दिया जाएगा ।
Not more than 4 persons shall be allowed inside the magazine or store house at any one time.
20. विस्फोटकों के खाली पैकजों को शीघ्रतिशीघ्र वहां से हटा दिया जाएगा और नष्ट कर दिया जाएगा ।
Empty packages of the explosives shall be removed at the earliest and destroyed.
21. अनुज्ञप्तिधारी और कर्मचारीयों को परिसर के भीतर आपातकाल के दौरान की जाने वाली प्रक्रियाओं से अवगत होना चाहिए ।
The licensee and the employee shall be conversant with procedure to be taken during the emergency within the premises.
22. निरीक्षण या नमूना अधिकारी को सभी युक्तियुक्त समयों पर अनुज्ञप्त परिसर में अबाध रूप से पहुंचने दिया जाएगा और यह सुनिश्चित करने के लिए कि अधिनियम और इन नियमों के उपबंधों और सुरक्षा स्थितियों को सम्यकत: अनुपालन किया जा रहा है, अधिकारी को प्रत्येक सुविधा प्रदान की जाएगी ।
Free access to the licensed premises shall be given at all reasonable times to any inspecting or sampling officer and every facility shall be afforded to the officer for ascertaining that the provisions of the Act and these rules and the safety conditions are duly observed.
23. यदि अनुज्ञापन प्राधिकारी या विस्फोटक नियंत्रक अनुज्ञप्तिधारक को अनुज्ञप्त परिसरों या मशीनरी, टूल या उपकरण में ऐसी कोई मरम्मत या परिवर्धन या परिवर्तन करने या सिफारिशें को लागू करने को लिखित रूप में सूचित करता है जो परिसर के अंदर या बाहर या व्यक्तियों की सुरक्षा के लिए आवश्यक है, अनुज्ञप्तिधारक सिफारिशों को निष्पादित करेगा और विनिर्दिष्ट अवधि के भीतर अनुपालन रिपोर्ट ऐसे प्राधिकारी को देगा ।
If the licensing authority or a Controller of Explosives informs in writing, the holder of the licence to execute any repairs or to make any additions or alterations to the licensed premises or machinery, tools or apparatus or carry out recommendations, which are in the opinion of such authority may pose unacceptable risk and so necessary for the safety of either on-site or off-site of the premises or persons, the holder of the license shall execute the recommendations and report compliance within the period specified by such authority.
24. अनुज्ञप्तिधारी मैगजीन में रखने और बिक्री के लिए प्राधिकृत विस्फोटक सूची में उल्लिखित अनुज्ञप्त फैक्टरी या कंपनी से प्राधिकृत विस्फोटक / आतिशबाजी या सुरक्षा फलीते खरीदेगा ।
The licensee shall purchase authorised explosives/ fireworks or safety fuse as mentioned in the list authorised explosives from a licensed factory or company for possession and sale from the magazine.
25. निम्न से अधिक ध्वनि स्तर उत्पादित करने वाले आतिशबाजियों पटाखों की बिक्री और रखने के लिए –
(क) जो फटने की जगह से चार मीटर की दूरी पर है, 125 डी.बी.(ए) या 145 डी.बी.(सी)पी.के प्रतिबंधित होगी;
(ख) श्रृंखला (जुड़े हुए पटाखे) को गठन करने वाले व्यक्तिगत पटाखों के लिए उपर्युक्त उल्लिखित सीमा 5 लॉग 10(एन) डी.बी. (सी) पी के प्रतिबंधित होगी ;
The possession and sale of fire-crackers generating noise level exceeding;
a) 125 dB(AI) or 145 dB(C)pk at 4 meters distance from the point of bursting shall be prohibited;
b) For individual fire-cracker constituting the series (joined fire-crackers), the above mentioned limit be reduced by 5 log10 (N) dB, where N = number of crackers joined together.
26. आग या विस्फोट द्वारा दुर्घटना या नुकसान पटाखों की कमी या चोरी, तुरंत पास के पुलिस थाने और अनुज्ञापन प्राधिकारी और अनुज्ञापन प्राधिकारी के स्थानीय कार्यालय को रिपोर्ट की जाएगी ।
Accidents by fire or explosion and losses, shortage or theft of explosives shall be immediately reported to the nearest police station and the licensing authority and local office of the licensing authority.

कृते मुख्य विस्फोटक नियंत्रक
For Chief Controller of Explosives

Public Domain | Application Status | Peso Web Site

Search Licenses Details

Valid Doc key No. (E##)	OR	Road Van Registration No. (MH ##)	OR	Select Premises State: Select Any Value; Select Premises District; Licensee Name (min. 4 characters)
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Get Details		Get Details		Get Details

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Sr. No.	Doc Key No	Form No	New Form No	Licence No	Licensee Name	Site State	Site District	Issued Date	Expiry Date	Current Status	Show
1	E36258	F22	LE-3(F22)	E/HQ/RJ/22/237	M/s. Hindustan Zinc Limited, Rajpura Dariba Mines	Rajasthan	RAJASMAND	04/02/1986	31/03/2022	Valid	Show

1

Licenses All Details

Sr. No.	Doc Key No	Licence Form No	Licence No	Licensee Name	Site State	Site District	Issued Date	Expiry Date	Current Status
1	E36258	LE-3(F22)	E/HQ/RJ/22/237	M/s. Hindustan Zinc Limited, Rajpura Dariba Mines	Rajasthan	RAJASMAND	04/02/1986	31/03/2022	Valid

Correspondence Address	Premises Address
M/s. Hindustan Zinc Limited, Rajpura Dariba Mines Rajpura Dariba Mine, P. O. Dariba, Tehsil Railmagra, Fatehnagar, - 313211 District : RAJASMAND, State : Rajasthan	, Survey No(s). - NIL, DARIBA District : RAJASMAND, State : Rajasthan

Sr. No.	Explosive Name	Class	Division	Quantity at a Time	Unit	No. of Times
1	Nitrate Mixture	2	0	29500.00	Kg.	10
2	Cast Booster	3	2	3000.00	Kg.	10
3	Detonating Fuse	6	2	50000.00	Mtrs	10

Sr. No.	Name	Age	Type	Address	Phone / Mobile No.
1	Shri Sanjay Kumar Khator S/o. Late Shri Ramswarup Maheshwari	48	Authorized Signatory	Unit Head, Hindustan Zinc Limited, Rajpura Dariba Mines, P. O. Dariba - 313 211, District Rajsamand - 313 211 (Rajasthan)	
2	Shri Sunil Duggal S/o. Shri Jagat Ram Duggal	53	Occupier	R/o. D-2, Ambavgarh, Udaipur (Rajasthan)	

BLOOD LEAD ESTIMATION OF SKM EMPLOYEES IN 2016						
sr.no.	DATE	UNIT	sample number	NAME	E.NO	BLOOD LEAD IN mcg %
1	APR-MAY 16	SK-1	HOFINCONS	DEVENDRA SI	13200	12
2	APR-MAY 16	SK-2	**********	**********	*****	***
3	APR-MAY 16	SK-3	HOFINCONS	CHETRAM NA	13953	15
4	APR-MAY 16	SK-4	HOFINCONS	SATYANARAY	13958	13
5	APR-MAY 16	SK-5	HOFINCONS	ROSHAN KUM	13887	12
6	APR-MAY 16	SK-6	HOFINCONS	SOHAN GADR	---	10
7	APR-MAY 16	SK-7	HOFINCONS	KISHAN LAL T	17927	9
8	APR-MAY 16	SK-8	HOFINCONS	PARSHRAM S	17911	9
9	APR-MAY 16	SK-9	HOFINCONS	SANJAY MALI	14152	7
10	APR-MAY 16	SK-10	HOFINCONS	SHANATI LAL	18013	8
11	APR-MAY 16	SK-11	HOFINCONS	SALIM BEG	17973	6
12	APR-MAY 16	SK-12	HOFINCONS	BALU RAM	18020	7
13	APR-MAY 16	SK-13	HOFINCONS	SHANKAR LOI	18021	4
14	APR-MAY 16	SK-14	HOFINCONS	SOHAN LAL N	18011	9
15	APR-MAY 16	SK-15	HOFINCONS	RATAN LAL PA	18001	6
16	APR-MAY 16	SK-16	HOFINCONS	SAHBUDDIN	13184	9
17	APR-MAY 16	SK-17	HOFINCONS	SHANKAR LAL	17924	5
18	APR-MAY 16	SK-18	HOFINCONS	KANARAM CH	13872	6
19	APR-MAY 16	SK-19	HOFINCONS	HEERA LAL M	17916	8
20	APR-MAY 16	SK-20	HOFINCONS	RAMESH GAD	17967	8
21	APR-MAY 16	SK-21	HOFINCONS	AJAY PAL SIN	14043	4
22	APR-MAY 16	SK-22	HOFINCONS	MADHAV JAT	13885	5
23	APR-MAY 16	SK-23	HOFINCONS	RAMESHWAR	17984	4
24	APR-MAY 16	SK-24	HOFINCONS	OM PRAKASH	13878	6
25	APR-MAY 16	SK-25	HOFINCONS	SAMPAT LAL	13879	4
26	APR-MAY 16	SK-26	HOFINCONS	PRAKASH JAT	---	3
27	APR-MAY 16	SK-27	HOFINCONS	KHEMRAJ JAT	18029	6
28	APR-MAY 16	SK-28	HOFINCONS	GHANSHYAM	12156	4
29	APR-MAY 16	SK-29	HOFINCONS	GAJENDRA SI	17912	5
30	APR-MAY 16	SK-30	HOFINCONS	NARAYAN LAI	16206	6
31	APR-MAY 16	SK-31	HOFINCONS	SAHID MANU	13864	4
32	APR-MAY 16	SK-32	HOFINCONS	SHARVAN DH	17991	7
33	APR-MAY 16	SK-33	HOFINCONS	VANI RAM KA	18026	7
34	APR-MAY 16	SK-34	HOFINCONS	LOKESH KUM	17283	3
35	APR-MAY 16	SK-35	HOFINCONS	MADAN REGA	17401	4
36	APR-MAY 16	SK-36	HOFINCONS	RATAN NAYA	17344	6
37	APR-MAY 16	SK-37	HOFINCONS	HEMENDRA S	16446	5
38	APR-MAY 16	SK-38	HOFINCONS	PAWAN KUM	20916	4
39	APR-MAY 16	SK-39	HOFINCONS	DINESH KUM	13957	4
40	APR-MAY 16	SK-40	HOFINCONS	DEVI LAL PAL	18003	3
41	APR-MAY 16	SK-41	HOFINCONS	BABU LAL BH	17995	6
42	APR-MAY 16	SK-42	HOFINCONS	OM PRAKASH	13888	7
43	APR-MAY 16	SK-43	HOFINCONS	KAILASH CHA	17978	6
44	APR-MAY 16	SK-44	HOFINCONS	VIJAY PRAKAS	17443	7
45	APR-MAY 16	SK-45	HOFINCONS	GOVRDHAN J	13886	4
46	APR-MAY 16	SK-46	HOFINCONS	BIJAY KUMAR	7131	9

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47	APR-MAY 16	SK-47	HOFINCONS	VIJAY KUMAR	17352	4
48	APR-MAY 16	SK-48	HOFINCONS	MANGI LAL G	18004	6
49	APR-MAY 16	SK-49	HOFINCONS	SAMPAT GAH	13954	3
50	APR-MAY 16	SK-50	HOFINCONS	SANDEEP NAI	17455	10
51	APR-MAY 16	SK-51	HOFINCONS	MURLIDHAR S	17934	5
52	APR-MAY 16	SK-52	HOFINCONS	SANDEEP MO	12171	6
53	APR-MAY 16	SK-53	HOFINCONS	DHARAM RAJ	18402	7
54	APR-MAY 16	SK-54	HOFINCONS	PARKASH CHA	14146	2
55	APR-MAY 16	SK-55	HOFINCONS	ASHISH GOSH	7877	6
56	APR-MAY 16	SK-56	HOFINCONS	MADAN LAL (	232	3
57	APR-MAY 16	SK-57	HOFINCONS	OM PRAKASH	18233	6
58	APR-MAY 16	SK-58	HOFINCONS	MUKESH KUN	13871	4
59	APR-MAY 16	SK-59	HOFINCONS	MALAY PRAD	17170	2
60	APR-MAY 16	SK-60	HOFINCONS	GAUTAM MO	17169	4
61	APR-MAY 16	SK-61	HOFINCONS	RATAN LAL H	---	4
62	APR-MAY 16	SK-62	HOFINCONS	AJAY SINGH	17929	5
63	APR-MAY 16	SK-63	HOFINCONS	LAHRU LAL RA	18403	2
64	APR-MAY 16	SK-64	HOFINCONS	OM PRAKASH	18030	5
65	APR-MAY 16	SK-65	HOFINCONS	DEVENDRA SI	18401	5
66	APR-MAY 16	SK-66	HOFINCONS	RHRISHIKESH	18405	9
67	APR-MAY 16	SK-67	HOFINCONS	SALIM MOHD	18406	2
68	APR-MAY 16	SK-68	HOFINCONS	JAWAHAR MA	18019	5
69	APR-MAY 16	SK-69	HOFINCONS	BHAGIRATH B	17964	6
70	APR-MAY 16	SK-70	HOFINCONS	PRAKASH CHA	17956	5
71	APR-MAY 16	SK-71	HOFINCONS	LADU LAL GA	18407	5
72	APR-MAY 16	SK-72	HOFINCONS	MANOHAR LA	17913	3
73	APR-MAY 16	SK-73	HOFINCONS	BINOD SINGH	14048	5
74	APR-MAY 16	SK-74	HOFINCONS	KESHRI MAL	12161	4
75	APR-MAY 16	SK-75	HOFINCONS	YOGESH POKI	17456	6
76	APR-MAY 16	SK-76	HOFINCONS	SHANKAR KU	17466	4
77	APR-MAY 16	SK-77	HOFINCONS	SHAMBHU LA	16266	6
78	APR-MAY 16	SK-78	HOFINCONS	BALU RAM	16516	6
79	APR-MAY 16	SK-79	HOFINCONS	JEETMAL GAD	17998	8
80	APR-MAY 16	SK-80	HOFINCONS	SHANKAR GA	18000	3
81	APR-MAY 16	SK-81	HOFINCONS	DALU BHIL	17944	5
82	APR-MAY 16	SK-82	HOFINCONS	HEERA LAL GA	17989	5
83	APR-MAY 16	SK-83	HOFINCONS	DEVI LAL GAD	17982	11
84	APR-MAY 16	SK-84	HOFINCONS	MADAN LAL B	18032	5
85	APR-MAY 16	SK-85	HOFINCONS	RAM CHANDR	18002	6
86	APR-MAY 16	SK-86	HOFINCONS	VIRENDRA SIN	17910	9
87	APR-MAY 16	SK-87	HOFINCONS	SURAJ KUMA	17480	7
88	APR-MAY 16	SK-88	HOFINCONS	SHANKAR GA	18232	4
89	APR-MAY 16	SK-89	HOFINCONS	SANDEEP JAIN	15090	3
90	APR-MAY 16	SK-90	HOFINCONS	PURAN LAL B	14046	5
91	APR-MAY 16	SK-91	HOFINCONS	DINESH KUM	16264	9
92	APR-MAY 16	SK-92	HOFINCONS	PRAVEEN KUI	16263	5
93	APR-MAY 16	SK-93	HOFINCONS	MUNESH CHA	8931	7
94	APR-MAY 16	SK-94	HOFINCONS	SRIKANT KUM	17245	6
95	APR-MAY 16	SK-95	HOFINCONS	BHOJRAJ MEE	11939	9
96	APR-MAY 16	SK-96	HOFINCONS	PURUSHOTTA	17954	5

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97	APR-MAY 16	SK-97	HOFINCONS	BOTHMAL JA	18038	7
98	APR-MAY 16	SK-98	HOFINCONS	NARAYAN LA	17943	4
99	APR-MAY 16	SK-99	HOFINCONS	NAVRATATN	13970	8
100	APR-MAY 16	SK-100	HOFINCONS	NARAYAN LA	16468	3
101	APR-MAY 16	SK-101	HOFINCONS	SHANKAR SIN	16265	20
102	APR-MAY 16	SK-102	HOFINCONS	KISHAN LAL D	18017	18
103	APR-MAY 16	SK-103	HOFINCONS	DINESH KUM	18031	8
104	APR-MAY 16	SK-104	HOFINCONS	GOVIND RAM	13868	3
105	APR-MAY 16	SK-105	HOFINCONS	GOVIND TAIL	17346	4
106	APR-MAY 16	SK-106	HOFINCONS	SANTOSH KU	17477	5
107	APR-MAY 16	SK-107	HOFINCONS	BHAGWAN LA	17955	5
108	APR-MAY 16	SK-108	HOFINCONS	LOBH CHAND	17958	5
109	APR-MAY 16	SK-109	HOFINCONS	BHERU LAL TE	17959	2
110	APR-MAY 16	SK-110	HOFINCONS	JASHRAJ JAT	17957	2
111	APR-MAY 16	SK-111	HOFINCONS	UDAI RAM SA	17937	3
112	APR-MAY 16	SK-112	HOFINCONS	AYODHYA PR	13956	2
113	APR-MAY 16	SK-113	HOFINCONS	SHANTI LAL K	17979	7
114	APR-MAY 16	SK-114	HOFINCONS	KAILASH SAR	17969	1
115	APR-MAY 16	SK-115	HOFINCONS	GAJENDRA SI	15860	5
116	APR-MAY 16	SK-116	HOFINCONS	SURESH SUTH	17974	13
117	APR-MAY 16	SK-117	HOFINCONS	LAHRU LAL BA	17966	8
118	APR-MAY 16	SK-118	HOFINCONS	RATAN LAL JA	17972	2
120	APR-MAY 16	SK-120	HOFINCONS	HARISH PRAJ	16475	1
121	APR-MAY 16	SK-121	HOFINCONS	BHERU LAL SV	13873	5
122	APR-MAY 16	SK-122	HOFINCONS	B Y SINGH	7679	3
123	APR-MAY 16	SK-123	HOFINCONS	RATAN LAL RE	13874	3
124	APR-MAY 16	SK-124	HOFINCONS	DINESH HARI	18016	1
126	APR-MAY 16	SK-126	HOFINCONS	PRAKASH HA	---	1
127	APR-MAY 16	SK-127	HOFINCONS	PREM SINGH	16448	1
128	APR-MAY 16	SK-128	HOFINCONS	MUBARIK HU	17442	2
129	APR-MAY 16	SK-129	HOFINCONS	HARI PRASHA	13869	1
130	APR-MAY 16	SK-130	HOFINCONS	SUBHASH CH	17914	3
131	APR-MAY 16	SK-131	HOFINCONS	RANDHIR KU	13463	1
132	APR-MAY 16	SK-132	HOFINCONS	RAJENDRA KU	13917	2
133	APR-MAY 16	SK-133	HOFINCONS	BHERU PURI	13966	1
134	APR-MAY 16	SK-134	HOFINCONS	JAGDISH REG	16476	3
135	APR-MAY 16	SK-135	HOFINCONS	PRAKASH JAT	13972	1
136	APR-MAY 16	SK-136	HOFINCONS	HEERA LAL JA	18028	2
137	APR-MAY 16	SK-137	HOFINCONS	KISHAN LAL G	18023	6
138	APR-MAY 16	SK-138	HOFINCONS	SHANKAR LAL	18022	9
139	APR-MAY 16	SK-139	HOFINCONS	RATAN LAL JA	17926	18
140	APR-MAY 16	SK-140	HOFINCONS	GOVIND LAL (	18018	12
141	APR-MAY 16	SK-141	HOFINCONS	MUKUT BHIH	14425	6
142	APR-MAY 16	SK-142	HOFINCONS	KRISHNA KAN	17475	1
143	APR-MAY 16	SK-143	HOFINCONS	NARAYAN LA	17963	5
144	APR-MAY 16	SK-144	HOFINCONS	MUKESH PUR	17993	2
145	APR-MAY 16	SK-145	HOFINCONS	PRAHALAD M	---	3
146	APR-MAY 16	SK-146	HOFINCONS	DINESH PRAJ	17949	1

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147	APR-MAY 16	SK-147	HOFINCONS	LADU HARIJA	---	12
148	APR-MAY 16	SK-148	HOFINCONS	BHARAT MEN	17962	3
149	APR-MAY 16	SK-149	HOFINCONS	PAPPU BAIRV	17933	11
150	APR-MAY 16	SK-150	HOFINCONS	SATYANARAY	---	1
151	APR-MAY 16	SK-151	HOFINCONS	PRAKASH MA	13881	2
152	APR-MAY 16	SK-152	HOFINCONS	LOKESH VYAS	13875	2
153	APR-MAY 16	SK-153	HOFINCONS	KISHAN KUM.	17953	20
154	APR-MAY 16	SK-154	HOFINCONS	BHERU LAL H.	---	1
155	APR-MAY 16	SK-155	HOFINCONS	MADAN HARI	---	2
156	APR-MAY 16	SK-156	HOFINCONS	SURESH GADI	17928	3
157	APR-MAY 16	SK-157	HOFINCONS	KISHAN SOLA	17981	1
158	APR-MAY 16	SK-158	HOFINCONS	ROSHAN JAT	17970	2
159	APR-MAY 16	SK-159	HOFINCONS	UMESH SUTH	17975	1
160	APR-MAY 16	SK-160	HOFINCONS	INDAR MAL JA	18741	4
161	APR-MAY 16	SK-161	HOFINCONS	LAXMAN SING	14353	9
162	APR-MAY 16	SK-162	HOFINCONS	H RAHAMAN	15857	1
163	APR-MAY 16	SK-163	HOFINCONS	KESHAR SING	15634	2
164	APR-MAY 16	SK-164	HOFINCONS	MUKESH KUN	13969	3
165	APR-MAY 16	SK-165	HOFINCONS	JAI CHAND	14161	2
166	APR-MAY 16	SK-166	HOFINCONS	JAGDISH KUM	---	1
167	APR-MAY 16	SK-167	HOFINCONS	BHARAT MEN	17951	3
169	APR-MAY 16	SK-169	HOFINCONS	KAILASH CHA	13889	1
170	**24/05/2016**	**SKM**	**1289**	**TEJ SINGH(S**	**17960**	3

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ANALYSIS

BLOOD LEAD VALUES	MALE VILLAGERS	AVERAGE VALUE	FEMALE VILLAGERS	AVERAGE VALUE	EMPLOYEES	AVERAGE VALUE	CONTRACT EMPLOYEES	AVERAGE VALUE
<10 mcg %	14	4.4 mcg%	11	4.9	53	5.8	153	4.54
11-20 mcg %	0	0	0	0	1	16	13	14.38
21-30 mcg%	0	0	0	0	0	0	0	0
31-39 mcg%	0	0	0	0	0	0	0	0
>40 mcg%	0	0	0	0	0	0	0	0

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राजस्थान - सरकार

कार्यालय खनि अभियन्ता, खान एवं भूविज्ञान विभाग
खनिज भवन, राजसमन्द द्वितीय राजसमंद।
क्रमांक ख अ/ राज/प- मारबल/2006/812 दिनांक 23/1/2006
प्रेषिति

श्रीमान प्रबन्धक
हिन्दुस्तान जिंक लिमिटेड
राजपुरा दरीबा।

खनन पट्टा संख्या 2/89 मिनरल ग्राम दरीबा खनिज लेड जिंक के उत्पादन वर्ष 1992-1993 के उत्पादन प्रमाणीकरण के सम्बन्ध में।

उपरोक्त विषयान्तर्गत लेख है कि माहवारी वर्ष 1992-93 सांख्यिकीय आकड़ो के अनुसार उत्पादन का प्रमाणिकरण किया जाता है

वर्ष	खनिज का उत्पादन (मेट्रिक टनो में)
1992-93	631407

सहायक खनि अभियन्ता
राजसमन्द (द्वितीय)

राजस्थान सरकार

कार्यालय खनि अभियन्ता, खान एवं भू विज्ञान विभाग, खनिज-भवन, राजसमन्द (द्वितीय), राजस्थान, राजसमन्द।

क्रमांक: ख.अ.। राज.-II। प-साख्य। 2004। 1103 दि० 25/9/04

प्रेषिति,

श्रीमान् प्रबन्धक,
हिन्दुस्तान जिंक लिमिटेड,
राजपुरा, दरीबा।

विषय: खनन पट्टा संख्या 2।89 निकट ग्राम दरीबा खनिज लेड़-जिंक के उत्पादन प्रमाणीकरण के सम्बन्ध में।

उपरोक्त विषयान्तर्गत लिखना है कि माहवारी सांख्यकीय आंकड़ों के अनुसार वर्ष 1993-94 से 2003-2004 तक वर्षवार निम्नांकित उत्पादन का प्रमाणीकरण किया जाता है।

वर्ष	खनिज उत्पादन (मैट्रिक टनों में)
1993-94	423805
1994-95	248652
1995-96	367550
1996-97	311750
1997-98	351710
1998-99	314890
1999-2000	282890
2000-2001	273400
2001-2002	375770
2002-2003	549770
2003-2004	585743

उपरोक्त 1993-94 से 2003-2004 तक के आंकड़ों से मिलान किया गया, सही पाया

खनि अभियन्ता
खण्ड-द्वितीय, राजसमन्द

राजस्थान सरकार

कार्यालय खनि अभियंता, राजसमंद खण्ड द्वितीय

क्रमांक : खअ/राज।।/अधिशुल्क नि./समएल2/89/105 दि. 27-3-06

प्रेषितः

ईकाई प्रबंधक,
हिन्दुस्तान जिंक लि0, राजपुरा दरीबा,
तह0 रेलमगरा जिला राजसमंद

विषय :- वर्ष 04-05 में उत्पादित अयस्क के आंकड़ो का प्रमाणित कराने बाबत ।

महोदय,

खनन पट्टा सं0 2/89 निकट ग्राम दरीबा के घृत खनन पट्टा में खनिज स्पेलेराईट-गेलेना का अधिशुल्क निर्धारण कार्यालय में प्रस्तुत स्टेटमेंट अनुसार ओर ट्रिटमेंट अयस्क माह अप्रेल 04 से मार्च 05 तक में कुल खनिज अयस्क (ओर ट्रिटमेंट) 527328 मेट्रन का उत्पादन किया गया है।

खनि अभियंता, राजसमंद
खण्ड द्वितीय

राजस्थान सरकार

खनि अभियंता, राजसमंद (द्वितीय)

क्रमांक:-खअ/राज./II/प.सांख्य/2008-438 दि. 17-11-08

प्रेषिति:-

श्रीमान् प्रबन्धक

हिन्दुस्तान जिंक लिमिटेड

राजपुरा, दरीबा

विषय:-जानपट्टा संख्या 2/89 निकट ग्राम दरीबा खनिज लैड, जिंक के उत्पादन प्रमाणिकरण के सम्बन्ध में।

उपरोक्त विषयान्तर्गत लेख है कि माहवारी सांख्यकीय आंकड़ो के अनुसार वर्ष 2005-2006 से 30 सितम्बर, 2008 तक वर्षवार निम्नांकित उत्पादन प्रमाणिकरण किया जाता है:-

वर्ष	उत्पादन टनों में
2005-2006	5,06,527
2006-07	5,07,560
2007-08	595,749
2008-09 (सितम्बर 2008 तक)	1,41,073

खान अभियन्ता
खनन एवं भू-विज्ञान विभाग
खण्ड द्वितीय, राजसमन्द

राजस्थान सरकार

कार्यालय खनि अभियंता, राजसमंद (द्वितीय)

क्रमांक:- खअ/राज. II/अ. नि. /2009/980 दिनांक:- 25-11-09

प्रेषिति:-

श्री वरिष्ठ प्रबन्धक (ईएनवी)

राजपुरा दरीबा माईन्स

विषय:- वार्षिक उत्पादन वर्ष 2008-2009 एवं 2009-2010 (अक्टुबर 2009 तक का) और उत्पादन एवं और ट्रीटमेन्ट का विवरण भिजाने बाबत। एम. एल. 2/89 (राजपुरा दरीबा)

प्रसंग:-आपका पत्र क्रमांक आरडी/ईएनवी/2009 दिनांक 20.10.2009

महोदय,

विषयान्तर्गत मामले में लेख है कि माहवारी सांख्यकीय आँकड़ो के अनुसार वर्ष 2008-2009 एवं 2009-2010 में (माह अक्टुबर 2009 तक) का उत्पादन निम्नानुसार है:-

वर्ष	उत्पादन और	और ट्रीटमेन्ट
2008-2009	483293 टन	783173 टन
2009-2010		
(माह अक्टुबर 2009 तक)	290443टन	527247टन

भवदीय

खनि अभियंता, राजसमंद II

राजस्थान सरकार

कार्यालय खनि अभियन्ता राजसमन्द खण्ड द्वितीय

क्रमांक :– खअ/राज।।/का.रा./2010–11/697 दिनांक :– 10/10/2011

–: प्रमाण – पत्र :–

यह प्रमाणित किया जाता हैं कि मैसर्स हिन्दुस्तान जिंक लि0 के पक्ष में खननपट्टा एम.एल. संख्या–02/1989 क्षेत्रफल 1142.20 हैक्टर खननपट्टा वास्ते खनिज लेड–जिंक निकट ग्राम राजपुरा दरीबा तहसील रेलमगरा जिला राजसमन्द में अवधि दिनांक 29.05.2010 तक वैद्य है तथा नवीनीकरण आवेदन पत्र एमएल–168/08 विचाराधीन है।

उक्त खननपट्टा से निकलने वाले मलबे को अनुमोदित माईन स्कीम/प्लान के अनुसार अनुमोदित स्थान पर डाला जाता हैं। पट्टाधारी द्वारा प्रस्तुत आकडों के अनुसार उत्पादन निम्नानुसार है :–

क्र.स.	वर्ष	उत्पादन (मे.टन) ओर प्रोडक्शन	ओर ट्रिटमेन्ट
1.	2009–2010	501282	942103
2.	2010–2011	496234	955218
3.	2011–2012 (अगस्त 2011 तक)	238753	262654

सहायक खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

राजस्थान सरकार

कार्यालय खनि अभियन्ता राजसमन्द खण्ड द्वितीय

क्रमांक :– खअ/राज।।/का.स./2012–13/213 दिनांक :– 15-4-2013

–: प्रमाण – पत्र :–

यह प्रमाणित किया जाता हैं कि मैसर्स हिन्दुस्तान जिंक लि0 के पक्ष में खननपट्टा एम. एल.संख्या–166/2008 क्षैत्रफल 1142.2106 हैक्टर खननपट्टा वास्ते खनिज लेड–जिंक निकट ग्राम राजपुरा दरीबा तहसील रेलमगरा जिला राजसमन्द में अवधि दिनांक 29.05.2030 तक वैद्य है

पट्टाधारी द्वारा प्रस्तुत आकडों के अनुसार उत्पादन निम्नानुसार है :–

क्र.सं.	वर्ष	उत्पादन (टनों में) ओर प्रोडक्शन	ओर ट्रिटमेन्ट
1	2011–2012	587600	626649
2.	2012–2013	554354	501153

खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

राजस्थान सरकार

कार्यालय खनि अभियन्ता, खान एवं भू–विज्ञान विभाग, राजसमन्द खण्ड–द्वितीय

खनिज भवन, आर.के राजकीय चिकित्सालय के सामने, बाईपास रोड़, राजसमन्द
Telephone-02952-222345, Fax-02952-220190, E-mail address - merajsamand-2@dmg-raj.org

क्रमांक :– खअ/राज–II/का.स./2014–15/1189 दिनांक 8/8/2014

–: प्रमाण–पत्र :–

यह प्रमाणित किया जाता हैं कि **मैसर्स हिन्दुस्तान जिंक लिमिटेड** के पक्ष में खननपट्टा संख्या एम.एल. नं.–**166/2008** खननपट्टा वास्ते खनिज **लेड–जिंक**, निकट ग्राम **राजपुरा–दरीबा**, तहसील **रेलमगरा**, जिला **राजसमन्द** में अवधि दिनांक **29.05.2030** तक वैद्य हैं।

पट्टाधारी द्वारा प्रस्तुत आंकड़ों के अनुसार उत्पादन निम्नानुसार हैं :–

वर्ष	उत्पादन (टनों में)	
	ओर प्रोडक्शन	ओर ड्रिटमेन्ट
2013-14	610242.00	606785.00
2014-15 (Up to Jun-2014)	142644.00	142590.00

खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

राजस्थान– सरकार

कार्यालय खनि अभियन्ता, खान एवं भू–विज्ञान विभाग, राजसमंद खण्ड–द्वितीय

क्रमांक–खअ/राज–2/का.स./2017–18/ 116 दिनांक:– 01.08.2017

–:: प्रमाण पत्र ::–

यह प्रमाणित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड के पक्ष में खननपट्टा एम. एल. सं. 166/2008 निकट ग्राम राजपुरा दरीबा, तहसील रेलमगरा जिला राजसमन्द में खनिज लेड– जिंक दिनांक 29.05.2030 वर्ष तक वैध है।

पट्टाधारी द्वारा प्रस्तुत आकडों के अनुसार उत्पादन निम्नानुसार हैं–

वर्ष	उत्पादन टन में	
	ओर प्रोडक्शन	ओर ट्रिटमेन्ट
2014–2015	573284	573018
2015–2016	668777	668034
2016–2017	745534	725220
2017–30.06.2017 तक	181820	203792

(एन.एल. [redacted])
खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

राजस्थान– सरकार

कार्यालय खनि अभियन्ता, खान एवं भू–विज्ञान विभाग, राजसमंद खण्ड–द्वितीय

क्रमांक–खअ/राज–2/का.स./2018–19/ 333 दिनांकः– 04.08.2018

–:: प्रमाण पत्र ::–

यह प्रमाणित किया जाता है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड के पक्ष में खननपट्टा एम. एल. सं. 166/2008 निकट ग्राम राजपुरा दरीबा तहसील रेलमगरा जिला राजसमन्द में खनिज लेड– जिंक दिनांक 29.05.2030 वर्ष तक वैध है।

पट्टाधारी द्वारा प्रस्तुत आकडों के अनुसार उत्पादन निम्नानुसार हैं–

Year	Ore Production (Mt)	Ore Treatment (Mt)
2017-18	895568	890653

(एन.एल.मेघवाल)
खनि अभियन्ता
राजसमन्द खण्ड द्वितीय

vedanta
transforming element

Reg. A/D

HZL/RDC/EC-CR/2017-18/H2

Date: 16.04.2018

To,

The Director,
Ministry of Environment and Forests,
5th Floor, Kendriya Bhawan
Sector H – Aliganj,
Lucknow - 226024

File no: IV/ENV/R/IND-115/758/2009

Sub: Six Monthly Environmental compliance report for the Integrated Project at Dariba, HZL (Zinc Smelter (5,00,000 TPA), Lead Smelter (1,25,000 TPA), Captive Power Plant (255 MW) and expansion of Rajpura Dariba Mine (6,31,000 to 9,00,000 TPA) along with Beneficiation Plant (9,00,000 to 12,00,000 TPA) at Village Dariba, Tehsil -Railmagra, Dis. Rajsamand from October'17 to March'18.

Ref: Environmental Clearance Letter No. J-11011/380/2008-IA II (I) dated 4.11.2009

Sir,

With reference to above subject please find enclosed herewith six monthly compliance report for the period from October'17 to March'18.

Thanking you,

For Hindustan Zinc Limited

Yours faithfully,

(Deepak Sopori)
Head
Dariba Smelter Complex

Deepak Sopori
Unit Head
Dariba Smelter Complex
Hindustan Zinc Limited
Dariba - 313211 (Raj.)

Hindustan Zinc Limited
Dariba Smelter Complex, P.O. Dariba, Teh. Railmagra, Distt. Rajsamand (Rajasthan) - 313 211
T +91-2952 265 873 - 76 F +91-2952 265 660 www.hzlindia.com

Enclosures: Six monthly EC compliance report with Annexure:

Annexure I	:	Stack Monitoring Report
Annexure II	:	Average Ambient Air Quality Monitoring Results (RDM)
Annexure III	:	Ambient Air Quality Monitoring Results (DSC)
Annexure IV	:	Ambient Air Quality Monitoring Report (Outside Plant)
Annexure V	:	Continuous Ambient Air Quality Monitoring Results
Annexure VI	:	Work Zone Environment Monitoring Results
Annexure VII	:	Fugitive Emission Monitoring Results
Annexure VIII	:	Treated Effluent (ETP Outlet) Quality Report
Annexure IX	:	Average Ground Water Monitoring Results (Around Tailing Dam Area)
Annexure X	:	Average Surface & Ground Water Monitoring Results (Around RD Mine & Tailing Dam Area)
Annexure XI	:	Fly Ash Return 2017-18
Annexure XII	:	Expenditures made in Environmental control measure
Annexure XIII	:	Funds earmarked towards Environmental control measure
Annexure XIV	:	Ambient Noise Monitoring Report

Cc:

1) The Member Secretary,
Rajasthan State Pollution Control Board,
4th Institutional Area, Jhalana Doongari,
Jaipur-302004

2) Zonal officer
Central Pollution Control Board
3rd Floor, Sahkar Bhawan
North TT Nagar
Bhopal-462003

3) Group Incharge (Mines)
Rajasthan State Pollution Control Board,
4th, Institutional Area, Jhalana Doongari,
Jaipur-302004

4) The Regional office
Rajasthan State Pollution Control Board,
18, Azad Nagar, Near Pannadhay Circle
Mining Office Road
Bhilwara-311001

5) AGM-Environment
Rajpura Dariba Mine

Hindustan Zinc Limited

Dariba Integrated Project

Village Dariba, Tehsil - Relmagra, Dist. - Rajsamand, Rajasthan

COMPLIANCE STATUS

Environment Clearance letter no. : J-11011/380/2008-IA II (I) dated 4.11.2009

Period of Compliance: October 2017 to March 2018

	Condition	Status of Compliance
	Specific Conditions:	
i)	No construction work related to expansion at the proposed project site shall be started without obtaining prior clearances / approvals for the linked mining component from the Indian Bureau of Mines (IBM) and State Govt. of Rajasthan. A copy of the mining lease approval from the Indian Bureau of Mines (IBM) and State Govt. of Rajasthan shall be submitted to the Ministry and its Regional Office at Lucknow before initiating any construction work at site related to mining.	Noted & Complied
ii)	The project proponent shall obtain 'Consent to Establish' and 'Consent to Operate' from the Rajasthan State Pollution Control Board (RSPCB) and effectively implement all the conditions stipulated therein.	'Consent to Establish' and 'Consent to operate' have been obtained from the Rajasthan State Pollution Control Board (RSPCB) and all the conditions stipulated therein are being implemented.
iii)	The environmental clearance is subject to approval of the State Land use Department, Government of Rajasthan for diversion of agricultural land for non-agricultural use.	Complied
iv)	The project proponent shall develop fodder plots in the non-mineralized area in lieu of use of grazing land. Monitoring of land use pattern shall be carried out once in three years by digital processing of the area using multi-data computer compatible tape.	The monitoring of land use using satellite imagery was done for the Mine Lease Area in July 2015.
v)	The gaseous emissions from various process units shall confirm to the standards prescribed by the concerned authorities from time to time. The State Board may specify more stringent	Complied & monitoring is being done on regular basis.

	standards for the relevant parameters keeping in view the nature of the industry and its size and location. At no time the emissions level shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit should not be restarted until the control measures are rectified to achieve the desired efficiency.	
vi)	High efficiency electrostatic precipitators (ESPs) of not less than 99.87 % efficiency shall be provided to captive power plant to limit particulate matter within 50 mg/Nm^3. The height of the stacks shall be as per the standards prescribed under the Environment (Protection) Act, 1986. Low NOx burners shall be provided to control NOx emissions. NOx emissions shall be restricted to 750 mg/Nm^3 by using low NOx burners. On-line stack emission monitoring equipments for continuous monitoring of SO_2, NOx, SPM and O_2 shall be provided to the stacks of captive power plant and sulphuric acid plant and all the pollution control measures shall be inter-locked. The company shall install fume extractors and bag filters to control the emissions from all melting and casting units. Off gas from the sulphuric acid plant, blast and fuming furnace plant, copper recovery plant shall be treated in the calcine based scrubbing plant where the SO_2 shall be removed before letting out to the atmosphere. Adequate stack height shall be provided for proper dispersion of pollutants like SO_2, NOx etc.	ESPs, provided to Captive Power Plant (CPP) are designed for particulate matter concentration less than 50 mg/Nm^3 at outlet. The height of the stacks is as per the standards prescribed under the Environment (Protection) Act, 1986. The height of the Acid Plant, CPP and TGT plant stack is 100 mtr. , 165 mtr. and 105 mtr respectively. Low NOx burners have been provided to control NOx emissions. Continuous on-line stack emission monitoring equipment for SO_2, NOx and SPM has been provided to the stack of captive power plant and for SO_2 to the sulphuric acid plants respectively. Off gas from the sulphuric acid plant, blast and fuming furnace plant, copper recovery plant of lead plant is treated in the calcine based scrubbing plant where the SO_2 is recovered before letting out to the atmosphere.
vii)	As reflected in the EIA/EMP, Double Conversion Double Adsorption (DCDA) plant for sulphuric acid recovery from SO_2 shall be provided. The company shall ensure that SO_2 emissions from the Zinc and lead smelter plant are taken to existing sulphuric acid plant properly and converted to sulphuric acid. The stack from	Double Conversion Double Adsorption (DCDA) plant for sulphuric acid recovery from SO_2 has been provided. SO_2 emissions from the Zinc and Lead Plant Smelter is taken to respective sulphuric acid plant

Dcd

	the Sulphuric acid plant shall be provided with on-line stack emission monitoring equipment for continuous monitoring of SO_2.	properly and converted to sulphuric acid. The stack from the Sulphuric acid plant provided with on-line stack emission monitoring equipment for continuous monitoring of SO_2.
viii)	SO_2 emissions shall be controlled less than 1.5 kg/ton of Sulphuric acid (H_2SO_4) produced. Acid mist emissions from the stack shall conform to the statutory limit of 50 mg/Nm^3 by providing candle filter system and reports submitted to the Ministry including its Regional Office at Lucknow, CPCB and RSPCB.	Being complied. Report is enclosed herewith as **Annexure I**
ix)	The critical parameters such as SPM, RSPM, NOx, SO_2 and acid mist in the ambient air within the impact zone, peak particle velocity at 300 m 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. Analysis reports for the ambient, stack and fugitive emission shall be submitted to the Ministry's Regional Office at Lucknow, CPCB and RSPCB.	Periodical monitoring of parameters i.e. SPM, RSPM, NOx and SO_2 is being done in the ambient air within the impact zone. Three nos. of Ambient Air Quality Monitoring Stations (AAQMS) have been established in Dariba Smelter Complex and 3 no's of AAQMS in mine area. Average Ambient Air Quality Monitoring results for mine are furnished herewith as **Annexure II** and for DSC as **Annexure III.** Eight nos. of AAQMS have been established at buffer zone for ambient air quality monitoring. Peak Particle Velocity values are enclosed as **Annexure IV.** Zero discharge is being maintained. The monitored data have been displayed on display board at the project site.
x)	Ash content in the coal shall not exceed 35 %. Sulphur content in coal shall be restricted to 1.5% to contain SO2 emissions.	Being complied
xi)	The company shall install continuous air quality	Three nos. of Continuous

DSoP

	monitoring stations. Data monitored shall be submitted to the Ministry and CPCB/SPCB once in six months.	Ambient Air Quality Monitoring Station (CAAQMS) have been installed and data monitored through CAAQMS in different locations are enclosed as **Annexure V.**
xii)	Fugitive dust emissions in the Zinc, Lead and Copper concentrate handling area and at various transfer points shall be minimized by provision of dust suppression system. The trucks carrying concentrate shall be fully covered. The Company shall improve overall housekeeping by asphalting the internal roads and to reduce the generation of fugitive dust from vehicle movements.	Fugitive dust emissions in the Zinc and Lead concentrate handling area and at various transfer points is mitigated by provision of dust suppression system. Water Sprinkling System already installed in the Raw Material Handling of the Zinc Plant, Captive Power Plant and Lead Plant. Mechanized road sweepers are deployed for regular cleaning of leaks and spills on the roads to reduce fugitive dust from vehicle movement. The trucks carrying concentrate are covered with tarpaulin before dispatched to Smelter from Mines. All roads in the plant and up to the connection to public road are concreted or black topped.
xiii)	Fugitive emissions, acid mist vapours, fumes and SO_2 shall be controlled and work environment monitored for prevailing contaminants regularly. Bag filters shall be provided to calcine handling plant, zinc dust plant, melting plant, dross milling plant, each coal transfer point, crushers and fly ash silos to control dust emissions. Bag filters shall be provided in fume extraction and melting and casting operations of smelter. SPM emissions from crusher house in beneficiation plant shall be controlled. Covered coal conveyors with water sprinkling system using wastewater to avoid dust emissions. Coal storage area shall be provided with water sprinkling system to arrest dust. Dust extraction system shall be provided to mineral handling area, loading and unloading areas including all the transfer points. Black top paved roads shall be made within the mine boundary. The trucks carrying concentrate shall be fully	In order to minimize fugitive emissions, 8-10% moisture is provided in the Zn Concentrate coming from the mines. Bag Filters have been provided to calcine handling system, zinc dust plant, coal transfer points, crusher and fly ash silos to control dust emissions. Details of the bag filters have been provided along with six monthly compliance report vide letter no. HZL/DSC/Env/2011/2/2 dated 23.11.2011. Covered Coal Conveyors with water sprinkling system have been installed at CPP to avoid dust emissions. Coal storage

	covered. Asphalting/concreting of roads and water spray all around the critical areas prone to air pollution and having high levels of SPM and RPM shall be ensured.	area is provided with water sprinkling system to arrest dust. All Internal roads and up to the public road are concreted/asphalted to reduce the dust emission. The trucks carrying concentrate are covered with tarpaulin and water is sprayed regularly on roads. Average Work Zone Environment Monitoring Results are furnished herewith as **Annexure VI.** SPM emissions from crusher house in beneficiation plant are controlled by the wet scrubbing system. Dust extraction system provided to mineral handling area, loading and unloading areas including all the mineral transfer points.
xiv)	The project proponent shall carry out conditioning of the ore with water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas. Water sprinkling shall be done to minimize the dust during transportation.	Ore conditioning is carried out to maintain 8-10% moisture as a mitigative measure against fugitive dust. Regular water sprinkling on fine ore stock points and at discharge points of conveyors carrying the crushed ore is done.
xv)	Secondary fugitive emissions (particularly below 5 micron) from all the sources including Roaster plant shall be controlled, regularly monitored along with ambient dust in dry day and still air condition on 24 hour basis and data submitted to the Regional Office of the Ministry at Lucknow, RSPCB and CPCB. It shall be ensured that the ambient air quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.	Fugitive emission monitoring results is furnished herewith as **Annexure VII.**
xvi)	Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral. The vehicles carrying the mineral shall be covered	Mining equipments and vehicle emissions are kept under control by regular preventive maintenance and condition monitoring at the in-house

	with a tarpaulin and shall not be overloaded.	workshop. During transportation of the mineral, vehicles are covered with tarpaulin.
xvii)	Total water requirement for the proposed smelter complex including the mining and beneficiation plants from Matrikundia dam, Gosunda dam and Mansiwakal dam shall not exceed 42,050 m^3 /day as per the agreements signed with Govt. of Rajasthan. As proposed, water requirement shall not exceed 184 liter/ton of Sulphuric acid produced. No ground water shall be used. Closed circuit cooling system with cooling towers shall be provided to captive power plant. All the effluent generated from gas cleaning plant, sulphuric acid plant, anode and cathode washing, lead smelter, DM plant, cooling towers and power plant shall be neutralized and metallic elements present shall be precipitated and removed. Effluents from the proposed smelters, acid plant and other associated services shall be treated in effluent treatment plant (ETP). Zinc sulphate solution from the scrubbing process shall be treated in the leaching section of the Zinc smelter. Cooling tower blow down and boiler blow down from CPP shall be neutralized and reused in dust suppression, green belt development etc. The treated effluent shall confirm to the prescribed standards and recycled in the process i.e. in gas cleaning plant, preparation of lime milk, dust suppression and green belt development. The effluents from sulphuric acid plant, scrubber, and general floor washings of electro-refinery plant shall also be sent to ETP for further treatment followed by two-stage Reverse Osmosis (RO) Plant. Sewage shall be treated in septic tank followed by soak pit. The rejects from the RO plant shall be evaporated in a solar evaporation pond to be constructed within smelter premises. 'Zero' discharge shall be maintained and no effluent shall be discharged outside the premises. Sewage generated shall be treated in septic tank followed by soak pit.	Noted. Closed circuit cooling system with cooling towers has been provided to captive power plant. Cooling tower blow down and boiler blow down from CPP is being recycled in process and reused in dust suppression, green belt development etc. Effluents generated from the smelter, acid plant and other associated services are treated in Effluent Treatment Plant (ETP) followed by two-stage Reverse Osmosis (RO) Plant. The treated effluents conform to the prescribed standards and recycled in the process. Sewage is treated in septic tank followed by soak pit. Multiple Effect Evaporator (MEE) and Solar Evaporation Ponds have been provided to ensure "Zero Discharge". In order to reduce fresh water requirements, Adiabatic cooling tower in Roaster plant of Zinc smelter has been installed and commissioned. Analysis Data of treated effluent quality are furnished herewith as **Annexure VIII.**
xviii)	The mine seepage water shall be collected in underground sumps and reused/recycled in mining and beneficiation process to minimize the fresh water consumption. Decanted water from the tailings dam shall be recycled in the	Underground water from the mine is pumped to beneficiation plant for reuse and tailing dam water is also recycled to beneficiation plant

	beneficiation plant to ensure 'zero' discharge. Tailings from beneficiation plant after recovery of Lead and Zinc concentrates shall be sent to tailing thickener for dewatering. Water recovered from tailing thickener shall be recycled to beneficiation plant for use in the process. Tailing thickener underflow shall be partly used as backfill for mines and remaining part shall be disposed to tailing dam. Water in the tailing dam shall be allowed to settle out and pumped to the water reservoir for reuse in the process.	for reuse. Zero discharge is being maintained.
xix)	Acid mine water, if any, has to be treated and use in plantation and existing mining activity after conforming to the standard prescribed by the competent authority.	No acid mine water is generated.
xx)	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the mine workshop for the wastewater generated.	Sewage treatment plant of 500KLD capacity is installed for the colony and the treated water is being used for horticulture purpose. Waste water from the workshop is collected in the sump after passing through oil and grease trap and water is regularly recycled.
xxi)	The effluent from the ore beneficiation plant shall be treated to conform to the prescribed standards and the tailings slurry shall be transported through a closed pipeline to the tailing dam. The decanted water from the tailing dam shall be re-circulated and there shall be 'zero' discharge from the tailing dam. Acid mine water, if any, shall be neutralized and reused within the plant.	The tailing slurry is pumped through pipeline to tailing dam and decanted water is pumped back to beneficiation plant for reuse in the process. Zero discharge is maintained. No acid mine water is generated through mines.
xxii)	Detailed hydrological study shall be carried out and implementation of recommendations of the detailed hydrological study shall be ensured.	Detailed hydrological and hydro-geological study has been carried out by M/s Hydro-Geosurvey Consultants Private Limited, Jodhpur and the recommendations have been implemented.
xxiii)	The project proponent shall ensure that no natural water course and/or water resources shall be obstructed due to any mining operations.	Due to underground mining activity no water course has been obstructed.

xxiv)	The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.	Suitable rain water harvesting structures have been constructed to harvest rain water and recharge the ground water in CPP, residential colonies, school & in mine premises. Copy of the compliance report submitted to CGWA has been submitted along with six monthly compliance report vide letter no. HZL/DSC/Env/2011/2/2 dated 23.11.2011.
xxv)	Regular monitoring of ground water level and quality shall be carried out in and around the project area (mine lease, beneficiation plant and tailing dam) by establishing a network of existing wells and installing new piezometers during the operation. The periodic monitoring [(at least four times in a year- pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office Lucknow, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity; necessary corrective measures shall be carried out.	Six no's of Peizometer have been installed for monitoring of ground water level and quality around the tailing dam and monthly monitoring is being carried out. Average Ground Water Monitoring Results for Oct'17 to Mar'18 are furnished herewith as **Annexure IX.**
xxvi)	Groundwater and surface water in and around the mine shall be regularly monitored at strategic locations for heavy metals such as Ni, Co, Cu, Pb, Zn and Cd. Data should be reviewed and analyzed time to time to detect changes in the quality of ground water and surface water, if any. The monitoring stations shall be established in consultation with the Regional Director, Central Ground Water Board and the Rajasthan Pollution Control Board.	Ground water and surface water monitoring is being carried out on monthly basis for analysis of heavy metals. Average Surface & Ground Water Monitoring Results (around RD Mine & Tailing Dam Area) for Oct'17 to Mar'18 are furnished herewith as **Annexure X.**
xxvii)	The project proponent shall obtain necessary prior permission of the competent authorities for draw	Permission have been obtained

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	of requisite quantity of water required for the project.	
xxviii)	Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, Central Ground Water Board.	Suitable rain water harvesting structures have been constructed to harvest rain water and recharge the underground water.
xxix)	Catch drains and siltation ponds of appropriate size shall be constructed around the mineral and over burden dumps to prevent run off of water and flow of sediments directly into the Banas River and other water bodies. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after the monsoon and maintained properly.	Garland drains have been constructed around the waste dump area along with a collection sump.
xxx)	Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mineral and over burden dumps to prevent run off of water and flow of sediments directly into the Banas River and other water bodies and sump capacity shall be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity shall 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.	Garland drains have been constructed around the waste dump area along with a collection sump.
xxxi)	Underground mining shall be carried out using Vertical Retreat Mining (VRM) and Blast Hot Stopping (BHS) with back filling. Concentration and separation of Lead and Zinc minerals shall be carried out in the beneficiation plant.	Complied.
xxxii)	Controlled blasting practice shall be adopted. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders shall be implemented.	Controlled blasting is adopted. Same practice will be continued.
xxxiii)	Wet drilling blasting method and provision for the control air emissions during blasting using dust collectors etc. shall be used.	Complied.
xxxiv)	Blast vibration shall be assessed from proposed operation. Ground subsidence and mine stability	Present practice will be

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	shall also be monitored on regular basis.	regularly followed.
xxxv)	Regular monitoring of subsidence movement on the surface over working area and impact on water bodies/vegetation/ structures/ surrounding shall be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil/suitable material.	Regular subsidence-monitoring is carried out on surface on top of mining area, till date no subsidence is recorded. Measurements show negligible disturbance of less than 1 mm. All underground voids are promptly filled with cemented fill material.
xxxvi)	All the mine entries shall be above the highest flood level to avoid any anticipated flooding of mine from the surface water during the rainy season.	Presently all the mine entries are above the highest flood level. HFL is 488.4 mRL. Main shaft collar & Aux shaft collar are at 501 mRL and 496 mRL respectively.
xxxvii)	In areas where subsidence is anticipated in shallow mineral occurrence, such areas be identified and provided with garland drains to ensure draining of water and avoid ingress of the same in to the underground mine.	In area where any subsidence is anticipated, the area is fenced and all possible water bodies/source is diverted away from the area so that ingress is totally stopped.
xxxviii)	The project authorities shall check the possibility of existence of fault(s) before deciding about the thickness of safe barrier required to be maintained between the working face and the water bodies, if any, in consultation with the Director General Mines & Safety (DGMS). De-pillaring shall also be carried out after taking prior approval of the DGMS.	The stipulation is being complied with as per the DGMS guidelines. De pillaring, if required, is done with due approval from DGMS.
xxxix)	All the fly ash shall be utilized as per Fly Ash Notification, 1999 subsequently amended in 2003. Fly ash shall be provided to cement / brick manufacturing units for further use in making Pozollona Portland Cement (PPC).	All the Fly Ash is utilized as per the Fly ash Notification and is being provided to cement manufacture. Fly Ash return for financial year 2017-18 has been submitted in vide letter No. HZL/DSC/ENV/FLY ASH Return /2017-18. Copy of Fly ash return is attached as **Annexure XI.**
xl)	Mine waste shall be dumped in mine voids. Overburden due to mine expansion shall be dumped at a designated place. Waste rocks generated due to mining activity shall be utilized	Mine waste is used for height rising of the tailing dam and construction of roads.

	in construction and enhancement of tailing dam. In beneficiation plant, existing tailing dam shall be used for disposal of tailings.	
xli)	The solid waste generated in the form Jarosite shall be stabilized as Jarofix and disposed off in Jarofix disposal yard inside the plant premises. Cobalt cake, cooler cake, anode mud, enrichment cake, ETP sludge and spent catalyst etc. shall be disposed off in secured landfill (SLF). Waste/used oil shall be sold to registered recyclers.	Cooler Cake and ETP sludge after stabilization is being disposed in SLF. Jarosite in the form of Jarofix after stabilization is being disposed in Jarofix Disposal Yard. Waste/used oil is being sold to registered recycler.
xlii)	ETP Sludge in the form of cake shall be disposed to the captive SLF. Jarosite shall be treated by mixing lime and cement to produce Jarofix, a stable product. After stabilization, Jarofix shall be disposed in dedicated disposal yard. Cooler cake and part of lead silver residue shall be neutralized and stabilized before disposal in SLF. Anode mud, cobalt cake and purification cake shall be recycled back in the process and, if surplus, shall be sold to authorized recyclers or disposed in SLF after neutralization. Spent catalyst shall be disposed in SLF after neutralization. Lead smelter slag after fuming shall be stored in designated area and alternatives shall be explored for usage in road construction and cement manufacturing.	ETP Sludge in the form of cake and Cooler Cake is disposed to the captive SLF. Jarosite after stabilization with lime and cement is being disposed in Jarofix Disposal Yard. Other hazardous wastes like Anode Mud, Purification Cake is being reused/ sold to authorized recyclers or excess quantity is disposed in SLF after stabilization.
xliii)	Column Leachate Studies of the stock piles of Run-of the-mine (ROM) ore, crushed ore, tailings, Jarofix shall be carried out to ascertain the pollution potential as per details given below: Temperature fluctuation and sunlight exposure under confined and unconfined conditions. Buried conditions Air circulation Dry – wet conditions in both confined and unconfined situations Temperature episodes and leachate release conditions Leachate environmental residence study The leachate shall be measured for heavy metals for cations viz. As, St, Ni, Cu, Sb, Cr, Hg, Fe, Al, Pb, Zn, Au and Ag and anions viz. Sulfate, Chloride, Fluorine, Carbonate, Bicarbonate, Phosphate. The primary and secondary organics	Report on Column Leachate Studies of the stock piles of Run-of the-mine (ROM) ore, crushed ore, tailings, Jarofix, carried out by IIT Kharagpur is submitted along with EC compliance report for Apr'12 to Sep'12 period.

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	(Poly Aromatic Hydrocarbons) shall also be monitored in Jarofix and fresh tailings. Reports prepared shall be submitted to the Ministry within 6 months of operation of the plant.	
xliv)	The tailing dam shall be provided with HDPE lining. Tailing dam stability, risk assessment and disaster risk mitigation & planning studies shall be conducted in the likely affected zone.	Complied
xlv)	A complete hazards and risk assessment, and mitigation studies of the areas where hazardous substances are stored shall be carried out by approved agencies having qualified personnel. All plants identifiable hazardous areas like Sulfuric acid plants shall be color coded in "Red" and shall be made safe from any eventual spill or leakage. Regular inspection of the site shall be carried out.	HAZOP study has been carried out by Safety Consultancy Services, Mumbai. Recommendations of the report are implemented. Sulphuric Acid Plant has been color coded in "Red" and made safe from any eventual spill or leakage.
xlvi)	In the mine sites, proper delineation of the confined and unconfined aquifers, permanent surface water bodies (having more than 1 ft standing water for at least 240 days in a year) within the lease hold area and within 3 kms radius of any potential mine site have to be shown in a map. Action plan shall be prepared for the protection of aquifers in the mine area during process of mining and submitted to the Ministry and its Regional Office at Lucknow.	No such surface water body exist having more than 1 ft standing water for at least 240 days in a year within the lease hold area and within 3 kms radius of any potential mine site.
xlvii)	The top soil, if any, shall temporarily be stored at earmarked site(s) only and it shall not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation.	Top soil is not generated.
xlviii)	The over burden generated during the mining operation shall be stacked at earmarked dump site(s) only and it shall not be kept active for a long period of time and its phase-wise stabilization shall be carried out. There shall be one external over burden dump. Proper terracing of the OB dump shall be carried out so that the overall slope of the dump shall be maintained to 28°. The over burden dump shall be scientifically vegetated with suitable native species to prevent erosion and surface run off. Monitoring and management of rehabilitated areas shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the	One external overburden dumps at mine site with 10 meter height and overall slope of 28° is maintained. Two no's of inactive dumps are rehabilitated with plantation.

	Ministry of Environment & Forests and its Regional Office located at Lucknow on six monthly basis.	
xlix)	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers shall be drawn and followed accordingly.	Medical examination of all the workers engaged is carried out and records are maintained as per the rules. The main tests include in PME are Audiometry, Lung function & X- Ray.
l)	As proposed, plantation shall be raised in an area of 33 % ha. Including a 7.5 m wide green belt in the safety zone around the mining lease, over burden dump, around beneficiation plant, around tailing dam, roads etc. as per Central Pollution Control Board guidelines by planting the native species around the periphery of plant and township, canopy based green belt shall be developed in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 1,500 plants per ha.	33% of acquired area has been covered under plantation and the same is being maintained.
li)	Action plan for the mining, management of over burden (removal, storage, disposal etc.), reclamation of the mined out area etc. shall be submitted to the Ministry and its Regional Office at Lucknow. A final mine closure plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	Noted for compliance.
lii)	Conservation Plan for Schedule-I animals as per Wildlife Protection Act, 1972, if found in the study area shall be prepared and implemented on priority before commission the project for the conservation of wild fauna in consultation with the State Forest & Wildlife Department.	No schedule-I animals are found in the core and buffer zone.
liii)	Regular medical examination and health monitoring of all the employees for Lead (Pb) and Cadmium (Cd) shall be carried out and if cases of presence of Lead (Pb) and Cadmium (Cd) are detected, necessary compensation shall be arranged under the existing laws. A competent occupational health physician shall be appointed to carry out medical surveillance. Occupational health of all the workers shall be monitored for relevant parameters and records maintained for at	A full-fledged occupation health centre with qualified doctor is established in the project site. All personnel working in the Lead plant undergo test for Lead and Cadmium in Blood, to ensure early detection and rehabilitation if required. The records shall be maintained as

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	least 40 years from the beginning of the employment or 15 years after the retirement or cessation of employment whichever is later.	stipulated.
liv)	All the recommendations made in Charter for Corporate Responsibility for Environment Protection (CREP) for Zinc smelters shall be implemented.	Being complied.
lv)	Overall proper housekeeping shall be ensured in all the plant areas viz. Zinc and Lead smelter, Beneficiation plant, Captive power plant and other processing plant areas. The Company shall improve overall housekeeping by asphalting the internal roads and to reduce the generation of fugitive dust from vehicle movements.	Noted. Internal roads have been concreted/ asphalted to reduce the dust emission. The roads are being swept through road sweeper and cleaned with water.
lvi)	Adequate funds shall be earmarked towards capital cost and recurring expenditure per annum and a break up shall be submitted to the Ministry covering all aspects of the environment pollution control measures including extensive tree plantation on the mine and plant sites with an objective to achieve 33 % green cover within 3 years of project completion and recurring expenditure/annum for adequate pollution control measures with on-line motoring systems, ETPs, SWTPs, sound and vibration control, social forestry, rain water harvesting, occupational health, employment of environmental cadre personnel for continuous improvement etc.	Adequate funds are allocated for capital and revenue expenditures and no fund is diverted to other jobs/places. Environmental control measure expenditure breakup for FY2017-18 and Funds earmarked towards environmental control measures for FY2018-19 is enclosed as **Annexure-** XII & XIII.
lvii)	Rehabilitation and Resettlement Plan for the project affected population including tribals, if applicable, as per the policy of the State Govt. in consultation with the State Govt. of Rajasthan shall be implemented. Compensation paid in any case shall not be less than the norms prescribed under the National Resettlement and Rehabilitation Policy, 2007.	R & R is not applicable.
lviii)	All the safety norms stipulated by the Director General, Mine & Safety (DGMS) shall be implemented.	Being complied.
lix)	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Smelters, thermal power plants and mining shall be implemented.	Being complied.

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lx)	The company shall comply with the commitments made during public hearing / consultation meeting held.	Complied.
lxi)	No change in mining technology and scope of working shall be carried out without prior approval of the Ministry.	Noted.
lxii)	The company shall provide housing for construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied.
	General Conditions:	
i)	The project authorities must strictly adhere to the stipulations made by the Rajasthan State Pollution Control Board (RSPCB) and the State Government.	All the stipulated conditions are being complied.
ii)	No expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests.	Noted.
iii)	Adequate number of ambient air quality-monitoring stations shall be established in the downward direction as well as where maximum ground level concentration of SPM, SO2 and NOx are anticipated in consultation with the Rajasthan State Pollution Control Board. Data on ambient air quality and stack emission shall be regularly submitted to this Ministry including its Regional Office at Lucknow and the State Pollution Control Board/Central Pollution Control Board once in six months.	Three nos. of ambient air quality-monitoring stations have been established in consultation with the Rajasthan State Pollution Control Board in DSC and 3 no's of AAQMS in mine area. Data on ambient air quality and stack emission for the period of Oct'17 to Mar'18 are furnished herewith as Annexure I, II, III and IV.
iv)	Industrial wastewater shall 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 form time to time. The treated wastewater should be recycled in the plant as well as utilization for plantation purposes.	Industrial waste water is properly collected, treated in the ETP followed by double stage RO so as to confirm treated water quality as per the prescribed standards and recycled back in the plant as well as utilized for plantation

		purposes. Details of ETP has been submitted along with six monthly compliance report vide letter no. HZL/DSC/Env/2011/2/2 dated 23.11.2011.
v)	The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collection, storage, treatment and disposal of hazardous wastes.	Complied. Hazardous waste Authorization has been obtained from RSPCB for collection, transportation, storage, treatment and disposal of hazardous wastes.
vi)	The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).	Noise control measures including acoustic hoods, silencers, enclosures etc. have been provided on all sources of noise generation. Noise levels in and around the plant area are being monitored regularly and utmost care is taken to ensure that noise level remains below the norms. Average noise monitoring report is furnished herewith as **Annexure XIV.**
vii)	Occupational Health Surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	Being complied.
viii)	The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA/EMP/risk analysis and DMP report.	Environmental protection measures and safeguards recommended in the EIA/EMP/risk analysis and DMP report are being implemented.
ix)	As proposed, Rs. 230.00 Crores and Rs. 1.20 Crores shall be earmarked towards total capital cost and recurring cost/annum for environmental pollution control measures to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein.	Being complied and funds are not diverted for any other purpose.

	The funds so provided should not be diverted for any other purposes.	
x)	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/ Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.	Complied and communicated to Regional Office, MoEF vide letter no: HZL/RDM/Env/2009/898 dated 20.11.2009. Complied
xi)	The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF at Lucknow, the respective Zonal Office of CPCB and the RSPCB. The criteria pollutant levels namely; SPM, RSPM, SO_2, NO_x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	Status of compliance of the stipulated environment clearance conditions, including results of monitored data are being furnished regularly to MoEF/ CPCB and RPCB. Critical environmental parameters are being displayed near the main gate.
xii)	The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the RSPCB. The Regional Office of this Ministry at Lucknow / CPCB / RSPCB shall monitor the stipulated conditions.	Being complied.
xiii)	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.	Being Complied
xiv)	The Project Proponent shall inform the public that the project has been accorded environmental	Press advertisement published in local newspapers (hindi) i.e.

	clearance by the Ministry and copies of the clearance letter are available with the RSPCB and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.	Rajasthan Patrika & Dainik Bhasker (Rajsamand edition) on 08.11.09 and has been communicated to Regional Office, MoEF vide letter no: HZL/RDM/Env/2009/898 dated 20.11.2009.
xv)	Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.	Complied.

Annexure I

Hindustan Zinc Limited
Dariba Smelter Complex
Dariba, Dist. Rajsamand, Rajasthan.

SO2 Continuous Monitoring Report (Oct'17-Mar'18)

Month Location	Parameters	Prescribed Limits	Oct'17	Nov'17	Dec'17	Jan'18	Feb'18	Mar'18
Acid Plant* (Zinc Smelter) Roaster-1	SO_2 (mg/Nm3)	950	292	270	191	241	208	283
	SO_2 (Kg/T of H_2SO_4 Production)	1.5	0.75	0.57	0.40	0.73	0.54	0.79
Acid Plant* (Zinc Smelter) Roaster-2	SO_2 (mg/Nm3)	950	271	243	174	233	252	296
	SO_2 (Kg/T of H_2SO_4 Production)	1.5	0.79	0.71	0.49	0.50	0.75	0.89
TGT Stack (Lead Plant)	SO2 (mg/Nm3)	950	120	137	87	112	137	149
	SO2 (Kg/T of H2SO4 Production)	1.5	0.23	0.27	0.18	0.24	0.32	0.32

(Pradeep Singh)
AGM-Environment

ANNEXURE I Cont.

EKO PRO

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Contact : +91 - 9810243570

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA
Contact No. : 9711159210, 9711159437, SMS/Whatsapp No. : 9711159422, E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/137/211217 **Issue Date** : 28/12/2017

Issued To : HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	:	Stack Emission
Sample Drawn on	:	18/12/2017
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	21/12/2017
Time of Sampling (minutes)	:	30.0
Sampling Location	:	NA
Sampling Plan & Procedure	:	SOP-SE/09
Analysis Duration	:	21/12/2017 To 27/12/2017
Source of Emission	:	Stack Attached To Zinc Smelter Roster 1(R-4)**
Capacity	:	-
Operating Load	:	Normal
Normal Operation Schedule	:	As per requirement
Type of Stack	:	MS
Diameter of Stack (meter)	:	2.5
Height of Stack from Ground Level (meter)	:	100.0
Height of Stack from Roof Level (meter)	:	-
Height of Sampling Location (meter)	:	-
Type of Fuel Used	:	-
Fuel Consumed per Hour	:	-
Ambient Temperature (°C)	:	23.0
Stack Temperature (°C)	:	52.0
Average Velocity of Fuel Emission (m/sec)	:	5.38
Average Flow Rate (lpm)	:	21.9
Control Measures (if any)	:	-
Remark (if any)	:	**Acid Plant Attached With DCDA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	380.5	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	33.6	mg/Nm³	50.0

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For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-SE/137/211217

Issue Date : 28/12/2017

Notes :

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End of Report

For EKO PRO ENGINEERS PVT. LTD

Authorized Signatory

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA
Contact No. : 9711159310, 9711159427, SMS/Whatsapp No. : 9711183422, E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/139/211217 **Issue Date** : 28/12/2017

Issued To	:	HINDUSTAN ZINC LIMITED DARIBA SMELTER COMPLEX POST - DARIBA DISTRICT - RAJASMAND (RAJASTHAN)
Sample Description	:	Stack Emission
Sample Drawn on	:	18/12/2017
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	21/12/2017
Time of Sampling (minutes)	:	30.0
Sampling Location	:	NA
Sampling Plan & Procedure	:	SOP-SE/09
Analysis Duration	:	21/12/2017 To 27/12/2017
Source of Emission	:	Stack Attached To Zinc Smelter Roster 2(R-5)**
Capacity	:	-
Operating Load	:	Normal
Normal Operation Schedule	:	As per requirement
Type of Stack	:	MS
Diameter of Stack (meter)	:	2.5
Height of Stack from Ground Level (meter)	:	100.0
Height of Stack from Roof Level (meter)	:	-
Height of Sampling Location (meter)	:	-
Type of Fuel Used	:	-
Fuel Consumed per Hour	:	-
Ambient Temperature (°C)	:	23.0
Stack Temperature (°C)	:	52.0
Average Velocity of Fuel Emission (m/sec)	:	6.92
Average Flow Rate (lpm)	:	23.5
Control Measures (if any)	:	-
Remark (if any)	:	**Acid Plant Attached With DCDA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	360.5	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	33.6	mg/Nm³	50.0

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For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-SE/139/211217

Issue Date : 28/12/2017

Notes :

"End of Report"

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For Any Query Contact
Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/138/211217

Issue Date : 28/12/2017

Issued To : HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	:	Stack Emission
Sample Drawn on	:	18/12/2017
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	21/12/2017
Time of Sampling (minutes)	:	30.0
Sampling Location	:	NA
Sampling Plan & Procedure	:	SOP-SE/09
Analysis Duration	:	21/12/2017 To 27/12/2017
Source of Emission	:	Stack Attached To Zinc Dust Plant**
Capacity	:	-
Operating Load	:	Normal
Normal Operation Schedule	:	As per requirement
Type of Stack	:	MS
Diameter of Stack (meter)	:	0.5
Height of Stack from Ground Level (meter)	:	30.0
Height of Stack from Roof Level (meter)	:	-
Height of Sampling Location (meter)	:	-
Type of Fuel Used	:	-
Fuel Consumed per Hour	:	-
Ambient Temperature (°C)	:	23.0
Stack Temperature (°C)	:	55.0
Average Velocity of Fuel Emission (m/sec)	:	7.19
Average Flow Rate (lpm)	:	23.5
Control Measures (if any)	:	-
Remark (if any)	:	**Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	41.2	mg/Nm³	50.0

For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-SE/138/211217

Issue Date : 28/12/2017

End of Report

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/144/211217 **Issue Date** 28/12/2017

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	20/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Att. To Lead Primary Plant (SKS Furnace)*
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.0
Height of Stack from Ground Level (meter)	75.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	42.0
Average Velocity of Fuel Emission (m/sec)	7.14
Average Flow Rate (lpm)	24.9
Control Measures (if any)	-
Remark (if any)	**Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	41.2	mg/Nm³	100.0
2	Lead (as Pb)	USEPA (P-12)	2.78	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-SE/144/211217 **Issue Date** 28/12/2017

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End of Report

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/140/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Attached To TGT Lead Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.0
Height of Stack from Ground Level (meter)	100.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	47.0
Average Velocity of Fuel Emission (m/sec)	6.92
Average Flow Rate (lpm)	24.8
Control Measures (if any)	-
Remark (if any)	**Attached to Blast Furnace, Acid Plant, CDT Input

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	34.6	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	20.3	mg/Nm³	50.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-SE/140/211217 **Issue Date** 28/12/2017

Notes :

****End of Report****

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For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/141/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Satck Attached To Lead Secondary Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.2
Height of Stack from Ground Level (meter)	75.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	52.0
Average Velocity of Fuel Emission (m/sec)	6.84
Average Flow Rate (lpm)	21.5
Control Measures (if any)	-
Remark (if any)	**(Blast Furnace) Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	47.3	mg/Nm³	100
2	Lead (as Pb)	USEPA (P-12)	3.19	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Group : A-9711159337

Test Report No. : EK0/EV-SE/141/211217 **Issue Date** 28/12/2017

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/142/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Attached To Lead Electro Refinery Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	1.2
Height of Stack from Ground Level (meter)	40.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	120.0
Average Velocity of Fuel Emission (m/sec)	6.92
Average Flow Rate (lpm)	23.5
Control Measures (if any)	-
Remark (if any)	**(Pyro) South Lead Plant Attached to Bag Filter

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	48.6	mg/Nm³	100.0
2	Lead (as Pb)	USEPA (P-12)	1.62	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Test Report No. : EK0/EV-SE/142/211217 **Issue Date** 28/12/2017

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EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/143/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Attached To Lead Electro Refinery Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	1.2
Height of Stack from Ground Level (meter)	40.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	24.0
Stack Temperature (°C)	130.0
Average Velocity of Fuel Emission (m/sec)	6.28
Average Flow Rate (lpm)	20.9
Control Measures (if any)	-
Remark (if any)	**(Pyro) North Lead Plant Attached to Bag Filter

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	57.3	mg/Nm³	100.0
2	Lead (as Pb)	USEPA (P-12)	1.14	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Test Report No. : EK0/EV-SE/143/211217 **Issue Date** 28/12/2017

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Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA,
Contact No. : 9711159210, 9711159427 E-mail : email@ekopro.in, ekoprceengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/145/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	20/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Attached To Common Stack of CPP 2 X 85 MW*
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	4.0
Height of Stack from Ground Level (meter)	165.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	124.0
Average Velocity of Fuel Emission (m/sec)	12.9
Average Flow Rate (lpm)	25.3
Control Measures (if any)	-
Remark (if any)	**(At Dust Opening Point) Attached With ESP

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	36.5	mg/Nm³	50.0
2	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	534.8	mg/Nm³	-
3	Oxides of Nitrogen (as NOx)	IS : 11255 (P-7)	350.3	mg/Nm³	750.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

Authorized Signatory

Contact : +91 - 9810243870

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End of Report

Notes :

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Test Report No. : EK0/EV-SE/146/211217 **Issue Date** 28/12/2017

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	20/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	21/12/2017 To 27/12/2017
Source of Emission	Stack Attached To Coal Crusher
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	-
Height of Stack from Ground Level (meter)	-
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	23.0
Stack Temperature (°C)	46.0
Average Velocity of Fuel Emission (m/sec)	4.98
Average Flow Rate (lpm)	20.5
Control Measures (if any)	-
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	32.8	mg/Nm³	50.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/121/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	27/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Zinc Smelter Roster 1(R-4)**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.5
Height of Stack from Ground Level (meter)	100.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	30.0
Stack Temperature (°C)	58.0
Average Velocity of Fuel Emission (m/sec)	4.82
Average Flow Rate (lpm)	20.5
Control Measures (if any)	-
Remark (if any)	**Acid Plant Attached With DCDA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	369.4	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	27.6	mg/Nm³	50.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Group : A-9711159337

Test Report No. : EK0/EV-SE/121/310318 **Issue Date** 05/04/2018

Notes :

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/123/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	27/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Zinc Smelter Roster 2(R-5)**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.5
Height of Stack from Ground Level (meter)	100.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	30.0
Stack Temperature (°C)	48.0
Average Velocity of Fuel Emission (m/sec)	5.32
Average Flow Rate (lpm)	21.6
Control Measures (if any)	-
Remark (if any)	**Acid Plant Attached With DCDA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	339.8	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	36.5	mg/Nm³	50.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Test Report No. : EK0/EV-SE/123/310318 **Issue Date** 05/04/2018

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/122/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	27/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Zinc Dust Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	0.5
Height of Stack from Ground Level (meter)	30.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	30.0
Stack Temperature (°C)	51.0
Average Velocity of Fuel Emission (m/sec)	6.58
Average Flow Rate (lpm)	22.4
Control Measures (if any)	-
Remark (if any)	** Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	45.8	mg/Nm³	50.0

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Test Report No. : EK0/EV-SE/122/310318 **Issue Date** 05/04/2018

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/128/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	29/03/2018
Sample Drawn by	EPEPL(Mr. Harish Kumar)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Att. To Lead Primary Plant (SKS Furnace)*
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.0
Height of Stack from Ground Level (meter)	75.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	32.0
Stack Temperature (°C)	48.0
Average Velocity of Fuel Emission (m/sec)	6.58
Average Flow Rate (lpm)	22.7
Control Measures (if any)	-
Remark (if any)	**Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	44.8	mg/Nm³	50.0
2	Lead (as Pb)	USEPA (P-12)	2.92	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/124/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	28/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To TGT Lead Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.0
Height of Stack from Ground Level (meter)	100.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	30.0
Stack Temperature (°C)	53.0
Average Velocity of Fuel Emission (m/sec)	5.16
Average Flow Rate (lpm)	23.8
Control Measures (if any)	-
Remark (if any)	**Attached to Blast Furnace, Acid Plant, CDT Input

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	42.6	mg/Nm³	-
2	Acid Mist (as H2SO4)	EPA Method 8	24.8	mg/Nm³	50.0

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/125/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	28/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Lead Secondary Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	2.2
Height of Stack from Ground Level (meter)	75.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	31.0
Stack Temperature (°C)	60.0
Average Velocity of Fuel Emission (m/sec)	7.24
Average Flow Rate (lpm)	22.7
Control Measures (if any)	-
Remark (if any)	**(Blast Furnace) Attached to Bag House

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	42.8	mg/Nm³	50.0
2	Lead (as Pb)	USEPA (P-12)	3.32	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

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Test Report No. : EK0/EV-SE/125/310318 **Issue Date** 05/04/2018

Notes :

End of Report

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For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

EKO PRO

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA,
Contact No. : 9711159210, 9711159427 E-mail : email@ekopro.in, ekoprcengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/127/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	28/03/2018
Sample Drawn by	EPEPL(Mr. Harish Kumar)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Lead Electro Refinery Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	1.2
Height of Stack from Ground Level (meter)	40.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	31.0
Stack Temperature (°C)	142.0
Average Velocity of Fuel Emission (m/sec)	7.68
Average Flow Rate (lpm)	21.6
Control Measures (if any)	-
Remark (if any)	**(Pyro) North Lead Plant Attached to Bag Filter

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	48.2	mg/Nm³	50.0
2	Lead (as Pb)	USEPA (P-12)	1.28	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

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Test Report No. : EK0/EV-SE/127/310318 **Issue Date** 05/04/2018

Notes :

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/126/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	28/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Lead Electro Refinery Plant**
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	1.2
Height of Stack from Ground Level (meter)	40.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	31.0
Stack Temperature (°C)	112.0
Average Velocity of Fuel Emission (m/sec)	5.85
Average Flow Rate (lpm)	20.7
Control Measures (if any)	-
Remark (if any)	**(Pyro) South Lead Plant Attached to Bag Filter

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	46.2	mg/Nm³	50.0
2	Lead (as Pb)	USEPA (P-12)	1.84	mg/Nm³	10.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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Group : A-9711159337

Test Report No. : EK0/EV-SE/126/310318 **Issue Date** 05/04/2018

End of Report

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/129/310318 **Issue Date** 05/04/2018

Issued To

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Stack Emission
Sample Drawn on	30/03/2018
Sample Drawn by	EPEPL(Mr. Harish Kumar)
Sample Received on	31/03/2018
Time of Sampling (minutes)	30.0
Sampling Location	NA
Sampling Plan & Procedure	SOP-SE/09
Analysis Duration	31/03/2018 To 04/04/2018
Source of Emission	Stack Attached To Common Stack of CPP 2 X 85 MW*
Capacity	-
Operating Load	Normal
Normal Operation Schedule	As per requirement
Type of Stack	MS
Diameter of Stack (meter)	4.0
Height of Stack from Ground Level (meter)	165.0
Height of Stack from Roof Level (meter)	-
Height of Sampling Location (meter)	-
Type of Fuel Used	-
Fuel Consumed per Hour	-
Ambient Temperature (°C)	32.0
Stack Temperature (°C)	112.0
Average Velocity of Fuel Emission (m/sec)	11.7
Average Flow Rate (lpm)	24.2
Control Measures (if any)	-
Remark (if any)	**(At Dust Opening Point) Attached With ESP

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	31.9	mg/Nm³	50.0
2	Sulphur Dioxide (as SO2)	IS : 11255 (P-2)	498.2	mg/Nm³	-
3	Oxides of Nitrogen (as NOx)	IS : 11255 (P-7)	332.7	mg/Nm³	750.0

For EKO PRO ENGINEERS PVT. LTD.

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Test Report No. : EK0/EV-SE/129/310318 **Issue Date** 05/04/2018

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EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

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TEST REPORT

Stack Emission Analysis

Test Report No. : EK0/EV-SE/130/310318 **Issue Date** : 05/04/2018

Issued To : HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	:	Stack Emission
Sample Drawn on	:	30/03/2018
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	31/03/2018
Time of Sampling (minutes)	:	30.0
Sampling Location	:	NA
Sampling Plan & Procedure	:	SOP-SE/09
Analysis Duration	:	31/03/2018 To 04/04/2018
Source of Emission	:	Stack Attached To Coal Crusher
Capacity	:	-
Operating Load	:	Normal
Normal Operation Schedule	:	As per requirement
Type of Stack	:	MS
Diameter of Stack (meter)	:	-
Height of Stack from Ground Level (meter)	:	-
Height of Stack from Roof Level (meter)	:	-
Height of Sampling Location (meter)	:	-
Type of Fuel Used	:	-
Fuel Consumed per Hour	:	-
Ambient Temperature (°C)	:	30.0
Stack Temperature (°C)	:	42.0
Average Velocity of Fuel Emission (m/sec)	:	4.84
Average Flow Rate (lpm)	:	21.9
Control Measures (if any)	:	-
Remark (if any)	:	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER Consent
1	Particulate Matter (as PM)	IS : 11255 (P-1)	30.5	mg/Nm³	50.0

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Group : A-9711159337

Test Report No. : EK0/EV-SE/130/310318 **Issue Date** : 05/04/2018

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Authorized Signatory

Annexure II

HINDUSTAN ZINC LIMITED

RAJPURA DARIBA MINE

Average Ambient Air Quality Monitoring Results

(Oct'17-Mar'18)

Name of Monitoring Station	Parameters (Values are in µg/m^3)				
	RSPM	SPM	CO	NO_X	SO_2
Near Laboratory	75.03-81.98	171.58-377.34	230-510	13.67-16.57	3.16-7.53
Near DG Set	72.5-87.69	245.34-438.6	300-540	12.03-20.57	3.62-7.45
Near AB - Type Quarter	56.7-90.09	123.18-483.45	270-410	13.23-17.75	4.22-6.64

(Pradeep Singh)
AGM-Environment

ANNEXURE III

Contact : +91 - 9810243870

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TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/124/211217 **Issue Date** 28/12/2017

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	18/12/2017 To 19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Sampling Location	Near Main Gate (South)
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	21/12/2017 To 27/12/2017
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	23.0
Average Flow Rate of SPM (m^3/min)	1.12
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per National Ambient Air Quality Standards
1	Particulate Matter (PM10)	IS:5182 (P-23)	71.9	µg/m³	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	41.7	µg/m³	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	17.2	µg/m³	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	30.5	µg/m³	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m³	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.316	µg/m³	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m³	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m³	6.0

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TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/125/211217 **Issue Date** 28/12/2017

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	19/12/2017 To 20/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Sampling Location	Near CPP Area (North East)
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	21/12/2017 To 27/12/2017
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	23.0
Average Flow Rate of SPM (m³/min)	1.08
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per National Ambient Air Quality Standards
1	Particulate Matter (PM10)	IS:5182 (P-23)	63.6	µg/m³	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	34.2	µg/m³	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	16.5	µg/m³	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	31.9	µg/m³	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m³	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.192	µg/m³	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m³	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m³	6.0

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For Any Query Contact
Group : A-9711159337

TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/126/211217 **Issue Date** : 28/12/2017

Issued To	:	HINDUSTAN ZINC LIMITED DARIBA SMELTER COMPLEX POST - DARIBA DISTRICT - RAJASMAND (RAJASTHAN)
Sample Description	:	Ambient Air
Sample Drawn on	:	19/12/2017 To 20/12/2017
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	21/12/2017
Sampling Location	:	Near Strom Water Pond (North West)
Sampling Plan & Procedure	:	SOP-AAQ/15
Analysis Duration	:	21/12/2017 To 27/12/2017
Sampling Time	:	24.0 Hrs
Ambient Temprature (deg °C)	:	23.0
Average Flow Rate of SPM (m^3/min)	:	1.13
Average Flow Rate of Gases (lpm.)	:	1.0
Weather Conditions	:	Clear
Remark (if any)	:	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per National Ambient Air Quality Standards
1	Particulate Matter (PM10)	IS:5182 (P-23)	57.3	µg/m^3	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	30.5	µg/m^3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	19.5	µg/m^3	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	35.2	µg/m^3	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m^3	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.114	µg/m^3	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m^3	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m^3	6.0

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Test Report No. : EK0/EV-AA/126/211217

Issue Date : 28/12/2017

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For Any Query Contact
Group : A-9711159337

TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/123/211217 **Issue Date** 28/12/2017

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	18/12/2018 To 19/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Sampling Location	Near SLF Area
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	21/12/2017 To 27/12/2017
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	23.0
Average Flow Rate of SPM (m^3/min)	1.15
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per National Ambient Air Quality Standards
1	Particulate Matter (PM10)	IS:5182 (P-23)	56.2	µg/m^3	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	31.9	µg/m^3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	9.26	µg/m^3	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	24.7	µg/m^3	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m^3	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.168	µg/m^3	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m^3	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m^3	6.0

Notes :

End of Report

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For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

Authorized Signatory

EKO PRO

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

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Contact No. : 9711159210, 9711159427 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/122/310318 **Issue Date** 05/04/2018

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	27/03/2018 To 28/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Sampling Location	Near Main Gate (South)
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	31/03/2018 To 04/04/2018
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	31.0
Average Flow Rate of SPM (m^3/min)	1.16
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per EPA*
1	Particulate Matter (PM10)	IS:5182 (P-23)	74.6	µg/m^3	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	45.3	µg/m^3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	15.8	µg/m^3	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	28.4	µg/m^3	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m^3	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.302	µg/m^3	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m^3	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m^3	6.0
9	Ozone (as O3)	IS:5182 (P-9)	<10.0	µg/m^3	180.0
10	Ammonia (as NH3)	APHA 3rd Ed. Method 401	<20.0	µg/m^3	400.0
11	Benzene (as C6H6)	IS:5182 (P-11)	<1.0	µg/m^3	5.0
12	Benzo (alpha) Pyrine-Particulate Phase only	IS:5182 (P-12)	<1.0	ng/m^3	1.0

For EKO PRO ENGINEERS PVT. LTD.

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For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-AA/122/310318 **Issue Date** 05/04/2018

*Details as per EPA-1986 National Ambient Air Quality Standards,date 18.11.2009

End of Report

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TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/123/310318 **Issue Date** 05/04/2018

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	27/03/2018 To 28/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Sampling Location	Near CPP Area (North East)
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	31/03/2018 To 04/04/2018
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	31.0
Average Flow Rate of SPM (m^3/min)	1.12
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per EPA*
1	Particulate Matter (PM10)	IS:5182 (P-23)	61.2	µg/m^3	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	36.8	µg/m^3	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	14.5	µg/m^3	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	30.3	µg/m^3	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m^3	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.184	µg/m^3	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m^3	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m^3	6.0
9	Ozone (as O3)	IS:5182 (P-9)	<10.0	µg/m^3	180.0
10	Ammonia (as NH3)	APHA 3rd Ed. Method 401	<20.0	µg/m^3	400.0
11	Benzene (as C6H6)	IS:5182 (P-11)	<1.0	µg/m^3	5.0
12	Benzo (alpha) Pyrine-Particulate Phase only	IS:5182 (P-12)	<1.0	ng/m^3	1.0

For EKO PRO ENGINEERS PVT. LTD. GHAZIABAD

Authorized Signatory

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For Any Query Contact
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Test Report No. : EK0/EV-AA/123/310318 **Issue Date** 05/04/2018

*Details as per EPA-1986 National Ambient Air Quality Standards,date 18.11.2009

End of Report

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For Any Query Contact
Group : A-9711159337

TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/124/310318 **Issue Date** 05/04/2018

Issued To: HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	28/03/2018 To 29/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Sampling Location	Near Strom Water Pond (North West)
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	31/03/2018 To 04/04/2018
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	30.0
Average Flow Rate of SPM (m^3/min)	1.09
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per EPA*
1	Particulate Matter (PM10)	IS:5182 (P-23)	54.2	µg/m³	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	28.7	µg/m³	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	17.6	µg/m³	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	32.8	µg/m³	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m³	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.128	µg/m³	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m³	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m³	6.0
9	Ozone (as O3)	IS:5182 (P-9)	<10.0	µg/m³	180.0
10	Ammonia (as NH3)	APHA 3rd Ed. Method 401	<20.0	µg/m³	400.0
11	Benzene (as C6H6)	IS:5182 (P-11)	<1.0	µg/m³	5.0
12	Benzo (alpha) Pyrine-Particulate Phase only	IS:5182 (P-12)	<1.0	ng/m³	1.0

For EKO PRO ENGINEERS PVT. LTD. GHAZIABAD

Authorized Signatory

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Group : A-9711159337

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TEST REPORT

Ambient Air Quality Monitoring

Test Report No. : EK0/EV-AA/121/310318 **Issue Date** 05/04/2018

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Ambient Air
Sample Drawn on	28/03/2018 To 29/03/2018
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	31/03/2018
Sampling Location	Near SLF Area
Sampling Plan & Procedure	SOP-AAQ/15
Analysis Duration	31/03/2018 To 04/04/2018
Sampling Time	24.0 Hrs
Ambient Temprature (deg °C)	30.0
Average Flow Rate of SPM (m^3/min)	1.14
Average Flow Rate of Gases (lpm.)	1.0
Weather Conditions	Clear
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	Limits as per EPA*
1	RSPM (PM10)	IS : 5182 (Part 23)	59.5	µg/m³	100.0
2	Particulate Matter (PM2.5)	Eko/Chem/SOP/AAQ-01	33.7	µg/m³	60.0
3	Sulphur dioxide (as SO2)	IS:5182 (P-2)	10.5	µg/m³	80.0
4	Nitrogen Dioxide (as NO2)	IS:5182 (P-6)	22.3	µg/m³	80.0
5	Carbon Monoxide (as CO)	IS:5182 (P-10)	<1.15	mg/m³	4.0
6	Lead (as Pb)	IS:5182 (P-22)	0.154	µg/m³	1.0
7	Nickel as Ni	Eko/Chem/SOP/AAQ-02	<15.0	ng/m³	20.0
8	Arsenic (as As)	Eko/Chem/SOP/AAQ-02	<5.0	ng/m³	6.0
9	Ozone (as O3)	IS:5182 (P-9)	<10.0	µg/m³	180.0
10	Ammonia (as NH3)	APHA 3rd Ed. Method 401	<20.0	µg/m³	400.0
11	Benzene (as C6H6)	IS:5182 (P-11)	<1.0	µg/m³	5.0
12	Benzo (alpha) Pyrine-Particulate Phase only	IS:5182 (P-12)	<1.0	ng/m³	1.0

For EKO PRO ENGINEERS PVT. LTD. GHAZIABAD

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Annexure IV

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Ambient Air Quality Monitoring Report (Outside Plant)

(Oct'17-Mar'18)

Month / Village	Parameters	Oct'17	Nov'17	Dec'17	Jan'18	Feb'18	Mar'18
Aanjana	PM10	65.42	69.94	67.13	64.28	66.36	64.16
	PM2.5	31.32	30.34	34.1	32.28	34.12	30.76
	SO2	10.58	12.46	10.03	11.42	13.26	12.83
	NOx	22.46	24.08	18.72	20.13	21.84	23.68
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Makhanpuriya	PM10	60.01	65.55	71.71	64.29	67.04	65.46
	PM2.5	27.37	34.75	36.3	31.44	33.57	30.62
	SO2	9.96	10.88	14.95	13.05	12.76	10.72
	NOx	17.54	20.71	24.88	22.24	21.02	16.49
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Mahenduriya	PM10	68.21	62.77	71.68	73.74	70.16	60.18
	PM2.5	30.86	26.49	33.4	34.385	36.96	31.55
	SO2	12.81	13.46	14.18	15.94	16.24	12.92
	NOx	24.78	20.82	25.08	27.22	29.11	20.78
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Ladapacha	PM10	61.13	58.79	66.36	62.48	60.52	59.85
	PM2.5	33.26	26.97	32.66	30.63	25.13	28.41
	SO2	9.87	10.62	8.38	10.39	11.24	9.04
	NOx	16.72	22.74	12.08	15.80	19.14	14.27
	Pb	BDL	BDL	BDL	BDL	BDL	BDL

DSOP.

Annexure IV (Cont.)

Lunera	**PM10**	58.18	57.01	67.93	69.87	70.54	65.13
	PM2.5	26.54	26.21	32.25	35.71	37.81	31.88
	SO2	12.87	11.78	14.15	15.34	16.87	12.06
	NOx	25.19	20.16	28.72	26.79	25.81	20.96
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Charana	**PM10**	66.95	73.87	58.1	54.29	51.83	76.28
	PM2.5	28.21	36.01	26.74	24.43	22.53	35.64
	SO2	11.71	10.02	12.28	9.528	10.18	11.22
	NOx	20.17	21.22	22.08	17.84	18.26	23.07
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Kotadi	**PM10**	64.47	66.57	63.99	68.28	71.12	54.05
	PM2.5	34.1	26.88	33.06	35.75	38.52	29.14
	SO2	12.58	13.71	11.21	16.78	18.25	12.72
	NOx	24.46	27.81	22.38	26.93	24.63	20.14
	Pb	BDL	BDL	BDL	BDL	BDL	BDL
Chothpura	**PM10**	64.05	64.94	59.38	63.72	65.81	62.16
	PM2.5	32.46	31.71	33.33	30.71	32.28	27.2
	SO2	10.03	12.91	13.48	11.63	12.84	10.36
	NOx	16.72	20.17	21.44	20.96	20.58	15.67
	Pb	BDL	BDL	BDL	BDL	BDL	BDL

*All readings in ug/m^3

(Pradeep Singh)
AGM-Environment

Annexure V

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Continuous Ambient Air Quality Monitoring Results
(Oct'17-Mar'18)

Location Month	Near to Main Gate (South)				Near to CPP (North East)				Near to SWP (North West)			
	RSPM	SO_2	NOx	CO	RSPM	SO_2	NOx	CO	RSPM	SO_2	NOx	CO
Prescribed Limits*	100	80	80	2	100	80	80	2	100	80	80	2
Oct'17	56.88	36.24	36.27	0.00	54.82	31.67	38.78	0.00	56.24	31.62	36.84	0.00
Nov'17	57.49	32.66	36.09	0.00	53.95	33.34	39.62	0.00	56.20	31.80	38.46	0.00
Dec'17	57.68	32.69	36.28	0.00	56.68	30.65	38.03	0.00	57.15	31.79	37.83	0.00
Jan'18	62.42	32.61	25.82	0.00	59.12	32.57	37.98	0.00	55.80	30.09	37.23	0.00
Feb'18	63.04	27.89	28.96	0.00	63.95	29.04	37.41	0.00	57.69	26.92	38.65	0.00
Mar'18	64.78	28.68	25.61	0.00	65.55	25.14	34.69	0.00	62.29	27.82	38.57	0.00

* National Ambient Air Standards, 2009

* All readings in ug/m^3

(Pradeep Singh)
AGM-Environment

Annexure VI

HINDUSTAN ZINC LIMITED

DARIBA SMELTER COMPLEX

Work Zone Environment Monitoring Results

(Oct'17-Mar'18)

Month Location	Parameters	Prescribed Standards*	Oct'17	Nov'17	Dec'17	Jan'18	Feb'18	Mar'18
Zinc Plant								
Raw Material Handling (RMH)	**SPM**	**10**	6.80	7.31	7.19	6.30	7.35	7.68
	SO_2	**5**	0.04	0.04	0.04	0.04	0.03	0.09
	Zn	**5**	0.67	0.79	0.62	0.56	0.71	0.75
Zinc Dust Plant	**SPM**	**10**	5.95	5.12	5.79	6.30	5.55	6.74
	SO_2	**5**	0.03	0.02	0.03	0.04	0.04	0.05
	Zn	**5**	0.52	0.48	0.51	0.56	0.51	0.59
Purification Section	**SPM**	**10**	5.27	6.25	6.13	5.30	5.50	6.63
	SO_2	**5**	0.03	0.05	0.04	0.06	0.06	0.06
	Zn	**5**	0.34	0.41	0.39	0.43	0.43	0.45
Cell House	**SPM**	**10**	2.22	2.42	1.96	2.57	2.27	2.75
	SO_2	**5**	0.07	0.07	0.08	0.17	0.15	0.14
	Zn	**5**	0.15	0.15	0.14	0.16	0.17	0.18
Lead Plant								
Raw Material Handling (RMH	**SPM**	**10**	7.21	7.06	7.95	7.81	7.78	8.39
	SO_2	**5**	0.04	0.04	0.06	0.07	0.08	0.08
	Pb	**0.15**	0.05	0.05	0.05	0.07	0.06	0.06
SKS	**SPM**	**10**	6.24	5.78	6.70	7.11	7.18	8.05
	SO_2	**5**	0.07	0.08	0.07	0.12	0.11	0.12
	Pb	**0.15**	0.04	0.04	0.04	0.06	0.05	0.05
Blast Furnance	**SPM**	**10**	6.33	6.24	6.28	5.36	6.13	6.59
	SO_2	**5**	0.06	0.07	0.08	0.07	0.07	0.08
	Pb	**0.15**	0.04	0.04	0.04	0.05	0.05	0.05
LEP Melting & Casting	**SPM**	**10**	5.22	4.86	4.61	4.97	4.63	6.03
	SO_2	**5**	0.03	0.04	0.03	0.06	0.05	0.06
	Pb	**0.15**	0.03	0.03	0.03	0.03	0.02	0.03

* Time Weighted Average (TWA) .All readings in ppm

* Factory Act, 1948 (Schedule II)

(Pradeep Singh)

AGM-Environment

Annexure VII

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Fugitive Emission Monitoring Results

(Oct'17-Mar'18)

Location	Parameters (All figures in $\mu g/m^3$)
	TSPM
Prescribed Limit*	-
Raw Material Handling (RMH) - Zinc	432
Roaster Plant	393
Calcine Handling	412
Coal Handling Plant (CPP)	403
Fly Ash Handling	384
Raw Material Handling (RMH) – Lead Plant	403
Near SKS Primary	372

Secondary fugitive emissions are monitored on 24 hrs basis at a distance of 10 m from the source.

(Pradeep Singh)

AGM-Environment

ANNEXURE VIII

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA.
Contact No. : 9711159210, 9711159427 E-mail : email@ekopro.in, ekoprcengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Effluent Sample Analysis

Test Report No. : EK0/EV-EW/121/211217 **Issue Date** 28/12/2017

Issued To
HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	Effluent After Treatment (ETP Outlet)
Sample Drawn on	20/12/2017
Sample Drawn by	EPEPL(Mr. K.K. Mishra)
Sample Received on	21/12/2017
Sampling Location	From ETP Plant
Sampling Plan & Procedure	SOP-W/66
Sample Quantity	2.0 Litre
Environmental Condition	Normal
Analysis Duration	21/12/2017 To 27/12/2017
Remark (if any)	NA

RESULTS

S.No.	PARAMETER	Test Methods	Result	Units	LIMITS AS PER EPA*
1	pH	IS 3025(P-11)	6.81	-	5.5 - 9.0
2	Total Suspended Solids	IS : 3025 (P-17)	28.0	mg/L	100.0
3	Oil & Grease	IS : 3025 (P-39)	<4.0	mg/L	10.0
4	COD (as O2)	IS : 3025 (P-58)	65.2	mg/L	250.0
5	BOD (@ 27°C for 3 day)	IS : 3025 (P-44)	17.0	mg/L	30.0
6	Sulphides (as S)	IS : 3025 (P-29)	<1.0	mg/L	2.0
7	Chloride (as Cl)	IS : 3025 (P-32)	470.2	mg/L	-
8	Fluoride (as F-)	IS : 3025 (P-60)	0.51	mg/L	2.0
9	Copper (as Cu)	IS : 3025 (P-42)	0.025	mg/L	3.0
10	Zinc (as Zn)	IS : 3025 (P-49)	0.78	mg/L	5.0
11	Cadmium (as Cd)	IS : 3025 (P-41)	<0.001	mg/L	2.0
12	Chromium (as Cr+6)	IS : 3025 (P-52)	<0.05	mg/L	0.1
13	Chromium Total (as Cr)	IS : 3025 (P-52)	<0.01	mg/L	2.0
14	Lead (as Pb)	IS : 3025 (P-47)	0.015	mg/L	0.1
15	Phosphate Diss. (as P)	IS : 3025 (P-31)	0.73	mg/L	5.0
16	Cyanide (as CN)	APHA 4500 CN-K 22nd Ed.	Absent	mg/L	0.2
17	Nickel (as Ni)	IS : 3025 (P-54)	<0.01	mg/L	3.0
18	Iron (as Fe)	IS : 3025 (P-53)	0.25	mg/L	3.0

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

Authorized Signatory

EKO PRO

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA.
Contact No. : 9711159210, 9711159427 E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

Test Report No. : EK0/EV-EW/121/211217 **Issue Date** 28/12/2017

* Details as per EPA-1986 Schedule-VI Part-A, General Standards for Discharge of Effluents.

End of Report

Notes :

1. The results given above are ralated to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.
2. This test report will not be generated again, either wholly or in part, without written permission of the Laboratory.
3. This test report will not be use for any publicity/legal purpose.
4. This test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer. Sample received for biological tests will be destroyed after 7 days from the date of issue of test report.
5. Responsibility of the Laboratory is limited to the invoiced amount only.

For EKO PRO ENGINEERS PVT. LTD.

EKO PRO ENGINEERS PVT. LTD. GHAZIABAD SAVE THE ENVIRONMENT

EKO PRO

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA.
Contact No. : 9711159210, 9711159427, SMS/Whatsapp No. : 9711163422, E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

For Any Query Contact
Group : A-9711159337

TEST REPORT

Effluent Sample Analysis

Test Report No. : EK0/EV-EW/112/310318 **Issue Date** : 05/04/2018

Issued To : HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX
POST - DARIBA
DISTRICT - RAJASMAND
(RAJASTHAN)

Sample Description	:	Effluent After Treatment (ETP Outlet)
Sample Drawn on	:	30/03/2018
Sample Drawn by	:	EPEPL(Mr. K.K. Mishra)
Sample Received on	:	31/03/2018
Sampling Location	:	From ETP Plant
Sampling Plan & Procedure	:	SOP-W/66
Sample Quantity	:	2.0 Litre
Environmental Condition	:	Normal
Analysis Duration	:	31/03/2018 To 04/04/2018
Remark (if any)	:	NA

RESULTS

S.No.	PARAMETER	Test Methods	Results	Units	LIMITS AS PER CTO
1	pH	IS 3025(P-11)	6.96	-	6.5 - 8.5
2	Total Suspended Solids	IS : 3025 (P-17)	26.0	mg/L	100.0
3	Oil & Grease	IS : 3025 (P-39)	<4.0	mg/L	10.0
4	COD (as O2)	IS : 3025 (P-58)	70.4	mg/L	250.0
5	BOD (@ 27°C for 3 day)	IS : 3025 (P-44)	16.0	mg/L	30.0
6	Sulphides (as S)	IS : 3025 (P-29)	<1.0	mg/L	2.0
7	Chloride (as Cl)	IS : 3025 (P-32)	429.5	mg/L	1000.0
8	Sulphate (as SO4)	IS : 3025 (P-24)	186.9	mg/L	1000.0
9	Fluoride (as F-)	IS : 3025 (P-60)	0.42	mg/L	2.0
10	Copper (as Cu)	IS : 3025 (P-42)	0.019	mg/L	1.0
11	Zinc (as Zn)	IS : 3025 (P-49)	0.64	mg/L	1.0
12	Cadmium (as Cd)	IS : 3025 (P-41)	<0.001	mg/L	2.0
13	Chromium (as Cr+6)	IS : 3025 (P-52)	<0.05	mg/L	0.1
14	Chromium Total (as Cr)	IS : 3025 (P-52)	<0.005	mg/L	0.2
15	Lead (as Pb)	IS : 3025 (P-47)	0.013	mg/L	0.1
16	Phosphate Diss. (as P)	IS : 3025 (P-31)	0.82	mg/L	5.0
17	Cyanide (as CN)	APHA 4500 CN-K 22nd Ed.	Absent	mg/L	0.2
18	Nickel (as Ni)	IS : 3025 (P-54)	< 0.005	mg/L	3.0
19	Iron (as Fe)	IS : 3025 (P-53)	0.31	mg/L	1.0

Analytical Services - Analysis of Environment, Food, AYUSH, Cosmetics, Building Material, Petroleum & Material Samples in the field of Chemical, Mechanical & Biological Disciplines
Consulting Services - EIA, SIA, EC Compliances, Consultancy for NOC from CGWA, Hydrogeological Studies, Environmental Audit & other studies, Ground Water & Soil Investigation

Contact : +91 - 9810243870

EKO PRO ENGINEERS PVT. LTD.

Environmental Consultants and Analytical Laboratory

(An ISO 9001:2008 Certified Company)

Office & Laboratory : 32/41, South Side of G. T. Road, UPSIDC Industrial Area, Ghaziabad - 201 009, UP, INDIA.
Contact No. : 9711159210, 9711159427, SMS/Whatsapp No. : 9711163422, E-mail : email@ekopro.in, ekoproengineers@gmail.com, website : www.ekopro.in

Test Report No. : EK0/EV-EW/112/310318 **Issue Date** : 05/04/2018

****End of Report****

Notes :

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For EKO PRO ENGINEERS PVT. LTD

Authorized Signatory

Annexure IX

HINDUSTAN ZINC LIMITED

RAJPURA DARIBA MINE

Average Ground Water Monitoring Results (Around Tailing Dam Area)

(Oct'17-Mar'18)

Piezometer Wells

Parameter	PW 1	PW 2	PW 3	PW 4	PW 5	PW 6
pH	7.10-7.50	7.2-7.4	7.10-7.5	7.1-7.3	7.2-7.4	7.10-7.50
Suspended Solids	73-83	55-89	69-76	70-89	54-84	65-74
Lead	0.01	0.01	0.01	0.01	0.01	0.01
Zinc	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.03	0.01-0.02
Copper	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
Cadmium	0.001	0.001	0.001	0.001	0.001	0.001
Iron	0.02-0.03	0.02-0.03	0.02-0.03	0.01-0.02	0.02	0.02
Nickel	BDL	BDL	BDL	BDL	BDL	BDL
Cobalt	BDL	BDL	BDL	BDL	BDL	BDL
Depth of well from Surface (in ft.)	145 Ft	145 Ft	150 Ft	140 Ft	145 Ft	150 Ft
Water level in well from Surface (in ft.)	10 - 20 Ft	10 - 20 Ft	10 - 25 Ft	10 - 30 Ft	10 - 30 Ft	10 - 20 Ft

All figures in ppm except pH

BDL: Below Detection Limit

(Pradeep Singh)

AGM-Environment

Annexure X

HINDUSTAN ZINC LIMITED

RAJPURA DARIBA MINE

Average Surface & Ground Water Monitoring Results

(Around RD Mine & Tailing Dam Area)

(Oct'17-Mar'18)

Parameter	Mine Water	Tailing Dam Water	Garland Drain Water	Sumer Singh Well Water	Nahar Singh Well Water
pH	7.1-7.5	7.3-7.6	7.0-7.4	7.1-7.4	7.2-7.5
Suspended Solids	71-87	76-95	65-78	63-84	56-78
Lead	0.01	0.01	0.01	0.01	0.01
Zinc	0.1-0.02	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
Copper	0.01	0.01	0.01	0.01	0.01
Cadmium	0.01	0.01	0.01	0.001	0.001
Iron	0.02-0.03	0.01-0.02	0.01-0.02	0.01	0.01
Nickel	BDL	BDL	BDL	BDL	BDL
Cobalt	BDL	BDL	BDL	BDL	BDL
Depth of well from Surface	--	--	--	90 Ft	85 Ft
Water level in well from Surface	--	--	--	10 - 25 Ft	10 - 20 Ft

*All figures in ppm except pH

*BDL: Below Detection Limit

(Pradeep Singh)

AGM-Environment

ANNEXURE- XI

vedanta
transforming element

o/c

Reg. A/D

HZL/DSC/ENV/FLY ASH Return /2017-18

Date: 16.04.2018

To,

The Member Secretary,
Rajasthan State Pollution Control Board,
4, Institutional Area,
Jhalana Doongri,
Jaipur-302004

Sub: Annual implementation report about the compliance of provision in fly ash notification.

Ref: 1. Consent to Operate No: F(CPM)/Rajsamand(Railmagra)/2(1)/2015-2016/8780-8782. Order No. 2016-2017/CPM/4710 Dated 08.12.2016 for Captive power Plant (2 X 85 MW) Unit I & II.

2. Environmental Clearance Ref. No. –J-11011/380/2008/IA II (I) dated 04.11.2009.

Sir,

With reference to the above subject matter, please find enclosed herewith compliance report on fly ash notification for the financial year 2017-18.

Thanking You,

Yours faithfully,

For Hindustan Zinc Ltd

(Pradeep Singh)
AGM-Environment
Dariba Smelter Complex
Hindustan Zinc Ltd

Cc: 1.Additional Director, Ministry of Environment & Forests
Kendriya Bhavan, 5th Floor, Section –H, Aliganj, Lucknow-226024.

2 Member Secretary
CPCB Parvesh Bhawan,CBD – Cum-office Complex,
East Arjun Nagar, Delhi-110032.

3. The Regional Officer, Rajasthan State Pollution Control Board,
18, Azad Nagar, Near Pannadhay Circle, Mining Office Rd, Bhilwara-311001
Rajasthan.

Hindustan Zinc Limited
Dariba Smelter Complex, P.O. Dariba, Teh. Railmagra, Distt. Rajsamand (Rajasthan) - 313 211
T +91-2952 265 873 - 76 F +91-2952 265 660 www.hzlindia.com
Registered Office : Yashad Bhawan, Udaipur (Rajasthan) - 313 004
CIN : L27204RJ1966PLC001208

Fly ash notification S.O. 763(E), dated the 14th September, 1999 (as amended)
Annual Implementation Report for the period 1st April 2017 to 31st March 2018

S. No.	Particular	Details
1	Name of the Thermal Power Station	Captive Thermal Power Plant Dariba Smelter Complex
2	Full address including Pin code	Dariba Smelter Complex HINDUSTAN ZINC LIMITED P.O. - Dariba, District: Rajsamand (Raj.)- 313211
3	E mail address	Manoj.Agarwal@vedanta.co.in
4	Name of the nodal officer(not below the rank of DGM/Dy.CE/or equivalent) dealing with the ash management and contents of this report and his designation	Manoj Agrawal Unit Head - CPP
5	Telephone No.	+91-02952- 265450/51
6	Fax. No.	+91-02952-265452
7	Capacity of the Thermal Power station (MW)	170 MW
8	Details of number of units	2 X 85 MW
9	Coal/Lignite consumption in 2017-2018 (million tonnes)	0.67

A. Ash generation in 2017-2018(in tonnes)

10	Bottom Ash	16168
11	Fly Ash	98989
	Total A (10 and 11)	115157

B. Fly Ash unutilized (in tonnes)

12	Ash Pond disposal	0
13	Ash yard	0
14	Ash dump	0
	Total B (12 to 14)	0

C. Fly Ash utilization in 2017-2018

	Purpose for which Fly ash is utilised	Target (as per action plan)	Actual (in Tonnes)		
			From ESP, Dry ash	From bottom Ash	Total
15	Ash pond dyke rising		--	--	--
16	Cement industry		98989	--	--
17	Landfill		--	--	--
18	Own brick unit		--	--	--
19	Outside brick units other than brick kilns		--	--	--
20	Brick kilns		--	16168	--
21	Own ash based products(other than bricks)		--	--	--
22	Ash based products		--	--	--
23	Road and flyover embankments		--	--	--
24	Back filling in mines		--	--	--
25	Agriculture		--	--	--
26	Ready mix concrete		--	--	--
27	Asbestos		--	--	--
28	Exports		--	--	--
29	Others(please specify)		--	--	--
	Total C(15 to 29)		98989	16168	NIL

D. Reasons for variation from target

1		Not Applicable
2		Not Applicable
3		Not Applicable

E. Remedial measures taken

1		Not Applicable
2		Not Applicable
3		Not Applicable

F. Quantity in ash pond

30	Estimated quantity of Pond ash in active ash pond(pond in use) as on 31.03.2018(million tonnes)	Nil

G. Ash Pond Details

31	Total area earmarked for ash ponds(ha)	Not Applicable
32	Ash ponds already filled up and reclaimed (ha)	Fly Ash is being provided to Cement Industry and Bottom Ash is being provided to Brick manufactures.
33	Ash ponds already filled up but yet to be reclaimed (ha)	
34	Ash ponds in use(ha) (Active ash ponds)	
35	Area earmarked for ash ponds but ash ponds yet to be constructed (ha)	

H. Dry ash collection facilities

36	Whether mechanical handling facility for dry fly ash collection is available	Yes
37	If yes for how many units	with each unit

I. Dry fly ash storage

38	Daily ash generation(TPD)	Capacity of storage as on 31.03.2018(tonnes)	Capacity proposed if any in 2018-2019(tonnes)
	271	Fly Ash Silo of 280 MT capacity has been provided for intermediate storage.	Same as on 31.03.2018

J. Capital expenditure (Rs. lakhs)

	Item	Expenditure in 2017-2018(Rs. lakhs)	Budgetary provision
39	Mechanical dry fly ash collection facility	0	0
40	Dry Fly Ash storage	0	0

K. Dispute Settlement Committee

41	No. of meetings held in 2017-2018	No Dispute, meetings not held
	Nil	Not Applicable

L. Provision regarding supply to brick kilns

42	Whether the thermal power station is maintaining records of ash made available to each brick kiln	Yes
43	If yes how many Brick kilns have been supplied with fly ash	--

M. Mode of transport for Fly Ash(strikeout whichever is not applicable) -Yes

44	Dry Ash	Open truck	--
		Truck covered with tarpaulin	--
		Trailer	--
		Trailer covered with tarpaulin	--
		Closed container	--
		Special container truck	Bulker
45	Wet Ash	Open truck	--
		Truck covered with tarpaulin	--
		Trailer	--
		Trailer covered with tarpaulin	--
		Closed container	--
		Special container truck	--

N. Promotional Measures

		No. of meetings/workshops exhibition held during 2017-2018	Amount spent in 2017-2018(Rs. Lakhs)	Outlay for 2018-2019(Rs. Lakhs)
46	Exhibitions	0	--	--
47	Seminars	0	--	--
48	Workshops	0	--	--
49	Advertisement in newspaper	0	--	--
50	Advertisement in TV	0	--	--
51	Advertisement in radio	0	--	--
52	Others(Please specify)	0	--	--
	Total N (46 to 52)	0	NIL	NIL

O. Administrative measures taken

	Administrative measures taken	Outcome
53	Meeting with brick manufacturers	Not required during the year
54	meeting with state government/agencies	Not required during the year
55	Any other measures (pl. specify)	Not required during the year

Signature of CEO/General Manager/
CE of the thermal power station
Name: Manoj Agrawal
Designation: Unit Head - CPP
Date: 16.04.2018

Annexure XII

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Expenditure made in environmental control measures
(2017-18)

Sr. No.	Description	Total amount (Rs. in lakhs)
1	Green Belt Development, Maintenance of old plantation & landscaping	130
2	Environment Monitoring	111
3	Storm water ponds operation and maintenance & Monsoon management	25
4	Environmental training, awareness and publicity	13
5	Hazardous Waste Management	736
6	O & M of Organic waste Convertor	3
7	Environmental Audit	12
8	Returns, fees for Award & CTO	5
9	Pollution control measure	596
	Grand Total	**1631**

Annexure XIII

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Funds earmarked towards environmental control measures
(2018 -19)

Sr. No.	Description	Total amount (Rs. in lakhs)
1	Green Belt Development, Maintenance of old plantation & landscaping	175
2	Environment Monitoring	109
3	Storm water ponds operation and maintenance & Monsoon management	25
4	Environmental training, awareness and publicity	15
5	Hazardous Waste Management	2700
6	O & M of Organic waste Convertor	3
7	Environmental Audit & IMS	14
8	Returns, fees for Award & CTO	55
9	Pollution control measure	761
	Grand Total	**3857**

DSOP

Annexure XIV

HINDUSTAN ZINC LIMITED
DARIBA SMELTER COMPLEX

Ambient Noise Monitoring Report

(Oct'17-Mar'18)

Plant	DARIBA SMELTER COMPLEX				RAJPURA DARIBA MINE		
Location / Prescribed Standards* (70-75)	Boundary Wall near Plantation site(SW)	Near Gate No.2 (SE)	Boundary wall of CPP (NE)	Behind main reservoir (NW)	Near Canteen	Near AD Block	Near Mine Office Building
Apr'17-Sep'17	57-67	58-68	56-66	57-67	52-55	50-53	50-52

*-All readings in dB(A)

*- Noise Pollution (Regulation & Control) Rules, 2000

(Pradeep Singh)
AGM-Environment

Annexure-1

Basic Information

Important Note: Please send the information by e-mail <u>in word format and a signed</u> <u>& scanned copy</u> to the Member Secretary *<u>prior to the EAC meeting.</u>* Please also provide a copy to the members of the EAC during the EAC meeting.

I. PROJECT DETAILS

1. Name of the project: Rajpura Dariba Mine (RD Mine)
2. Name of the Company, Address Tele No. & E-mail Head of organization:
   M/s Hindustan Zinc Limited (HZL)
   Rajpura Dariba Mine, P.O.- Dariba, Tehsil- Relmagra,
   Distt- Rajsamand (Rajasthan) - 313211
   Mr. Ram Murari, Unit Head – RD Mine
   Email- Ram.Murari@vedanta.co.in
3. If a Joint venture, the names & addresses of the JV partners including their share:
   Not Applicable
4. Latitude and Longitude of the project: Latitudes 24°55'40.8"N-24°57'49.0"N
   Longitudes 74°06"57.7"E-74°08'41.4"E
5. Whether the project is in the Critically Polluted Area (CPA) : No
6. Cost of the project: The total project capital cost is INR 960 Crores.
7. Whether new or expansion project. If expansion: Yes, It's a Expansion Project
   (i) The proposed Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (ROM) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA
   (ii) What is the % of expansion: Ore Underground Mining- 85.18% and Lead Zinc Ore Beneficiation -108.33%
8. If for expansion, whether the application is under 7(ii) of the EIA Notification, 2006. No
9. No. and Date of the ToR /and revised ToR, if any, letter issued by the MoEF (if this is a case for EC). Not Applicable. Applying for TOR
10. No. and Date of the EC and the revised EC letter issued by the MoEF (if this is a case for reconsideration. If so, what specific reconsideration(s) being sought by the

proponent) . Letter No. J-11011/380/2008-IA II (I) dated 4.11.2009 and J-11015/380/2008-IA.II(M) dated 26.07.2018.

11. If the project was considered in EAC, Pl.give dates of the meeting (s) : Not Applicable

12. Type of Mine: (Open cast/Underground/mixed) : Underground

13. Capacity of the mine applied for : From 1.08 million TPA to 2.0 million TPA (ROM)

14. ML Area

(i) As per block allotment : Not Applicable

(ii) As per approved mine plan : 1142.2106 Ha (ML-166/2008)

15. Date of approval of mine plan, mine closure plan, status & date :

Scheme of Modified Mining plan with progressive mine closure plan has been approved vide letter no.584 (4)(3)(1705)/2017-RCM-AJM dated 26.09.2017.

16. Date of Board's approval:

17. Date of Ground water clearance and surface water approval:

- NOC from CGWA for mine dewatering (446.50 KLD) has been obtained wide letter no. 21-4(315)/WR/CGWA/2008-212 dated 14.07.2009. Renewal for the same was obtained vide letter dated 06.06.2012.
- Application for obtaining NOC from CGWA for additional ground water dewatering (2698.5 KLD) has been submitted on dated 27.01.2017.

18. Existing Ground water level in (M) : 5 - 30 Mtr.

19. Date of mine closure approval : 26.09.2017 (PMCP approved by IBM)

20. Any river/Nallah flowing near or adjacent to the proposed mine. If yes, please give details : No

Details of mine lease:-

1. Date of entering into original lease deed 30-05-1970	1. Date of 1st lease Renewal 1990	1. Date of 2nd lease Renewal 2010	1. Date of 3rd lease Renewal NA
2. Date of expiry of original lease deed 1990	2. Whether renewal or deemed renewal 3. Date of expiry of 1st lease renewal/deemed renewal. 2010	2. Whether renewal or deemed renewal 3. Date of expiry of 2nd lease renewal / deemed renewal 29-05-2030	2 - 3.-

II TECHNICAL DETAILS

21. Geological Reserve:

(i) Total geological reserve: Estimated in-situ ore Reserves & Resources computed on 01-04-2018 stands at 60.05 million tons with 1.91% Pb & 6.38% Zn.

(ii) Mineable reserve : 31 million tons

(iii) Extractable reserve : 31 million tons

(iv) Per cent (%) of extraction : 100%

(v) Range of ground water level : 5 – 30 Mtr.

Total estimated water requirement : An additional 2200 m3/d of water is required for proposed expansion, in addition to approved 5800 m3/d water.

(vi) Details of intersecting ground water level : 3145 KLD

22. Details of Deposits :

(i) Depth of ore body : 300 mtr. – 1400 mtr.

(ii) Grade of ore : 6.38 % Zn, 1.91 % Pb

(iii) Stripping ratio : Not Applicable

23. Method of mining : Mining is being carried out with blast hole stoping method with post filling in primary-secondary sequence to maximize ore recovery

24. Life of mine : +20 Years

25. Whether ambient air quality seasonal data has been monitored. If so, from which season to which season and whether the results are within the prescribed limits.

Yes, ambient air quality data has been monitored during March-May '2017 and the results are well within the permissible limits.

26. Whether the monitoring report of earlier EC from MoEF Regional Office has been obtained, in case the proposal is for expansion.

Yes, vide letter no. F.No. IV/ENV/R/Ind-115/758/2009/148 dated 08.09.2017. Regional office of MoEFCC has been again requested to provide latest Certified Compliance Report.

27. **Details of O.B.** : Not Applicable, since it is an Underground Operation.

(i) External OB dumps

(ii) No of OB dumps

(iii) Area of each dump

(iv) Height of each dump

(v) Quantity (in MCm) of OB in each dump

(vi) Year of back filling

(vii) No. of OB dumps reclaimed

(viii) If garland drains and settlement facility for runoff created

(ix) Whether runoff water being utilized

28. **Details of Internal Dumps**

(i)	Number of internal dumps	01
(ii)	Area of each dump	3.0 Ha.
(iii)	Height of each dump	7 Mtr.
(iv)	Quantity of wastes filled (MCm)	0.0145

29. **Utilization potential of wastes**

(i) Within the mines - 100%

(ii) Outside mines

(iii) Efforts made by proponent

30. **Details of final Mine Voids :** Not Applicable as stopes will be backfilled.

(i) Area

(ii) Depth

31. **Details of Quarry:** Not Applicable

(i) Total quarry area :

(ii) Backfilled quarry area of .....ha shall be reclaimed with plantation

(iii) A void of ..... ha at a depth of ..... m which is proposed to be converted into a water body

(iv) Green belt created in ha.

32. **Details of Land usage**

(i) Pre-mining

(ii) Post- Mining

(iii) Core area

Particulars	Existing land use (ha)	Proposed land use (ha)	Total Area (ha)
A) MINE & SMELTER Operational use			
a) Mine, beneficiation plant, workshops and other office buildings.)	58.62	0	58.62
b) Old Mine Premise (Sala Mill, incline, vent. Fan)	7.32	0	7.32
c) Main Explosive Magazine	1.56	0	1.56
d)Tailing Dam	3.02	0	3.02
e) Core shed	0.06	0	0.06
f) Tailing pipeline	1.78	0	1.78
g) Zinc Plant	22.64	0	22.64
h) Lead Plant	20.15	0	20.15
i) Captive Power Plant	0	0	0
j) Utilities (ETP, RO etc.)	0.42	0	0.42
k) Hazardous Waste Disposal Site	53	0	53
l) Others(Open space & internal roads)	3.1	0	3.1
Total (A)	171.67	0	171.67
B) Other Use: Residential Colony, Welfare buildings and internal roads	41.41	0	41.41
C)Roads and open spaces	15.58	0	15.58
D) Green Belt (Plantation)	134.0	0	134
Total (A+B+C+D) Considered for financial assurance	**362.66**	**0**	**362.66**
E) Khatedari land	578.2	0	578.2
F) Charagah	27.33	0	27.33

G) Bilanam	131.03	0	131.03
H) Public roads & Others	42.98	0	42.98
TOTAL (E+F+G+H)	779.54	0	779.54
GRAND TOTAL (A+B+C+D+E+F+G+H)	1142.2	0	1142.2

33. Details of Forest issues : Not Applicable

(i) Total forest area involved (in ha) for mining lease.

(ii) Total broken forest area.

(iii) Status of Forest Clearance and extend of forest land diverted in ha.

(iv) Is there any National Park, eco-sensitive Zones, within 10 km radius? If so, give the details.

(v) Extent of forest land in the project (including safety zone and all types of forest land) (in ha)

(vi) Total forest land for which Stage-1 FC is available (give area in ha), provide breakup of this area in following format: Not Applicable

Area (in ha)	Stage-1 FC issued vide letter no. & date	Validity period of earlier FC granted

(vii) Balance forest land for which Stage-1 FC is not available (give area in ha)

(viii) Details of wild life issues involved, if any. If so, whether WL management plan has been prepared; pl. indicate the status.

(ix) Whether schedule -I species, if yes conservation plan is approved by CWLW?

34. Costs of the project :

(i) Total capital Cost : Rs. 960crores (Existing: Rs.300 Crores + Proposed: Rs.660 Crores)

(ii) Cost of Production :

(iii) Sale Price :

(iv) CSR cost :

(v) R&R Cost :

(vi) No of PAFs :

(vii) Cost for implementing EMP: Rs. 110 crores

35. Details of villages/habitation in mine lease area

(i) Inside the lease Kotdi, Dariba, Mata Ji Ka Khera

(ii) Surrender by lease - Not applicable

(iii) Extent of cropland acquired/ being acquired in ha.

36. Details of transportation of mineral

(i) In pit:

(ii) Surface to siding:

(iii) Siding to loading:

(iv) Quantity being transported by Road/Rail/conveyer /ropeway – 108000 TPA Concentrate

(v) Proposed change in transportation means it any, give details - No

37. Details of reclamation:

a. Afforestation shall be done covering an area of: ..... ha at the end of mining. This will include:

(i) Reclaimed external OB dump (in ha) : Not Applicable

(ii) Internal dump (in ha), 5.0

(iii) Green belt (in ha) 190

(iv) Density of tree plantation (in no of plants) 1500 nos. per hectare

(v) Void (in ha) at a depth of (in m)which is proposed to be converted into water body – Not applicable

(vi) Others in ha (such as excavation area along ML boundary, along roads and infrastructure, embankment area and in township located outside the lease etc).

(vii) Agriculture and horticulture

(viii) Fisheries

(ix) ECO Tourist/recreation spot

III. LEGAL ISSUES

38. Any court case pending. If so, please provide a list with details as annexure : No

(i) Environment (Protection) Act

(ii) Air (P&CP) Act

(iii) Water (P&CP) Act

(iv) MMRD Act

(v) The Factories Act

(vi) Other land R&R related cases

39. Any violation cases pending. If so, please provide a list with details as annexure: Not Applicable.

40. Give details of actual production vis-à-vis sanctioned capacity since the inception of mine in following format or since 1993-94 as applicable:

Year	EC sanctioned capacity (MTPA)	Actual production (MTPA)	Excess production beyond the EC sanctioned capacity
1982-83		55990	
1983-84		145768	
1984-85		243403	
1985-86		362879	
1986-87		361707	
1987-88		400161	
1988-89		382195	
1989-90		385013	
1990-91		511641	
1991-92		623179	
1992-93		631407	
1993-94		423805	
1994-95		248652	
1995-96		367550	
1996-97		311750	
1997-98		351710	

1998-99		314890	
1999-2000		282890	
2000-01		273400	
2001-02		375770	
2002-03		549770	
2003-04		585743	
2004-05		527328	
2005-06		506527	
2006-07		507560	
2007-08		505749	
2008-09		483293	
2009-10	900000	501282	Nil
2010-11	900000	496234	Nil
2011-12	900000	587600	Nil
2012-13	900000	554354	Nil
2013-14	900000	610242	Nil
2014-15	900000	573284	Nil
2015-16	900000	668777	Nil
2016-17	900000	745534	Nil
2017-18	900000	895568	Nil

IV. PUBLIC HEARING ISSUES

Not Applicable, Applied for TOR

41. Date and Place of public hearing:

42. The designation of officer presided our the PH:

43. Issues raised during Public Hearing and assurance given alongwith the financial provisions and action plan, if any, by the project proponent. (Please attach as an annexure in a tabular form.):

44. Number of representation received in writing from the district and outside of district, please give details:

V. **Consultant;**

45. Name of the EIA consultant who prepared the EIA/EMP report:

Gaurang Environmental Solutions Pvt Ltd

501, Paris Point, Collectorate Circle, Bani Park, Jaipur (Rajasthan)

E-mail- gaurangenviro@gmail.com

Has been hired for preparation of EIA Report

46. Whether the consultant has been accredited by the QCI and NABET as per the MoEF OM dated 2nd December, 2009.

Yes, The Consultant is accredited by the QCI and NABET Certificate No. NABET/EIA/1720/IA0026

47. Name of specialists/consultants involved in making EIA report and in collecting data.

48. One page summary for TOR and EC separately as applicable : Attached

49. Brief Background of the Project as per table:

1	Details of PP and Group companies a) Financial Position b) Group companies c) Legal Issues d) Past and current litigations	Hindustan Zinc Limited Rajpura Dariba Mine Rajsamand, Rajasthan No legal issues & litigations
2	Social, economic and environmental aspects of the project in brief	

Unit Head
Hindustan Zinc Limited
Rajpura Dariba Mines
Distt. Rajsamand (Raj.)
PIN-313 211

HINDUSTAN ZINC LIMITED

Rajpura Dariba Mines

P.O. Dariba – 313 211

Rajsamand District (Rajasthan)

UH (RDM) / Env /DCF/2018 /

15.11.2018

To,

Deputy Conservator of Forest,
Office of Deputy Conservator of Forests,
Department of Social Forestry,
Rajsamand (Raj.)

Subject: Approval of Conservation Plan for Schedule-I species for Buffer Zone (10 Km. radius) of Rajpura Dariba Mine of M/s Hindustan Zinc Ltd., located at Tehsil Relmagra, Dist: Rajsamand, Rajasthan (ML No. 166/2008, Area 1142.2106 Ha.).

Dear Sir,

Ref.:- Ministry of Environment & Forests, Climate Change, (MoEF & CC), Letter No: J-11015/84/2018-IA.II(M), dated 27th September, 2018.

Sir,

With reference to above, Conservation Plan for Schedule-I Species is enclosed herewith for approval please.

Thanking You,

Yours faithfully,

22.11.18
प्रेषक लिपिक
सहायक वन संरक्षक
सवाईमाधोपुर, राजस्थान

(**Ram Murari**)
Unit Head
Rajpura Dariba Mine

Unit Head
Hindustan Zinc Limited
Rajpura Dariba Mines
Distt. Rajsamand (Raj)
PIN 313211

CONSERVATION PLAN FOR SCHEDULE-1 SPECIES

FOR

The Expansion of Lead-Zinc Ore Underground Mine from 1.08 million TPA to 2.0 million TPA (Total Excavation 2.48 million TPA) & Lead Zinc Ore Beneficiation from 1.2 to 2.5 million TPA at Rajpura Dariba Mine of M/s Hindustan Zinc Ltd., located at Tehsil Relmagra, Dist: Rajsamand, Rajasthan (ML No. 166/2008, Area 1142.2106 Ha.)

Environment Consultant		Project Proponent
Gaurang Environmental Solutions Pvt Ltd. Jaipur, Raj.		Hindustan Zinc Limited, Rajpura Dariba Mine Rajsamand, Raj.
October, 2018		

1.0 Introduction

Hindustan Zinc Limited (HZL) intends to enhance Lead and Zinc ore production and beneficiation capacities from the Expansion of Rajpura Dariba mine from 1.08 to 2.0 million TPA Ore Production (Total Excavation 2.48 million TPA) and Beneficiation from 1.2 million TPA to 2.5 million TPA, located at Relmagra Tehsil, Rajamand District, Rajasthan (ML No. 166/2008, area 1142.2106 ha.).

2.0 Location & Ecological Sensitivities

The project is located at 24º55'40.8''N- 24º57'49.0''Nand 74º06'57.7''E - 74º08'41.4''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: J-11015/84/2018-IA.II(M), dated 27th September, 2018.

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 *Pavocristatus*(Indian Peafowl), along with other schedule –I birds and reptilian fauna in the study area, along with Indian Python and 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	*Pavocristatus*	Indian Peafowl	Schedule-I, Part-III
2	*Ocycerosbirostris*	Indian Grey Horn Bill	Schedule-I, Part-III
3	*Elaenuscaeruleus*	Black Shouldered Kite	Schedule-I, Part-III
4	*Butasturteesa*	White-Eyed Buzzard	Schedule-I, Part-III
Reptiles			
5	*Varanusbengalensis*	Indian Monitor Lizard	Schedule-I, Part-II
6	*Lissemyspunctata*	Indian Flapshell Turtle	Schedule-I, Part-II
7	*Python molurus*	Indian Python	Schedule-I, Part-II
Mammal			
8	*Pantherapardus*	Indian Leopard	Schedule-I, Part- 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.

However, the list of authenticated species, circulated by DFO, Rajasmand district comprises of entire working plan of Rajasmand district. Hence, only observed species in the study area is alone given in the above list.

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	*Azadirachtaindica*	Meliaceae	Neem/Nimba
2	*Proposis cineraria*	Mimosaceae	Khejri
3	*Pongamiapinnata*	Fabaceae	Karanj
4	*Cassia fistula*	Caesalpinaceae	Amaltas
5	*Pithecellobiumdulce*	Mimosaceae	Jangli Jalebi
6	*Butea monosperma*	Fabaceae	Palash
7	Adenantherapavonia	Fabaceae	Rakthrohida
8	Prosopisjuliflora	Mimosaceae	Vilayati Babul

3.0 Conservation Action Plan for the Schedule –Ispecies 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, *Pantherapardus*–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- *Pavocristatus*

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.

Indian Peafowl- *Pavocristatus*

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 RD 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 RD 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 RD mines, Hindustan Zinc Limited administered roads in the study area mainly bearing such as *Bauhinia variegata,*

*Azadirachtaindica*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 *Pavocristatus*(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 (*Ocycerosbirostris*), is found in pairs or small groups.

Common Indian Grey Hornbill – *Ocycerosbirostris*

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 RD 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 **RD mines, Hindustan Zinc Limited** administered roads in the study area mainly bearing *Ficusbengalensis,* 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 *Elanuscaeruleus* –Black Shouldered Kite

(*Elanuscaeruleus*) 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.

Black Shouldered Kite - *Elanuscaeruleus*

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 comprises 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 RD 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 **RD 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*Butasturteesa*– 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 - *Butasturteesa*

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 –*Butasturteesta* – 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 RD 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 RD mines buffer area, Hindustan Zinc Limited administered roads in the study area mainly bearing *Ficusbengalensis, Strebulus asper, Grewiatiliaefolia, Lanneacoromandelica, 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.

6.5 References of White Eye Buzzard-http://www.iucnredlist.org/details/22695718/0

7.1 Introduction of the Indianflapshell turtle (*Lissemyspunctata*) 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 RD 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 *Lissemyspunctata* has been known to range from 240 to 370 mm in length.

Indian Flapshell Turtle - *Lissemyspunctata*

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 *Lissemyspunctata*–Indian Flapshell Turtle:

Indian FlapshellTurtle is found in the buffer zone of the RD mines area in the marshy and near the wetlands in the study area.

7.4 Reproduction and Growth of Indian Flapshell Turtle

Lissemyspunctata-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 forLissemyspunctata

Lissemyspunctata- 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 RD 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. Lissemyspunctata. (errata version published in 2016) The IUCN Red List of Threatened Species 2000: e.T46579A97399871. Downloaded on16 June 2017).*

8.1 Introduction of *Varanusbengalensis*–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 – *Varanusbengalensis*

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.

Monitor Lizard - *Varanusbengalensis*

8.3 Ecology and Behaviour of Bengal Monitor Lizard- *Varanusbengalensis*

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 – *Varanusbengalensis*

Is found in the buffer zone of the RD mines area.

8.5 Action Plan for Conservation of Bengal Monitor Lizard – *Varanusbengalensis*

*Varanusbengalensis*is protected by its inclusion in the Schedule-I of the Indian Wildlife (Protection), Act, 1972. Buffer Zone of the RD 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 RD mines project area.

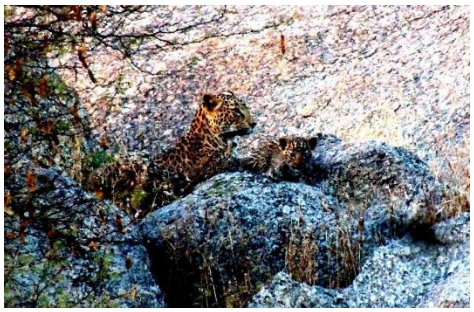
Especially protection of wetlands in the study area, village ponds is ensured and spreading awareness from time to time for conservation of Indian Monitor Lizard – *Varanusbenghalensis* will ensure it is conservation in the wild devoid of any potential risks it may face due to habitat fragmentation.

8.6 Bibliography of Bengal Monitor Lizard - *Varanusbengalensis*

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 – *Pantherapardusfusca*The Indian leopard (*Pantherapardus*fusca) is a leopard subspecies of Panther species which is widely distributed on the Indian subcontinent. The species of the *Pantherapardusfusa*is found in the RD mines buffer zone

The species Pantherapardus 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 – *Pantherapardusfusca*

In 1794, Friedrich Albrecht Anton Meyer wrote the first description of *Felisfusca*, 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. – *Pantherapardus*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 – *Pantherapardus*:Is found in the buffer zone of RD 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- *Pantherapardus*

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 RD mines area and also their conservation measures are undertaken by the management of RD 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 Introduction of the Indian Python (*Python molurus*)

Common Names

Indian python, Indian rock python, Asian rock python. eferred to as "Ajingar" in Nepali,"Ajgar" in Hindi and Marathi, "Azdaha" in Urdu and "awjogor" in Bengali.

The color pattern is whitish or yellowish with the blotched patterns varying from shades of tan to dark brown. This varies with terrain and habitat. Specimens from the hill forests of Western Ghats and Assam are darker, while those from the Deccan Plateau and East Coast are usually lighter.

Indian pythons commonly reach a length of 2.4-3 metres (7.9 -9.8 ft), occurring in a wide range of habitats, including grasslands, swamps, marshes, rocky foothills, and woodlands".

They depend on a permanent source of water. Sometimes they can be found in abandoned mammal burrows, hollow trees, and dense water reeds.

Indian Python - *Python molurus*

10.1 Ecology and Behaviour of Indian (*Python molurus*)

Python is a slow moving even in its native habitat; they exhibit timidity and rarely try to attack when attacked. Locomotion is usually rectilinear, with body moving in a straight line. They are good swimmers and are quite at home in water. They can be submerged in water for many minutes if necessary, but prefer to remain near the bank.

10.2 Distribution of Indian Python (*Python molurus*)

Indian Python- *Python molorus*is native to Indian sub-continent, India, Pakistan, Nepal and found in Srilanka. It is also found in Island territories of Andaman & Nicobar Islands, India. It is found in the study area.

10.3 Reproduction and Growth of Indian Python (*Python molurus*)

Oviparous, up to 100 eggs are laid by the animal, which are protected and incubated by the female. Towards this end, it has been shown that they are capable of raising their body temperature above the ambient level through muscular contractions. The hatchlings are 45–60 cm (18–24 in) in length and grow quickly. An artificial incubation method using climate-controlled environmental chambers was developed in India for successfully raising hatchlings from abandoned or un-attended eggs.

10.4 Conservation Action Plan for Indian Python (*Python molurus*)

The Indian Python is classified as Lower Risk/Near Threatened on the IUCN Red List of Threatened Species. This listing indicates that it may become threatened with extinction and is in need of frequent reassessment. Listed in the Indian Wildlife (Protection), Act 1972 – Schedule-I.

Conservation of marshy areas, rocky crevices are important for the conservation of Indian Python in RD mines -10 km radius buffer zone.

Indian pythons are found in a variety of habitats including rainforests, river valleys, woodlands, scrublands, grassy marshes, and semi rocky foothills. They are usually found in habitats with areas that can provide sufficient cover. This species is never found very far from water sources, and seems to prefer very damp terrain.

10.5 References on Indian Python (*Python molurus*)

- Andrew Snider and J. Bowler (1992) Longevity of Reptiles and Amphibians in North American Collections, Second Edition. Society for the Study of Amphibians and Reptiles .
- Banks, R. C., R. W. McDiarmid, A. L. Gardner, and W. C. Starnes. 2004. Checklist of Vertebrates of the United States, the U.S. Territories, and Canada, draft (2004)
- Barker, D.G & Barker, T.M. 2008. The Distribution of the Burmese Python, Python molurusbivittatus. Bull. Chicago Herp. Soc. 43(3): 33-38.
- Barone, S. 2004. Natural history and captive care of Asian Rock pythons. Reptilia (GB) (36): 32-38.
- Barone, S. 2007. Haltung und Nachzucht des Tigerpythons. Reptilia (Münster) 12 (6): 56-61.
- Whitaker, Romulus and Ashok Captain. 2004. Snakes of India. Draco Books, 500 pp.

11. 0 Conservation Plan and Budgetary Provision in subsection

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) in consultation with local forest

department 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 intiatives envisaged by HZL-Hindustan Zinc Limited.

11.1 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.

11.2 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	Habitat Improvement–Plantation of suitable plant species in buffer zone.	60
2	Development of water holes	20
3	Fencing of habitat sites	10
5	Watch & ward of habitat - plantation area	10
7	**Total**	**100**

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	50,000	50,000	50,000	50,000	50,000	2,50,000
2	Research, settling up wildlife alert cell within study area for information to Rescue	50,000	50,000	50,000	50,000	50,000	2,50,000

3	Rehabilitation, increasing awareness through posters and village group meetings	20,000	20,000	20,000	20,000	20,000	1,00,000
4	Maintenance of water tank within the plantation area and maintenance	50,000	50,000	50,000	50,000	50,000	2,50,000
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	50,000	50,000	50,000	50,000	50,000	2,50,000
7	Plantation in gaps	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000	10,00,000
8	Celebrations of World Environment Day (5th June,) in Schools and nearby villages	50,000	50,000	50,000	50,000	50,000	2,50,000
9	Environment Quiz to studies	25,000	25,000	25,000	25,000	25,000	1,25,000
10	Fire Protection Measures	25,000	25,000	25,000	25,000	25,000	1,25,000
	Total						**26,00,000**

SITE PHOTOGRAPHS


it is better to correct
an unsafe friend than
to bury one.

GREENBELT DEVLOPMENT