May, 2023

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

DHIRAULI COAL MINING OF 6.5 MTPA (5 MTPA OPEN CAST & 1.5 MTPA UNDERGROUND) CAPACITY OVER AN AREA OF 2672 HA.

VILLAGE: DHIRAULI, PHATPANI, SIRSWAH, AMDAND, JHALARI, AMRAIKHOH, BANSIBRIDHA, and BELWAR, TEHSIL – SARAI, DISTRICT- SINGRAULI, MADHYA PRADESH.

STUDY PERIOD: MARCH TO MAY, 2021 COLLECTED BY: VIMTA LABS LTD

[The proposed project is listed under Schedule 1 (a) Mining of Minerals under the Schedule of EIA Notification, 2006 and categorized as Category A]

PROJECT PROPONENT

M/s STRATATECH MINERAL RESOURCES PRIVATE LIMITED

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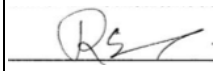
REVIEW AND REVISION HISTORY

History of revisions of the present report:

Table I: History of the Revisions

S. No.	Rev.	Date	Modifications	Remarks
1.	Rev. 00 Draft	24.02.2022	Draft EIA /EMP Report	Report has been prepared by team Vardan and all comments of reviewers have been incorporated in the Final EIA/EMP Report.
2	Rev. 01 Final	03.05.2023	Final EIA /EMP Report	

Table II: Record of Review

Rev.	Date	Description	Review-1	Approval
Rev.00Draft	24.02.2022	Draft EIA/EMP Report	Anshul Yadav	Mr. R.S. Yadav
Reb.01 Final	03.05.2023	Final EIA report	Anshul Yadav	Mr. R.S. Yadav
-	-	The EIA EMP report has been prepared by Mr. K M Khare (EIA coordinator) and assisted by other team members.		

This Report has been prepared by **Vardan EnviroNet** on behalf of and for the use of M/s Stratatech Mineral Resources Private Limited (SMRPL) with due consideration and skill as per our general terms and conditions of business and terms of agreement with M/s Stratatech Mineral Resources Private Limited (SMRPL).



DISCLAIMER

Vardan EnviroNet has taken all reasonable precautions in the preparation of this report as per its auditable quality plan. Vardan EnviroNet also believes that the facts presented in the report are accurate as on the date it was written. However, it is impossible to dismiss absolutely, the possibility of errors or omissions. Vardan EnviroNet therefore specifically disclaims any liability resulting from the use or application of the information contained in this report. The information is not intended to serve as legal advice related to the individual situation.

NABET ANNEXURE – VII

Declaration by Experts contributing in report preparation of M/s Stratatech Mineral Resources Private Limited (SMRPL) located at Singrauli district, Madhya Pradesh.

Declaration by Experts contributing:

I, hereby, certify that I was part of the EIA team in the following capacity that developed the above EIA.

EIA Co-ordinator:

Name : Mr. K.M.Khare

Signature & Date :

Period of involvement : **24.08.2021– Till date**

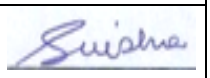
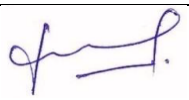
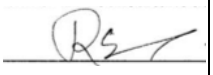
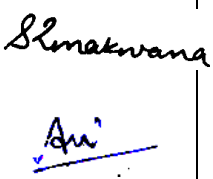
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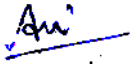
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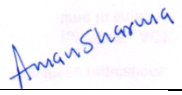
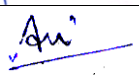
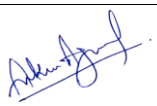
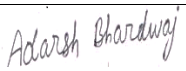
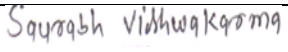
Functional Area Experts (FAEs):

S. No.	Functional Areas	Name of the Expert/s	Involvement	Signature & Date
1.	**AP**	Mr. K.M Khare	a) Identifying the sources of emissions and mitigation measures. b) Site-specific micro meteorology monitoring. c) Ambient Air Quality (AAQ) monitoring Impact predictions and mitigations. d) Impact Identification	
2.	**WP**	Mr. K.M Khare Ms. Avi (FAE – Cat. B)	a) selection of sampling locations b) Ground water quality monitoring and assessment, impacts on water environment and mitigations. c) Identification, characterization of effluent and treatments there of d) Water balance and conservation measures	

3.	**SHW**	Mr. Pawan Kumar Verma Ms. Avi (FAE B cat)	a) Identification of haz, solid w.g, and their disposal and mitigation measure. b) Recycling and disposal	
4.	**SE**	Ms. Shilpa Mishra	a) Determination of demographic profile including socio economy & livelihood b) Assessing the changes in socio economic pattern	
5.	**EB**	Mr. Niteesh Kumar	a) Biological environment status in respect of terrestrial fauna and aquatic eco system. b) Impact on ecological environment.	
6.	**HG/Geo**	Mr. R.S. Yadav	a) Ground water resource assessment. b) Impact on ground water potential and mitigation measures for avoiding ground water contamination.	
7.	**AQ**	Mrs. Surbhi Makhwana Ms. Avi (FAE - Cat. B)	a) Processing of site specific micro-meteorological data. b) Collection and use of data for modelling. c) Air dispersion modelling for prediction of GLCS due to PM10, S02 and Nox	
8.	**NV**	Mr. K.M Khare	a) Analysis of ambient noise quality data b) Impact due to plant noise and abatement measures	
9.	**LU**	Mr. Ankur Agarwal	a) Analysis of data related to land use pattern b) Land use map development. c) Impact on land environment in respect to land form change	
10.	**RH**	Ms. Ashwini Ganvir	a) Identification of hazardous prone areas b) Environment risk evaluation c) On-site and Off-site emergency planning	
11.	**SC**	Sameer Vilasrao Deshpande	a) Monitoring, analysis and characterization of soil. b) Assessment of impact on soil	

		TM- Ms. Avi	quality and mitigation measure.	

List of Team Members

Mr. Anshul Yadav	
Mr. Aman Sharma	
Ms. Avi	
Mr. Ankur Agarwal	
Mr. Adarsh Bhardwaj	
Mr. Saurabh Vishwakarma	

Declaration by the Head of the accredited consultant organization/ authorized person.

I, R.S. Yadav, hereby, confirm that the above mentioned mining case of coal block located at Dhirauli Coal Mining Project, Dhirauli village, Singrauli district, Madhya Pradesh.

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

I also confirm that I shall be fully accountable for any mis-leading information mentioned in this statement.

Name: **R.S.Yadav**



Signature

Designation: **Managing Director**

Name of the EIA Consultant Organization: Vardan EnviroNet, QCI/NABET Accredited Environment Consultancy

NABET Certificate No. & Issue Date: Certificate No. QCI/NABET/EIA/ 2023/SA0158, Valid up to 05.05.2023.

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COMPLIANCE TO TOR CONDITIONS

Point wise compliance of ToR issued by Ministry of Environment, Forest & Climate Change (MoEF&CC) vide letter J-11015/49/2021-IA. II (M) dated 03.08.2021.

ToR	Description	Compliance
	Additional Condition	
i.	Public Consultation, including public hearing, shall be conducted through concerned SPCB in the concerned districts as per the provisions/procedure contained in the EIA Notification, 2006 for information of the stakeholders about the present coal mining operations inviting comments and their redressal.	The public hearing for the proposed coal mine was held under Chairmanship of Shree D.P Barman, ADM, Singrauli at Senior secondary school Basi Bardah on 04.05.2022 at 11.00 AM as per the EIA Notification dated 14th September 2006, as amended on date by the Ministry of Environment Forest and Climate Change, New Delhi. Details of public hearing is incorporated in **Chapter 7, Section 7.2, Page no: 323.**
ii.	As suggested by EAC, no diversion of Hurdul source stream shall be allowed and the same shall be proposed in EIA Study with appropriate mining methods to recover the coal in river catchment so that biodiversity in the area by source stream could be maintained.	As per the Mining Plan and Mine Closure Plan of Dhirauli Coal Block approved by Ministry of Coal (MoC), Govt. of India, New Delhi, the Hurdul Nala diversion has been envisaged to extract coal by open cast mining method. A proposal was put forward to the EAC for Amendment of existing ToR for Diversion of Hurdul Nala which was subsequently approved by the committee and ToR amendment for Diversion of Nala was granted on 09.01.2023. The origin/ source of Hurdul Nala with map & drone photographs showing origin/ source falling outside block boundary of Dhirauli coal block & falling in the adjacent coal block i.e., Mara-II Mahan which is located at about approximately 1.2 km from boundary of Dhirauli Coal Block. The Nala diversion study has been carried out and same has approved by Chief Engineer Ganga Basin Rewa vide letter 2513/G/W/MP/1-48 of 22 dated 19.04.2022, the report is

		concluded as: The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of nonrenewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. Diversion of Hurdul nala is proposed from eastern side of block boundary (flowing northern side) which will join the Bardiya/Jharia Nala a tributary of Hurdul Nala. In this way complete external surface runoff will go into same Drainage Density System. A cost of Rupees Forty Crore Ninety-Three Lakhs Fifty Thousand Five Hundred & Eighteen Only for the diversion of nala and site levelling. **(Copy of the Report along with the approval letter is enclosed as Annexure-XVI)**.
iii.	Stage-I Forest Clearance for diversion for non-forestry activity shall be submitted.	Out of the total 2672 Ha Lease Area 1397.54 ha is Forest land (Reserve Forest Land: 1335.35 ha, Revenue Forest land:62.19 ha), Forest application for diversion of forest land is submitted vide proposal no. FP/MP/MIN/142344/2021 dated 08th June 2021, attached as **Annexure - IV**.
iv.	In addition to existing data already collected (if any). the Cumulative Impact Assessment Study, carrying capacity and ecosystem services study of the area shall be carried over by project proponent considering the project being in Singrauli, having ~ 1400 ha of forest land and presence of other coal mining activity and industries. PP shall collect one season baseline data of all environmental parameters and shall compare with the data of earlier data collected for cumulative assessment of area. Air pollution impact prediction shall be conducted by considering the maximum values.	Primary data for Baseline has been collected during pre-monsoon from March to May 2021, additionally one-season data i.e post monsoon (October to December 2021) has been collected as per ToR condition for cumulative impact assessment study, carrying capacity. Data has been compared and a Cumulative Impact Assessment Study report has been prepared by considering the maximum values, Report is attached as **Annexure XIV**. Carrying capacity and ecosystem services study of the area has

		also been prepared and attached as **Annexure XIII** and **Annexure XV** respectively.
v.	PP shall explore the possibilities of utilization of OB material for different purposes (in construction of roads, manufacture of artificial sand, aggregates, use for farmers etc.) and accordingly Plan shall be included in EIA/EMP Report.	Overburden from the mine will be utilized in the Reclamation work. Details of overburden are given in **Item no 2.9.4 in Chapter 2 Page no: 49,** of EIA/EMP report.
vi.	Inpit conveyor belt with silo loading should be proposed and installed for transportation of coal till railway siding. No transportation of coal by trucks/dumpers shall be proposed in EIA/EMP.	As Dhirauli Coal Block being a commercial block MSME & other consumers are to be catered the transportation of coal shall be carried through Road & Rail.
vii.	Wind rose pattern in the area should be reviewed and accordingly location of AAQMS shall be planned by the collection of air quality data. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area.	Wind rose pattern in the area has been reviewed and accordingly location of AAQMS has assesses in 10 km buffer zone for collection of air quality data. Monitoring location detail is given **Chapter 3, Section 3.4.4.1, page no: 79,** of EIA/EMP report**.**
viii.	Project proponent to prepare Environmental Cost Benefit Analysis for the project in EIA/EMP Report.	Environmental Cost Benefit analysis is incorporated in **Chapter 9,** of EIA/EMP report**.**
ix.	PP shall provide the details of mining technology/methodology proposed to be adopted for coal mining operations and its associated environmental benefits of using from Climate Change perspective.	Opencast mining is proposed by Surface miners for coal excavation and drill blast for OB. Underground mining is proposed by Continuous miner (CM) in scientific way using environment friendly technology. Detail of method of mining is given in **item no 2.4 in chapter 2** of EIA report.
x.	Detailed Social Impact Assessment shall be prepared in villages for Rehabilitation and Resettlement. R &R Activity shall be proposed with timeline and allotted fund.	Social Impact Assessment has been assessed & copy of the same has been enclosed as **Annexure-XII.** Land Acquisition is under progress, R&R Plan has been approved by the Joint Collector, Singrauli on 28.11.2022.
xi.	Permission for ground water withdrawal shall be obtained from Central Ground Water Authority (CGWA) only for mining activity.	PP has obtained the NOC from Central Ground Water Authority (CGWA) vide NOC no **CGWA/NOC/MIN/ORIG/2022/15765** which is valid from 15.06.2022 to 14.06.2024 copy is attached as **Annexure VI.**

xii.	Heavy metals including other parameters in surface water quality shall be analyzed and provided in EIA Report. Further, detailed mineralogical and chemical composition of the mineral and percentage of free silica from a NABL/MoEF&CC accredited laboratory.	Heavy metals including other parameters in surface water quality has been analyzed and incorporated in the **Chapter 3**. Mineralogical and chemical composition of the mineral and percentage of free silica has been assessed by Vimta Lab NABL/MoEF&CC accredited laboratory result for the same is attached as **Annexure VII-X.**
xiii.	PP shall be submitting R &R 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 programs prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government.	Social Impact Assessment has been assessed & copy of the same has been enclosed as **Annexure-XII.** Land Acquisition is under progress, R&R Plan has been approved by the Joint Collector, Singrauli on 28.11.2022.
xiv.	Inpit conveyor belt with silo loading should be proposed and installed for transportation of coal till railway siding. No transportation of coal by trucks/dumpers shall be proposed in EIA/EMP.	Transportation of the mineral for initial five years will be done by the trucks and after that In-pit conveyor belt with silo loading will be installed for transportation of coal till railway siding. As Dhirauli Coal Block being a commercial block MSME & other consumers are to be catered the transportation of coal shall be carried, Hence limited coal transportation may also be done through Road.
xv.	No mining activity shall be proposed on grazing land till the alternate land is provided of same area to the community.	The proposed project does not contain any grazing land however 4 ha alternate grazing land to be considered with in the proposed R & R Colony land area of 154 Ha.
xvi.	PP should clearly bring out that what is the specific diesel consumption ~ (Liters/Tonne of total excavation & mineral) and steps to be taken for reduction of the same. Year-wise target for reduction in the specific diesel consumption needs to be submitted.	Presently average specific diesel consumption per tonne of total excavation is 7 Litre/tonne of total excavation which has been planned to be reduced in next five years, gradually in a phased manner, year wise target for reduction in specific diesel consumption and measure steps to be taken for reduction is given in **Item no 10.3.3 Chapter 10, Page no: 476 of EIA/EMP report.**
xvii.	PP shall provide provision of integrated mine plan and mine reclamation cum land form land scape plan for both underground	Integrated mine plan and mine reclamation cum landform land scape plan for both underground and open cast coal mining

	and open cast coal mining projects. The plan must show the predicted post mining reclaimed and reformed surface by regarding and reshaping to reduce its height as close to the original surface level and proper sloping benching and terracing of external dup should be clearly brought out in the post mine closure plan. This would also include water management strategies such as surface water catchment and drainage paths etc. of post mining land surface.	projects has been approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021. **(Attached as Annexure III).** All required details are given in the mining plan.
xviii.	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of coal.	Project proponent will explore the technology and economic feasibility through LNG/CNG based mining machineries during operation phase of the project.
xix.	PP shall submit letter from Principal Chief Conservator of Forest, State Government that the area does not falls under any Eco-sensitive zone and areas and further is no corridor of Elephants & Tigers.	PP Has obtained the NOC from Principal Chief Conservator of Forest, Sidhi M.P vide letter no KRAMANK/MACHI./ 2022/3494 dated 20.05.2022 stating that there is no Eco-sensitive zone Elephants and Tigers corridor falls within the 10 km radius of the mine, approval copy is attached as **Annexure-XIX.**
Generic ToR for an opencast /UG coal mine project		
I.	An EIA-EMP Report should be prepared for a peak capacity of •• MTPA over an area of ... ha addressing the impacts of the underground coal mine project including the aspects of mineral transportation and issues of impacts on hydrogeology, plan for conservation of flora/fauna and afforestation/plantation programme based on the generic structure specified in Appendix III of the EIA Notification 2006. Baseline data collection can be for any season except monsoon.	Impacts and management plan for physical, biological & social Environment for 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground) of coal production with setting up of CHP planned with the system capacity as 850 TPH rated capacity and 935 TPH design capacity, is given in chapter-4 of EIA report. **Chapter 4** is completely based on impact & mitigation from **Page no: 215 – 302.** EIA/EMP report has been prepared as per generic structure specified in Appendix III of the EIA Notification, 2006 and subsequent amendments till date. The baseline data was collected during pre-monsoon season (March to May 2021). One season additional data was collected during post monsoon from Oct to Dec 2021 (which has been enclosed in CIA report).
II.	The EIA-EMP report should also cover the impacts and	EIA/EMP report has been prepared as per generic structure

	management plan for the project specific activities on the environment of the region, and the environmental quality - air, water, land, biotic community, etc. through collection of baseline data and information, generation of baseline data on Impacts for..... MTPA of coal production based on approval of project/Mining Plan.	specified in Appendix III of the EIA Notification, 2006 and subsequent amendments till date. EIA is containing impacts and management plan for the project specific activities on the environment of the region, and the environmental quality - air, water, land, biotic community, etc**.**
III.	A Study area map of the core zone and 10 km area of the buffer zone (15 km of the buffer zone in case of ecologically sensitive areas) delineating the major topographical features such as the land use, drainage, locations of habitats, major construction including railways, roads, pipelines, major industries/mines and other polluting sources, which shall also indicate the migratory corridors of fauna, if any and the areas where endangered fauna and plants of medicinal and economic importance are found in the area.	A Study area map of the core zone and 10 km area of the buffer zone delineating the major topographical features such as the land use, drainage, locations of habitats, major construction including railways, roads, pipelines, major industries/mines and other polluting sources, has been prepared and attached as **Figure 2.4 in Chapter 2 Page no: 25.** There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km of the mine lease. PP has obtained the NOC from Principal Chief Conservator of Forest M.P. vide letter no KRAMANK/V.Pra./MACHI./ Mine/6779 dated 14.09.2022 stating that there is No Eco-sensitive zone within the 10 KM radius letter for same is attached as **Annexure-XIX.**
IV.	Map showing the core zone along with 3-5 km of the buffer zone) delineating the agricultural land (irrigated and unirrigated, uncultivable land (as defined in the revenue records), forest areas (as per records) and grazing land and wasteland and water bodies should be provided.	Pre-mining land use of the core zone (inside the ML) is given in **Item no 2.15 of Chapter 2 Page no: 63,** of EIA/EMP report**.**
V.	Contour map at 3m interval along with Site plan of the mine (lease/project area with about 3-5 km of the buffer zone) showing the various surface structures such as buildings, infrastructure, CHP, ETP, Stockyard, township/colony (within/adjacent to the ML), green belt and undisturbed area and if any existing roads, drains/natural water bodies are to be left undisturbed along with details of natural drainage adjoining the lease/project and	Contour map at 3m interval along with Site plan of the mine showing the various surface structures such as buildings, infrastructure, CHP, ETP, Stockyard, (within/adjacent to the ML), green belt and undisturbed area etc. showing on the Plate which is mentioned in the **Fig 2.3 of Chapter-2 Page no: 24,** of EIA/EMP report**.**

<table>
<tr><td></td><td>modification of thereof in terms of construction of embankments/ bunds, proposed diversion/ rechanneling of the water courses, etc., highways, passing through the lease/project area.</td><td></td></tr>
<tr><td>VI.</td><td>Original land use (agricultural land/ forestland/ grazing and/wasteland/ water bodies) of the area. Impacts of project, if any on the land use, in particular, agricultural land/ forestland/grazing and/ water bodies falling within the lease/project and acquired for mining operations. Extent of area under surface rights and under mining rights.

<table>
<tr><th>S.N.</th><th>ML/Project Land use</th><th>Area under Surface Rights (Ha.)</th><th>Area under Rights (ha.)</th><th>Area Under Both (ha.)</th></tr>
<tr><td>1</td><td>Agricultural land</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Forest Land</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Grazing Land</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Settlements</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>Others (specify)</td><td></td><td></td><td></td></tr>
</table>

Area Under Surface Rights
<table>
<tr><td>S.no.</td><td>Details</td><td>Area (ha)</td></tr>
<tr><td>1</td><td>Buildings</td><td></td></tr>
<tr><td>2</td><td>Infrastructure</td><td></td></tr>
<tr><td>3</td><td>Roads</td><td></td></tr>
<tr><td>4</td><td>Others (specify)</td><td></td></tr>
<tr><td></td><td>TOTAL</td><td></td></tr>
</table></td><td>Impact of the project on the agricultural land/ forestland/grazing and/ water bodies etc. are given in the Para 4.5.1, Page no: 233 of Chapter 4, of EIA/EMP report.
During scrutiny and updation of land records at the time of notification of Section 19 of - Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. It has been observed that there are changes in revenue forest records and government land records henceforth land schedule has undergone change, however, there is no change in the total land area which was approved in the ToR granted by MoEF&CC vide letter J-11015/49/2021-IA-II(M)] on 03.08.2021. The revised land schedule is as below:

<table>
<tr><th colspan="3">REVISED LAND SCHEDULE</th></tr>
<tr><th>Ownership</th><th>Type of Land</th><th>Area, (Ha)</th></tr>
<tr><td>Tenancy Land</td><td>Private Land</td><td>553.540</td></tr>
<tr><td colspan="2">Sub Total</td><td>553.540</td></tr>
<tr><td rowspan="4">Govt Non-Forest Land</td><td>Grazing</td><td rowspan="4">720.92</td></tr>
<tr><td>Barren (Road)</td></tr>
<tr><td>Water bodies</td></tr>
<tr><td>Other</td></tr>
<tr><td colspan="2">Sub Total</td><td>720.92</td></tr>
</table></td></tr>
</table>

		<table><tr><td rowspan="2">Forest Land</td><td>Protected Forest land</td><td>1335.35</td></tr><tr><td>**Rev Forest (CJBJ)**</td><td>62.19</td></tr><tr><td>Free hold</td><td></td><td></td></tr><tr><td colspan="2">**Sub Total**</td><td>**1397.54**</td></tr><tr><td colspan="2">**Grand Total**</td><td>**2672.00**</td></tr></table>
VII.	Study on the existing flora and fauna in the study area carried out by an institution of relevant discipline and the list of flora and fauna duly authenticated separately for the core and buffer zone and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna. The flora and fauna details should be furnished separately for the core zone and buffer zone. The report and the list should be authenticated by the concerned institution carrying out the study and the names of the species scientific and common names) along with the classification under the Wild Life Protection Act, 1972 should be furnished.	There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km of the mine lease. PP has obtained the NOC from Principal Chief Conservator of Forest M.P. vide letter no KRAMANK/V.Pra./MACHI./ Mine/6779 dated 14.09.2022 stating that there is No Eco-sensitive zone within the 10 KM radius letter for same is attached as **Annexure-XIX.** The list of flora and fauna, separately for core and buffer zone is given in **Item no 3.6, Page no: 136 in Chapter 3,** of EIA/EMP report**.**
VIII.	Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working plan/scheme until end of mine life should be reflected on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps should also be included.	Geological map, progressive year has been given **in Fig-3.18 of Chapter-3** & stage-wise working plan are given in **Fig 2.11 to 2.13 of Chapter-2.** Mine Plan and Mine Closure Plan has been approved by MoC. Copy of the approval letter is enclosed as **Annexure III.**
IX.	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon should be provided.	Hurdul Nala passes through proposed mine area. Drainage and Catchment study of the nala has been carried out and copy attached as **Annexure XVI.**

X.	Collection of one-season (non-monsoon) primary baseline data on environmental quality - air ($PM_{10,}$ $PM_{2.5}$, SOx, NOx and heavy metals such as Hg, Pb, Cr, AS, etc), noise, water (surface and groundwater), soil along with one-season met data should be provided.	Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has been collected for March to May 2021 and compiled data is described in **Chapter 3, Item No 3.4, Page no: 74** primary data of Air, water quality, noise level and soil is attached as **Annexure VII-X.** Site specific meteorology data has been collected for March to May 2021 and the summary is incorporated in **Item no 3.4.1, Page no: 74, Chapter 3,** of EIA/EMP report**.**
XI.	Map of the study area (core and buffer zone) clearly delineating the location of various monitoring stations (air/water/soil and noise - each shown separately) superimposed with location of habitats, wind roses, other industries/ mines, polluting sources. The number and location of the stations should be selected on the basis of the proposed impacts in the downwind/downstream/groundwater regime. One station should be in the upwind/upstream/non-impact on-polluting area as a control station. Wind roses to determine air pollutant dispersion and impacts thereof shall be determined. Monitoring should be as per CPCB guidelines and standards for air, water, noise notified under Environment Protection Rules. Parameters for water testing for both ground and surface water should be as per ISI standards and CPCB classification of surface water wherever applicable.	Monitoring location map has been prepared and location of Air Monitoring stations was selected to represent the whole of the study area. The monitoring location selections criteria are given in the **Table no 3.5, Page no: 80 of Chapter 3,** of EIA/EMP report**.** During the selection of monitoring location sensitive receptor have also been considered and accordingly ambient air location no 8 i.e. Bansi is selected as sensitive location as the area is located near to the forest. Two monitoring location i.e. Chrwani (A6) and Bansi (A8) has been selected in the pre-dominant Downwind direction. Two monitoring location i.e Mine Site (A1) and Mine site (A2) is selected within the 500m radius of the lease area Mineralogical composition of PM_{10} particularly for Free silica is incorporated in **Table 3.11, Page no 86 of Chapter 3,** of EIA/EMP report**.**
XII.	Impact of mining and water abstraction and mine water discharge in mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term modeling studies on the impact of mining on the groundwater regime. Details of rainwater harvesting and measures for recharge of groundwater	Impact of mining and water abstraction and mine water discharge in mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term modeling studies on the impact of mining on the groundwater regime has been assessed and described in **Chapter 4**,

	should be reflected wherever the areas are declared dark/grey from groundwater development.	Hydrogeology study has also been carried out and study report is attached as **Annexure XI.**
XIII.	Study on subsidence, measures for mitigation/prevention of subsidence, modelling subsidence prediction and its use during mine operation, safety issues should be done.	Subsidence study has been carried out by IIT BHU (Varanasi) and report of the same is attached as **Annexure XVII.**
XIV.	Detailed water balance should be provided. The breakup of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the competent authority in the State Govt. and impacts vis-a-vis the competing users should be provided.	Water requirement for the project is 1936 cu.m/day. This will be met from Borewell / dewatering. A detail water backup indicating freshwater requirement is given in the **Table 2.13, Page no 61 of Chapter 2,** of EIA/EMP report**.**
XV.	Impact of choice of mining method, technology, selected use of machinery - and impact on air quality, mineral transportation, coal handling & Storage/stockyard, etc., Impact of blasting, noise and vibrations.	Technology and process description including method of work is given in **Chapter-2 of Para 2.9, Page no: 42.** Impact of selected technology in air quality & ground vibration is given in **Chapter 4**. Selection of mining method/ equipment to be used is given in **Chapter 2.**
XVI.	Impacts of mineral transportation - within and outside the lease/project. The entire sequence of mineral production, transportation, handling, transfer and storage of mineral and waste, and their impacts on air quality should be shown in a flow chart with the specific points where fugitive emissions can arise and the specific pollution control/mitigative measures proposed to be put in place. Examine the adequacy of roads existing in the area and if new roads are proposed, the impact of their construction and use particularly if forestland is used Efforts be made to reduce coal dust generation by truck loading through CHP and wagon loading through CHP/SILO to reduce air pollution.	Due to the mine project the traffic density will increase as the entire mineral will be transported through the Road 1 the value of LOS will change from Excellent to V good. Transportation of the mineral for initial five years will be done by the Trucks and after that In-pit conveyor belt with silo loading will be installed for transportation of coal till railway siding. Impacts of mineral transportation - within and outside the lease/project. The entire sequence of mineral production, transportation, handling, transfer and storage of mineral and waste, and their impacts on air quality is given in the impact matrix **Table 4.1, Page no: 219**, impact during construction phase showing in **Table 4.2, Page no: 220** and during operation

		phase showing in **Table: 4.3, Page no; 224,** of EIA/EMP report.
XVII.	Details of various facilities to be provided in terms of parking, rest areas, canteen, and effluents/pollution load resulting from these activities. Examine whether existing roads are adequate to take care of the additional load of mineral and their impacts.	It is proposed to construct the parking, rest areas, canteen, to the mine workers. Development of the existing road will be done for mineral transportation. Impacts details are mentioned in impact matrix **Table 4.1, Page no: 219**, impact during construction phase showing in **Table 4.2, Page no: 220** and during operation phase showing in **Table: 4.3, Page no; 224,** of EIA/EMP report**.**
XVIII.	Examine the number and efficiency of mobile/static water sprinkling system along the main mineral transportation road within the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality.	Fixed water sprinkler with adequate capacity will be provided along coal stock yard. Adequate no of pressurized water tanker will be used in haul road & mineral transportation road.
XIX.	Impacts of CHP, if any on air and water quality. A flow chart of water use and whether the unit can be made a zero-discharge unit.	Impact of CHP during construction phase showing in **Table no: 4.2, Page no: 220,** and during operation phase showing in **Table no: 4.3, Page no 224** in **Chapter 4** of EIA report. Proposed unit will work as zero discharge unit.
XX.	Conceptual Final Mine Closure Plan along with the fund requirement for the detailed activities proposed there under. Impacts of change in land use for mining operations and whether the land can be restored for agricultural use post mining.	Mining plan / Mine closure plan containing all the information of mine such as land use, impact on land use has been approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021 attached as **Annexure III.** Impacts of mining in land use during construction phase mentioned in **Section 4.4.1, Page no: 229** & impact during operation phase mentioned in **Section 4.5.1**, **Page no: 234 of Chapter-4,** of EIA/EMP report**.**
XXI.	Greenbelt development should be undertaken particularly around the transport route and CHP. Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	Proponent has proposed to plant 60,30,275 trees on 2412.11 Ha (2500 trees/Ha) area till the conceptual period of the mine with 90% survival rate. Plantation plan is incorporated in **Item no 4.14, Page no: 289 of Chapter 4**, of EIA/EMP report.
XXII.	Details of cost of EMP (capital and recurring) in the project cost and for final mine closure plan. The specific costs (capital and	The environment management cost is Rs. 1550 lakhs as a capital cost and Rs. 282 lakhs for recurring expenditure. Detail

	recurring) of each pollution Control /mitigative measures proposed in the project until end of mine life and a statement that this is included in the project cost.	of EMP is incorporated in **Table 10.7, Page no: 481 Chapter 10**, of EIA/EMP report.
XXIII.	Integrating in the Env. Management Plan with measures for minimizing use of natural resources- water, land, energy, raw materials/mineral, etc.	Environment management plan to mitigate the impact during construction phase showing in **Table 4.2, Page no: 220** and during operation phase showing in **Table: 4.3, Page no; 224,** of EIA/EMP report**.**
XXIV.	R&R: Detailed project specific R&R Plan with data on the existing socioeconomic status (including tribals, SC/ST) of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood Concerns/ employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan.	Social Impact Assessment has been assessed & copy of the same has been enclosed as **Annexure-XII.** Land Acquisition is under progress, R&R Plan has been approved by the Joint Collector, Singrauli on 28.11.2022.
XXV.	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project	As per Ministry's OM dated 30.09.2020, the Ministry has decided to deliberate on the commitments made by the project proponent. Hence, the commitments made by SMRPL to address the concerns raised during the Public Hearing of the proposed coal Mine held on 04.05.2022, are given in **Chapter-7** along with the detailed action plan and cost break-up. The total budget for the proposed activities to meet the commitments made by the PP in the public hearing to address the concern of stake holders is **Rs. 653 lakhs**.
XXVI.	Corporate Environment Responsibility: A. The Company must have a well laid down Environment Policy approved by the Board of Directors. B. The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/ deviation/violation of the environmental or forest norms/conditions. C. The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring	The proponent company is having a well laid down Environment Policy duly approved by its board of directors. Copy of the policy is given as **Figure 10.2, Page no: 480 in Chapter 10,** of EIA/EMP report**.** Infringement/deviation/violation of the environmental or forest norms/ conditions is also given in Chapter 10, of EIA/EMP report.

	compliance with the environmental clearance conditions must be furnished. D. To have proper checks and balances, the company should have a well laid down 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.	The hierarchical system or administrative order of the Company to deal with the environmental issues to comply the EC conditions is given in **Figure No 10.1, Page no: 477 of Chapter 10,** of EIA/EMP report**.** The system of reporting of non-compliances / violations of environmental norms is given at **Chapter 10,** of EIA/EMP report**.**
XVII.	Public Hearing should cover the details as specified in the EIA Notification 2006, and include notices issued in the newspaper, proceedings /minutes of public hearing, the points raised by the general public and commitments by the proponent made should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.	The public hearing for the proposed coal mine was held under Chairmanship of Shree D.P Barman, ADM, Singrauli at Senior Secondary School Basi Bardah on 04.05.2022 at 11.00 AM as per the EIA Notification dated 14th September 2006, as amended on date by the Ministry of Environment Forest and Climate Change, New Delhi. Action plan for the public hearing minutes is enclosed **Section 7.2.3, Page no: 325** in **Chapter 7** and Public Hearing minutes are attached as **Annexure – XVIII**
XVIII.	In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	Agreed & effort will be made as per the Approved mine closure plan.
XIX.	Status of any litigations/ court cases filed/pending in any Court/Tribunal on the project should be furnished.	There is no litigation, directions or any order passed by any Court of Law or pending against the project.
XXX.	Submission of sample test analysis of: Characteristics of coal - this includes grade of coal and other characteristics - ash, S and heavy metals including levels of Hg, As, Pb, Cr etc.	Characteristics of coal - this includes grade of coal and other characteristics is described in **Chapter 2**, of EIA/EMP report.
XXI.	Copy of clearances/approvals - such as Forestry clearances, Mining Plan Approval, NOC from Flood and Irrigation Dept. (if req.), etc. FORESTRY CLEARANCE: Details on the forest clearance the details should be given as per format.	Out of the total 2672 Ha Lease Area, 1397.54 ha is Forest land (Protected Forest Land: 1335.35 ha, Revenue Forest land: 62.19 ha), Forest application for diversion of 1397.54 ha of forest land submitted vide proposal no. FP/MP/MIN/142344/2021 dated 08th June 2021, attached as **Annexure IV.** Mining plan was approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021 attached as **Annexure-III.**

	<table><tr><td>Total ML/Project Area (ha)</td><td>Total Forest land (ha)</td><td>Date of FC</td><td>Extent of Forest land</td><td>Balance area for which FC is yet to be obtained</td><td>Status of appl. For diversion of forest land</td></tr><tr><td></td><td></td><td>If more than one, provide details of each FC</td><td></td><td></td><td></td></tr></table> Mining Plan/Project Approval: Date of Approval of Mining Plan/Project Approval: Copy of Letter of Approval of Mining Plan/Project Approval	<table><tr><td>Total ML/Project Area (ha)</td><td>Total Forest land (ha)</td><td>Date of FC</td><td>Extent of Forest land</td><td>Balance area for which FC is yet to be obtained</td><td>Status of appl. For diversion of forest land</td></tr><tr><td>2672</td><td>1397.54</td><td>Under Process</td><td>1397.54</td><td>1397.54</td><td>Under Process</td></tr></table>
Generic ToR for an Opencast coal mine project		
1.	An EIA-EMP Report shall be prepared for..... MTPA rated capacity in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Impacts and management plan for physical, biological & social Environment for 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground) of coal production with setting up of CHP planned with the system capacity as 850 TPH rated capacity and 935 TPH design capacity, based on approved Mining Plan is given in chapter-4. EIA-EMP Report has been prepared for 6.5 MTPA rated capacity in an ML/project area of 2672 ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.
2.	An EIA-EMP Report would be prepared for..... MTPA rated capacity to cover the impacts and management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on	EIA/EMP report has been prepared as per generic structure specified in Appendix III of the EIA Notification, 2006. EIA is contacting impacts and management plan for the project specific activities on the environment of the region, and the environmental quality - air, water, land, biotic community, etc.

	impacts including prediction modeling for..... MTPA of coal production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season except monsoon.	
3.	A map specifying locations of the State, District and Project location should be provided.	Location map of the project is attached in **Chapter 1 Figure 1.1, Page no: 6**, of EIA/EMP report.
4.	A Study area map of the core zone and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries/mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given.	A Study area map of the core zone and 10 km area of the buffer zone (15 km of the buffer zone in case of ecologically sensitive areas) delineating the major topographical features such as the land use, drainage, locations of habitats, major construction including railways, roads, pipelines, major industries/mines and other polluting sources, has been prepared and attached as **Figure 2.4, Page no: 25 in Chapter 2,** of EIA/EMP report**.** There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km of the mine lease. PP Has obtained the NOC from Principal Chief Conservator of Forest sidhi M.P vide letter no KRAMANK/MACHI./ 2022/3494 dated 20.05.2022 stating that there is no Eco-sensitive zone within 10 km radius of the mine, letter for same is attached as **Annexure-XIX.**
5.	Land use map (1: 50,000 scale) based on a recent satellite imagery of the study area may also be provided with explanatory note on the land use.	Land use detail of the area is given in **Item no 3.4.9, Page no: 116 in Chapter 3,** of EIA/EMP report. The land use/land cover pattern has been divided into 7 classes as follows: (i), Industry. (ii) Forest, (iii) Built up, (iv), Agriculture Land, (v) Open Scrub (vi), Waste Land, (vii) Water body. The given categories of land use and land cover pattern covers an area of about 59626 Ha. Impact of the project on the agricultural land/ forestland/grazing and/ water bodies etc. are given in the Chapter 4 of the EIA report.
6.	Map showing the core zone delineating the agricultural land	Land use detail of the area is given in **Item no 3.4.9, Page no:**

	(irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	**116 in Chapter 3,** of EIA/EMP report. The land use/land cover pattern has been divided into 7 classes as follows: ((I), Industry. (ii) Forest, (iii) Built up, (iv), Agriculture Land, (v) Open Scrub (vi), Waste Land, (vii) Water body. The given categories of land use and land cover pattern covers an area of about 59626 Ha.
7.	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) is attached as **Annexure XX**.
8.	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, CHP, ETP, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of the water courses, etc., approach roads, major haul roads, etc. should be indicated.	Site plan of the mine showing the various surface structures such as buildings, infrastructure, CHP, ETP, Stockyard, (within/adjacent to the ML), green belt and undisturbed area etc. showing on the Plate which is shown in **Fig-2.3, Page no: 24 of Chapter-2,** of EIA/EMP report**.**
9.	In case of any proposed diversion of nallah/canal/river, the proposed route of diversion /modification of drainage and their realignment, construction of embankment etc. should also be shown on the map as per the approval of Irrigation and flood control Department of the concerned state.	The Nala diversion study has been carried out and same has approved by Chief Engineer Ganga Basin Rewa vide letter 2513/G/W/MP/1-48 of 22 dated 19.04.2022, the report is concluded as: The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of nonrenewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. Diversion of Hurdul nala is proposed from eastern side of block boundary (flowing northern side) which will join the

<table>
<tr><td></td><td></td><td>Bardiya/Jharia Nala a tributary of Hurdul Nala. In this way complete external surface runoff will go into same Drainage density system.
A cost of Rupees Forty Crore Ninety-Three Lakhs Fifty Thousand Five Hundred & Eighteen Only for the diversion of nala and site levelling. (Copy of the Report along with the approval letter is enclosed as Annexure-XVI).</td></tr>
<tr><td>10.</td><td>Similarly if the project involves diversion of any road/railway line passing through the ML/project area, the proposed route of diversion and its realignment should be shown in the map.</td><td>None.</td></tr>
<tr><td>11.</td><td>Break up of lease/project area as per different land uses and their stage of acquisition should be provided.
LANDUSE DETAILS FOR OPENCAST PROJECT should be given as per the following table:
<table>
<tr><th>S.N</th><th>land use</th><th>Within ML Area (ha)</th><th>Outside ML Area (ha)</th><th>TOTAL</th></tr>
<tr><td>1</td><td>Agricultural Land</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Forest land</td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Wasteland</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Grazing land</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>Surface water bodies</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>Settlements</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>Others (specify)</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Total</td><td></td><td></td><td></td></tr>
</table></td><td>Pre-mining land use of the core zone (inside the ML) is given in Item no 2.15, Page no: 63 of Chapter 2, of EIA/EMP report.

During scrutiny and updation of land records at the time of notification of Section 19 of - Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. It has been observed that there are changes in revenue forest records and government land records henceforth land schedule has undergone change, however, there is no change in the total land area which was approved in the ToR granted by MoEF&CC vide letter J-11015/49/2021-IA-II(M)] on 03.08.2021. The revised land schedule is as below:

<table>
<tr><th colspan="3">REVISED LAND SCHEDULE</th></tr>
<tr><th>Ownership</th><th>Type of Land</th><th>Area, (Ha)</th></tr>
<tr><td>Tenancy Land</td><td>Private Land</td><td>553.540</td></tr>
<tr><td colspan="2">Sub Total</td><td>553.540</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="4">Govt Non-Forest Land</td><td>Grazing</td><td rowspan="4">720.92</td></tr>
<tr><td>Barren (Road)</td></tr>
<tr><td>Water bodies</td></tr>
<tr><td>Other</td></tr>
<tr><td colspan="2">Sub Total</td><td>720.92</td></tr>
<tr><td rowspan="2">Forest Land</td><td>Protected Forest land</td><td>1335.35</td></tr>
<tr><td>Rev Forest (CJBJ)</td><td>62.19</td></tr>
<tr><td>Free hold</td><td></td><td></td></tr>
<tr><td colspan="2">Sub Total</td><td>1397.54</td></tr>
<tr><td colspan="2">Grand Total</td><td>2672.00</td></tr>
</table>
</td></tr>
<tr><td>12.</td><td>Break-up of lease/project area as per mining operations should be provided.</td><td>Pre-mining land use of the core zone (inside the ML) is given in Item no 2.15, Page no 63 of Chapter 2, of EIA/EMP report.</td></tr>
<tr><td>13.</td><td>Impact of changes in the land use due to the project, if much of the land being acquired is predominantly agricultural land/forestland/grazing land.</td><td>Impact of the project on the agricultural land/ forestland/grazing and/ water bodies etc during construction phase are given in Section 4.4, Page no: 229 & during operation phase given in Section 4.5, Page no: 234 of Chapter 4 of the EIA report.</td></tr>
<tr><td>14.</td><td>One-season (non-monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided.</td><td>Primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has been collected for March to May 2021 and compiled data is described in Chapter 3, Item No 3.4 dated wise primary data of Air, water quality, noise level and soil is attached as Annexure VII-X.
Site specific meteorology data has been collected for March to May 2021 and the summary is incorporated in Item no 3.4.1. Page no 74 of Chapter 3 of EIA report, of EIA/EMP report.</td></tr>
<tr><td>15.</td><td>Map of the study area (1: 50, 000 scale) (core and buffer zone clearly delineating the location of various sampling stations</td><td>Monitoring location map has been prepared and location of Air Monitoring stations was selected to represent the whole of the</td></tr>
</table>

	superimposed with location of habitats, other industries/mines, polluting sources should be provided. The number and location of the stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Values should be provided based on desirable limits.	study area. The monitoring location selections criteria are given in the **Table no 3.5, Page no: 80 of Chapter 3**. During the selection of monitoring location sensitive receptor have also been considered and accordingly ambient air location no 8 i.e. Bansi is selected as sensitive location as the area is located near to the forest. Two monitoring location i.e. Chrwani (A6) and Bansi (A8) has been selected in the pre-dominant Downwind direction. Two monitoring location i.e Mine Site (A1) and Mine site (A2) is selected within the 500 m radius of the lease area Mineralogical composition of PM_{10} particularly for Free silica is incorporated in **Table 3.11, page no: 86 of Chapter 3.**
16.	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I fauna, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan should be prepared and submitted with EIA-EMP Report; and comments from the CWLW of the State Govt. should also be obtained and furnished.	There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km of the mine lease. PP has obtained the NOC from Principal Chief Conservator of Forest Sidhi M.P vide letter no KRAMANK/MACHI./ 2022/3494 dated 20.05.2022 same is attached as **Annexure-XIX.** The list of flora and fauna, separately for core and buffer zone is given in **Item no 3.6, Page no: 136, in Chapter 3,** of EIA/EMP report**.** Comprehensive Conservation Plan has been prepared and approved by PCCF (WL), MP on 24.11.2022.
17.	Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also	Geological map, progressive year working plan are enclosed as **Plate No. 2, and 3** respectively**.** Mine Plan and Mine Closure Plan has been approved by MoC. Copy of the approval letter is enclosed as **Annexure III.**

	be shown in figures.	
18.	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	Technology and process description including method of work is enclosed as **Clause 2.9, Page no: 42, of Chapter – 2,** of EIA/EMP report**.**
19.	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	Hurdul nala along with its tributary covers an area of 2.4 sq km out of 20.96 sq km of quarry area. Mining is proposed as single quarry operation which is the only feasible option to operate this block as opencast mining. Total 186 Mt coal extraction is estimated in single quarry (20.96 sq.km). The diversion is planned in such a way that Hurdul nala sanctity will be intact without affecting the flora and fauna. Detailed Hydrology & Nala diversion study has been undertaken to plan the scientific diversion of the Nala (Copy of the Report enclosed as **Annexure-XVI**).
20.	Detailed water balance should be provided. The break-up of water requirement for the various mine operations should be given separately.	Water requirement for the project is 1936 cu.m. per day which will be met from Borewell/ dewatering. A detailed breakup for water usage indicating fresh water requirement is given in the **Table 2.13, page no: 61 of Chapter 2,** of EIA/EMP report**.**
21.	Source of water for use in mine, sanction of the competent authority in the State Govt. and impacts vis-à-vis the competing users should be given.	Water requirement for the project is 1936 cu.m. per day which will be met from Borewell/ dewatering. A detailed breakup for water usage indicating fresh water requirement is given in the **Table 2.13, page no: 61 of Chapter 2,** of EIA/EMP report**.**
22.	Impact of mining and water abstraction use in mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.	Impact of mining and water abstraction and mine water discharge in mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term modeling studies on the impact of mining on the groundwater regime has been assessed and report of the same is attached as **Annexure XI.**

23.	Impact of blasting, noise and vibrations should be given.	Impact of Blasting noise and vibration, along with the mitigation measures are given in **Chapter 4** of EIA report.
24.	Impacts of mining on the AAQ and predictions based on modeling using the ISCST-3 (Revised) or latest model should be provided.	The AERMOD model (9.5.0 Version) has been setup and run for study period (3 months) to find out the cumulative maximum ground level concentration from the different activities in the mining areas.
25.	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop, management plan for maintenance of HEMM, machinery, equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating. From these activities should also be provided.	Impacts of mineral transportation - within and outside the lease/project. The entire sequence of mineral production, transportation, handling, transfer and storage of mineral and waste, and their impacts on air quality is given in the impact matrix **Table 4.1, Page no: 219**, impact during construction phase showing in **Table 4.2, Page no: 220** and during operation phase showing in **Table: 4.3, Page no; 224** of EIA/EMP report**.** Due to the mine project the traffic density will increase as the entire mineral will be transported through the Road 1 the value of LOS will change from Excellent to Very Good.
26.	Effort be made to reduce/eliminate road transport of coal inside and outside mine and for mechanized loading of coal through CHP/ Silo entirely wagons and into trucks/tippers.	Transportation of the mineral for initial five years will be done by the trucks and after that In pit conveyor belt with silo loading will be installed for transportation of coal till railway siding. As Dhirauli Coal Block being a commercial block MSME & other consumers are to be catered the transportation of coal shall be carried, hence a limited coal transportation may also be done through Road.
27.	Details of waste OB and topsoil generated as per the approved calendar programme, and their management shown in figures as well explanatory notes tables giving progressive development and mine closure plan, green belt development, backfilling programme and conceptual post mining land use should be given. OB dump heights and terracing based on slope stability studies with a max of 28o angle as the ultimate slope should be given. Sections of final dumps (both longitudinal and cross section) with relation to the	Overburden from the mine will be utilized in the Reclamation work. The top soil would be spread over the reclaimed land, afterward. Details of overburden is given in **Item no 2.9.4, Page no: 49** in **Chapter 2,** of EIA/EMP report.

<table>
<tr><td></td><td>adjacent area should be shown.</td><td></td></tr>
<tr><td>28.</td><td>Efforts be made for maximizing progressive internal dumping of O.B., sequential mining, external dump on coal bearing area and later rehandling into the mine void to reduce land degradation.</td><td>Agreed</td></tr>
<tr><td>29.</td><td>Impact of change in land use from mining operations and whether the land can be restored to agriculture use post mining.</td><td>Integrated mine plan and mine reclamation cum land form land scape plan for both underground and open cast coal mining projects and approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021 (Attached as Annexure III).
All required details are given in the Mining Plan.
Impacts & mining in land use during construction phase mentioned in Section 4.4.1, Page no: 229 & impact during operation phase mentioned in Section 4.5.1, Page no: 234 of Chapter-4, of EIA/EMP report.</td></tr>
<tr><td>30.</td><td>Progressive Green belt and ecological restoration /afforestation plan (both in text, figures and in the tabular form as per the format of MOEF&CC given below) and selection of species (native) based on original survey/landuse should be given.
Table 1: Stage-wise Landuse and Reclamation Area (ha)
<table>
<tr><td>S.No</td><td>Land use Category</td><td>Present (5th Year)</td><td>5th Year</td><td>10th Year</td><td>20th Year</td><td>24 th Year (end of the mine life)</td></tr>
<tr><td>1</td><td>Backfilled Area(Reclaimed with plantation)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Excavated Area (not reclaimed) /void</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>External OB dump</td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>Proponent has proposed to plant 60,30,275 trees on 2412.11 Ha (2500 trees/Ha) area till the conceptual period of the mine with 90% survival rate on:
Plantation plan is incorporated in Item no, 4.14 Page no 289 of Chapter 4, of EIA/EMP report.
Table - Land Degradation and Technical Reclamation
<table>
<tr><th colspan="9">Land Degradation and Technical Reclamation</th></tr>
<tr><th></th><th></th><th colspan="2">Land Degraded</th><th></th><th></th><th>Technically Reclaimed Area</th><th></th><th></th></tr>
<tr><th>Ye</th><th>Exca</th><th>Dum</th><th>Infr</th><th>Tot</th><th>Bac</th><th>Dum</th><th>Oth</th><th>Total</th></tr>
</table></td></tr>
</table>

	Reclaimed with plantation)					
4	Reclaimed Top soil dump					
5	Green Built Area					
6	Undisturbed area (brought under plantation)					
7	Roads (avenue plantation)					
8	Area around buildings and Infrastructure					
	Total					

Table 2: Stage-wise Cumulative Plantation

S. N	YEAR*	Green Belt		External Dump		Backfilled Area		Others (Undisturbed/ Area)	Tota
		Area (ha.)	No. of trees	Area (ha.)	No. of trees	Area (ha.)	No. of trees	Area (ha.)	No. of trees
1	1st year								
2	3rd year								
3	5th year								
4	10th year								
5	15th year								
6	20th year								
7	25th year								
8	30th year								
9	34th								

ar	v area	p (Ext +top soil)	a /Others	al	kfill	p (Extn + Topsoil)	er	
Y-01	57.21	163.34	141.06	361.61	-	-	8.2	8.2
Y-03	173.92	355.54	141.06	670.53	-	-	11.26	11.26
Y-05	323.79	548.15	141.06	1013	-	-	53.7	53.7
Y-10	536.33	274.34	141.06	951.73	343.12	200.45	78.74	622.31
Y-15	764.83	330.94	141.06	1236.84	519.75	250.76	78.74	849.25
Y-20	993.34	387.55	141.06	1521.95	664.33	330.94	78.74	1074.01
Y-25	1251.42	387.55	141.06	1780.03	771.97	387.55	78.74	1238.26
Y-30	1509.5	387.55	141.06	2038.1	931.35	387.55	78.74	1397.64
Y-35	1826.42	387.55	141.06	2355.03	1135.27	387.55	78.74	1601.56

	year (end of mine life)								
10	34-37th Year (Post-mining)								

Y-40	2096.59	387.55	187.86	2672	1596.23	387.55	115.24	2099.02
Y-45	2096.59	387.55	187.86	2672	1843.03	387.55	181.53	2412.11

Table - Biological Reclaimed Area (Ha)

			Biological Reclaimed Area (Ha)					
Year	**Agri**	**Plantation**	**Water Body**	**Public /Company Use**	**Total**	**Forest Land (Return)**	**Undisturbed / to be left for Public /com use**	**Total**
Y-01	-	-	2.2	-	2.2	-	-	-
Y-03	-	-	2.2	4.13	6.33	-	4.13	4.13
Y-05	-	-	2.2	4.13	6.33	-	4.13	4.13
Y-10	-	543.57	2.2	4.13	549.9	543.5	4.13	547.7

							7		
Y-15	-	770.51	2.2	4.13	7768.84	7705.51	4.13	7746.44
Y-20	-	995.28	2.2	4.13	10001.66	9952.68	4.13	9991.41
Y-25	-	1159.52	2.2	4.13	11765.85	11959.52	4.13	11763.65
Y-30	-	1318.9	2.2	4.13	13325.23	13118.9	4.13	13123.03
Y-35	-	1522.81	2.2	4.13	15329.14	15122.81	4.13	15126.94
Y-40	-	1729.35	2.2	4.13	17335.69	17129.35	4.13	17133.49
Y-45	-	2412.11	255.76	4.13	2672	2412.11	4.13	2416.29

31.	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the status pre- mining should be provided. A Plan for the ecological restoration of the mined out area and post mining land use should be prepared with detailed cost	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the status pre- mining is described in **Item 4.15, Page no: 294 of Chapter 4,** of EIA/EMP report.

provisions. Impact and management of wastes and issues of rehandling (wherever applicable) and backfilling and progressive mine closure and reclamation should be detailed.

Table 3: Post-Mining Land use Pattern of ML/Project Area (ha)

S. N	Land use during Mining	Land Use (ha)				
1	External OB Dump	Plantation	Water Body	Public Use	Undisturbed	TOTAL
2	Top soil Dump					
3	Excavation					
4	Roads					
5	Built up area					
6	Green Belt					
7	Undisturbed Area					
	Total					

Mining Activity	Proposed Land Use	Land Use (End of Life)	Agriculture Land	Plantation	Water Body	Public Use	Forest land (Returned)	Undisturbed	Total
Excavation Area	2,096.59	2,096.59	-	1,843.03		-	19403.03	-	1843.03
Backfilled Area (in Excavation Area	1,796.23	1,796.23	-	1,843.03	-	-	18743.03	-	1843.03
Excavated Void (in Excavation Area)	300.36	300.36	-	-	253.56	-	-	-	253.56
Topsoil Dump	35.34 (Upto 5th Year)	35.34 (Upto 5th Year)	-	-	-	-	-	-	0.00
External Dump	387.55	387.55	-	387.55	-	-	387	-	387.55

		Safety Zone	19.73	19.73	-	19.73	-	-	19.73	-	19.73
		Haul Road between quarries	-	-	-	-	-	-	-	-	0.00
		Road diversion	4.13	4.13	-	-	-	4.13	-	-	40.13
		Settling pond	2.20	2.20	-	-	2.20	-	-	-	2.20
		Road & Infrastructure area	20.80	20.80	-	20.80	-	-	20.80	-	20.80
		CHP & Washery	8.10	8.10	-	8.10	-	-	8.10	-	8.10
		Coal Evacuation Route & Approach Road	1.15	1.15	-	1.15	-	-	1.15	-	1.15
		Garland drains	5.34	5.34	-	5.34	-	-	5.34	-	5.34
		Embankment	7.50	7.50	-	7.50	-	-	7.50	-	7.50
		Green Belt	46.80	46.80	-	46.80	-	-	46.80	-	46.80
		Water Reservoir	-	-	-	-	-	-	-	-	0.00-

		Rationalization area: 72.11 | 72.11 | - | 72.11 | - | - | 72.11 | - | 72.11 **Total (exclude back filled void & Topsoil area): 2672.00 | 2672.00 | - | 2412.111 | 255.76 | 4.13 | 2412.11 | - | 2672.00**
32.	Flow chart of water balance should be provided. Treatment of effluents from workshop, township, domestic wastewater, mine water discharge, etc. should be provided. Details of STP in colony and ETP in mine should be given. Recycling of water to the max. possible extent should be accorded.	Water requirement for the project is 1936 cu.m. which will be met from Borewell/dewatering. A detail water balance indicating freshwater requirement is given in the **Table 2.13, Page no: 61 of Chapter 2** of EIA/EMP report**.** Domestic waste water will be treated in the septic tank / STP and waste from the workshop will be treated in proposed ETP.
33.	Occupational health issues. Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower in the mine should be given.	Details on Occupational health issues have been incorporated in **Chapter 7**, of EIA/EMP report.
34.	Risk Assessment and Disaster Preparedness and Management Plan should be provided.	Risk Assessment and Disaster Preparedness and Management has been prepared and provided in **Item 7.3, Page no: 413 of Chapter 7**, of EIA/EMP report.
35.	Integration of the Env. Management Plan with measures for minimising use of natural resources - water, land, energy, etc. should be carried out.	Environment management plan is described in **Table no 10.7, Page no: 481** of **Chapter 10**, of EIA/EMP report.
36.	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	The environment management cost is Rs. 1550 lakhs as a capital cost and Rs. 282 lakhs for recurring expenditure . Detail

		of EMP is incorporated in **Table no 10.7, Page no: 481** of **Chapter 10**, of EIA/EMP report.
37.	Details of R&R. Detailed project specific R&R Plan with data on the existing socio-economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc. and costs along with the schedule of the implementation of the R&R Plan should be given.	Social Impact Assessment has been assessed & copy of the same has been enclosed as **Annexure-XII.** Land Acquisition is under progress, R&R Plan has been approved by the Joint Collector, Singrauli on 28.11.2022.
38.	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.	As per Ministry's OM dated 31.09.2020, the Ministry has decided to deliberate on the commitments made by the project proponent. Hence, the commitments made by SMRPL to address the concerns raised during the Public Hearing of the proposed coal Mine held on 04.05.2022, are given in Chapter-7 along with the detailed action plan and cost break-up. The total budget for the proposed activities to meet the commitments made by the PP in the public hearing to address the concern of stake holders is Rs. 653 lakhs.
39.	Corporate Environment Responsibility: a) The Company must have a well laid down Environment Policy approved by the Board of Directors. b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions. c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished. d) To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company	The proponent company is having a well laid down Environment Policy duly approved by its board of directors. Copy of the policy is given as **Figure 10.2, Page no: 480** in **Chapter 10,** of EIA/EMP report**.** Infringement/deviation/violation of the environmental or forest norms/ conditions is also given in **Chapter 10**. The hierarchical system or administrative order of the Company to deal with the environmental issues to comply the EC conditions is given in **Figure No 10.1, Page no: 471, of Chapter 10,** of EIA/EMP report**.** The system of reporting of non-compliances/ violations of environmental norms is given at **Chapter 10** of EIA/EMP report**.**

	and/or shareholders or stakeholders at large.	
40.	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of public hearing, the points raised by the general public and commitments made by the proponent and the action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.	The public hearing for the proposed coal mine was held under Chairmanship of Shree D.P Barman, ADM, Singrauli at Senior secondary school Basi Bardah on 04.05.2022 at 11.00 AM as per the EIA Notification dated 14th September 2006, as amended on date by the Ministry of Environment Forest and Climate Change, New Delhi. Details of public hearing is incorporated in **Chapter 7, Section 7.2, page no: 323,** of EIA/EMP report. Action plan for the public hearing minutes is enclosed **Section 7.2.3, Page no: 325** in **Chapter 7** and Public Hearing minutes are attached as **Annexure - XVIII**
41.	In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	Agreed & effort should be made as per the Approved Mine Closure Plan.
42.	Status of any litigations/ court cases filed/pending on the project should be provided.	There is no litigation, directions or any order passed by any Court of Law or pending against the project.
43.	Submission of sample test analysis of Characteristics of coal: This should include details on grade of coal and other characteristics such as ash content, S and heavy metals including levels of Hg, As, Pb, Cr etc.	Coal Quality has been mentioned as part of approved Mining Plan enclosed as **Annexure-III.**

<table>
<tr>
<td>44.</td>
<td>Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable FORESTRY CLEARANCE:
Details on the Forest Clearance should be given as per the format given:
<table>
<tr><td>Total ML/Project Area (ha)</td><td>Total Forest land (ha)</td><td>Date of FC</td><td>Extent of Forest land</td><td>Balance area for which FC is yet to be obtained</td><td>Status of appl. For diversion of forest land</td></tr>
<tr><td></td><td></td><td>If more than one, provide details of each FC</td><td></td><td></td><td></td></tr>
</table>
</td>
<td>Out of the total 2672 Ha Lease Area,1397.54 ha is Forest land (Protected Forest Land: 1335.35 ha, Revenue Forest land:62.19 ha), Forest application for diversion of forest land is submitted vide proposal no. FP/MP/MIN/142344/2021 dated 08th June 2021, attached as Annexure IV.

Mining plan was approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021 attached as Annexure-III.</td>
</tr>
</table>

General conditions		
I	All documents should be properly indexed, page numbered	**Complied**
II	Period/date of data collection should be clearly indicated	**Complied**
III	Authenticated English translation of all material provided in regional languages.	**Complied**
IV	After the preparation of the draft EIA-EMP Report as per the aforesaid TOR, the proponent shall get the Public Hearing conducted as prescribed in the EIA Notification 2006 and take necessary action for obtaining environmental clearance under the provisions of the EIA Notification 2006	**Agreed**
V	The letter/application for EC should quote the Ministry's file No. and also attach a copy of the letter prescribing the ToR.	**Provided**
VI	The copy of the letter received from the Ministry on the ToR prescribed for the project should be attached as an annexure to the final EIA-EMP Report.	**Enclosed**
VII	General Instructions for the preparation and presentation before the EAC of ToR/EC projects of Coal Sector should be incorporated/followed	**Followed**

ToR	Description	Compliance
	Amendment Condition	

Point wise compliance of Amendment to ToR issued by Ministry of Environment, Forest & Climate Change (MoEF&CC) vide letter J-11015/49/2021-IA. II(M) dated 09.01.2022.

i.	PP may divert the Hurdul stream after taking all possible precautions in order to catch natural flow of water so that biodiversity in the area could be maintained.	Study for Hurdul Nala diversion has been carried out and same has approved by Chief Engineer Ganga Basin Rewa vide letter 2513/G/W/MP/1-48 of 22 dated 19.04.2022, the report is concluded as: The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of non-renewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. The Hydrological study for estimation of peak flood runoff for Hurdul nala watershed inclusive micro watershed of external area of mine has been also studied. The Hydrological study concludes that peak flood runoff of Hurdul watershed (134 km^2) is 702m^3/sec whereas, for external watershed it is 35m3/sec which is 5% of peak flood of Hurdul watershed. The design storm flood runoff considering 2.5 times safety factor amounts to 88m^3/sec. The nala diversion trench has been designed using manning's equation. Diversion of Hurdul Nala is proposed from eastern side of block boundary (flowing northern side) which will join the Bardiya/Jharia Nala a tributary of Hurdul Nala. In this way complete external surface runoff will go into same Drainage density system. A cost of Rupees Forty Crore Ninety Three Lakhs Fifty Thousand Five Hundred & Eighteen Only for the diversion of nala and site levelling. (Copy of the Report along with the approval letter is enclosed as **Annexure-XVI).**
ii.	PP shall not divert the north eastern stream (Berdiya/Jharia Stream) and leave 100 mts of width on both side for safety embankment and dense tree plantation.	No diversion of the north eastern stream (Berdiya/Jharia Stream) will be done and a width of 100 meters shall be left on both the sides for safety embankment and dense tree plantation.

iii.	PP shall implement the Report on Hydrology prepared by Srushti Seva Private Limited for completion of the diversion of Hurdul Stream.	Agreed
iv.	PP shall plan the greenbelt development all along the mining boundary as well as on the diverted route of nallah.	Project Proponent has proposed to plant 60,30,275 trees on 2412.11 Ha (2500 trees/Ha) area till the conceptual period of the mine with 90% survival rate. Plantation plan is incorporated in **Item no 4.14, page no: 289 of Chapter 4,** of EIA/EMP report.
5.	All other conditions stipulated in ToR granted vide Letter No. F No. J-11015/49/2021-IA-II(M) dated 03.08.2021 shall remain unchanged.	Agreed

1. INTRODUCTION

1.1 INTRODUCTION

M/s Stratatech Mineral Resources Private Limited (SMRPL), is a private company wholly owned by the **Adani Enterprises Limited (AEL).** The total coal production from this mine has been proposed as **5 MTPA** from Open cast mine and **1.5 MTPA** from Underground mine with setting up of CHP planned with the system capacity as 850 TPH rated capacity and 935 TPH design capacity, keeping the peak production capacity in mind located at Singrauli Coalfield, Singrauli District, Madhya Pradesh.

Dhirauli Coal Block in Singrauli Coalfield has been allocated to **M/s Stratatech Mineral Resource Private Limited (SMRPL)** vide Letter No. **NA-104/7/2020-NA** dated **03.03.2021** by Ministry of Coal, Government of India for the purpose of sale of coal including sale to affiliate and related parties, utilization of coal for any purpose including but not limited to captive consumption, coal gasification, coal liquification and export of coal. The ultimate target production capacity is estimated as 6.5 MTPA (OC-5 MTPA; UG-1.5 MTPA) from Dhirauli Coal Mine. The production build up has been planned in such a way that it will meet the requirement peak production of 5.0 MTPA of Opencast in the 3rd year of mine operation.

1.2 PURPOSE OF THE REPORT

The proposed project is listed under activities **1(a) Mining of Minerals** under the Schedule of EIA Notification, 2006 and categorized as **Category-A**. As per the notification, the projects necessitate prior environmental clearance from Ministry of Environment Forest & Climate Change. Hence, the company has followed due course of procedure for obtaining Environmental Clearance. As a part of the procedure, application to MOEF&CC for obtaining Terms of References (TOR) for conducting the EIA study was submitted online vide proposal no. **IA/MP/MIN/214743 /2021** on 25.06.2021. The proposal was considered in the 15th EAC (Coal Mining) meeting held on 06.07.2021, wherein the ToR for the project was recommended.

Terms of References (ToR) for the project was granted by Ministry of Environment, Forest & Climate Change (MoEF&CC) vide letter **J-11015/49/2021-IA-II(M)]** dated 03.08.2021 and Amendment of ToR, vide letter no - J-11015/49/2021-IA.II(M) dated – 09.01.2023 which is attached as **Annexure – I**.The EIA/EMP Report has been prepared as per the Terms of References (ToR) after collection of baseline data (pre-monsoon season-March to May 2021). The objective of the EIA study report is to take stock of the prevailing status of the environment, assess the impacts of

proposed proposal on environment and to plan appropriate environment management plan to minimize the adverse impacts. The following major objectives have been kept in view:

- Assessment of the existing status of environment.
- Assessment of the impacts due to proposed project.
- Planning pollution control and suggested mitigation measures.
- Action plan for implementation of suggested measures.
- Monitoring programme to assess efficacy of the environmental control measures.
- Assessment of financial considerations for suggested environmental control plans.
- Clearances from statutory authorities.

1.3 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

1.3.1 The Project

As per the geological report prepared by Mineral Exploration Corporation Limited, Dhirauli Block has a gross geological reserve of 620.013 MT and net geological reserve of 558.011 MT (OCP-260.263 MT; UG-297.748 MT). The mining plan envisages for mining of 313.79 MT (OCP-195.74 MT, UG-118.05 MT) of mineable coal reserves within the lease area where the reserves are proved at an average stripping ratio of 10.55.

Justification of Area Statement

Dhirauli Coal Mining Project of Opencast cum Underground mine with the capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground) in mine lease area of 2672 ha located at Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar by M/s Stratatech Mineral Resources Private limited (SMRPL). During ToR application the 2672 ha area break has been submitted. The breakup of the lease area is as follows:

Ownership	Type of Land	Area (Ha)
Tenancy Land	Agricultural	554.01
	Township	
Sub Total		**554.01**
Govt Non-Forest Land	Grazing	681.80

	Barren (Road)	
	Water Bodies	
	Other	
Sub Total		**681.80**
Forest Land	Protected Forest Land	1335.35
	Rev Forest (CJBJ)	100.84
Free Land		
Sub Total		**1436.19**
Grand Total		**2672.00**

During scrutiny and updation of land records at the time of notification of Section 19 of - Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. It has been observed that there are changes in revenue forest records and government land records henceforth land schedule has undergone change, however, there is no change in the total land area which was approved in the ToR granted by MoEF&CC vide letter **J-11015/49/2021-IA-II(M)]** on 03.08.2021. The revised land schedule is as below:

Revised Land Summary (Dhirauli Coal Block)		
Ownership	**Type of Land**	**Area (Ha)**
Tenancy Land	**Private Land**	553.540
Sub Total		**553.540**
Government Non Forest Land	**Grazing**	720.92
	Barren (Road)	
	Water Bodies	
	Other	
Sub Total		**720.92**
Forest Land	**Revenue Forest Land**	62.19

	Reserve Forest Land	1335.35
Free Hold		
Sub Total		**1397.54**
Grand Total		**2672.00**

Particular of Adjacent block

The Dhirauli Coal block spread over 26.72 sq km area is in Singrauli Coal field. The block boundary has been defined below:

North: Northern boundary is defined by eastern boundary of Gurwani passing north of borehole MDP-4, MDP-6, MSD-81 & MSD-89 and west of borehole MDP-5 & MSD-76 of Dhirauli block.

South: Southern boundary of the block is defined by an imaginary line commencing 400m south of borehole MDP-17 & 100 m south of borehole MSD-105 running almost parallel to E-W grid line and passing south of borehole MDP-18, MSD-100 & MDP-24 of Dhirauli block.

East: Eastern boundary is demarcated by western boundary of Mara II Mahan block explored earlier by MECL.

West: Dhirauli block is delimited on the west by eastern boundary of Suliyari- Belwar Coal block in the southern & part in the region of borehole no. MSD-105, MDP-17, MSD-60, 102, 45, 107, 46, 32, 29, 34 & 75 while in the region of borehole no. MSD-65, MDP-1, MSD-13, MDP-8, MSD- 85 & MDP-4, it is delimited partly by eastern boundary of Dongri-Tal block.

1.3.2 The Project Proponent

- **Applicant**

Stratatech Mineral Resources Private Limited (SMRPL) is an unlisted private company incorporated on 03.10.2019. It is classified as a private limited company with registered office located at Ahmedabad, Gujarat. SMRPL, a private company wholly owned by the Adani Enterprises Limited (AEL).

Contact details of the Project Proponent are given below:

Table 1.1: Contact details of SMRPL

Designation	Head, Singrauli Cluster

Mailing Address	Adani Corporate House, Shantigram, Nr. Vaishnodevi, S G Highway. Khodiyar, Ahmedabad-382421, Gujarat
E-mail	dhirauli@adani.com
Telephone	+91 124 255 5555
Mobile No.	+91 78386 51134

1.4 BRIEF DESCRIPTION NATURE, SIZE & LOCATION OF THE PROJECT

The proposed Dhirauli coal mine of 6.5 MTPA capacity is an open cast cum underground coal mine auctioned under commercial coal block with no restriction to carry on mining operation for own consumption, sale or for any other purpose and will accelerate the economic development of the nation. The total proposed area for the project is 2672 Ha, which includes 1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19) and 1274.46 ha of non-forest land. Considering the geo-mining characteristics of the block and for conservation of resource, it is proposed to extract the coal reserves within the block using combination of open cast mining (up to Seam VII) and underground mining (below Seam VII to Seam II) method.

1.4.1 Location of the Project

Dhirauli coal mine covers an area of 2672 Ha and located in eight villages Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar lies within the latitude 23°56'07" N to 24°03'04" N and longitude 82°19'04" E to 82°24'21" E, covered under the Survey of India Toposheet no. 64 I/5 **(Figure 1.1).**

The block is located at about 70 km south-west of Singrauli township, whereas it is around 50 km south-west of Waidhan township, the District Headquarter of Singrauli District. Blocks are well connected with the tehsil and district headquarter through major district road followed by NH-75 at 23 Km in N. A metalled road from Parsona to Mara is located further east of the block. An un-metaled road branching out of this at Rajmelan culminates at Sarai. From this road to the west of River Mahan, a north-south running road leads to Langadda via Bhalyatola, Suliyari & Jhalri. The block is also accessible by an all-weather metalled road from Singrauli as well as from Waidhan. The distance of Sarai-Gram, the nearest major railway station on Chopan-Singrauli-Katni line of central railway is about 18 km from the block. The nearest Airport is Varanasi which is at a distance of about 250 km from Waidhan. Shakti Nagar an important industrial town is located in the vicinity of Singrauli and Waidhan township. The other important industrial township & railway station Renukoot is located 70 km from Waidhan on Chopan-Garwah Road section of eastern railway. Block is traversed by number of fair weathered and forest roads. The important

villages in and around the block are Suliyari & Dhirauli villages located within the block, while village Jhalri & Majhalipath are located outside, west of the block.

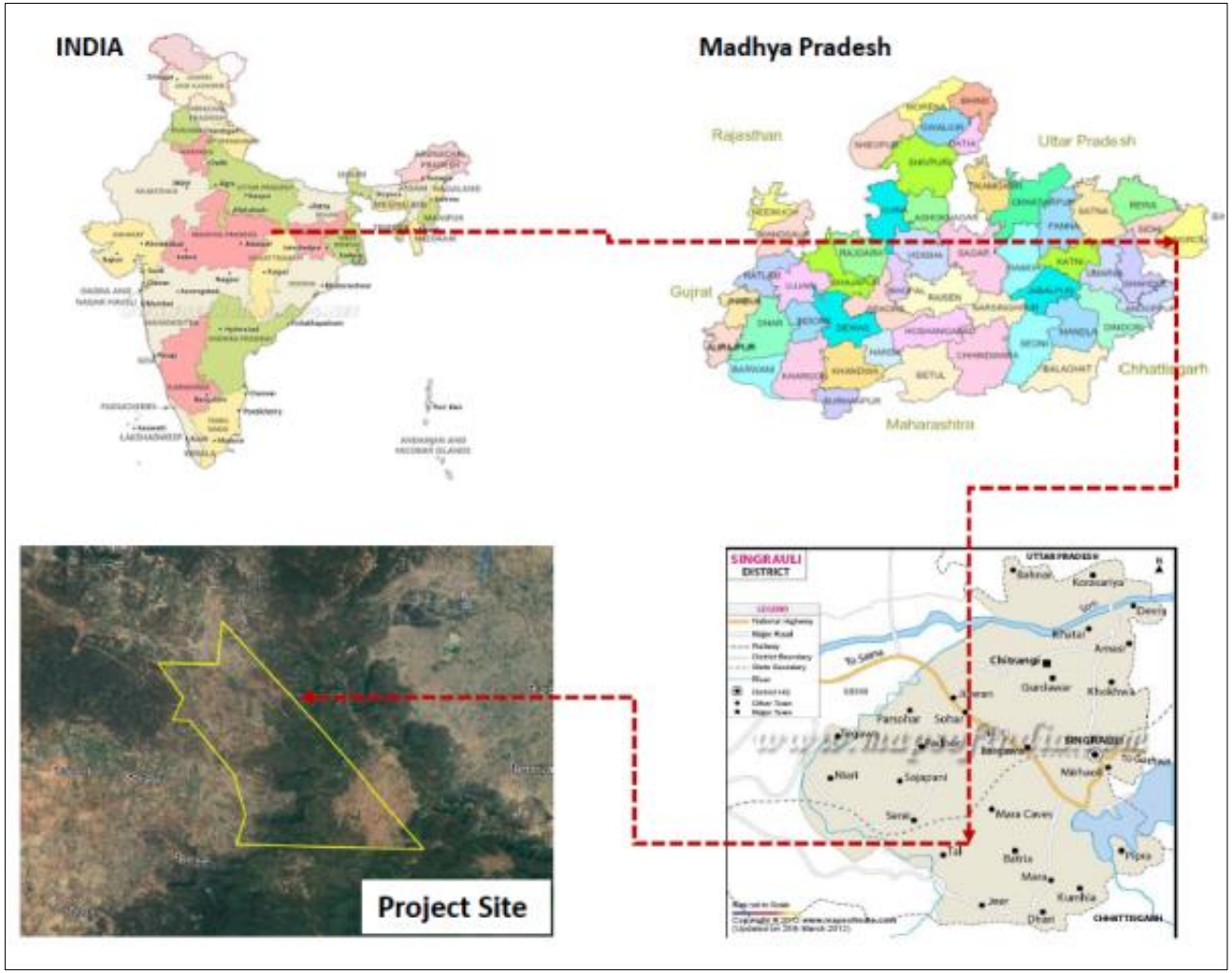


Figure 1.1: Location of Project Site

Table 1.2: Environmental Setting of the Project

S. No.	Particulars	Details
1.	Project	Dhirauli Coal Mining Opencast cum Underground mine of 6.5 MTPA (5 MTPA through open cast & 1.5 MTPA through underground) in mine lease area of 2672 ha, with setting up of CHP planned with the system capacity as 850 TPH rated capacity and 935 TPH design capacity by M/s Stratatech Mineral Resources Private limited (SMRPL) located at villages Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar, Tehsil-Sarai, District-Singrauli, (Madhya Pradesh).
2.	Type of project	Opencast cum Underground
3.	New/ Expansion	New
4.	Category as per EIA Notification	Category A
5.	Mining lease area	2672 ha (1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19 ha) and 1274.46 ha of non-forest land).
6.	**Location**	
7.	Villages	Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha and Belwar
	Tehsil	Sarai,
	District	Singrauli,
	State	Madhya Pradesh
	Latitude	23°56'07" N to 24°03'04" N
	Longitude	82°19'04" E to 82°24'21" E
	Toposheet No.	64 I/5
8.	Name of the Organization	M/s Stratatech Mineral Resources Private Limited (SMRPL)
9.	Coal Field	Singrauli Coal Field
10.	Coal Block	Dhirauli Coal Block
11.	No. of coal seams	21
12.	Elevation above MSL (Lease area)	Max- 638 m
13.	Nearest highway	The Block is connected to the NH-75 at about ~23 Km in NE direction.
14.	Nearest railway station	Sarai gram railway station at a distance of ~18 Km in NW direction.
15.	Nearest airport	Varanasi Airport, approx.250 km, NE direction
16.	Nearest Town/City	Waidhan Approx. 28.62 km, ENE direction
17.	Nearest water bodies	Hurdul Nala within ML area, Gopad River (10.2 km, W), Sulkhia Nala (5.3km, W),

S. No.	Particulars	Details
		Chuniya Nala (13.0 km, WNW), Sukar Nala (6.7 km, NNW), Mahan Nala (1.7 km, N), Hariya Nala (9.9 km, NNW)
18.	Reserve / Protected Forest	Mohan ban RF (within the ML area), Langhadol PF (10.5 km, SW), Hatta PF (10.7 km,W), Sarai PF (10.8 km, NW), Runda Bhadora RF (11.2 km, W), Pidarwah PF (11.5 km, NNE), Kasaiya PF (12.5 km, NNW), Daser PF (13.9 km,S), Shivgarh PF (14.5 km, NW)
19.	Other historical and archaeological places	None within 10 km radius
20.	Ecology sensitive/ Protected areas as per Wildlife Protection Act 1972 (National Park/ Wildlife Sanctuary/ Bio-sphere reserves)	Sanjay Tiger Reserve is located at 10.21 Km in W direction. Further, the Project Proponent has obtained NOC from Principal Chief Conservator of Forest (WL), Government of Madhya Pradesh stating that there is no Eco-sensitive zone, Elephants and Tigers corridor falling within the 10 km radius of the mine vide letter no **KRAMANK/MACHI./ 2022/3494** dated 20.05.2022 & 17.08.2022, the copy of the letter is attached as **Annexure-XIX**.
21.	Defense installations	None within 10 km radius from ML boundary
22.	Industries	None within 10 km radius from ML boundary
23.	Critically polluted area	No
24.	Transmission line	5 transmission line (132kv- 1 line, 765 kv – 4 lines) passing from the block
25.	Seismic zone	Zone-III as per IS-1893 (Part-1)-2002

Source: Approved Mining Plan, Dhirauli Coal Block Mine and SOI Topo-sheet No. 64 I/5

1.4.2 Nature of the Project

The proposed Dhirauli coal mine of 6.5 MTPA capacity is an open cast cum underground coal mine auctioned under commercial coal block with no restriction to carry on mining operation for own consumption, sale or for any other purpose. The total requirement of land is estimated as 2672 Ha, which includes 1397.54 ha of forest land (Protected Forest Land 1335.35 ha & Revenue Forest land: 62.19 ha) and 1274.46 ha of non-forest land for the proposed Dhirauli coal mine.

The proposed project is listed under activity 1(a) Mining of Minerals under the Schedule of EIA Notification, 2006 and categorized as Category-A.

1.4.3 Size of the Project

Total Mining Lease area of the project is 2672 Ha. (1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land 62.19 ha) and 1274.46 ha of non-forest land. The total gross geological reserves, mineable reserves and overburden have been estimated as follows:

Table 1.3: Mineral Detail

Reserves	Opencast	Underground	Total
Geological Reserve (Mt)	260.263	297.748	558.011
Blocked reserve (Mt)	64.52	179.70	244.22
Mineable Reserve (Mt)	195.74	118.05	313.79
Extractable reserve (Mt)	186.06	112.07	298.12
% Of Extraction/ Recovery	71.49	37.64	53.43
Proposed Production (MTPA)	5.0	1.5	6.5
Average Grade	G8 (Overall)		
Total Overburden in mm^3	1963.55 MBCM		
Mine Life	40 (excluding 2 years of construction period)	87	-

Source: Approved Mining Plan, Dhirauli Coal Block Mine

1.4.4 Importance of the Project to the Country & Region

Coal is the primary source of energy supply in India. About 55% of the current commercial energy use is met by coal. Rising demand for energy and coal as the primary energy source make it a significant resource in the country. The demand for coal in 2016-17, was estimated to be 884.87 million tonnes (Mt), whereas the domestic availability was estimated at 724.71 million tonnes (Mt). In the recent years, coal production has failed to match the demand for coal. As a result, India's coal imports have risen from 20.5 million tonnes (Mt) in 2002-03 to 200 million tonnes (Mt) in 2015-16. In the year 2020-21, import of raw coal to the country was 214.995 MT valued at Rs 1,16,037.2 crore.

Opening of Dhirauli coal block mine will have the following benefits:

- Increased supply of coal for India's power programme.
- Reduces power shortages hindering growth, foreign investment, and productivity.
- Generate additional employment, both direct and indirect which will lead to economic growth of the industrial sector as well as country.

- Quality of life of local populace in villages shall improve due to company's community development programmes.

1.5 SCOPE OF THE STUDY

The Environmental Impact Assessment (EIA) study is aimed to identify and analyze the aspects that affect the environment within the Mine Lease Area (Core -Zone) and 10 km radius around the Mine Lease Area (Buffer-Zone). The project scope includes detailed characterization of various environmental components like air, noise, water, land and socio-economic within the study area.

The objectives set for carrying out this EIA study based on the requirements that fulfill the EIA Notification 2006 and their subsequent amendments.

With a view to assess the environmental impacts arising due to the proposed Project, M/s Stratatech Mineral Resources Private Limited (SMRPL) has entrusted the work to NABET accredited EIA consultant M/s. Vardan EnviroNet, Gurgaon to prepare EIA report, in order to obtain the Environment Clearance.

1.5.1 Terms of Reference of EIA Study Prescribed by MoEF&CC

Online application for grant of ToR was submitted by SMRPL on 25.06.2021 under schedule 1 (a) of EIA Notification as asked by the Expert Appraisal Committee of MoEF&CC committee. The project was considered in the 15th meeting of the Expert Appraisal Committee held during 06.07.2021. Terms of References (ToR) for the project were granted by Ministry of Environment, Forest & Climate Change (MoEF&CC) vide letter no. J-11015/49/2021-IA. II (M) dated 03.08.2021.

Subsequently, the project proponent applied for Amendment in additional condition no (ii) of ToR, which stated that:

(ii) As suggested by EAC, no diversion of Hurdul source stream shall be allowed and the same shall be proposed in EIA Study with appropriate mining methods to recover the coal in river catchment so that biodiversity in the area by source stream could be maintained.

EAC in its 38th Meeting held on 14 – 15 December 2022 recommended grant of Amendment of ToR, vide letter no - J-11015/49/2021-IA.II(M) dated – 09.01.2023 which is attached as **Annexure – I**.

1.5.2 Baseline Data Generation, Field Studies

The EIA/EMP report has been prepared on the basis of one full season baseline environmental data monitored during March to May 2021 by VIMTA Labs Ltd., NABL Accredited Lab, in accordance with the EIA Notification, 2006 issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi.

The monitored baseline data includes micro meteorological parameters, ambient air quality, noise levels, surface & ground water quality and soil characteristics. Site survey has been conducted for studying the flora & fauna, socio-economic conditions including public consultation, land use, hydrology and hydrogeology, ecology, traffic density etc. Secondary information has been collected from several agencies and departments, both under State and Central Government.

The collected data have been analyzed in detail for identifying, predicting and evaluating the environmental impacts of the proposed project. Potential impacts on environment have been assessed and suitable environmental management plan has been formulated. SMRPL has engaged Vardan EnviroNet, as consultant for formulation of EIA / EMP study report for the mine.

1.5.3 Secondary Information Collection

Secondary baseline information on water resources, geology, hydrology and hydrogeology, demography was collected from the following sources:

- India Meteorological Department (IMD) (1981-2010)
- Geological Survey of India (GSI)
- Botanical Survey of India
- Office of Divisional Forest Officer
- Census of India (Demographic data)
- CGWB, Ministry of Water Resources, Govt. of India
- National Bureau of Soil Survey & Land use Planning

1.5.4 Public Consultation

On the basis of Terms of References (ToR) the draft EIA report has been prepared and submitted to MPPCB for public hearing. PH of the project was held on 04.05.2022 and detail of the same is given in the Chapter 7 of the Final EIA report.

1.5.5 Report Coverage

This EIA Report is prepared in accordance with the EIA Notification, 2006 and has been divided into twelve chapters (in addition to the Executive Summary). The report contains information on the existing environment and evaluates the predicted environmental and socio-economic impacts of the proposed activities of the mine. A detailed coverage of background environmental quality, pollution sources,

anticipated environmental impacts (including socio-economic impacts) and mitigation measures, environmental monitoring programme, additional studies, project benefits, environmental monitoring plan and all related aspects have been covered in this report as briefed hereunder:

Chapter 1 – Introduction

Chapter 2 – Project Description

Chapter 3– Description of the Environment

Chapter 4 – Anticipated Environmental Impacts and Mitigation Measures

Chapter 5 – Analysis of Alternatives (Technology and Site)

Chapter 6 – Environmental Monitoring Program

Chapter 7 – Additional Studies

Chapter 8 – Project Benefits

Chapter 9 – Environmental Cost Benefit Analysis

Chapter 10 – Environmental Management Plan

Chapter 11 – Summary

Chapter 12 – Disclosure of Consultant

1.6 LAWS APPLICABLE TO THIS PROJECT

The Acts and Rules applicable to this project along with roles and responsibilities of the project proponent is given in the **Table 1.4** below.

1.7 ACKNOWLEDGEMENT

Vardan Environet wishes to place on record its deep appreciation for the trust reposed on Vardan Environet. Vardan Environet also wishes to place on records the courtesy and help extended by the officials of SMRPL.

Table 1.4: Acts and Rules Applicable to the Project

Legal Channel	Responsible Ministries/Bodies	Objective of Legislation	Roles & Responsibilities
The Water (Prevention & Control of Pollution) Acts 1974/ Rules 1975	CPCB, SPCB	The prevention and control of water pollution and also maintaining or restoring the wholesomeness of water	o Not to discharge any effluent, not confirming to standards, prescribed by SPCB into any stream, well, sewers or land. o Not to discharge air pollutant(s) in excess of standards, prescribed by the State PCB. o Obtain 'Consent to Establish' prior to establish any process, operation or treatment system. o Obtain 'Consent to Operate' prior to operation of system which is likely to discharge effluent. o Apply for renewal of the 'Consent to Operate' before the expiry. o Comply with conditions as prescribed under consents.
The Air (Prevention & Control of Pollution) Acts 1981/ Rules 1982	CPCB, SPCB	The prevention, control and abatement of air pollution	
The Environment (Protection) Acts 1986/ Rules 1986 The Environmental Impact Assessment (EIA) Notification, 2006	MoEF&CC, CPCB, SPCB	Protection and Improvement of the Environment	o Prevent discharge or emission of environment pollutants in excess of the prescribed standards. o Submit 'Environmental Statement' every year. o Obtain prior "Environmental Clearance' from MoEF&CC in case of new project or for Modernization / Expansion.
Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016	MoEF&CC, CPCB, SPCB	Management & Handling of hazardous wastes in line with the Basel convention	o It is the responsibility of the occupier to identify the hazardous wastes in their units and ensure proper handling and disposal o PP to take all steps to contain contamination, prevent accident and limit consequences on human being and environment o Obtain authorization from SPCB and comply with the conditions. o Maintain records of Hazardous Waste generated in Form-3 and submit yearly return for generation, treatment, recycling, disposal etc., to SPCB in Form-4

			○ Used Oil to be send / sold to the registered recycler, re-processor, registered authorized facility ○ Shall be transported in accordance with the rule. ○ Site storage is allowed for 90 days only
Batteries (Management and Handling) Rules, 2001.	SPCB, CPCB and MoEF&CC	To control the hazardous waste generation (lead waste) from used lead acid batteries	○ It is the responsibility of the generator to ensure, used batteries are not disposed of in any manner other than depositing with dealer, manufacturer, importer, re-conditioner registered recycler or at designated collection centre ○ Submit half yearly return for disposal of used batteries to State PCB by 30th June & 31st December, every year ○ In case of auction, ensure batteries are auctioned to the registered recycler only ○ File half yearly return for the auction ○ Maintain record for such auction
E-Waste (Management) Rules, 2016	SPCB, CPCB and MoEF&CC	To recycle /manage the electronic waste from the industry	○ Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that e-waste generated by them is channelized through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler; ○ Bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board; ○ Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that such end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under;

			○ Bulk consumers of electrical and electronic equipment listed in Schedule I shall file annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the bulk consumer with multiple offices in a State, one annual return combining information from all the offices shall be filed to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates
The Solid Waste Management Rules, 2016	CPCB, SPCB	To manage/ utilize the generated solid waste without damaging the environment and surroundings	○ Segregate waste in to three streams, Wet (Biodegradable), Dry (Plastic, Paper, metal, wood, etc.) and domestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.) and handover segregated wastes to authorized rag-pickers or waste collectors or local bodies.
Noise Pollution (Regulation and Control) Rules, 2000 and its amendments	CPCB, SPCB, MoEF&CC	To maintain the noise levels with respect to the place/equipment/ industry	○ Noise Quality Monitoring & submission of reports on weekly/monthly basis. ○ Providing Ear plugs and Muffs to the workers working in noise prone areas. ○ Dampening the source noise level or making the noise characteristics less annoying by providing suitable enclosures and barriers.
The Central Motor Vehicle Rules, 1989	Ministry of Shipping, Road Transport and Highways	To consolidate and amend the law relating to motor vehicles including to regulate the transportation of dangerous goods with a view to prevent loss of life or damage to the environment	○ Ensure compliance to safety provisions in the transport vehicle carrying dangerous and hazardous substances inside works ○ Display of emergency information panels at front, back and both side of vehicle ○ Every transporter to ensure safe transportation of dangerous/ hazardous goods. ○ Earthing chain for grounding, any prevalent static charge. ○ All motor vehicle entering the works shall have properly

			maintained brakes, lights, signal system for brakes, blinkers and registration number displayed, and valid Pollution under Control Certificate.
Mines & Minerals Development Restoration and Rehabilitation Act 1957	DMG	Regulation of mines and the development of minerals	o Development Restoration and Rehabilitation fund will be spent as per Mines & minerals Development Restoration and Rehabilitation Act 1957.
Mines Act 1952	Mineral Resource Department	Guidelines for mining of Minor Mineral in the lease area	o Mineral will be extract as per the mining plan approved by DMG/IBM.
Land Acquisition, Rehabilitation and Resettlement Act, 2013	Administration	Right to Fair Compensation and Transparency in Land Acquisition	o R&R compensation will be done as per Land Acquisition, Rehabilitation and Resettlement Act, 2013
Wildlife protection Act 1972	Forest Department, PCCF	Protection of plants and animal species	o Wildlife conservation plan has been prepared to protect the Schedule species in the study area.
Forest Conservation Act 1980	Forest Department	Protection of forest	o Conservation of the forest will be done as per the Act

2. PROJECT DESCRIPTION

The project envisages developing a mechanized opencast and underground coal mine in Singrauli Coalfields (Main Basin) located at village(s) Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha and Belwar in Tehsil-Sarai, District-Singrauli, State-Madhya Pradesh. The project envisages;

- Open cast cum Underground mine with 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground) production capacity over ML area 2672 Ha.
- Setting up of Coal Handling Plant with 850 TPH rated capacity and 935 TPH design capacity, keeping the peak production capacity in mind.

This chapter deals with the lease details, geology of the mining lease area, evaluation of the deposit, estimation of coal reserves, proposed method of mining, mining machineries, year wise coal extraction details, details on infrastructure, various sources of pollution and the measures to control.

2.1 Type of project

The proposed project falls under Category 'A' Mining of Minerals of the list of project or activities requiring prior Environmental Clearance from MoEF&CC notification dated 14th September 2006 in connection with Environment (Protection) Rules 1986.

Terms of reference (ToR) for carrying out EIA/EMP study has been granted by Ministry of Environment, Forests & Climate Change (MoEF&CC) through vide letter dated 03.08.2021 & Amendment to ToR on 09.01.2023, for production capacity of 6.5 MTPA (5MTPA Open cast & 1.5 MTPA Underground) in total Mine lease area of 2672 ha.

2.2 Need of the project

Coal is the primary source of energy supply in India. About 55% of the current commercial energy use is met by coal. Rising demand for energy and coal as the primary energy source make it a significant resource in the country. Opening of Dhirauli coal mine will have the following benefits:

- Increase supply of coal for India's power programme.
- Reduces power shortages hindering growth, foreign investment and productivity.
- Generate additional employment, both direct and indirect which will lead to economic growth of the industrial sector as well as country.
- Quality of life of local populace in villages shall improve due to company's community development programmes.

2.3 Location of project (maps showing general location, specific locations, project boundary and project site layout)

The mine is located at village(s)- Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha and Belwar, Tehsil-Sarai, District-Singrauli, State-Madhya Pradesh within mine lease area of 2672 Ha.

The Dhirauli Coal Mining is bounded between latitudes 23°56'07" N to 24°03'04" N and longitude 82°19'04" E to 82°24'21" E, and is covered under the survey of India toposheet no. 64 I/5. The DGPS coordinates of the ML area are given in **Table 2.1**.

Dhirauli Coal Mining is well connected with the tehsil and district headquarters through Major district road followed by NH-75 at 23 Km in N. A metalled road from Parsona to Mara is located further east of the block. An un-metalled road branching out of this at Rajmelan culminates at Sarai. From this road to the west of River Mahan, a north-south running road leads to Langadda via Bhalyatola, Suliyari & Jhalri. The block is also accessible by an all-weather metalled road from Singrauli as well as from Waidhan. The Route Map, Site Photographs & Mine Layout is shown in **Figure 2.1, Figure 2.2,** and **Figure 2.3** respectively. Toposheet Map showing study area is given in **Plate 1** and Surface plan is given in **Plate 2**. Topographic Map and Coordinate map and Google map is shown in **Figure 2.4, Figure 2.5 & Figure 2.6** respectively.

Table 2.1: Latitude and Longitude of the project site

Pillar No	Latitude	Longitude
P-1	23° 56' 8.050" N	82° 20' 41.828" E
P-2	23° 56' 39.089" N	82° 20' 50.850" E
P-3	23° 57' 5.526" N	82° 20' 41.671" E
P-4	23° 57' 20.472" N	82° 20' 36.481" E
P-5	23° 58' 16.288" N	82° 19' 42.885" E
P-6	23° 58' 16.849" N	82° 19' 23.052" E
P-7	23° 58' 40.299" N	82° 19' 33.286" E
P-8	23° 59' 1.261" N	82° 19' 16.590" E
P-9	23° 59' 1.400" N	82° 19' 16.479" E
P-10	23° 59' 16.431" N	82° 19' 4.505" E
P-11	23° 59' 16.438" N	82° 19' 4.645" E
P-12	23° 59' 16.769" N	82° 19' 4.382" E
P-13	23° 59' 16.880" N	82° 19' 10.421" E
P-14	23° 59' 16.984" N	82° 19' 17.296" E
P-15	23° 59' 17.215" N	82° 19' 32.702" E
P-16	23° 59' 17.746" N	82° 20' 4.348" E
P-17	23° 59' 17.831" N	82° 20' 13.490" E
P-18	23° 59' 19.414" N	82° 20' 13.672" E
P-19	23° 59' 26.521" N	82° 20' 14.490" E
P-20	23° 59' 35.671" N	82° 20' 15.530" E
P-21	23° 59' 42.269" N	82° 20' 16.060" E
P-22	24° 0' 0.375" N	82° 20' 17.753" E

Pillar No	Latitude	Longitude
P-23	24° 0' 0.405" N	82° 20' 17.755" E
P-24	24° 0' 2.782" N	82° 20' 17.978" E
P-25	24° 0' 2.765" N	82° 20' 17.994" E
P-26	24° 0' 2.755" N	82° 20' 18.005" E
P-27	23° 59' 59.910" N	82° 20' 20.825" E
P-28	23° 59' 59.888" N	82° 20' 20.846" E
P-29	23° 59' 59.888" N	82° 20' 20.846" E
P-30	23° 59' 59.308" N	82° 20' 21.421" E
P-31	23° 59' 59.034" N	82° 20' 21.693" E
P-32	23° 59' 58.300" N	82° 20' 22.421" E
P-33	23° 59' 47.987" N	82° 20' 33.434" E
P-34	23° 59' 46.887" N	82° 20' 34.609" E
P-35	23° 59' 46.862" N	82° 20' 34.636" E
P-36	23° 59' 40.729" N	82° 20' 41.185" E
P-37	23° 59' 40.723" N	82° 20' 41.192" E
P-38	23° 59' 37.000" N	82° 20' 45.167" E
P-39	23° 59' 36.967" N	82° 20' 45.202" E
P-40	23° 59' 28.481" N	82° 20' 54.264" E
P-41	23° 59' 28.447" N	82° 20' 54.300" E
P-42	23° 59' 25.291" N	82° 20' 57.670" E
P-43	23° 59' 17.337" N	82° 21' 6.039" E
P-44	23° 59' 17.320" N	82° 21' 6.058" E
P-45	23° 59' 10.337" N	82° 21' 13.404" E
P-46	23° 59' 7.735" N	82° 21' 15.987" E
P-47	23° 59' 7.733" N	82° 21' 15.989" E
P-48	23° 59' 3.193" N	82° 21' 20.497" E
P-49	23° 58' 59.036" N	82° 21' 24.675" E
P-50	23° 58' 56.172" N	82° 21' 27.555" E
P-51	23° 58' 54.681" N	82° 21' 29.063" E
P-52	23° 58' 54.605" N	82° 21' 29.140" E
P-53	23° 58' 48.805" N	82° 21' 35.008" E
P-54	23° 58' 44.204" N	82° 21' 40.180" E
P-55	23° 58' 34.898" N	82° 21' 50.640" E
P-56	23° 58' 34.895" N	82° 21' 50.642" E
P-57	23° 58' 25.695" N	82° 22' 0.983" E
P-58	23° 58' 18.698" N	82° 22' 9.112" E
P-59	23° 58' 18.660" N	82° 22' 9.156" E
P-60	23° 58' 14.515" N	82° 22' 13.972" E
P-61	23° 58' 14.145" N	82° 22' 14.402" E
P-62	23° 58' 14.140" N	82° 22' 14.408" E
P-63	23° 58' 14.045" N	82° 22' 14.517" E
P-64	23° 58' 11.809" N	82° 22' 16.490" E
P-65	23° 58' 7.869" N	82° 22' 19.964" E
P-66	23° 58' 0.929" N	82° 22' 26.687" E
P-67	23° 58' 0.876" N	82° 22' 26.739" E
P-68	23° 57' 55.843" N	82° 22' 31.614" E
P-69	23° 57' 42.880" N	82° 22' 43.585" E
P-70	23° 57' 42.593" N	82° 22' 43.889" E
P-71	23° 57' 42.573" N	82° 22' 43.910" E
P-72	23° 57' 33.698" N	82° 22' 53.282" E

Pillar No	Latitude	Longitude
P-73	23° 57' 26.902" N	82° 23' 0.343" E
P-74	23° 57' 26.890" N	82° 23' 0.355" E
P-75	23° 57' 18.132" N	82° 23' 9.453" E
P-75	23° 57' 18.090" N	82° 23' 9.497" E
P-77	23° 57' 16.700" N	82° 23' 10.940" E
P-78	23° 57' 11.105" N	82° 23' 16.947" E
P-79	23° 57' 6.215" N	82° 23' 22.196" E
P-80	23° 57' 5.430" N	82° 23' 22.913" E
P-81	23° 57' 5.426" N	82° 23' 22.916" E
P-82	23° 57' 3.475" N	82° 23' 24.696" E
P-83	23° 57' 2.234" N	82° 23' 25.828" E
P-84	23° 56' 56.930" N	82° 23' 30.667" E
P-85	23° 56' 50.675" N	82° 23' 37.034" E
P-86	23° 56' 50.661" N	82° 23' 37.048" E
P-87	23° 56' 44.937" N	82° 23' 42.874" E
P-88	23° 56' 37.480" N	82° 23' 51.058" E
P-89	23° 56' 36.759" N	82° 23' 51.994" E
P-90	23° 56' 36.599" N	82° 23' 52.154" E
P-91	23° 56' 8.603" N	82° 24' 20.086" E
P-92	23° 56' 8.247" N	82° 22' 30.929" E
P-93	23° 56' 8.247" N	82° 22' 30.831" E
P-94	23° 56' 8.160" N	82° 22' 5.257" E
P-95	23° 56' 7.869" N	82° 20' 41.822" E
P-96	23° 56' 8.050" N	82° 20' 41.875" E
P-97	23° 56' 8.050" N	82° 20' 41.828" E

Source: DGPS Survey Report

2.3.1 Human Settlement in the Study Area

All eight villages (Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar) lying within the block has been identified to be rehabilitated and resettled. The displaced families are proposed to be rehabilitated and resettled colony, R&R plan has been approved by Joint collector Singrauli, vide letter no **2147/BHU-ARJAN/22 on dated 18.11.2022**.

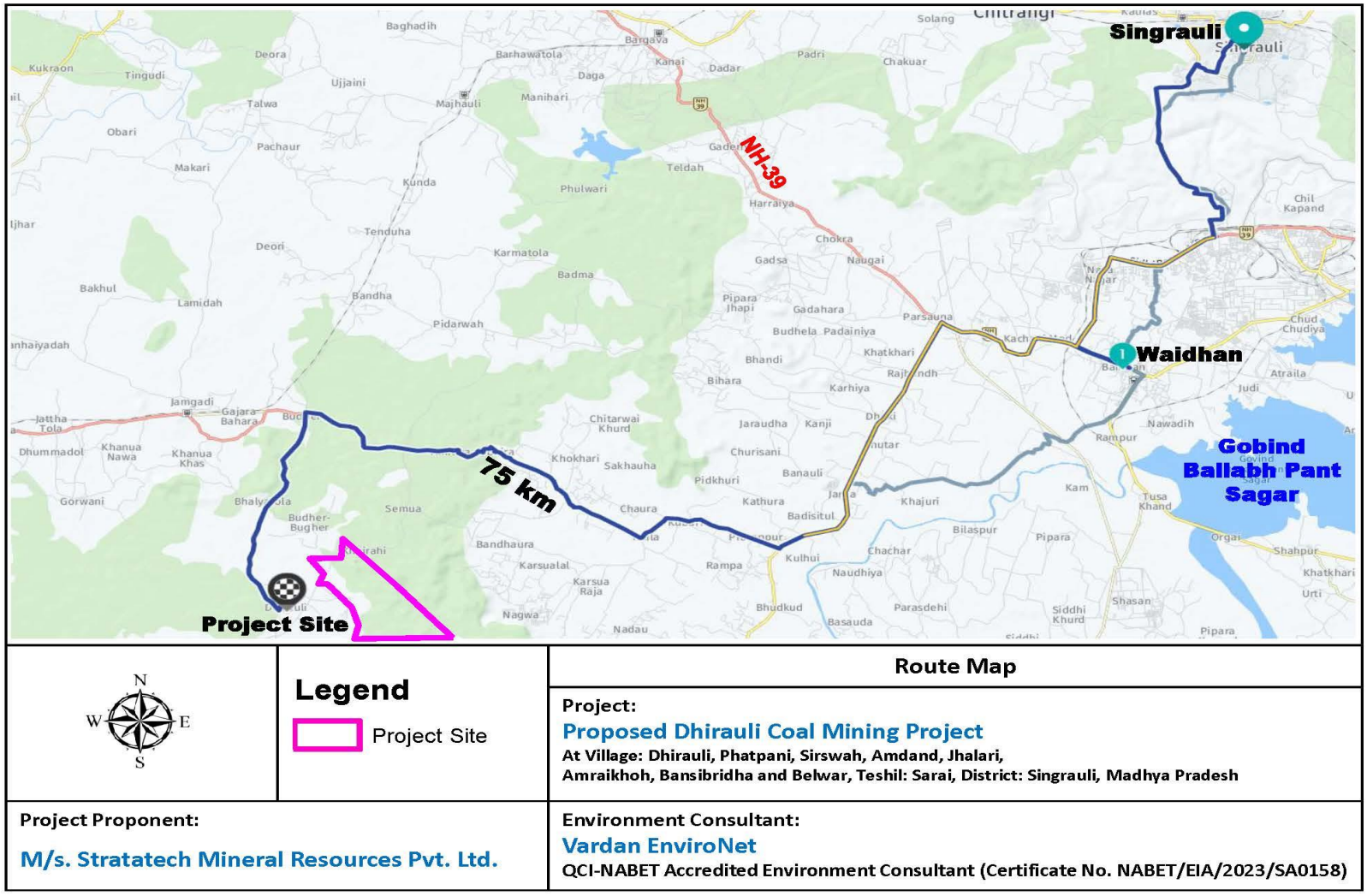


Figure 2.1: Route Map



Figure 2.2: Site Photographs of Dhirauli coal block

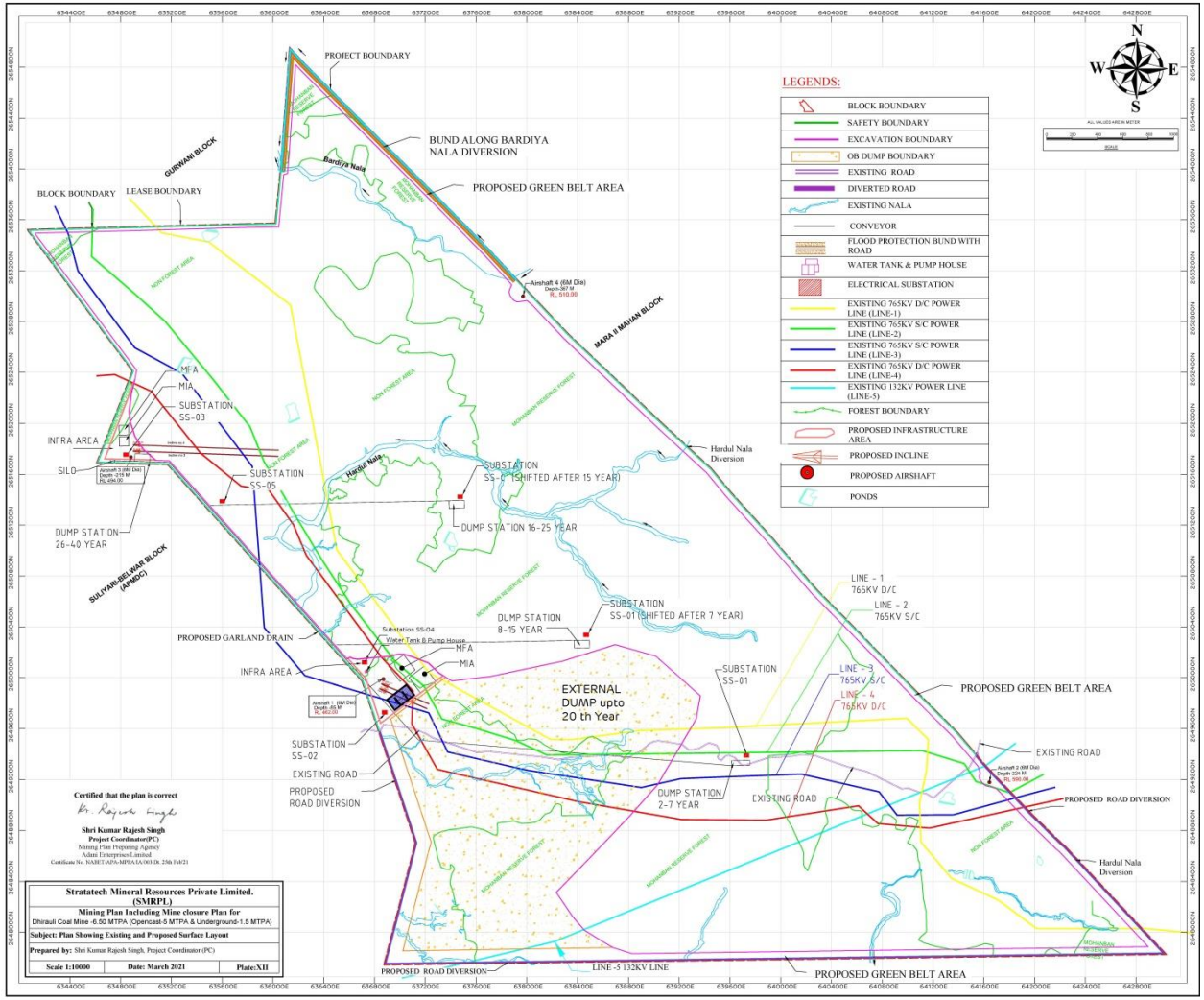


Figure 2.3: Mine Layout with Proposed Facilities (Surface Plan)

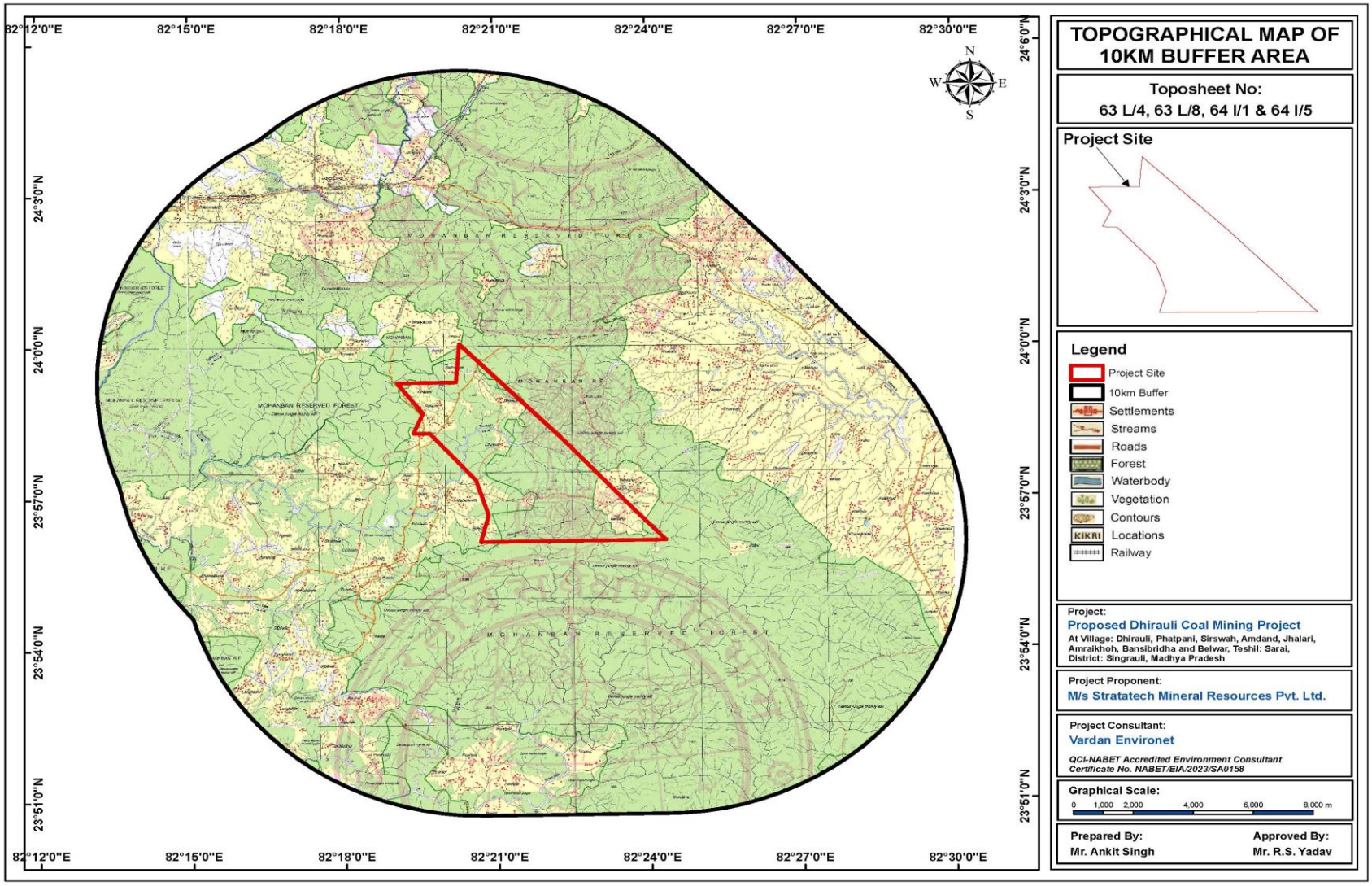


Figure 2.4: Topographical Map of Study Area

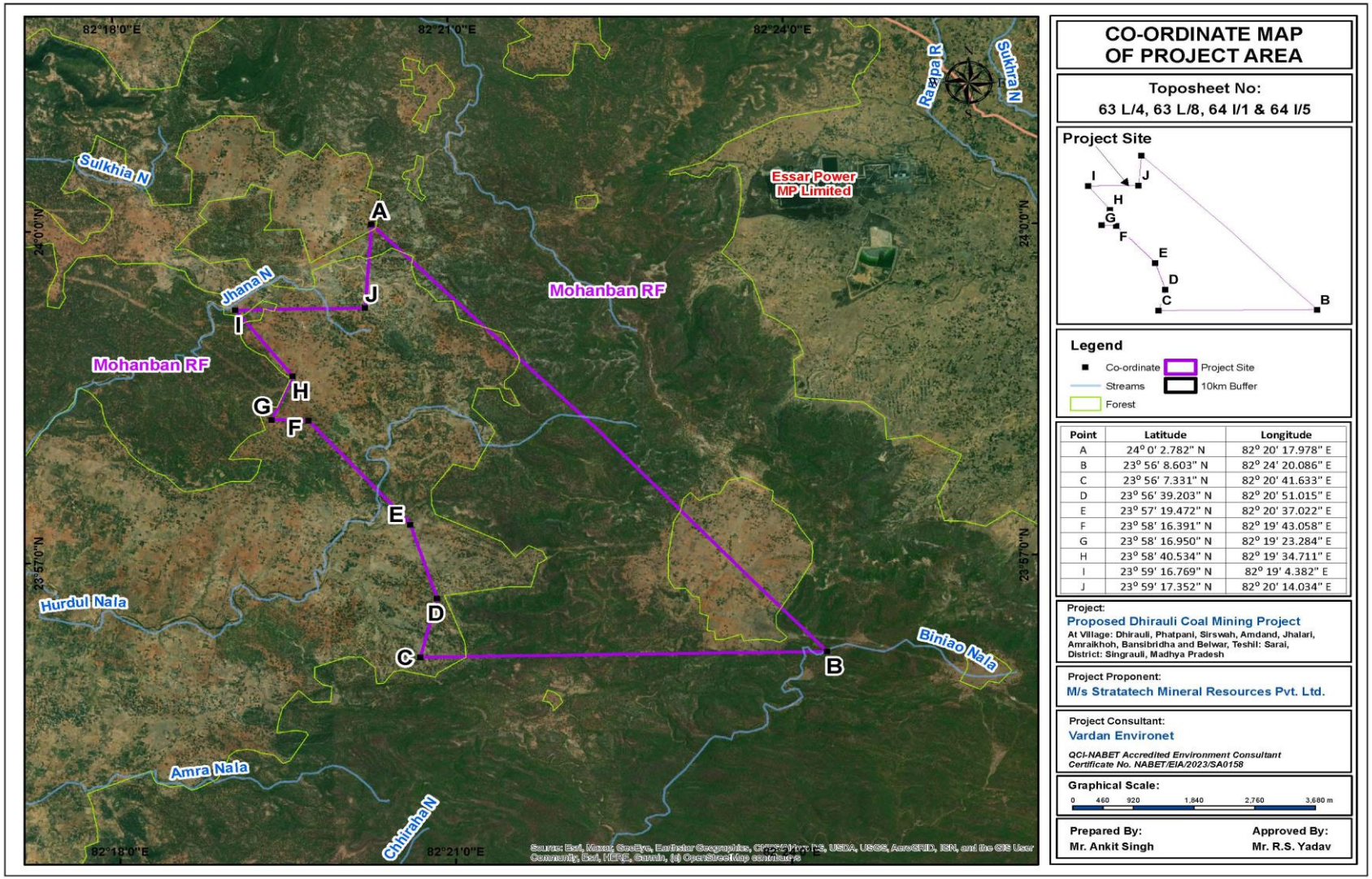


Figure 2.5: Coordinate Map

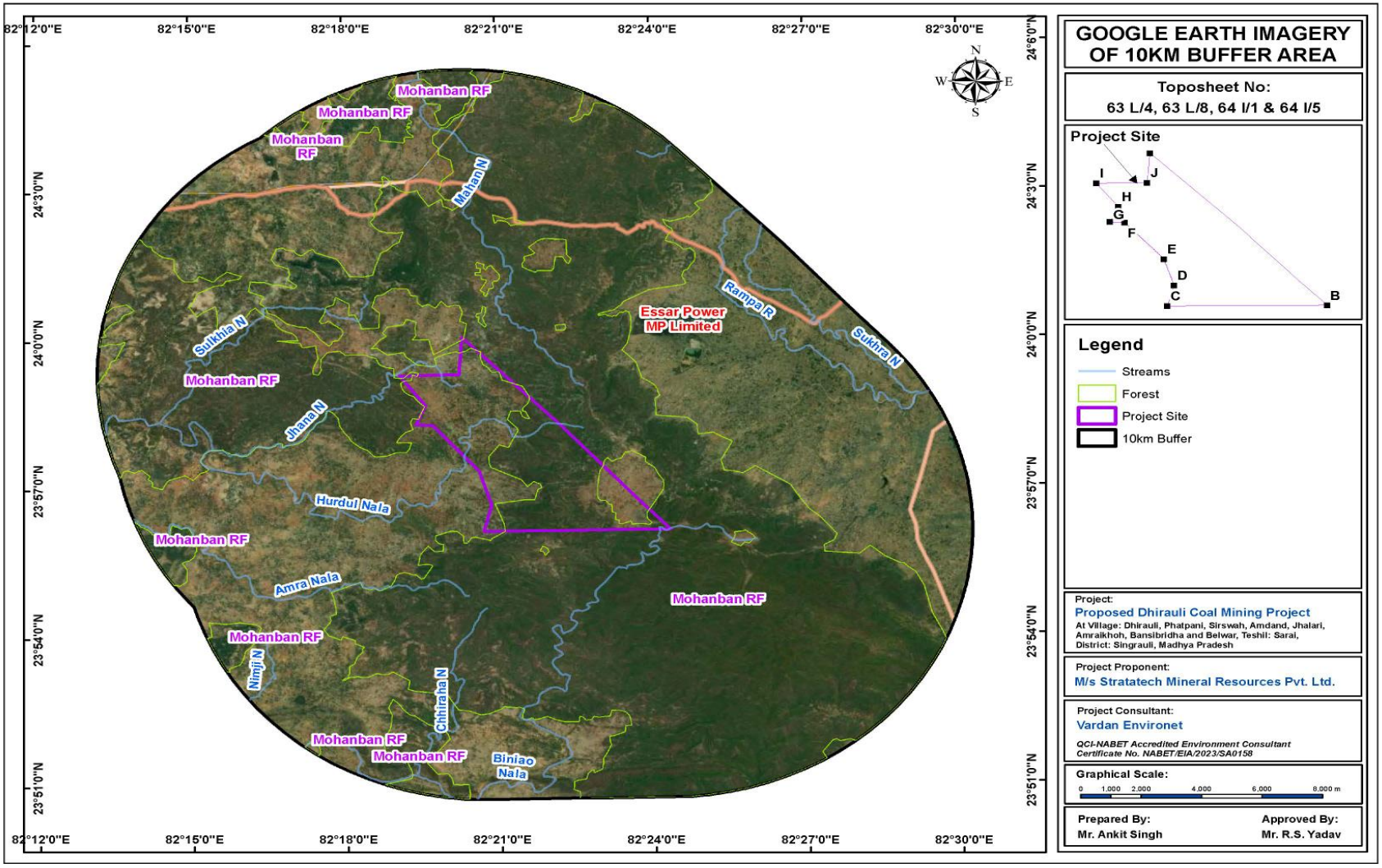


Figure 2.6: Google Earth Imagery of 10 KM Buffer Area

2.4 Size/magnitude of operation

2.4.1 Proposed Operation

The allotted Coal Block measuring an area of 2672 ha is a virgin coal block. The project is proposed for Open cast cum Underground mine with 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground) production capacity with setting up of Coal Handling Plant of 850 TPH rated capacity and 935 TPH design, keeping the peak production capacity in mind.

Considering the geo-mining characteristics of the block and for conservation of resource, it is proposed to extract the coal reserves within the block using combination of open cast mining (up to seam VII) and underground mining (below Seam VII to Seam II) method. Mining method for extracting coal is surface miner-FEL-Dumper for coal and the OBR would be removed using conventional shovel dumper method with drilling and blasting for open cast mining and Continuous Miner for UG mine.

The salient features of the Mine are as given in **Table 2.2:**

Table 2.2: Salient Features of the Proposed Mine

S. No.	Description	Particulars
1.	**Name of the Project**	Dhirauli Coal Mining
2.	**Type of the Project**	Opencast and underground mine
3.	**Mining lease area**	2672 Ha
4.	**Forest Area**	**Forest land** 1397.54 ha (Protected Forest Land: 1335.35 ha, Revenue Forest land: 62.19 ha) Forest Diversion proposal applied - Proposal No. FP/MP/MIN/142344/2021 dated 08th June 2021 **Non-Forest land:** Tenancy Land– 553.54 ha Govt Non-Forest Land- 720.92 ha.
5.	**New / Expansion**	New
6.	**Category as per EIA Notification**	"A"
7.	**Location**	
8.	**Villages**	Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar
	Tehsil	Sarai
	District	Singrauli

	State	Madhya Pradesh
	Latitude	23°56'8.050"N to 23°58'59.036"N
	Longitude	82°19'4.382"E to 82°24'20.086"E
	Toposheet No.	64 I/5
9.	**Name of the Organization**	M/s. Stratatech Mineral Resources Private Limited
10.	**Coal Field**	Singrauli Coal Field
11.	**Coal Block**	Dhirauli Coal Block
12.	**Borehole density**	5 boreholes per sq.km
13.	**No. of coal seams**	A total of 21 coal seams are present in Dhirauli block including 7 local seams viz. Seam-L-1, Seam-VIII Top, VIII Bottom, VIII-Combined, L-2, VII Top, VII Bottom, VII Combined, VI, L-3, L-4, V-Top, V-Bottom, L-5, IV, III Top, III Bottom, L-6, L-7, II & Seam-I.
14.	**Seams no considering for mining**	12 (<1m Thickness and inconsistence in nature)
15.	**Maximum Thickness of seams**	9.08 (Seams VII COMB)
16.	**Geological Reserves**	Gross Geological Reserve – 620.013 Mt Net Geological reserves – 558.011 Mt Opencast Mine – 260.263 Mt Underground Mine – 297.748 Mt
17.	**Net Minable Reserves**	Total- 313.79 Mt Opencast Mine – 195.74 Mt Underground Mine – 118.05 Mt
18.	**Reserves extracted by UG**	298.12 Mt (OCP- 186.06 Mt, UG- 112.07 Mt)
19.	**Extractable Reserves by OC**	298.12 Mt (OCP- 186.06 Mt, UG- 112.07 Mt)
20.	**Average GCV & Grade of Coal**	G8 (overall)
21.	**Average gradient of the seams**	2^0- 4^0
22.	**Total OB/Inter burden to be excavated**	1963.55 MBCM
23.	**Average Stripping Ratio**	10.55 m^3/te.
24.	**Bench width**	Working : 20 m -30 m ; Non-working: 12 m - 20 m
25.	**Bench height**	For OBR: 10-12 m; Top soil : 3-6 m

<table>
<tr><td>26.</td><td>Peak Production Capacity</td><td>6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground)</td></tr>
<tr><td>27.</td><td>Life of the Mine</td><td>Open Cast:- 40 years; Underground:- 87 years</td></tr>
<tr><td rowspan="3">28.</td><td>Forestland requirement</td><td>1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19)</td></tr>
<tr><td>Non-forestland within ML Area</td><td>Non-forestland - 1274.46 ha</td></tr>
<tr><td>Total Land requirement</td><td>2672 ha</td></tr>
<tr><td>29.</td><td>Details of Wildlife Sanctuaries, National Park, eco-sensitive Zones, within 10 km radius?</td><td>None</td></tr>
<tr><td>30.</td><td>R & R Involved</td><td>All eight villages (Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar) lying within the block has been identified to be rehabilitated and resettled. The displaced families are proposed to be rehabilitated and resettled colony in a nearby area after discussion with villagers.
R&R plan has been approved by Joint collector Singruli, vide letter no 2147/BHU-ARJAN/22 on dated 18.11.2022.</td></tr>
<tr><td>31.</td><td>No. of affected families</td><td>1456 & 1581 no of PAFs & PDFs respectively due to proposed project for which R&R plan has been approved by Joint collector Singruli, vide letter no 2147/BHU-ARJAN/22 dated 18.11.2022.</td></tr>
<tr><td>32.</td><td>Technology</td><td>Opencast mining is proposed by Surface miners (SM) - FEL-Truck for coal and drill blast for OB. Underground mining is proposed by Continuous miner (CM).</td></tr>
<tr><td>33.</td><td>Area of Excavation</td><td>2,096.59 Ha</td></tr>
<tr><td>34.</td><td>Depth of the quarry</td><td>280 M</td></tr>
<tr><td>35.</td><td>Details of External OB Dumps</td><td>The OB removed during initial years will be placed beyond the incrop of the seam VII as external dump. The total volume of external dump has been estimated as 259.01 Mm3.
<table>
<tr><td>Place</td><td>Area in ha</td><td>Max. Height</td><td>Quantity OB in M.Cum</td></tr>
<tr><td>Seam VII</td><td>387.55</td><td>60m</td><td>259.01</td></tr>
</table></td></tr>
<tr><td rowspan="2">36.</td><td rowspan="2">Details of backfilling (at the end of mine)</td><td>Commenced from 3rd year of coal production</td></tr>
<tr><td><table><tr><td></td><td></td><td></td><td>Quantity</td></tr></table></td></tr>
</table>

		Place	Area in ha	Max. Height	OB in M.Cum.	
		BF-1	1,796.23	500m	1,843.03	
37.	**Details of Final Mine Void (at the end of mine)**	At final stage		Out of total 2,096.59 ha excavated area 1796.23 ha will be backfilled upto a level of 350– 500 mRL. Remaining 300.36 ha (mine void) area to be converted into water body (253.56 ha).		
	Area	300.36 ha				
	Depth	280 m bgl				
	Void Volume	-				
38.	**Details of afforestation**	-				
	Plantation on External OB Dumps	Nil; the area will conceptually come under backfilled surface				
	Plantation of Backfilled surface	1,843.03				
	Other area	-				
	Total Plantation					
39.	**Density of Plantation**	2500 No./ha				
40.	**Coal Linkage**	Direct sale to long term buyers				
41.	**Coal Evacuation**					
	In-Pit	Dumpers				
	Surface to Siding	Trucks				
	Siding to Loading	Loading to wagon				
	Road Diversion	There are 4 roads passing from block having total length of approx. ~18 km which needs to be diverted along southern, western and northern boundary of the block.				
42.	**Employment potentiality**	Total 970 (Direct/Indirect)				
43.	**Total cost of the project**	Rs 2800 Crores				
44.	**Fund Provision for EMP**	Capital - 1550 Lakhs Recurring - 282 Lkahs **Mine Closure Cost** Capital - 979.28 Lakhs Recurring - 50 Lkahs				
45.	**Name of the EIA Consultant Organization**	M/s Vardan EnviroNet				
46.	**QCI / NABET Accreditation**	Certificate No. QCI/NABET/EIA/ 2023/SA0158, Valid up to 05.05.2023				

Source: Approved Mining Plan, Dhirauli Coal Mine

2.5 Status of Statutory Permissions

2.5.1 Lease Deed

As per the vesting order no: NA-104/7/2020-NA dated 3rd March 2021, Ministry of Coal has allocated the Dhirauli coal Block to Stratatech Mineral Resources Private Limited (SMRPL), the total mining lease area of Dhirauli Coal Mine is 2672 Ha. **(Attached as Annexure-II).**

2.5.2 Mining Plan

Mining plan was approved by Ministry of Coal vide letter no. File No.MPS-34011/4/2021-MPS dated 04.05.2021 **(Attached as Annexure III).**

2.5.3 Forestry Clearance

Out of the total 2672 Ha Lease Area, 1,397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19) and 1,274.46 ha of non-forest land. Forest application for diversion of 1436.19 ha of forest land submitted vide proposal no. FP/MP/MIN/142344/2021 dated 08th June 2021 **(Attached as Annexure IV)**.

There are no wildlife sanctuary, national park or eco sensitive zone within 10 Km radius of the mine lease area.

2.5.4 Other Clearances

Wildlife Conservation Plan

A Site-Specific Wildlife Conservation Plan (SSWCP) w.r.t. Dhirauli Coal has been prepared and submitted to by DFO Waidhan Madhya Pradesh for their approval (**WLCP-Attached as Annexure V).**

NOC from Principal Chief Conservator of Forest

PP Has obtained the NOC from Principal Chief Conservator of Forest, M.P, vide letter no KRAMANK/MACHI./ 2022/3494 dated 20.05.2022 & 17.08.2022 stating that there is no Eco-sensitive zone Elephants and Tigers corridor falls within the 10 m radius of the mine, same is attached as **Annexure-XIX.**

NOC from CGWB

PP has obtained the NOC from Central Ground Water Authority (CGWA) vide NOC no CGWA/NOC/MIN/ORIG/2022/15765 which is valid from 15.06.2022 to 14.06.2024 copy is attached as **Annexure VI.**

Legal Issues

There is no litigation, directions or any order passed by any Court of Law or pending against the project.

2.6 Implementation Schedule

Proposed mine is subjected to the grant of Environmental Clearance and other requisite statutory clearances for proposed facility, which is expected to be obtained during FY 2021-22 and expected to be operational in 2025.

2.7 Geology of area

2.7.1 Regional Geology

The geology of the district reveals that the Occurrence of various work formation as old as granites of Achaean age to the Alluvium of Recent age. The other important formations Outcropping in the district are Deccan trap of cretaceous – Eocene, Gondwanas of Paleozoic to Mesozoic Sandstone and other ranks of Vindhayans and Phyllites. Quartzites, Schist Gneisses and Granites of Archeans age. The Geology of the district is shown in the Hydrogeogical Map. The general Stratigraphical Succession obtained in the district is given as under:

Table 2.3: Stratigraphic Succession of Singrauli coalfield

Age	Group	Formation	Lithology
Cretaceous		Intrusives	Dolerite dykes & Sills
Upper Triassic	Upper Gondwana	Mahadeva	Coarse grains, ferruginous sandstone with bands of shale, clay and conglomerates.
Lower Triassic	Lower **Gondwana**	Panchet	White, greenish white and pink micaceous, medium to coarse grained sandstone with red beds, greenish brown silty shales, and conglomerates.
Upper Permian		Raniganj (215-403 m)	Fine grained sandstones and **shales** with coal seams **including** 134 m thick **Jhingurdah** seam
Middle Permian		Barren Measures (125-300 m)	Very coarse grained, **ferruginous**, sandstones, green clays & shales.
Lower Permian		Barakar (325-600 m)	Medium to coarse grained, **sandstones**, shales, clays and coal seams.

Upper Carboniferous to Lower Permian		Talchir (75-130 m)	Tillite, sandstones, siltstones, needle shales etc.
---------- Unconformity ----------			
Precambrian		Precambrian	Phyllites, quartzites, schists and gneisses.

Source: Approved Mining Plan, Dhirauli Coal Mine and G.S.I. 2005

2.7.1.1 Geology of Singrauli Coal Field:

Singrauli coalfield forms the northern extremity of Son-Mahanadi master Gondwana basin, at the junction region of east-west trending Damodar-Koel-Tatapani garben and the NW-SE trending Son-Mahanadi rift zone; thus, reflecting the lithological and structural characteristics of both Damodar and Son valley Gondwana basins. The northern limit of the Singrauli coalfield is defined by a major east-west trending northern boundary fault, which is parallel to the Narmada-Son lineament. High standing Mahadeva hills are defining the southern boundary. Talchir beds rest un-conformably over Precambrian rocks and the Precambrian themselves are forming the eastern boundary whereas the western boundary is formed by the contact of Precambrian and Supra Barakar sediments.

2.7.1.2 Talchir Geology of Dhirauli Block:

The Dhirauli block is traversed by 11 normal gravity faults designated as F1-F1 to F11-F11. There are two sets of faults - one trending NW-SE and the other trending NE-SW. The magnitude of these faults varies from 5 m to 85 m within the block. The faults have been deciphered based on the floor level difference observed on either side of the fault planes and on the basis of borehole intersections. It is pertinent to mention here that the numbers of minor slips are also observed in boreholes causing insignificant reduction of parting and seam thickness. It is seen that, out of 11 faults interpreted, 10 faults are of low magnitude having throw between 5 m to 35 m except fault F9-F9 which is having maximum 85 m of throw. In general, the strike varies from NW-SW in the entire area of the block to almost E-W in the southern part of the block with gentle dip of 2° to 4° north-easterly to north and south-westerly to south at places. The net geological and mineable reserves estimated for both open cast and underground mining is 558.01 Mt and 313.79 Mt respectively.

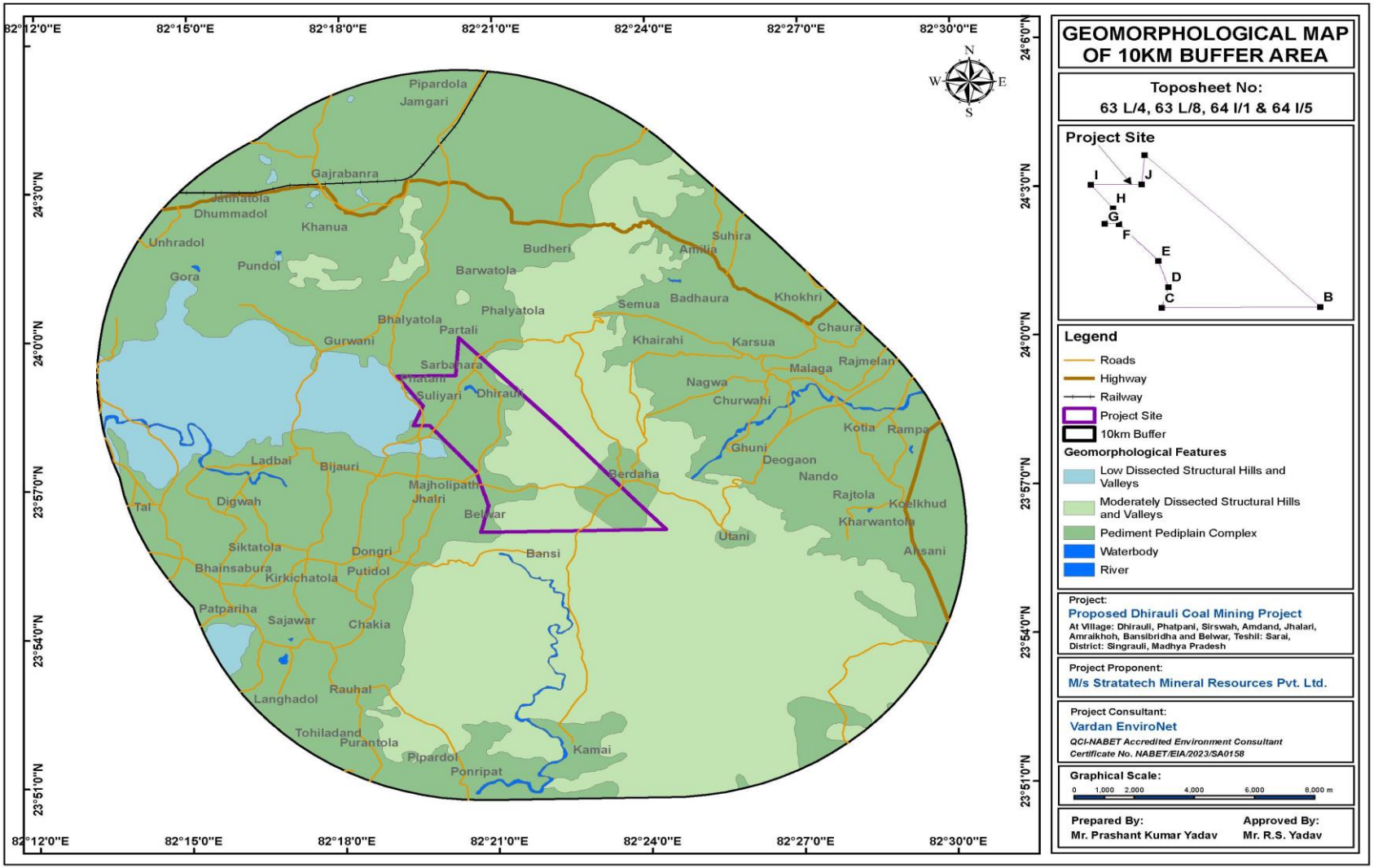


Figure 2.7: Geomorphological Map of the Study Area

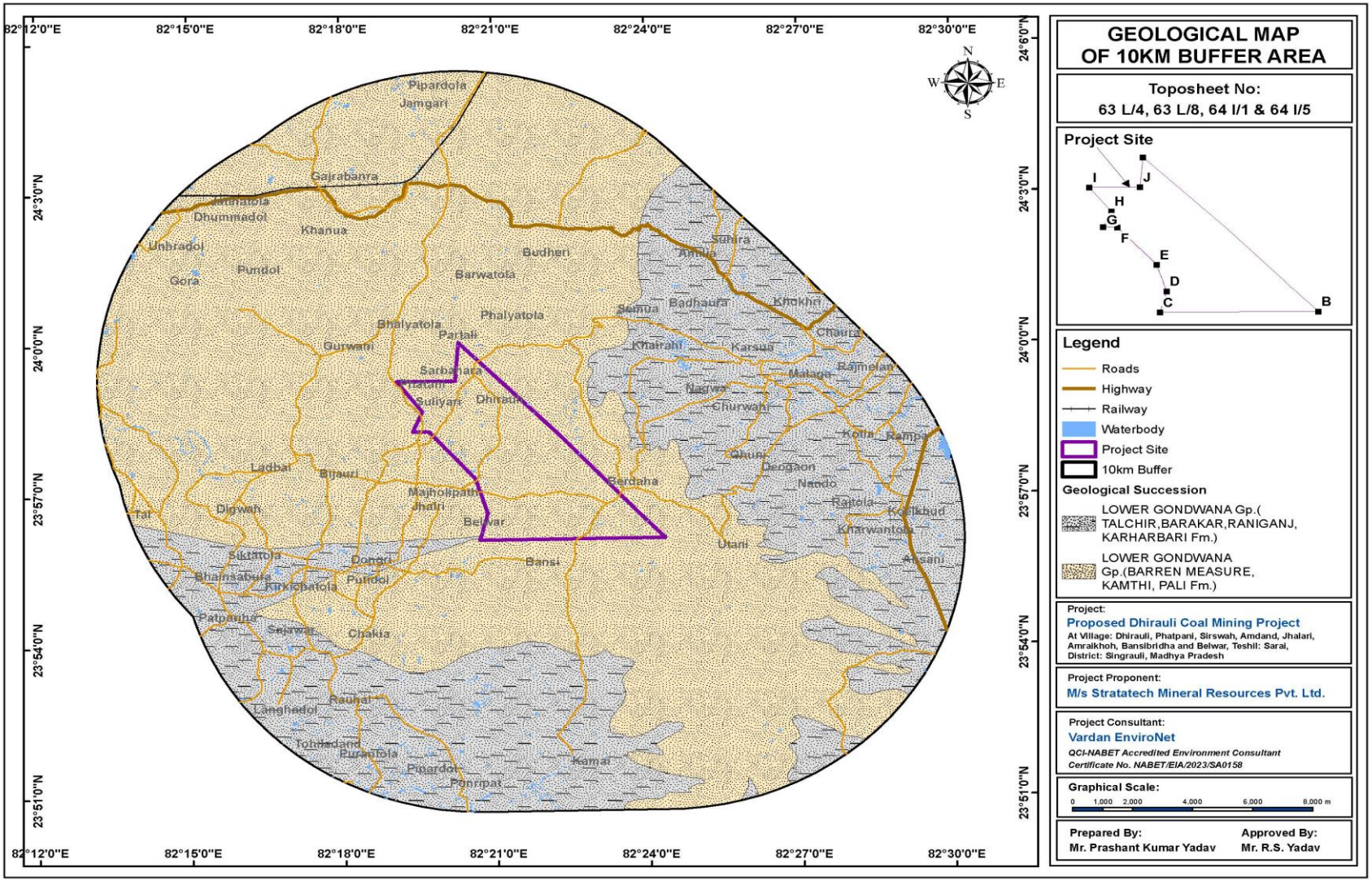


Figure 2.8: Geological Map of the Study Area

Strike and Dip

In general, the strike varies from NE-SW in the entire area of the block to almost E-W in the southern part of the block with gentle dip of 2º to 4º north-easterly to north and south-westerly to south at places.

Faults

The Dhirauli block is traversed by 11 normal gravity faults designated as F1-F1 to F11-F11. There are two sets of faults – one trending NW-SE and the other trending NE-SW. The magnitude of these faults varies from 5 m to 85 m within the block. The faults have been deciphered based on the floor level difference observed on either side of the fault planes and based on borehole intersections. It is pertinent to mention here that, the numbers of minor slips are also observed in boreholes causing insignificant reduction of parting and seam thickness. It is seen that, out of 11 faults interpreted 10 faults are of low magnitude having thrown between 5 m to 35 m, except fault F9-F9 which is having a maximum 85 m of throw.

Description of Coal Seams (Geological Report)

The detailed exploration in Dhirauli Coal Mine has established the presence of total of 21 coal seams are found including 7 local seams viz. Seam-L-1, Seam-VIII Top, VIII Bottom, VIII-Combined, L-2, VII Top, VII Bottom, VII Combined, VI, L-3, L-4, V-Top, V-Bottom, L-5, IV, III Top, III Bottom, L-6, L-7, II & Seam-I.

Seam not considered for mining with reason

The seams viz. L-1 to L-7, VIII Bottom, V Top, V Bottom, III Bottom & Seam-I are not considered for mining as it has not developed workable thickness and are uneconomical.

Sequence of Coal Seam

The sequence of coal seams, their thickness and intervening parting as intersected in the boreholes drilled within the block is given in descending order in below table.

Table 2.4: Sequence of Coal Seam- Dhirauli Block

Seam	Floor Depth Range	Thickness Range	Eff. Thickness Range	Parting	Intersection
L-I					
MIN	22.39(MSD-32)	0.07(MDP-15)	0.07(MDP-15)	0.33 (MSD-18)	8
MAX	172.89(MDP-7)	0.93(MSD-63)	0.93(MSD-63)	1.02 (MSD-63)	
VIII-T					
MIN	24.31(MSD-32)	0.55(MSD-63)	0.55(MSD-63)	0.25 (MSD-63)	24
MAX	218.37(MSD-68)	3.16(MSD-25)	2.82(MSD-25)	0.90 (MSD-106)	

Seam	Floor Depth Range	Thickness Range	Eff. Thickness Range	Parting	Intersection
VIII-B					
MIN	25.12(MSD-32)	0.18(MSD-25)	0.18(MSD-25)	26.10 (MSD-34)	24
MAX	219.56(MSD-68)	0.60(MSD-35)	0.60(MSD-35)	27.96 (MSD-6)	
VIII-COMB					
MIN	21.73(MSD-86)	1.37(MSD-65)	1.37(MSD-65)	23.27 (MDP-22)	82
MAX	258.99(MSD-103)	4.47(MDP-22)	4.00(MDP-22)	32.39 (MSD-69)	
L-2					
MIN	51.86(MSD-32)	0.16(MSD-29)	0.16(MSD-29)	0.56 (MDP-22)	13
MAX	272.75(MDP-5)	1.44(MDP-7)	1.44(MDP-7)	1.64 (MSD-69)	
VII-TOP					
MIN	68.68(MSD-101)	0.83(MDP-7)	0.83(MDP-7)	0.63 (MSD-94)	36
MAX	296.78(MSD-103)	8.48(MSD-58)	7.92(MSD-58)	5.35 (MSD-88)	
VII-BOTT					
MIN	69.84(MSD-101)	0.18(MSD-58)	0.18(MSD-58)	11.69 (MSD-94)	36
MAX	299.00(MSD-103)	1.52(MSD-88)	1.52(MSD-88)	27.83 (MDP-22)	
VII-COJMB					
MIN	43.08(MSD-43)	1.27(MDP-24)	1.27(MDP-24)	12.52 (MSD-100)	71
MAX	242.61(MSD-4)	9.08(MDP-23)	8.32(MDP-23)	38.88 (MSD-75)	
VI					
MIN	83.00(MSD-86)	0.05(MSD-29)	0.05(MSD-29)	4.30 (MDP-3)	91
MAX	318.45(MSD-103)	2.47(MSD-13)	2.47(MSD-13)	26.84 (MSD-7)	
L-3					
MIN	55.59(MSD-46)	0.02(MSD-46)	0.02(MSD-46)	7.18 (MSD-7)	44
MAX	329.00(MSD-103)	2.13(MDP-3)	2.03(MDP-3)	42.53 (MSD-18)	
L-4					
MIN	82.96(MSD-46)	0.02(MSD-1)	0.02(MSD-46)	20.27 (MSD-88)	50
MAX	362.00(MSD-72)	1.02(MSD-91)	1.02(MSD-91)	61.45 (MSD-89)	
V-T					
MIN	64.17(MSD-107)	0.04(MSD-36)	0.04(MSD-91)	2.54 (MDP-21)	39
MAX	392.81(MSD-103)	0.93(MDP-12)	0.93(MDP-12)	11.89 (MSD-91)	
V-B					
MIN	43.27(MSD-50)	0.11(MSD-73)	0.11(MSD-73)	0.52 (MSD-57)	81
MAX	398.24(MSD-103)	1.25(MSD-3)	1.25(MSD-3)	9.91 (MSD-87)	
L-5					
MIN	47.40(MSD-62)	0.03(MSD-26)	0.03(MSD-26)	0.60 (MSD-94)	46
MAX	388.50(MSD-67)	0.48(MSD-94)	0.48(MSD-94)	3.37 (MSD-48)	

Seam	Floor Depth Range	Thickness Range	Eff. Thickness Range	Parting	Intersection
IV					
MIN	51.08(MSD-62)	1.11(MSD-107)	1.11(MSD-107)	2.85 (MSD-65)	126
MAX	407.80(MSD-103)	3.90(MDP-3)	3.90(MDP-3)	13.23 (MSD-101)	
III-T					
MIN	27.11(MDP-17)	1.60(MSD-105)	1.60(MSD-105))	0.38 (MDP-17)	130
MAX	422.12(MSD-103)	7.60(MSD-2)	6.98(MSD-2)	6.94 (MSD-10)	
III-B					
MIN	29.20(MDP-17)	0.18(MSD-16)	0.18(MSD-16)	1.57 (MSD-30)	125
MAX	426.91(MSD-103)	2.44(MSD-90)	2.44(MSD-90)	17.80 (MSD-5)	
L-6					
MIN	36.07(MSD-105)	0.03(MSD-39)	0.03(MSD-39)	1.40 (MDP-5)	56
MAX	425.00(MSD-72)	0.95(MSD-69)	0.95(MSD-69)	8.58 (MSD-44)	
L-7					
MIN	199.96(MDP-15)	0.02(MDP-18)	0.02(MDP-18)	0.90 (MSD-103)	31
MAX	436.10(MSD-103)	0.79(MSD-76)	0.79(MSD-76))	18.61 (MDP-12)	
II					
MIN	60.02(MDP-17)	0.05(MDP-16))	0.05(MDP-16)	20.23 (MDP-21)	119
MAX	440.00(MSD-103)	4.55(MSD-96)	4.35(MSD-96)	48.37 (MDP-16)	
I					
MIN	94.64(MDP-17)	0.25(MDP-13)	0.25(MDP-13)	-	10
MAX	445.16(MDP-21)	1.30(MDP-19)	1.30(MDP-19)	-	
BAND					
MIN	107.95(MSD-24)	0.51(MSD-24)	0.51(MSD-24)	-	1
MAX	107.95(MSD-24)	0.51(MSD-24)	0.51(MSD-24)	-	

Source: Approved Mining Plan, Dhirauli Coal Mine

2.8 Reserves Estimation and Life of Mine

The seam-wise, thickness-wise, depth-wise reserves, volume of overburden is furnished in below given in **Table 2.5**.

Table 2.5: Break-up of Net Geological Reserve

Seam	Thickness Range	Depth Range (m)	Net Geo. Res. (Mt)	Blocked Reserve (Mt)					Mineable Reserves (Mt)		Mining losses (Mt)
				High wall/ Batter	Nala/ River/Road	Barrier	Uneconomical	Total Blocked	UG	OC	
VIII-Top	0.55-3.16	24.31-218.37	6.96	1.08	0.02	0.10		1.20	0.00	5.76	0.69
VIII-Comb.	1.37-4.47	21.73-258.99	83.55	13.98	0.32	3.31		17.61	0.00	65.94	4.27
VII-Top	0.83-8.48	68.68-296.78	31.13	6.89	0.14	1.24		8.27	0.00	22.86	0.87
VII-Bott.	0.32-1.52	69.84-299.00	4.11	0.91	0.02	0.45		1.37	0.00	2.73	0.11
VII-Comb.	1.27-9.0	43.08-242.61	134.52	29.79	0.59	5.69		36.06	0.00	98.46	3.75
Total OC	-	-	260.26	52.66	1.08	10.78	0.00	64.52	0.00	195.74	9.69
VI	0.58-2.47	83-318.45	25.15	0.00	0.00	18.23		18.23	6.92	0.00	0.36
V-Bott.	0.33-1.25	43.27-398.24	3.54	0.00	0.00	0.00	3.54	3.54	0.00	0.00	0.00
IV	0.55-3.9	51.08-407.80	83.07	0.00	0.00	46.12		46.12	36.95	0.00	1.87
III-Top	1.6-7.6	27.11-422.12	149.75	0.00	0.00	82.43		82.43	67.31	0.00	3.39
III-Bott.	0.22-2.44	29.20-426.91	8.11	0.00	0.00	6.94	1.18	8.11		0.00	0.00
II	0.4-4.55	60.02-440.00	28.13	0.00	0.00	21.27		21.27	6.87	0.00	0.36
Total UG	**-**	**-**	**297.75**	**0.00**	**0.00**	**174.99**	**4.72**	**179.70**	**118.05**	**0.00**	**5.98**
Grand Total	**-**	**-**	**558.01**	**52.66**	**1.08**	**185.77**	**4.72**	**244.22**	**118.05**	**195.74**	**15.66**

Source: Approved Mining Plan, Dhirauli Coal Mine

Table 2.6: Seam Wise Extractable Reserve

Seam	Extractable Reserve (MT)			Depletion of Reserve (MT)			Balance Reserve (MT)				Reason not considered for mining
	UG	OC	Highwall	UG	OC	Highway	UG	OC	Highway	Total	
VIII-Top	-	4.76	-	-	-	-	-	4.76	-	4.76	considered
VIII-Comb.	-	63.46	-	-	-	-	-	63.46	-	63.46	considered
VII-Bott.	-	21.72	-	-	-	-	-	21.72	-	21.72	considered
VII-Top	-	2.58	-	-	-	-	-	2.58	-	2.58	considered
VII-Comb.	-	93.53	-	-	-	-	-	93.53	-	93.53	considered
VI	6.56	-	-	-	-	-	6.56	-	-	6.56	considered
V-Bott.	-	-	-	-	-	-	-	-	-	-	Thickness <1.5 m
IV	35.08	-	-	-	-	-	35.08	-	-	35.08	considered
III-Top	63.92	-	-	-	-	-	63.92	-	-	63.92	considered
III-Bott.	0.00	-	-	-	-	-	-	-	-	-	Thickness <1.5 m
II	6.51	-	-	-	-	-	6.51	-	-	6.51	considered
Total	**112.07**	**186.06**	**-**	**-**	**-**	**-**	**112.07**	**186.06**	**-**	**298.12**	

2.8.1 Extractable Reserve

Total Extractable Reserve of Dhirauli Coal Block upto Seam VIII and Summary of Geological reserve, Mineable reserve, Waste generation and stripping ratio is given in table below:

Parameter	Detail
Geological Reserves	Gross Geological Reserve – 620.013 Net Geological reserves – 558.011 MTPA Opencast Mine – 260.263 MTPA Underground Mine – 297.748 MTPA
Net Minable Reserves	313.79 MTPA; Opencast Mine – 195.74 MTPA;

	Underground Mine – 118.05 MTPA
Reserves extracted by UG	298.12 Mte (OCP- 186.06 Mte, UG- 112.07 Mte)
Extractable Reserves by OC	298.12 Mte (OCP- 186.06 Mte, UG- 112.07 Mte)
Average Stripping Ratio	10.55 m^3/te.

2.8.2 Life of Mine

Life of underground mine is 87 years and Opencast mine is 40 years (excluding 2 years of construction period).

2.9 Technology and Process Description

2.9.1 Mining Methodology

The Dhirauli Coal Mining comes under Category-A (Fully Mechanized category) as per the MoC guidelines. The Proposed coal block is a green field project. Hence no earlier work has been done except exploration. Considering the geo-mining characteristics of the block and for conservation of resource, it is proposed to extract the coal reserves within the block using combination of open cast mining (upto seam VII) and underground mining (below Seam VII to Seam II) method. Opencast mining is proposed by Surface miners (SM)-FEL-Truck for coal and drill blast for OB. Underground mining is proposed by Continuous miner (CM).

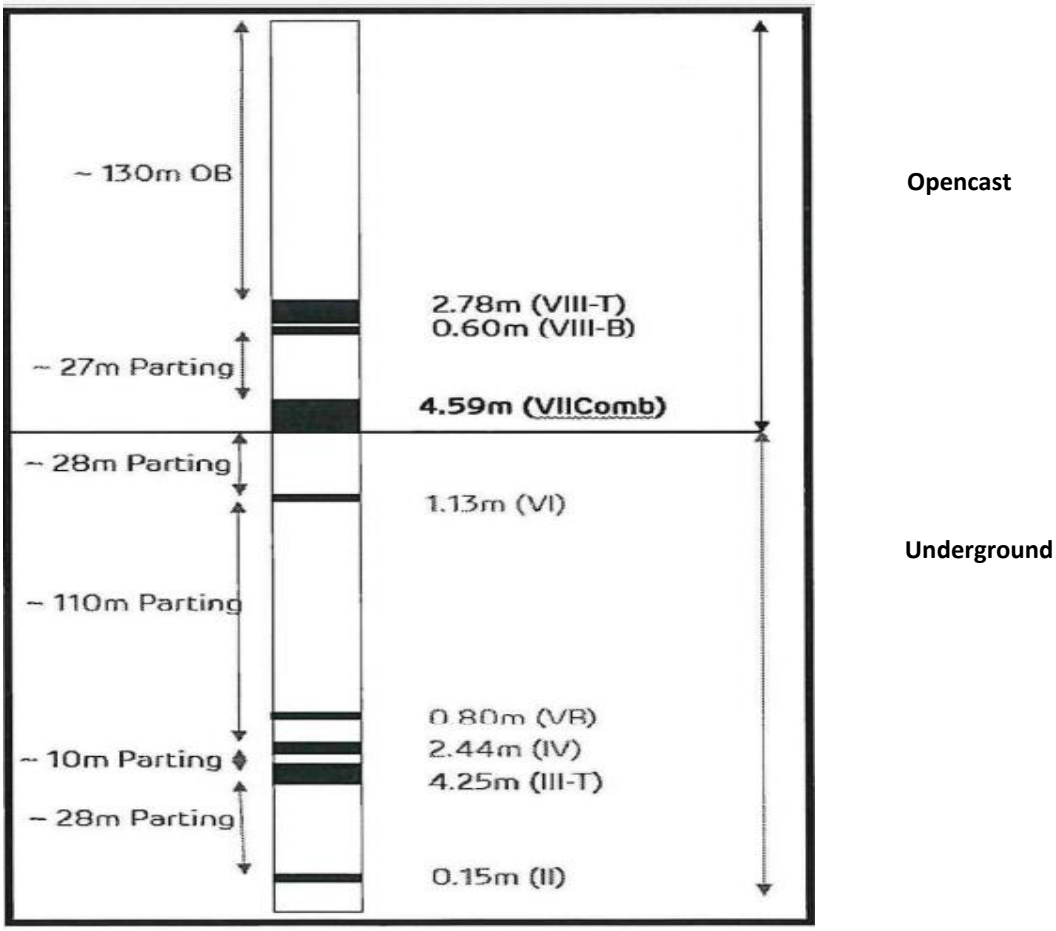


Figure 2.9: Generalized coal and Parting thickness

2.9.1.1 Working Regime

No. of working days per year : 330 Days/year
No. of working shifts/day : 3 shifts/day
Working Hours per shift : 8 Hours/shift

2.9.1.2 Drilling and Blasting

Coal will be mined using Combination of surface miner – FEL – Dumper method. The surface miner shall essentially be used in coal seams for quality improvement. The OBR would be removed using conventional shovel dumper method with drilling & blasting. Drilling & blasting shall be conducted in scientific way using environment friendly technology.

2.9.1.3 Mine Design Parameter

Mining Plan for Dhirauli Coal Block has been prepared for a rated capacity of 5.0 MTY of power grade ROM Coal from Opencast mine and 1.5 MTY from underground mines. This output is considered technically feasible because of following conditions-

- Gradient of 2^0-4^0 of the coal seams.

- Multiple coal seams (9 No. of Coal Horizons 5 for OCP and 4 for UG)
- Strike length.
- Thin coal seams (due to splitting).
- Variable thickness of OB/partings (high strip ratio)
- 11 number of Normal faults (Dip-side).

With this rated capacity of 5.0 Mty of the mine, the annual rate of advance of the mine would be about 150-160 m along the dip on the mine floor for opencast mine.

2.9.2 Calendar Plan (Proposed Production Detail)

Year-wise proposed production plan up to the end of mine life is given below in Table 2.7.

Table 2.7: Year-Wise Proposed Production Plan up to the End of Mine Life

Sl. No.	Years	Coal Production			OB	SR	
		OC (Mt)	UG (Mt)	Total (Mt)	Running (MCum)	Running (Cum/t)	Cumulative (Cum/t)
1.	2025-26	2.00	0.00	2.00	16.35	8.18	8.18
2.	2026-27	4.00	0.00	4.00	28.12	7.03	7.41
3.	2027-28	5.00	0.00	5.00	33.30	6.66	7.07
4.	2028-29	5.00	0.00	5.00	33.15	6.63	6.93
5.	2029-30	5.00	0.00	5.00	33.17	6.63	6.86
6.	2030-31	5.00	0.00	5.00	34.80	6.96	6.88
7.	2031-32	5.00	0.00	5.00	36.00	7.20	6.93
8.	2032-33	5.00	0.00	5.00	37.25	7.45	7.00
9.	2033-34	5.00	0.00	5.00	38.30	7.66	7.08
10.	2034-35	5.00	0.00	5.00	38.60	7.72	7.15
11.	2035-36	5.00	0.00	5.50	40.30	8.06	7.24
12.	2036-37	5.00	0.00	6.50	41.75	8.35	7.34
13.	2037-38	5.00	1.50	6.50	43.90	8.78	7.46
14.	2038-39	5.00	1.50	6.50	45.90	9.18	7.59
15.	2039-40	5.00	1.50	6.50	47.30	9.46	7.72
16.	2040-41	5.00	1.50	6.50	49.00	9.80	7.86
17.	2041-42	5.00	1.50	6.50	50.05	10.01	7.99

Sl. No.	Years	Coal Production			OB	SR	
		OC (Mt)	UG (Mt)	Total (Mt)	Running (MCum)	Running (Cum/t)	Cumulative (Cum/t)
18.	2042-43	5.00	1.50	6.50	50.85	10.17	8.12
19.	2043-44	5.00	1.50	6.50	51.40	10.28	8.24
20.	2044-45	5.00	1.50	6.50	52.25	10.45	8.35
21.	2045-46	5.00	1.50	6.50	53.30	10.66	8.47
22.	2046-47	5.00	1.50	6.50	54.25	10.85	8.58
23.	2047-48	5.00	1.50	6.50	55.75	11.15	8.69
24.	2048-49	5.00	1.50	6.50	58.25	11.35	8.82
25.	2049-50	5.00	1.50	6.50	60.75	12.15	8.96
26.	2050-51	5.00	1.50	6.50	62.75	12.55	9.10
27.	2051-52	5.00	1.50	6.50	64.00	12.80	9.24
28.	2052-53	5.00	1.50	6.50	64.50	12.90	9.38
29.	2053-54	5.00	1.50	6.50	65.50	13.10	9.51
30.	2054-55	5.00	1.50	6.50	65.75	13.15	9.63
31.	2055-56	5.00	1.50	6.50	66.50	13.30	9.76
32.	2056-57	5.00	1.50	6.50	67.25	13.45	9.87
33.	2057-58	5.00	1.50	6.50	67.25	13.45	9.98
34.	2058-59	5.00	1.50	6.50	67.75	13.55	10.09
35.	2059-60	5.00	1.50	6.50	68.50	13.70	10.20
36.	2060-61	5.00	1.50	6.50	68.50	13.70	10.30
37.	2061-62	5.00	1.50	6.50	69.25	13.85	10.40
38.	2062-63	3.00	1.50	4.50	53.50	17.83	10.52
39.	2063-64	1.50	1.50	3.00	21.50	14.33	10.55
40.	2064-65	0.56	1.50	2.56	7.01	12.52	10.55
41.	2065-2113	-	68.57	68.57			
Total		**186.06**	**112.07**	**298.13**	**1963.55**	**-**	**10.55**

Source: Approved Mining Plan, Dhirauli Coal Mine

2.9.3 Mine Development

The general orientation of the block is North-South (~9.9 x 2.7 km) and coal extraction by underground mining is proposed by two set of inclines seeing the dip rise length (9.9 km) of block. First set incline is planned to cover first half of the block named as Sector-I (~ 4.9 km length) and second set of incline for remaining half named as Sector II of the property (5 km length). Inclines are proposed at western side of block boundary and Vertical ventilation shaft of 6m diameter will be driven separately for exhaust of return air, proposed at eastern side of block.

The underground mining will be first start with one pair of inclines from surface named as Incline No.1 and No.2. These Inclines will be driven with height of 3.3 meters and width of 5.5 meters having gradient of 1 in 5. The mouths of inclines are located on borehole No. MSD-107 at Surface RL 460m and are aligned towards borehole No. MSD-59. The Incline will reach the floor of seam III at 380 m FRL and will have a length of ~410m crossing Seam VI to III Top and partings. Seam II is not developed in first half of the property (Sector I) therefore first set of incline is not planned upto seam II.

Second set of Inclines named as incline no. 3 and 4 is proposed to access remaining half of the property (Sector-II). Second set of Inclines will be driven with height of 3.3 meters and width of 5.5 meters having gradient of 1 in 5. The mouths of inclines are located on borehole No. MSD-65 at Surface RL 490m and are aligned towards borehole No. MSD-15. The Incline will reach the floor of seam II at 230 m FRL and will have a length of ~1174m crossing Seam VI to III Top and partings.

During Development:

All development galleries in coal are proposed to be supported by five nonretractable resin grouted roof bolts of 1.8m length for VI, IV, II and combined III Top Seams, in one row for Sector-I & II. The bolts will be made of 22mm diameter high tensile strength Tor Steel.

The distance between the rows of roof bolts as well as between two bolts in the same row shall be 1.2m. The roof bolts nearest to the pillar shall be kept 0.60m away from the edge of the pillars.

In geologically disturbed areas and in junctions the galleries should be additionally supported by roof bolts of 1.8m / 2.4m length (flexi bolts or hydra bolts) with w-straps. In extreme bad condition additional supporting with steel girders shall be provided. Support system shall follow the DGMS approved Systematic Support Plan.

During Depillaring Stage:

During the extraction of pillars, additional supporting will be required at the goaf edges in the form of breaker line support in order to facilitate caving. The breaker line support roof bolts will be of 2.4m length with 0.8m grid pattern which will be placed during development of split galleries only. The first bolt in a row shall be 0.20m away from the edge of the pillar.

If need be, sides of the pillars are to be supported by two Fiberglass/ reinforced plastic (GPR) based rib bolts of 1.8m length. This support may be required where the height of extraction is more than 3m or areas where spalling of coal pillar is observed.

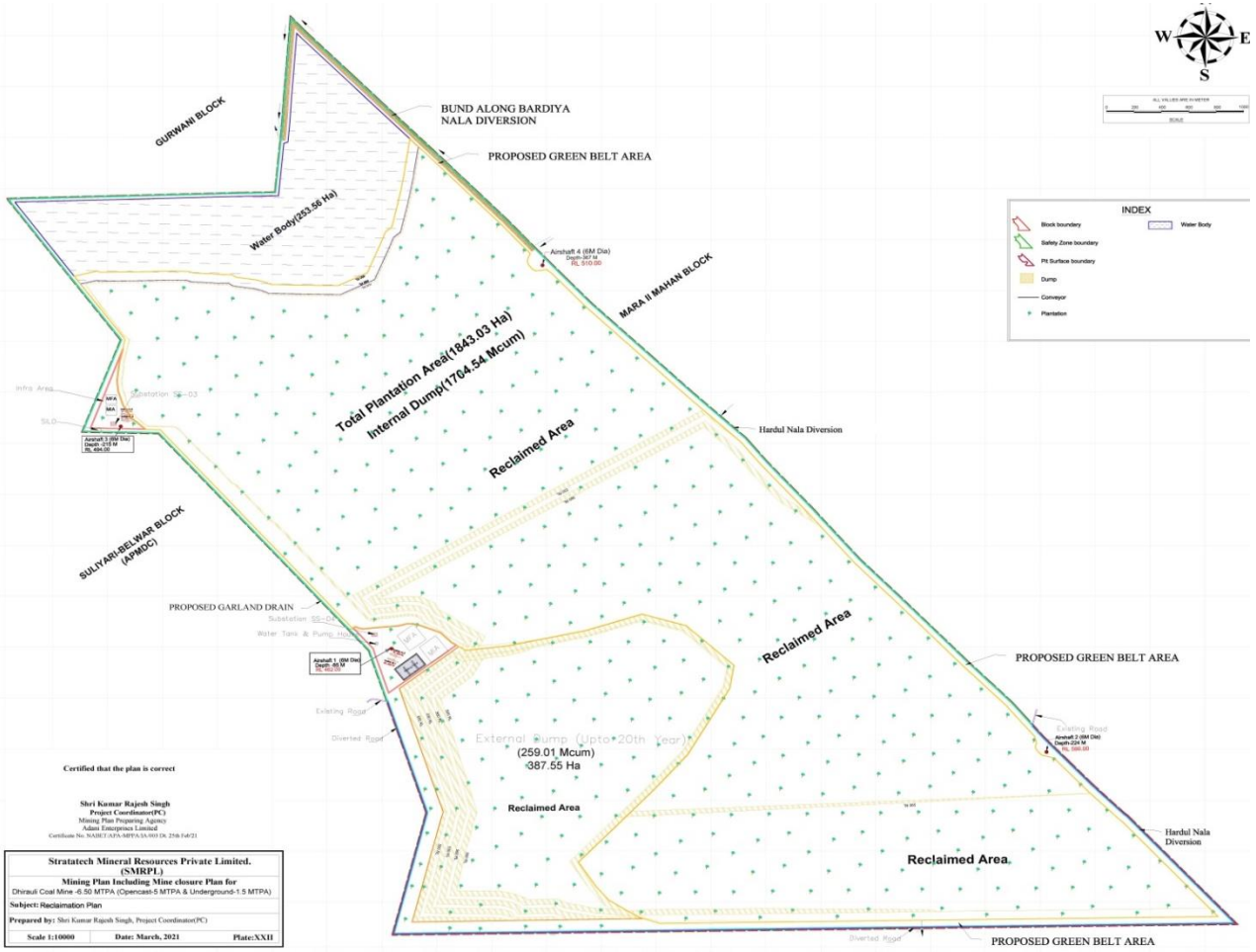


Figure 2.10: Mine Development Plan

2.9.4 Waste Management

2.9.4.1 Nature of Waste to be generated

The overburden consists of soil, weathered mantle, and argillaceous as well as arenaceous rocks. The parting between the two seams consists of argillaceous and arenaceous rocks with thin coal / carbonaceous bands. Overburden and parting up to Seam-VII is considered us OB. Below seam VII underground mining in proposed.

2.9.4.2 Overburden and Inter-burden Dump

The opencast mine is planned upto 280 m depth on the floor of seam-VII with overall average stripping ratio of 10.55 m^3 /te.

The total volume of OB has been estimated as 1963.55 Mcum. The OB removed during initial years will be placed beyond the incrop of the seam VII as external dump. The total volume of external dump has been estimated as 259.01 Mm^3.

The internal dumping will start when about 100 m internal space is available on quarry floor. By adopting the proposed sequence of mining, as the quarry advances, the amount of internal dump will increase as more space for the internal dumping is created.

It is proposed to start internal dumping from 3rd year of mine operation along with external dumping to optimize lead. As the gradient of the seam is flat, during working of the quarry substantial amount of OB can be accommodated as internal dump. After 18th year of mine operation, no external dumping will be required. Hence, OB will be accommodated as internal dump for rest of the mine life. During 1st year, height of external dump will be kept at only 60 m above the ground level. During 3rd year, height of eastern external dump and eastern in-pit dump will be merged by maintaining 90m height above the ground level (RL of 600). At the end of 5th year height of internal dump will be 90m above ground level. At the end of mine life, internal dump will be at 60 above the ground level for some part.

2.9.5 Coal winning & OB Removal

Coal will be mined using Combination of surface miner – FEL – Dumper method. The surface miner shall essentially be used in coal seams for quality improvement. The OBR would be removed using conventional shovel dumper method with drilling & blasting. Drilling & blasting shall be conducted in scientific way using environment friendly technology. Some major system parameters for both coal winning & OB removal are given below: -

Bench Height	
For OBR (12 m^3 Hyd. Shovel)	10-12 m
Top Soil/ Intervening Parting (3-4.5 m^3 excavator) Coal	3-6 m as per thickness
Proposed Bench Width	
Working Bench Width for 12 m3 Hyd. Shovel	20-30m
Non-Working Bench Width for 12 m3 Hyd. Shovel	12-20m
Width of the temporary transport ramp	20 m
Usual height of the Top soil / parting dump bench	12-15m
Usual height of the Hard Rock dump bench	30 m
Bench Slope	
a) OB Bench	70^0
b) Coal Bench	70^0
c) Dump bench	37^0
Overall (Ultimate) pit slope	37^0

Source: Approved Mining Plan, Dhirauli Coal Mine

Table 2.8: Year-Wise Dhirauli Coal Block Solid Waste Management and Other Waste Generation

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-1	16.35	16.35	-	-	16.35	16.35
Yr-2	28.12	44.47	-	-	28.12	44.47
Yr-3	19.36	63.83	13.94	13.94	33.30	77.77
Yr-4	12.39	76.22	20.76	34.70	33.015	110.92
Yr-5	11.64	87.86	21.53	56.23	33.17	144.09
Yr-6	10.5	98.36	24.30	80.53	34.80	178.89
Yr-7	11.34	109.70	24.30	105.19	36.00	214.89
Yr-8	11.55	121.25	25.70	130.89	37.25	252.14
Yr-9	41.97	133.22	26.33	157.22	38.30	290.44
Yr-10	12.11	145.33	26.49	183.71	38.60	329.04
Yr-11	12.81	158.14	27.49	211.20	40.30	369.34
Yr-12	13.02	171.16	28.73	239.93	41.75	411.09

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-13	13.58	184.74	30.32	270.25	43.90	454.99
Yr-14	13.79	198.53	32.11	302.36	45.90	500.89
Yr-15	14.42	212.95	32.88	335.24	47.30	548.19
Yr-16	14.91	227.86	34.09	369.33	49.00	597.19
Yr-17	15.33	243.19	34.72	404.05	50.05	647.20
Yr-18	15.82	259.01	35.03	439.08	50.85	698.09
Yr-19	-	259.01	51.40	490.08	51.40	749.49
Yr-20	-	259.01	52.25	542.73	52.25	801.74
Yr-21	-	259.01	53.30	596.03	53.30	855.04
Yr-22	-	259.01	54.25	650.28	54.25	909.29
Yr-23	-	259.01	55.75	706.03	55.75	965.04
Yr-24	-	259.01	58.25	764.28	58.25	1023.29
Yr-25	-	259.01	60.75	825.03	60.75	1084.04
Yr-26	-	259.01	62.75	887.78	62.75	1146.79
Yr-27	-	259.01	64.00	951.78	64.00	1210.79
Yr-28	-	259.01	64.50	1016.28	64.50	1275.29
Yr-29	-	259.01	65.50	1081.78	65.50	1340.79
Yr-30	-	259.01	65.75	1147.53	65.75	1406.54
Yr-31	-	259.01	66.50	1214.03	66.50	1473.04
Yr-32	-	259.01	67.25	1281.28	67.25	1540.29
Yr-33	-	259.01	67.25	1348.53	67.25	1607.54
Yr-34	-	259.01	67.75	1416.28	68.50	1675.29
Yr-35	-	259.01	68.50	1484.78	68.50	1743.79
Yr-36	-	259.01	68.50	1553.28	69.25	1812.29
Yr-37	-	259.01	69.25	1622.53	68.50	1881.54
Yr-38	-	259.01	53.50	1676.03	69.25	1935.04

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-39	-	259.01	21.50	1697.53	53.50	1956.54
Yr-40	-	259.01	7.01	1704.54	21.50	1963.55
Total	**259.01**	**259.01**	**1704.54**	**1704.54**	**1963.55**	**1963.55**
	259.01		**1704.54**		**1963.55**	

Source: Approved Mining Plan, Dhirauli coal Mine

Table 2.9: Waste Management

Year	Waste Management (Figures in Mm3)						
	Cumulative OB Removal			External Dump (Cumulative)		Internal dump/Backfilling (Cumulative)	
	Topsoil	OB	Total	Top soil	OB	Top soil	OB
Y-01	0.80	15.55	16.35	-	16.35	-	0.00
Y-03	2.20	75.77	77.77	-	53.83	-	23.94
Y-05	2.90	141.09	144.09	-	73.27	-	70.82
Y-10	5.36	3232.68	329.04	0.54	130.20	4.83	193.48
Y-15	7.65	540.55	548.19	0.76	197.60	6.88	342.95
Y-20	9.93	791.81	801.74	0.99	258.02	8.94	533.79
Y-25	12.51	1071.53	1084.04	1.81	257.20	10.71	814.33
Y-30	15.09	1391.45	1406.54	1.81	257.20	13.29	1134.25
Y-35	18.26	1725.53	1743.79	1.81	257.20	16.496	1468.33
Y-40	21.43	1942.12	1963.55	1.81	257.20	19.63	1684.91
Y-45	-	-	-	1.81	257.20	19.63	1684.91

Source: Approved Mining Plan, Dhirauli Coal Mine

Year-wise waste dumping/backfill plan & section is given in **Fig 2.11 to 2.13**.

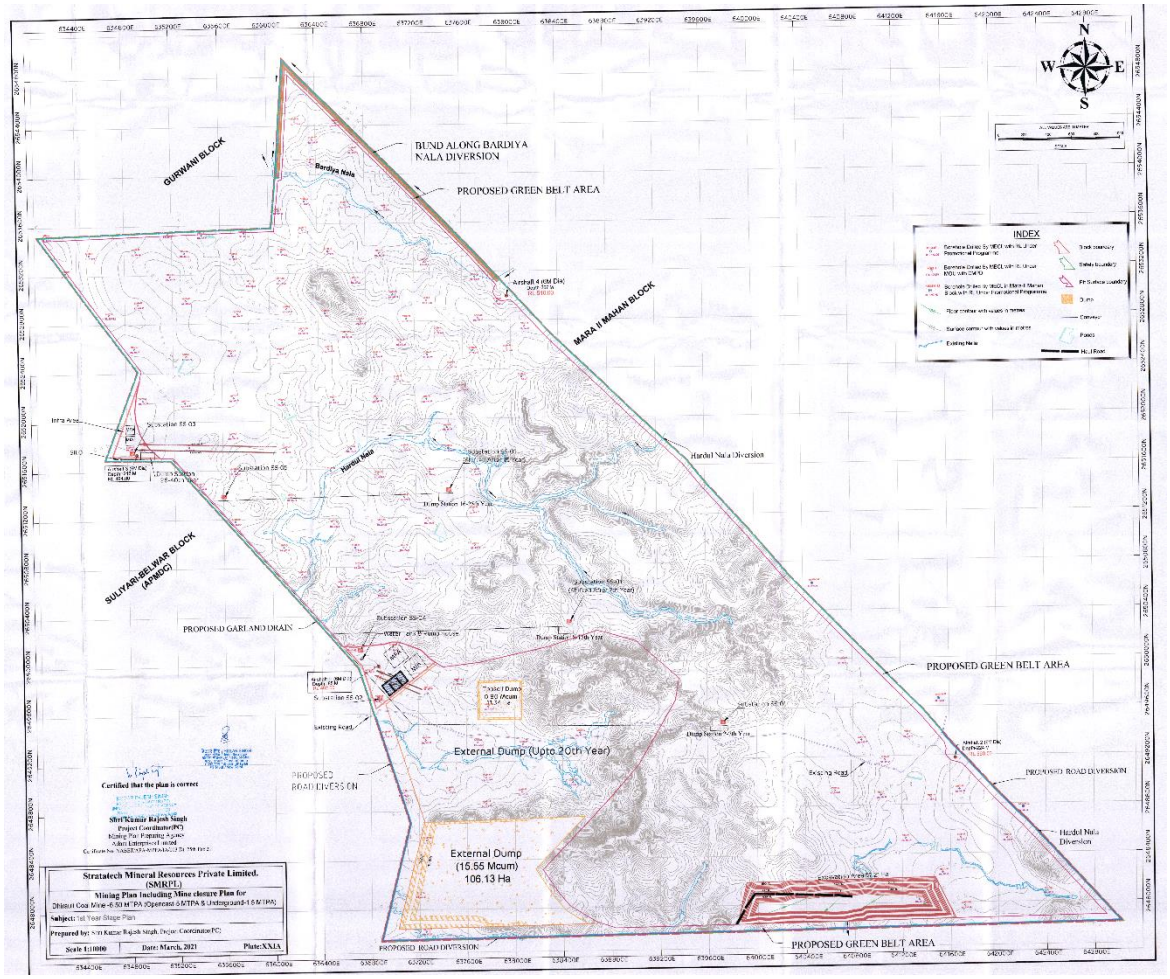


Figure 2.11: First Year Stage Plan

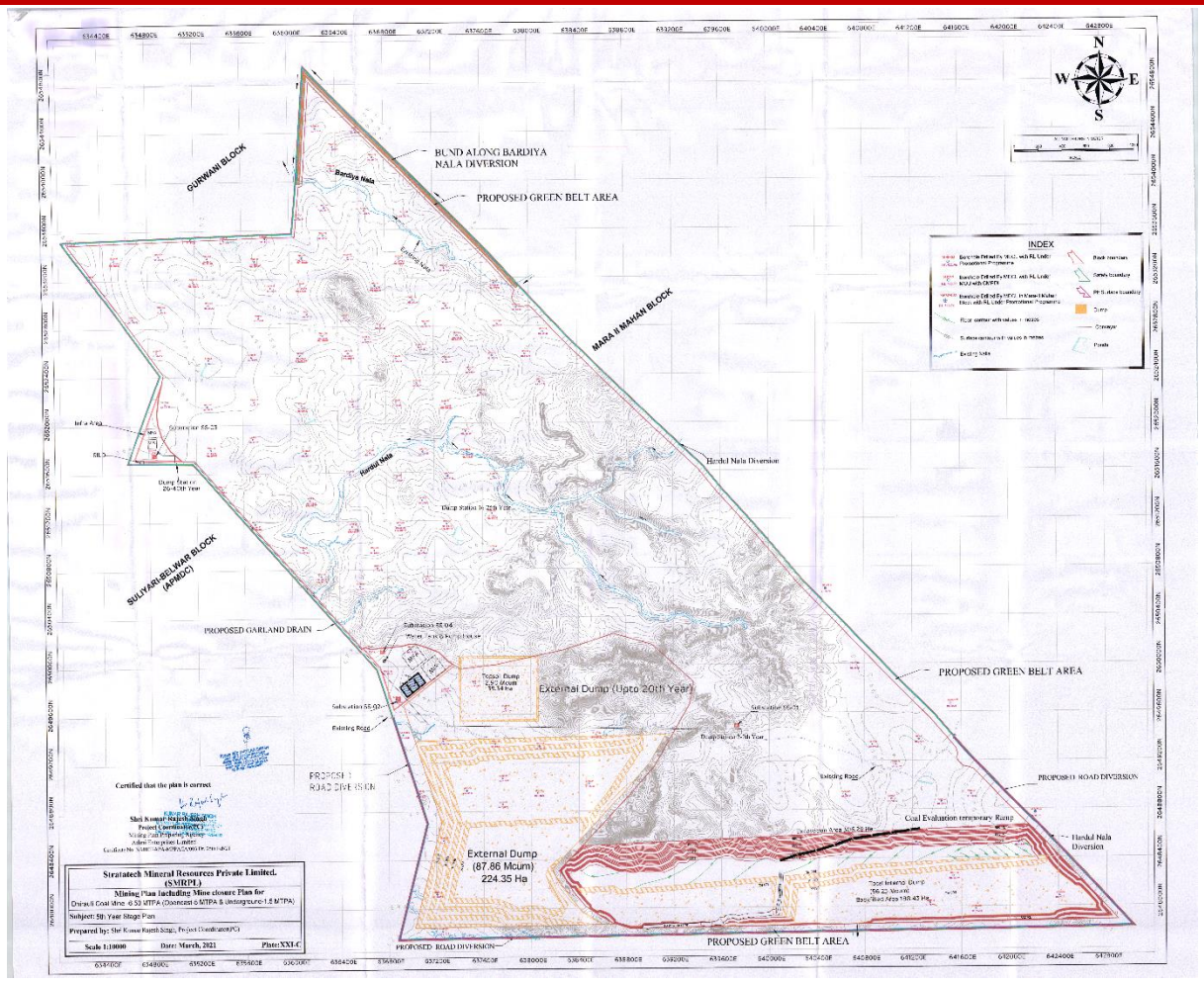


Figure 2.12: Fifth Year Stage Plan

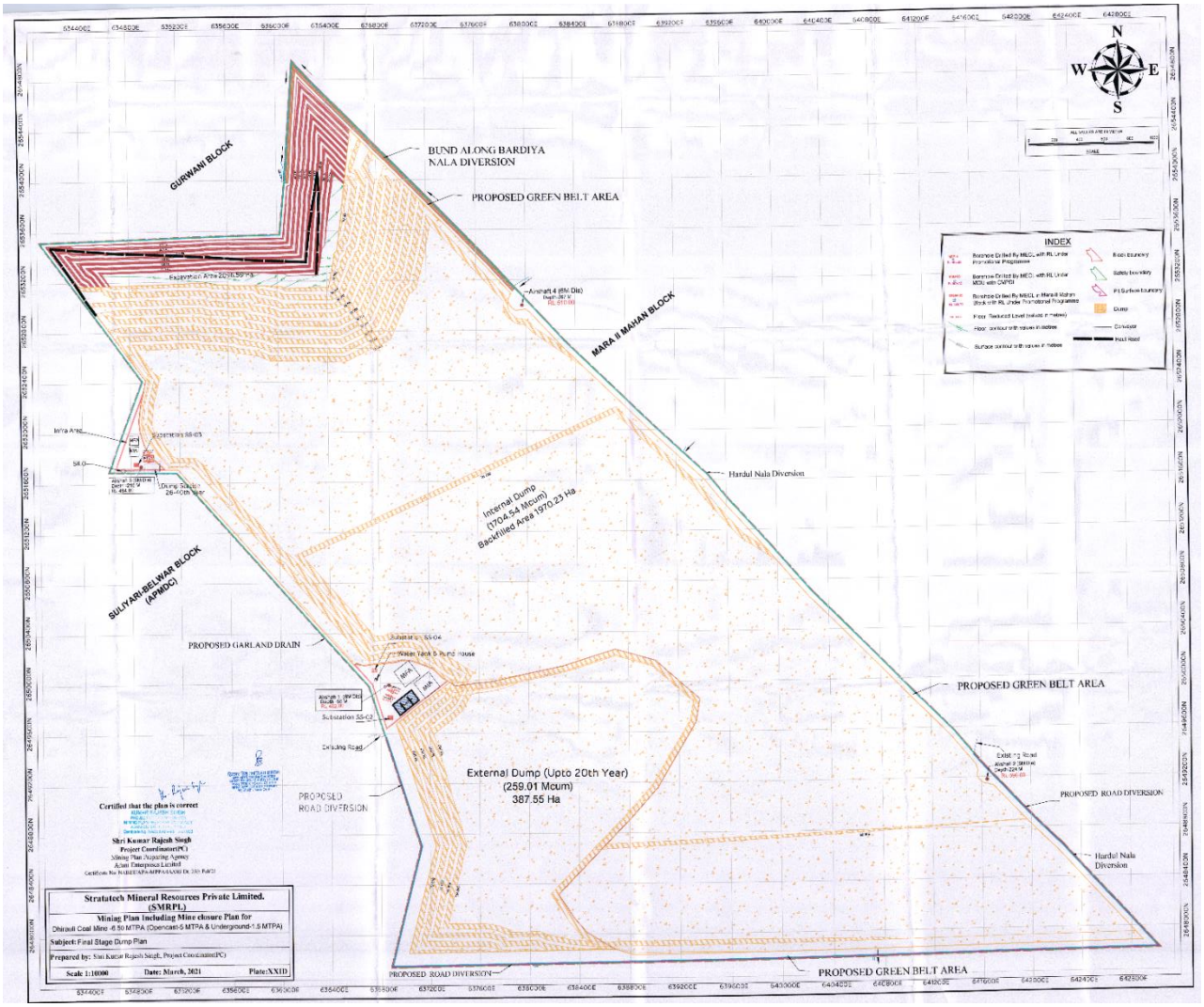


Figure 2.13: Final Stage Dump Plan

2.9.6 Type of Equipment / HEMM proposed

The mine is envisaged to be worked with by combination of opencast and underground mining method. Opencast mining is proposed by Surface miners (SM) - FEL-Truck for coal and drill blast for OB. Underground mining is proposed by Continuous miner (CM).

Overburden

3-4.5 Cum Hydraulic Shovel in combination of 35 T Dump truck and 10-12 cum Hyd. Shovel in combination of 100 T Rear Dumper will be used for removal of overburden. In initial year, 3-4.5 Cum Hydraulic Shovel in combination of 35 T Dump truck will be deployed because of highly undulating topography and parting near around in-crop zone.

Coal

Selective mining is required to control coal quality. It is, therefore, suggested to use surface miner methods of coal extraction for this mine. Surface Miner, 5-6 M^3 pay loaders & 35T Rear Dumpers have been proposed for coal extraction. The list of HEMM and other equipment along with their population at peak production stage is provided below in **Table: 2.10**.

Table 2.10: Major Mining Equipment

Sl no	Particulars	Capacity	No. of equipment
HEMM			
Overburden:			
1.	Hydraulic shovel	3-4.5 cu.m.	20
2.	Rear Dumper	35 T	98
3.	Dozer	410 HP	2
4.	Ripper Attachment		2
5.	Hydraulic shovel	10-12 cu.m.	7
6.	Rear Dumper	100 T	49
7.	Dozer	410 HP	8
8.	Blast Hole Drill	160 mm	15
Coal (OCP)			
1.	Surface Miner	2200/3800	2
2.	Hyd. Shovel	5-6 m3	2
3.	Front End Loader	5-6 m3	3
4.	Rear Dumper	35	22
5.	Wheel Dozer	410 HP	6
6.	Ripper attachment		2
7.	Blast Hole Drill	160 mm	2
Coal (UG)			
1.	Continuous Miner		3

Sl no	Particulars	Capacity	No. of equipment
HEMM			
Overburden:			
	(CM)		
2.	Shuttle Cars		6
3.	Twin Roof Bolting Machines		6
4.	Feeder Breaker with suitable power pack		3
5.	Belt Conveyors		
6.	LHD		3
7.	Material Haulage		
8.	Main & Auxiliary Fan		4
Common			
1.	Hyd. Exc.(Backhoe)	1.2-2.5m3	2
2.	Motor Grader	280 HP	2
3.	Vibratory Compactor	30 T	1
4.	Explosive Van	10T	2
5.	Wheel Dozer	410HP	1
6.	Mobile R.T. Crane	75T	1
7.	R.T. Crane	30T	1
8.	R.T. Crane	8T	2
9.	Front End Loader	5-6M3	1
10.	Water Sprinkler	28 Kl	4
11.	Wagon Drill	100-120mm	2
12.	Diesel Bowser	10KL	2
13.	Tyre Handler		2
14.	Fire Tender		1
15.	Tipping Trucks	10T 2	2
16.	Maintenance Van		2
17.	Ambulance		1

Source: Approved Mining Plan, Dhirauli Coal Mine

Waste generation up to the end of mine life is given at **Table 2.11**.

2.9.7 Generation & Disposal of Topsoil

Topsoil is proposed to be removed separately and dumped outside the quarry in a manner so as not to lose its fertility. The topsoil would be spread over the reclaimed land, afterward. Topsoil will be removed and dumped on the area shown on surface plan. Topsoil will be stored for initial four years and during subsequent years it will be

directly spread over the reclaimed area. The phase-wise generation of topsoil is given in **Table 2.11.**

Topsoil details:

1. Height of Topsoil dump: 3-6 meters.
2. Year of reclamation: after 5th year of mine operation.

Table 2.11: Topsoil Generation

Year	Topsoil Generation, Mcu.m
1	0.80
2	0.90
3	0.50
4	0.40
5	0.30

Source: Approved Mining Plan, Dhirauli coal Mine

Table 2.12: Topsoil Management

		Topsoil Used				
Year	**Topsoil Removal Plan**	**Spreading over Embankment**	**Spreading over Backfilling area**	**Spreading over External Dump area**	**used in Green Belt area**	**Total Utilised**
Y-01	0.80	-	-	-	-	-
Y-03	2.20	-	-	-	-	-
Y-05	2.90	-	-	-	-	-
Y-10	85.36	-	4.83	0.54	-	5.36
Y-15	7.65	-	6.88	0.76	-	7.65
Y-20	9.93	-	8.94	0.99	-	9.93
Y-25	12.51	-	10.71	1.81	-	12.51
Y-30	15.09	-	13.29	1.81	-	15.09
Y-25	18.26	-	16.46	1.81	-	18.26
Y-40	21.43	-	19.63	1.81	-	21.43

Source: Approved Mining Plan, Dhirauli coal Mine

2.10 Coal Handling Plant

The total coal production from this mine has been proposed as 5 MTPA from OCP and 1.5 MTPA from UG mine. Independent CHP- dump station/ train loading stations have been proposed to handle the entire production of ROM coal from this mine.

No crushing and screening are considered, since the mining method for extracting coal is surface miner from OCP and Continuous Miner from UG mine.

The coal handling plant shall have facilities for receiving coal from rear discharge dumpers via dump station, conveyor and loading into wagons by wagon loading system. Enough ROM storage provision has been provided in the coal handling system to meet the eventualities of disrupted coal production in the mine or dispatch irregularities. The plant will be operated in synchronization with the production of the mine. The coal handling plant shall also be provided with suitable repair, communication, and other auxiliary facilities to meet the day-to-day requirement in the plant operation.

The CHP has been planned to keep in view the rugged terrain. The following factors have been considered in finalizing the location of CHP:

a) Mine Lease Boundary
b) Location of quarries
c) Entry of Each quarry
d) Topography
e) Availability of free space
f) External dumps of the mine
g) Proposed Evacuation system

2.10.1 System Description

The handling capacity of the CHP has been decided to match with the production capacity of the mine. The system capacity has been considered based on mine's production and to meet any fluctuations of coal output from the mine or due to irregularities of dispatch / transport system and seasonal fluctuations. The coal handling plant shall be designed to match the mine production rate of 5 million tons per year (MTPY) from Dhirauli coal block, in planned mine production hours. The scheme for coal handling plant facility has been described below, which meets the functional requirement of the coal handling facility.

The facilities have been designed to consider regulation on environmental aspects so that the coal handling is possible in an environmentally acceptable manner. Safety devices have been provided to allow safe operation of all the facilities i.e. conveyors alarms, trip switches, interlocks, emergency trip system reclamation purposes. As per mine plan total mine production is 6.5 MTPA (including UG production). Accordingly CHP is planned with the system capacity as 850 TPH rated and 935 TPH design, keeping the peak production capacity in mind.

Dump trucks will discharge ROM coal to Coal receiving station which has adequate receiving and conveying equipment's to handle and deliver the coal into wagons for further transport.

In the initial year surface conveyor will planned from south side of the mine to north side of mine without any inpit conveying system. As mine progress from south side to north side the Dump station will be relocated to new pit location.

Accordingly to suit the new dump station location as per mine plan requirement Conveyor will be retrieved in different years of operations. In retrieving the conveyor system (5 MTPA -OCP), certain length of conveyor will be dismantled to suit the mine pit boundary location. For underground production separate fixed conveyor unit is planned.

As dispatch will be done in northern side of mine and small stockpile of adequate capacity will be made near norther side of mine and coal from stockpile will be load into rapid loading silo to load the rake in about 1 hour time.

Transportation of the mineral for initial five years will be done by the Trucks and post that evacuation of coal may be done through overland conveyor or to the nearest railway siding. As Dhirauli being the commercial coal block, MSME and other consumers are to be catered; hence limited coal transportation may also be done through road.

2.11 Mine Water

Water accumulates in course of mining and has to be constantly pumped out for safety of men and machines Mine water is generated from two sources (a) ground water: as the quarry goes deeper, more and more aquifers are intercepted and volume of water increases, (b) rain water: direct precipitation over the excavated area and surface run-off flowing into the mine during rains. For reducing the run-off, garland drains will be constructed around the excavated area and the top of backfilled. area will be given a grade, so that rainwater flows outwards. However, a portion of the rain water will always find way in the quarry.

The pumped out water of the quarry generally contains high TSP and in some cases dissolved minerals making the water acidic. Though a substantial portion of this water is used within the mine for industrial use viz. HEMM washing / workshop use / CHP and for dust suppression and forestation, it is not advisable to discharge the surplus water to the general drainage system without treatment, lest the surrounding will be contaminated. To mitigate this, it has been proposed to conduct the water to a Sedimentation Pond of 10,000 cu.m. from where the water will collect in clear water sump. During actual mining, it will be decided whether raw water treatment will be needed to avoid high turbid water supply. After treatment, the water is distributed by pumping to consuming points. And the surplus water allowed to flow out. Regular sampling of surplus water shall also be conducted.

2.11.1 Water accumulation in mine

Hurdul Nala flows from east to west, from the center of block, Catchment study for the nalla to be carried out. All required precaution against inundation would be taken care of.

A careful assessment shall be made against the danger from surface water before the onset of rainy season. Garland drains shall be provided to drain away the surface rainwater from the mine excavated area. Adequate capacity of pumping will be installed. All pumps in designated sumps will be mounted on floats to prevent drowning in case of unwarranted heavy rainfall. Inspection for any accumulation of water, obstruction in normal drainage and weakening of embankment shall be carried out regularly.

2.12 Social impact assessment (SIA)

Social Impact Assessment study has been conducted in the project area copy of SIA is attached as **Annexure XII**.

2.13 Resource requirement

2.13.1 Power Requirement

The power requirement shall be fulfilled from the nearby 132/33kV substation at Dongri village. 33kV line shall be taken up to the CHP area and further power distribution for CHP equipment, mine pit water pumping, and illumination shall be carried out as per requirement at 7.233 MW and 415 V through overhead line and cables as suitable.

2.13.2 Water Requirement

The demand of water for the project has been estimated as per industrial norms. The requirement of water for various purposes has been furnished below in **Table 2.13.**

Table 2.13: Water Requirement for Mining

Sl.no.	Industrial water	m^3 /day
1	Water requirement for sprinkling at mine haul roads	340
2	Service water requirement for CHP & dust suppression system	500
3	Water requirement for Base Workshop & other miscellaneous purposes	100
4	Water requirement for green belt development and biological reclamation	750

5	Evaporation loss	20
6	Potable Water (Drinking and sanitation water requirement in Mine)	50
Total		**1760**
Add 10 % design allowance		176
Net water demand		**1936**
Considering 18 hrs/day of operation		107.5555556

2.13.2.1 Source of water

It is envisaged that to meet the requirement of water for construction, drinking and sanitation as well as mine operation, at the initial stage of 2- 3 years, will be met from ground water. PP has obtained the NOC from Central Ground Water Authority (CGWA) vide NOC no. CGWA/NOC/MIN/ORIG/2022/15765 which is valid from 15.06.2022 to 14.06.2024 copy is attached as **Annexure VI**. Water sourced from bore well will be treated to make potable water.

After that mine quarry will collect sufficient water which will meet the industrial demand. However, the potable water demand at mine, mine facilities will be met through ground water by bore wells.

2.13.3 Manpower

Mine shall provide an opportunity of direct and indirect employment to 970 peoples.

2.13.4 Proposed Investment

Total cost of the proposed mining project is estimated as **Rs. 2800 Crore**.

2.13.5 Site Services

The project being green field, all necessary structures must be developed before and during commencement of mining operation. Facilities such as Coal Handling Plant (CHP), maintenance and electrical workshops, stores, Explosive Magazine, Power supply, Access roads to Mine site, Telecommunication, housing, offices, first aid centre/hospital, canteen, Vocational training centre and other necessary facilities will have to be developed. Workshop area will house facility for the servicing of light vehicles, HEMM, wash bays, warehouse etc.

2.14 Transportation

2.14.1 Mineral Transportation: Within Mining Lease

Coal evacuation is planned from advancing face and no permanent haulage road is planned for the block. Loaded coal from mine head shall be transported by dumpers up to Coal Handling Plant. Subsequently, coal will be unloaded in a ground hopper. Overburden and inter-burden will be loaded by 10-12 m^3 capacity hydraulic excavators into 35 t capacity dumpers which will be transported to either proposed dump or backfill in different stages of mining operation.

2.14.2 Mineral Transportation: Outside the mine lease area

As Dhirauli Coal Block being a commercial block MSME & other consumers are to be catered the transportation of coal shall be carried through Road & Rail.

2.15 Land use

The lease area confirms to the land use policy of the state. The validity period of Mining lease over an area of 138.96 ha was extended as per the MMDR Amendment Act, 2015 till 29.09.2058 (i.e., 50 years from 30.09.2008). Class / type of different land uses as are given below in **Table 2.14 to Table 2.16**:

Table 2.14: Village Wise Land Use

Sr.No	Name of the village	Forest land	Non-Forest land
1	Aamdand Village	7.49	43.57
2	Amraikhoh Village	2.38	110.77
3	Basi Bedrah Village	0.0	200.96
4	Phatpani Village	0.0	62.88
5	Belwar Village	0.0	41.49
6	Dhirauli Village	52.32	707.72
7	Jahalari Village	0.0	98.35
8	Sirswah Village	0.0	8.72
9	Reserve Forest	1335.35	0.00
	Total	**1397.54**	**1274.46**

Table 2.15: Village Wise Land Use Break up as per Forest, Revenue and Government Land

Sl. No.	Village	Private Land	Govt. Land	Revenue Forest	Reserve Forest Land	Total Land
1	**Aamdandh**	25.39	18.18	7.49		**51.06**
2	**Amraikhoh**	41.73	69.04	2.38	214.4	**327.55**
3	**Basi Berdah**	151.610	49.35		537.17	**738.130**
4	**Belwar**	30.83	10.66			**41.49**
5	**Sirswah**	4.9	3.82			**8.72**
6	**Dhirauli**	195.01	512.71	52.32	571.6	**1331.64**
7	**Jhalari**	72.47	25.88			**98.35**
8	**Phatpani**	31.6	31.28		12.18	**75.06**
G. Total		553.540	720.92	62.19	1335.35	**2672.00**

Table 2.16: Pre-Mining Land Use Plan

Ownership	Type of Land	Area, (Ha)
Tenancy Land	Agricultural	553.54
	Township	
Sub Total		553.54
Govt Non-Forest Land	Grazing	720.92
	Barren (Road)	
	Water bodies	
	Other	
Sub Total		720.92
Forest Land	Protected Forest land	1335.35
	Rev Forest (CJBJ)	62.19
Free hold		
Sub Total		**1397.54**
Grand Total		**2672.00**

Source: Approved Mining Plan, Dhirauli Coal Mine

Table 2.17: Post Mining Land-use

Mining Activity	Proposed Land Use	Land Use (End of	Agricultur e Land	Plantation	Water	Public	Forest land	Undisturb	Total
Excavation Area	2,096.59	2,096.59	-	1,843.03		-	1843.03	-	1843.03
Backfilled Area (in Excavation Area	1,796.23	1,796.23	-	1,843.03	-	-	1843.03	-	1843.03
Excavated Void (in Excavation Area)	300.36	300.36	-	-	253.56	-	-	-	253.56
Topsoil Dump	35.34 (Upto 5th Year)	35.34 (Upto 5th Year)	-	-	-	-	-	-	0.00
External Dump	387.55	387.55	-	387.55	-	-	387	-	387.55
Safety Zone	19.73	19.73	-	19.73	-	-	19.73	-	19.73
Haul Road between quarries	-	-	-	-	-	-	-	-	0.00
Road diversion	4.13	4.13	-	-	-	4.13	-	-	4.13
Settling pond	2.20	2.20	-	-	2.20	-	-	-	2.20

Road & Infrastructure area	20.80	20.80	-	20.80	-	-	20.80	-	20.80
CHP & Washery	8.10	8.10	-	8.10	-	-	8.10	-	8.10
Coal Evacuation Route & Approach Road	1.15	1.15	-	1.15	-	-	1.15	-	1.15
Garland drains	5.34	5.34	-	5.34	-	-	5.34	-	5.34
Embankment	7.50	7.50	-	7.50	-	-	7.50	-	7.50
Green Belt	46.80	46.80	-	46.80	-	-	46.80	-	46.80
Water Reservoir	-	-	-	-	-	-	-	-	0.00-
Rationalization area	72.11	72.11	-	72.11	-	-	72.11	-	72.11
Total (exclude back filled void & Topsoil area)	**2672.00**	**2672.00**	**-**	**2412.11**	**255.76**	**4.13**	**2412.11**	**-**	**2672.00**

Source: Approved Mining Plan, Dhirauli Coal Mine

Post Mining Land Use plan and section is given in **Plate 5.**

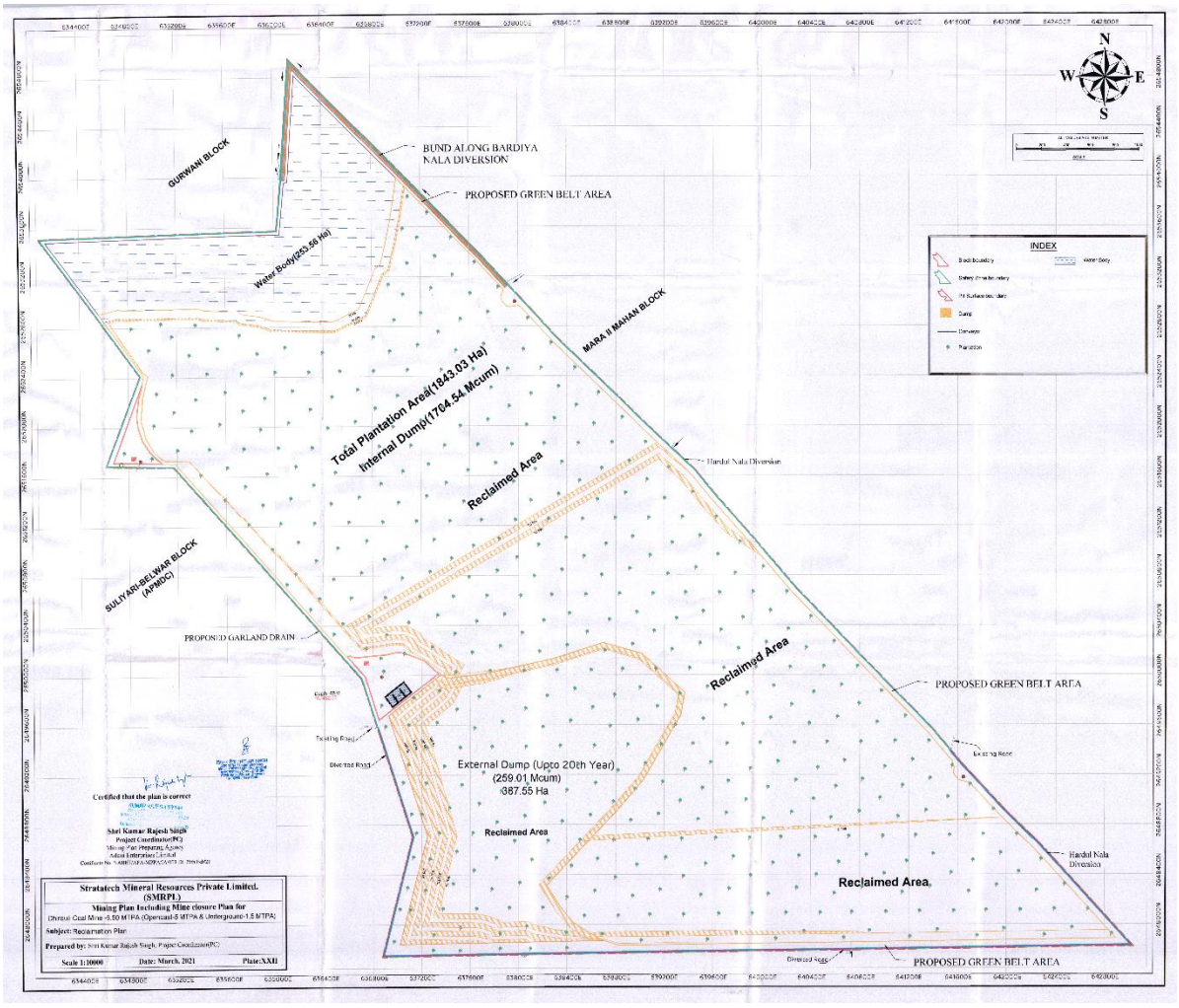


Figure 2.14: Final reclamation Plan

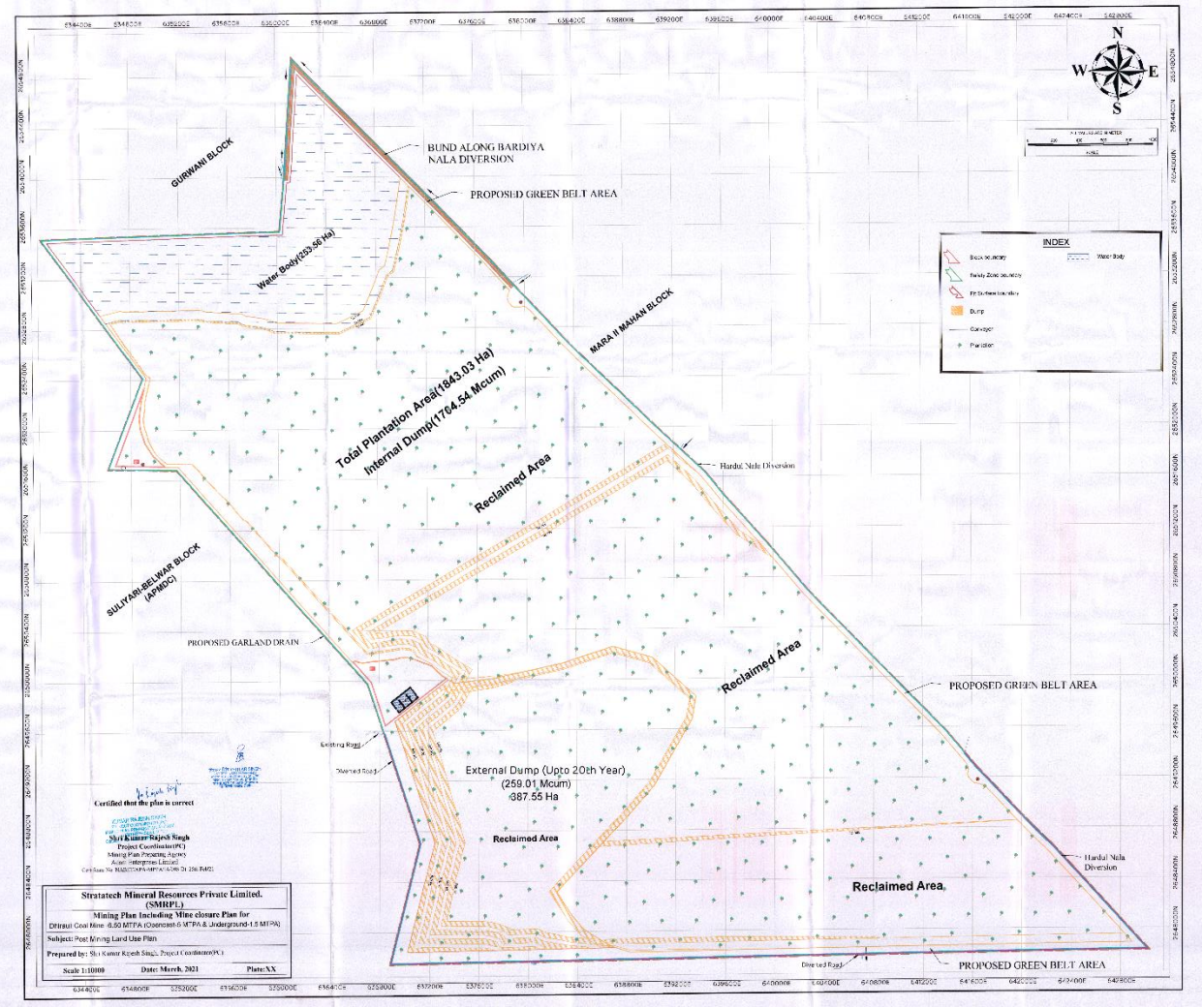


Figure 2.15: Post Mining Land Use Plan

2.16 Assessment of New & Untested Technology for the risk of Technological Failure

Process of production of mineral though open cast and underground mining method and operation of mine are well proven technology all over the world.

2.17 Description of mitigation measure incorporated in to the project to meet environmental standard, environmental operating conditions or other eia requirements

The equipment / facilities proposed below, are prescribed to meet the environmental standards and in most of the cases to keep below the prescribed standards. The environmental aspect, impact and proposed mitigation measures are given below in **Table 2.17.**

Table 2.18: Mitigation Measures for Pollution Control

Location	Pollution control facility
AIR POLLUTION	
Mining	
Drilling	• Wet drilling facility / Drill with dust extractor shall be provided
Blasting	• SME explosive with Raydet /Nonel delay detonators and proper design of blast and using muffle.
Transportation of Mineral	• Water sprinkling on haul road. • Grader will follow water sprinkler • Plantation along both sides of haul road
Coal Handling Plant	
Receiving Hopper	• Apron Feeder and Feeder Breaker is proposed to be enclosed in covered structure. A dust extraction, collection and disposal system would be installed.
WATER POLLUTION	
General	
Treatment of Bore hole water for drinking & sanitation	• Chemical Treatment
Treatment of Domestic Effluent	• Through septic tank & soaking pits
Mining	
Surface run-off flowing into mine	• Retaining Wall/Bunds at the toe of waste dumps Garland drain along with series of settling pits around excavated area and around toe of waste

Location	Pollution control facility
	dumps
Pump-out water from Mine for Industrial purpose	• Mine water shall be utilized for industrial purpose only
Pump-out water from Mine to drain and for Industrial use	• Sedimentation Pond
To arrest the sediments and prevent silting of the water courses by the run-off during rain from OB Dumps	• Toe-walls / retaining walls with weepholes at strategic stretches • Settling pits • Garland drains
NOISE POLLUTION	
Blasting	• SME explosive with Raydet /Nonel delay detonators and proper design of blast and using muffle. • Regular monitoring through Seismograph.
Control of Noise at the boundary of Mine	• Plantation
WASTE MANAGEMENT	
Waste dump management	• Garland drain along with Settling tank will be provided
	• Retaining Wall at the Toe of the Waste Dump
	• Proper terracing of the dumps • Biological Reclamation
	• Slope stability
Management of Topsoil	• Separate stacking of topsoil in earmarked places. • Use of topsoil for plantation on waste dump, green belt development and reclamation

3. DESCRIPTION OF ENVIRONMENT

This chapter illustrates the description of the existing environmental status of the study area with reference to the major environmental attributes. The existing environmental setting is considered to establish the baseline conditions which are described with respect to physical environment, air environment, water environment, noise environment, vibration, traffic pattern and density, land environment, biological environment, and socio-economic environment.

The monitoring of environmental parameters has been conducted within the core zone and buffer zone (10 km radial distance) from project site at Village: Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar, Tehsil: Sarai, District: Singrauli, Madhya Pradesh, in accordance with the guidelines issued by the Ministry of Environment, Forests and Climate Change, CPCB, and SPCB, during the study period (pre-monsoon season - March to May 2021).

The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorological conditions, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment, Socio-economic status, Demographic profile, Traffic density, Geology and Hydrology etc. within the study area of 10 km. radius.

This baseline environmental study reveals information on existing environmental scenario.

- Delineation of project site and study area.
- Delineation of the environmental components and methodology
- Delineation of study period.
- Delineation of the location and description of its surroundings based on secondary data.

Based on the baseline data, environmental impact assessment is carried out, mitigation measures proposed, and Environmental Management Plan is prepared.

3.1 STUDY AREA

Studies of various environmental parameters have been done within 10 km radius area of the Mining lease area. The impact identification always commences with the collection of baseline data such as Ambient Air Quality, Micro-Meteorology, Ground and Surface Water Quality, Noise levels, Soil Quality, Land use pattern, Biological Environment and Socio-economic aspects, Solid and Hazardous waste, Risk Assessment, Geology and Hydrology within the study zone of 10 km. radius.

3.2 STUDY PERIOD

The baseline environmental study has been carried out during pre-monsoon season i.e March to May 2021 by Vimta Lab, NABL Accredited Lab, in accordance with the guidelines of EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi. Secondary data was collected from different Government sources. The scope of the study has been done as per standard ToR letter.

3.3 COMPONENTS AND METHODOLOGY

The data was collected from both primary and secondary resources. The baseline information on micro-meteorology, ambient air quality, water quality, noise levels, soil quality are largely drawn from the data collected by Vimta Lab. Micro-meteorological data was recorded using an automatic weather at site. Ecology and Social economic survey have been carried out by the expert of M/s Vardan EnviroNet. Apart from these, secondary data have been collected from nearest IMD Station atSidhi. Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Planning Organization, Forest Department, Central Ground Water Authority, etc.

The studies involved conducting field studies and analyzing various parameters that might be affected due to the project and conducting socio-economic survey among the people. For reconnaissance survey the sampling locations were identified based on:

- Existing topography and meteorological conditions
- Location of human habitation and other sensitive areas present in the vicinity of the proposed project site.
- Representative areas for baseline conditions.
- Accessibility for sampling

The scoping and extent of data collection were formulated based on interdisciplinary team discussions, and professional judgment keeping in view of ToR issued by MoEF&CC. The baseline studies started with reconnaissance survey and site visits in the studyarea and the meteorological condition of the area for fixing the monitoring locations for collection of the primary data. Secondary data has been collected from various Government and other organizations. Various parameters surveyed and studied for the baseline study are tabulated below in **Table 3.1**:

Table 3.1: Environmental Components and Their Methodologies

S. No.	Environmental components	Parameters	Methodology	Done By
1	Air	Meteorology (Temp., RH, WS, WD, RF)	USEPA (Meteorological Monitoring guidance for regulatory modeling applications)	Vimta Lab
		Ambient Air Quality (PM_{10}, $PM_{2.5}$, SO_2, NOx, CO)	IS-5182, CPCB (guidelines for measurement of Ambient Air Pollutants).	
2	Water	Water Quality (Surface & Ground)	Standard limits: Surface-IS:2296 Ground-IS 10500 Sampling Methodology-IS: 3025	Vimta Lab
3	Noise	Ambient Noise Quality (Lmax, Lmin, Leq)	IS:9989 (Assessment of noise with respect to community response)	Vimta Lab
4	Soil	Soil Quality (pH, EC, BD, Infiltration, Texture, SAR, Key nutrients, OM, OC, Fe, Zn and Cu)	Sampling Methodology and Analysis- IS: 2720	Vimta Lab
5	Land Use	Land use types, Land schedules, Satellite imagery	Bhuvan, NRSA	Vardan Environet
6	Ecology	Ecology studies (Floristic diversity, Terrestrial ecosystem sustainability, green belt development, sinking capacity of pollutants)	Field Study / Secondary Data	Vardan Environet
7	Socio Economic	Demography and Occupational details, agricultural situation etc.	Census, District report Public Consultation by Questionnaire survey	Vardan Environet
8	Hydrology & Geology	Geological, hydrological, geomorphologic studies	Geological Survey of India	Vardan Environet

S. No.	Environmental components	Parameters	Methodology	Done By
9	Traffic Study	PCU/hr., LOS	IRC 64:1990	Vardan Environet

3.4 Establishment of baseline for valued environmental components, as identified in the scope

The scope of the study is as per ToR letter issued by MoEF&CC vide File no. **J-11015/49/2021-IA-II (M)]** dated **03.08.2021**.

3.4.1 Micro-Meteorological Data

Micro-meteorological data of the project site during the air quality survey period is an indispensable part of air pollution study. To understand, the micro-meteorology data has been collected from both secondaryand primary sources:

3.4.2 Secondary Data

Historical data on meteorological parameters also plays an important role in identifying the general meteorological status of the region. The data collection in the field is compared with the historical data to identify changes, which may have taken place during the course of time.

The latest secondary data for 30 years (1981-2010) is procured from the IMD, Sidhi for observing parameters like Temperature, Relative Humidity, Rainfall, Wind Speed and Wind direction in the Sidhi district of MP. The IMD data for Sidhi is given in **Table 3.2**.

3.4.2.1 Temperature

The pre-monsoon season, the mean maximum temperature (May) was observed to be 41.9°C with the mean minimum temperature at 16.1°C (March). The mean maximum temperature in the monsoon season was observed to be 39.1 °C in the month of June whereas the mean minimum temperature was observed to be 24.2°C in the month of September. By the end of September with the onset of post-monsoon, day temperature decreases slightly with height. Maximum temperature 33°C was observed in October and the lowest minimum temperature was observed 13.8°C during November. In winter season (December to February), the mean monthly maximum temperature at 27.9°C in February and the mean monthly minimum temperature at 8.8 °C in January. The monthly variations of temperature are presented in **Table 3.2.**

3.4.2.2 Relative Humidity

The air is generally humid in this region during the entire year.The relative humidity at 08:30 hr. was observed with a maximum of 83% and a minimum of 21%, at 17:30 hr. The monthly variations in the relative humidity are presented in **Table3.2.**

Table 3.2: Climatological Data Station: IMD- Sidhi

Month	Atmospheric Pressure (mb)		Temperature (^{0}C)		Relative Humidity (%)		Rainfall (mm)
			Mean Max	Mean Min			
January	985.9	982.6	24.6	8.8	76	46	20.5
February	983.7	980.3	27.9	11.5	67	38	22.7
March	980.9	977	33.5	16.1	50	26	11.4
April	977	972.7	39.2	21.9	38	21	7.3
May	972.9	968.8	41.9	26.3	42	26	13.8
June	969.3	965.6	39.1	27.6	58	47	117.2
July	969.3	966.4	33.5	25.7	79	71	340.3
August	971	968	32.3	26.2	83	75	316.8
September	974.7	971.5	32.6	24.2	81	71	244.1
October	980.4	977	33	19.9	74	52	35.2
November	984.5	981	29.9	13.8	71	47	6.9
December	986.6	983	26.4	9.1	73	50	7.1
Total							**1143.3**

Source: IMD Climatological Normal 1981-2010

3.4.2.3 Atmospheric Pressure

The maximum pressure observed were 986.6 mb at 08:30 hr. in the month of December. The minimum pressure observed were 965.6 mb at 08:30 hr during the month of June in monsoon season. The pressure levels are found to be consistent over the region. The monthly variations in the pressure levels are presented in **Table 3.2.**

3.4.2.4 Rainfall

The average annual rainfall based on the 30 years of IMD data, was observed to be 1143.3 mm. The monsoon sets in the month of June and continues till October. The maximum amount of rainfall (340.3 mm) occurring in the month of July. Monthly variations in the rainfall for past 30 years are given in **Table3.2.**

3.4.2.5 Wind Speed/Direction

Generally, light to moderate winds prevail throughout the year. The seasonal wind rose has been prepared based on secondary data are presented in **Figure 3.1**the summary of wind pattern at IMD, Sidhi is given in **Table 3.3**.

Table 3.3: Summary of Wind Pattern–IMD Sidhi

Season	First Predominant Winds	Avg. Wind Speed (Km/hr)	Calm Condition (%)
March	W (32%)	1.4	81
April	W (33%)	1.2	72
May	W (27%)	1.3	62

Source: IMD Climatological Normal 1981-2010

3.4.3 Primary Data

3.4.3.1 Temperature

Maximum temperature of 40.6^{o}C and minimum temperature of 10.8^{0}C was recorded during the study period. Maximum temperature was observed in April and minimum temperature was observed during March in the study period.

3.4.3.2 Relative Humidity

During the period of observation, the relative Humidity recorded ranged from 93% to 3%. Maximum humidity was observed during the month of May.

Table 3.4: Summary of the Meteorological Data Monitored at Site (Primary Data)

Month	Temperature (ºC)		Relative Humidity (%)		Rainfall (mm)	Atmospheric Pressure (mb)	
	Max.	Min.	Max.	Min.		Max.	Min.
March	39.3	10.8	70	3	0	690	679
April	40.6	14.1	51	3	0	963	952
May	40.1	20.3	93	8	0	959	949

Source: Primary On-site Data Collected by Vimta lab

3.4.3.3 Pressure

The maximum pressures observed were 963mb in the month of April and the minimum pressure were observed 679mb in the month of March. The pressure levels are found to be consistent over the region.

3.4.3.1 Rainfall

During the period of baseline data collection, no rainfall was observed.

3.4.3.1 Wind Speed/Direction

The wind roses for the study period representing winter season are shown in Figure-3.2. A review of the wind rose diagram shows that predominant winds direction from W-E.

3.4.3.4 Interpretation

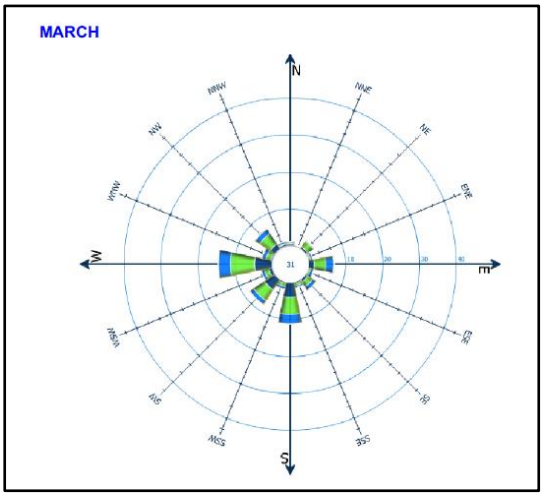
The India Meteorological Department (IMD) records the data at two times a day viz. 08:30 hr and 17:30 hr while the site-specific data has been recorded at an hourly interval. On comparison of site-specific data generated for study period vis-à-vis the IMD data, slight variations were found. The following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

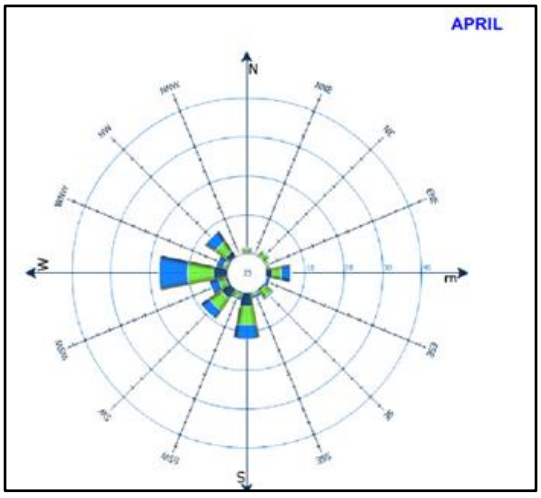
The temperature recorded on site when compared vis-à-vis the IMD data, slight variations was found. The maximum and minimum temperatures recorded at site during study period were 40.6^{o}C and 10.8^{0}C, whereas the maximum and minimum temperature recorded at IMD, Sidhi for the same season is 41.9^{0}C and 16.1^{o}C respectively.

The relative humidity was observed to range from 93% to 3% during the study period whereas according to IMD, Sidhi data the relative humidity in the same season was observed to range from 50% to 21 %. The variation could be because of the fact that the RH values considered for the site are actual values while the range of IMD, Sidhi data represents the average values for 30-year period.

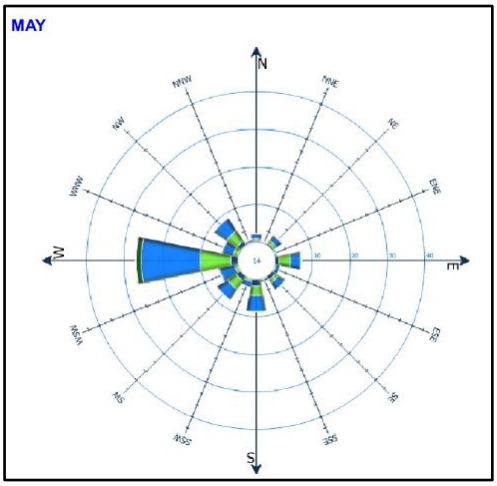
During the study period was observed that the predominant direction in W-E followed. The variation could be because the values considered for the site are actual values while the range of IMD, Sidhi data represents the average values for 30-year period.

The data obtained when compared with IMD data are found to be consistent the data generated at continuous monitoring station at mine site when compared with the data recorded at IMD, it can be observed that the data generated at the site is broadly compatible with regional meteorology, except minor variations as described above.





March **April**



May

Figure 3.1: Secondary Data Wind Rose

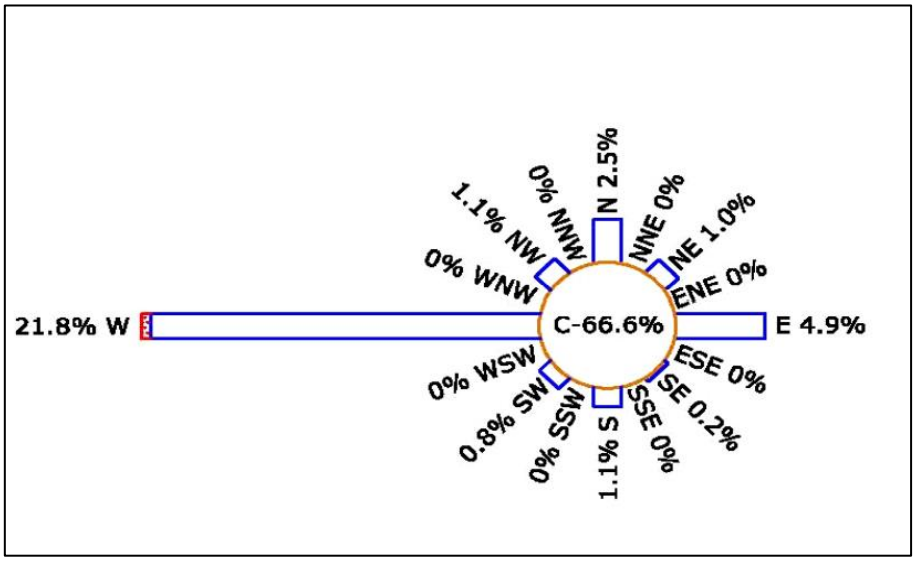


Figure 3.2: Wind Rose Diagram of Study Period (March to May 2021)

3.4.4 AIR ENVIRONMENT

The baseline air quality was established by monitoring major air pollutants like suspended particulate matter, Sulphur di-oxide, oxides of nitrogen, carbon monoxide and free silica at various locations near the project site. The prime objective of the ambient air quality study is to assess the existing air quality of the study area and to establish the existing ambient air quality within the study area and its conformity with NAAQS.

3.4.4.1 Selection of Sampling Locations

The sources of air pollution in the region are mining activities (drilling, blasting, excavation, loading, transportation of excavated materials, crushing, and screening) and haul road dust emission.

The design of monitoring network in the air quality surveillance program was based on the following considerations.

- Meteorological conditions on synoptic scale
- Topography of the study area
- Representation of project site
- Representation of cross-sectional distribution in the downward direction
- Influence of the existing sources if any, are to be kept at minimum

Ten (10) numbers of monitoring stations were set up to assess the existing air quality of the study area. Two stations were located within the project site (core zone) and the eight others were outside (buffer zone) the proposed project site.

The locations of the monitoring stations are also based on the meteorological conditions of the study area like likeliness of pollution dispersion in areas located towards predominant wind directions, sensitive receptors in the study area like densely populated areas, forest area, river bodies, etc. Logistic considerations as ready accessibility, security, availability of reliable power supply, etc. were also examined while finalizing the monitoring locations. The Ambient Air Quality Monitoring locations have been presented in **Figure 3.3.**

Table 3.5: Ambient Air Quality Monitoring Stations

Stations	Name	Latitude	Longitude	Distance (km)	Direction	Selection Criteria
A1	Mine Area (Dhirauli South)	23°58'01.35"N	82°21'08.15"E	ML Area		Proposed Mine Site
A2	Mine Area (Dhirauli North)	23°58'56.40"N	82°21'07.79"E	ML Area		Proposed Mine Site
A3	Mine Area (Dhirauli North)	24°00'50.31"N	82°18'46.65"E	2.0	NNW	Cross wind direction of first predominant
A4	Budheri	24°01'48.81"N	82°22'02.98"E	3.9	N	Cross wind direction of first predominant
A5	Khairahi	23°59'58.17"N	82°24'37.23"E	4.5	NE	Up wind direction of second predominant and located near to industrial area
A6	Churwani	23°58'41.81"N	82°25'49.42"E	4.6	E	Downwind direction of first predominant
A7	Berdaha	23°57'11.77"N	82°23'45.81"E	0.5	ESE	Cross wind direction of first predominant
A8	Bansi	23°55'40.74"N	82°21'53.48"E	0.8	S	Downwind direction of second predominant and forest area
A9	Majholipath	23°56'59.11"N	82°20'04.80"E	0.8	SW	Cross wind direction of first Second predominent
A10	Bijauri	23°57'29.18"N	82°18'29.63"E	2.6	W	Up wind direction of first predominant

Source: Baseline Monitoring Report, Vimta Lab

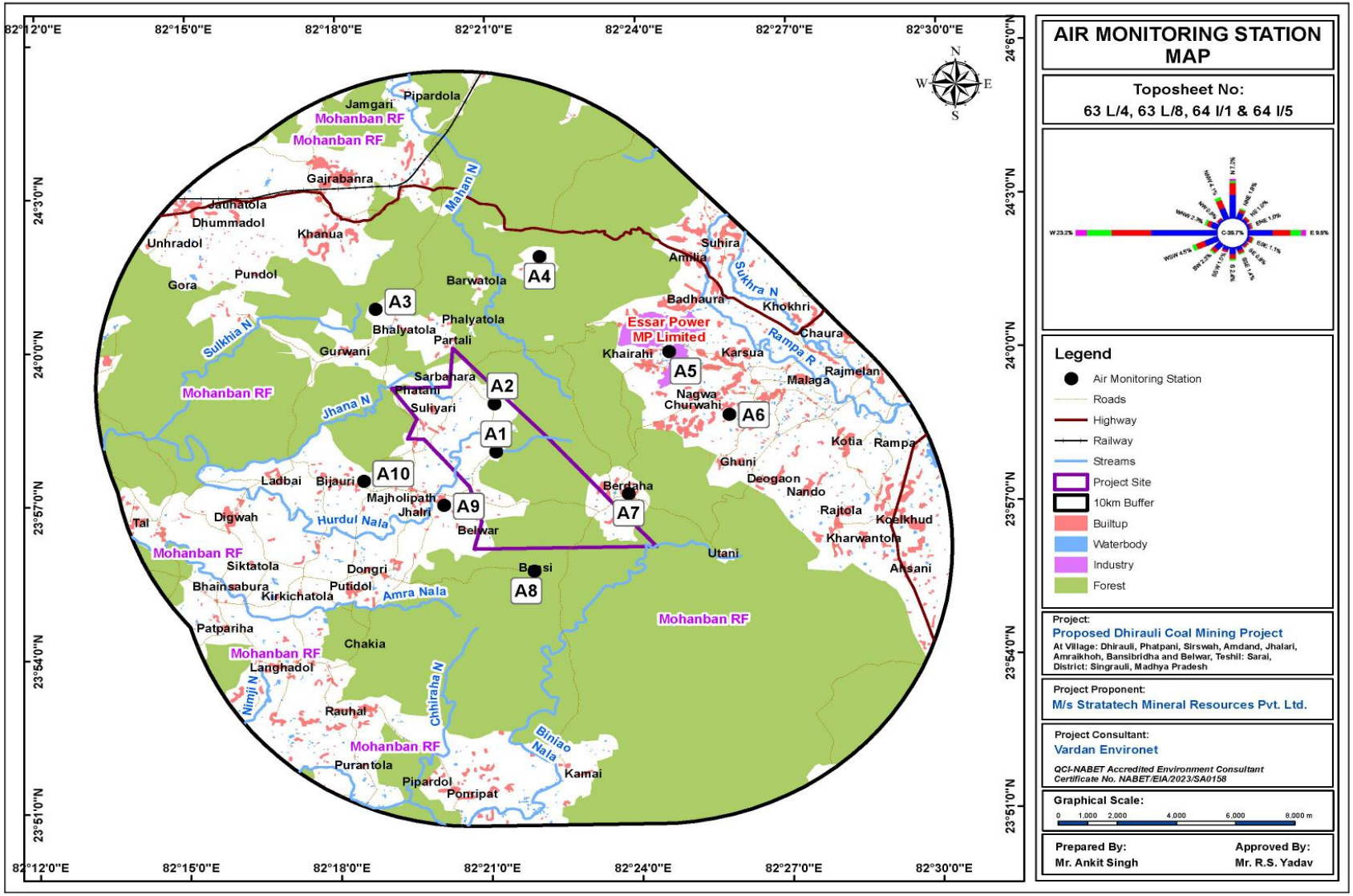


Figure 3.3: Ambient Air Quality Monitoring Locations

3.4.4.2 Analytical Techniques for Air Quality Monitoring

The sampling and analysis of the required parameters were carried out as per IS: 5182 methodology entitled "Methods of Measurement of Air Pollution" and AWMA entitled "Methods of Air Sampling and Analysis." Summary of the analytical techniques and their references are as given in **Table-3.6**.

Ministry of Environment, Forest & Climate Change (MoEF&CC) has stipulated environmental standards for coal mines vide GSR-742 (E), dated 25.09.2000 (refer Table 3.6). These standards will be followed for core zone i.e., within the ML area. Whereas, in case of any residential or commercial or industrial place falling within or beyond 500 m. of any dust generating sources, the National Ambient Air Quality Standards, EPA Notification: GSR 176 (E), April 02, 1996, are made applicable. Thus, the prevailing National Ambient Air Quality Standards vide G.S.R. 826 (E) dated 16thNov. 2009 are applicable for stations monitored in the buffer zone (refer Table 3.7).

Table 3.6: Coal Mines Standards vide GSR 742 (E), dated 25.9.2000

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
I New Coal Mines	Suspended Particulate Matter (SPM)	Annual Average *	360 µg/m^3	- High Volume Sampling (Average flow rate not less than 1.1 m3 /min)
		24 hours **	500 µg/m^3	
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average *	180 µg/m^3	-Respirable Particulate Matter sampling and analysis
		24 hours **	250 µg/m^3	
	Sulphur Dioxide (SO_2)	Annual Average *	80 µg/m^3	Improved West and Gaeke method. -Ultraviolet fluorescene
		24 hours **	120 µg/m^3	
	Oxide of Nitrogen as NO_2	Annual Average *	80 µg/m^3	Jacob &Hochheiser Modified (Na-Arsenic) Method Gas phase Chemiluminescence
		24 hours **	120 µg/m^3	

Table 3.7: National Ambient Air Quality Standards vide GSR 826 (E), Dt.16.11.09

Sr. No.	Parameter	Time Weighted Average	Concentration in Ambient Air	
			Industrial Area, Residential, Rural & Other Areas	Ecologically Sensitive Area (Notified by Central Government)
1	SO_2 (µg/m^3)	Annual*	50	20
		24 Hours**	80	80
2	NO_x (µg/m^3)	Annual*	40	30
		24 Hours**	80	80
3	PM_{10} (µg/m^3)	Annual*	60	60
		24 Hours**	100	100
4	$PM_{2.5}$ (µg/m^3)	Annual*	40	40
		24 Hours**	60	60
5	CO (mg/m^3)	8 hours**	2.0	2.0
		1 hour**	4.0	4.0

Table 3.8: Techniques Adopted/Protocols for Ambient Air Quality Monitoring

S. No	Parameters	Techniques	TechnicalProtocol
1	Sulphur Dioxide (SO_2)	West&Gaeke	IS:5182(P2)
2	Nitrogen Dioxide(NO_2)	Jacob&Hochheiser	IS:5182(P6)
3	Particulate Matter PM_{10}	Gravimetric	IS:5182(P23)
4	Particulate Matter $PM_{2.5}$	Gravimetric	IS:5182 (P24)
5	Carbon-monoxide as CO	NDIR	IS:5182(P-10)

Source: Baseline Monitoring Report, Vimta Lab

3.4.4.3 Air Quality Monitoring

Ambient air quality analysis reports are appended below in the **Table3.9** and attached as **AnnexureVII**.The graphical representations of the results are depicted in **Figure3.4, 3.5,3.6.**

Table 3.9: Baseline Result for the Air Monitoring Locations

Pollutant	Location Codes	Max.	Min.	Avg.	98 Percentile	NAAQS
PM_{10} (µg/m^3)	A-1	49.50	34.80	43.20	49.30	100
	A-2	52.30	35.90	43.70	51.80	
	A-3	49.30	35.10	42.90	49.30	
	A-4	48.90	33.80	41.50	48.90	
	A-5	58.60	38.90	46.90	58.50	
	A-6	61.30	39.70	47.90	60.00	

Pollutant	Location Codes	Max.	Min.	Avg.	98 Percentile	NAAQS
	A-7	51.30	37.50	43.40	51.10	
	A-8	44.60	26.50	36.80	44.40	
	A-9	51.80	35.00	42.50	51.20	
	A-10	48.90	28.90	39.30	48.90	
$PM_{2.5}$ ($\mu g/m^3$)	A-1	29.2	17.1	22.6	28.7	60
	A-2	30.3	17.6	23.3	29.9	
	A-3	27.9	16.9	21.4	26.1	
	A-4	26.7	16.6	21.7	26.6	
	A-5	33.6	21.8	27.1	33.1	
	A-6	40.2	23.1	29.7	40.0	
	A-7	39.2	22.9	29.2	39.0	
	A-8	28.2	15.8	21.6	28.0	
	A-9	32.5	17.9	24.3	31.2	
	A-10	27.8	16.8	21.8	27.8	
NO_X ($\mu g/m^3$)	A-1	23.6	17.4	19.7	23.3	80
	A-2	23.9	17.9	19.8	23.2	
	A-3	25.4	16.5	21.2	25.3	
	A-4	25.5	18.0	21.6	25.3	
	A-5	34.2	22.6	26.2	33.9	
	A-6	32.2	21.0	25.6	31.7	
	A-7	30.9	20.6	27.5	30.8	
	A-8	29.1	20.5	26.0	28.9	
	A-9	31.5	21.3	26.0	31.3	
	A-10	24.9	16.4	20.6	24.8	
SO_2 ($\mu g/m^3$)	A-1	16.3	13.2	14.7	16.2	80
	A-2	17.1	13.5	15.0	17.0	
	A-3	15.9	12.8	14.2	15.6	
	A-4	21.6	13.9	17.2	21.5	
	A-5	25.1	17.8	21.0	24.7	
	A-6	23.8	17.3	20.4	23.7	
	A-7	22.8	15.6	18.8	22.5	
	A-8	20.7	13.1	16.3	20.1	
	A-9	23.4	14.2	18.1	22.9	
	A-10	15.9	12.5	14.2	15.6	
CO (mg/m^3)	A-1	0.418	0.316	0.382	0.417	2
	A-2	0.419	0.314	0.381	0.415	
	A-3	0.439	0.350	0.384	0.431	

Pollutant	Location Codes	Max.	Min.	Avg.	98 Percentile	NAAQS
	A-4	0.378	0.317	0.333	0.358	
	A-5	0.487	0.381	0.406	0.473	
	A-6	0.472	0.373	0.391	0.458	
	A-7	0.415	0.325	0.354	0.391	
	A-8	0.335	0.305	0.319	0.327	
	A-9	0.437	0.353	0.366	0.399	
	A-10	0.342	0.312	0.319	0.327	
O_3 (µg/m3)	A-1	8.3	4.3	6.1	8.2	100
	A-2	8.9	4.8	6.7	8.4	
	A-3	7.9	4.2	5.6	7.4	
	A-4	8.6	4.4	6.1	8.0	
	A-5	9.6	4.9	7.1	9.0	
	A-6	9.8	4.8	7.1	9.7	
	A-7	9.4	4.1	6.1	9.1	
	A-8	7.9	3.7	5.5	7.6	
	A-9	8.9	4.3	6.5	8.6	
	A-10	8.2	4.0	5.8	7.9	

Source: Baseline Monitoring Report, Vimta Lab

Location Codes	NH_3 (µg/m^3)	C_6H_6 (µg/m^3)	BaP (ng/m^3)	As (ng/m^3)	Ni (ng/m^3)	Pb (µg/m3)	Standards
A-1	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	400
A-2	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	5
A-3	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	1
A-4	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-5	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-6	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-7	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-8	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-9	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-
A-10	<20.0	<1.0	<0.1	<1.0	<1.0	<0.1	-

Source: Baseline Monitoring Report, Vimta Lab

Mineralogical Composition for $PM_{10}$is “defined as the component of inhaled respirable dust small enough to reach the pulmonary or alveolar region of the lung”.

Table 3.10: Classification of RSPM

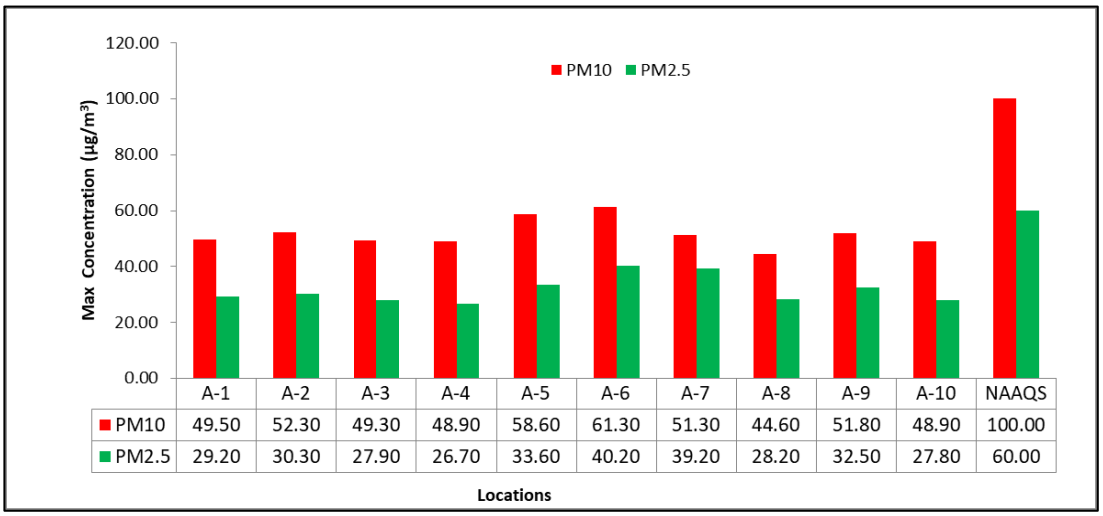
Classification	Type of particles	Size of Particles
PM_{10}	Inhalable particles	≤ 10µm
$PM_{2.5}$	Fine particles	≤ 2.5µm

Source: Baseline Monitoring Report, Vimta Lab

Table 3.11: Mineralogical Composition of RSPM / PM_{10}

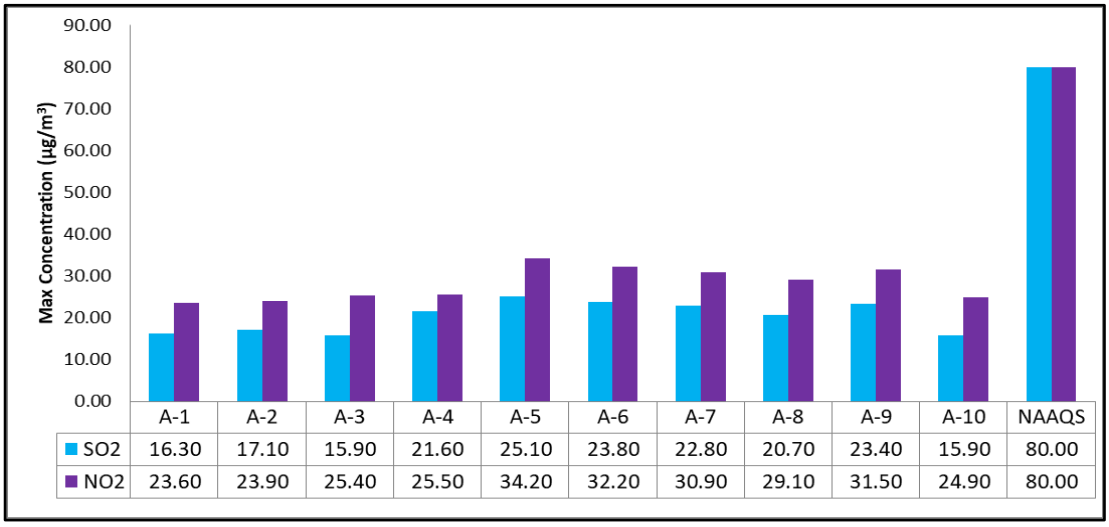
Sr. No.	Parameter (Unit-µg/m^3)	AAQ1		AAQ2		AAQ3		AAQ4		AAQ5		AAQ6		AAQ7		AAQ8		AAQ9		AAQ10	
		Mine Lease Area (Dhirauli South)		Mine Lease Area (Dhirauli North)		Bhaiyatola Village		Budheri Village		Khairahi Village		Churwani Village		Berdaha Village		Bansi Village		Majholipath Village		Bijauri Village	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	Free Silica	1.7	2.6	2.4	2.5	1.5	3.2	1.1	2	0.9	2.5	1.9	2.8	0.8	1.7	1.8	2.9	2.1	3.5	1.4	2.7
2	Aluminium	2.1	2.8	1.6	3.7	1.9	3.4	1.7	2.8	2.6	4.1	2.9	4.3	3	4.3	0.9	2.6	1.1	2.1	1.9	3.6
3	Calcium	3.1	4.2	1.9	2.4	2	2.9	1.2	3.3	2.9	4.6	2.7	4.6	2.3	4.2	1.4	2.8	2.2	2.8	2.8	4
4	Sodium	2.5	3.1	2.8	3.5	1.9	2.7	2.3	3.4	2.4	4.8	3.3	4.4	3	3.4	1.3	2.5	0.5	1.6	1.9	3.2
5	Potassium	3.2	3.9	2.3	3.8	2.6	3.9	1.9	2.9	2.6	4.1	2.2	4.1	2.6	4.2	1.1	2.7	1.3	1.9	1.7	2.5
6	Magnesium	1.4	2.8	1.9	2.5	1.8	3.7	2.4	3.3	4.1	4.9	3	4.3	3.2	5.4	0.8	2.2	2.7	3.9	1.8	3.1
7	Lead	2.3	3.8	0.8	1.9	2.1	2.9	2.1	3.1	1.4	2.2	2.2	3.1	1.4	2.3	2.5	3.1	3.4	4.1	2.1	3.3
8	Zinc	1.5	2.4	2.3	2.9	1.4	1.9	2.3	2.8	2.7	3.4	2.7	3.8	2.6	3.4	1.6	2.5	2.6	4.3	1.9	3.7
9	Vanadium	1.7	3	2.8	3.3	2.1	2.9	1.5	2.3	1.7	2.5	1.9	2.3	1.3	1.62	2.2	3.1	2.9	3.7	1.7	2.2
10	Iron	1.9	2.7	1.5	2.1	1.5	2	1.3	1.7	0.8	1.5	0.9	1.7	1.9	2.14	1.3	2.1	1.4	2.3	1.4	3.2
11	Manganese	2.4	2.9	1.9	2.7	1.9	2.7	1.8	2.5	2	2.8	2.1	3.4	1.5	1.76	1.4	2.4	2.4	3.2	0.8	2.8
12	Boran	1.3	1.9	2.1	3.9	2.2	3.7	1.7	2.4	3.2	3.9	1.7	3.7	2.1	2.94	1.7	2.3	2.5	3.1	0.9	1.4
13	Cadmium	0.003	0.008	0.005	0.009	0.004	0.006	0.005	0.01	0.03	0.07	0.02	0.09	0.03	0.08	0.5	1.4	0.01	0.04	0.07	0.14
14	Copper	0.6	1.3	0.9	1.5	0.3	1.1	0.9	1.5	0.41	0.78	0.47	0.89	0.037	0.072	0.7	1.1	0.6	0.9	0.06	0.12

15	Nickel	0.05	0.09	0.07	0.17	0.08	0.56	0.09	1.2	0.04	0.09	0.08	0.29	0.028	0.081	0.8	1.7	0.052	0.089	0.02	0.04
16	Cobalt	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
18	Arsenic	0.004	0.034	0.018	0.0022	0.032	0.0051	0.016	0.0039	0.056	0.013	0.089	0.0096	0.031	0.07	0.045	0.082	0.006	0.009	0.002	0.006
19	Sulphur	0.24	0.64	0.15	0.34	0.51	0.87	0.31	0.49	0.53	0.71	0.6	0.74	0.29	0.58	0.8	1.5	0.2	0.67	0.78	1.43
20	Phosphorus	0.28	0.46	0.29	0.47	0.68	0.98	0.4	0.45	0.39	0.48	0.45	0.52	0.41	0.84	0.69	0.92	0.9	1.32	0.45	1.32
21	Chlorides	0.004	0.032	0.52	0.67	0.29	0.5	0.49	0.7	0.87	1.27	0.89	1.14	1.3	1.87	0.35	0.59	1.6	2.1	0.9	1.7
22	Chromium	6.5	8.9	6.34	8.67	6.3	7.9	6.5	7.3	6.8	9.7	7.8	9.9	6.5	8.4	4.12	6.5	4.9	7.1	5.3	6



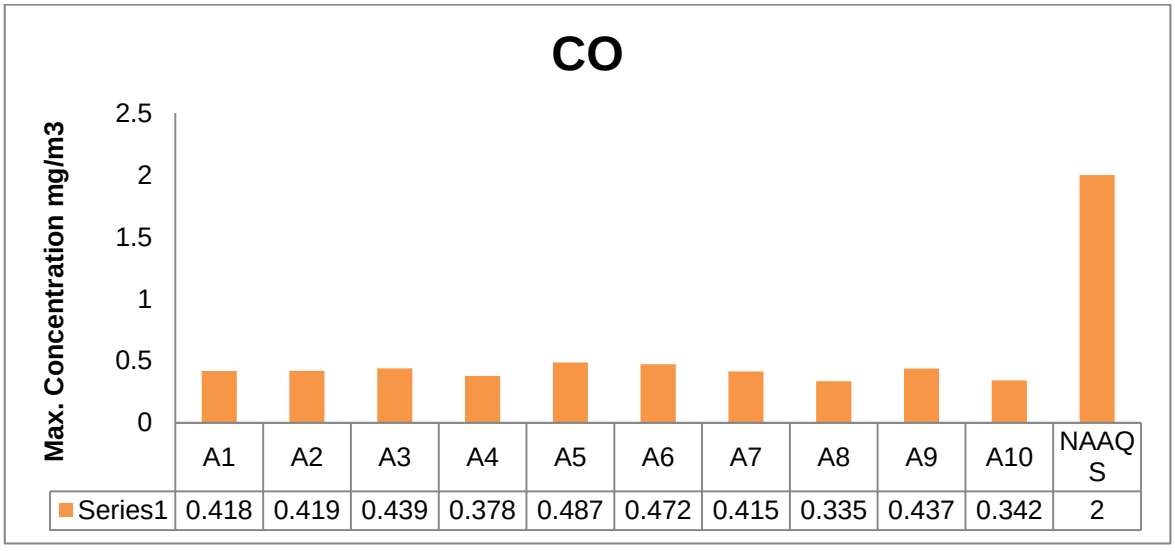
	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	NAAQS
PM10	49.50	52.30	49.30	48.90	58.60	61.30	51.30	44.60	51.80	48.90	100.00
PM2.5	29.20	30.30	27.90	26.70	33.60	40.20	39.20	28.20	32.50	27.80	60.00

Figure 3.4: Graphical Representation of Particulate Pollutants



	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	NAAQS
SO2	16.30	17.10	15.90	21.60	25.10	23.80	22.80	20.70	23.40	15.90	80.00
NO2	23.60	23.90	25.40	25.50	34.20	32.20	30.90	29.10	31.50	24.90	80.00

Figure 3.5: Graphical Representation of Gaseous Pollutants



	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	NAAQS
Series1	0.418	0.419	0.439	0.378	0.487	0.472	0.415	0.335	0.437	0.342	2

Figure 3.6: Graphical Representation of CO Pollutant

3.4.4.4 Interpretation of Data Obtained

The results of the monitored data indicate that the ambient air quality of the region in general is in conformity with the National Ambient Air Quality Standards with present level of activities.Ambient Air Quality Monitoring reveals that.

- The maximum and minimum concentrations of PM_{10} and $PM_{2.5}$ for all the 10 AAQM stations were found between 26.50 to 61.30 µg/m^3 and 15.80 to 40.20µg/m^3 respectively.
- **The maximum value for PM_{10}** is observed at Churwani (A6) station, as 61.30 µg/m^3 the reason of maximum result on this location due to the operation of mine near the monitoring station, However the minimum value observed at Bansi (A8) station as 26.50 µg/m^3 during the study period as the monitoring location near to the protected forest and no major activity found near to this monitoring location.
- **The maximum value for $PM_{2.5}$** was also observed at Churwani (A6) station as 40.2 µg/m^3, this is also due to the operational mining site near to the monitoring location however the minimum value observed at Bansi (A8) station as 15.8 µg/m^3 during the study period as the monitoring location near to the protected forest and no major activity found near to this monitoring location.
- **The maximum value for SO_2**is observed to be 25.1 µg/m^3 at Khairahi (A5) as the monitoring location located near to the thermal power plant, however minimum value observed at Bijauri (A10) station as 12.5µg/m^3during the study period.
- **The maximum value for NOx**is is observed to be 34.2µg/m^3 at Khairahi (A5) as the monitoring location located near to the thermal power plant, however minimum value observed at Bijauri (A10) station as 16.4µg/m^3 during the study period.
- **The maximum value for CO** is observed at Khairahi (A5), as 0.487 mg/m^3 with the minimum value observed at Bansi (A8) station as 0.305 mg/m^3 during the study period.
- **The maximum value for O_3** is observed at Khairahi (A5) station, as 9.6 µg/m^3 with the minimum value observed at Bansi (A8) station as 3.7 µg/m^3 during the study period.

To maintain the ambient air quality of the area within the NAAQS, the latest/ modern air pollution control facilities along with suitable EMP will be adopted, which is elaborated in detailed in **Chapter 4** of the report.

3.4.5 NOISE ENVIRONMENT

Noise levels were measured at eight (8) locations within the study area in **Table 3.12** and shown on map at **Figure 3.7.** Noise monitoring has been carried during day and night time and Leq values have then been computed hourly. Day time & Night time monitoring were conducted from 6 a.m. to 10 p.m. and from 10 p.m. to 6 a.m., respectively. Ambient noise levels were measured using integrated sound level meter (SLM) Lutron (SL-4001).

SLM was mounted on a tripod as per the standard methodology for noise measurements. Special care was taken for not making noise during the measurement and ensuring the least amount of reflective from our body to the meter. Noise levels were recorded at 10 locations by Sound Level Meter. Noise levels were recorded as per IS: 9989 entitled “Assessment of noise with respect to community response” methodology. Noise levels were recorded at approximately 1.5 meter above the ground level and about 3 m away from walls, buildings or other sound reflecting sources. Ambient Noise Monitoring Locations and analysis reports are appended below in the **Table3.12 and 3.13** and attached as **Annexure VIII.**

Table 3.12: Noise Level Monitoring Locations

Stations	Name	Latitude	Longitude	Distance (km) Direction	Criteria
N1	Mine Site (Dhirauli)	23°58'55.55"N	82°21'6.85"E	--	Mine site
N2	Bhaiyatola	23°59'59.97"N	82°18'5.31"E	2.0/NNW	Cross wind direction of first predominant
N3	Budheri	24°01'49.38"N	82°22'2.41"E	3.9/N	Cross wind direction of first predominant
N4	Khairahi	23°59'55.82"N	82°24'36.26"E	4.5/NE	Up wind direction of second predominant and located near to industrial area
N5	Churwani	23°58'42.89"N	82°25'49.61"E	4.6/E	Downwind direction of first predominant
N6	Berdaha	23°57'10.44"N	82°23'46.54"E	0.5/ESE	Cross wind direction of first predominant
N7	Bansi	23°55'41.32"N	82°21'52.54"E	0.8/S	Downwind direction of second predominant and forest area
N8	Jhalri	23°57'24.56"N	82°19'12.64"E	1.5/W	Up wind direction of first predominant

Source: Baseline Monitoring Report, Vimta lab

Table 3.13: Noise Level Data (All Data is Expressed in dB(A))

S.No.	Locations	Average Noise Levels in dB(A)			
		Leq	Lday	Lnight	Ldn
1	MineSite(Dhirauli)	47.8	48.4	45.2	***52.2***
2	Bhaiyatola	44.9	45.8	42.2	***49.3***
3	Budheri	46.9	47.5	44.5	***51.5***
4	Khairahi	64.6	65.2	62.1	***69.1***
5	Churwani	60.9	61.4	58.2	***65.2***
6	Berdaha	42.8	43.9	40.0	***47.2***
7	Bansi	41.7	42.2	39.3	***46.3***
8	Jhalri	49.6	50.1	47.0	***54.0***

Source: Baseline Monitoring Report, Vimta lab

The environment setting of each noise monitoring location is shown in **Figure 3.7** below:

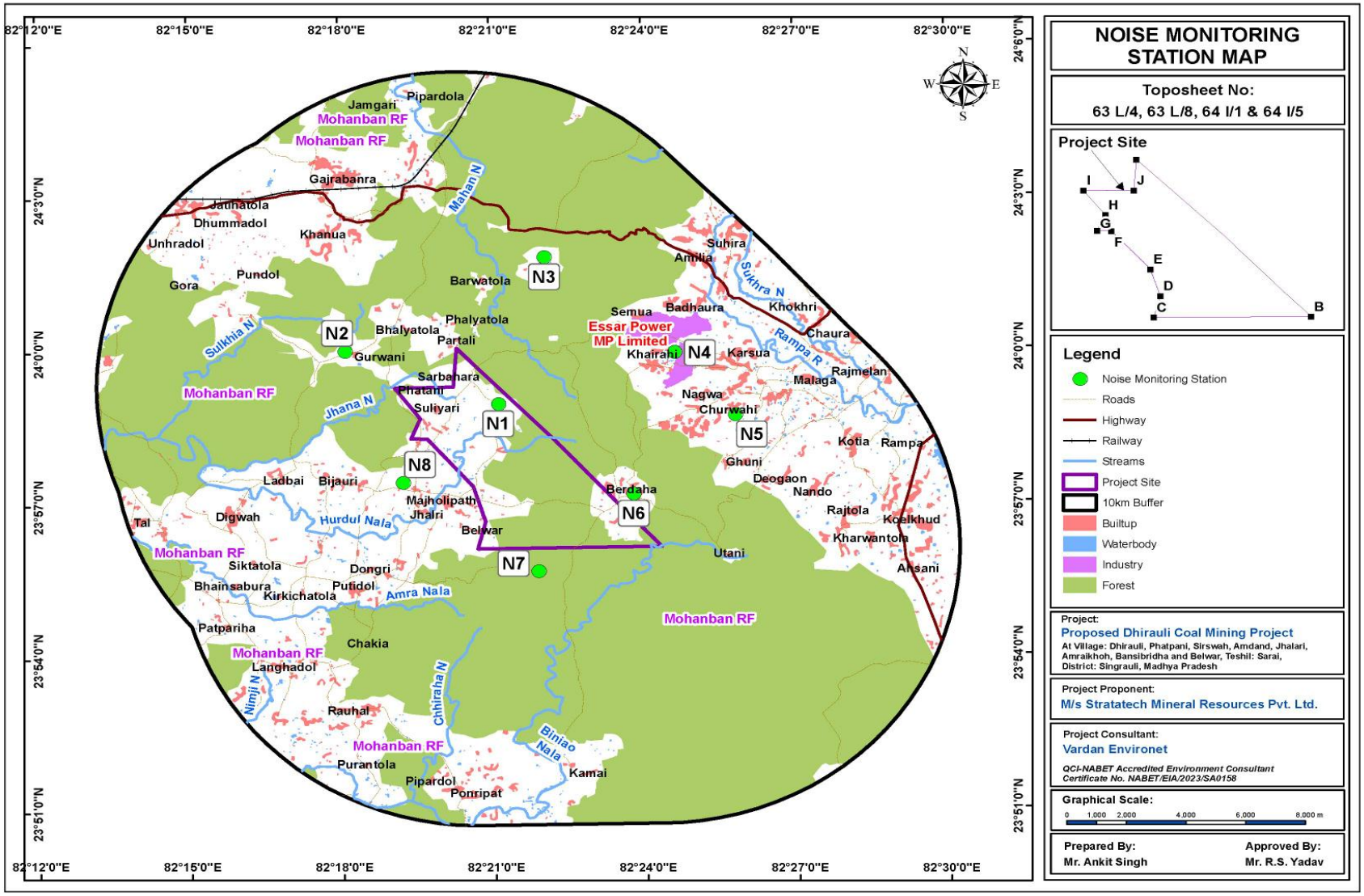


Figure 3.7: Noise Quality Monitoring Location Map

Noise Standards as per Noise Regulation (Pollution & Control) Rules, 2000 is as follows:

Table 3.14: Noise Standards as per Noise Regulation (Pollution & Control) Rules, 2000

Category of Zones	Categorization of locations	L_{eq} in dB(A)	
		Day	Night
Industrial	N1, N4	75	70
Commercial		65	55
Residential	N2, N3, N5, N6, N7, N8	55	45
Silence Zone		50	40

Source: Noise Regulation (Pollution & Control) Rules, 2000

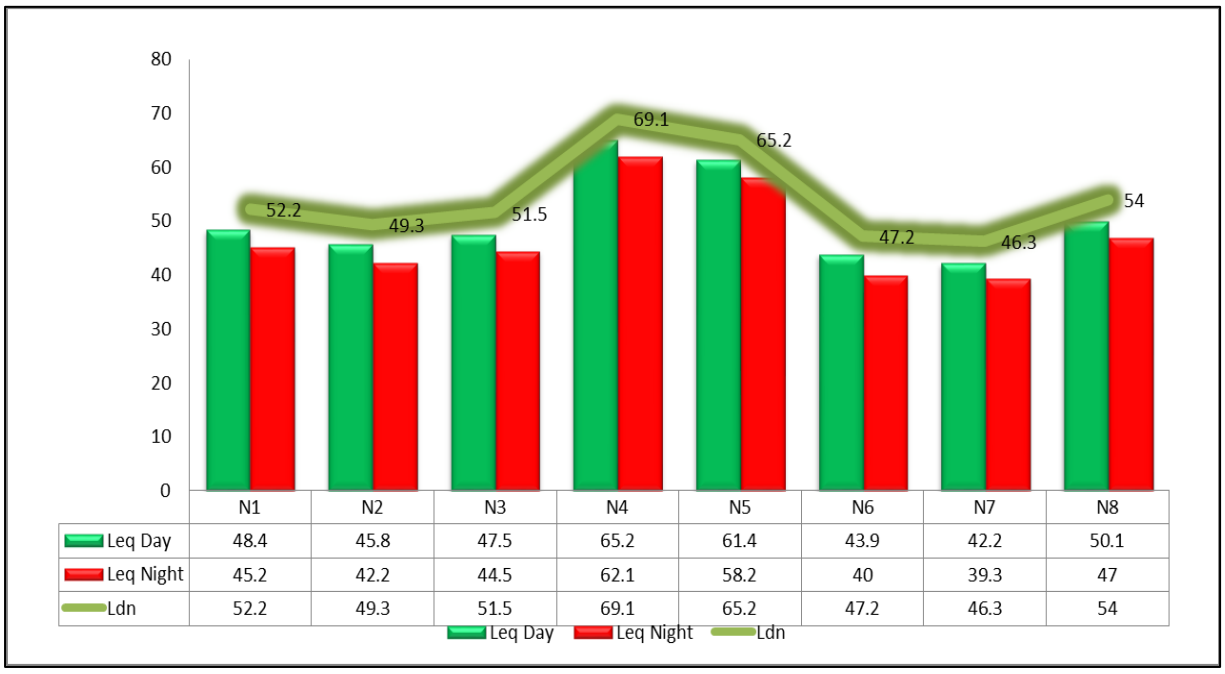


Figure 3.8: Equivalent Noise Levels at all Locations

3.4.5.1 Interpretation of Data obtained

- The noise levels recorded at all locations were within the limits of ambient noise as per Noise Regulation (Pollution & Control) Rules, 2000.
- Out of all 10 locations measured for noise levels, the noise level samplecollectedat Khairahi (N4) was found on slightly higher side.
- The Leq values at this location for day and nighttime was observed to be 64.6 and 69.1dB (A) respectively, which can be attributed to local prevailing environment (Mining, industrial, Railway siding and Highway). However, the recorded noise levels were found within the limits of Industrial Noise (75 dB (A)).

- Apart from this the noise levels recorded at Churwani (N5) were found to be of higher level, which can be attributed to presence of Power Plant, nearby roads. However, these levels are found to be well within the permissible residential limits (55 dB(A) for daytime).
- The noise levels recorded at all locations were within the NAAQS limits.
- With the operation of mine, the noise levels inside the project site will have some impacts on the nearby areas.
- However, with suitable control measures and EMP, the noise levels will be reduced, and the impacts will be minimized.However, with suitable control measures and EMP, the noise levels will be reduced, and the impacts can be minimized.

3.4.6 WATER ENVIRONMENT

The impact has been assessed on randomly selected surface and groundwater sources falling within the impact zone. To assess the existing water quality, the Groundwater samples were collected from eight (08) different locations and Surface Water quality from five (05) locations within the study area and analyzed as per the procedure specified in standard methods for examination of water and wastewater published by American Public Health Association and Bureau of Indian Standards (APHA/BIS). The groundwater samples were drawn from the open wells being used by the villagers for their domestic needs. Surface water sampling was carried out from rivers present within 10 km of the project site. The details of the locations are given in **Table 3.15.**

3.4.6.1 Methodology

Water Samples were collected from 13 locations out of which 05 for surface and 08 for ground water (**Figure 3.19**). Samples were collected as per IS: 3025 (Part-1) methodology. Necessary precautions were taken while collecting, preserving and transporting. All the parameters were analyzed as per “Methods of Sampling and Test (Physical and Chemical) for water and waste water” IS: 3025 and “Standard Methods for the Examination of Water and Wastewater” APHA. The results are then compared with the standards (IS: 10500 & IS: 2296) as per the quality of water. The ground water samples were drawn from the hand pumps and open wells being used by the villagers for their domestic needs. Surface water sampling was carried out from ponds present within 10km of the project site. Water quality analysis reports are appended below in the **Table3.16 & 3.17** and attached as **Annexure IX.**

Table 3.15: Water Sampling Locations

Location	Name	Latitude	Longitude	Distance (km)/ Direction	Selection Criteria
SW1	Hurdul Nala near Majholipath (U/S)	23°57'16.01"N	82°19'56.96"E	0.7/SW	Nala
SW2	Hurdul Nala near Digwah (D/S)	23°57'19.24"N	82°16'08.14"E	6.9/W	Nala
SW3	Rampa River near Badhaura (U/S)	24°00'58.94"N	82°25'15.30"E	7.4/NE	River
SW4	Rampa River near Rampa (D/S)	23°58'54.15"N	82°29'09.83"E	9.6/E	River
SW5	Biniao Nala near Kamai (U/S)	23°51'54.80"N	82°22'15.37"E	7.5/S	Nala
GW1	M.L. Area – Dhirauli South	23°58'00.76"N	82°21'08.33"E	ML Area	Bore well
GW2	Bhalyatola	24°00'52.78"N	82°19'06.05"E	2.0	Bore well
GW3	Khairahi	23°59'56.10"N	82°24'34.35"E	4.5	Bore well
GW4	ML Area - Berdaha	23°56'40.98"N	82°23'32.56"E	M,L Area	Bore well
GW5	Majholipath	23°56'58.93"N	82°20'06.85"E	0.8	Bore well
GW6	ML Area near Suliyari	23°58'27.19"N	82°19'56.05"E	M,L Area	Bore well
GW7	Bijauri	23°57'27.73"N	82°18'28.86"E	2.6	Bore well
GW8	Dongri	23°55'40.09"N	82°18'42.98"E	2.9	Bore well

Source: Baseline Monitoring Report, Vimta lab

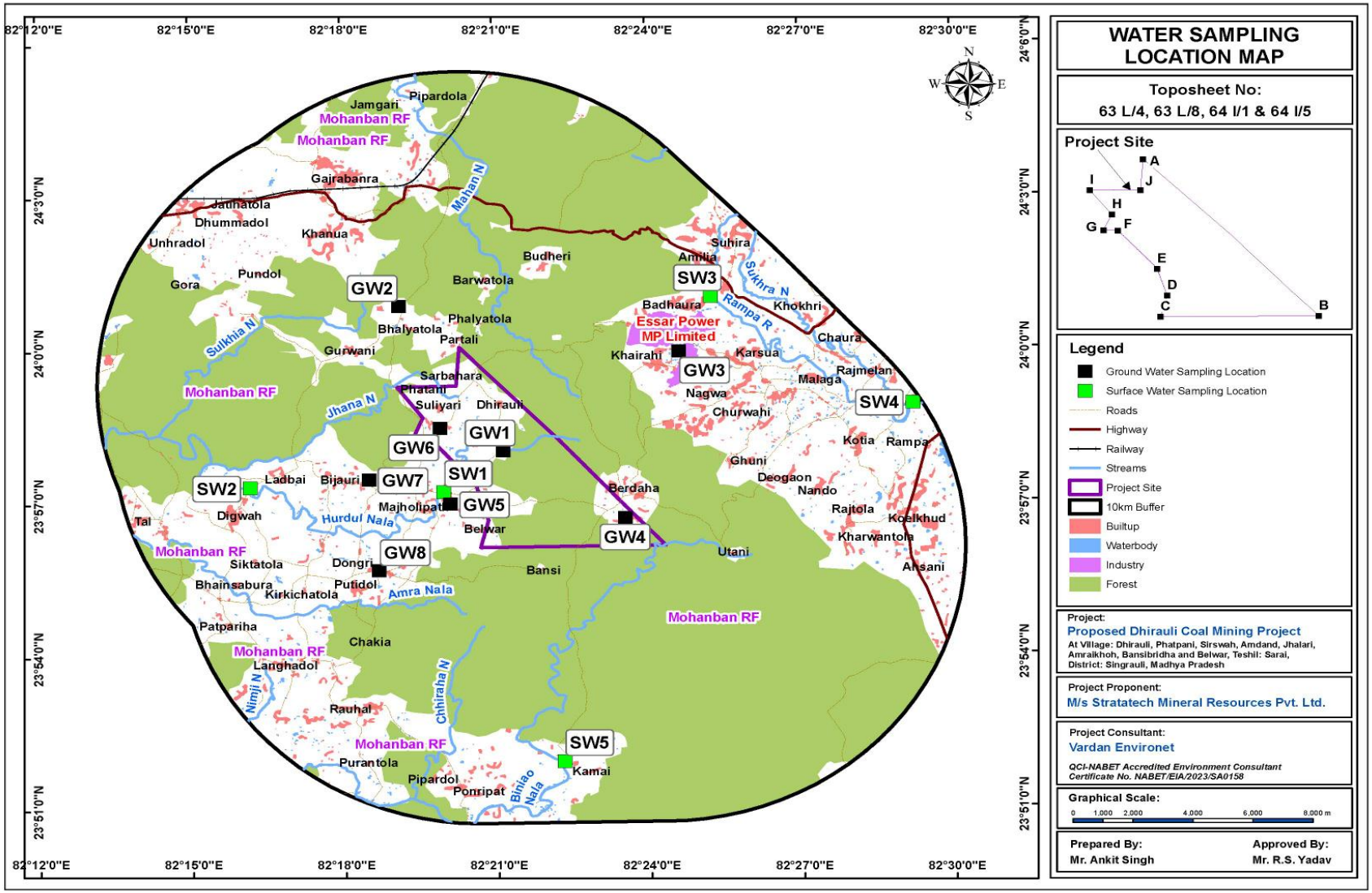


Figure 3.9: Map showing Water Sampling Locations

Table 3.16: Ground Water Quality Data

Sr. No	Parameters	UOM	IS: 10500 Limits	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	pH	-	6.5 – 8.5 (NR)	6.86	6.61	7.49	7.12	7.1	7.54	6.89	6.78
2	Colour	Hazen	5(25)	1	1	1	1	1	1	1	1
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Conductivity	µS/cm	--	305	260	717	435	392	600	336	367
6	Turbidity	NTU	1(5)	2	2	3	3	3	4	2	2
7	TDS	mg/l	500(2000)	178	162	389	267	239	360	210	225
8	Total Hardness ($CaCO_3$)	mg/l	200(600)	90.9	77.9	263.4	147.6	118.0	173.6	95.2	102.3
9	Alkalinity ($CaCO_3$)	mg/l	200(600)	95	65	265	125	110	165	74	95
10	Calcium as Ca	mg/l	75(200)	17.6	15.7	61.4	32.2	23.5	41.8	19.4	22.4
11	Magnesium as Mg	mg/l	30(100)	11.4	9.4	26.7	16.3	14.4	16.8	9.5	11.2
12	Residual Chlorine	mg/l	0.2 Min	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

13	Boron as B	mg/l	0.5(2.4)	0.06	0.05	0.11	0.09	0.12	0.09	0.14	0.11
14	Chlorides as Cl	mg/l	250(1000)	27.4	32.8	46.9	52.2	44.5	66.4	28.6	32.5
15	Sulphates as SO_4	mg/l	200(400)	9.6	10.3	14.8	8.7	11.5	32.6	12.9	10.2
16	Fluorides as F	mg/l	1.0(1.5)	0.2	0.3	0.2	0.4	0.3	0.5	0.2	0.3
17	Nitrates as NO_3	mg/l	45(NR)	7.8	9.2	14.5	11.8	13.6	10.5	9.7	12.5
18	Sodium as Na	mg/l	--	26.7	23.5	41.7	29.6	32.4	57.5	25.2	28.3
19	Potassium as K	mg/l	--	1.5	1.0	2.3	5.2	6.4	3.7	2.4	4.8
20	Phenolic Compounds	n mg/l	0.001(0.002)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21	Cyanides as CN	mg/l	0.05 (NR)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
22	Anionic Detergent	mg/l	0.2 (1.0)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
23	Mineral Oil	mg/l	0.01 (0.03)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Cadmium as Cd	mg/l	0.003 (NR)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
25	Arsenic as As	mg/l	0.01 (NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Copper as Cu	mg/l	0.05 (1.5)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Lead as Pb	mg/l	0.01 (NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

28	Manganese as Mn	mg/l	0.1 (0.3)	0.02	0.01	0.03	0.02	0.01	0.02	0.01	0.01
29	Iron as Fe	mg/l	0.3(1.0)	0.11	0.09	0.12	0.14	0.09	0.12	0.07	0.05
30	Chromium as Cr+	mg/l	0.05(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
31	Selenium as Se	mg/l	0.01(NR)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Zinc as Zn	mg/l	5(15)	0.08	0.05	0.07	0.09	0.07	0.05	0.09	0.04
33	Aluminium as Al	mg/l	0.03(0.2)	0.03	0.02	0.04	0.02	0.02	0.04	0.01	0.03
34	Mercury as Hg	mg/l	0.001(NR)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
36	E. Coil	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
37	Total Coliforms	MPN /100	10	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Source: Baseline Monitoring Report, Vimta lab

Table 3.17: Surface Water Quality Data

Sr.No.	Parameters	Unit	SW1	SW2	SW3	SW4	SW5
1	pH	-	7.34	7.43	7.55	7.67	7.49
2	Colour	Hazen	3	4	3	4	4
3	Conductivity	µS/cm	188	160	235	192	260
4	TDS	mg/l	120	97	141	110	152
5	TSS	mg/l	11	12	16	19	14
6	Turbidity	NTU	5	7	4	6	5
7	DO	mg/l	5.2	5.4	5.7	5.3	5.1
8	BOD	mg/l	<3	<3	<3	<3	<3
9	COD	mg/l	<5	<5	<5	<5	<5
10	Total Hardness as $CaCO_3$	mg/l	58.8	48.1	59.3	77.7	93.1
11	Total Alkalinity as $CaCO_3$	mg/l	60	56	80	76	84
12	Calcium as Ca	mg/l	12.5	10.7	11.2	17.1	18.3
13	Magnesium as Mg	mg/l	6.7	5.2	7.6	8.5	11.5
14	Chlorides as Cl	mg/l	14.1	13.6	19.8	7.8	23.1
15	Residual free chlorine	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1
16	Phosphates as PO_4	mg/l	0.07	0.05	0.08	0.06	0.09
17	Sulphates as SO_4	mg/l	6.7	3.4	5.3	5.7	9.8
18	Fluorides as F	mg/l	0.4	0.3	0.2	0.3	0.4
19	Nitrates as NO_3	mg/l	6.8	2.9	4.8	5.2	3.1
20	Sodium as Na	mg/l	13.4	14	22.3	7.83	15.2

21	Potassium as K	mg/l	4.2	2.52	7.9	2.45	3.4
22	Total Boron as B	mg/l	0.09	0.21	0.08	0.14	0.12
23	Phenolic Compounds	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
24	Cyanides	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02
25	Oil & grease	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
26	Cadmium as Cd	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
27	Arsenic as As	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
28	Copper as Cu	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
29	Lead as Pb	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
30	Iron as Fe	mg/l	0.11	0.08	0.09	0.05	0.14
31	Chromium as Cr^{+6}	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
32	Selenium as Se	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
33	Zinc as Zn	mg/l	0.09	0.04	0.08	0.06	0.05
34	Aluminum as Al	mg/l	0.03	0.04	0.02	0.03	0.02
35	Mercury as Hg	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
36	SAR	-	0.76	0.88	1.26	0.39	0.69
37	Pesticides	mg/l	Absent	Absent	Absent	Absent	Absent
38	Anionic detergents as MBAS	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02
39	Total Coliforms	MPN/100	1120	1030	1180	1340	1160

Source: Baseline Monitoring Report, Vimta Lab

3.4.6.2 Interpretation of data

The analysis of the 08nos. of Ground Water and 05nos. of Surface Water samples are presented in **Table3.16** and **Table3.17** respectively and are compared with the standards for drinking water as per IS: 10500-2012 “Specifications for Drinking Water” and IS:2296 respectively.

3.4.6.3 Interpretation of Ground Water Quality

- The analysis results indicate that the pH ranges in between 6.61 to 7.54. The maximum pH of 7.54 was observed Near ML Area near Suliyari village (GW6) and the minimum pH of 6.61 was observed at Bhalyatola village (GW2).
- Total Dissolved Solids (TDS) concentrations were found to be ranging in between 162 to 389 mg/l, the maximum concentration 389 mg/l was observed at Near Khairahivillage (GW3). The minimum concentration 162mg/l was observed at Bhalyatola village (GW2).
- Total Hardness was observed to be ranging from 77.9 to 263.4 mg/l. The maximum hardness is 263.4 mg/l was recorded at Khairahi village (GW3) and the minimum is 77.9 mg/l was recorded at Bhalyatola (GW2) respectively.
- Alkalinity of the samples lies between 65mg/l to 265mg/l. The maximum value 265mg/l was at Near Khairahi village (GW3) and the minimum value 65 mg/l was found at Bhalyatola village (GW2).
- Chlorides were found to be in the range of 27.4 to 66.4 mg/L, the maximum concentration is 66.4 mg/l was observed at ML Area near Suliyari village (GW6), and where as the minimum concentration is 27.4 mg/l was observed at Near M.L. Area – Dhirauli South (GW1) respectively.
- Sulphates were found to be in the range of 8.7 mg/l to 32.6 mg/l. The maximum value is 32.6 mg/l observed at ML Area near Suliyari village (GW6), whereas the minimum value is 8.7 mg/l was observed at Near ML Area – Berdaha (GW4).
- Bacteriological studies revealed the absence of Total coliform.
- In study area, water quality has been observed to vary considerably between the sampling locations. Mostly the parameters of groundwater quality fall within the permissible limits of drinking water standards.

The detailed water quality reports are given in **Annexure IX**.

3.4.6.4 Interpretation of Surface Water Quality

- The analysis results indicate that the pH ranges in between 7.34 to 7.67 which are well within the specified standard of 6.5 to 8.5. The maximum pH of 7.67 was observed at Pond near Rampa River near Rampa (D/S) (SW4) and the minimum pH of 7.34 was observed at pond near Hurdul Nala near Majholipath (U/S) (SW1).
- Conductivity of the samples lies between 160 µS/cm to 260 µS/cm. The maximum value 235 µS/cm was found in Rampa River near Badhaura (U/S) (SW3) and the minimum value 160 µS/cm was found near Hurdul Nala near Digwah (D/S) (SW2).

- The Total Dissolved Solids (TDS) concentrations were found to be ranging in between 97 to 152 mg/l, the maximum concentration 152 mg/l was observed in Biniao Nala near Kamai (U/S) (SW5) and minimum concentration 97 mg/l of TDS was observed in Nala near Hurdul Nala near Digwah (D/S) (SW2).
- Total Hardness was observed to be ranging from 48.1 to 93.1 mg/l, the maximum concentration 93.1 mg/l was observed in Biniao Nala near Kamai (U/S) (SW5) and minimum concentration 48.1 mg/l of Hardness as observed in Pond near Hurdul Nala near Digwah (D/S) (SW2).Chlorides were found to be in the range of 7.8 mg/l to 23.1 mg/l, the maximum concentration23.1 mg/l was observed at Biniao Nala near Kamai (U/S) (SW5), and where as the minimum concentration7.8 mg/l was observed at near Rampa River near Rampa (D/S) (SW4).
- Sulphates were found to be in the range of 3.4 mg/l to 9.8 mg/l, the maximum concentration 9.8 mg/l was observed Biniao Nala near Kamai (U/S) (SW5), and where as the minimum concentration 3.4 mg/l was observed at Hurdul Nala near Digwah (D/S) (SW2).
- Dissolved Oxygen were found to be in the range of 5.1 mg/l to 5.7 mg/l, the maximum concentration 5.7 mg/l was observed Rampa River near Badhaura (U/S) (SW3), and where as the minimum concentration 5.1 mg/l was observed at Biniao Nala near Kamai (U/S)(SW5).
- Total Coliform count is measured 1030 to 1340 MPN/100ml.

3.4.7 Soil Environment

In order to establish the baseline status of soil characteristic, soil sampling is conducted in the study area based on the land classification.

3.4.7.1 Methodology

Soil sampling was carried out at 10 sites to understand the soil quality. Meticulous attention was paid to collect adequate amount of composite soil samples for analysis. After removing the surface vegetation cover, visible roots, plant litter, gravel, plastic materials and other foreign materials. Samples were collected by Agar at a depth of 50, 150 and 300 cm and mixed thoroughly and analyzed as a single unit sample. The samples were packed in dependable, waterproof zip lock pouch bag and was marked specifically, accurately and brought to the laboratory for testing. This will establish the baseline characteristics and facilitate to identify if any.

3.4.7.2 Data Analysis

The soil samples were collected from ten locations around the 10 km radius of proposed project. The samples were analyzed and the results were obtained. The detailed soil quality reports are given in **Annexure X.** The samples were collected

during pre-monsoon season from the selected locations **(Figure 3.10)**. The monitoring locations and results of all the specified parameters at each location are given in **Table 3.18 and 3.19**.

Table 3.18: Soil Quality Sampling Locations

Location	Name	Latitude	Longitude	Distance (km)/ Direction	Criteria
S1	Mine Area (Dhirauli)	23°58'57.86"N	82°21'05.18"E	ML Area	Mine area (Agriculture)
S2	Mine Area (Suliyari)	23°58'28.90"N	82°19'52.98"E	ML Area	Built up area
S3	Bhaiyatola	24°00'53.12"N	82°19'06.52"E	2.0/NNW	Waste land
S4	Budheri	24°01'49.37"N	82°22'03.91"E	3.9/N	Forest area
S5	Badhaura	24°01'02.21"N	82°25'15.19"E	4.7/NE	Near Industry
S6	Churwani	23°58'41.54"N	82°25'47.35"E	4.6/E	Waste land
S7	Berdaha	23°57'11.13"N	82°23'45.80"E	0.5/ESE	Agriculture
S8	Bansi	23°55'40.62"N	82°21'53.28"E	0.8/S	Forest area
S9	Majholipath	23°56'58.64"N	82°20'05.53"E	0.8/SW	Buildup area
S10	Bijauri	23°57'28.00"N	82°18'22.55"E	2.6/W	Agriculture

Source: Baseline Monitoring Report, Vimta lab

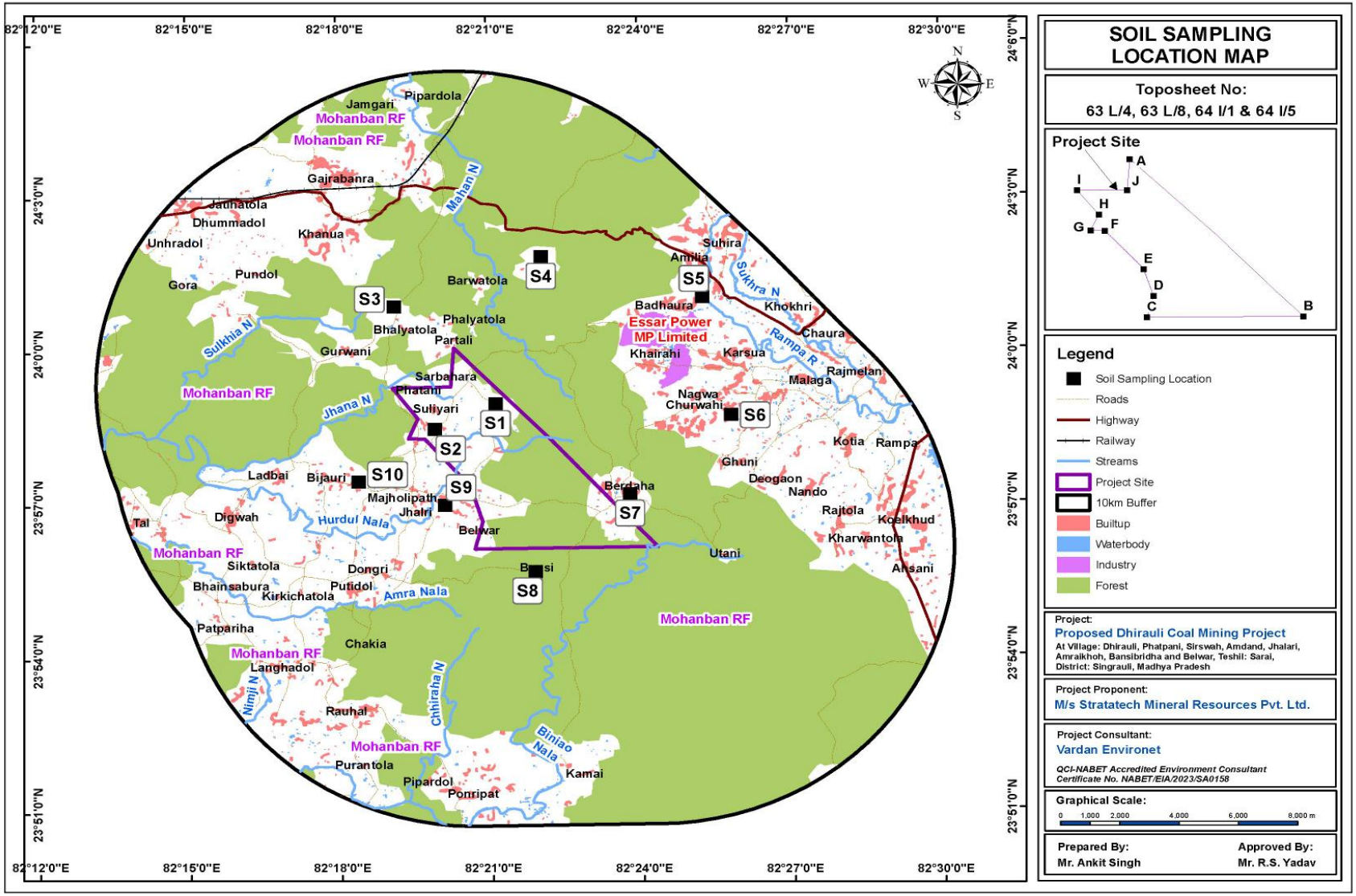


Figure 3.10: Soil Quality Monitoring Locations Map

Table 3.19: Soil Analysis Results

Sr. No.	Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	**Texture**	----	sandy	sandy	Clay	Clay	Clay	sandy		sandy	sandy	sandy
a	**Sand**	%	49	51	23	21	22	48	24	53	49	46
b	**Silt**	%	15	10	25	15	20	13	14	11	12	16
c	**Clay**	%	36	39	52	64	58	39	62	36	39	38
2	**Textural Class**	----	Sandy	Sandy	Clay	Clay	Clay	Sandy	Caly	Sandy	Sandy	Sandy
3	**Bulk Density**	g/cc	1.3	1.2	1.2	1.1	1.2	1.3	1.2	1.2	1.3	1.2
4	**pH (1:5 Aq. Extraction)**	----	4.89	5.98	5.67	5.56	5.94	7.06	5.44	5.35	6.40	5.49
5	**Conductivity (1:5Aq. Extraction)**	µS/cm	63	74.5	66.9	51	161	106.9	103.6	83.10	98.30	130.90
6	**Exchangeable Calcium as Ca**	mg/kg	1918.9	1476.3	1096.3	1138.3	2871.1	2440.6	1559.8	1033.8	2028.6	1869.1
7	**Exchangeable Magnesium as Mg**	mg/kg	449.3	424.2	508.6	303.3	721.7	735.3	595.3	748.8	604.1	531.5
8	**Exchangeable Sodium as Na**	mg/kg	17.0	12.7	14.7	13.3	31.1	13.9	16.5	18.9	11.7	12.4
9	**Sodium Absorption Ratio (SAR)**	----	0.02	0.01	0.02	0.02	0.03	0.01	0.03	0.04	0.01	0.02
10	**Available Nitrogen as N**	Kg/hac	53.9	84.2	136.0	112.6	155.3	104.9	140.8	103.7	90.1	97.2

11	**AvailablePhosphorous as P**	Kg/hac	79.7	63.7	103.8	85.1	109.1	68.2	107.2	71.5	68.9	75.0
12	**Available Potassium as K**	Kg/hac	120.3	248.9	143.1	240.1	378.1	360.0	296.9	364.2	355.8	265.9
13	**Organic Carbon**	%	0.25	0.42	0.68	0.61	0.77	0.48	0.70	0.52	0.42	0.49
14	**Organic Matter**	%	0.43	0.72	1.17	1.06	1.34	0.83	1.21	0.89	0.72	0.84
15	**Water Soluble Chlorides as Cl**	mg/kg	134.5	99.2	120.4	113.0	85.0	148.9	127.5	92.1	170.0	148.8
16	**Water Soluble Sulphatesas SO_4**	mg/kg	36.2	32.2	43.6	50.9	37.0	29.1	38.8	35.6	27.2	31.8
17	**Aluminum**	%	0.98	1.11	1.93	1.01	1.38	0.47	0.72	1.16	0.51	0.65
18	**Total Iron**	%	0.54	0.49	0.66	0.55	1.82	0.60	1.04	0.68	1.09	0.71
19	**Manganese**	mg/kg	216.3	487.2	214.2	183.2	444.3	250.6	385.8	159.3	356.5	196.4
20	**Boron**	mg/kg	96.5	100.2	93.0	88.3	76.4	55.8	49.3	60.7	52.7	49.2
21	**Zinc**	mg/kg	14.0	35.1	33.8	31.2	38.1	19.8	16.1	20.2	27.1	12.0
22	**Total Chromium as Cr**	mg/kg	46.5	19.0	16.2	25.4	74.5	30.2	43.9	10.6	35.6	45.5
23	**Lead as Pb**	mg/kg	13.1	6.6	18.3	9.4	10.3	3.1	11.6	15.7	6.7	12.0
24	**Nickel as Ni**	mg/kg	8.8	20.7	24.7	16.4	29.2	11.2	10.3	14.5	8.2	6.6
25	**Arsenic as As**	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

26	**Mercury as Hg**	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	**Cadmium as Cd**	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.36	<0.1	<0.1
28	**Exchangeable Calcium**	mg/l	9.59	7.38	5.48	5.69	14.36	12.20	7.80	5.17	10.14	9.35
29	**Exchangeable Magnesium**	mg/l	3.74	3.53	4.24	2.53	6.01	6.13	4.96	6.24	5.03	4.43
30	**Exchangeable Sodium**	mg/l	0.07	0.06	0.06	0.06	0.14	0.06	0.07	0.08	0.05	0.05
31	**Exchangeable Potassium**	mg/l	0.03	0.07	0.04	0.07	0.11	0.09	0.08	0.10	0.09	0.07
32	**Cation Exchange Capacity**	mg/l	13.44	11.04	9.82	8.35	20.61	18.48	12.91	11.59	15.32	13.90

Source: Baseline Monitoring Report, Vimta lab

3.4.7.3 Interpretation

- Based on the results obtained, it is evident that the soil samples are predominantly Silty clay type.
- The pH of the soil samples ranged from 4.89 to 7.06 indicating the slightly acidic in nature. The electrical conductance of the soil samples varied from 51 µS/cm to 130 µS/cm based on the Conductivity results it can be concluded that the ionic content of the soil samples is within the limits that does not harm the crops. Bulk densities of the soil samples varied from 1.1 to 1.3 gm/cc.
- Available nitrogen in the soil samples varied from 53.9 Kg/ha to 155.3 Kg/ha which is indicating in goodquantities in the soil samples. Available phosphorus in the region varied from 63.7 kg/ha to 109.1 kg/ha revealing the distribution from medium to average sufficient quantities.
- Available potassium levels in the samples ranged from 120.3 Kg/ha to 378.1 Kg/ha, which is indicating average quantities in the soil samples.
- Soluble chlorides in the region varied from 85.0 mg/l to 148.9 mg/kg. Organic matter concentrations ranged from 0.43% to 1.34% on an average sufficient content is noticed in the soil samples.

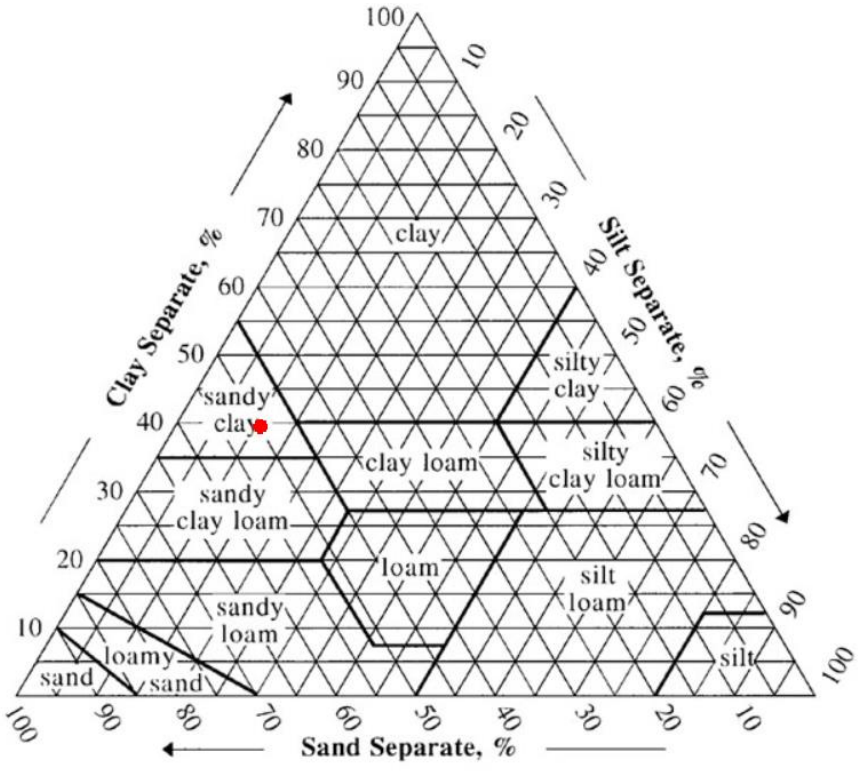


Figure 3.11: Soil Texture

3.4.8 Traffic Study

Traffic analysis is a study carried out to predict the magnitude and impact that the proposed project may have on the existing transportation network. Traffic analysis can also be used to evaluate whether the existing transportation facility is appropriate or needs an improvement for the proposed developmental project.

During the operational phase, major additional traffic will be due to the movement employees and due to transportation of materials. Traffic study was performed to assess impact of the project on local transport infrastructure, by understanding the existing carrying capacity of the road in the vicinity of site, present traffic and additional traffic due to the proposed project. This will be compared with the carrying capacity of the road, as recommended by Indian Road Congress (IRC). Project site connected to metalled road from Suliyari to Bhalya Tola and BhalyaTola to Khanua which will further connected to District Road, which is a two-row lane, and connecting the project site with Singrauli.

3.4.8.1 Traffic Survey

The traffic survey was conducted as per IRC: 64-1990. The sites for traffic survey monitoring were fixed away from the villages and the roads were divided into sections. The traffic density was monitored at the up and down sides of the locations namely:

Location No: T1- Suliyari to Bhalya Tola

Location No: T2- BhalyaTola toKhanua

The monitoring was done for a period of 24 hours continuously. The observed traffic density has been processed for an interval of 1 hour. The total no. of vehicles was calculated on hourly basis as well as for 24 hours. The monitoring plan included the following vehicles namely Car, Buses, trucks, Tractors, Two wheelers, Three wheelers. The traffic density was reported to be low and four skilled persons were deployed simultaneously at each station during each shift (morning and evening)- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour were determined.

3.4.8.2 Data Analysis

Table 3.20: Roads and Highways in the Study Area

Name of National Highway	Direction		Dispatched Ratio in Percentage
	Up	Down	
Road 1	Suliyari	Bhalya Tola	
NH-39	Bhalya Tola	Khanua	
Total			**100**

Source: Traffic Survey

3.4.8.3 Existing traffic scenario

The Level of Service (LOS) and the capacity of the Roadway segments computed is based on the Indian Roads Congress (IRC) standards sourced from Guidelines for Capacity of Urban Roads in Plain Areas IRC 64-1990.

Table 3.21: Summarized Traffic Data

Type of Vehicles	No. of Vehicles		Equivalent PCU	PCU/day	
	Road 1	NH-39		Road 1	Road 2
Trucks	141	147	3	423	441
Agriculture tractors/LCV	134	115	1.5	201	172.5
Bus	94	94	3	282	282
Cars	336	338	1	336	338
3 Wheeler	252	252	1	252	252
2 Wheeler	489	489	0.5	244.5	244.5
Total PCU/day	**1446**	**1435**		**1739**	**1730**

Source: Traffic Survey

3.4.8.4 Railway

Coal will be loaded into trucks of long-term buyers and will be transported into these tarpaulin covered trucks uptothe end user for initial 5 years after that it is proposed to transport coal through railway siding.

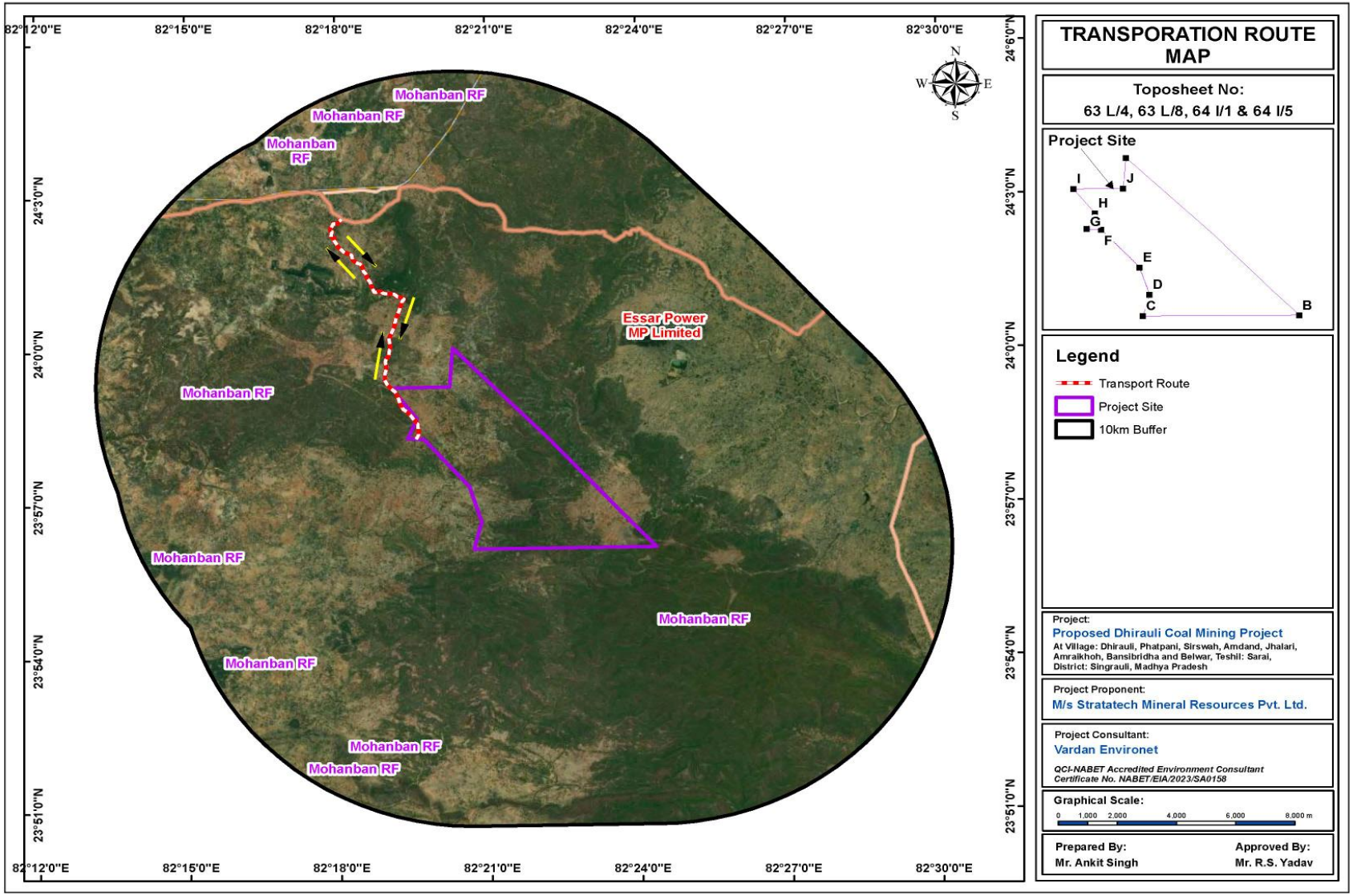
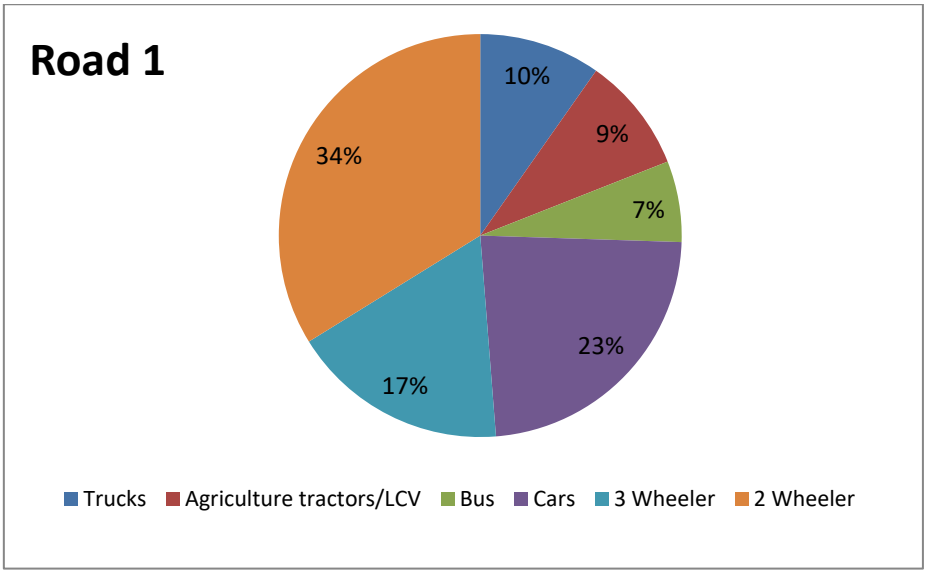


Figure 3.12: Transportation Map

Table 3.22: LOS Standards

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



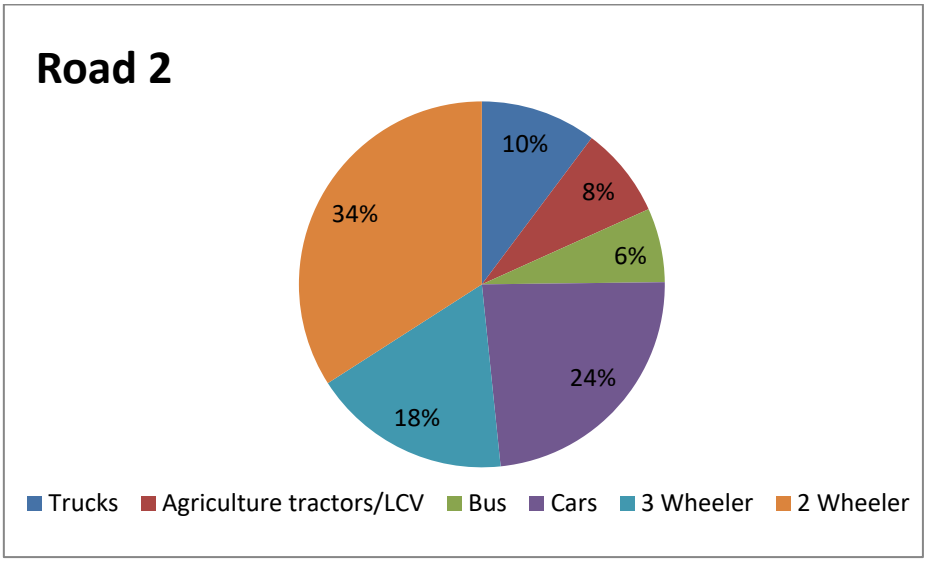


Figure 3.13: Chart Representations for Total Vehicular Data

Table 3.23: Existing Traffic Scenario and LOS

Type of Road	Existing Volume (PCU/day)	Capacity in (PCU/day)	V/C Ratio	LOS
Road 1	1739	15000	0.11	A
Road 2	1730	15000	0.11	A

Source: Traffic Survey

Table 3.24: Proposed traffic Scenario and LOS

During Mine Operation		
1	Total Production Capacity of mine (tons / year)	65,00,000
2	No. of working days	330
3	Production per day	19696 MT/day
4	Frequency of trucks (120*4*2)	960
	Total PCU/day	**2880**

Source: Traffic Survey

All traffic load from the mine will be on Road 1 which will further divided to road, hence 100% traffic load has been calculated on Road 1. Increase in PCU/day due to proposed project is given below in **Table 3.25**

Table 3.25:Existing and Increase in PCU/day

Road	Existing	Proposed Volume (V)	Capacity (C)	Modified V/C Ratio	LOS
Road 1	1739*100	1739+2880=4619	15000	0.30	B
Road 2	1730*50	1730+1440=3170	15000	0.21	B

Source: Traffic Survey

3.4.8.5 Interpretation

Due to the mine project the traffic density will increase as the entire mineral will be transported through the Road 1 the value of LOS will change from Excellent to Very Good.

3.4.9 Land Use Environment

Land use/cover change detection is very essential for better understanding of landscape dynamic during a known period of time having sustainable management. Land use and land cover change has been recognized as an important driver of environmental change on all spatial and temporal scales; Changes may involve the nature or intensity of change but may also include spatial and time aspects. Land use/ Land cover changes also involve the modification, either direct or indirect, of natural habitats and their impact on the ecology of the area. Land use mapping has always been a time consuming and expensive process. Space technology in recent years has emerged as a powerful tool for land use /land cover studies, particularly

change detection. Contrary to the traditional methods of field survey in which it took several years for the preparation and initial mapping of land use/ land cover of an area, remote sensing technology, due to synoptic view, map like format and repetitive coverage, is a viable source of gathering quality land cover information at local, regional and global scales. Land use is a matter of continuous growth and change in pattern.

As an information system GIS provides for the organization, storage, analysis, modeling, mapping, and display of physical and biological data, as well as the distribution of cultural or socio-economic data. The Land use Land cover study has been carried out using Digital Image Processing and Digital Image Interpretation techniques. The Image Processing and Geographical Information Systems software have been used for the Spatial Analysis.

3.4.9.1 Land use / Land cover Classification

Digital image processing was carried out to delineate various land use / land cover categories in the lease area viz. built up area, crop area, forests, scrub land, and water bodies etc. by assigning necessary training sets, which were identified based on tone, texture, size, shape pattern and location information **(Figure 3.14, 3.15& 3.16)**. Necessary care was taken to identify proper land use class, where there is conflict between the signatures of various classes. The interpreted map was verified on ground at limited points and final land use / land cover map was prepared.

3.4.9.2 Various Land Use Classes Considered

The buffer zone can be broadly classified in to forest areas, built-up areas, agriculture areas and other land with or without scrubs.

3.4.9.3 Industry

Industrial area means an area of land transferred to or placed at disposal of the Corporation by the state Government or the land purchased, acquired or otherwise held by the Corporation or reserved or set apart or here after reserved or set apart under any law for setting up an industry or industries including essential welfare and supporting services.

3.4.9.4 Forest

All the areas declared as reserve forest / protected forest areas are shown in this class.

3.4.9.5 Agriculture

The areas where farmers practice cultivation in one season/ two seasons in a year.

3.4.9.6 Scrubs

Generally waste lands-non agriculture and non-forest areas covered with or without scrubs.

3.4.9.7 Waste lands

Land without any usage and without scrubs and sometimes they are rock exposed areas.

3.4.9.8 Water Bodies

The oceans, rivers, streams, lakes, tanks, reservoirs, canals, are etc. will be identified in this class.

3.4.9.9 Built-up

The villages/ colonies/ towns area are shown in this class.

3.4.10 Land Use / Land Cover

The land use/land cover pattern of the area have been framed from the Satellite Imagery and Topo-sheet and authenticated by field visit. The land use/land cover pattern has been divided into 7 classes as follows: (i), Industry. (ii) Forest, (iii) Builtup, (iv), Agriculture Land, (v) Open Scrub (vi), Waste Land, (vii) Water body. The given categories of land use and land cover pattern covers an area of about 59626 Ha. Various classes and their respective areas with percentage of coverage are given in **Figure 3.15** &**Table 3.26.**

Table 3.26: Land use of the study area

Land Use	Area in Hectare	Area in %
Industry	340	0.6
Forest	33700	56.5
Builtup	1579	2.6
Agriculture Land	11013	18.5
Open Scrub	11021	18.5
Waste Land	1781	3.0
Waterbody	192	0.3
Total	**59626**	**100.0**

Source: IRS P-6 Satellite Imagery, Google Imagery and On-site Data

3.4.10.1 Forest Area

Forest covers major portion of the project area. The forest land consists mostly of Protected Forest or Reserved Forest as well as revenue forest land as per legal land status. Some open mixed jungles are also situated in the study area. The study area is covered by MohanbanRF. The total forest area cover is about 33700 Ha which is 56.5% of the total study area.

3.4.10.2 Industry

Few part of the study area is covered with industry. The total industry area covers about 340 Ha which is 0.6% of the total study area.

3.4.10.3 Scrub Land

The soil of this type of land is with very little vegetation and is unsuitable for agricultural purposes and is classified in the wasteland category. Only small thorny bushes are sustained in the soil. Generally this type of land cover may be observed to be spread within the agricultural land areas. Land area with the scrubs covers 11021 Ha of land area which is about 18.5% of total land area.

3.4.10.4 Agriculture Land

The Agricultural land covers the third major land area of the project which is about 11013 Ha, 18.5% of the total land area. Major part of the agriculture land is double cropped agriculture land.

3.4.10.5 Waste Land

Wastelands are lands which are unproductive, rocky, unfit for cultivation and other economic uses due to rough terrain and eroded soils. The soil of this type of land area with very little vegetation is unsuitable for agricultural purposes. This type of land-use and land cover pattern covers about 1781 Ha of land which is 3% of the total area.

3.4.10.6 Built-up

Built-up in the project area refers to the village settlements with all infrastructural facilities like school, market, play ground and various other facilities. In the study area the settlements are mostly rural settlements scattered all over in patches but mainly in the northern direction of the coal blocks. Total area comes under built-up is 1579 Ha, which is 2.6% of the total. Some of the village settlements present in the study area are Gumga, Kente, Chandannagar, Shivnagar, Basan, Tara etc.

3.4.10.7 Waterbody

Water bodies refer to the small collection of water in any natural or manmade storage like ponds, lakes, tanks, reservoirs etc. In the study area these water bodies are present in very small patches near village settlements. Such types of water bodies are very few covering only 192 Ha of land area which is 0.3% of total study area.

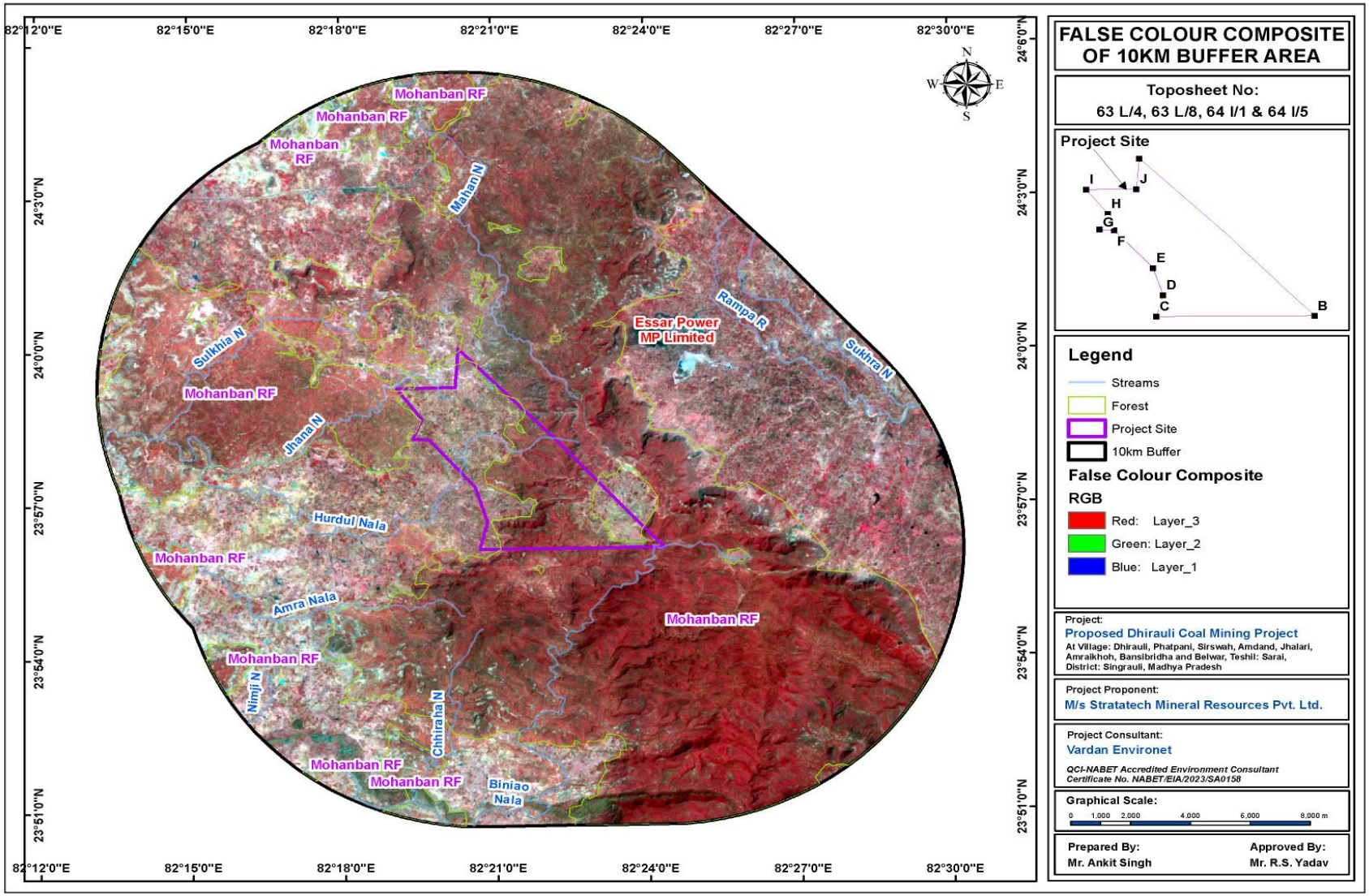


Figure 3.14: Satellite Imagery of 10 Km Study Area

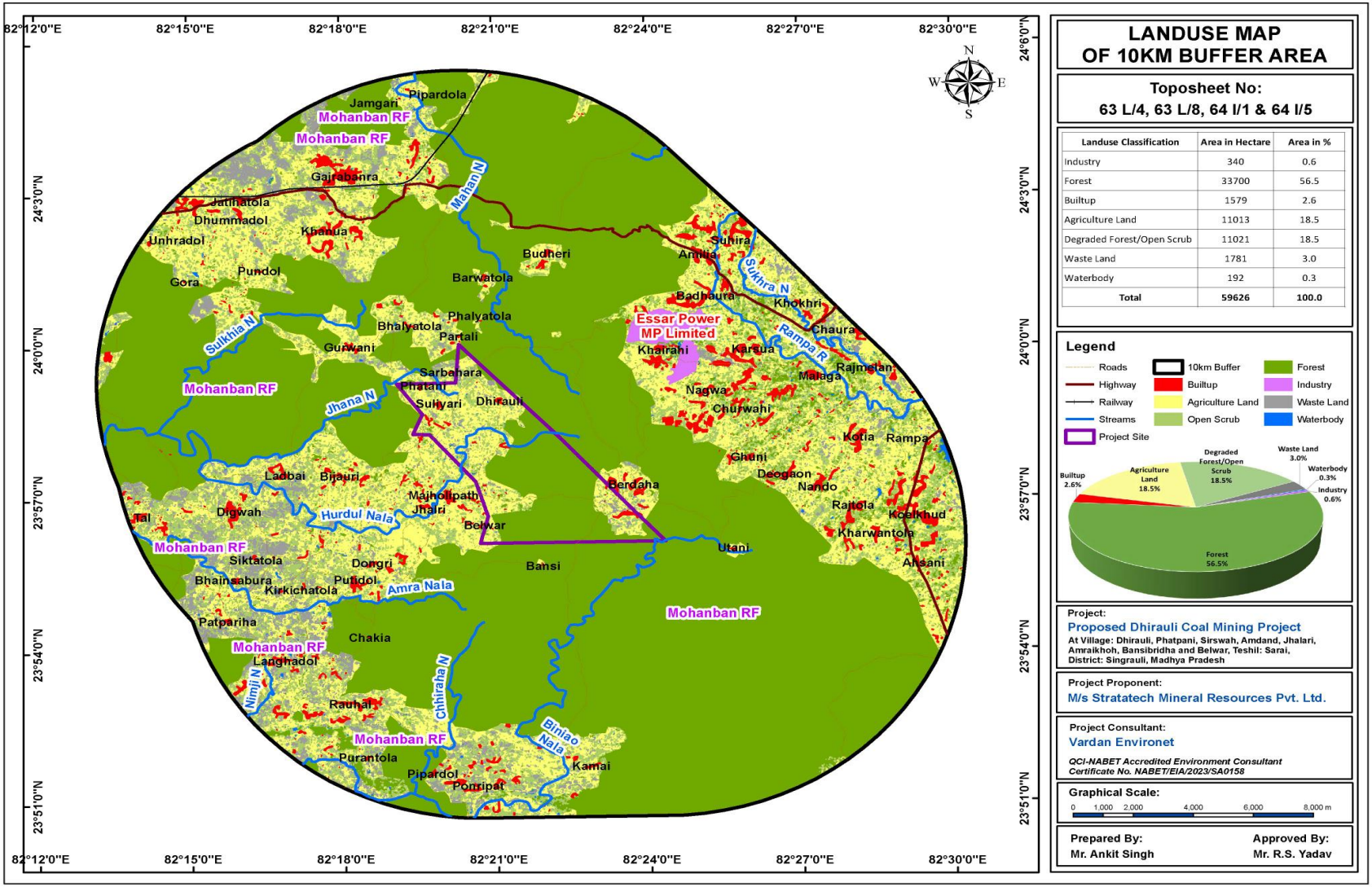


Figure 3.15: LULC Map of 10 km Study Area

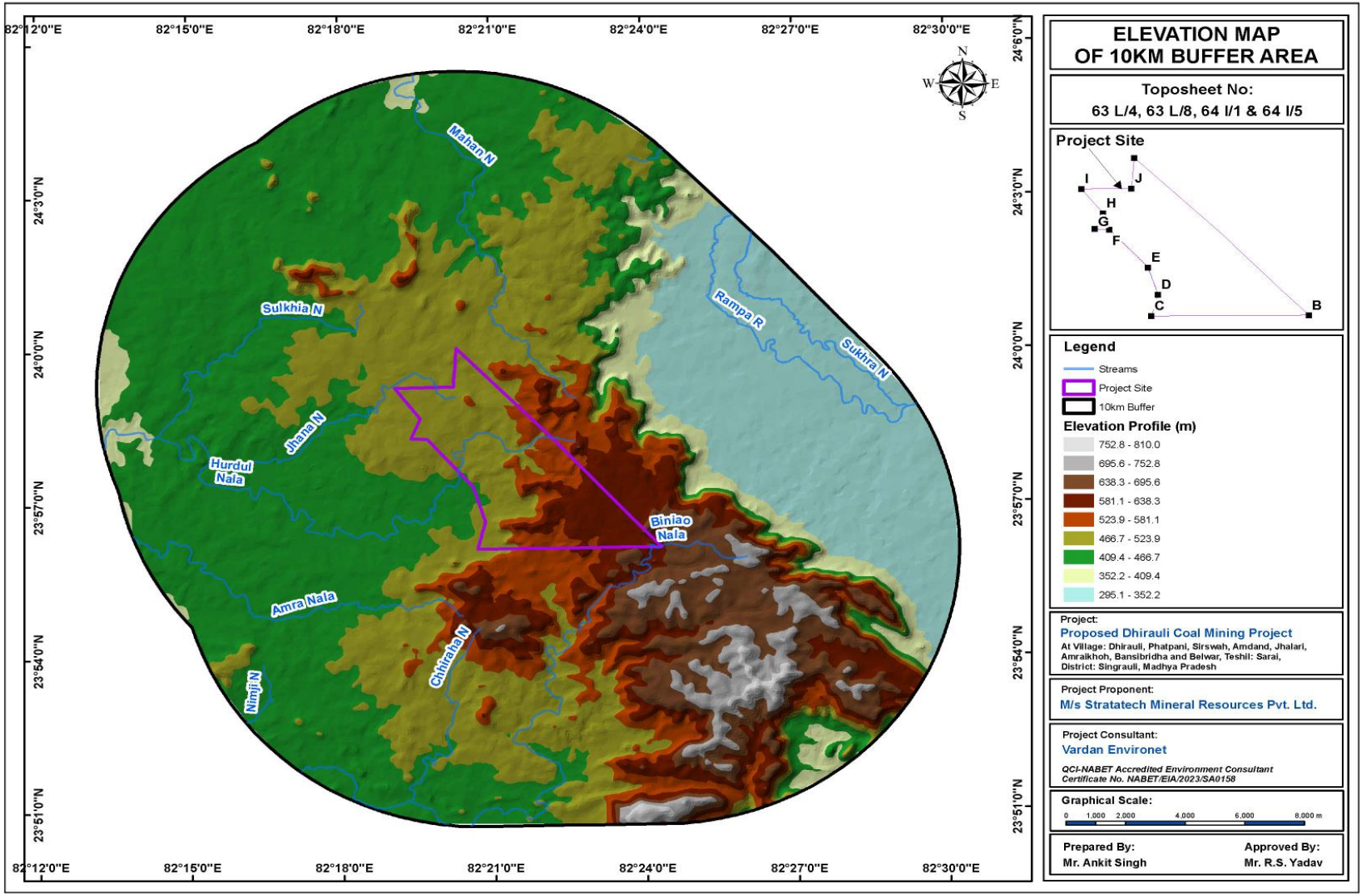


Figure 3.16: Elevation Map of 10 Km Study area

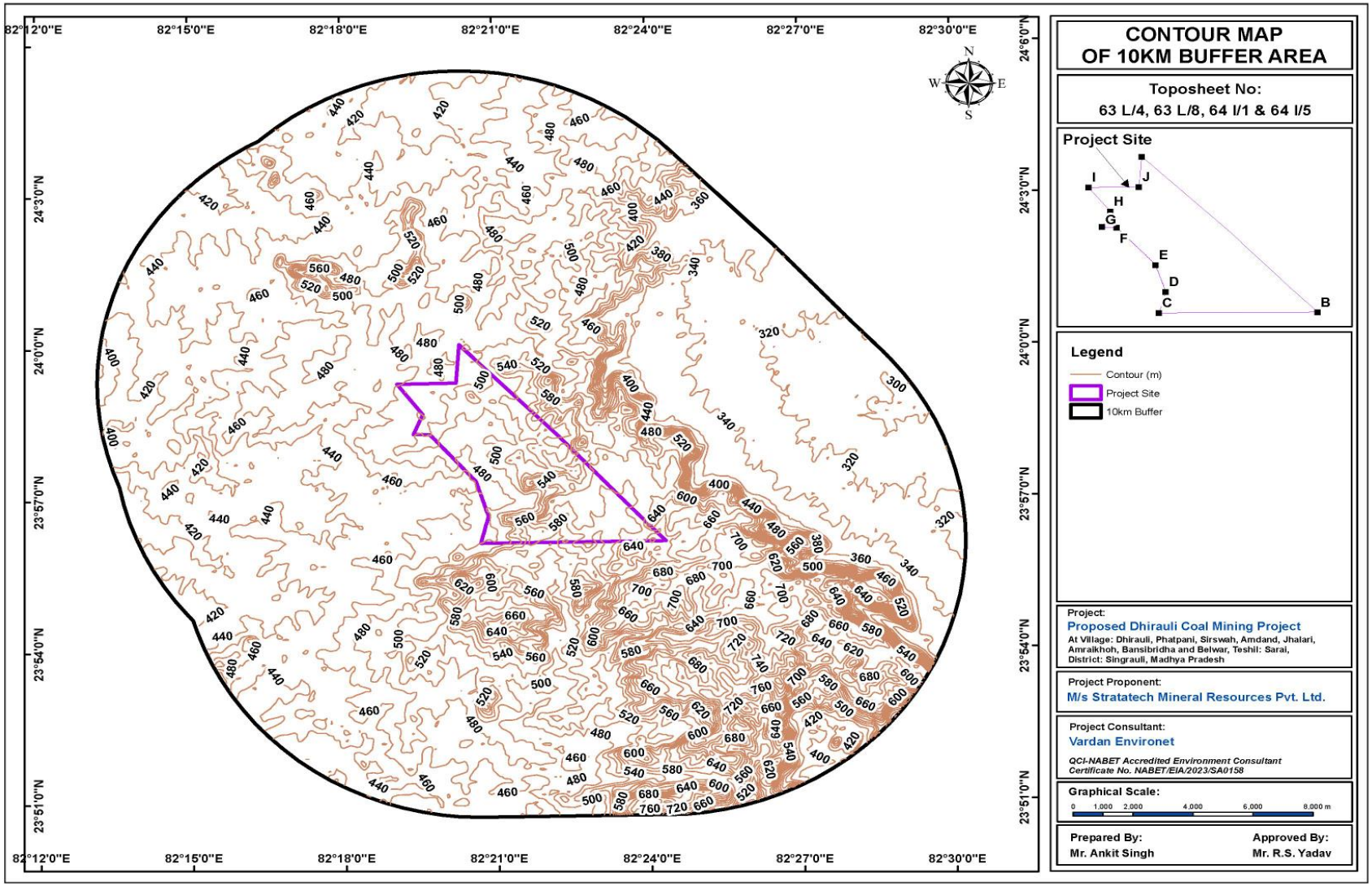


Figure 3.17: Contour Map of Study Area

3.5 Hydrogeology

3.5.1 Physiography of District

The district as a whole constitutes a hilly terrain most part of the district is covered by kaimur hilly ranges. The district is divided into three physiographic divisions: - (i) Kaimur hilly ranges (ii) The Central part hilly ranges and (iii) Southern hilly ranges. In the district three main river flows along with several tributaries rivers the major rivers are the son, Gopal and Rihand. The Kaimur range stretching from NE and SW direction and covered most part of the district. The central part of the district forms a series of hill ranges. The Southern part of district the elevation of hills ranges varies between 365 and 488m above MSL. The general slope of the area is towards North east.

3.5.2 Physiography of the Project Site

Western part of Dhirauli block is characterized by almost plain topography, while, north-eastern and south-central part are highly undulating and have rugged topography as evident from the topographical plan. The north-eastern and south-central part of the block have forest cover and is occupied by hillocks of elevation up to a maximum of 638 m above MSL. In general elevation of ground varies from 459.23m as observed near borehole MSD-102 to 603.45 m near borehole MDP-19 located in the south-western and south-eastern corner of the block respectively.

3.5.3 Soil Type

The Singrauli District is generally covered with Alluvial soil, red Sandy soil and yellow loamy Sandy soil, laterite soil and red loam soil. The district comprises sedimentary, crystalline and metamorphic rocks, weather into red soil. Similarly, the red colour of the laterite soil is more due to diffusion of Iron compounds rather than due to high proportion of Iron oxides. The alluvial soil is mostly restricted by along the banks of major rivers, whose thickness varies from few meters to 25 meters.

3.5.4 Geology

The geology of the district reveals that the Occurrence of various work formation as old as granites of Achaean age to the Alluvium of Recent age. The other important formations Outcropping in the district are Deccan trap of cretaceous – Eocene, Gondwanas of Paleozoic to Mesozoic Sandstone and other ranks of Vindhayans and Phyllites. Quartzites, Schist Gneisses and Granites of Archeans age. The Geology of the district is shown in the Hydrogeogical Map. The general Stratigraphical Succession obtained in the district is given as under.

Table 3.27: Stratigraphic succession of Singrauli coalfields

Age	Group	Formation	Lithology
Cretaceous		Intrusives	**Dolerite dykes & Sills**
Upper Triassic	Upper Gondwana	Mahadeva	**Coarse grains, ferruginous sandstone with bands of shale, clay and conglomerates.**
Lower Triassic	Lower Gondwana	Panchet	**White, greenish white and pink micaceous, medium to coarse grained sandstone with red beds, greenish brown silty shales and conglomerates.**
Upper Permian		Raniganj (215-403 m)	**Fine grained sandstones and shales with coal seams including 134 m thick Jhingurdah seam**
Middle Permian		Barren Measures (125-300 m)	**Very coarse grained, ferruginous, sandstones, green clays & shales.**
Lower Permian		Barakar (325-600 m)	**Medium to coarse grained, sandstones, shales, clays and coal seams.**
Upper Carboniferous to Lower		Talchir (75-130 m)	**Tillite, sandstones, siltstones, needle shales etc.**

Permian			
---------- Unconformity ----------			
Precambrian		**Precambrian**	**Phyllites, quartzites, schists and gneisses.**

3.5.4.1 Geology of Singrauli Coal Field

Singrauli coalfield forms the northern extremity of Son-Mahanadi master Gondwana basin, at the junction region of east-west trending Damodar-Koel-Tatapanigarben and the NW-SE trending Son-Mahanadi rift zone; thus, reflecting the lithological and structural characteristics of both Damodar and Son valley Gondwana basins. The northern limit of the Singrauli coalfield is defined by a major east-west trending northern boundary fault, which is parallel to the Narmada-Son lineament. High standing Mahadeva hills are defining the southern boundary. Talchir beds rest un-conformably over Precambrian rocks and the Precambrian themselves are forming the eastern boundary whereas the western boundary is formed by the contact of Precambrian and Supra Barakar sediments.

3.5.4.1 Geology of Dhirauli Block

The Dhirauli block is traversed by 11 normal gravity faults designated as F1-F1 to F11-F11. There are two sets of faults - one trending NW-SE and the other trending NE-SW. The magnitude of these faults varies from 5 m to 85 m within the block. The faults have been deciphered based on the floor level difference observed on either side of the fault planes and on the basis of borehole intersections. It is pertinent to mention here that the numbers of minor slips are also observed in boreholes causing insignificant reduction of parting and seam thickness. It is seen that, out of 11 faults interpreted, 10 faults are of low magnitude having throw between 5 m to 35 m except fault F9-F9 which is having maximum 85 m of throw. In general, the strike varies from NW-SW in the entire area of the block to almost E-W in the southern part of the block with gentle dip of 2° to 4° north-easterly to north and south-westerly to south at places. The net geological and mineable reserves estimated for both open cast and underground mining is 558.01 Mt and 313.79 Mt respectively.

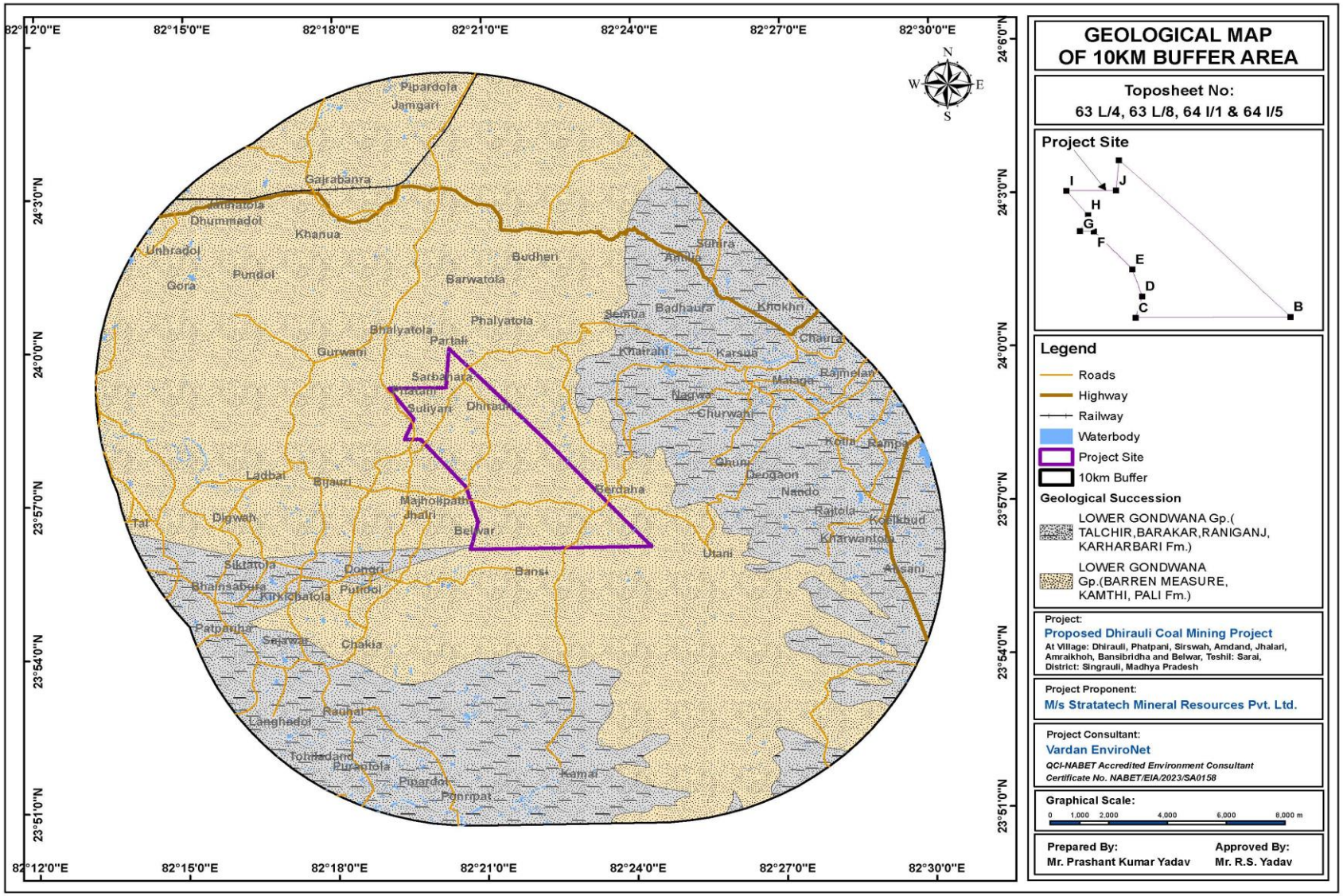


Figure 3.18: Geological Map of 10 Km Buffer

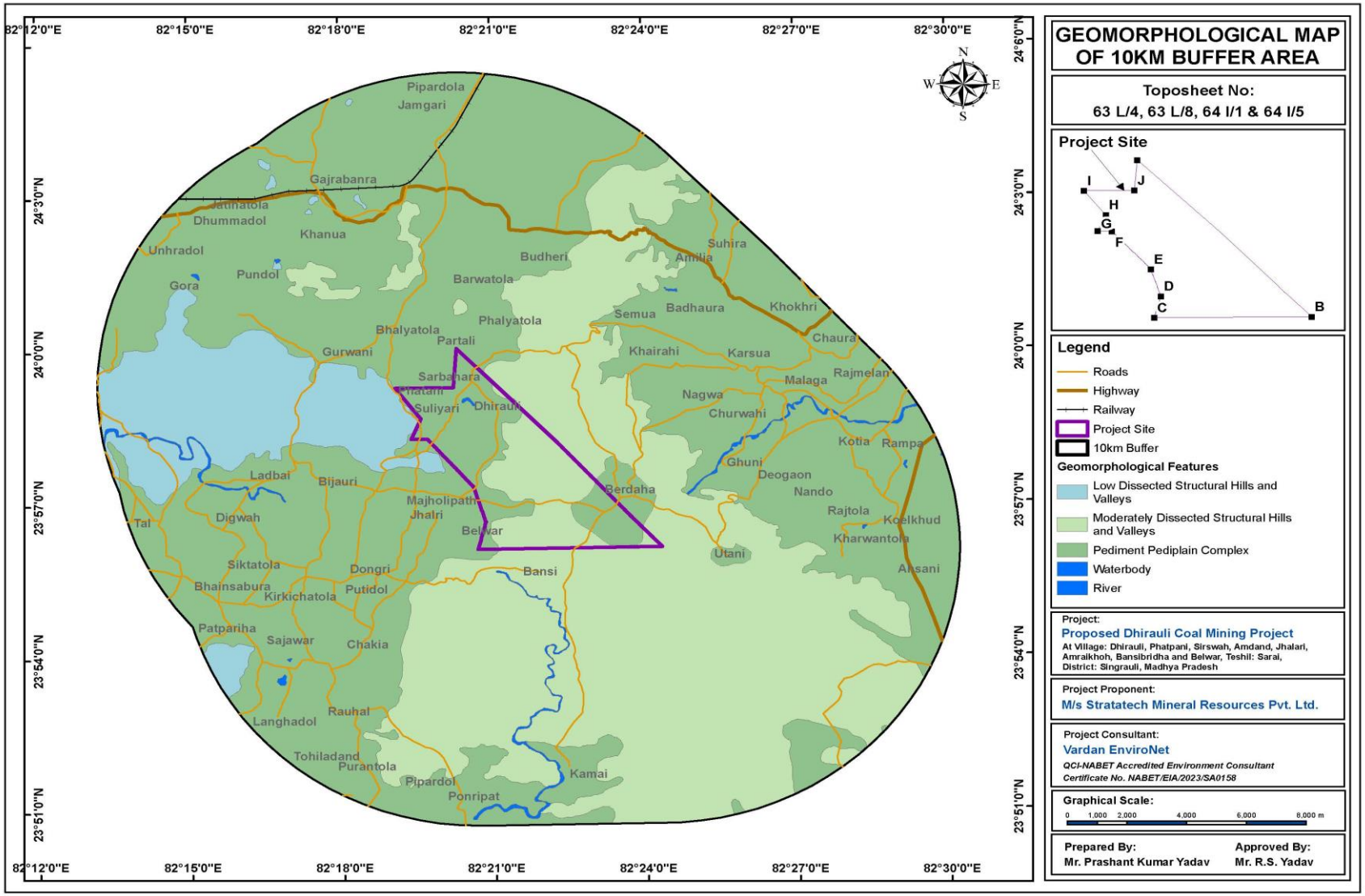


Figure 3.19: Geomorphology Map (Source: GSI (Bhukosh))

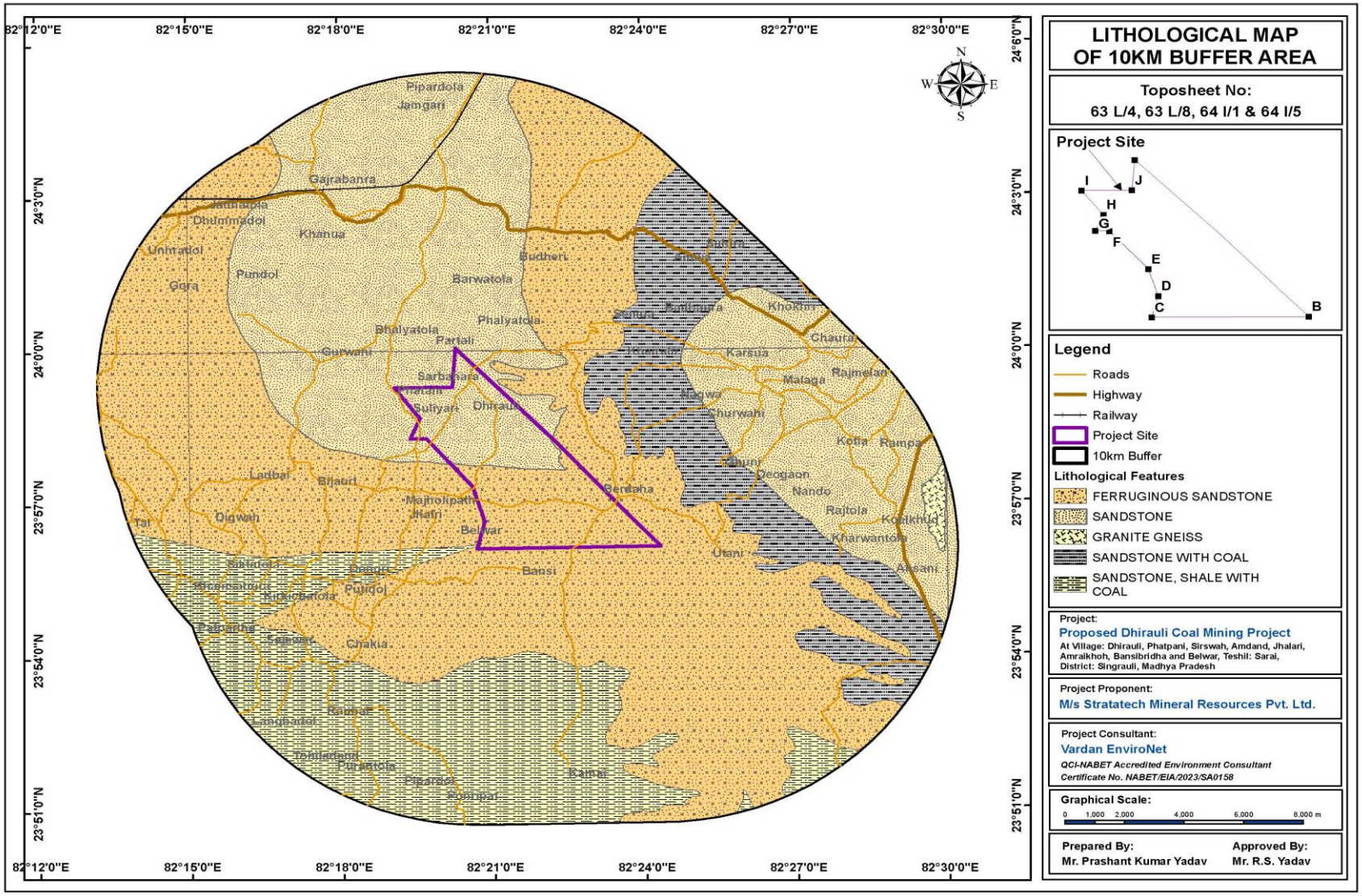


Figure 3.20: Lithological Map of 10 Km Buffer

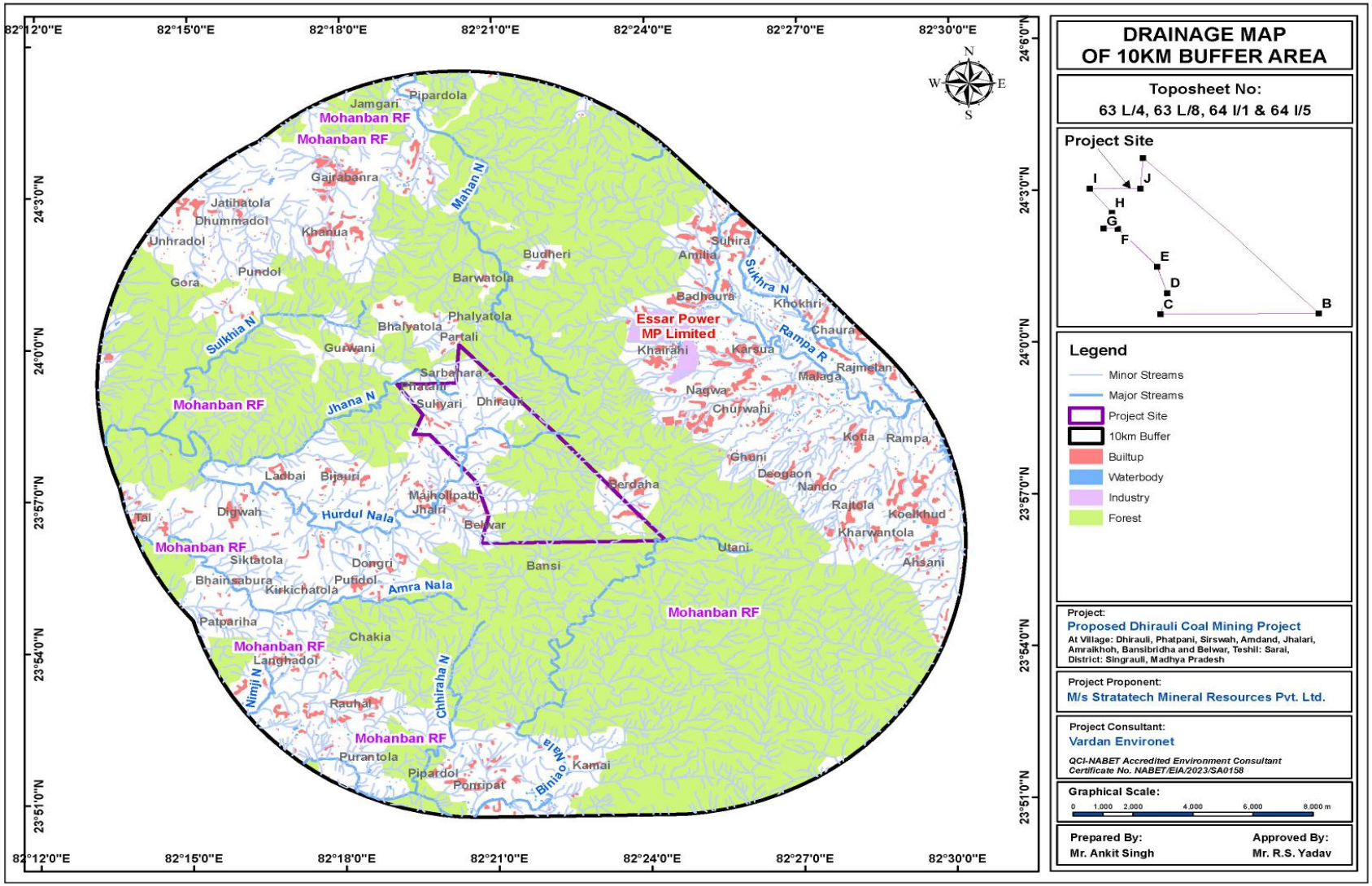


Figure 3.21: Drainage Map of the study area

3.5.5 Hydrogeology

As per Ground Water Resources Assessment (CGWA) the project location comes under the non-Notified, Safe Zone.

The entire district drained by the above mentioned 3 major rivers and their tributaries for us the Ganges drainage System. The pattern of drainage is dendrite in hectare excepting the localized radial pattern in the hilly terrain.

Ground water is the principal source of irrigation in the district. The district area is underlain by hand rocks as well alluvium. The occurrence and movement of ground Water in different formations varies with rock type. The weathered and fractured zones occurring at shallow depths provide scope of ground water storage and movement. Ground water in Achaeans rocks occur in joints and fractures plane and in the weathered zones mostly under the water table conditions occurrence and movement of ground water is controlled by the extended size and interconnection of Joints and the degree of weathering which varies specially areas having a high degree of fracturing and weathering and fracturing can sustain tube wells. Hydrogeology report is attached as **Annexure XI.**

3.5.5.1 Aquifer Study

The area occupied by Achaean rocks comprising mostly granites schist's phyllites gneisses and quartizes where ground water occurs under phreatic conditions in the shallow weathered, Jointed, and fractured zones of these rock types of the thickness of weathered zone generally varies from 7 to 18 mbgl. The depth of the dug wells ranged between 3 to 21 mbgl with depth to water level varies from 2.41 to 16.70 mbgl.

The Vindhyan Sandstone and limestone, when occurring at lower elevations and having well developed joints, yield modulate quantities of ground water. The semri limestone has well developed and interconnected solution openings and ground water occurs under confined conditions. The depth to dug wells range between 6 to 24m bgl with depth to water level varying between 3.72 to 21.50m bgl Lower gondwana formations are represented by Talchir formation occupy in the northern part of the district wells located in topographic lows and piercing the Talchir Sandstones yield vary between 200 to 400m^3 /day. The upper gondwana formations mainly consists of sandstones and clays and appear as hilly terrain in the southern part of the district the depth to water level in the upper gondwana formations verging between 3.15 to 11.32. The well discharge varies between 100 to 150m^3 /day during summer months and can be developed by large diameter dug wells with diameter dug wells with diameter varying between 5 to 10m with 15 to 20m depth

piercing the full thickness of weathered Jointed and fractured zones available in this formation.

Ground Water Level:
District Scenario:

Pre-Monsoon: The pre-monsoon depth to water level in the district ranges between 4.13 m bgl and 18.50m bgl. Major part of the district has water level in the range of 8- 12m bgl during the pre-monsoon.

Post-Monsoon: During post-monsoon period, water level varies from 2.94m bgl to 15.17m bgl. In major part of the district, water level lies between 5 & 10 m bgl.

Ground water level at project location: Ground water level near the project location varies from 5.00 to 15.00 mbgl.

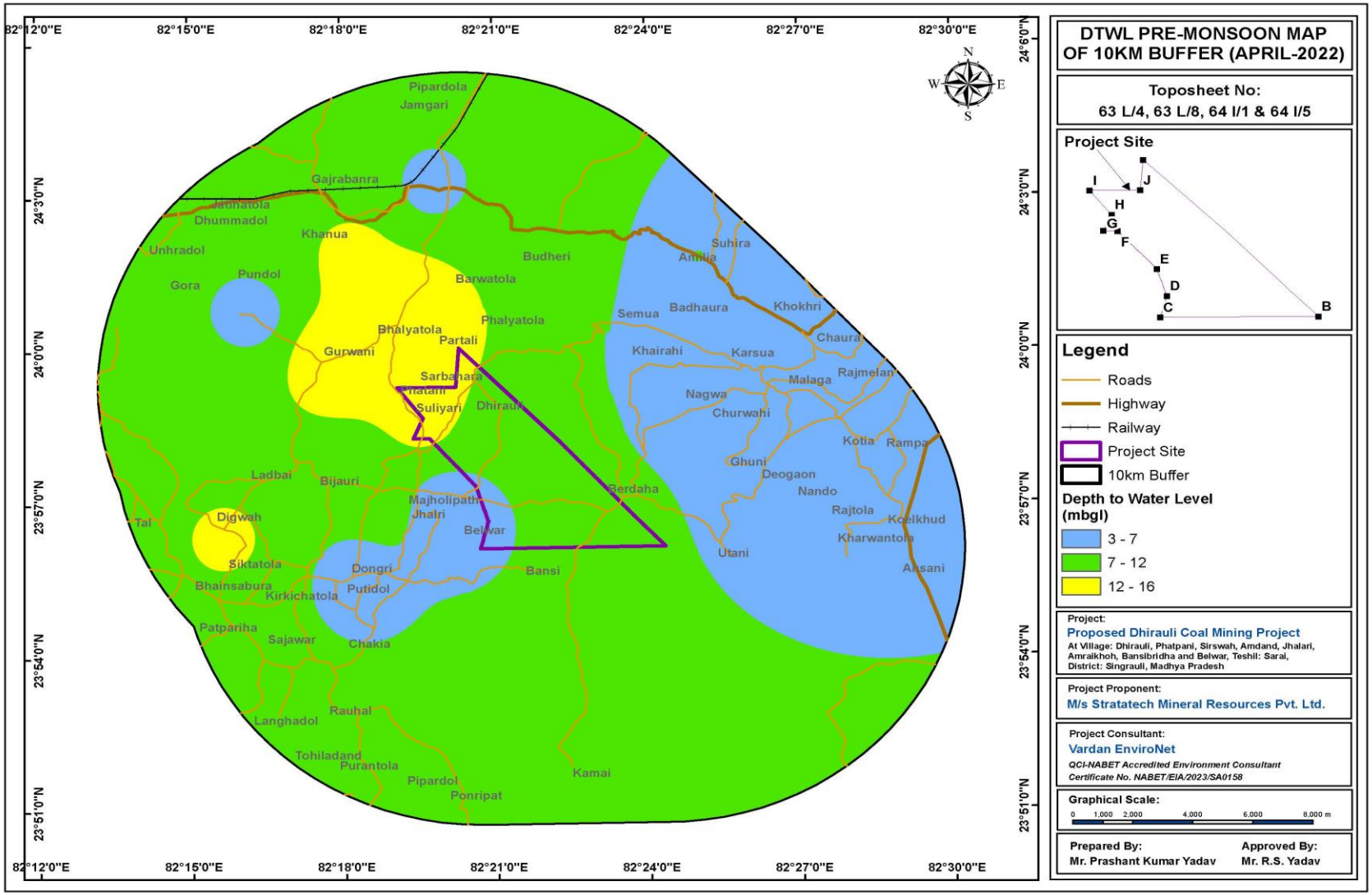


Figure 3.22: Pre-Monsoonal Ground Water Level 10KM Buffer

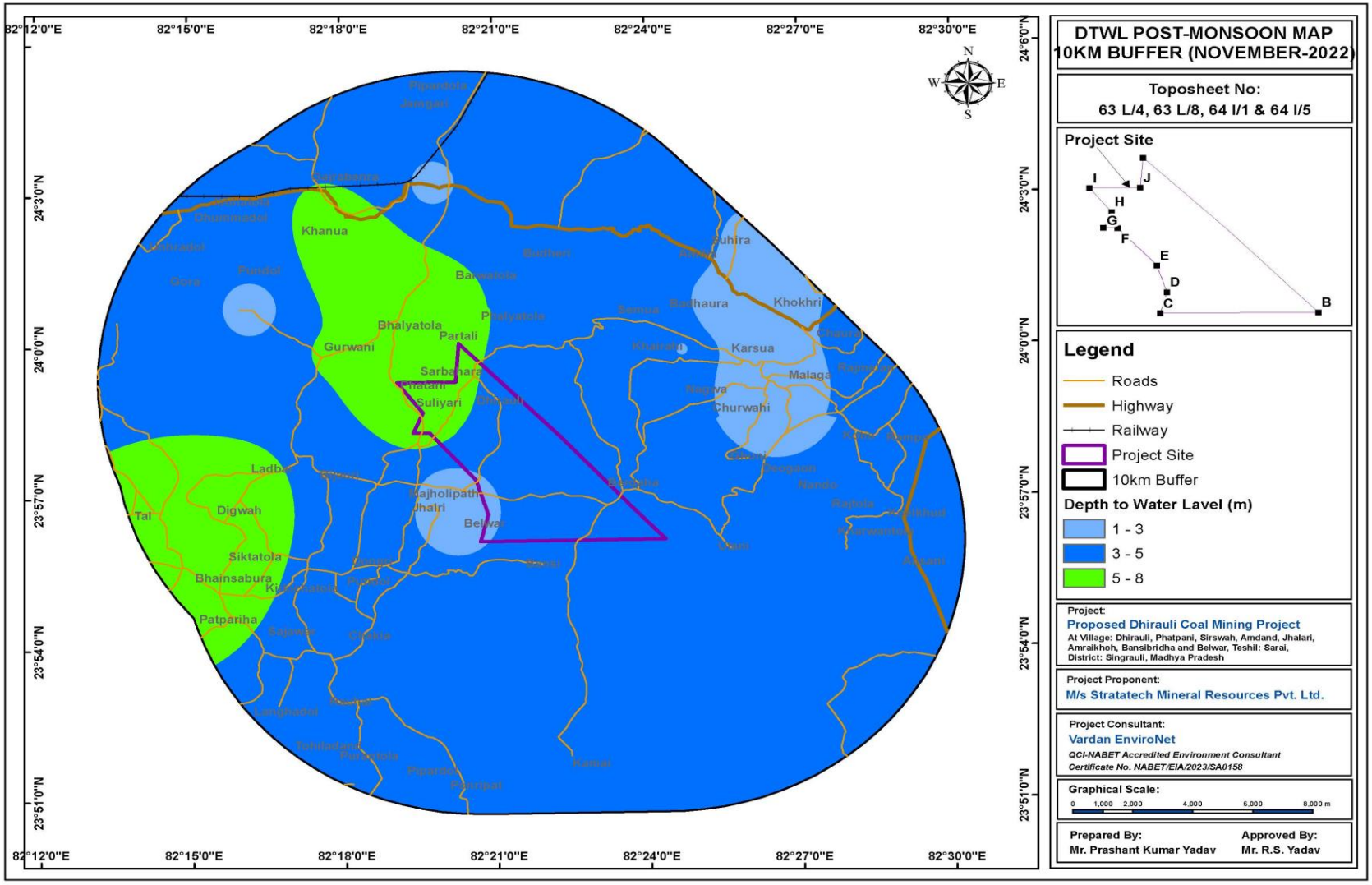


Figure 3.23: Post-Monsoonal Ground Water Level 10KM Buffer

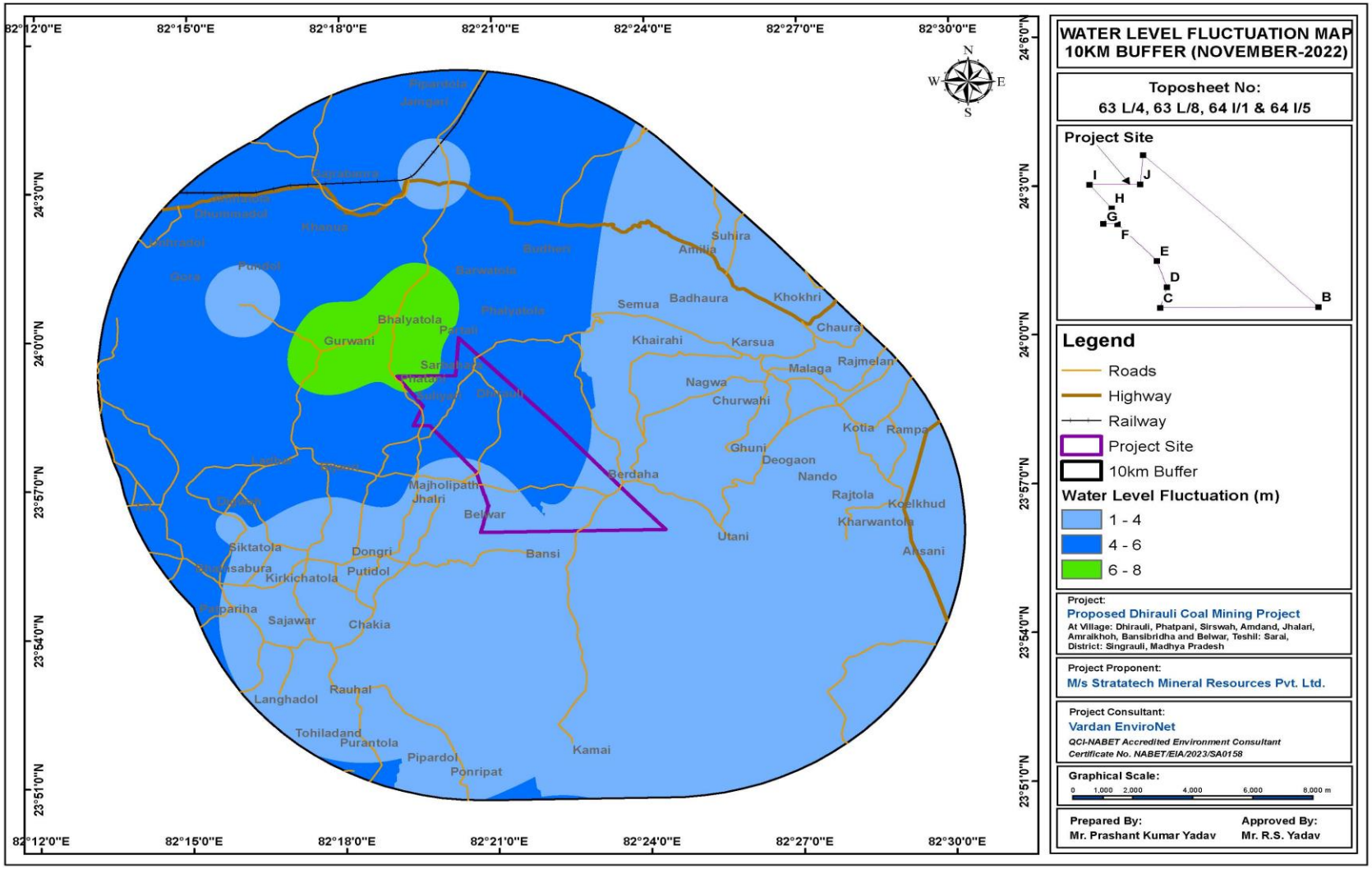


Figure 3.24: Ground Water Level Fluctuation Map 10KM Buffer

3.6 Ecology and Biodiversity

3.6.1 Status of Terrestrial Ecology in the Study Area

3.6.1.1 Ecology of the Area

The area of Singrauli coal fields is about 2202 sq. km. This coal field can be divided into two basins, viz. Moher Sub-basin (312 Sq. km), and Singrauli Main basin (1890 sq. km). Major part of the Moher Sub-basin lies in the Singrauli district of Madhya Pradesh and a small part lies in the Sonbhadra district of Uttar Pradesh. Singrauli main basin lies in the western part of the coalfield and largely unexplored.

There are twenty six coal blocks identified by Ministry of Coal, Government of India, and New Delhi. They are Amelia (North), Amelia, Chatarsal, Mahan, Mara Mahan, Suliyari, Patpahari, Dhirauli, Bandha, Bandha North, GondbaheraUjheni, GondbaheraUjheni East, Pachaur, Makri Barka East, Makri Barka, Makri Barka West Phase-I, Gurbara South, Gurbara Central, Gurbara North, Purail, Saratola, Borka, Bari Mahuli, Hattadudhmania, Sarai East, Sarai West, Dongri Tal-I and Dongri Tal-II.

Dhirauli Coal Block is located in Singrauli Coalfield (Main Basin), Village Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar, Tehsil: Sarai, Singrauli district of Madhya Pradesh.

The Biodiversity conservation and habitat fragmentation are terms that are often used together because of the burgeoning human population and rapidly declining biodiversity all over the world. A logical consequence of an increasing human population and subsequent use of land for development projects is less space for flora and fauna and greater pressure on remaining habitat fragments.

Cropping Pattern Adopted by Villagers:

Two seasonal crops mainly Kharif (summer crop) and Rabi (winter crop) are well developed in this region. The crops grown are Paddy, Jawar, Maize and Kodo. Besides pulses like Arhar, Mung, Mustard and Til are also grown. The main Rabi crop is also paddy which is cultivated with a short rotation and this type of crop is grown only where irrigation facilities are available during winter. In addition Alsi, Mustard, etc. are also grown during Rabi. A very significant matter is use of fertilizers and pesticides in this region are very much limited as most of the agricultural practitioners are traditional and support use of green manure.

Extent of Biotic Pressure of the villagers on the study area

At present agriculture is not imposing any biotic pressure on the natural ecosystem particularly of this region. The population growth is a common phenomenon all over

which is not restricted to only the study area. The population growth has its impact on the natural ecosystem, common to everywhere. The energy consumption by the villagers for cooking food items entirely depends on adjoining forest areas i.e. collection of fuel wood.

Number of Families depending upon the NTFP Collection:

A majority of families in the impact area belong to SC and ST, who are involved in collection of NTFP. The main NTFP (non-timber forest produce) product is mouha (Madhuca indica) flower. Aapart from mouha they also collect Amla (*Emblica officinalis*), Baheda (*Terminalia bellirica*), Harra (*Terminalia chebula*) and Aam (*Mangifera indica*) fruits. Honey and Jhuna (raal) (resin from Sal tree) collection is infrequent in the study area. Tendu leaf collection is also practised here. However, during our survey we did not found any family entirely dependent on NTFP collection. The left over family members of the main work force (old age people, women and children) are mostly engaged in NTFP collection. All family members' joins for collection of NTFP during the lean period when no other engagement for earning their lively hood is available. Apart from NTFP, fire wood (locally called Jhati) collection from forest is a traditional and common practice in the study area. Villagers cut the tree for small timber and firewood for their own consumption. They collect their fencing materials and materials required for agricultural tools from the surrounding forests. On an average per standard family (Father+ mother+ one child) consumes 10 kg of firewood per day.

Method of NTFP Collection:

Handpicking from the ground is the main system of collection of mohua. For collecting from the ground villagers clean the forest floor by igniting fire, which destroy the ground vegetation, as well as restrict the regeneration of tree species. Repeated use of this method adversely impact herbivore population. Due to the impact of this cleaning process of underground forest growth, the ground becomes completely barren at places to check the rainwater flow, resulting in to soil erosion.

3.6.1.2 Forest Types of Study area

Madhya Pradesh is a forest rich State and is ranked first among the States in terms of the RFA. The State has a sizeable tribal and rural population which is dependent on the forests for their livelihood and basic needs. As per the Champion & Seth Classification of Forest Types (1968), the forests in Madhya Pradesh belong to five Forest Type Groups, which are further divided into 21 Forest Types. Madhya Pradesh is a pioneering State in the implementation of the Joint Forest Management (JFM) movement in the country. The State has a strong JFM network through 15,228 JFMC/VSS/EDCs covering an area of 66,874 sq km.

Recorded Forest Area (RFA) in the State is 94,689 sq km of which 61,886 sq km is Reserved Forests, 31,098 sq km is Protected Forests and 1,705 sq km is Unclassed Forests. In Madhya Pradesh, during the period 1st January 2015 to 5th February 2019, a total of 12,785.98 hectares of forest land was diverted for nonforestry purposes under the Forest Conservation Act, 1980 (MoEF & CC, 2019).

Ten National Parks and 25 Wildlife Sanctuaries constitute the Protected Area network of the State covering 3.51% of its geographical area. There are 6 Tiger Reserves in the State covering an area of 6117.26 sq km. Eco-sensitive zones have been declared for 19 protected areas. The State with a population of 526 Tigers, is recognized as Tiger State of India, as per the 'All India Tiger Estimation 2018' released recently.

Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the period Oct 2017 to January 2018, the Forest Cover in the State is 77,482.49 sq km which is 25.14 % of the State's geographical area. In terms of forest canopy density classes, the State has 6,676.02 sq km under Very Dense Forest (VDF), 34,341.40 sq km under Moderately Dense Forest (MDF) and 36,465.07 sq km under Open Forest (OF). Forest Cover in the State has increased by 68.49 sq km as compared to the previous assessment reported in ISFR 2017 (ISFR, 2019).

According to revised Forest Types (Champion & Seth, 1968) the forest type of the lease area confirms to following forest types:-

i. Dry Peninsular Sal Forest (5B/C1c)
ii. Northern Dry Mixed Deciduous Forest (5B/C2)
iii. Dry Deciduous Scrub (5/DS1)
iv. Dry Bamboo Brakes (5/E9)

i. Dry Peninsular Sal Forest (5B/C1c): Sal occurs either pure or in mixture with *Terminalia tomentosa, Terminalia bellerica, Pterocarpus marsupium, Anogeissus latifolia, Lagerstroemia parviflora, Madhuca latifolia, Diospyros melanoxylon, Buchananialanzan, Ougeiniadalbergiodes etc. Under storey consists of Combretum decandrum, Flacourtiacataphracta, Randiadumetorum, Zizyphusmauritiana, Gardenia gummifera, Holarrhena Spp., Lantana Camara, Eupatorium odoratum* etc.

ii. Northern Dry Mixed Deciduous Forest (5B/C2): The upper canopy in this forest type is usually light, open and irregular, the trees having relatively short bole and poor form and a height rarely over 10 m. The canopy is formed entirely of deciduous trees. The main species found are *Cassia fistula, Diospyros tomentosa, Acacia catechu, Anogeissus latifolia, Bombax ceiba, Albizzia lebbeck, Albizzia procera, Melia azadirachta, Acacia nilotica, Acacia modesta, Bauhinia variegate, Bauhinia purpurea, Bauhinia racemosa,*

Cassariaeliptica, Syzygiumcumini, Mangifera indica, Ehrilialaevis, Phoenix sylvestris, Morus alba, Morus Australia, Terminalia tomentosa, Boswellia serrata, Aegle marmelos, Erythrina suberosa, Ficus glomerata, Grewia elastica, Mallotusphilippensis and Shorearobusta (Rarely).

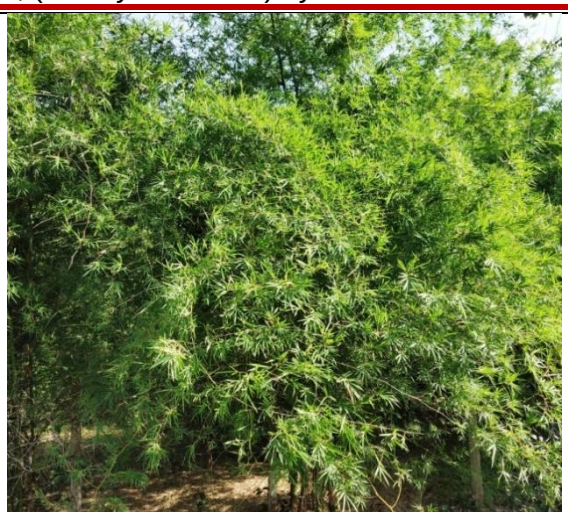
The under growth is mainly *Zizyphusmauritiana, Carissa apaca, Holarrhenaantidysenterica, Diospyros cordifolia, Capparis deciduas, Adhatodavasica, Murrayakoenigii, Agave Americana, Capparis sepiaria, Cordia dichotoma, Cassia tora, Zizyphusnummularia, Zizyphusoenopolia, Woodfordiafruticosa, Vitex negundo, Dodoneaviscosa*.

Climbers found are *Bauhinia vahlii, Militia extensa, Mucuna Spp., Tinospora cordifolia, Pueraria tuberose, Vallarissolanacea. Grasses are Panicum antidotate, Aristida depressa, Bothrichloa intermedia, Cynodondactylon, Bothrichloapertusa, Cymbopogon Marini, Dendrophtoe falcate and Eriophorimcomosum*.

iii. **Dry Deciduous Scrub (5/DS1):** This forest type represents a degradation stage of the Dry Deciduous Forest and has been brought into existence by adverse biotic factors like excessive grazing, lopping, felling and fires. In spite of sufficient rains, moisture retention is poor and the type has now become a stable edaphic climax. The crop is open with less tree cover. The main tree species found are *Diospyros tomentosa, Acacia leucopholea, Butea monosperma, Premnabarbata, Cassia fistula, Anogeissus latifolia and Lannea grandis*. The undergrowth is mainly *Carissa apaca, Woodfordiafruticosa, Nyctanthesarbor-tristis* and *Flacourtia indica*.

iv. **Dry Bamboo Breaks (5/E9):** In this forest type, only one species Dendrocalamusstrictusocuurs and forms low but often dense bamboo breaks. This forest type occurs mainly on dry hillsides of the study area.





Bamboosetum in Buffer Zone

3.6.1.3 CoreZone Flora:

The core zone i.e., Dhirauli Coal Block, in Singrauli Coalfield, in the State of Madhya Pradesh has been allocated to M/s Stratatech Mineral Resource Private Limited (SMRPL) vide Letter No. NA-104/7/2020-NA dated 03.03.2021 by MoC, GoI.

The lease is located in Singrauli Coalfields (Main Basin), Village: Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar, Tehsil: Sarai, Singrauli district of Madhya Pradesh. The details of floral diversity of Dhirauli coal block (core zone).

Table 3.28: Floral Diversity within Core of Proposed Coal Mine

SN.	Scientific Name	Local Name	Family	Habit
TREES				
1.	*Acacia catechu*	Khair	Fabaceae	Tree
2.	*Acacia leucophloea*	Reunjha	Fabaceae	Tree
3.	*Acacia nilotica*	Babul	Fabaceae	Tree
4.	*Aegle marmelos*	Bel	Rutaceae	Tree
5.	*Ailanthus excels*	Maharukh	Simaroubaceae	Tree
6.	*Alangiumsalvifolium*	Ankol	Cornaceae	Tree
7.	*Albizia lebbeck*	Kala Siris	Fabaceae	Tree
8.	*Artocarpus heterophyllus*	Kathal	Moraceae	Tree
9.	*Azadirachta indica*	Neem	Rutaceae	Tree
10.	*Bauhinia malabarica*	Aasta	Caesalpiniaceae	Tree
11.	*Bauhinia purpurea*	Kachnar	Caesalpiniaceae	Tree

SN.	Scientific Name	Local Name	Family	Habit
12.	*Bauhinia racemosa*	Kathmahula	Caesalpiniaceae	Tree
13.	*Bombax ceiba*	Semal	Malvaceae	Tree
14.	*Boswellia serrata*	Salai	Burseraceae	Tree
15.	*Buchananialanzan*	Chironji	Anacardiaceae	Tree
16.	*Butea monosperma*	Palash	Fabaceae	Tree
17.	*Careya arborea*	kumbhi	Lecythidaceae	Tree
18.	*Cassia fistula*	Amaltas	Caesalpiniaceae	Tree
19.	*Cassine glauca*	Jamrashi	Celastraceae	Tree
20.	*Catunaregamnilotica*	Kharhar	Rubiaceae	Tree
21.	*Cordia dichotoma*	Lasora	Boraginaceae	Tree
22.	*Corymbia citriodora*	Safeda	Myrtaceae	Tree
23.	*Dalbergia latifolia*	Shisham	Fabaceae	Tree
24.	*Dillenia indica*	Bhavya	Dilleniaceae	Tree
25.	*Diospyros melanoxylon*	Tendu	Ebenaceae	Tree
26.	*Diospyros montana*	Patvan	Ebenaceae	Tree
27.	*Dodonaea angustifolia*	Khareta	Sapindaceae	Tree
28.	*Erythrina suberosa*	Haduwa	Fabaceae	Tree
29.	*Ficus benghalensis*	Bargad	Moraceae	Tree
30.	*Ficus hispida*	Kathmur	Maoraceae	Tree
31.	*Ficus racemosa*	Gular	Moraceae	Tree
32.	*Ficus religiosa*	Papal	Moraceae	Tree
33.	*Ficus virens*	Pakar	Moraceae	Tree
34.	*Flacourtia indica*	Kaakai	Salicaceae	Tree
35.	*Gardenia gummifera*	Kaapar	Rubiaceae	Tree
36.	*Gardenia latifolia*	Papra	Rubiaceae	Tree
37.	*Garuga pinnata*	Kharpat	Burseraceae	Tree
38.	*Gmelina arborea*	Khamer	Verbenaceae	Tree
39.	*Grewia tiliifolia*	Dhankat	Tiliaceae	Tree
40.	*Haldina cordifolia*	Haldu	Rubiaceae	Tree
41.	*Holarrhenapubescens*	Kutki	Apocynaceae	Tree
42.	*Holoptelea integrifolia*	Chilbil	Ulmaceae	Tree
43.	*Kydiacalycina*	Barunga	Malvaceae	Tree
44.	*Lagerstroemia parviflora*	Sendha	Lythraceae	Tree
45.	*Lanneacoromandelica*	Gunja	Anacardiaceae	Tree
46.	*Madhuca longifolia*	Mahua	Sapotaceae	Tree
47.	*Mallotusphilippensis*	Sindoor	Euphorbiaceae	Tree
48.	*Mangifera indica*	Aam	Anacardiaceae	Tree
49.	*Manilkara hexandra*	Khirni	Sapotaceae	Tree
50.	*Melia azedarach*	Bakain	Meliaceae	Tree

SN.	Scientific Name	Local Name	Family	Habit
51.	*Mitragynaparvifolia*	Kaima	Rubiaceae	Tree
52.	*Moringa oleifera*	Sainjna	Moringaceae	Tree
53.	*Morus alba*	Sehtut	Moraceae	Tree
54.	*Phoenix sylvestris*	Khajur	Arecaceae	Tree
55.	*Phyllanthus emblica*	Aaonla	Euphorbiaceae	Tree
56.	*Polyalthia longifolia*	Ashok	Annonaceae	Small Tree
57.	*Pongamia pinnata*	Karanj	Fabaceae	Tree
58.	*Pterocarpus marsupium*	Bijasal	Fabaceae	Tree
59.	*Salix tetrasperma*	Bansa	Salicaceae	Tree
60.	*Schleicheraoleosa*	Kusum	Sapindaceae	Tree
61.	*Semecarpus anacardium*	Bhilma	Anacardiaceae	Tree
62.	*Shorearobusta*	Sal	Dipterocarpaceae	Tree
63.	*Sterculia urens*	Kullu	Sterculiaceae	Tree
64.	*Sterculia villosa*	Udaal	Sterculiaceae	Tree
65.	*Strychnosnux-vomica*	Kochila	Loganiaceae	Tree
66.	*Syzygiumcumini*	Jamun	Myrtaceae	Tree
67.	*Tamarindus indica*	Imli	Caesalpiniaceae	Tree
68.	*Tectona grandis*	Sagaun	Verbenaceae	Tree
69.	*Terminalia alata*	Sanja	Combretaceae	Tree
70.	*Terminalia arjuna*	Arjun	Combretaceae	Tree
71.	*Terminalia bellirica*	Bahera	Combretaceae	Tree
72.	*Terminalia catappa*	Badam	Combretaceae	
73.	*Terminalia chebula*	Harra	Combretaceae	Tree
74.	*Wrightia tinctoria*	Dudhi	Apocynaceae	Tree
	SHRUBS			
1.	*Abelmoschus manihot*	Jangali Bhindi	Malvaceae	Shrub
2.	*Abutilon indicum*	Kanghi	Malvaceae	Shrub
3.	*Adhatodazeylanica*	Adusa	Acanthaceae	Shrub
4.	*Alangiumsalvifolium*	Ankola	Cornaceae	Shrub
5.	*Annona squamosa*	Sitaphal	Annonaceae	Shrub
6.	*Calotropis gigantea*	Safed Aak	Asclepiadaceae	Shrub
7.	*Calotropis procera*	GulabiAak	Asclepiadaceae	Shrub
8.	*Carica papaya*	Papita	Caricaceae	Shrub
9.	*Carissa opaca*	Karaunda	Apocynaceae	Shrub
10.	*Carissa spinarum*	JangaliKaraunda	Apocynaceae	Shrub
11.	*Cassia occidentalis*	Kasaundhi	Caesalpiniaceae	Shrub
12.	*Catunaregamnilotica*	Kharhar	Rubiaceae	Shrub
13.	*Citrus limon*	Neebu	Rutaceae	Shrub

SN.	Scientific Name	Local Name	Family	Habit
14.	*Clerodendrummultiflorum*	Bharangi	Verbenaceae	Shrub
15.	*Combretum nanum*	Bilaura, Medila	Combretaceae	Shrub
16.	*Euphorbia nivulia*	Sehund	Euphorbiaceae	Shrub
17.	*Flemingiachappar*	Galphula	Fabaceae	Shrub
18.	*Flemingia nana*	Gursankari	Tiliaceae	Shrub
19.	*Flemingiapaniculata*	Ramdant	Fabaceae	Shrub
20.	*Helicteresisora*	Marodfali	Sterculiaceae	Shrub
21.	*Hibiscus rosa-sinensis*	Gudhal	Malvaceae	Shrub
22.	*Holarrhenapubescens*	Kurriya	Apocynaceae	Shrub
23.	*Indigofera tinctoria*	Neel	Fabaceae	Shrub
24.	*Ixora pavetta*	Khujja	Rubiaceae	Shrub
25.	*Jatropha curcas*	Ratanjyot	Euphorbiaceae	Shrub
26.	*Lawsoniainermis*	Mehndi	Lythraceae	Shrub
27.	*Murrayapaniculata*	Aathil	Rutaceae	Shrub
28.	*Nyctanthesarbor-tristis*	Harsingar	Oleaceae	Shrub
29.	*Phoenix acaulis*	BhuiKhajur	Arecaceae	Shrub
30.	*Phyllanthus reticulatus*	Panjoli	Euphorbiaceae	Shrub
31.	*Ricinus communis*	Rendi	Euphorbiaceae	Shrub
32.	*Thespesia lampas*	Chaumukhia,	Malvaceae	Shrub
33.	*Vitex negundo*	Nirgundi	Verbenaceae	Shrub
34.	*Woodfordiafruticosa*	Dhavai	Lythraceae	Shrub
35.	*Ziziphus mauritiana*	Ber	Rhamnaceae	Shrub
36.	*Ziziphus oenoplia*	Barari	Rhamnaceae	Shrub
HERBS				
1.	*Achyranthes aspera*	Apamarg	Amaranthaceae	Herb
2.	*Acorus calamus*	Buch	Araceae	Herb
3.	*Aervalanata*	Gorakhganja	Amaranthaceae	Herb
4.	*Ageratum conyzoides*.	Agreatum	Asteraceae	Herb
5.	*Allium leptophyllum*	Van Lehsun	Liliaceae	Herb
6.	*Alternanthera sessilis*	Gudari sag	Amaranthaceae	Herb
7.	*Alysicarpusmonilifer*	Alisicarpus	Fabaceae	Herb
8.	*Andrographis paniculata*	Kalmegh	Acanthaceae	Herb
9.	*Anisomeles indica*	Jangali Tulsi	Lamiaceae	Herb
10.	*Argemone Mexicana*	Swarnchhiri (Peeli)	Papaveraceae	Herb
11.	*Bacopa monnieri*	Brahmi	Scrophulariaceae	Herb
12.	*Bacopa procumbens*	Jal-Neem	Scrophulariaceae	Herb
13.	*Boerhaviadiffusa*.	Raktpunarwa	Nyctaginaceae	Herb
14.	*Bulbostylisbarbata*		Cyperaceae	Sedges

SN.	Scientific Name	Local Name	Family	Habit
15.	*Cassia tora*	Chakramard	Caesalpiniaceae	Herb
16.	*Catharanthus roseus*	Sadabahar	Apocynaceae	Herb
17.	*Centella asiatica*	Mandukparni	Apiaceae	Herb
18.	*Chlorophytum tuberosum*	Safed Musli	Liliaceae	Herb
19.	*Cleome gynandra*	Hurhur	Capparaceae	Herb
20.	*Commelinabenghalensis*	Kanchara	Commelinaceae	Herb
21.	*Commelinadiffusa*Burm	Kanshura	Commelinaceae	Herb
22.	*Convolvulus prostratus*	Shankhpushpi	Convolvulaceae	Herb
23.	*Crotalaria prostrate*	Kartik Jhumka	Fabaceae	Herb
24.	*Curcuma angustifolia*	Tikhur	Zingiberaceae	Herb
25.	*Curculigoorchioides*	Kali Musli	Hypoxidaceae	Herb
26.	*Curcuma aromatica*	Van Haldi	Zingiberaceae	Herb
27.	*Cyperus rotundus*	Motha	Cyperaceae	Sedges
28.	*Dentella repens*	Parpat	Rubiaceae	herb
29.	*Desmodiumtriflorum*	Desmodium	Fabaceae	Herb
30.	*Ecliptaprostrata*	Bhringraj	Asteraceae	Herb
31.	*Elytraria acaulis*	Sahasramuniya	Acanthaceae	herb
32.	*Euphorbia hirta*	Doodhi	Euphorbiaceae	Herb
33.	*Evolvulusalsinoides*	Sakhpushpi	Convolvulaceae	Herb
34.	*Fimbristylisdipsacea*	NA	Cyperaceae	Sedges
35.	*Fimbristylis falcata*	Hathi Paw	Cyperaceae	Sedges
36.	*Fumaria indica*	Pitpapra	Papaveraceae	Herb
37.	*Heliotropium indicum*	Hastimundi	Boraginaceae	Herb
38.	*Ipomoea eriocarpa*	Besharam	Convonvulaceae	Herb
39.	*Justicia quinqueangularis*	Justicia	Acanthaceae	Herb
40.	*Leucas aspera*	Bhondaki	Lamiaceae	Herb
41.	*Melilotus indica*	Van Maithi	Fabaceae	herb
42.	*Ocimumbasilicum*	Ban Tulsi	Lamiaceae	Herb
43.	*Oxalis corniculata*	Teenpati	Oxalidaceae	Herb
44.	*Oxalis corniculata*	Teen Patti	Oxalidaceae	Herb
45.	*Oxalis richardiana*	Teenpatti	Oxalidaceae	Herb
46.	*Phyllanthus amarus*	BhuinAnwla	Euphorbiaceae	Herb
47.	*Physalis minima*	Chirponta	Solanaceae	Herb
48.	*Polygonum barbatum*	Polygonum	Polygonaceae	Herb
49.	*Polygonum glabrum*	Polygonum		Herb
50.	*Rauvolfia serpentina*	Sarpandha	Apocynaceae	Herb
51.	*Rungiapectinata*	Rungia	Acanthaceae	Herb
52.	*Sida acuta* Burm.	Mahabala	Malvaceae	Herb
53.	*Sida cordifolia*	Kharenti	Malvaceae	Herb

SN.	Scientific Name	Local Name	Family	Habit
54.	*Sidarhombifolia*	Atibala	Malvaceae	Herb
55.	*Solanum nigrum*	makoya	Solanaceae	Herb
56.	*Solanum virginianum*	Katai	Solanaceae	Herb
57.	*Tridax procumbens*	Khal Muriya	Asteraceae	Herb
58.	*Triumfettapentandra*	Chipki	Tiliaceae	Herb
59.	*Triumfettarhomboidea*	Chipki	Tiliaceae	Herb
60.	*Xanthium strumarium*	Gokharu	Asteraceae	Herb
GRASSES				
1.	*Aristida adscensionis*.	Aristida	Poaceae	Grasses
2.	*Bambusabambos*	Bamboo	Poaceae	Grasses
3.	*Bothriochloapertusa*	Bothricloa	Poaceae	Grasses
4.	*Cenchrus ciliaris*	Cenchurus	Poaceae	Grasses
5.	*Chrysopogonserrulatus*	Chrysopogan	Poaceae	Grasses
6.	*Cynodondactylon*	Doob	Poaceae	Grasses
7.	*Dichanthiumannulatum*	Dichanthium	Poaceae	Grasses
8.	*Digitaria stricta*	Digitaria	Poaceae	Grasses
9.	*Eragrostis amabilis*	Erogrostis	Poaceae	Grasses
10.	*Heteropogoncontortus*	hetropogan	Poaceae	Grasses
11.	*Imperata cylindrica*	Imperata	Poaceae	Grasses
12.	*Oryza minuta* J.Presl	Jangali Dhan	Poaceae	Grasses
13.	*Saccharum spontaneum*	Kans	Poaceae	Grasses
14.	*Dendrocalamusstrictus*	Bans	Poaceae	Grasses
CLIMBERS				
1.	*Abrusprecatorius*	Kali Ghughchi	Fabaceae	Climber
2.	*Asparagus racemosus*	Shatawar	Liliaceae	Climber
3.	*Butea superba*	Palas Bel	Fabaceae	Climber
4.	*Cissus quadrangularis*	Hadjood	Vitaceae	Climber
5.	*Coccinia grandis*	Kunduru	Cucurbitaceae	Climber
6.	*Combretum roxburghii*	Bilora, Medila	Combretaceae	Climber
7.	*Cryptolepisbuchanani*	Nagbel	Asclepiadaceae	Climber
8.	*Gymnemasylvestre*	Gudmar	Asclepiadaceae	Climber
9.	*Tinospora cordifolia*	Giloya	Menispermaceae	Climber
EPIPHYTES				
1.	*Cuscutareflexa*.	Amarbel	Convolvulaceae	Epiphyte
2.	*Vanda tessellata*	Vanda	Orchidaceae	Epiphyte

Source: Primary On-site Data and Working Plan

3.6.1.4 Faunal Diversity within Core Zone

The Fauna of a particular region indicates environmental conditions and the well being of the population residing in the region. Faunal studies help to understand the well being of the natural systems and indicate functioning of ecosystem. It helps to monitor pollution levels, biological richness or heritage quality, habitat change quantifying threatened species. The faunal components such as Arthropods, Molluscs, Pisces, Birds and Mammals are very sensitive to any change in the ecosystem, therefore are very good indicators of the health of an ecosystem. The details of faunal diversity of Dhirauli coal block (Core Zone).

Table 3.29: Faunal Diversity within Core Zone

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
Mammals				
1	Spotted Deer	*Axis axis*	III	LC #
2	Bandicoot Rat	*Bandicota bengalensis*	V	LC #
3	Jackal	*Canis aureus*	II	LC #
4	Indian Wolf	*Canis lupus callipes*	I	LC #
5	Short Nosed Fruit Bat	*Cynopterus sphinx*	V	LC #
6	Wild Cat	*Felis chaus*	II	LC #
7	Five striped Palm squirrel	*Funambulus pennanti*	IV	LC #
8	Mongoose	*Herpestres edwardsii*	IV	LC #
9	Striped Hyena	*Hyaena hyaena*	III	NT #
10	Indian Porcupine	*Hystrix indica*	IV	LC #
11	Hare	*Lepas nigricollis*	IV	LC #
12	Rhesus Macaque	*Macaca mulatta*	II	LC #
13	Indian Pangolin	*Manis crassicaudata*	I	EN #
14	Honey Badger	*Mellivora capensis*	I	LC #
15	Sloth Bear	*Melursus ursinus*	I	Vu #
16	Indian Field Mouse	*Mus booduga*	V	LC #
17	Hedgehog	*Paraechinus micropus*	IV	LC #
18	Indian Pipistrelle	*Pipistrellus mimus*	IV	LC #
19	Barking Deer	*Muntiacus muntjak*	III	LC #
20	Flying Fox	*Pteropus giganteus*	V	LC #
21	Common house Rat	*Rattus rattus*	V	LC #
22	Hanuman Langur	*Semnopithecus entellus*	II	LC #
23	Musk Shrew	*Suncus murinus*	-	LC #
24	Wild Pig	*Sus scrofa*	III	LC #

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
25	Common Fox	*Vulpes bengalensis*	II	LC #
26	Indian Civet	*Viverricula indica*	II	LC#
	Birds			
1	Shikra	*Accipter badius*	IV	LC #
2	Jungle Mynah	*Acridotheresfuscus*	IV	LC #
3	Common Mynah	*Acridotheres tristis*	IV	LC #
4	Common Iora	*Aegithina tiphia*	IV	LC #
5	Common Kingfisher	*Alcedo atthis*	IV	LC #
6	Quaker Babbler	*Alcippe poioicephala*	IV	LC #
7	Rufous-tailed Finch-lark	*Ammomanes phoenicurus*	IV	LC #
8	Open Billed Stork	*Anastomus oscitans*	IV	LC #
9	House swift	*Apus affinis*	IV	LC #
10	Tawny Eagle	*Aquila rapax*	I	VU #
11	Pond Heron	*Ardeola grayii*	IV	LC #
12	Ashy Swallow Shrike	*Artamus fuscus*	-	LC #
13	Eagle Owl	*Bubo bubo*	IV	LC #
14	Cattle Egret	*Bubulcus ibis*	IV	LC #
15	Common Indian Nightjar	*Caprimulgus asiaticus*	IV	LC #
16	Crow Pheasant	*Centropus sinensis*	IV	LC #
17	Golden-fronted Leaf-bird	*Chloropsis aurifrons*	IV	LC #
18	Gold-mantled Leafbird	*Chloropsis chochinchinensis*	IV	LC #
19	Pied Crested Cuckoo	*Clamator jacobiuns*	IV	LC #
20	Blue Rock Pegion	*Columba livia*	IV	LC #
21	White Rumped Shama	*Copsychus malabaricus*	IV	LC #
22	Magpie Robin	*Copsychus saularis*	IV	LC #
23	Indian Roller	*Coracias benghalensis*	IV	LC #
24	Large Cuckoo-shrike	*Coracina novaehollandiae*	-	LC #
25	Jungle Crow	*Corvus marorhynchos*	IV	LC #
26	Common Crow	*Corvus splendens*	V	LC #
27	Common Quail	*Coturnix coturnix*	IV	LC #
28	Brain-fever bird	*Cuculus varius*	IV	LC #
29	Indian Tree Pie	*Dendrocitta vagabunda*	IV	LC #
30	Tickell's Flower Pecker	*Dicaeum erythrarthynchos*	IV	LC #
31	Fire-breasted Flower	*Dicaeum ignipectus*	IV	LC #

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
	Pecker			
32	Drongo	*Dicrurus adsimilis*	IV	LC #
33	White-bellied Drongo	*Dicrurus caerulescens*	IV	LC #
34	Greater Racket-tailed Drongo	*Dicrurus paradiseus*	IV	LC #
35	Lesser Golden Backed Woodpecker	*Dinopium benghalense*	IV	LC #
36	Black Winged Kite	*Elanus caeruleus*	IV	LC #
37	Ashy-crowned Finch-lark	*Eremopterix grisea*	IV	LC #
38	Red Munia	*Estrilda amandava*	IV	LC #
39	Koel	*Eudynamis scolopacea*	IV	LC #
40	Lesser Kestrel	*Falco naumanni*	IV	LC #
41	Common Kestrel	*Falco tinnunculus*	IV	LC #
42	Black Partridge	*Francolinus francolinus*	IV	LC #
43	Painted Partridge	*Francolinus pictus*	IV	LC #
44	Grey Partridge	*Francolinus pondicerianus*	IV	LC #
45	Red Spurfowl	*Galloperdixspadicea*	IV	LC #
46	Red Jungle Fowl	*Gallus gallus*	IV	LC #
47	Jungle Owlet	*Glaucidium radiatum*	IV	LC #
48	White Rumped Vulture	*Gyps bengalensis*	I	CR #
49	White Breasted Kingfisher	*Halcyon smyrnensis*	IV	LC #
50	Heartspotted Woodpecker	*Hemicircus canente*	IV	LC #
51	Indian Cliff Swallow	*Hirundo fluvicola*	-	LC #
52	Wire-tailed Swallow	*Hirundo smithii*	-	LC #
53	Rufous Backed Shrike	*Lanius schach*	-	LC #
54	Black-headed Munia	*Lonchura malacca*	IV	LC #
55	Coppersmith Barbet	*Megalaima haemacephala*	IV	LC #
56	Crested Bunting	*Melophus lathami*	IV	LC #
57	Small Green Bee-eater	*Merops orientalis*	IV	LC #
58	Blue tailed Bee-eater	*Merops philippinus*	IV	LC #
59	Blue cheeked Bee-eater	*Merops superciliosus*	IV	LC #
60	Pariah Kite	*Milvus migrans*	IV	LC #
61	Blacknaped	*Monarcha azurea*	IV	LC #

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
	Flycatcher			
62	Blue headed Rock Thrush	*Monticola cinclorhynchus*	IV	LC #
63	Pied Wagtail	*Motacilla alba*	-	LC #
64	Grey Wagtail	*Motacilla cinerea*	-	LC #
65	Yellow Wagtail	*Motacilla flava*	-	LC #
66	Large Pied Wagtail	*Motacilla maderaspatensis*	-	LC #
67	Tickell's Blue Flycatcher	*Muscicapa tickelliae*	IV	LC #
68	Purple Sunbird	*Nectarinia asiatica*	IV	LC #
69	Crested Hawk Eagle	*Nisaetus cirrhatus*	I	LC #
70	Golden Oriole	*Oriolus oriolus*	IV	LC #
71	Black Headed Oriole	*Oriolus xanthornus*	IV	LC #
72	Tailor Bird	*Orthotomus sutorius*	IV	LC #
73	Grey Tit	*Parus major*	IV	LC #
74	Yellow-cheeked Tit	*Parus xanthogenys*	IV	LC #
75	House Sparrow	*Passer domesticus*	IV	LC #
76	Pea-fowl	*Pavo cristatus*	I	LC #
77	Jungle Bush Quail	*Perdicula asiatica*	IV	LC #
78	Small Minivet	*Pericrocotus cinnamomeus*	IV	LC #
79	Scarlet Minivet	*Pericrocotus flammmeus*	IV	LC #
80	Black Redstart	*Phoenicurus ochruros*	IV	LC #
81	Yellow-fronted Pied Woodpecker	*Picoides mahrattensis*	IV	LC #
82	Indian Pitta	*Pitta brachyura*	IV	LC #
83	Weaver Bird	*Ploceus philippinus*	IV	LC #
84	Slaty-headed Scimitar Babbler	*Pomatorhinus horsfieldi schisticeps*	IV	LC #
85	Ashy Wren-warbler	*Prinia socialis*	IV	LC #
86	Blossom headed Parakeet	*Psittacula cyanocephala*	IV	LC #
87	Large Indian Parakeet	*Psittacula eupatria*	IV	NT #
88	Rose Ringed Parakeet	*Psittacula krameri*	IV	LC #
89	Red Vent Bulbul	*Pycnonotus cafer*	IV	LC #
90	Red Whiskered Bulbul	*Pycnonotus jocosus*	IV	LC #
91	White-throated Fantail Flycatcher	*Rhipidura albicolis*	IV	LC #

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
92	White-browed Fantail Flycatcher	*Rhipidura aureola*	IV	LC #
93	Pied Bush-chat	*Saxicola caprata*	IV	LC #
94	Collared Bush-chat	*Saxicola torquata*	IV	LC #
95	Indian Robin	*Saxicoloides fulicata*	IV	LC #
96	Chestnut-bellied Nuthatch	*Sitta castanea*	-	LC #
97	Velvet-fronted Nuthatch	*Sitta frontalis*	-	LC #
98	Crested Serpent Eagle	*Spilornis cheela*	-	LC #
99	Spotted Dove	*Streptopelia chinensis*	IV	LC #
100	Indian Ring Dove	*Streptopelia decaocto*	IV	LC #
101	Red Turtle Dove	*Streptopelia tranquebarica*	IV	LC #
102	Pied Mynah	*Sturnus contra*	IV	LC #
103	Grey-Headed Mynah	*Sturnus malabaricus*	IV	LC #
104	Black-headed Mynah	*Sturnus pagodarum*	IV	LC #
105	Rosy Pastor	*Sturnus roseus*	IV	LC #
106	Paradise Flycatcher	*Terpsiphone paradisi*	IV	LC #
107	Black Headed Ibis	*Threskiornis melanocephalus*	IV	NT#
108	Indian Grey Hornbill	*Tokus birostris*	-	LC #
109	Yellow-footed Green Pigeon	*Treron phoenicoptera*	IV	LC #
110	Jungle Babbler	*Turdoides striatus*	IV	LC #
111	Hoopoe	*Upupa epops*	IV	LC #
112	Red Wattled Lapwing	*Vannelus indicus*	IV	LC #
Reptiles				
1	Green Vine Snake	*Ahaetulla nasuta*	IV	LC #
2	Garden Lizard	*Calotes versicolor*	-	-
3	Russel's Viper	*Daboia russelii*	IV	LC #
4	Geckos	*Hemidactylus sps.*	IV	-
5	Common Skink	*Mabuya carinata*	-	LC #
6	Indian Cobra	*Naja naja*	IV	LC #
7	Yellow Rat Snake	*Ptyas mucosa*	II	-
8	Indian Python	*Python morulus*	I	Vu #
9	Bengal Monitor Lizard	*Varanus bengalensis*	I	LC #

Sl. No.	Common Name	Scientific Name	Schedule as per WPA, 1972	Conservation Status as per IUCN
	Fishes			
1	Chela	*Chela sp.*	NA	NA
2	Magur	*Clarias batrachus*	NA	NA
3	Punti	*Barbus sp.*	NA	NA
4	Snakehead	*Ophiocephalus punctatus*	NA	NA
	Butterflies			
1.	Common Emigrant	*Catopsilia pomona*	NA	NA
2.	Stripped Tiger	*Danaus genutia*	NA	NA
3.	Common crow	*Euploea core*	NA	NA
4.	Common Grass Yellow	*Eurema hecabe*	NA	NA
5.	White orange tip	*Ixias marianne*	NA	NA
# LC – Least Concern; NT – Near Threatened; Vu – Vulnerable; EN – Endangered; CR – Critically Endangered				

Source: Primary On-site Data

3.6.1.5 Buffer Zone Flora

The northern and southern parts of the mine are occupied by hillocks. The study area best represents as moist region. The vegetation is fairly dense and occurs on crystalline rocks and yellow loam soils. Soil and topography vary together. It can be helpful to differentiate three subtypes of topography; hilltops and plateaus, lower hill slopes and valley bottom. There is light shrub and weed growth under the forest canopy. The vegetation mainly consists of tall tress of *Shorearobusta, Tectona grandis, Terminalia tomentosa, Madhuca indica.* The vegetation can be described as moist peninsular Sal Forest.

The total species of plants are indicating the floristic richness of the area. However, these species are not uniform in their distribution. The most dominant genera were *Shorea, Tectona, Bahuinia, Cassia, Ficus, Euphorbia* followed by *Acacia, Anogessus, Lagerstromia, Bamboo, Jatropha* and *Madhuca.* The most dominant family was Fabaceae, followed by Poaceae (22 species), Euphorbiaceae (17 species), Mimosaceae (11 species), Caesalpinaceae (13 species), Asteraceae (15 species) and Amaranthaceae (10 species).

There is predominance of herbs and trees followed by shrubs, climbers, epiphytes, grasses and sedges. The common climbers are *Butea superba, Combretum decandrum,* and *Bauhinia vahli.* Only two Gymnosperms were noticed which are cultivated in gardens. The Pteridophytes represented reasonably good number (7)

along with 6 Bryophytes. They are very much sensitive to humidity and moisture. List of plant species as reported according to the Working Plans of **Singrauli Forest Division** has been studied out of which the main associates of Sal as observed in the field are furnished below.

Table 3.30: Floral Diversity within buffer zone of Proposed coal mine

SN.	Scientific Name	Local Name	Family	Habit
		TREES		
1.	*Acacia catechu*	Khair	Fabaceae	Tree
2.	*Acacia leucophloea*	Reunjha	Fabaceae	Tree
3.	*Acacia nilotica*	Babul	Fabaceae	Tree
4.	*Aegle marmelos*	Bel	Rutaceae	Tree
5.	*Ailanthus excelsa*	Maharukh	Simaroubaceae	Tree
6.	*Alangiumsalvifolium*	Ankol	Cornaceae	Tree
7.	*Albizia lebbeck*	Kala Siris	Fabaceae	Tree
8.	*Albizia odoratissima*	Chichwa	Fabaceae	Tree
9.	*Albizia procera*	Safed Siris	Fabaceae	Tree
10.	*Anogeissus latifolia*	Dhawda	Combretaceae	Tree
11.	*Artocarpus heterophyllus*	Kathal	Moraceae	Tree
12.	*Azadirachta indica*	Neem	Rutaceae	Tree
13.	*Bauhinia malabarica*	Aasta	Caesalpiniaceae	Tree
14.	*Bauhinia purpurea*	Kachnar	Caesalpiniaceae	Tree
15.	*Bauhinia racemosa*	Kathmahula	Caesalpiniaceae	Tree
16.	*Bombax ceiba*	Semal	Malvaceae	Tree
17.	*Boswellia serrata*	Salai	Burseraceae	Tree
18.	*Bridelia retusa*	Kasai	Euphorbiaceae	Tree
19.	*Buchananialanzan*	Chironji	Anacardiaceae	Tree
20.	*Butea monosperma*	Palash	Fabaceae	Tree
21.	*Careya arborea*	kumbhi	Lecythidaceae	Tree
22.	*Cassia fistula*	Amaltas	Caesalpiniaceae	Tree
23.	*Cassine glauca*	Jamrashi	Celastraceae	Tree
24.	*Catunaregamnilotica*	Kharhar	Rubiaceae	Tree
25.	*Chloroxylon swietenia*	Bhirra	Rutaceae	Tree
26.	*Cordia dichotoma*	Lasora	Boraginaceae	Tree
27.	*Cordia obliqua*	Lasora	Boraginaceae	Tree
28.	*Corymbia citriodora*	Safeda	Myrtaceae	Tree
29.	*Dalbergia latifolia*	Shisham	Fabaceae	Tree
30.	*Dillenia indica*	Bhavya	Dilleniaceae	Tree
31.	*Dilleniapentagyna*	Karkat	Dilleniaceae	Tree
32.	*Diospyros melanoxylon*	Tendu	Ebenaceae	Tree

SN.	Scientific Name	Local Name	Family	Habit
33.	*Diospyros montana*	Patvan	Ebenaceae	Tree
34.	*Dodonaea angustifolia*	Khareta	Sapindaceae	Tree
35.	*Ehretialaevis*	Charmor	Boraginaceae	Tree
36.	*Erythrina suberosa*	Haduwa	Fabaceae	Tree
37.	*Ficus benghalensis*	Bargad	Moraceae	Tree
38.	*Ficus hispida*	Kathmur	Maoraceae	Tree
39.	*Ficus mollis*	Baril	Moraceae	Tree
40.	*Ficus racemosa*	Gular	Moraceae	Tree
41.	*Ficus religiosa*	Papal	Moraceae	Tree
42.	*Ficus tinctoria*	Paakar	Moraceae	Tree
43.	*Ficus virens*	Pakar	Moraceae	Tree
44.	*Flacourtia indica*	Kaakai	Salicaceae	Tree
45.	*Gardenia gummifera*	Kaapar	Rubiaceae	Tree
46.	*Gardenia latifolia*	Papra	Rubiaceae	Tree
47.	*Garuga pinnata*	Kharpat	Burseraceae	Tree
48.	*Gmelina arborea*	Khamer	Verbenaceae	Tree
49.	*Grewia tiliifolia*	Dhankat	Tiliaceae	Tree
50.	*Haldina cordifolia*	Haldu	Rubiaceae	Tree
51.	*Holarrhenapubescens*	Kutki	Apocynaceae	Tree
52.	*Holoptelea integrifolia*	Chilbil	Ulmaceae	Tree
53.	*Kydiacalycina*	Barunga	Malvaceae	Tree
54.	*Lagerstroemia parviflora*	Sendha	Lythraceae	Tree
55.	*Lanneacoromandelica*	Gunja	Anacardiaceae	Tree
56.	*Litseaglutinosa*	Maida	Lauraceae	Tree
57.	*Madhuca longifolia*	Mahua	Sapotaceae	Tree
58.	*Mallotusphilippensis*	Sindoor	Euphorbiaceae	Tree
59.	*Mangifera indica*	Aam	Anacardiaceae	Tree
60.	*Manilkara hexandra*	Khirni	Sapotaceae	Tree
61.	*Melia azedarach*	Bakain	Meliaceae	Tree
62.	*Miliusa tomentosa*	Kaari	Annonaceae	Tree
63.	*Mitragynaparvifolia*	Kaima	Rubiaceae	Tree
64.	*Moringa oleifera*	Sainjna	Moringaceae	Tree
65.	*Morus alba*	Sehtut	Moraceae	Tree
66.	*Oroxylum indicum*	Sonpatha	Bignoniaceae	Tree
67.	*Ougeiniaoojeinensis.*	Tinsa	Fabaceae	Tree
68.	*Phoenix sylvestris*	Khajur	Arecaceae	Tree
69.	*Phyllanthus emblica*	Aaonla	Euphorbiaceae	Tree
70.	*Polyalthia longifolia*	Ashok	Annonaceae	Tree
71.	*Pongamia pinnata*	Karanj	Fabaceae	Tree

SN.	Scientific Name	Local Name	Family	Habit
72.	*Pterocarpus marsupium*	Bijasal	Fabaceae	Tree
73.	*Salix tetrasperma*	Bansa	Salicaceae	Tree
74.	*Schleicheraoleosa*	Kusum	Sapindaceae	Tree
75.	*Schreberaswietenioides*	Ghainta	Oleaceae	Tree
76.	*Semecarpus anacardium*	Bhilma	Anacardiaceae	Tree
77.	*Shorearobusta*	Sal	Dipterocarpaceae	Tree
78.	*Sterculia urens*	Kullu	Sterculiaceae	Tree
79.	*Sterculia villosa*	Udaal	Sterculiaceae	Tree
80.	*Stereospermumcolais*	ChotaPadar	Binoniaceae	Tree
81.	*Strychnosnux-vomica*	Kochila	Loganiaceae	Tree
82.	*Symplocosracemosa*	Lodra	Symplocaceae	Tree
83.	*Syzygiumcumini*	Jamun	Myrtaceae	Tree
84.	*Tamarindus indica*	Imli	Caesalpiniaceae	Tree
85.	*Tectona grandis*	Sagaun	Verbenaceae	Tree
86.	*Terminalia alata*	Sanja	Combretaceae	Tree
87.	*Terminalia arjuna*	Arjun	Combretaceae	Tree
88.	*Terminalia bellirica*	Bahera	Combretaceae	Tree
89.	*Terminalia catappa*	Badam	Combretaceae	
90.	*Terminalia chebula*	Harra	Combretaceae	Tree
91.	*Trema orientalis*	Jibhi	Ulmaceae	Tree
92.	*Trema politoria*	Trema	Ulmaceae	Tree
93.	*Trewiapolycarpa*	Surahi	Euphorbiaceae	Tree
94.	*Wrightia tinctoria*	Dudhi	Apocynaceae	Tree
95.	*Ziziphus mauritiana*	Ber	Rhamnaceae	Small Tree
SHRUBS				
1.	*Abelmoschus manihot*	Jangali Bhindi	Malvaceae	Shrub
2.	*Abutilon indicum*	Kanghi	Malvaceae	Shrub
3.	*Adhatodazeylanica*	Adusa	Acanthaceae	Shrub
4.	*Alangiumsalvifolium*	Ankola	Cornaceae	Shrub
5.	*Annona squamosa*	Sitaphal	Annonaceae	Shrub
6.	*Barleriaprionitis*	Katsaraiya	Acanthaceae	Shrub
7.	*Boehmeria macrophylla*	Sohkhara	Urticaceae	Shrub
8.	*Calotropis gigantea*	Safed Aak	Asclepiadaceae	Shrub
9.	*Calotropis procera*	GulabiAak	Asclepiadaceae	Shrub
10.	*Carica papaya*	Papita	Caricaceae	Shrub
11.	*Carissa opaca*	Karaunda	Apocynaceae	Shrub
12.	*Carissa spinarum*	JangaliKaraunda	Apocynaceae	Shrub
13.	*Cassia occidentalis*	Kasaundhi	Caesalpiniaceae	Shrub

SN.	Scientific Name	Local Name	Family	Habit
14.	*Catunaregamnilotica*	Kharhar	Rubiaceae	Shrub
15.	*Citrus limon*	Neebu	Rutaceae	Shrub
16.	*Clerodendrummultiflorum*	Bharangi	Verbenaceae	Shrub
17.	*Colebrookeaoppositifolia*	Ameda	Lamiaceae	Shrub
18.	*Combretum nanum*	Bilaura, Medila	Combretaceae	Shrub
19.	*Euphorbia neriifolia*	Sehud	Euphorbiaceae	Shrub
20.	*Euphorbia nivulia*	katthuar	Euphorbiaceae	Shrub
21.	*Flemingiachappar*	Galphula	Fabaceae	Shrub
22.	*Flemingia nana*	Gursankari	Tiliaceae	Shrub
23.	*Flemingiapaniculata*	Ramdant	Fabaceae	Shrub
24.	*Grewia helicterifolia*	Vansuli	Tiliaceae	Shrub
25.	*Grewia hirsuta*	Gursankari	Tiliaceae	Shrub
26.	*Helicteresisora*	Marodfali	Sterculiaceae	Shrub
27.	*Hibiscus rosa-sinensis*	Gudhal	Malvaceae	Shrub
28.	*Holarrhenapubescens*	Kutki, Kurriya	Apocynaceae	Shrub
29.	*Indigofera tinctoria*	Neel	Fabaceae	Shrub
30.	*Ixora pavetta*	Khujja	Rubiaceae	Shrub
31.	*Jasminum humile*	Pili Chameli	Oleaceae	Shrub
32.	*Jatropha curcas*	Ratanjyot	Euphorbiaceae	Shrub
33.	*Lawsoniainermis*	Mehndi	Lythraceae	Shrub
34.	*Leea macrophylla*	Hatfun	Leeaceae	Shrub
35.	*Murrayapaniculata*	Aathil	Rutaceae	Shrub
36.	*Nyctanthesarbor-tristis*	Harsingar	Oleaceae	Shrub
37.	*Ochna obtusata*	Kanak Champa	Ochnaceae	Shrub
38.	*Phoenix acaulis*	BhuiKhajur	Arecaceae	Shrub
39.	*Phyllanthus reticulates*	Panjoli	Euphorbiaceae	Shrub
40.	*Plumbago zeylanica*	Chitrak	Plumbaginaceae	Shrub
41.	*Premnabarbata*	Aradi	Verbenaceae	Shrub
42.	*Ricinus communis*	Rendi	Euphorbiaceae	Shrub
43.	*Tamarixericoides*	Jhau	Tamaricaceae	Shrub
44.	*Thespesia lampas*	Chaumukhia,	Malvaceae	Shrub
45.	*Vitex negundo*	Nirgundi	Verbenaceae	Shrub
46.	*Woodfordiafruticosa*	Dhavai	Lythraceae	Shrub
47.	*Ziziphus mauritiana*	Ber	Rhamnaceae	Shrub
48.	*Ziziphus oenoplia*	Barari	Rhamnaceae	Shrub
HERBS				
1.	*Acalypha ciliata*	Chipki	Asteraceae	Herb
2.	*Achyranthes aspera*	Apamarg	Amaranthaceae	Herb
3.	*Acorus calamus*	Buch	Araceae	Herb

SN.	Scientific Name	Local Name	Family	Habit
4.	*Aervalanata*	Gorakhganja	Amaranthaceae	Herb
5.	*Aervasanguinolenta*	Gorakh Ganja	Amaranthaceae	Herb
6.	*Ageratum conyzoides*	Agreatum	Asteraceae	Herb
7.	*Allium leptophyllum*	Van Lehsun	Liliaceae	Herb
8.	*Alternanthera sessilis*	Gudari sag	Amaranthaceae	Herb
9.	*Alysicarpusmonilifer*	Alisicarpus	Fabaceae	Herb
10.	*Ammanniabaccifera*	Dadmari	Lythraceae	Herb
11.	*Andrographis paniculata*	Kalmegh	Acanthaceae	Herb
12.	*Anisomeles indica*	Jangali Tulsi	Lamiaceae	Herb
13.	*Aponogetoncrispum*	*Aponogeton*	Aponogetonaceae	Herb
14.	*Argemone mexicana*	Swarnchhiri	Papaveraceae	Herb
15.	*Asphodelus tenuifolius*	Bokat	Linaceae	Herb
16.	*Atylosiascarabaeoides*	Lotar	Fabaceae	Herb
17.	*Bacopa monnieri*	Brahmi	Scrophulariaceae	Herb
18.	*Bacopa procumbens*.	Jal-Neem	Scrophulariaceae	Herb
19.	*Barleria cristata*	Katsaraiya	Acanthaceae	Herb
20.	*Boerhaviadiffusa*	Raktpunarwa	Nyctaginaceae	Herb
21.	*Bulbostylisbarbata*		Cyperaceae	Sedges
22.	*Cassia tora*	Chakramard	Caesalpiniaceae	Herb
23.	*Catharanthus roseus*	Sadabahar	Apocynaceae	Herb
24.	*Centella asiatica*	Mandukparni	Apiaceae	Herb
25.	*Chlorophytum tuberosum*	Safed Musli	Liliaceae	Herb
26.	*Cleome gynandra*	Hurhur	Capparaceae	Herb
27.	*Cleome viscose*	Hurhur	Capparaceae	Herb
28.	*Commelinabenghalensis*	Kanchara	Commelinaceae	Herb
29.	*Commelinadiffusa*	Kanshura	Commelinaceae	Herb
30.	*Convolvulus prostratus*	Shankhpushpi	Convolvulaceae	Herb
31.	*Crotalaria prostrata*	Kartik Jhumka	Fabaceae	Herb
32.	*Curcuma angustifolia*	Tikhur	Zingiberaceae	Herb
33.	*Curculigoorchioides*	Kali Musli	Hypoxidaceae	Herb
34.	*Curcuma aromatica*	Van Haldi	Zingiberaceae	Herb
35.	*Cyperus rotundus*	Motha	Cyperaceae	Sedges
36.	*Dentella repens*	Parpat	Rubiaceae	herb
37.	*Desmodiumheterocarpon*	Salparni	Fabaceae	Herb
38.	*Desmodiumtriflorum*	Desmodium	Fabaceae	Herb
39.	*Dipteracanthussuffruticosus*	Chowlai	Acanthaceae	Herb
40.	*Echinopsechinatus*	Utkatara	Asteraceae	Herb
41.	*Ecliptaprostrata*	Bhringraj	Asteraceae	Herb
42.	*Elytraria acaulis*	Sahasramuniya	Acanthaceae	herb

SN.	Scientific Name	Local Name	Family	Habit
43.	*Euphorbia hirta*	Doodhi	Euphorbiaceae	Herb
44.	*Evolvulusalsinoides*	Sakhpushpi	Convolvulaceae	Herb
45.	*Fimbristylisdipsacea*	NA	Cyperaceae	Sedges
46.	*Fimbristylis falcata*	Hathi Paw	Cyperaceae	Sedges
47.	*Fumaria indica*	Pitpapra	Papaveraceae	Herb
48.	*Heliotropium indicum*	Hastimundi	Boraginaceae	Herb
49.	*Hygrophilasalicifolia*	Talamkhana	Acanthaceae	Herb
50.	*Ipomoea eriocarpa*	Besharam	Convonvulaceae	Herb
51.	*Justicia quinqueangularis*	Justicia	Acanthaceae	Herb
52.	*Leucas aspera*	Bhondaki	Lamiaceae	Herb
53.	*Melilotus indica*	Van Maithi	Fabaceae	herb
54.	*Ocimumbasilicum*	Ban Tulsi	Lamiaceae	Herb
55.	*Oxalis corniculata*	Teenpati	Oxalidaceae	Herb
56.	*Oxalis corniculata*	Teen Patti	Oxalidaceae	Herb
57.	*Oxalis richardiana*	Teenpatti	Oxalidaceae	Herb
58.	*Phyllanthus amarus*	BhuinAnwla	Euphorbiaceae	Herb
59.	*Physalis minima*	Chirponta	Solanaceae	Herb
60.	*Polygonum barbatum*	Polygonum	Polygonaceae	Herb
61.	*Polygonum glabrum*	Polygonum	Polygonaceae	Herb
62.	*Rauvolfia serpentina*	Sarpandha	Apocynaceae	Herb
63.	*Rungiapectinata*	Rungia	Acanthaceae	Herb
64.	*Sclerialevis*Retz.	Scleria	Cyperaceae	Sedges
65.	*Sesbania bispinosa*	Sirmili	Fabaceae	Herb
66.	*Sida acuta*	Mahabala	Malvaceae	Herb
67.	*Sida cordifolia*	Kharenti	Malvaceae	Herb
68.	*Sidarhombifolia*	Atibala	Malvaceae	Herb
69.	*Solanum nigrum*	makoya	Solanaceae	Herb
70.	*Solanum virginianum*	Bhatkataiya	Solanaceae	Herb
71.	*Tridax procumbens*	Khal Muriya	Asteraceae	Herb
72.	*Triumfettapentandra*	Chipki	Tiliaceae	Herb
73.	*Triumfettarhomboidea*	Chipki	Tiliaceae	Herb
74.	*Xanthium strumarium*	Gokharu	Asteraceae	Herb
GRASSES				
1.	*Apludamutica*	Apluda	Poaceae	Grasses
2.	*Apocopisvaginata*	Apocopis	Poaceae	Grasses
3.	*Aristida adscensionis*	Aristida	Poaceae	Grasses
4.	*Bambusabambos*	Bamboo	Poaceae	Grasses
5.	*Bothriochloa glabra*	Bothriochloa	Poaceae	Grasses
6.	*Bothriochloa intermedia*	Bothriochloa	Poaceae	Grasses

SN.	Scientific Name	Local Name	Family	Habit
7.	*Bothriochloapertusa*	Bothricloa	Poaceae	Grasses
8.	*Brachiariaeruciformis*	Brachiaria	Poaceae	Grasses
9.	*Brachiariaramosa*	Brachiaria	Poaceae	Grasses
10.	*Brachiariareptans*	Brachiaria	Poaceae	Grasses
11.	*Cenchrus ciliaris*	Cenchurus	Poaceae	Grasses
12.	*Chloris dolichostachya*	Chloris	Poaceae	Grasses
13.	*Chloris virgata*	Chloris	Poaceae	Grasses
14.	*Chrysopogon fulvus*	Chrysopogan	Poaceae	Grasses
15.	*Chrysopogonserrulatus*	Chrysopogan	Poaceae	Grasses
16.	*Cymbopogon martinii*	Musail	Poaceae	Grasses
17.	*Cynodondactylon*	Doob	Poaceae	Grasses
18.	*Dichanthiumannulatum*	Dichanthium	Poaceae	Grasses
19.	*Digitaria stricta*	Digitaria	Poaceae	Grasses
20.	*Eragrostis amabilis*	Erogrostis	Poaceae	Grasses
21.	*Eragrostis atrovirens*	Erogrostis	Poaceae	Grasses
22.	*Eragrostiscilianensis*	Erogrostis	Poaceae	Grasses
23.	*Eragrostisciliaris*	Erogrostis	Poaceae	Grasses
24.	*Heteropogoncontortus*	hetropogan	Poaceae	Grasses
25.	*Imperata cylindrica*	Imperata	Poaceae	Grasses
26.	*Oplismenuscompositus*	Oplismenus	Poaceae	Grasses
27.	*Oropetiumthomaeum*	Oplismenus	Poaceae	Grasses
28.	*Oryza minuta*	Jangali Dhan	Poaceae	Grasses
29.	*Panicum psilopodium*	Panicum	Poaceae	Grasses
30.	*Panicum sumatrense*	Panicum	Poaceae	Grasses
31.	*Paspalidiumflavidum*	Paspalum	Poaceae	Grasses
32.	*Paspalidium punctatum*	Paspalum	Poaceae	Grasses
33.	*Pennisetum pedicellatum*	Pennisetum	Poaceae	Grasses
34.	*Pennisetum polystachyon*	Pennisetum	Poaceae	Grasses
35.	*Perotis indica*	Perotis	Poaceae	Grasses
36.	*Saccharum spontaneum*	Kans	Poaceae	Grasses
37.	*Dendrocalamusstrictus*	Bans	Poaceae	Grasses
CLIMBERS				
1.	*Abrusprecatorius*	Kali Ghughchi	Fabaceae	Climber
2.	*Asparagus racemosus*	Shatawar	Liliaceae	Climber
3.	*Butea superba*	Palas Bel	Fabaceae	Climber
4.	*Cissus quadrangularis*	Hadjood	Vitaceae	Climber
5.	*Coccinia grandis*	Kunduru	Cucurbitaceae	Climber
6.	*Combretum roxburghii*	Bilora, Medila	Combretaceae	Climber
7.	*Cryptolepisbuchanani*	Nagbel	Asclepiadaceae	Climber

SN.	Scientific Name	Local Name	Family	Habit
8.	*Gymnemasylvestre*	Gudmar	Asclepiadaceae	Climber
9.	*Tinospora cordifolia*	Giloya	Menispermaceae	Climber
EPIPHYTES				
1.	*Cuscutareflexa*	Amarbel	Convolvulaceae	Epiphyte
2.	*Vanda tessellata*	Vanda	Orchidaceae	Epiphyte

Primary On-site Data and Working Plan



Figure 3.25: Qualitative Analisis at Mohanban R.F.

3.6.1.6 Fauna in buffer area

A linear transect of 1.0 km each has been chosen for sampling at each site. Each transect was trekked for 1.5 hr for the sampling of faunal diversity through following methods for different categories. For the sampling of butterflies, the standard 'Pollard Walk' method was employed and all the species recorded.

For bird's sampling, 'Point Sampling' along the fixed transect (Foot trails) was carried out. All the species of birds were observed and identified with the help of field guide book and photographs.

For the sampling of mammals, direct count on open width (20m) transect were used. In addition, information on recent sightings/records of mammals by the villagers/locals were also be collected. For carnivores, indirect sampling was carried out and the mammals were identified by foot marks, faeces and other marks/sign created by them. In case of reptiles mainly lizards were sampled by direct count on open width transects.

The study of fauna takes substantial amount of time to understand the specific faunal characteristic of area. The assessments of fauna were done by extensive field survey of the area.

Table 3.31: Faunal Diversity from Study Area

Sl. No.	Common Name	Scientific Name	Schedule of WPA, 1972	Conservation Status as per IUCN
Mammals				
1	Spotted Deer	*Axis axis*	III	LC #
2	Bandicoot Rat	*Bandicota bengalensis*	V	LC #
3	Nilgai	*Boselaphustragocamelus*	III	LC #
4	Jackal	*Canis aureus*	II	LC #
5	Indian Wolf	*Canis lupus callipes*	I	LC #
6	Sambhar	*Cervus unicolor*	III	LC #
7	Dhole	*Cuon alpinus*	II	EN #
8	Short Nosed Fruit Bat	*Cynopterus sphinx*	V	LC #
9	Indian Elephant	*Elephas maximus*	I	EN #
11	Wild Cat	*Felis chaus*	II	LC #
12	Five striped Palm squirrel	*Funambulus pennanti*	IV	LC #
13	Chinkara	*Gazella bennettii*	I	LC #
14	Mongoose	*Herpestresedwardsii*	IV	LC #
15	Striped Hyena	*Hyaena hyaena*	III	NT #
16	Indian Porcupine	*Hystrix indica*	IV	LC #
17	Hare	*Lepas nigricollis*	IV	LC #
18	Otter / Odha	*Luthra luthra*	II	NT#
19	Rhesus Macaque	*Macaca mulatta*	II	LC #
20	Indian Pangolin	*Manis crassicaudata*	I	EN #
21	Honey Badger	*Mellivora capensis*	I	LC #
22	Sloth Bear	*Melursus ursinus*	I	Vu #
23	Barking Deer	*Muntiacusmuntjak*	III	LC #
24	Indian Field Mouse	*Mus booduga*	V	LC #
25	Leopard	*Panthera pardus*	I	Vu #
27	Hedgehog	*Paraechinusmicropus*	IV	LC #
28	Indian Pipistrelle	*Pipistrellus mimus*	IV	LC #
29	Flying Fox	*Pteropus giganteus*	V	LC #
30	Common house Rat	*Rattus rattus*	V	LC #
31	Hanuman Langur	*Semnopithecus entellus*	II	LC #
32	Musk Shrew	*Suncus murinus*	-	LC #

33	Wild Pig	*Sus scrofa*	III	LC #
34	Four-horned antelope	*Tetracerus quadricornis*	I	Vu #
35	Mouse Deer	*Tragulusmeminna*	I	LC #
36	Indian Civet	*Viverricula indica*	II	LC#
37	Indian Fox	*Vulpes bengalensis*	II	LC #
		Birds		
1	Shikra	*Accipter badius*	IV	LC #
2	Jungle Mynah	*Acridotheresfuscus*	IV	LC #
3	Common Mynah	*Acridotheres tristis*	IV	LC #
4	Common Iora	*Aegithina tiphia*	IV	LC #
5	Common Kingfisher	*Alcedoatthis*	IV	LC #
6	Quaker Babbler	*Alcippepoioicephala*	IV	LC #
7	Rufous-tailed Finch-lark	*Ammomanesphoenicurus*	IV	LC #
8	Common Teal	*Anas crecca*	IV	LC #
9	Open Billed Stork	*Anastomusoscitans*	IV	LC #
10	Pied Hornbill	*Anthracocerescoronatus*	I	NT #
11	House swift	*Apus affinis*	IV	LC #
12	Tawny Eagle	*Aquila rapax*	I	VU #
13	Grey Heron	*Ardeacineara*	IV	LC #
14	Pond Heron	*Ardeolagrayii*	IV	LC #
15	Ashy Swallow Shrike	*Artamusfuscus*	-	LC #
16	Eagle Owl	*Bubo bubo*	IV	LC #
17	Cattle Egret	*Bubulcus ibis*	IV	LC #
18	Common Indian Nightjar	*Caprimulgus asiaticus*	IV	LC #
19	Crow Pheasant	*Centropus sinensis*	IV	LC #
20	Crow Pheasant	*Centropus sinensis*	IV	LC #
21	Whiskered Tern	*Chlidoniashybrida*	-	LC #
22	Golden-fronted Leaf-bird	*Chloropsisaurifrons*	IV	LC #
23	Gold-mantled Leafbird	*Chloropsischochinchinensis*	IV	LC #
24	White Necked Stork	*Ciconia episcopus*	IV	VU #
25	White stork	*Ciconia episcopus*	I	LC #
26	Pied Crested Cuckoo	*Clamatorjacobiuns*	IV	LC #
27	Blue Rock Pegion	*Columba livia*	IV	LC #
28	White Rumped Shama	*Copsychusmalabaricus*	IV	LC #
29	Magpie Robin	*Copsychussaularis*	IV	LC #
30	Magpie Robin	*Copsychussaularis*	IV	LC #

31	Indian Roller	*Coracias benghalensis*	IV	LC #
32	Large Cuckoo-shrike	*Coracinanovaehollandiae*	-	LC #
33	Jungle Crow	*Corvus marorhynchos*	IV	LC #
34	Common Crow	*Corvus splendens*	V	LC #
35	Common Quail	*Coturnix coturnix*	IV	LC #
36	Brain-fever bird	*Cuculusvarius*	IV	LC #
37	Indian Tree Pie	*Dendrocittavagabunda*	IV	LC #
38	Lesser Whistling Teal	*Dendrocygnajavanica*	IV	LC #
39	Tickell's Flower Pecker	*Dicaeumerythrarthynchos*	IV	LC #
40	Fire-breasted Flower Pecker	*Dicaeumignipectus*	IV	LC #
41	Drongo	*Dicrurusadsimilis*	IV	LC #
42	White-bellied Drongo	*Dicruruscaerulescens*	IV	LC #
43	Greater Racket-tailed Drongo	*Dicrurusparadiseus*	IV	LC #
44	Lesser Golden Backed Woodpecker	*Dinopiumbenghalense*	IV	LC #
45	Little Egret	*Egrettagarzetta*	IV	LC #
46	Black Winged Kite	*Elanus caeruleus*	IV	LC #
47	Ashy-crowned Finch-lark	*Eremopterix grisea*	IV	LC #
48	Red Munia	*Estrildaamandava*	IV	LC #
49	Koel	*Eudynamisscolopacea*	IV	LC #
50	Lesser Kestrel	*Falco naumanni*	IV	LC #
51	Common Kestrel	*Falco tinnunculus*	IV	LC #
52	Black Partridge	*Francolinusfrancolinus*	IV	LC #
53	Painted Partridge	*Francolinus pictus*	IV	LC #
54	Grey Partridge	*Francolinuspondicerianus*	IV	LC #
55	Fantail Snipe	*Gallinagogallinago*	IV	LC #
56	Moorhen	*Gallinula chloropus*	IV	LC #
57	Red Spurfowl	*Galloperdixspadicea*	IV	LC #
58	Red Jungle Fowl	*Gallus gallus*	IV	LC #
59	Jungle Owlet	*Glaucidium radiatum*	IV	LC #
60	White Rumped Vulture	*Gyps bengalensis*	I	CR #
61	White Breasted Kingfisher	*Halcyon smyrnensis*	IV	LC #
62	Heartspotted Woodpecker	*Hemicircuscanente*	IV	LC #

63	Black-winged Stilt	*Himantopus himantopus*	IV	LC #
64	Indian Cliff Swallow	*Hirundofluvicola*	-	LC #
65	Wire-tailed Swallow	*Hirundosmithii*	-	LC #
66	Pheasant Tailed Jacana	*Hydrophasianuschirurgus*	IV	LC #
67	Rufous Backed Shrike	*Laniusschach*	-	LC #
68	Black-headed Munia	*Lonchuramalacca*	IV	LC #
69	Coppersmith Barbet	*Megalaimahaemacephala*	IV	LC #
70	Crested Bunting	*Melophuslathami*	IV	LC #
71	Small Green Bee-eater	*Meropsorientalis*	IV	LC #
72	Blue tailed Bee-eater	*Meropsphilippinus*	IV	LC #
73	Blue cheeked Bee-eater	*Merops superciliosus*	IV	LC #
74	Bronze Winged Jacana	*Metopidius indicus*	IV	LC #
75	Pariah Kite	*Milvus migrans*	IV	LC #
76	Blacknaped Flycatcher	*Monarchaazurea*	IV	LC #
77	Blue headed Rock Thrush	*Monticolacinclorhynchus*	IV	LC #
78	Pied Wagtail	*Motacilla alba*	-	LC #
79	Grey Wagtail	*Motacilla cinerea*	-	LC #
80	Yellow Wagtail	*Motacilla flava*	-	LC #
81	Large Pied Wagtail	*Motacillamaderaspatensis*	-	LC #
82	Tickell's Blue Flycatcher	*Muscicapatickelliae*	IV	LC #
83	Purple Sunbird	*Nectarinia asiatica*	IV	LC #
84	White Scavenger Vulture	*Neophron percnopterus*	I	EN #
85	Golden Oriole	*Oriolusoriolus*	IV	LC #
86	Black Headed Oriole	*Oriolusxanthornus*	IV	LC #
87	Tailor Bird	*Orthotomussutorius*	IV	LC #
88	Grey Tit	*Parus major*	IV	LC #
89	Yellow-cheeked Tit	*Parus xanthogenys*	IV	LC #
90	House Sparrow	*Passer domesticus*	IV	LC #
91	Pea-fowl	*Pavocristatus*	I	LC #
92	Jungle Bush Quail	*Perdicula asiatica*	IV	LC #
93	Small Minivet	*Pericrocotuscinnamomeus*	IV	LC #
94	Scarlet Minivet	*Pericrocotusflammmeus*	IV	LC #

95	Small Indian Cormorant	*Phalacrocorax niger*	IV	LC #
96	Black Redstart	*Phoenicurusochruros*	IV	LC #
97	Yellow-fronted Pied Woodpecker	*Picoidesmahrattensis*	IV	LC #
98	Indian Pitta	*Pitta brachyura*	IV	LC #
99	Weaver Bird	*Ploceusphilippinus*	IV	LC #
100	Eastern Golden Plover	*Pluvialiadominica*	IV	LC #
101	Slaty-headed Scimitar Babbler	*Pomatorhinushorsfieldisc histiceps*	IV	LC #
102	Purple Moorhen	*Porphyrioporphyrio*	IV	LC #
103	Ashy Wren-warbler	*Priniasocialis*	IV	LC #
104	Blossom headed Parakeet	*Psittaculacyanocephala*	IV	LC #
105	Large Indian Parakeet	*Psittaculaeupatria*	IV	NT #
106	Rose Ringed Parakeet	*Psittaculakrameri*	IV	LC #
107	Red Vent Bulbul	*Pycnonotuscafer*	IV	LC #
108	Red Whiskered Bulbul	*Pycnonotusjocosus*	IV	LC #
109	White-throated Fantail Flycatcher	*Rhipiduraalbicolis*	IV	LC #
110	White-browed Fantail Flycatcher	*Rhipiduraaureola*	IV	LC #
111	Painted Snipe	*Rostratulabenghalensis*	IV	LC #
112	Pied Bush-chat	*Saxicola caprata*	IV	LC #
113	Collared Bush-chat	*Saxicola torquata*	IV	LC #
114	Indian Robin	*Saxicoloidesfulicata*	IV	LC #
115	Chestnut-bellied Nuthatch	*Sittacastanea*	-	LC #
116	Velvet-fronted Nuthatch	*Sitta frontalis*	-	LC #
117	Crested Serpent Eagle	*Spilornischeela*	-	LC #
118	Crested Hawk Eagle	*Nisaetuscirrhatus*	I	LC #
119	Spotted Dove	*Streptopelia chinensis*	IV	LC #
120	Indian Ring Dove	*Streptopeliadecaocto*	IV	LC #
121	Red Turtle Dove	*Streptopeliatranquebaric a*	IV	LC #
122	Pied Mynah	*Sturnus contra*	IV	LC #
123	Grey-Headed Mynah	*Sturnus malabaricus*	IV	LC #
124	Black-headed Mynah	*Sturnus pagodarum*	IV	LC #
125	Rosy Pastor	*Sturnus roseus*	IV	LC #
126	Paradise Flycatcher	*Terpsiphone paradisi*	IV	LC #
127	Black Headed Ibis	Threskiornis *melanoceph*	IV	NT#

		alus		
128	Indian Grey Hornbill	*Tokusbirostris*	-	LC #
129	King Vulture	*Sarcogyps calvus*	I	CR #
130	Yellow-footed Green Pigeon	*Treronphoenicoptera*	IV	LC #
131	Redshank	*Tringatotanus*	IV	LC #
132	Jungle Babbler	*Turdoides striatus*	IV	LC #
133	Hoopoe	*Upupa epops*	IV	LC #
134	Red Wattled Lapwing	*Vannelus indicus*	IV	LC #
Reptiles				
1	Garden Lizard	*Calotes versicolor*	-	-
2	Common Skink	*Mabuyacarinata*	-	LC #
3	Indian Cobra	*Najanaja*	IV	LC #
4	Yellow Rat Snake	*Ptyas mucosa*	II	-
5	Indian Python	*Python morulus*	I	Vu #
6	Bengal Monitor Lizard	*Varanus bengalensis*	I	LC #
7	Russel's Viper	*Viperarusselii*	II	NA
8	Checkered Keelback	*Xenochrophis piscator*	IV	-
Fishes				
1.	Chelluah	*Aspidopariamorar*	NA	NA
2.	BarnaBaril	*Bariliusbarna*	NA	NA
3.	Katla	*Catlacatla*	NA	NA
4.	Chaguni	*Chaguniuschagunio*	NA	NA
5.	Great Snakehead	*Channa maruliuss*	NA	NA
6.	Reba Carp	*Cirrhinusreba*	NA	NA
7.	Singi	*Clarias batrachus*	NA	NA
8.	Common Carp	*Cyprinus carpio*	NA	NA
9.	Calbasu	*Labeocalbasu*	NA	NA
10.	Kali, Boalla	*Labeodyocheilus*	NA	NA
11.	Rohu	*Labeorohita*	NA	NA
12.	Cat fish	*Mystuscavasius*	NA	NA

13.	Bronze Feather Back	*Notopterusnotopterus*	NA	NA
14.	Swamp Barb	*Puntius chola*	NA	NA
15.	Hilsa	*Tenualosailisha*	NA	NA
Butterflies				
1.	Common Emigrant	*Catopsiliapomona*	NA	NA
2.	Common map	*Cyrestisthyodamas*	NA	NA
3.	Stripped Tiger	*Danaus genutia*	NA	NA
4.	Plain Tiger	*Danaus chrysippus*	NA	NA
5.	Stripped Tiger	*Danaus genutia*	NA	NA
6.	Common crow	*Euploea core*	NA	NA
7.	Common Grass Yellow	*Euremahecabe*	NA	NA
8.	western blue sapphir	*Heliophorus sp.*	NA	NA
9.	Danaid Egg Fly	*Hypolimanasmisippus*	NA	NA
10.	White orange tip	*Ixias marianne*	NA	NA
11.	Blue pancy	*Junonia orithya*	NA	NA
12.	Common evening Brown	*Melanitis leda*	NA	NA
13.	Common Bush Brown	*Mycalesisperseus*	NA	NA
14.	Lime butterfly	*Papiliodemoleus*	NA	NA
# LC – Least Concern; NT – Near Threatened; Vu – Vulnerable; EN – Endangered; CR – Critically Endangered				

(Source: Primary On-site Data and Working Plan of District)

3.6.1.7 Scheduled Species from study area

As per list of The Indian Wildlife (Protection) Act, 1972, Fauna coming under the schedule - I is treated as endangered species. The schedule - I fauna as per reconnaissance survey are listed in Table-3.32 Although these are very common species and found in every locality, even in villages, certain steps should be taken to conserve the critical wild life:

Programs for the conservation of wildlife will be formulated and implemented outside the protected areas by educating the local communities with help of local

public agencies, and other stakeholders including the environment division officers of our company, in order to reduce the scope of man-animal conflict.

It will be ensured that human activities on the fringe of the protected areas do not degrade the habitat.

Over all, the status of wildlife in a region is an accurate index of the state of ecological resources, and thus, of the natural resources base of human well-being. This indicates the interdependent nature of ecological entities (the web of life), in which wild life is a vital link and a base of eco-tourism. Thus, the importance of conserving and protecting wildlife will be spread among the local people.

Table 3.32: List of Scheduled species from study area

Sr. No.	Scientific name	Common Name	Schedule
Mammals			
1.	*Melursus ursinus*	Sloth bear	Schedule-I
2.	*Elephas maximus indicus*	Elephant	Schedule-I
3.	*Manis crassicaudata*	Pangolin	Schedule-I
4.	*Canis lupus callipes*	Indian Wolf	Schedule-I
5.	*Mellivora capensis*	Honey Badger	Schedule-I
6.	*Panthera pardus*	Leopard	Schedule-I
7.	*Tetracerus quadricornis*	Four-horned antelope	Schedule-I
8.	*Gazella bennettii*	Chinkara	Schedule-I
9.	*Tragulusmeminna*	Mouse Deer	Schedule-I
Reptiles			
10.	*Varanus bengalensis*	Bengal Monitor Lizard	Schedule-I
11.	*Python molurus*	Python	Schedule-I
Birds			
12.	*Pavocristatus*	Indian Peafowl	Schedule-I
13.	*Aquila rapax*	Tawny Eagle	Schedule-I
14.	*Gyps bengalensis*	White Rumped Vulture	Schedule-I
15.	*Nisaetuscirrhatus*	Crested Hawk Eagle	Schedule-I
16.	*Anthracocerescoronatus*	Pied Hornbill	Schedule-I
17.	*Ciconia episcopus*	White stork	Schedule-I
18.	*Neophron percnopterus*	White Scavenger Vulture	Schedule-I
19.	*Sarcogyps calvus*	King Vulture	Schedule-I

Source: Primary On-site Data and Working Plan

3.6.1.8 Aquatic Diversity

The biological species are the best indicators of environmental quality. This includes different species, such as, phytoplankton, zooplankton, benthos, fishes etc. Studies on biological aspects of certain ecosystems are an important part of any

environmental impact assessment in view of the need for conservation of environmental quality and safety of aquatic life.

From the baseline survey on existing aquatic environmental conditions in and around the proposed Project on the Hurdul Nala Jhana nala within the mine lease area and Mahan Nala, Chhiraha Nala, Sulkhia Nala, Biniao Nala, Sukhra Nala, Nimji Nala, Hariya Nala Ramnpa&Gopad River and other drainages/ponds the following data's were generated:

Biological characteristics of river water

- Inventorization of phytoplankton and Zooplankton
- Present status of riverine fish fauna: Identification of fish species
- Migratory pattern, feeding and breeding grounds of the fish fauna
- Assessment of local catches during the field trips to assess the fish fauna**.**

The samples for qualitative and quantitative analysis of planktons were collected from the sub surface layer at knee depth. Water samples were filtered through plankton net of 20µ mesh size (APHA, 1971). The filtered samples were concentrated by using the centrifuge. By using Lackey's drops method and light microscope (Lackey, 1938), the qualitative analysis was carried out for phytoplankton and zooplankton (Table 3.33. The standard flora and other literature were followed for the qualitative evaluation of Plankton.

Table 3.33: Phytoplankton and Zooplanktons Recorded in the Study Area

Sr No.	Phytoplankton Species	Zooplankton Species
1.	Navicula sp. (Diatom)	Daphnia sp.
2.	Cyclotella sp. (Diatom)	Moina sp.
3.	Synedra sp. (Diatom)	Paramecium sp.
4.	Pinnularia sp. (Diatom)	Euglena sp.
5.	Oscillatoria sp.	Ranatra sp.
6.	Nostoc sp.	Larvae of culex sp.
7.	Anabaena sp. (Diatom)	Larvae of Dytiscus sp.
8.	Spirogyra sp.	Cyclops sp.
9.	Pediastrum.sp.	Diaptomus sp.
10.	Microspora sp.	

Source: Primary On-site Data

3.6.1.9 Fish

Fish occurrences were determined by collecting samples using different fishing gears like cast net, scoop net, hand net, hook-line, pot and open local devices methods. Also visual observations in different habitats were made. Fishes were identified up to the species level with the help of keys of Jayaram (1981), Menon

(1987) and Talwar and Jhingran (1997). IUCN red data list (2006) was compared to assess threatened, endangered and vulnerable species in the study area.

Fishes are the integral component of stream and rivers which are not only the best sources of food and animal protein for the human population but provides a source of income for the local inhabitants. People capture fishes for their consumption and in some cases to sell in local markets as an alternative means for procurement of foods and other requirement of daily needs.

Table 3.34: Common Fish Species Recorded in Buffer Zone

S. No.	Common name	Scientific name
1	Catla	*Catlacatla*
2	Rohu	*Labeorohita*
3	Maral	*Channa punctata*
4	Dokh	*Channa gachua*
5	Mangur	*Clarias batrachus*
6	Dandvan	*Garramulllya*
7	Malya	*Oreochromis mosambicus*
8	Darai	*Puntius sarana*
9	Khavli	Puntius sophore
10	Dara	*Rasbora daniconius*
11	Chikli	*Indoreonectesevezardi*
12	Chikani	*Lepidocephalichthysthermalis*

Source: Primary On-site Data and Working Plan

3.6.1.10 Aquatic Floral Diversity

Wetlands are very useful to us. By producing resources, enabling recreational activities and controlling flood and pollution, they contribute to the national and local economies and environmental consequences. Wetlands provide important and incredible services to society, these services can neither be sold nor do they have the market value and tried to give wetlands an economic value.

Table 3.35: Common Species Recorded in Buffer Zone

Family	Botanical Name	Local Name
Salviniaceae	*Azolla pinnata*	Mosquito Fern
Commelinaceae	*Commelinabenghalensis*	Kana
Cyperaceae	*Cyperus alternifolius*	Umbrella Sedge
Poaceae	*Echinochloacolona*	Shama

Family	Botanical Name	Local Name
Pontederiaceae	*Eichhornia crassipes*	Jal Kumbhi
Lemnaceae	*Lemna minor*	Duck Weed
Onagraceae	*Ludwigiaadscendens*	Water Primrose
Marsileaceae	*Marsilea quadrifolia*	Four Leaf Clover
Oxalidaceae	*Oxalis corniculata*	Amrul
Ranunculaceae	*Ranunculussceleratus*	Aglaon
Typhaceae	*Typha angustifolia*	Patera



Typhya angustifolia



Eichhornia crassipes

3.6.1.11 Movement of Mega Wildlife

According to the book “Right of Passage”, Elephant Corridors of India-2017 the elephant habitats in central India extend over 21,000 sq km in the states of Odisha, Jharkhand, Chhattisgarh and southern West Bengal, at times extending to Madhya Pradesh and Bihar, and hold a population of about 3128 elephants (MoEFCC, 2017). There have been recent reports of elephants straying into Madhya Pradesh’s eastern districts of Singrauli and Anuppur from bordering northern Chhattisgarh, causing concern among the locals and forest officials. The deterioration in habitat quality has forced elephants to undertake long-range disoriented movements by using smaller forest patches to move to larger forest areas. This is one of the major causes for the migration of elephants into Chhattisgarh and at times extending to Madhya Pradesh.

Elephant is the flagship species of this area and the only mega herbivore (wildlife) with long ranging movement behaviour, present in the Singrauli Forest Division. Elephants have not been reported from the mining lease area as well as from the impact area. However, there are reports of the movement of elephants, far beyond

the lease area in the district of Korba and Sarguja of Chhattisgarh State. Elephants follow streams and move in valleys and unless hard pressed try to avoid hilly terrain to conserve energy. This behaviour exposes them close to human habitation. The movement of elephants has also been reported in the eastern part of the Renukoot Dam. But the dam is a huge barrier for the elephants to reach anywhere near to the presently Dhirauli coal mine lease area. The movement of elephants in Singrauli Forest Division is shown in **Figure-3.26.**

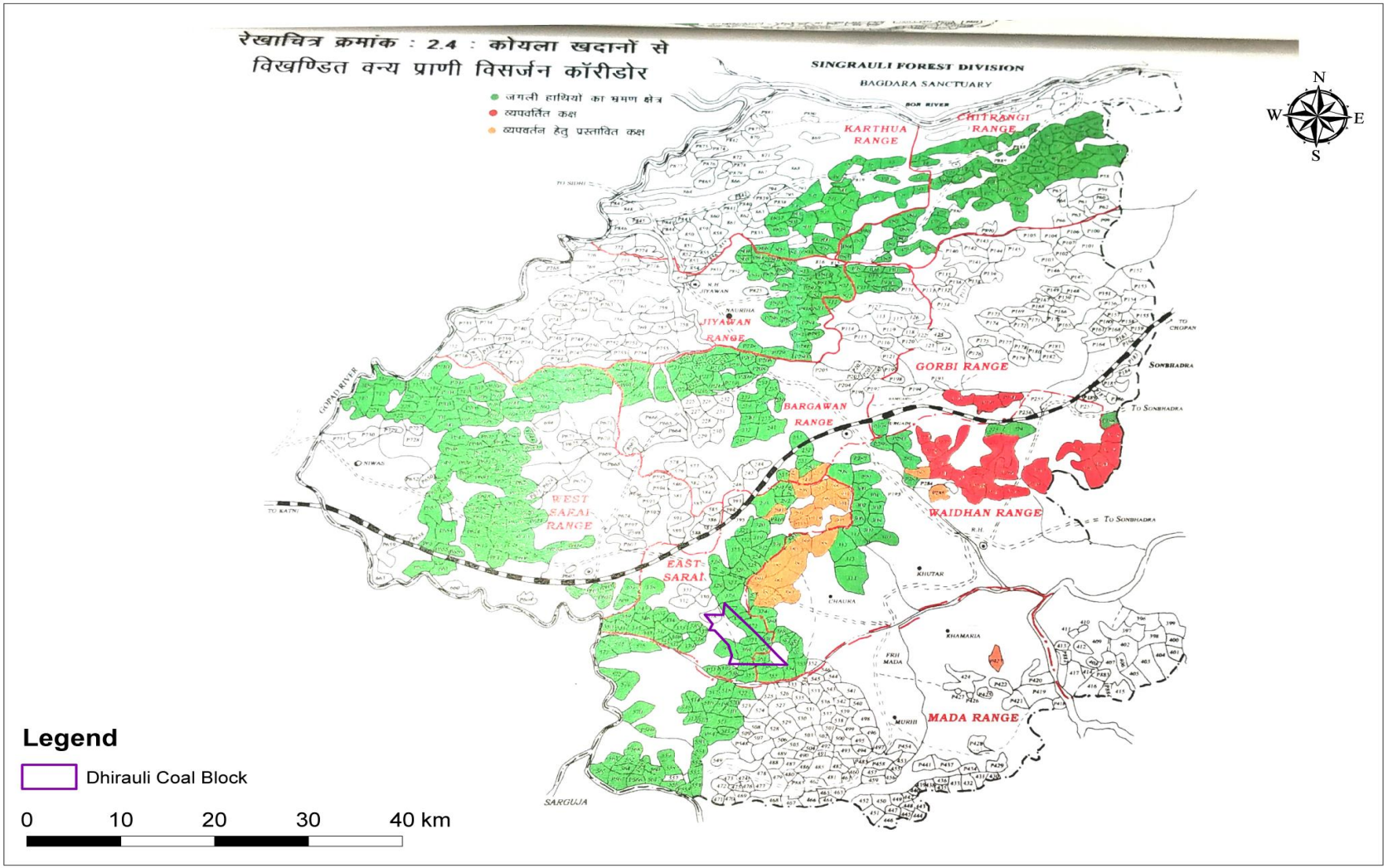


Figure 3.26: Wildlife Movement in Singrauli Coal Block

3.7 Socio Economic Environment

The latest available data has been complied to generate the existing socio-economic scenario of the study area. Information on socio-economic profile was collected from the Primary Census Abstract CD 2011 including the population details of the region.

The Socio-Economic Status of the study areas is mentioned below and the villages surveyed are enlisted in Table Below**.**

Table 3.36: Summarized Demographic Structure of the Study Area

Sl. No.	Parameter	Study Area (Rural)
1.	No. of Villages	38
2.	Household	10724
3.	Household Ratio	4.6
4.	Total Population	49383
5.	Male Population %	25143(50.91%)
6.	Female Population %	24240(49.08%)
7.	Population (0-6 Years) %	9688(19.61%)
8.	Sex Ratio	964
9.	Child Sex Ratio	906
10.	Scheduled Caste %	6954(14.08%)
11.	Scheduled Tribes %	24401(49.41%)
12.	Literates %	21449(43.43%)
13.	Main Workers %	14424(29.20%)
14.	Marginal Workers %	8455(17.12%)
15.	Non-Workers %	26504(53.67%)

Source: PCA, 2011, Madhya Pradesh State

3.7.1 Village

The basic unit for rural areas is the revenue village which has definite surveyed boundaries. The revenue village may comprise of one or more hamlets but the entire village is treated as one unit for presentation of data.

3.7.2 AdministrativeSet up of the Study Region

The 12 Mining Blocks in the region are coming from **Singrauli and Deosar Tehsil of Singrauli Distric**t. So, to represent the population facts of the area the District and Blockwise details have been presented in the following **Tables 3.37.**

SINGRAULI DISTRICT Singrauli is the 50th district in the state of Madhya Pradesh, which was formed on 24th May 2008 by division of Sidhi district, which covers a region comprising of the eastern part of the Sidhi district in Madhya Pradesh and the adjoining region in Sonebhadra district in Uttar Pradesh. Historically Singrauli belonged to the princely state of Rewa, a part of the Baghelkhand region. It is rich in natural and mineral resources, covered with dense forests and inhospitable terrain in ancient times. Due to abundance of mineral resources and Power Plants this region is also called Urjanchal.

In 2011, Singrauli had population of 1,178,273 of which male and female were 613,637 and 564,636 respectively. In 2001 census, Singrauli had a population of 920,169 of which males were 478,633 and remaining 441,536 were females. There was change of 28.05 percent in the population compared to population as per 2001. In the previous census of India 2001, Singrauli District recorded increase of 38.60 percent to its population compared to 1991.

Table 3.37: Population in Singrauli District

Description	2011	2001
Population	11.78 Lakhs	9.20 Lakhs
Actual Population	1,178,273	920,169
Male	613,637	478,633
Female	564,636	441,536
Population Growth	28.05%	38.60%
Area Sq. Km	5,675	5,675
Density/km2	208	162
Sex Ratio (Per 1000)	920	922
Child Sex Ratio (0-6 Age)	923	955
Average Literacy	60.41	49.25
Male Literacy	71.34	65.45
Female Literacy	48.53	31.52
Total Child Population (0-6 Age)	209,792	196,253
Literates	585,054	356,524

Description	2011	2001
Male Literates	359,923	247,559
Female Literates	225,131	108,965
Child Proportion (0-6 Age)	17.81%	21.33%

Table 3.38: Summarized Demographic Structure of the Tehisl coming under the study area

Name	No_HH	TOT_P	TOT_M	TOT_F	P_06	P_SC	P_ST	P_LIT	M_LIT	F_LIT
Singrauli Tehsil	62420	296940	152382	144558	55177	44254	77932	136697	86353	50344
	4.757129	948.6554	51.31744	48.68256	18.58187	14.90335	26.24503	46.03523	63.1711	36.8289
Deosar Tehsil	69398	324363	170347	154016	59706	42937	134333	152406	95590	56816
	4.673953	904.131	52.5174	47.4826	18.40715	13.23733	41.4144	46.98625	62.72063	37.27937

3.7.3 SINGRAULI DISTRICT

3.7.3.1 SINGRAULI TEHSIL

- Total number of households are about 62420.
- Total population of villages under the study area is 296940 out of which males are 152382 (51.31) and females are 144558 (48.68%).
- The average family size is about 4.7 persons per family.
- Sex ratio (No. of females per 1000 males) is 948 which indicates that females are less in number than their male counterpart in the study area.
- Out of the total population, the population of children within the age of 0-6 age-group is about 55177 (18.58%).
- Scheduled caste population is 44254 (14.90%) and Scheduled tribe population are maximum in the tehsil i.e about 77932(26.24%) in the region.
- Out of the total population in the study area is 136697 i.e 46.03% are literates with 63.17% male literates and 37.27% are female literates

3.7.4 Deosar Tehsil

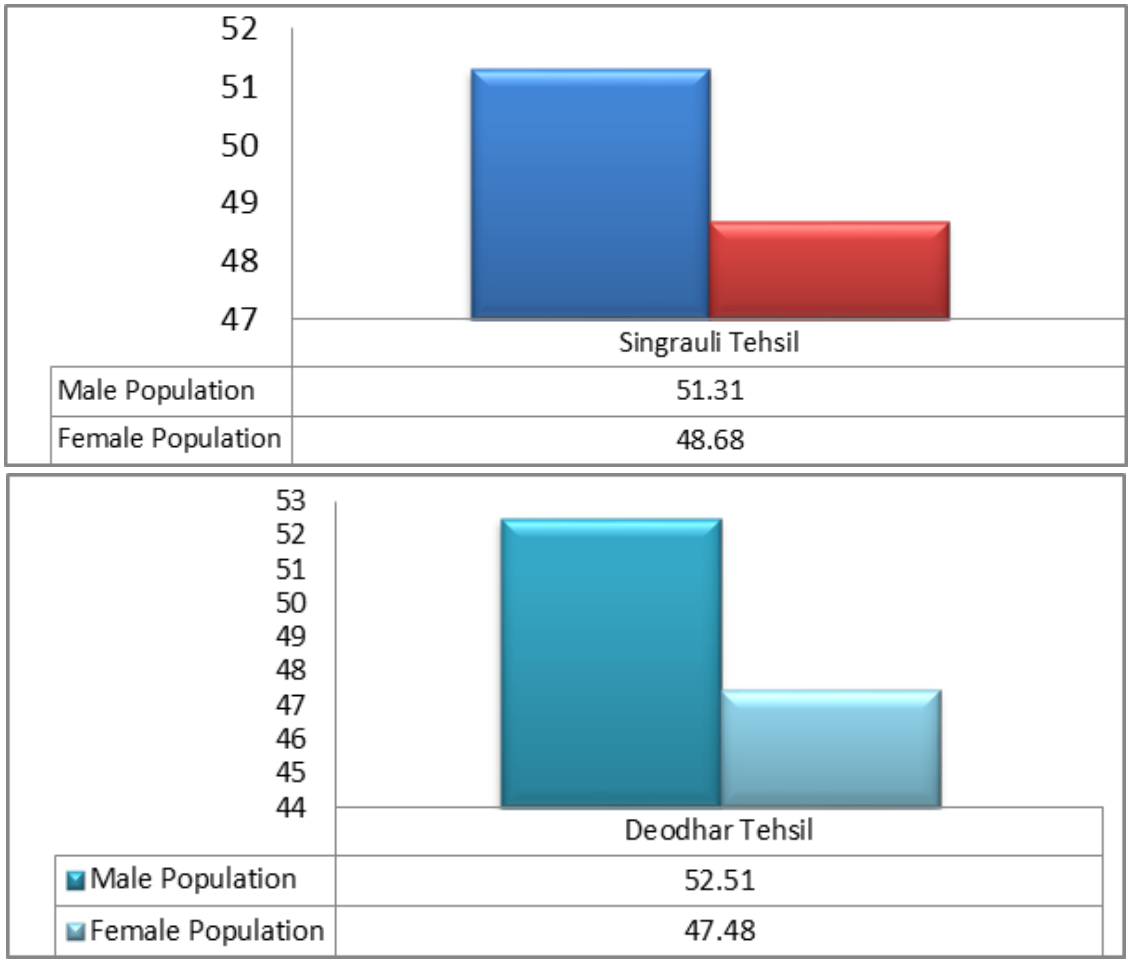
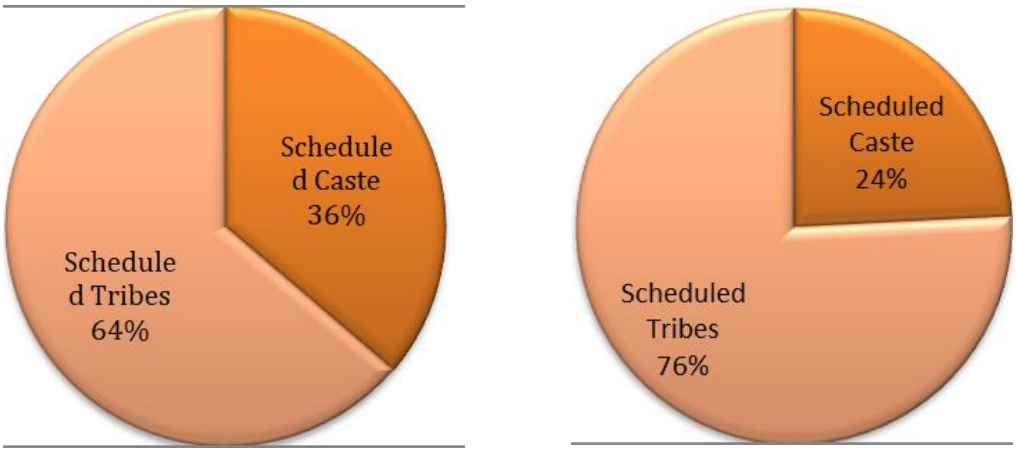


Figure 3.27: Bar Diagram Representing Male and Female Population in the Tehsil Coming in the Study Area



Singrauli Tehsil **Deosar Tehsil**

Figure 3.28: Distribution of Scheduled Caste and Scheduled Tribes Population in the Tehsil in the Study Area

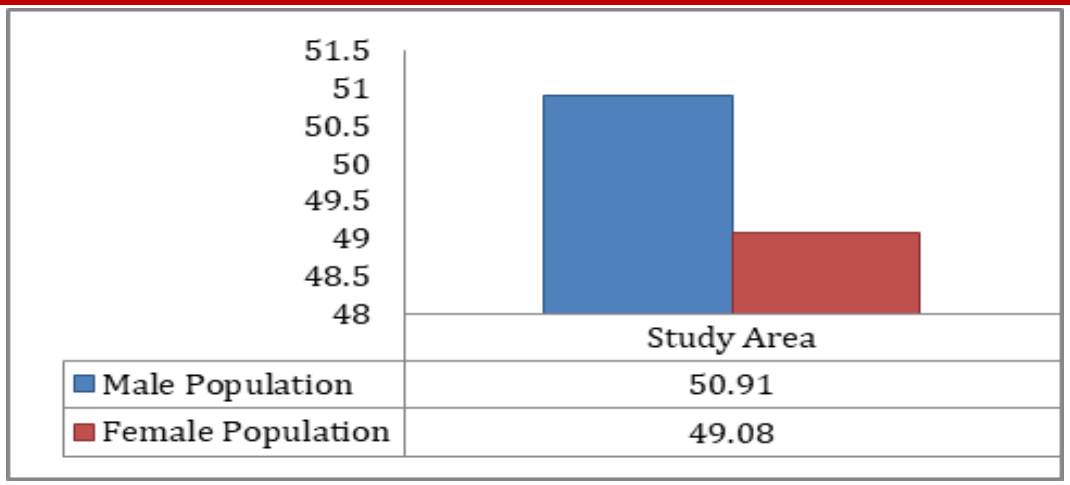


Figure 3.29: Bar Diagram Representing the Population Data of the RegionHousehold Ratio and Population Density

3.7.5 Demographic Profile of the Study Area

3.7.5.1 Householdand Population

Total number of households in the study area of rural region is about 10724 with total population in rural area is about 49383 with male population is 25143 (50.91%) and female population is 24240(49.08%).

The average family size i.e person per family in Rural and urban area is 4.6. It can be concluded from the data obtained that the rural area is average populated.

Population 0-6 Age-Group

Out of the total population, the population of children within the age of 0-6 age-group in rural area is 9688 (19.61%).

Sex Ratio & Child Sex Ratio

Sex ratio (No. of females per 1000 males) is 964 in rural area which indicates that females are less in number than their male counterpart in rural area and also the Child Sex ratio is 906 in rural area i.e., no.of female child per 1000 male child. It can be concluded from the data that female child is lower than the adult female population. The graphical presentation of the distribution of population is given in fig below:

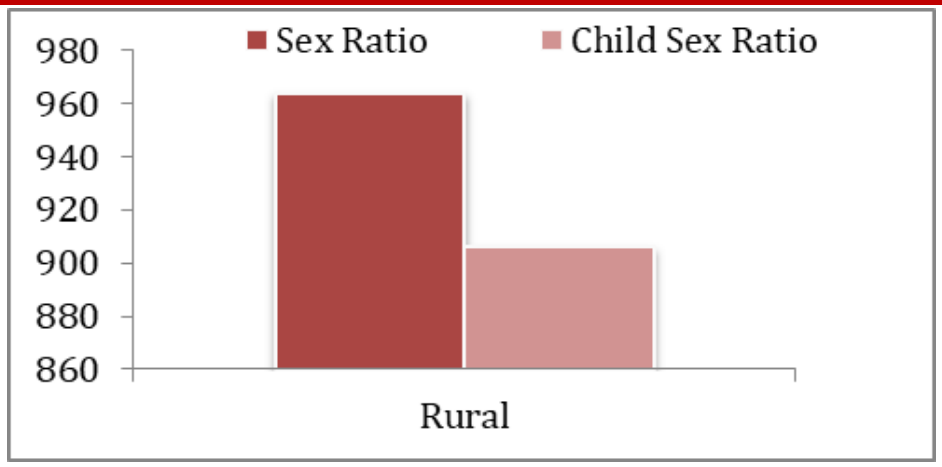


Figure 3.30: Figure Representing the Ratio of Population in the Study Area

3.7.5.1 Scheduled Caste and Scheduled Tribe Population inthe Study Area

Scheduled Caste population in rural area is about 6954 (14.08%) while Scheduled Tribe population are higher of about 24401(49.41%) in the study area.

3.7.5.1 Literacy Rate inthe Study Area

Out of the total population 21449 i.e 43.43% literates are from rural area with male literates 13420(62.56%) and female literates 8029 (37.43%) in the study area. The literacy level of the region is also good while male populations are more literates as compared to the female population.

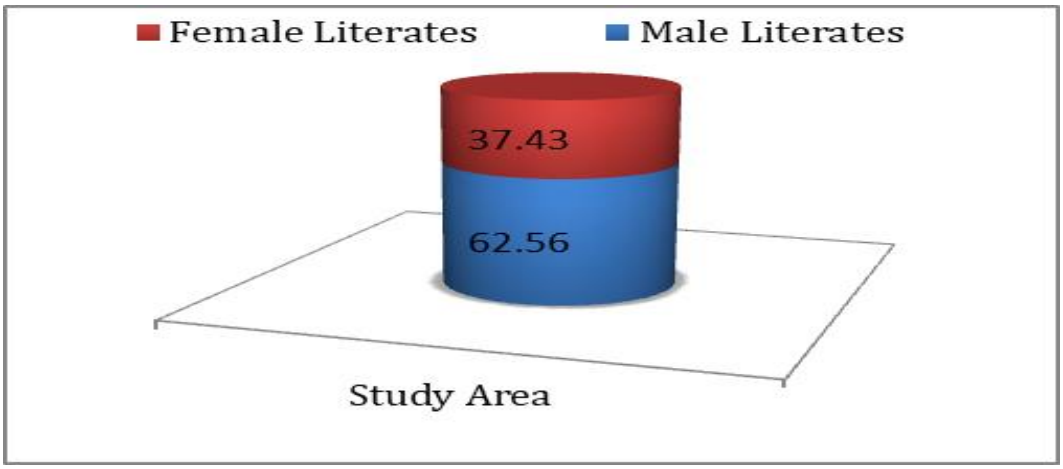


Figure 3.31: Literacy rate of the Study Area

3.7.5.2 Occupational Pattern/ Economic Resource Base

'Work' has been defined as participation in any economically productive activity. Such participation may be physical or mental. Persons on leave and under training are also treated as workers. However, rent receivers and pensioners are not treated as workers.

Total Workers

Occupational pattern of any region mainly depends upon its economically active group i.e. the working populations involved in different economically productive activities. The total workers further categorized as main worker, marginal and the non-working population.

Main Workers

Main workers are those who have worked for a major part of the year (i.e. at least six months or 183 days). Main activity of a person who was engaged in more than one activity was reckoned in terMiddle school of time disposition. 14424 (29.20%) in study area from the total population comes under the main workers category from the villages coming in the project site.Main workers are further classified into 4 categories viz., cultivators, agricultural laborers and household workers and other main workers.

Cultivators

Maximum population in the study area is engaged as Cultivators'i.e depended on agriculture. The cultivator population within the rural area is 7209(49.97%). It can be concluded from the data the populations in the villages are mainly engaged in agriculture activity.

Agricultural Laborers

Persons working on land owned by others for wages or share in the yield have been treated as agricultural laborers. Out of the total main worker category in the study area, agricultural laborers population in rural area is about 6001(41.60%).

Laborers in Household Industry

The laborers engaged in household activity are quite low in all the study area. Among the total main worker very few populations are engaged in household activity are only 53 persons in the study area.

Other Workers

All main workers i.e. those who have been engaged in some economic activity during the last one year and who are neither cultivators nor agricultural laborers or household industry workers are classified as other main workers. The type of workers that come under this category includes factory workers, plantation workers, those in trade, commerce, business, transport, construction, political or social works, all government servants, municipal employees, teachers, priests,

entertainers, artists etc. Among the total population of the study area only 8.04% are engaged in other activity.

It can be concluded that maximum population from the villages are engaged in other activities which means either in service, labourer or business activity. Different types of workers in total worker population may be classified and described below while presented in **Fig 3.32.**

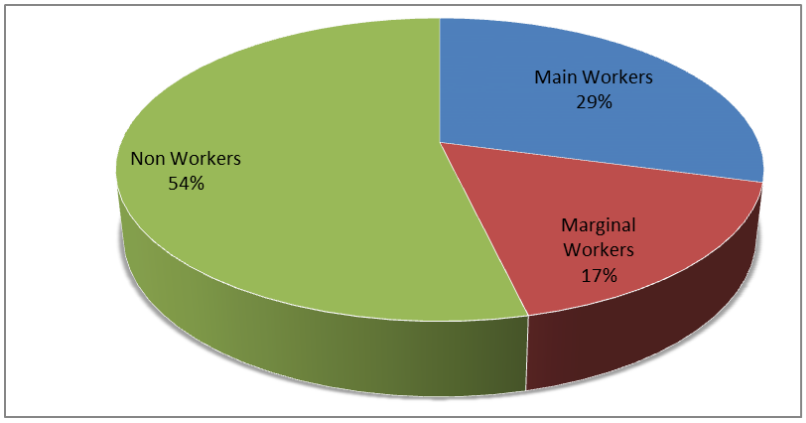


Figure 3.32: Occupational Structure in the Study Area

Marginal Workers

Marginal workers are those who have worked any time in the year for less than six months or 183 days but have not worked for a major part of the year. The population of marginal workers within the rural area comprises of about 17.12% of the total population.

Non-Workers

Non-Workers are those who have not worked any time at all in the year. Non-workers constitute householders, students, dependents, retired persons etc.

The economy of the study area is primarily based on agriculture. The agriculture sector has thus absorbed a major portion of the working force. It is being observed that the 53.67% population are unemployed in villages:

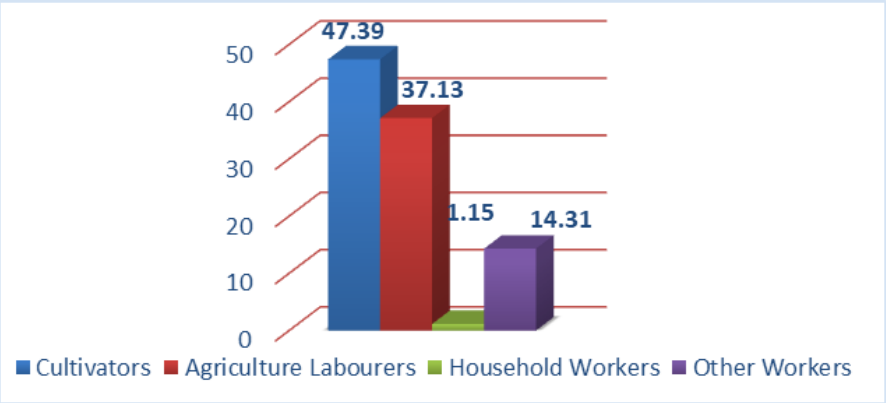
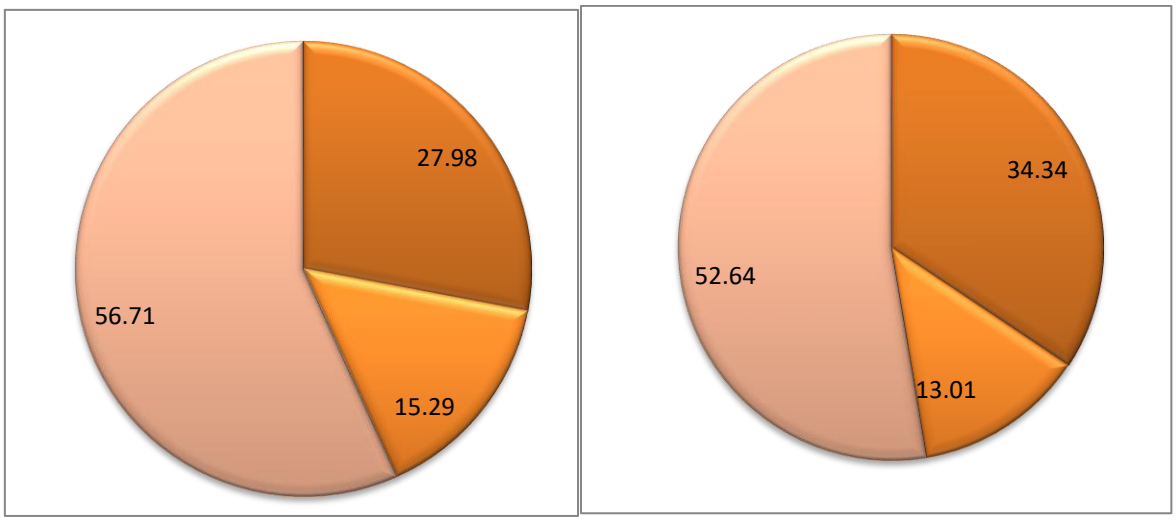


Figure 3.33: Category of Main Workers in Rural Area of the Study Area

3.7.6 Occupational Pattern/ Economic Resource Base (Tehsil Basis)

Singrauli Tehsil

- Main Workers in the rural area are about 83102 i.e 27.98% of the total population.
- The population of marginal workers in the rural area is about 45420 i.e 15.29% out of the total population.
- The economy of the study area is primarily based on agriculture and major portion of the working force are observed to be engaged in agriculture activity as Cultivators and Agriculture Labourers (81.55%). Only 15.29% are engaged in other activity which is mostly temporary. It is observed that 56.71% population are unemployed in villages.



Singrauli	Deosar Tehsil

Figure 3.34: Employment Pattern of Main, Marginal and Non-Workers in the Tehsil Coming in the Study Area

Table 3.39: Demographic Structure of the Study Area

Sr.No.	Villages	Households	Total Population	Male Population	Female Population	Population (0-6 Years)	Scheduled Caste	Scheduled Tribes	Literates
Madhya Pradesh State									
Singrauli District									
1.	Gorwani	148	623	336	287	155	23	540	212
2.	Dhirauli	236	1186	609	577	250	24	801	333
3.	AmraiKhoh	25	111	63	48	23	0	30	48
4.	Amdand	35	163	91	72	28	0	0	76
5.	Majhauli Path	128	673	349	324	108	21	214	321
6.	Basi Berdaha	218	1049	518	531	233	0	936	333
7.	Belwar	86	385	192	193	74	1	60	180
8.	Dogari	541	2752	1389	1363	583	334	1436	1171
9.	Siraswah	15	82	41	41	13	6	39	50
10	Chalari	422	1852	940	912	369	244	751	877
11	Phatpani	141	741	358	383	171	300	208	306
12	Bajaudi	322	1645	856	789	339	173	636	834
13	Ladbai	72	419	207	212	75	4	387	169
14	Tal	323	1607	810	797	339	108	1182	632
15	Digwah	217	1051	544	507	181	122	918	471
16	Bhaisa Buda	298	1452	710	742	296	231	908	532
17	Khanua Nawa	629	2687	1340	1347	502	117	2028	1135
18	Khanua Khas	173	849	433	416	166	129	465	353
19	Jamgadi	343	1607	816	791	319	93	1001	716
20	Bhalyatola	214	1098	583	515	210	0	382	553
21	Budher(Bugher)	40	165	82	83	32	0	93	71
22	Langhadol	417	1922	952	970	429	314	1436	667
23	Sajawar	196	896	445	451	199	80	598	286
24	Rauhal	266	1363	674	689	297	25	460	573

25	Kamai	147	653	309	344	136	0	493	200
26	Jeer	344	1548	761	787	298	200	809	633
27	Pondi Path	338	1688	860	828	381	127	1363	635
28	PadariKhairwari Tola	87	376	186	190	43	35	274	199
29	Nadau	247	1155	602	553	227	179	430	496
30	Amiliya	657	3171	1592	1579	605	431	821	1397
31	Semua	110	463	231	232	97	14	147	191
32	Bandhaura	347	1642	833	809	342	737	369	775
33	Khairahi	402	1840	948	892	403	350	1148	770
34	Nagwa	1126	4501	2370	2131	783	1227	1869	2164
35	Dhuni	198	950	500	450	172	313	224	422
36	Karsua Raja	715	2886	1525	1361	472	849	426	1506
37	Churwahi	124	602	293	309	98	77	82	312
38	Malga	377	1530	795	735	240	66	437	850
Total		**10724**	**49383**	**25143**	**24240**	**9688**	**6954**	**24401**	**21449**

Source: PCA Census 2011, Singrauli District, Madhya Pradesh State

Table 3.40: Occupational Structure of the Study Area (RURAL)

Sr.No.	Villages	Total Main Workers	Main Workers				Marginal Workers	Non-Workers
			Cultivators	Agricultural Laborers	Household Laborers	Other Workers		
Madhya Pradesh State								
Singrauli District								
1.	Gorwani	210	11	196	0	3	21	392
2.	Dhirauli	437	146	254	2	35	164	585
3.	AmraiKhoh	45	40	4	0	1	0	66
4.	Amdand	78	64	12	0	2	1	84
5.	Majhauli Path	291	284	3	0	4	28	354
6.	Basi Berdaha	28	19	0	4	5	525	496
7.	Belwar	164	115	33	3	13	1	220
8.	Dogari	1290	220	1038	1	31	82	1380
9.	Siraswah	34	31	3	0	0	0	48
10.	Chalari	565	389	130	0	46	227	1060
11.	Phatpani	255	125	129	0	1	106	380
12.	Bajaudi	565	423	124	0	18	284	796
13.	Ladbai	105	98	3	0	4	106	208
14.	Tal	747	154	574	1	18	6	854
15.	Digwah	245	235	0	0	10	279	527
16.	Bhaisa Buda	728	522	203	0	3	15	709
17.	Khanua Nawa	1268	427	801	2	38	105	1314
18.	Khanua Khas	452	238	201	0	13	1	396
19.	Jamgadi	796	230	527	0	39	6	805
20.	Bhalyatola	166	153	8	1	4	407	525
21.	Budher(Bugher)	72	64	7	0	1	0	93
22.	Langhadol	671	501	157	0	13	330	921
23.	Sajawar	362	104	253	0	5	18	516

24.	Rauhal	409	12	384	6	7	333	621
25.	Kamai	211	183	20	0	8	121	321
26.	Jeer	393	252	111	0	30	332	823
27.	Pondi Path	499	442	32	5	20	515	674
28.	PadariKhairwari Tola	158	129	25	0	4	67	151
29.	Nadau	341	262	10	0	69	172	642
30.	Amiliya	715	356	236	0	123	784	1672
31.	Semua	14	3	0	0	11	49	400
32.	Bandhaura	337	105	45	7	180	236	1069
33.	Khairahi	31	1	2	0	28	767	1042
34.	Nagwa	234	60	40	2	132	1544	2723
35.	Dhuni	233	117	107	2	7	49	668
36.	Karsua Raja	759	341	226	13	179	405	1722
37.	Churwahi	19	3	3	0	13	310	273
38.	Malga	497	350	100	4	43	59	974
Total		**14424**	**7209**	**6001**	**53**	**1161**	**8455**	**26504**

Source: Source: PCA Census 2011, Singrauli District, Madhya Pradesh State

3.7.7 Infrastructure Resource Base in the Study Area

The details of infrastructure resources base of the study area with reference to education, medical facility, water supply, post and telegraph, transportation, communication facility, power supply, existence of nearest town etc. are presented in Table 3.40 to 3.42. The significant features of these important parameters for each study area are discussed as below.

3.7.7.1 Educational Facility

The numbers of educational institution in the study area are only 3 primary schools, 4 middle schools, no Secondary and senior secondary schools in the study area. Villagers avail the higher education facility in Raj Milan, Bindul, Khanua Nawa, Chalari and Baidhan villages. Villages of the study area avail and College from the nearest town that is Baidhan, Siddhi and Rewa town.

Table 3.41: Details of education status available in singrauli district

PARTICULARS	PRIMARY	UPPER PRIMARY
Gross Enrolment Ratio (%)	119.60	96.10
Net Enrolment Ratio (%)	95.10	76.10
Drop Out Rate (%)	7.90	4.51
Pupil-Teacher Ratio (%)	55.00	78.00
Student-Classroom Ratio (%)	29.00	45.00
Girl's Enrolment (%)	49.20	54.30
Female Teachers (%)	25.20	19.50
New Government Schools since 2003 (%)	20.00	46.90
Schools with girl's toilet (%)	95.00	89.50
Schools with boy's toilet (%)	96.40	92.50
Schools with drinking water facility (%)	93.50	91.70
Schools with electricity (%)	5.80	12.20

Source: District Census Handbook, Annual Survey 2013-14

3.7.7.2 Drinking Water Facility

The numbers of major sources of drinking water in the study area is through Hand Pump facility in 35 villages, covered well is available in 38 villages, Uncovered Wells in 27 villages.

3.7.7.3 Medical Facility

Medical institutions in rural parts of the region are inadequate, as per the data recorded in the village amenities CD 2011 there are Community Health Centre and Primary health centre is in Khanua Nawa village, Primary health sub-centre (PHS) in 4 villages (Langhadol,Pondi Path, Amiliya and Bandhaura) and Dispensary is in Khanua Nawa village in the study area.

3.7.7.4 Sanitation & Drainage Facility

It is observed that there are open nallas in most of the villages of the study area. Toilet facility is available in very few houses in the villages. Most of the villages have public toilets build by the government.

3.7.7.5 Communication Facility

Communication facility is available in the form of Post and Telegraph office is available in 17 villages and telephone connections are available in mostly all the villages.

3.7.7.6 Details of the Educational Institution in Dharauli Cluster, Chitarangi Block

High School Dharauli is a school cluster in Chitarangi block of Singrauli district in Madhya Pradesh Which is having about 1 Schools in it. This cluster includes all private and govt. schools of this area.

PVT DVS PUBLIC SCHOOL DHARAULI was established in 2015 and it is managed by the Pvt. Unaided. The school consists of Grades from 1 to 5. The school is Co-educational, and it has an attached pre-primary section. Medium of instruction is Hindi in this school. This school is approachable by all-weather road.

The school has rented building. It has got 7 classrooms for instructional purposes. All the classrooms in school are in good condition. It has 2 other roomsfor non-teaching activities. The school has Pucca boundary wall. The school has electric connection. The source of Drinking Water in the school is Hand Pump. The school has 5 boys toilet and 5 girls toilet. The school has a playground. The school has a library and has 500 books. The school has 6 computers for teaching and learning purposes and all are functional. The school is having a computer aided learning lab. The mid-day meal is prepared and provided to the School Premises.

3.7.7.7 Details of the Educational Institution in Khanua Cluster, Waidhan Block

HrsKhanua is a school cluster in Waidhan block of Singrauli district in Madhya Pradesh Which is having about 48 Schools in it. This cluster include all private and govt. schools of this area.

Table 3.42:List of the Schools in HrsKhanua Cluster, Waidhan Block

Sr. No.	List of the Schools in HrsKhanua Cluster, Waidhan Block
1	Middle School Khanua
2	UEGS Gora Purv Tola
3	Primary School Khanua Khas

4	Primary School Gora
5	UEGS ChaupalJhariya (Tenduha)
6	UEGS Baheradol (Khanua)
7	UEGS Jalfadol
8	UEGS PipardolJamgadi
9	Private. Primary School Maa Saraswati Shishu Mandir Khanua Nawa
10	UEGS Chatak Tola Bandha
11	Primary school Gorwani
12	UEGS Budher
13	UEGS Badanmada
14	Primary school Gora
15	Primary school Tenduha
16	UEGS Karahi Khadi (Dhumma Dol)
17	Primary school Pidarwah
18	Middle school Tenduha
19	Govt. High School Bandha
20	Primary school Khanua Nawa
21	Private Middle School Indira Gandhi Primary School, Bandha
22	UEGS Mahuagodam Tola (Jamgadi)
23	Middle School Lamidah
25	Primary school Jathha Tola
26	Govt. High school, Khanua Nawa
27	Middle school Gora
28	Uegs Majhi Tola (Dewari)
29	Primary school Lamidah
30	Primary school Pondi Dol
31	Uegs Barwa Tola Jamgadi
32	Primary school Jamgadi
33	Uegs Paschim Tola (Bandha)
34	UegsChhatainidand (Bandha)
35	Middle school Jamgadi

36	Middle school Jathha Tola
37	Middle school Pondi Dol
38	Middle school Bandha
39	UegsPurv Tola Jamgadi
40	Primary school Badijhiriya
41	Middle school Bhalya Tola
42	Primary school Uttar Tola Jattha Tola Gora
43	UegsJiganhwa Tola (Tenduha)
44	Primary school Dewari
45	UegsPahadi Tola (Khanua)
46	UegsAgariyan Tola Dewari
47	Primary school Dhummadop
48	Primary school Bandha

3.7.8 Medical Facility:

Medical facility is available in the form of medical colleges, Community health centres, Primary health Centres, Mobile health centres and Dispensaries in the state In Singrauli district there is 1 District Hospital, 7 Community Health Centres, 15 Primary Health Centres. There are 227 primary health sub-centres in the District. Whereas, there is only 1 Mobile health Unit.

Table 3.43: Medical Facility inSingrauli District

S. No.	Health Instiitiutions	Approved
1	District Hospital	1
2	Community Health Center	7
3	Primary Health Center	15
4	Sub Health Center	227
5	Mobile Medical Unit	1

3.7.9 Economic Resource Base inthe Study Area

3.7.9.1 Agriculture Scenario in the Region

Singrauliis located in the north eastern corner of the state of Madhya Pradesh is one of the most important economic zones of the state. The region which initially started

off as an agricultural economy is now known as South Asia's largest industrial base. The discovery of coal in the region has fueled the economy with many state owned as well as private owned Thermal power stations situated here. Owning to the enormous energy potential of Singrauli, it is also known as the Energy Capital of India.

Economic History of Singrauli

Singrauli lies in the forest belt of Central India, which remained mainly agricultural and pastoral community for much of its known history. The discovery of coal in the region by English Captain Rabthan led to the setting up of the first open cast mine at Kotav in 1857. Later Coal India Ltd set up the first modern operations in the region laying the road for full-fledged mining activity here.

Agriculture of Singrauli

Singrauli was essentially an agricultural community with the local population dependent mainly on farming and forest produce. The forests are home to the local tribes who earn their living from the trees like Saguan, Mahua, Chironji, Tendu etc. This region lies in the warm tropical monsoonal climate zone with an annual rainfall of 1014mm and hence ideal for growing crops like Rice, Maize, wheat, Pigeon Pea, Chickpea, Barley etc. Apart from this, there is also thriving livestock, poultry and fisheries industry.

Economic Dependency of Tribals in the Region

Major population of the district comprises of tribal population. Tribal communities such as BaigasGonds, Agarias, Panikas, and Khairawars in Singrauli region have always being heavily dependent on forest for their food, fuel and livelihood needs.
The main tribes are Baiga, Kanwar, Panika, and DandKorwa dependent on agriculture. On the hilly areas' grains like maize, barley, kodo, mahua, kutki, bajra, and gondali are grown. Bagai grass in this region is used for making cots. Many tribals used to sell the grass to people outside for ₹30 kilo or ₹3000 a quintal now the grass has stopped in the region because of the industries working in the region.

Mining Activity in Surguja District

Northern Coalfields Limited was separated from Central Coalfields Limited (both subsidiaries of state-owned Coal India) in 1985, solely for the purpose of taking over operations on the Singrauli coalfield. The current surface coal mines are on the Moher sub-basin of the Singrauli coalfield, which is only 312 sq km in size. The main Singrauli basin, which is 1,890 sq km in size and is located further to the west, is largely unexplored.
Numerous existing and proposed coal power plants are sited in the two districts in which this coalfield is found: Bina Thermal Power Project, Chitrangi Power Project, Gorgi power station, Jaypee Nigrie Super Thermal Power Project, Mahan

Super Thermal Power Project, Sasan Ultra Mega Power Project, and Vindhyachal power station in Singrauli district of Madhya Pradesh, and Anpara thermal power station, Anpara-C power station, Anpara-D power station, Churk captive power station, Obra Thermal Power Station, Renusagar power station, Rihand power station, and Singrauli Super Thermal Power Station in Sonbhadra district of Uttar Pradesh. If all these projects are completed as planned, the two districts will have 30 GW of coal-fired generating capacity in total.

Cultural and Aesthetic Attributes

As such no culturally and aesthetically important places are located within the 10 km radius of the study area.

Socio-Economic Survey

In order to access and evaluate likely impacts arising out of any development projects on socio economic environment, it is necessary to gauge the apprehensions of the people in the study areas.

3.7.10 SAMPLING METHOD

A judgmental and purposive sampling method was used for choosing respondents of various sections of the society Judgmental and purposive sampling method includes the right cases from the total population to fulfill the purpose of study.

3.7.10.1 METHODOLOGY FOR DATA COLLECTION

For the study, both qualitative and quantitative methods were adopted.
Data regarding the field area were collected both from primary as well as secondary sources.

- Primary sources include data collected through direct field sampling, observations based on schedules, questionnaires etc.
- Secondary source includes Census 2011 records, District Statistical Handbook literatures, documents from district etc.
- Data regarding mining, revenue generated by mining practices etc was collected from the Mine Department.

PRIMARY DATA COLLECTION

- The Socio-economic survey was carried out in the nearby human inhabitations (villages) of mining sites in order to study the existing resources of the area, land use, social structure of the community, employment patterns, income generation activities, dependency on forests and species preferred by the local people along with information on other related environmental and socioeconomic aspects.

- Detailed information on demography, labor allocation and employment, dependence on forest products, health and perceptions of change in the local environment was elicited through the interviews.
- The study was performed in mining areas by using Questionnaire based pre-structured Feedback Surveys and Interviews
- Economic status levels and forest dependency was also studied. The Questionnaire contains the questions covering environmental and socio-economic aspects of mining, forest and forestry related issues.

DATA COLLECTION TECHNIQUES USED FOR SOCIO ECONOMIC SURVEY:

- The sample frame of this study consists of communities within the 10 km of mining sites.
- Quantitative and qualitative data collection techniques namely Participatory Rural Appraisal (PRA) tools, direct observations through questionnaire-based survey through villagers' meetings were employed.

Participatory Rural Appraisal: Face-to-face interview conducted with the villagers to obtain information regarding household heads, live stocks, income, dependency on forest, impacts of mining, choice of species for reclamation from nearby communities in the study area.

Direct Observation: Direct observation was used throughout the pre-structured questionnaire-based survey.

SECONDARY DATA COLLECTION

Preparation of Work Plan including information collected from secondary sources, profile of the study site, criteria for assessment etc.

Secondary data obtained from the sources was verified during the primary survey carried out in the study area.

Sample Size

The sample size of roughly 10-20 percent of the total Study area is selected that include all strata of the study area (including women and other vulnerable grouPrimary school).

Socio-economic survey was conducted in the villages within the study areas located in all directions with reference to the study area. 8 villages were surveyed from study area.

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

- More than 90% of the main workforce is engaged in agriculture and its agriculture Labourers in rural area of the study area.
- Majority of workers are practicing farming activities without any irrigation source; it means that area under irrigation is very low and maximum area is covered by unirrigated land
- About 17% of the working population in the surveyed villages are engaged as marginal workers i.e they are engaged for temporary work or the job is seasonal in nature
- Maximum populations in the region are scheduled tribes and follow their own tradition and culture and their economy is mostly depended on forest produce.
- Most of the villages have Primary School while in some villages, it is extended up to Middle School. While for further education villagers go to the town places that are to Khanua Nawa, Chalari, Baidhan and in Raj Milan town.
- Literacy level in the villages of the study area is very poor, only 43% people in the area are literates.
- The main source of drinking water supply is through hand pump and tube well while few villages have untreated tap water facility. But majority of respondents expressed unsatisfactory opinion regarding the availability of drinking water facility as the villages mainly have open wells which are not portable for drinking
- Government medical facility is poor in the villages and villagers expressed unsatisfactory opinion regarding the facilities available at the centre.
- Power supply is available in mostly all the sampling villages. Streetlights are also available in all villages, but frequent power cut/ load shedding problem is experienced by the people in the area
- Wood, kerosene and LPG gas is a major fuel used for cooking purpose
- Post office is available in the surveyed villages few have sub post offices and banking facility is available within the villages.

3.7.11 PUBLIC CONSULTATION

- Most of the respondents are aware about the project but they are not aware when the project will commission.
- Many respondents were positive about the proposed project and were willing to give their land if proper and adequate compensation is given to them while few respondents were not positive towards the land acquisition as according to them there will be loss of there cultivable land and also the cultural and emotional attachment towards their anscestral land.
- Most of the respondents expect Employment opportunities may be increase due to project works
- Compensation for the loss of land should be given on market rate.
- Villagers opined that the project proponent should work for improving the health facility in the village and also develop the water facility.



School building in surveyed villages



Primary health sub-centre in khanuakhas



Gram panchyat building in raila village





Discussion with the villagers in the study area

3.7.11.1 REHABILITATION AND RESETTLEMENT

R&R Plan for the project affected people is prepared and will be done as per the provisions and recommendations mentioned in RTFCTLARRA, 2013. The detailed plan is covered in Social Impact assessment report attached as **Annexure XII.**

Dhirauli Coal Mining Project is an Opencast cum Underground mine with the capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground). DhirauliCoal Block has an area of 2672 hectares and is spread over 8 villages, Amdand, Amraikhoh, BasiBerdaha, Belwar, Sirswah, Jhalari, Dhirauli and Phatpani, in Sarai Tehsil of Singrauli District. The details given in tables below are abstracted from the Social Impact Assessment Report attached in Annexure for the reference.

TOTAL LAND REQUIRED UNDER THE DHIRAULI COAL BLOCK PROJECT

Sr.No.	Land Details	Area (In Hectares)	Approximate Percentage
1.	Private Land	554.01	21%
2.	Government Land	680.81	25%
3.	Reserve Forest and Revenue Forest land	1436.19	54%
Total		**2672.00**	**100%**

VILLAGE WISE LAND SCHEDULE UNDER THE DHIRAULI COAL BLOCK PROJECT

~~Sr. No.~~	~~Village~~	~~Private Land~~	~~Government Land (Hectare)~~		~~Total Land~~
			~~Revenue Land~~	~~Reserve Forest Land~~	
~~1.~~	~~Aamdandh~~	~~25.75~~	~~17.98~~	~~7.49~~	~~**51.22**~~
~~2.~~	~~Amraikhoh~~	~~45.78~~	~~64.74~~	~~2.63~~	~~**113.15**~~
~~3.~~	~~Basi Berdah~~	~~147.67~~	~~23.30~~	~~29.63~~	~~**200.80**~~
~~4.~~	~~Belwar~~	~~30.83~~	~~10.66~~	~~Nil~~	~~**41.49**~~
~~5.~~	~~Sirswah~~	~~4.90~~	~~3.82~~	~~Nil~~	~~**8.72**~~
~~6.~~	~~Jhalari~~	~~72.47~~	~~25.88~~	~~Nil~~	~~**98.35**~~
~~7.~~	~~Dhirauli~~	~~195.01~~	~~504.14~~	~~60.89~~	~~**760.04**~~
~~8.~~	~~Phatpani~~	~~31.6~~	~~31.28~~	~~Nil~~	~~**62.88**~~
		~~**504.01**~~	~~**681.80**~~	~~**100.84**~~	~~**1336.65**~~

~~Total Revenue Land(A)~~	~~1336.65~~
~~Total Reserved Forest Land(B)~~	~~1335.35~~
~~Total Land (A+B)~~	~~2672.00~~

Sl. No.	Village	Private Land	Govt. Land	Revenue Forest	Reserve Forest Land	Total Land
1	Aamdandh	25.39	18.18	7.49		**51.06**
2	Amraikhoh	41.73	69.04	2.38	214.4	**327.55**
3	Basi Berdah	151.610	49.35		537.17	**738.130**
4	Belwar	30.83	10.66			**41.49**
5	Sirswah	4.9	3.82			**8.72**
6	Dhirauli	195.01	512.71	52.32	571.6	**1331.64**
7	Jhalari	72.47	25.88			**98.35**
8	Phatpani	31.6	31.28		12.18	**75.06**
G. Total		553.540	720.92	62.19	1335.35	**2672.00**

DETAILS OF THE PROJECT AFFECTED VILLAGES IN DHIRAULI COAL BLOCK

TABLE (a) PAPs whose House is affected by the Project

Sr.No.	Name of the village	Number of Project Affected Person (PAPs)	Number of Project Affected Families
1.	Amdand	17	4
2.	Sirswah	79	27
3.	Belwar	0	0
4.	Basi Berdaha	18	7
5.	AmraiKhoh	0	0
6.	Dhirauli	13	6
7.	Jhalari	5	4
8.	Phatpani	18	9
Total		**150**	**57**

TABLE (b) PAPs whose House or land and House is affected by the Project

Sr.No.	Name of the village	Number of Project Affected Person (PAPs)	Number of Project Affected Families
9.	Amdand	223	66
10.	Sirswah	18	6
11.	Belwar	704	234
12.	Basi Berdaha	1558	483
13.	AmraiKhoh	1589	510
14.	Dhirauli	3163	1117
15.	Jhalari	882	308
16.	Phatpani	727	256
Total		**8864**	**2980**

TOTAL OF TABLE (a+b)

Grand Total	**9014**	**2980**

Dhirauli Coal Block is acquiring private land from the Eight villages of Amdand, Sirswah, Belwar, Amraikhoh, Basi Berdaha in Sarai tehsil of Singrauli district of Madhya Pradesh state. The 8 project affected villages includes 9014 Project Affected Persons (PAPs)from 2980 Project Affected Families (PAFs). The land acquired under the Dhirauli Coal Block is been acquired under the Right to Fair Compensation in Land Acquisition, Rehabilitation and Resettlement Act 2013 and Model Rehabilitation Policy 2002 has been made keeping in mind the Government of Madhya Pradesh.Rehabilitaion and Resettlement Plan has been prepared and approved by the District Collector which includes the provisions and guidelines applicable for rehabilitating the Project affected persons in the areaLegal Policy Framework and Applicable Guidelines

The definitions of various terms utilized in this policy are:

- **Acquired land** means the land acquired under Land Acquisition Act 1894 or the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 for the proposed Project.
- **Affected Area** means such area as may be notified by the Government of Madhya Pradesh under the relevant land acquisition acts for the purposes of land acquisition for the Project;
- **Affected family** means:

i. A family whose land or other immovable property has been acquired for the Project;

ii. A family which does not own any land but a member or members of such family may be agricultural labourers, tenants including any form of tenancy or holding of usufruct right, share-croppers or artisans or who may be running a commercial establishment in the Affected Area, whose primary source of livelihood stand affected by the acquisition of the land;

iii. The Scheduled Tribes and other traditional forest dwellers who have lost any of their forest rights recognized under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 due to acquisition of land;

iv. Any family whose main source of livelihood for three years prior to the acquisition of the land is dependent on forests or water bodies and includes gatherers of forest produce, hunters, fisher folk and boatmen and such livelihood is affected due to acquisition of land;

v. A member of the family who has been assigned land by the State Government or the Central Government under any of its schemes and such land is under acquisition.

vi. A family residing on any land in the affected area for preceding three years or more prior to the acquisition of the land or whose primary source of livelihood for three years prior to the acquisition of the land is affected by the acquisition of such land.

Displaced Family means any Affected Family,

- who on account of acquisition of land has to be relocated from the affected area.
- a family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land for the Project
- any tenure holder, tenant, lessee or owner of other property, who on account of acquisition of land in the affected area, has been involuntarily displaced from such land or other property.
- any agricultural or non-agricultural laborer, landless person (not having homestead land or agricultural land) rural artisan, small trader or self-employed person; who has been residing or engaged in any trade, business, occupation or vocation in the acquired land, and who has been deprived of earning his livelihood or alienated wholly or substantially from the main source

of his trade, business, occupation or vocation because of the acquisition of land in the affected area

- **Collector** means the Collector of a revenue district, and includes a Deputy Commissioner and any officer specially designated by the appropriate Government to perform the functions of a Collector under this Act;
- **Commissioner** means the Commissioner for Rehabilitation and Resettlement appointed under sub-section (1) of section 44;
- **Displaced family** means any family, who on account of acquisition of land has to be relocated and resettled from the affected area to the resettlement area;
- **Family** includes a person, his or her spouse, minor children, minor brothers and minor sister's dependent on him Provided that widows, divorcees and women deserted by families shall be considered separate families.
- Explanation-An adult of either gender with or without spouse or children or dependents shall be considered as a separate family for the purposes of this Act; (n) —holding of landǁ means the total land held by a person as an owner, occupant or tenant or otherwise;
- The Scheduled Tribes and other traditional forest dwellers, who have lost any forest rights recognised under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (2 of 2007);
- **Rehabilitation and Resettlement** means carrying out rehabilitation and resettlement as per RTFCTLARRA on rehabilitation and resettlement or under Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 or as per any other law in force as may be applicable for rehabilitation and resettlement benefits to be provided to the affected families.
- **R & R Entitlements** means the benefits awarded as per the R & R Framework given in the RTFCTLARRA and as subsequently approved by the Government of Madhya Pradesh.

Determination of market value of land by Collector-

(1) The Collector shall adopt the following criteria in assessing and determining the market value of the land, namely:

(a) the market value, if any, specified in the Indian Stamp Act, 1899 (2 of 1899) for the registration of sale deeds or agreements to sell, as the case may be, in the area, where the land is situated; or

(b) the average sale price for similar type of land situated in the nearest village or nearest vicinity area; or

(c) consented amount of compensation as agreed upon under sub-section

(2) of section 2 in case of acquisition of lands for private companies or for public private partnership projects, whichever is higher

Provided that the date for determination of market value shall be the date on which the notification has been issued under section 11.

The market value calculated as per sub-section

(3) Where the market value under sub-section (1) or sub-section (2) cannot be determined for the reason that—

(a) the land is situated in such area where the transactions in land are restricted by or under any other law for the time being in force in that area; or

(b) the registered sale deeds or agreements to sell as mentioned in clause (a) of sub-section (1) for similar land are not available for the immediately preceding three years; or

(c) the market value has not been specified under the Indian Stamp Act, 1899 (2 of 1899) by the appropriate authority, the State Government concerned shall specify the floor price or minimum price per unit area of the said land based on the price calculated in the manner specified in sub-section (1) in respect of similar types of land situated in the immediate adjoining areas

As per the section 26(b) of the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act 2013 the registered sale deeds compiled during the effective date for fixing the market value shall be submitted against the registered sale deeds of all the above villages or villages in its vicinity. The average selling rate of the market rate mentioned in the certified copy of Madhya Pradesh guideline rate in compliance of section 26(a) of Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act 2013 of both the above districts whichever is higher will be taken.

In addition, as per section 30(3) of the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act 2013, on the said market value at the rate of 12% of the market value till the date of award. According to the notification published in the Gazette of Madhya Pradesh government on 29.09.2014 100% compensation will be payable under section 31 of the coefficient (1) and Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and

Resettlement Act 2013 under section 80 on the said compensation,if the amount of compensation is not paid or deposited on or before taking possession of the land from the date of the award, the Collector from the time of taking such possession of the award till the time it is paid or deposited compensation will be paid at the rate of 9% per annum and animal along with the interest there on.

Provided that if such compensation or any part thereof from the date on which the possession is taken the same is not paid or deposited within a period of one year 15% of the amount of compensation or part thereof which has not been paid or deposited before the date of such expiry, from the date of exipry of the said period of one year 15% interest will be payable at the rate of per annum.

Determination of value of things attached to land or building.

1. The Collector in determining the market value of the building and other immovable property or assets attached to the land or building which are to be acquired, use the services of a competent engineer or any other specialist in the relevant field, as may be considered necessary by him. According to the model rehabilitation policy 2002 of Madhya Pradesh government, every displaced family will be provided with a free alternative plot of 502 square meter (90 feet x 90 feet)=5400 square feet.

(2) The Collector for the purpose of determining the value of trees and plants attached to the land acquired, use the services of experienced persons in the field of agriculture, forestry, horticulture, sericulture, or any other field, as may be considered necessary by him.

(3) The Collector for the purpose of assessing the value of the standing crops damaged during the process of land acquisition, may use the services of experienced persons in the field of agriculture as may be considered necessary by him.

THE SECOND SCHEDULE
[See sections 31(1), 38(1) and 105(3)]

ELEMENTS OF REHABILITATION AND RESETTLEMENT ENTITLEMENTS FOR ALL THE AFFECTED FAMILIES (BOTH LAND OWNERS AND THE FAMILIES WHOSE LIVELIHOOD IS PRIMARILY DEPENDENT ON LAND ACQUIRED) IN ADDITION TO THOSE PROVIDED IN THE FIRST SCHEDULE.

Sr.No.	Elements of Rehabilitation and Resettlement Entitlements	Entitlement/provision	Whether provided or not (if provided, details to be given)
1.	**Provision of housing units in case of displacement**	(1) If a house is lost in rural areas, a constructed house shall be provided as per the Indira Awas Yojana specifications. If a house is lost in urban areas, a constructed house shall be provided, which will be not less than 50sq mts in plinth area. (2) The benefits listed above shall also be extended to any affected family which is without homestead landand which has been residing in the area continuouslyfor a period of not less than three years preceding the date of notification of the affected area and which has been involuntarily displaced from such area: Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than one lakh fifty	Lump Sump amount of Rs.5,00,000 and plot of 502 square metre or a constructed house will be provided on a plot of 502 meters as per Indira awas yojana or lump sum amount of 7,00,000/-

		thousand rupees: Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house may be offered in lieu of the constructed house: Provided also that no family affected by acquisition shall be given more than one house under the provisions of this Act. *Explanation.* –The houses in urban area may, if necessary, be provided in multi-storied building complexes.	
2.	**Land for Land**	In the case of irrigation project, as far as possible and in lieu of compensation to be paid for land acquired,each affected family owning agricultural land in the affected area and whose land has been acquired or lost,or who has, as a consequence of the acquisition or loss of land, been reduced to the status of a marginal farmer or landless, shall be allotted, in the name of each person included in the records of rights with regard to the affected family, a minimum of one acre of land in the command area of the project for which the land is acquired: Provided that in every project those persons losing land and belonging to the	Not related to the Project

		Scheduled Castes or the Scheduled Tribes will be provided land equivalent to land acquired or two and a one-half acres, whichever is lower.	
3.	**Offer for Developed Land**	In case the land is acquired for urbanisation purposes, twenty per cent. of the developed land will be reservedand offered to land owning project affected families, inproportion to the area of their land acquired and at aprice equal to the cost of acquisition and the cost ofdevelopment: Provided that in case the land owning project affected family wishes to avail of this offer, an equivalent amount will be deducted from the land acquisition compensation package payable to it.	Not related to the Project
4.	**Choice of Annuity or Employment**	The appropriate Government shall ensure that the affected families are provided with the following options: (a) where jobs are created through the project, after providing suitable training and skill development in the required field, make provision for employment at a ratenot lower than the minimum wages provided for in anyother law for the time being in force, to at least onemember per affectedfamilyin	Lump sum amount of Rs. 5,00,000/-(Rupees five lakh only) per affected family or employment or job or ₹2000 per month for 20 years

		the project or arrange for a job in such other project as may be required; or (b) one time payment of five lakhs rupees per affected family; or (c) annuity policies that shall pay not less than twothousand rupees per month per family for twenty years, with appropriate indexation to the Consumer Price Index for Agricultural Labourers.	
5.	**Subsistence grant for displaced families for a period of one year**	Each affected family which is displaced from the land acquired shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. In addition to this amount, the Scheduled Castes and the Scheduled Tribes displaced from Scheduled Areasshall receive an amount equivalent to fifty thousand rupees. In case of displacement from the Scheduled Areas, asfar as possible, the affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities, language, culture and community life of the tribal communities.	Lump sum amount of Rs. 36,000/- only to displaced families and in addition to this lump sum amount of rupees 50,000/- only to the displaced families of schedule cost and schedule tribes
6.	**Transportation cost for displaced families**	Each affected family which is displaced shall get a one-time financial assistance of	Lump Sump Amount of Rs.50,000/- to the project

		fifty thousand rupees as transportation cost for shifting of the family, building materials, belongings and cattle.	Affected Families
7.	**Cattleshed/Petty shops cost**	Each affected family having cattle or having a petty shop shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty-five thousand rupees for construction of cattle shed orpettyshopasthe casemaybe.	Lump Sump Amount of Rs.25,000/- to the project Affected Families
8.	**One-time grant to artisan, small traders and certain others**	Each affected family of an artisan, small trader or self-employed person or an affected family which owned non-agricultural land or commercial, industrial or institutional structure in the affected area, and which has been involuntarily displaced from the affected area due to land acquisition,shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty-five thousand rupees.	Lump Sump Amount of Rs.50,000/- to the project Affected Families
9.	**Fishing rights**	In cases of irrigation or hydel projects, the affected families may be allowed fishing rights in the reservoirs, in such manner as may be prescribed by the appropriate	Not related to the Project

		Government.	
10.	**One-time Resettlement Allowance**	Each affected family shall be given a one-time—Resettlement Allowance of fifty thousand rupees only.	Lump Sump amount of Rs. 50,000/- to the affected families
11.	**Stamp duty and registration fee**	(1) The stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the Requiring Body.	
		(2) The land for house allotted to the affected families shall be free from all en cumbrances.	
		(3) The land or house allotted may be in the joint names of wife and husband of the affected Family	

THE THIRD SCHEDULE

[See sections 32, 38(1) and 105(3)]

PROVISION OF INFRASTRUCTURAL AMENITIES

For resettlement of populations, the following infrastructural facilities and basic minimum amenities are to be provided at the cost of the Requisitioning Authority to ensure that the resettled population in the new village or colony can secure for themselves a reasonable standard of community life and can attempt to minimise the trauma involved in displacement.

A reasonably habitable and planned settlement would have, as a minimum, the following facilities and resources, as appropriate

Serial No.	Component of infrastructure amenities provided/proposed to be provided by the acquirer of land
(1)	(2)
1.	Roads within the resettled villages and an all-weather road link to the nearest pucca road, passages and easement rights for all the resettled families be adequately arranged.
2.	Proper drainage as well as sanitation plans executed before physical resettlement.
3.	One or more assured sources of safe drinking water for each family as per the norms prescribed by the Government of India.
4.	Provision of drinking water for cattle.
5.	Grazing land as per proportion acceptable in the State.
6.	A reasonable number of Fair Price Shops.
7.	Panchayat Ghars, as appropriate.
8.	Village level Post Offices, as appropriate, with facilities for opening saving accounts.
9.	Appropriate seed-cum-fertilizer storage facility if needed.
10.	Efforts must be made to provide basic irrigation facilities to the agricultural land allocated to the resettled families if not from the irrigation project, then by developing a cooperative or under some Government scheme or special assistance.
11.	All new villages established for resettlement of the displaced persons shall be provided with suitable transport facility which must include public transport facilities through local bus services with the nearby growth centres/urban localities.
12.	Burial or cremation ground, depending on the caste- communities at the site and their practices.
13.	Facilities for sanitation, including individual toilet points.
14.	Individual single electric connections (or connection through non-conventional sources of energy like solar energy), for each household and

	for public lighting.
15.	Anganwadi's providing child and mother supplemental nutritional services.
16.	School as per the provisions of the Right of Children to Free and Compulsory Education Act, 2009 (35 of 2009);
17.	Sub-health centre within two kilometres range.
18.	Primary Health Centre as prescribed by the Government of India.
19.	Playground for children.
20.	One community centre for every hundred families.
21.	Places of worship and chowpal/tree platform for every fifty families for community assembly, of numbers and dimensions consonant with the affected area.
22.	Separate land must be earmarked for traditional tribal institutions.
23.	The forest dweller families must be provided, where possible, with their forest rights on non-timber forest produce and common property resources, if available close to the new place of settlement and, in case any such family can continue their access or entry to such forest or common property in the area close to the place of eviction, they must continue to enjoy their earlier rights to the aforesaid sources of livelihood.
24.	Appropriate security arrangements must be provided for the settlement, if needed.
25.	Veterinary service centre as per norms.

NOTE. – Details of each component of infrastructural amenities mentioned under column (2) against serial numbers 1 to 25 should be indicated by the acquirer of land under column (3).

3.7.11.2 District Mineral Foundation (DMF) Schemes

In order to ensure the parcipation of the Mine Holders for the interests and welfare of the area and individuals affected by mining operations, the Government of India created provisions under Section 9B of the 'Mine and Minerals Development and Regulation (Amendment) Act, (MMDRA) 2015'5 for the establishment of District Mineral Foundation (DMF). DMF is a non-profit statutory 'Trust' for each and every district affected by mining-related operations.

The main objective of DMF is to protect the interest of communities and benefit the people in those areas. It is evident that for years, mining has benefitted mining companies, individual miners and governments, not the communities living there.
Because of mining, people are displaced from their land and suffer other negative consequences like loss of livelihood, health risks due to extreme pollution of environment and lack of provision of basic facilities. The mining Institute Trust will use grant amount received to the given overall requirements in the area affected by mining operations such as Health, Education, environment and Sanitation etc. and the local community will develop an attachment towards mining.

YEAR	2015-16	2016-17	2017-18	2018-19
COAL	4.9	698.8	348.1	296.5
Non -Coal	NIL	NIL	NIL	2.1
TOTAL	4.9	698.8	348.1	298.6

Source: Government of Madhya Pradesh, Department of Mineral Resources

3.7.12 Activities Taken Under Environmental Protection and Pollution Control Measures from DMF (Singrauli District)

Drinking WaterFacility

- Rs.12.27 crores spent on 1468Handpumps
- Rs. 9.75 Crores sanctioned for 8 Pipeline Water Supply Schemes benefitting 1.25 lakhpersons.

Environment

- Rs. 15.20 crores for plantation of 7.65 lakhs trees over 530 Hectares.

HealthCare

- Rs 21.41 crores for extension and strengthening of health infrastructure as per IPHS (Indian Public Health Standard) norms.
- Rs. 19.55 crores allocated for procurement of equipments resulting increase in improvement in health outcomes.

Education

- Rs. 78.26 crores spent on development of school infrastructure- Repair and construction of school buildings, boundary walls for schools
- Dual Desks for students in 100% Middle Schools, High Schools
- Building as Learning Aid works as per parameters of Niti Ayog
- “Shiksha Sarathi” project initiated for providing eligible teachers in zero teachers schools. Increase in enrolment, attendance and learning outcomes.

Welfare of Aged and Disabled People

- Rs. 5.50 crores worth distribution of artificial equipments to 6431Disabled and 4400 old age beneficiaries.
- Rs. 2.90 crores spent on construction of 851 ramps. Ministry of Social Justice and Empowerment, GoI recognised the efforts by delivering National Award, 2018 for the “Outstanding Work in Creation of Barrier–Free Environment for Persons with Disabilities” to the district.
- Skill Development: - Rs. 1.15 crores was spent on skill developmenttraining along with employment assistance.

Physical Infrastructure

- Rs. 233.15 crores allocated for physical infrastructure in District Singrauli.
- 6 major projects of road construction of about 51.64 Kms are going to complete soon with expenditure amount Rs. 57.80 crores
- 91 projects of bridge construction with expenditure amount Rs.
- 18.21 crores facilitating millions in district to reach Health Institutes, Schools Colleges and AanganbadiCenters
- Roads leading to Increase in Antenatal Check-ups of pregnant women, Institutional Deliveries, Immunization, aid in extension of Supplementary Nutrition program under ICDS and lower IMR, MMR along with decrease in number of mall-nourished, underweight and stunted children.





Infrastructure Development







Education Facality

Skill Development

Figure 3.35: Photographs of activities undertaken under the district mineral funds in singrauli region

3.9.9.1 Environment Preservation and Pollution Control

- Effluent treatment plants, Prevention of pollution on nearby water bodies and other water sources in the region.
- Measures for control of air pollution caused by mining operations and from dumps.

- Prevention of pollution from Surface run-off from mines, waste dumps etc.
- Prevention of pollution from Mine drainage.
- Rehabilatation of abandoned mines.
- Other air, water & surface land pollution control mechanisms required for environment-friendly and sustainable mine development.

3.9.9.2 Health Care

- Focus is on creation of primary / secondary health care facilities in the affected areas.
- Emphasis on the creation of the health care infrastructure.
- Provision of necessary staffing,
- Equipment and supplies required for making such facilities effective.

3.9.9.3 Education

- Construction of educational institutes
- Vocational training centres,
- Additional class rooms, laboratories, libraries, Art and crafts room,
- Toilet blocks,
- Drinking water provisions
- Residential Hostels for students/teachers in remote areas
- Sports infrastructure
- Engagement of teachers/other supporting staff, e-learning setup
- Arrangement of transport facilities for students (bus/van/cycles/rickshaws etc.) and nutrition related programs.

3.9.9.4 Agriculture and Allied Activities

- Development of activities related to agriculture & allied activities and agro forestry.
- Assistance to farmers through provision of seed mini kits,
- Financial assistance for agricultural implements and micro irrigation facilities including drip irrigation
- Financial assistance for bore wells and pumps energisation.
- Assistance to farmers for allied activities of agriculture such as dairy, poultry, fisheries agro forestry etc.

4. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

4.1 Introduction

Environmental impact in the study area is any alteration of environmental conditions or creation of new set of environmental conditions, adverse or beneficial, caused or induced by the impact of project. Prediction involving identification and assessment of potential impacts of the project on surrounding environment is a significant component of EIA studies. As per the interpretations of **Chapter 2** and **Chapter 3,** the proposed project is for mining of coal with production capacity of 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground). Dhirauli Coal Block in Singrauli Coalfield has been allocated to M/s Stratatech Mineral Resource Private Limited (SMRPL) vide Letter No. NA-104/7/2020-NA dated 03.03.2021 by Ministry of Coal, Government of India. The Block has been auctioned under commercial coal block.

All components of the environment were considered and wherever possible impacts were evaluated in quantitative/qualitative terms. Several scientific methods are available to qualify and predict the impact of project on environmental attributes such as water, air, noise, land, ecological and socio-economic. Such predictions are superimposed, over baseline environmental status to derive post project scenario of the environmental conditions.

The resultant (post-project) quality of environmental parameters is reviewed with respect to the permissible limits. Based on the impacts thus predicted, preventive and mitigation measures were formulated and incorporated in the environmental management plan to minimize adverse impacts on environmental quality during and after the project execution.

Construction and operation phase of the project comprises of various activities, each of which will have an impact on some or other environmental parameters. Activates during construction and operational phase have been studied to estimate the impacts on environment. The impacts have been predicted for the proposed project assuming that the pollution due to the existing activities has already been covered under baseline environmental data.

4.2 Identification & characterization of impacts

The wastes and pollutants generated due to various activities of the project may cause impacts on different environmental attributes. The major project activities and the anticipated environmental impacts due to the proposed project are discussed below, under the following categories:

- Impacts due to project location
- Impacts due to project design
- Impacts during construction
- Impacts during operation

4.2.1 Impacts due to Project Location

Mining is a site-specific project. The proposed project shall be carried out within the mining lease area of 2672 Hectares. No additional land shall be required for the project.

4.2.2 Impacts due to Project Design

Following facilities have been proposed which will have impact on the environment:

- Open cast cum Underground mine with 6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground) production capacity over ML area 2672Ha.
- Setting up of Coal Handling Plant with 850 TPH rated capacity and 935 TPH design, keeping the peak production capacity in mind.

4.2.3 Impact during Construction

Construction activity includes foundation works, fabrication and erection of Coal Handling Plant. The impact on the environment will be low as all fronts for construction shall not be opened at a time. The major activities during construction phase are given below:

4.2.3.1 Project Activities

1. Earth Work
2. Civil works
3. Fabrication
4. Vehicular movement
5. Loading and unloading of construction items and plant machineries
6. Storage of construction items & plant machineries
7. Erection & Installation of structures and machineries
8. Maintenance of construction machinery
9. Power supply
10. Utilisation / Disposal of removed earth / Construction waste

4.2.4 Impact during Operation Phase

The major activities at Dhirauli Coal Mine in the operational phase involve drilling, blasting, excavation, dumping, backfilling, loading, transportation, CHP etc. These activities may affect the environment in varying degrees through natural resources depletion viz. water consumption, release of pollutants (particulates and gaseous emissions), run-off from waste dump areas etc. Air, water, and noise environment may be affected due to these activities. Associated activities, e.g., transportation of

materials, operations of HEMM and canteen etc., may also affect air, water, and noise environment. Greenbelt development will have a positive impact not only on flora and fauna but also on the air quality, noise, and soil. Positive impacts on socio-economic environment are expected due to employment, infrastructure development and due to developmental activities will be taken up by the project management. The major project activities and the affected environmental parameters are given below:

4.2.4.1 Project Activities

1. Drilling, blasting, excavation, processing of coal.
2. Disposal of Over burden
3. Transportation of materials (coal and OB) and personnel.
4. Water Usage
5. Waste dump management.
6. Wastewater management
7. Maintenance of HEMM and Plant

4.2.4.2 Pollution Sources

1. Air pollution due to drilling, blasting, excavation, loading, unloading of Coal and OB,
2. Noise & Vibration during blasting
3. Haul road emissions (fugitive dust) during transportation within Mine
4. Gaseous emissions during transportation of coal to the end use plant
5. Water pollution from Waste dump
6. Wastewater and solid waste generation from CHP
7. Water pollution from HEMM workshop

4.2.4.3 Affected Environmental Parameters

1. Air quality
2. Water quality and resource
3. Noise quality and Vibration
4. Soil quality
5. Biological environment
6. Socio-economic conditions

4.3 Impact Matrix

Environmental impacts could be positive or negative, direct, or indirect, local or regional and also reversible or irreversible. The primary function of an environment impact assessment study is to predict and quantify the magnitude of these impacts, evaluate, and assess the importance of the identified changes, present information and monitor actual changes. The activities of the proposed project are studied. The impacts of various activities of the proposed project is identified and presented as

matrix in **Table 4.1.** Further the characteristics of these impacts have been evaluated and they are presented as matrix in **Table- 4.2 & 4.3**

Table 4.1: Impact Identification Matrix

Aspects Impacted Attributes	Construction phase				Mining, Storage and handling and allied activity (Operation phase)							Post Operation		
	Storage of Raw materials	Ready-mix concrete preparation	Transportation of raw materials	Construction activities	Site Clearance	Operation Open Cast-	Back Filling of Mine	Transportation Mineral	Coal Handling Plant	Generation of wastewater	Development Greenbelt	Development of Green belt	(Buffer) Urbanization	Industrialization
Ambient Air	•	•	•	•	•	•	*	•	•	-	*	*	*	*
Water Resource	•	•	-	•	-	•	-	-	-	•	-	*	-	-
Water Quality	•	•	-	•	-	•	-	-	*	-	-	-	-	-
Ambient Noise	-	•	•	•	-	•	•	•	•	-	-	*	-	-
Flora and Fauna	-	-	•	•	•	•	*	-	-	-	*	*	-	-
Soil and Land-use	•	•	•	•	•	•	*	-	*	-	*	*	-	-
Infrastructure	-	-	-	-	•	•	-	-	-	-	-	-	-	-
Traffic	-	-	•	-	-	-	-	*	•	-	-	-	-	•
Health & Safety	•	•	•	•	-	•	-	-	*	-	*	*	-	*
Socio-economic	-	-	-	*	*	*	-	-	-	-	*	*	*	*

• *Adverse Impact * Beneficial Impacts.*

Table 4.2: Environmental Impacts during Construction Phase

Activity	Environmental attributes	Cause	Impact characteristics			
			Nature	Duration	Reversibility	Significance, Mitigative measures
Construction of CHP and other infrastructure	Air Pollution (Dust)	Excavation of the area, cutting, CHP, etc.	Negative	Short Term	Reversible	Significant- Water sprinkling at specific locations and Personnel Protective Equipment (PPE) shall be used. Greenbelt will be developed for mitigating the air pollution.
	Noise Pollution	Movement of HEMM	Negative	Short Term	Reversible	Significant- Acoustic enclosures will be provided in all HEMM and proper maintenance of machineries.
	Land use	Change in land use due to excavation.	Negative	Long Term	Reversible	Significant- Reclamation of the area will be done by plantation on the land at the end of mine.
	Water Pollution	Potential for seepage from the waste storage area.	Negative	Short Term	Reversible	Significant- Proper care of the storage area shall be taken. Temporary check dam along temporary storage area shall be made, if required.
Site clearing	Air Pollution (Dust)	Conversion of forest land to mining area	Negative	Long Term	Reversible	Significant- There will be afforestation in safety zone, greenbelt along infrastructure as well as gap plantation within Mine lease area.

Activity	Environmental attributes	Cause	Impact characteristics			
			Nature	Duration	Reversibility	Significance, Mitigative measures
	Noise Pollution	Noise generation from earth moving equipment	Negative	Short Term	Reversible	Insignificant- Acoustic enclosures will be provided in all HEMM and proper maintenance of machineries. Personnel Protective Equipment (PPE) shall be used.
	Land use	Change of Land use	Negative	Long Term	Irreversible	Significant- After mining the excavated area will be reclaimed and afforested.
	Ecology	Removal of vegetation and loss of flora & fauna	Negative	Long Term	Reversible	Significant- After mining the excavated area will be reclaimed and afforested and conservation of flora and fauna will be a part of Biodiversity management plan.
Transportation of scrap/spares/ waste material/ construction material	Air Pollution (Dust & Gases)	Transportation of scrap / waste material by trucks	Negative	Short Term	Reversible	Insignificant- Regular emission checks shall be performed. Raw materials will be transported, covered with tarpaulin.
	Noise Pollution	Noise generated from loading / unloading and movement of vehicles	Negative	Short Term	Reversible	Insignificant- Regular vehicle maintenance shall be done. PPE shall be provided.
Construction activities	Air Pollution (Dust & Gases)	Operation of construction machinery, welding & others	Negative	Short Term	Reversible	Significant- Water sprinkling will be done to suppress the air pollutants PPE shall be provided to workers.

Activity	Environmental attributes	Cause	Impact characteristics			
			Nature	Duration	Reversibility	Significance, Mitigative measures
	Noise Pollution	Generation from construction activities	Negative	Short Term	Reversible	Significant- Regular maintenance will be carried out for the machineries used PPE shall be provided to workers
	Land use	Storage of spares/ materials	Negative	Short Term	Reversible	Significant- Storage of materials is temporary and during construction period only
	Ecology	Loss of vegetation	Negative	Short Term	Reversible	Insignificant, No cutting of trees. Green belt development is envisaged.
Disposal of scrap / waste material	Air Pollution (Dust & Gases)	Due to movement of Vehicles and loading / unloading of material	Negative	Short Term	Reversible	Significant- PUC certified vehicles will be utilized, and material will be covered by Tarpaulin sheets.
	Noise Pollution	Due to movement of Vehicles and loading / unloading of material	Negative	Short Term	Reversible	Insignificant- Regular vehicle maintenance and pollution check shall be done.
Development of Road	Air Pollution (Dust & Gases)	Due to development of road Cutting of trees to construct the widening of road	Negative	Short Term	Reversible	Significant- Trees will be planted along the road and water sprinkling will be done during construction phase.
	Noise Pollution	Due to movement of HEMM	Negative	Short Term	Reversible	Insignificant- Regular vehicle maintenance and pollution check shall be done.

Activity	Environmental attributes	Cause	Impact characteristics			
			Nature	Duration	Reversibility	Significance, Mitigative measures
	Solid waste	Due to widening road	Negative	Short Term	Reversible	Significant- The solid waste generated from widening of road will be handled as per the waste management rule
	Ecology	Tree cutting and loss of flora fauna	Negative	Long Term	Reversible	Significant Plantation will be done along both sides of road.
	Land Use	Due to widening of road	Negative	Long Term	Irreversible	Significant- construction of road would be designed to minimize the cutting and filling of earth. Land clearing at sit will be kept to the absolute minimum practicable. Construction debris will be managed properly.

Table 4.3: Environmental Impacts During Operation Phase

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
Coal Mining				
Excavation	Excavation of area by Drilling, blasting and surface miner	Air Pollution	Significant	Dust curtains will be installed on drill rigs. Water injector will be used on drill rigs to minimize dust emission. Blast will only be conducted when meteorological conditions are favourable. Thick green belt will be developed.
	Mine runoff, Sumps	Water Pollution	Significant	Garland drains will be constructed to collect the runoff water. Pumped out mine water from the quarry sump(s) will be discharged to series of sedimentation ponds for settling of suspended solids.
	Due to Drilling, blasting and surface miner	Noise Pollution	Significant	Provision and maintenance of thick tree belts Proper maintenance of noise generating machinery including the transport vehicles. Provision of protective devices like earmuffs/ear plugs to workers. Confining the noise by isolating the source of noise
	Excavation of Coal	Land use	Significant	Land will be covered with plantation after backfilling and stabilisation after due technical and biological reclamation.

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
Drilling	Generation of dust	Air pollution	Significant	Drills will have dust extractors. Presently Blast- hole Drill manufacturers have provided for wet drilling arrangement.
	Generation of Gaseous emissions	Air pollution (SO_2/NOx/CO)	Insignificant	Regular maintenance of Drilling M/c to reduce gaseous emissions.
	Generation of Noise	Noise Pollution	Insignificant	Operator Cabin is enclosed. Earmuff shall also be provided to the operator. Confining the noise by isolating the source of noise. Reducing the exposure time of workers to the higher noise levels.
Blasting	Dust generation	Air pollution	Significant	Controlled blasting with proper burden, spacing, safe charge and adequate stemming shall be done. Nonelectric (NONEL) initiation system shall be used.
	Gaseous emission	Air pollution NOx / CO	Insignificant	Slurry explosive will be used
	Vibration & Air blast	Damage to nearby structures & buildings	Significant	Safe explosive charge will be decided based on Vibration study
	Fly rock generation	Potential for accidents (damage to equipment etc.)	Significant	Blasting Shelters have been provided Warning Signal have been placed Danger Zone shall be marked with Red Flag

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
Excavation	Dust generation	Air pollution	Insignificant	Operators are in closed cabins of HEMM. Dust mask shall be provided
	Gaseous emission	Air pollution SO_2/NOx/CO/HC	Insignificant	Proper maintenance of Excavators, Dumpers / Tippers shall be done
	Noise generation	Noise pollution	Insignificant	Insignificant. No action needed. PPE shall be provided
Dozing of Coal and OB	Dust generation	Air pollution	Insignificant	Operators are in closed cabins of Dozer. Dust mask shall be provided
	Gaseous emission	Air pollution SO_2/NO_x/CO/HC	Insignificant	Proper maintenance of Dozer shall be done to keep emissions low.
	Noise generation	Noise pollution	Insignificant	Insignificant. No action needed. PPE shall be provided
Transportation of Coal	Dust generation	Air pollution	Significant	Water sprinkling is being done on haul road
	Gaseous emission	Air pollution SO_2/NOx/CO/HC	Insignificant	Regular maintenance of Dumper / Tippers to keep emissions under control
Transportation of waste-to-Waste Dump or for Backfilling	Dust generation	Air pollution	Significant	Water sprinkling is being done on haul road
	Gaseous emission	Air pollution SO_2/NOx/HC	Insignificant	Regular maintenance of Dumper / Tippers to keep emissions under control
Grading of Haul Road	Dust generation	Air pollution SPM/RPM	Insignificant	Operators are in closed cabins of Grader. Dust mask shall be provided
	Gaseous emission	Air pollution SO_2/NOx/CO	Insignificant	Proper maintenance of Grader shall be done to keep emissions low.

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
	Noise generation	Noise pollution	Insignificant	Insignificant. No action needed. PPE shall be provided
HEMM Workshop				
HEMM and Workshop	Generation of dust	Air Pollution	Significant	PUC certification of HEMM will be provided. Greenbelt will be developed around the workshop to suppress the air pollution from workshop
	Operation of CHP	Water Pollution	Significant	The wastewater will be treated in Effluent Treatment Plant.
	Due to operation of HEMM	Noise Pollution	Significant	Dampers and springs will be provided at strategic locations in HEMM for control of noise and vibration. HEMM with Acoustic Enclosures will be used in the mining area.
	Decommissioning of HEMM and Dismantling of workshop	Solid waste generation	Significant	The equipment including HEMM deployed by MDO will be taken back by the MDO. Scrap and other waste from dismantling of workshop will be disposed of as per standard guidelines.
DG Set				
DG Set	Flue gas emission, used oil generation	Air Pollution	Insignificant	The DG will be operated in case of power failure only. Green DG sets shall be installed
	Generation of noise during DG Set operation	Noise Pollution	Significant	The DG Sets will have acoustic enclosure to minimize the noise.

Activity	Environmental Aspects	Impact	Impact characteristics	
			Significance	Mitigative measures
				The sewage will be treated in septic tank.
Domestic Use				
Operation of domestic utilities	Washroom, toilets – Wastewater generation	Water Pollution	Operation of domestic utilities	The sewage will be treated in septic tank.
Green Belt Development				
Development and maintenance of Green Belt	Plantation of trees within premises. to cover 33% of the area	Reduction in Air Pollution and Noise Pollution	Insignificant	Positive Impact due to development of a proper green belt along the periphery of the premises. This will act as barrier for air emission and noise Mine area will be afforested after the end of mine life.
	Noise Pollution	Noise Pollution	Significant	DG set installed in separate room
Socio-economic Development				
Employment Generation	Operation of mine	Socio-economic		Positive Impact due to direct employment of persons from the nearby area
				Substantial benefits in the form of contracts to local agencies for different services.
				Employment generation in transport sector for transportation of material.
Rehabilitation and Resettlement	Villages coming under the mining area	Rehabilitation and Resettlement	Significant	Compensation and Resettlement will be provided to project effected families as per approved R&R pl.

4.4 Impacts during construction phase

4.4.1 Impact on Land use

The proposed project will be carried out within the mining lease area of 2672 Ha. No additional land shall be required for the project. Considering the land required for the proposed project is already in possession, no major change in land use is envisaged.

Forest application for diversion of 1436.19 ha (Protected Forest Land –1335.35 ha Revenue Forest land: 100.84 ha.) of forest land submitted, vide proposal no. **FP/MP/MIN/142344/2021** dated 8th June 2021. During scrutiny and updation of land records at the time of notification of Section 19 of - Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. It has been observed that there are changes in revenue forest records. Now the updated forest area is 1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19) and 1274.46 ha of non-forest land.The same has been revised in Part II of Form A of forest application under Forest Conservation Act 1980 and its subsequent amendments.

4.4.2 Impact on Topsoil

Topsoil is proposed to be removed separately and dumped outside the quarry in a manner so as not to lose its fertility. The topsoil would be spread over the reclaimed land, afterward.

Topsoil will be stored for initial four years and during subsequent years it will be directly spread over the reclaimed area.

4.4.3 Impact on Air Quality

During construction phase, dust is expected to be the main pollutant, which is associated with general construction activity including excavation, levelling, and material handling. In this case, pollution emission sources are distributed throughout the project site and shall fall under the category of area source. Concentration of SO_2, NO_X and CO may slightly increase due to the increased vehicular traffic. The impact of such activities would be temporary and restricted to the constructed phase only. The impact will be confined within the project boundary. In good order to minimize the dust pollution due to vehicular traffic, proper upkeep, and maintenance of vehicles, sprinkling of water on haul roads & construction site and providing sufficient vegetation all-around, are some of the measures that would greatly reduce the impacts during the construction phase. With the emission factor and the phased way construction activity is to be carried out, it is likely that increase in dust levels due to construction would mainly be confined to the project site. Thus, it is inferred that minor negative impact within a few 100 meters from the source within the site

would occur on the ambient air quality under the worst conditions, which are mitigated by implementing environmental management plan. However, no significant impacts are expected on the overall ambient air quality due to construction activities, at the sensitive receptors outside the mining lease.

4.4.4 Impact on Water Resources and Quality

4.4.4.1 Water Resource

The construction will be more related to mechanical fabrication, assembly, and erection; hence the water requirement will be minimal during construction phase. The construction water requirement will be met from the ground water. PP has obtained the NOC from Central Ground Water Authority (CGWA) vide NOC no CGWA/NOC/MIN/ORIG/2022/15765 which is valid from 15.06.2022 to 14.06.2024 copy is attached as **Annexure VI**. Mine Sump is planned for storage and recycling of mine pit water for using again in the mine.

4.4.4.2 Impact on Water Quality

Construction activities for the proposed development can have minor impact on hydrology and ground water quality of the area if the construction waste leaches into the ground water source. Potential sources of impacts on the hydrology and groundwater quality during the construction phase are as follows:

- Soil runoff from the site leading to off-site contamination (particularly during rainy season).
- Improper disposal of construction debris leading to off-site contamination of water resources.
- Spillage of oil and grease from the vehicles and wastewater generated on site activities such as vehicles washing, workshop etc.

Following precautions and preventive measure will be taken at the site during construction to avoid any ground and surface water contamination.

- Not allowing water to discharge outside the construction site.
- Disposal of construction debris in approved areas.
- Construction of storm water diversion channels to divert storm run-off from flowing over the construction areas.
- Installing oil and grease traps in construction workshop.
- Due to civil construction activities, during rainy season the surface runoff may contain more of eroded soil and other loose matter. As far as possible, construction activities will be avoided during rainy days to mitigate the small impacts on soil/water quality caused due to construction activity.
- With segregation of construction area with proper drainages contamination of water due to soil erosion shall be prevented.

The earth work includes cutting and filling will be avoided during rainy season and will be completed during the winter and summer seasons. Stone pitching on the slopes and construction of concrete drains for storm water to minimize soil erosion in the area will be undertaken. Toilets with septic tanks shall be made available at site for construction workers. The overall impacts on water environment during construction phase due to proposed activity shall be temporary and marginal.

4.4.5 Impact on Noise Levels

Construction Phase

The areas affected are those close to the site. At the peak of the construction, marginal increase in noise levels is expected to occur but they are temporary. During the construction phase, noise generated from various construction activities are listed below:

- Movement of vehicles carrying materials and loading & unloading activities.
- Excavation machines, concrete mixer and other construction machines including pneumatic tools and compressors.
- Operation of DG sets.
- Concreting, hammering.
- Mechanical operations, like, drilling, fitting, etc.

All the above-mentioned sources will be intermittent and would be experienced occasionally. It may also be noted that, most of the construction activities will be carried out only during the daytime. The expected noise levels from these activities are as per given here under **(Table 4.4)**:

Table 4.4: Noise levels of construction equipment

Description	*Noise Levels dB(A)	Combined Effective Noise levels dB(A)	Combined Effective Noise levels dB(A) (With the EMP implementation)
Earth Movers			
Front End Loaders	85	89	79
Tractors	84		
Scrapers, Graders	85		
Material Handlers			
Concrete mixers	85	91	82
Cranes (movable)	83		
Trucks	88		
Stationary Equipment			

Description	*Noise Levels dB(A)	Combined Effective Noise levels dB(A)	Combined Effective Noise levels dB(A) (With the EMP implementation)
Pumps	76	84	75
Generators	81		
Compressors	80		
Total		**94**	**84**

Source: FHWA (Construction noise handbook)

The resultant maximum noise level for the above sources as calculated using combined equivalent noise equation (http://noisetools.net/noisecalculator) is **94 dB(A)** at source. This result is calculated considering that all the construction machineries are operated at once. Sound pressure level generated by construction activities decreases with increasing distance from the source due to wave divergence. An additional decrease in sound pressure level from the source is expected due to atmospheric effect or its interaction with objects in the transmission path **(Table 4.5)**.

The Noise levels when calculated considering the EMP implementation and green belt attenuation during construction phase is observed to be 84 dB(A).

Sound from an ideal point source (i.e., non-directional source) will spread out spherically and sound pressure levels would decrease 6 dB for each doubling of distance from the source (OSHA Technical Manual). So, the Noise levels will be negligible beyond the boundary of the mine site.

The noise produced during construction phase will have temporary impact on the existing ambient noise levels at the project site but restricted to small distance.

Table 4.5: Noise Dispersion in Ambient Air w.r.t Distance

Noise Level dB(A)	Distance (m)
84	1
78	2
72	4
66	8
60	16
54	32

From the above table it can be concluded that noise will be confined within the mine boundary and will have negligible impact during construction phase.

4.4.5.1 Mitigation Measures

- Selection of low noise generating machinery/equipment.
- Engineering specifications shall be stipulated during tendering as a condition to maintain noise level equal to or less than 85 dB (A) at 1 m from each source.

- Provision of rubber padding/noise isolators/silencers to modulate the noise generated by machinery/equipment, wherever possible.
- Provision of protective devices like earmuff/ plugs for the workers.
- Preventive maintenance of machinery/equipment and vehicles.
- The high noise zones at site will be properly mark, information on noise, the risks of exposure to noise and the appropriate control measures shall be displayed at the workplace.
- Information on noise, the risks of exposure to noise and the appropriate control measures shall be displayed at the workplace.
- Appropriate training and education will be given to the workers.
- Regular monitoring of ambient noise level as per monitoring plan shall be carried out.

The peak noise levels from continuous construction activity with implementation of EMP may be about 84 dB (A). Since the nearest habitation is 0.5 km away from the proposed mine site, the noise levels are considered to have insignificant impact. Overall, the impact of noise generated on the environment is likely to be insignificant and localized in nature and mainly confined to the day hours.

4.4.6 Impact on Ecology

Construction activities at the site involving human and vehicular movement will disturb aerial and wild animals in the area. Terrestrial micro flora and fauna at the site are also affected. However, the adverse effect is reduced by shortening the construction phase period and development of greenery along the plant boundary. Further, there are no sensitive locations within the study area. Also, construction work will be undertaken in phases *i.e.,* all the fronts will not be opened at a time. Construction work will be done only during daytime. No endangered flora and fauna species are present in the mine area. Hence no impact is envisaged on biological environment due to the proposed project.

4.4.7 Demography and Socio-Economics

The construction phase induces employment opportunities for the local people. Up to 100 persons are likely to be employed during peak construction phase. In addition to the opportunity of getting employment in construction work, the local population would also have employment opportunities in related activities like small commercial establishments, small contracts, and supply of construction materials etc. The dwelling of construction workers at the site may cause sanitation and other problems. As the villages are nearby and staying facilities are readily available in these villages, the construction workers may not be required to stay at the project site. Safety and health care of workers is also an important factor to be considered during construction phase. Hazards expected are electrocution, vehicular accident, fall of personnel from overhead works, high level noise due to construction

machinery, cantering failure and exposure of eyes to dust and welding rays. Constructional and occupational safety measures will be adopted during construction phase of the industry.

4.5 Impacts during operational phase

The proposed mine is opencast and underground, which will involve drilling, blasting, excavation of coal and transportation to the Coal Handling plants within the mining lease and transportation Coal to the end use plant commercial purpose. the activities related to the operational phase will have varying impacts on the environment and are considered for impact assessment.

4.5.1 Impact on Land Use

The proposed opencast Cum underground mine will result in disturbance of the land use pattern of the ML area. The land degradation is expected during mining activities like excavation of mineral overburden dumps, soil extraction etc.

4.5.1.1 Land-use Alteration

As indicated earlier in **Chapter 3,** the mine lease area of Dhirauli coal mine is 2672 ha, comprising of 1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19) and 1274.46 ha of non-forest land. Activity wise land utilization under various land categories is given in below **Table 4.6**:

Table 4.6: Pre-Mining Land Use Plan

Ownership	Type of Land	Area, (Ha)
Tenancy Land	Agricultural	553.54
	Township	
Sub Total		**553.54**
Govt Non-Forest Land	Grazing	720.92
	Barren (Road)	
	Water bodies	
	Other	
Sub Total		**720.92**
Forest Land	Protected Forest land	1335.35
	Rev Forest (CJBJ)	62.19
Free hold		
Sub Total		**1397.54**
Grand Total		**2672.00**

Table 4.7: Post Mining Land-use

Mining Activity	Proposed Land Use Area (Ha)	Land Use (End of Life) Area	Agriculture Land	Plantation	Water Body	Public Use	Forest land (Returned)	Undisturbed	Total
Excavation Area	2,096.59	2,096.59	-	1,843.03		-	1943.03	-	1843.03
Backfilled Area (In Excavation Area	1,796.23	1,796.23	-	1,843.03	-	-	18743.03	-	1843.03
Excavated Void (in Excavation Area)	300.36	300.36	-	-	253.56	-	-	-	253.56
Topsoil Dump	35.34 (Up to 5th Year)	35.34 (Up to 5th Year)	-	-	-	-	-	-	0.00
External Dump	387.55	387.55	-	387.55	-	-	387	-	387.55
Safety Zone	19.73	19.73	-	19.73	-	-	19.73	-	19.73
Haul Road between quarries	-	-	-	-	-	-	-	-	0.00
Road diversion	4.13	4.13	-	-	-	4.13	-	-	4.13
Settling pond	2.20	2.20	-	-	2.20	-	-	-	2.20
Road & Infrastructure area	20.80	20.80	-	20.80	-	-	20.80	-	20.80
CHP & Washery	8.10	8.10	-	8.10	-	-	8.10	-	8.10
Coal Evacuation Route & Approach Road	1.15	1.15	-	1.15	-	-	1.15	-	1.15
Garland drains	5.34	5.34	-	5.34	-	-	5.34	-	5.34
Embankment	7.50	7.50	-	7.50	-	-	7.50	-	7.50
Green Belt	46.80	46.80	-	46.80	-	-	46.80	-	46.80

Water Reservoir	-	-	-	-	-	-	-	-	0.00-
Rationalization area	72.11	72.11	-	72.11	-	-	72.11	-	72.11
Total (exclude back filled void & Topsoil area)	**2672.00**	**2672.00**	**-**	**2412.11**	**255.76**	**4.13**	**2412.11**	**-**	**2672.00**

Source: Approved Review of Mining Plan, Dhirauli coal mine

It can be seen from the above **Table 4.7,** the proposed project will be carried out on a virgin land. At the end of mining activity, the land use of the area will be changed. The excavated mining area will be partly backfilled from the existing waste dumps prevailing over the lease at that time to restore the natural profile. The backfilling will be properly graded & terraced and will be biologically reclaimed by plantation.

4.5.2 Slope Study of the Area

it will be ensured that the mine including its method of working, ultimate pit slope, dump slope and monitoring of slope stability has been planned, designed, and worked as determined by a scientific study, and a copy of the report of such study, shall be kept available in office of the mine.

4.5.3 Impact on Air Quality

The opencast cum underground coal mining operation will generate high levels of Particulate Matters (PM) and limited SO_2, NO_x, and CO operation of mining equipment etc. Impacts on air quality due to the project depend on the quantum of mineral extraction, processing in respective plants and transportation. The Increase in excavation from the mine may further increase the work-zone dust levels, in absence of any dust control measures.

4.5.3.1 Emission from Area Sources (Fugitive Emissions)

Fugitive emissions are expected from following sources: Drilling, Blasting

4.5.3.2 Air Pollution Impact Prediction through Dispersion Modelling

The emissions will be mainly Particulate Matter (PM)

Details of Mathematical Modelling

The Gaussian Dispersion Modeling (GDM) is used for prediction of dispersion of air emission and the computation of Ground Level Concentration (GLC) up to a specified distance from source. The fundamental model is given below:

$$c(x,y,z) = \frac{Q}{2\pi\sigma_y\sigma_z u}\exp\left(\frac{-y^2}{2\sigma_y^2}\right)\left(\exp\left(\frac{-(z-h)^2}{2\sigma_z^2}\right)+\exp\left(\frac{-(z+h)^2}{2\sigma_z^2}\right)\right)$$

Where c is a concentration at a given position, Q is the source term, x is the downwind, y is the crosswind and z is the vertical direction and u is the wind speed at the h height of the release. The σy, σz deviations describe the crosswind and vertical mixing of the pollutant. The above equation describes a mixing process that results in a Gaussian concentration distribution both in crosswind and in vertical direction, centered at the line downwind from the source. Gravitational settling and chemical or radioactive decays are neglected.

The model computes the pollutant concentration dispersed in microgram per cubic meter for any point source with the location coordinated x, y and z.

Approach & Methodology

The "Gaussian Dispersion Model" version formed the basic framework of the computer model used for the computations of concentration of pollutants at ground level.

The model assumptions

- Steady State Condition - Ideal gas, continuous uniform emission rate, homogenous horizontal wind field, representative wind velocity, no directional wind shear in the vertical, infinite plume, no plume history and normal distribution of eddy turbulences.
- Pollutants Characteristics - The pollutant emitted are stable gases or aerosol which remains suspended in the air and particulates in the turbulent movement of the atmosphere and none of the material is removed as the plume advances and diffuses down wind and there is complete reflection at the ground.
- Gaussian distribution - The pollutant material within the plume takes on a Gaussian distribution in both the horizontal cross wind and vertical directions described by empirical dispersion parameters σy, and σz.
- It has been assumed that the pollutant does not undergo any physicochemical transformations.
- Gravitational settling of pollutants has not been considered.
- Reflection factor from any surface has not been considered.
- Control measures applied during calculation.

Model Setup

4.5.3.2.1 Emission Estimate from Mining area

The emissions from the mining operations can be estimated either by sampling or direct measurement or using emission factors. Emission factors are being widely used for estimation of emissions from the Dhirauli Mining Operations. An emission factor is a representative value that attempts to relate the quantity of pollutant released in the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant. The parameters that are most likely to influence the particle emissions are measure of source activity, properties of the material being disturbed and climatic parameters.

United States Environmental Protection Agency (USEPA) has developed emission factors for coal mining operation was published through AP- 42 (1998), based on these emission factors, National Pollution Inventory (NPI), Australian Government also developed emission factors for Suspended Particulate Matter (TSP) and Particulate Matter (PM_{10}) and published the Emission Estimation Technique Manual (EET Manual) for mining and the version 3.1 is updated in January 2012.

4.5.3.2.2 Emission Sources and Strength

The emissions are estimated using the USEPA, AP- 42 Emission factors and NPI emission factors for different mining operations such as drilling, blasting, dozing, loading, dumping, transportation, loading on to the trains, scarping, grading, CHP, and wind erosion of dumps for both coal and OB operations separately.

As per the New National Ambient Air Quality standards notified vide GSR 826 (E), dated November 2009, the monitoring parameters for Particulate Matters for Ambient Air Quality were prescribed as PM_{10} and $PM_{2.5}$.

Hence, the emission estimation for PM_{10} is carried with equation of USEPA and NPI. Emission Factor Equations used for calculation PM10 from Drilling, Blasting, Excavation, Loading, CHP, Transportation, Dumping, Grading, Wind Erosion, etc. for both coal and OB is discussed below:

4.5.3.2.3 Drilling in Coal

Emissions from the drilling are relatively minor component of the overall emission from the opencast mining. The variables like, depth of hole, diameter of the hole, moisture content of the material being drilled, type of the drilling, wind current at the drilling site will influence the rate of emission. USEPA (1998) has derived emission factor for TSPM is 0.59 Kg / hole taking into consideration of all the parameters. USEPA (1998) does not provide any emission factor for PM_{10} component. However,

the NPI EET Manual (2012) states that the mean fraction of PM_{10}/TSP was 0.52. Hence the best estimation of the emission factor for drilling for PM_{10} is = 0.59*0.52= 0.31 Kg/hole.

EF PM10 = 0.31 Kg/Hole
Where, EF PM10 = Emission Factor for PM10.

4.5.3.2.4 Blasting Operation in Coal

The emissions from the blasting operations mainly depend on the area of the blasting, moisture content of the blasted material, depth of the blast hole, explosives being used, mode of detonation, blasting pattern, etc. NPI EET Manual (2012) provided emission factor for blasting for PM10 is as follows:

EFPM10 = 0.000114*A1.5 Kg/blast
Where,
EFPM10 = Emission factor for PM_{10} in Kg/blast
A = Area of blasting in m^2

4.5.3.2.5 Blasting Operation in OB

As per the USEPA and NPI, the emission factor for coal is also suitable for OB. As such,
EFTSP = (344*A0.8)/(M1.9*D1.8) Kg/blast
Where,
EFTSP = Emission factor for TSP in Kg/blast
A = Area of blasting in m^2 (OB)
M =Moisture content in OB, %
D = Depth of the hole, m
For PM10 fraction, USEPA (1998) estimated that, it will be 52% of TSP (Ref: NPI EET Manual, 2012). Hence,
EFPM10 = EFTSP x 0.52

4.5.3.2.6 Excavation in Coal

The emission during the excavation i.e., loading of coal on to the trucks is mainly depending on the moisture content. As per the USEPA (1998) and NPI EET Manual, 2012 the emission factor is:
$EFPM10 = k*0.0596/(M)^{0.9}$
Where,
EFPM10 = emission factor for PM_{10} in Kg / ton
k = 0.75 for PM_{10} concentration
M = Moisture content in (%)

4.5.3.2.7 Excavation in OB

The emission during the excavation i.e., loading of OB on to the dumpers / trucks is mainly depending on the moisture content of OB and mean wind speed.
EFPM10 = k*0.0016*(U/2.2)1.3/(M/2)1.4
Where,

EFPM10 = emission factor for PM_{10} in Kg / ton
k = 0.35 for PM10
U = Mean wind speed in m/s
M = Moisture content in %

4.5.3.2.8 Bulldozing in Coal

The emission during the bulldozing operation in the coal is mainly depending on the moisture content and silt content of the material. As per the USEPA (1998) and NPI EET Manual, 2012 the emission factor is:
EFPM10 = 6.33(s)1.5/(M)1.4
Where,
EFPM10 = emission factor for PM_{10} in Kg/h
s = Silt content in (%),
M = Moisture content in (%)

4.5.3.2.9 Bulldozing in OB

As per the USEPA (1998) and NPI EET Manual, 2012 the emission factor is:
EFPM10 = 0.34(s)1.5/(M)1.4
EFPM10 = emission factor for PM_{10} in Kg/h
s = Silt content in (%),
M = Moisture content in (%)

4.5.3.2.10 Transportation of Coal

When a vehicle travels an unpaved road, the force of the wheels on the road surfaces causes pulverization of the surface material, particles are lifted and dropped from the rolling wheels and the road surface is exposed to strong air currents in turbulent shear, with turbulent wake behind the vehicle continue to act on the road surface after the vehicle has passed. Various types of road surfaces and vehicle characteristics are likely to have an impact on the particulate emission from unpaved roads. The particulate emission is mainly depending on the weight of the vehicle and silt content on the road surface.

As per the USEPA (1998) and NPI EET Manual 2012 the emission factor for PM_{10} is:

$$EFPM10 = k*(s/12)^{0.8*(}W/3)^{0.4}/(M/0.2)^{0.3}$$

Where,
EF_{PM10}=emission factor in Kg per vehicle per km (Kg/VKT)
k = 0.733 for PM_{10}
s = Silt content of road surface %
W = Vehicle gross mass in tonnes
M = Moisture content, %

4.5.3.2.11 Transportation of OB

As per the USEPA (1998) and NPI EET Manual 2012 the emission factor for PM_{10} for OB is also same as coal:

EFPM10 = k*(s/12)0.8*(W/3)0.4/(M/0.2)0.3

Where,
s = silt content of road surface
W = Vehicle gross mass in tonnes
M = Moisture content, %

4.5.3.2.12 Dumping of Coal

As per the NPI EET Manual 2012 the emission factor for PM_{10} for dumping coal is,

EFPM10 = 0.0042 kg/ton

4.5.3.2.13 Dumping of OB

The USEPA uses the same equation for unloading overburden as it does for loading OB

EF = 0.000644 Kg/ton

4.5.3.2.14 Grading in Coal and OB

Grading of haul roads is required to carryout to sweep the loose material pilfered from the loaded dumpers, flying fragments during blasting, etc. As per the USEPA (1998) and NPI EET Manual 2012, the emission factor for PM_{10} for grading in coal & OB is:

EF= 0.0034*(S)2 kg/VKT

Where,
S= Mean Vehicle Speed in Kmph

4.5.3.2.15 Wind Erosion of Coal Dump (Stock Yard)

Dumping of coal in the coal stock yard is required to be carried as an alternate arrangement at the surface when the bunker / pre-weigh bin is full of its capacity. Wind provides the mechanical energy for particle entrainment. A certain minimum wind velocity, often called threshold wind velocity is responsible for air borne of the dust from the dumps. For long term emission estimations, average soil moisture content or the number of rainy days, silt content of the dumping material, wind speed is influencing parameters. As per USEPA (1998) and NPI EET Manual 2012, emission factor for PM_{10} for wind erosion of dump is as given below.

EFTSP = 1.9*(s/1.5)*365*((365-p)/235)*(f/15)

4.5.3.2.16 Wind Erosion of OB Dumps

As per the USEPA (1998) and NPI EET Manual 2012 the emission factor for PM_{10} for wind erosion of dump is:

EFTSP = 1.9*(s/1.5)*365*((365-p)/235)*(f/15)

Taking,
EFPM10 = 50% of EFTSP
EF = emission factor for TSPM kg/ha/Year
s = silt content in exposed area of the coal heap, %
p = number of days when rain fall > 0.25 mm
f = % of time that wind speed is > 5.40 m/sec at the mean height of the dump

4.5.3.2.17 Coal Handling Plant

As per the USEPA (1998) the emission factor for Coal Handling Plant is,

EF = ((100-M) / M)) 0.4 x (a2 x s / (100-s)) 0.3 x (u / 160+ 3.7u)

Where,
M= Moisture Content, %
A= area, m^2
S= silt content, %
u= mean wind speed, m/s
The emission rates for the different sources in the mining area were calculated primarily based on emission factor equation given in latest USEPA's AP-42 guidelines. Further the emission estimation equations given in "TSP Emission Factors for different mining activities for Air Quality Impact Prediction as collated from different Sources" by S P Banerjee (CMRI) were also considered since these are based on the study conducted in India for the estimation of emission rate of respirable suspended particulate matter from various open cast mining activities. In addition, as the proposed mine development will be undertaken in environmentally friendly manner as per the stipulated guidelines, activity specific control factors are considered in calculation the emission rates.

Model Output

The AERMOD model has been setup and run for study period (3 months) to find out the cumulative maximum ground level concentration of PM_{10} and $PM_{2.5}$ generated from the different activities in the mining areas.

Maximum ground level concentration of PM_{10} and $PM_{2.5}$ generated from the different activities in the mining areas is described below:

PM_{10}: Max Incremental GLC will be 63.397 µg/m^3 and maximum cumulative GLC will be 112.897 µg/m^3 at Mine Site (Dhirauli South) A1 location, this is due to the major mining activity in this area.

$PM_{2.5}$: Max Incremental GLC will be 38.038 µg/m^3 and maximum cumulative GLC will be 67.238 µg/m^3 at Mine Site (Dhirauli South) A1 location, this is also due to the

major mining activity in the nearby area.

SO_x: Max Incremental GLC will be 0.0172 µg/m^3 and maximum cumulative GLC will be 25.10 µg/m^3 at (Khairahi) A5 location, this is due to the Industrial area.

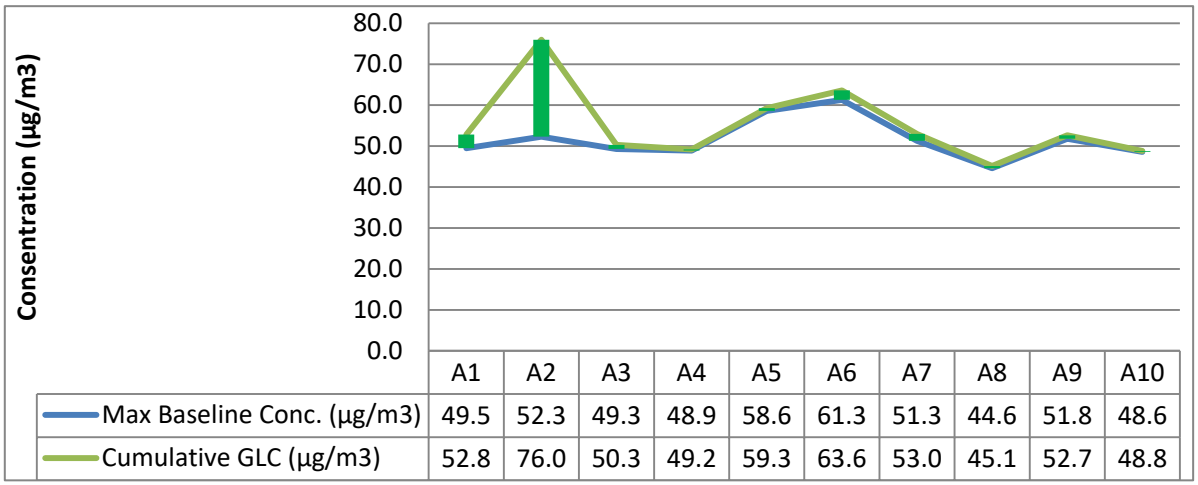
NO_x: Max Incremental GLC will be 0.0019 µg/m^3 and maximum cumulative GLC will be 34.2001 µg/m^3 at (Khairahi) A5 location, this is due to the Industrial area.

CO: Max Incremental GLC will be 0.0000034 mg/m^3 and maximum cumulative GLC will be 0.4870 mg/m^3 at (Khairahi) A5 location.

The spatial distribution of PM_{10} and $PM_{2.5}$ GLC in 10 km study area are presented in **Figure 4.1 to Figure 4.5**. Summary of GLC incremental at Baseline locations are given in **Table 4.8** below. Isopleths of the modelling are given in **Figure 4.6 to Figure 4.10.**

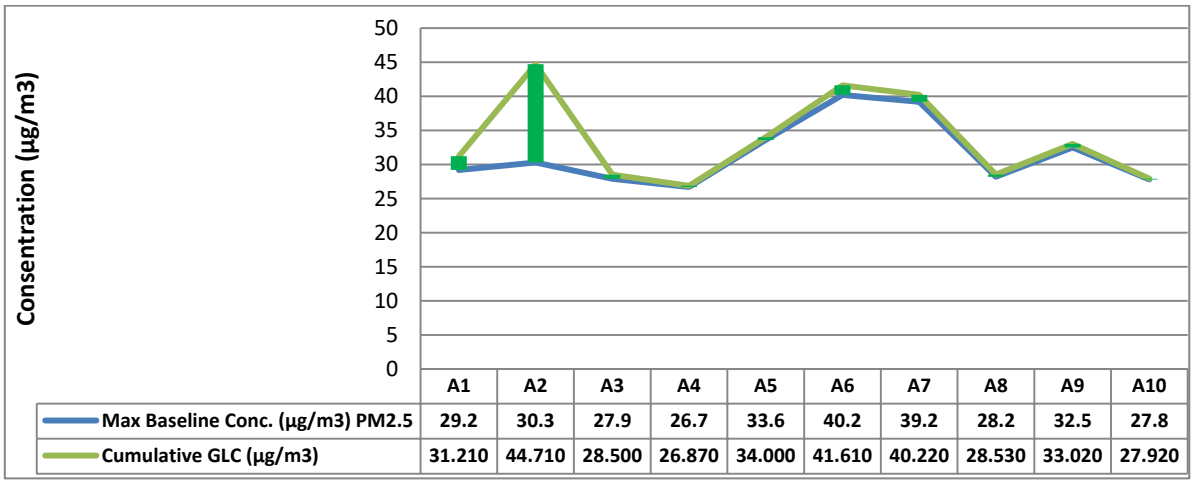
Table 4.8: Predicted 24 Hourly GLC & Resultant Cumulative GLC for Controlled Condition

Location Code	AAQM Location Name	PM_{10}			$PM_{2.5}$			Sox			Nox			CO		
		Max Baseline Conc. ($\mu g/m^3$)	Predicted GLC ($\mu g/m^3$) – PM_{10}	Cumulative GLC PM_{10} ($\mu g/m^3$)	Max Baseline Conc. ($\mu g/m^3$) $PM_{2.5}$	Predicted GLC ($\mu g/m^3$) – $PM_{2.5}$	Cummulative GLC ($\mu g/m^3$) – $PM_{2.5}$	Max Baseline Conc. ($\mu g/m^3$)	Predicted GLC ($\mu g/m^3$) –sox	Cumulative GLC	Max Baseline Conc. ($\mu g/m^3$) Nox	Predicted GLC ($\mu g/m^3$) – Nox	Cummulative GLC ($\mu g/m^3$) Nox	Max Baseline Conc. ($\mu g/m^3$)	Predicted GLC ($\mu g/m^3$) CO	Cumulative GLC PM_{10} CO
A1	Mine Site (Dhirauli South)	49.50	3.31	52.81	29.20	2.01	31.21	16.30	0.02	16.32	23.60	0.00	23.60	0.42	0.00	0.42
A2	Mine Site (Dhirauli North)	52.30	23.68	75.98	30.30	14.41	44.71	17.10	0.01	17.11	23.90	0.00	23.90	0.42	0.00	0.42
A3	Bhaiyatola	49.30	0.99	50.29	27.90	0.60	28.50	15.90	0.00	15.90	25.40	0.00	25.40	0.44	0.00	0.44
A4	Budheri	48.90	0.28	49.18	26.70	0.17	26.87	21.60	0.00	21.60	25.50	0.00	25.50	0.38	0.00	0.38
A5	Khairahi	58.60	0.66	59.26	33.60	0.40	34.00	25.10	0.00	25.10	34.20	0.00	34.20	0.49	0.00	0.49
A6	Churwani	61.30	2.31	63.61	40.20	1.41	41.61	23.80	0.00	23.80	32.20	0.00	32.20	0.47	0.00	0.47
A7	Berdaha	51.30	1.68	52.98	39.20	1.02	40.22	22.80	0.00	22.80	30.90	0.00	30.90	0.42	0.00	0.42
A8	Bansi	44.60	0.53	45.13	28.20	0.33	28.53	20.70	0.00	20.70	29.10	0.00	29.10	0.34	0.00	0.34
A9	Majholi path	51.80	0.85	52.65	32.50	0.52	33.02	23.40	0.00	23.40	31.50	0.00	31.50	0.44	0.00	0.44
A10	Bijauri	48.60	0.21	48.81	27.80	0.12	27.92	15.90	0.00	15.90	24.90	0.00	24.90	0.34	0.00	0.34



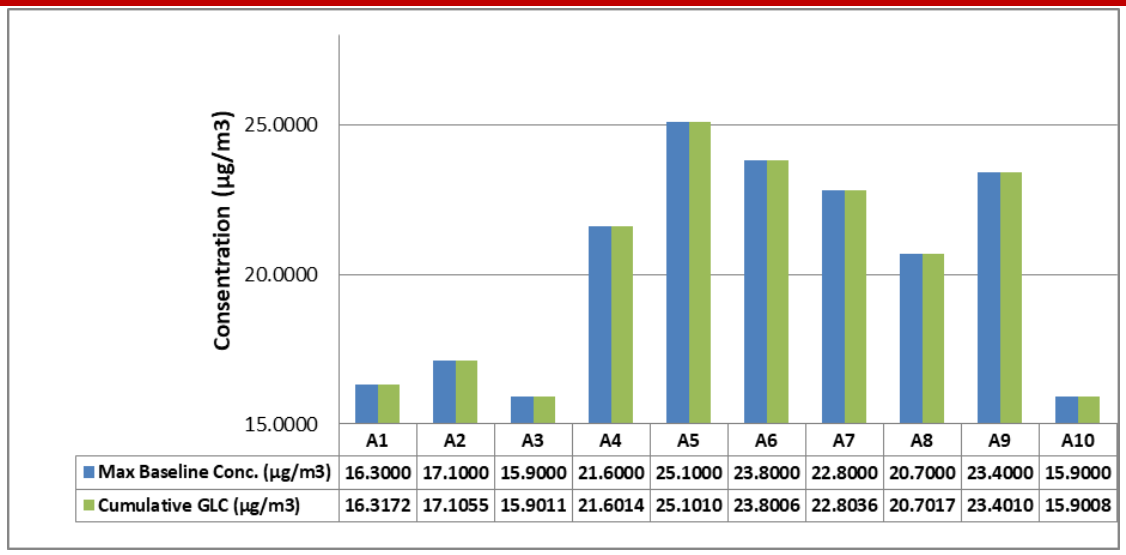
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Max Baseline Conc. (µg/m3)	49.5	52.3	49.3	48.9	58.6	61.3	51.3	44.6	51.8	48.6
Cumulative GLC (µg/m3)	52.8	76.0	50.3	49.2	59.3	63.6	53.0	45.1	52.7	48.8

Figure 4.1: Incremental Conc. (µg/m^3) for PM_{10}



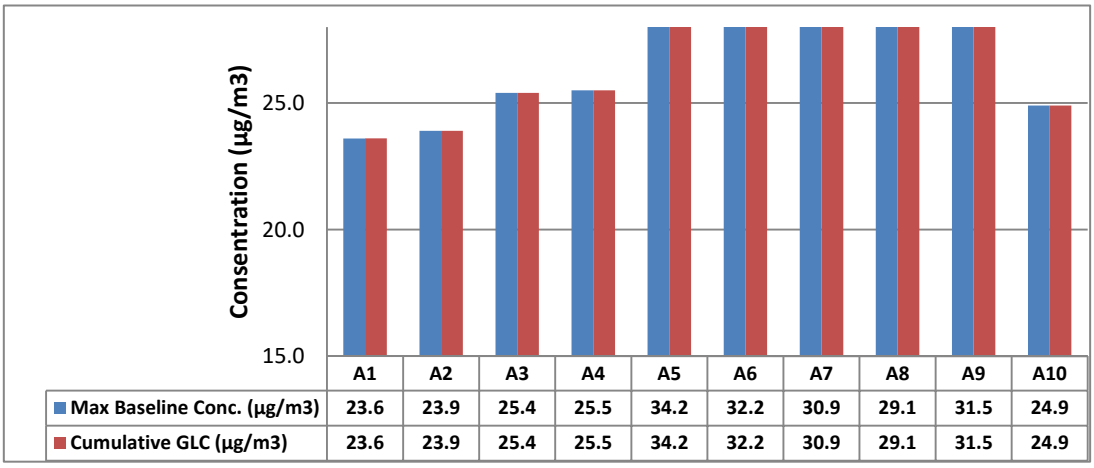
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Max Baseline Conc. (µg/m3) PM2.5	29.2	30.3	27.9	26.7	33.6	40.2	39.2	28.2	32.5	27.8
Cumulative GLC (µg/m3)	31.210	44.710	28.500	26.870	34.000	41.610	40.220	28.530	33.020	27.920

Figure 4.2: Incremental Conc. (µg/m^3) for $PM_{2.5}$



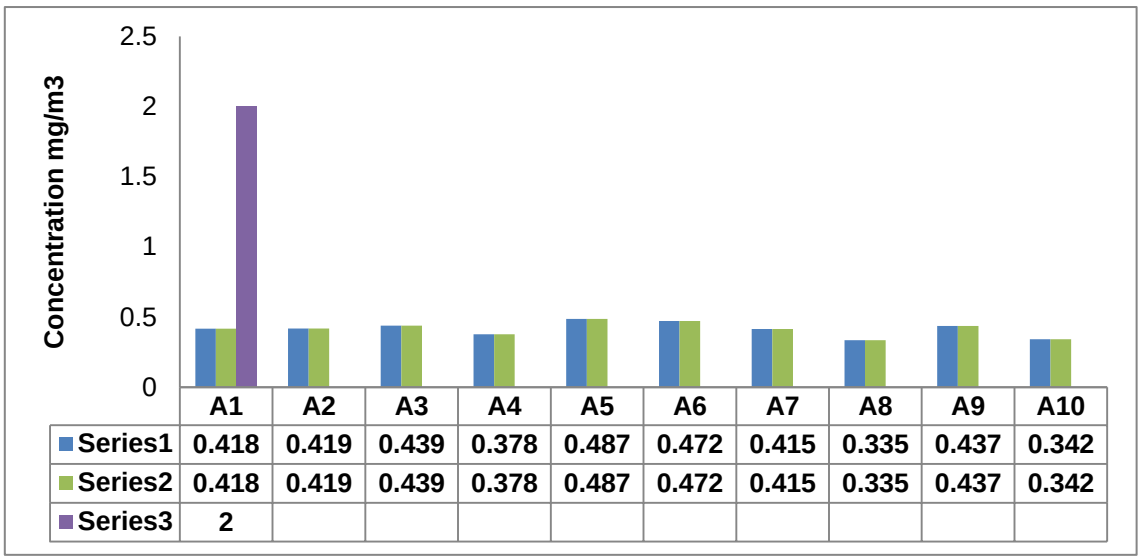
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Max Baseline Conc. (µg/m3)	16.3000	17.1000	15.9000	21.6000	25.1000	23.8000	22.8000	20.7000	23.4000	15.9000
Cumulative GLC (µg/m3)	16.3172	17.1055	15.9011	21.6014	25.1010	23.8006	22.8036	20.7017	23.4010	15.9008

Figure 4.3: Incremental Conc. (µg/m^3) for Sox



	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Max Baseline Conc. (µg/m3)	23.6	23.9	25.4	25.5	34.2	32.2	30.9	29.1	31.5	24.9
Cumulative GLC (µg/m3)	23.6	23.9	25.4	25.5	34.2	32.2	30.9	29.1	31.5	24.9

Figure 4.4: Incremental Conc. (µg/m^3) for Nox



	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Series1	0.418	0.419	0.439	0.378	0.487	0.472	0.415	0.335	0.437	0.342
Series2	0.418	0.419	0.439	0.378	0.487	0.472	0.415	0.335	0.437	0.342
Series3	2									

Figure 4.5: Incremental Conc. (mg/m^3) for CO

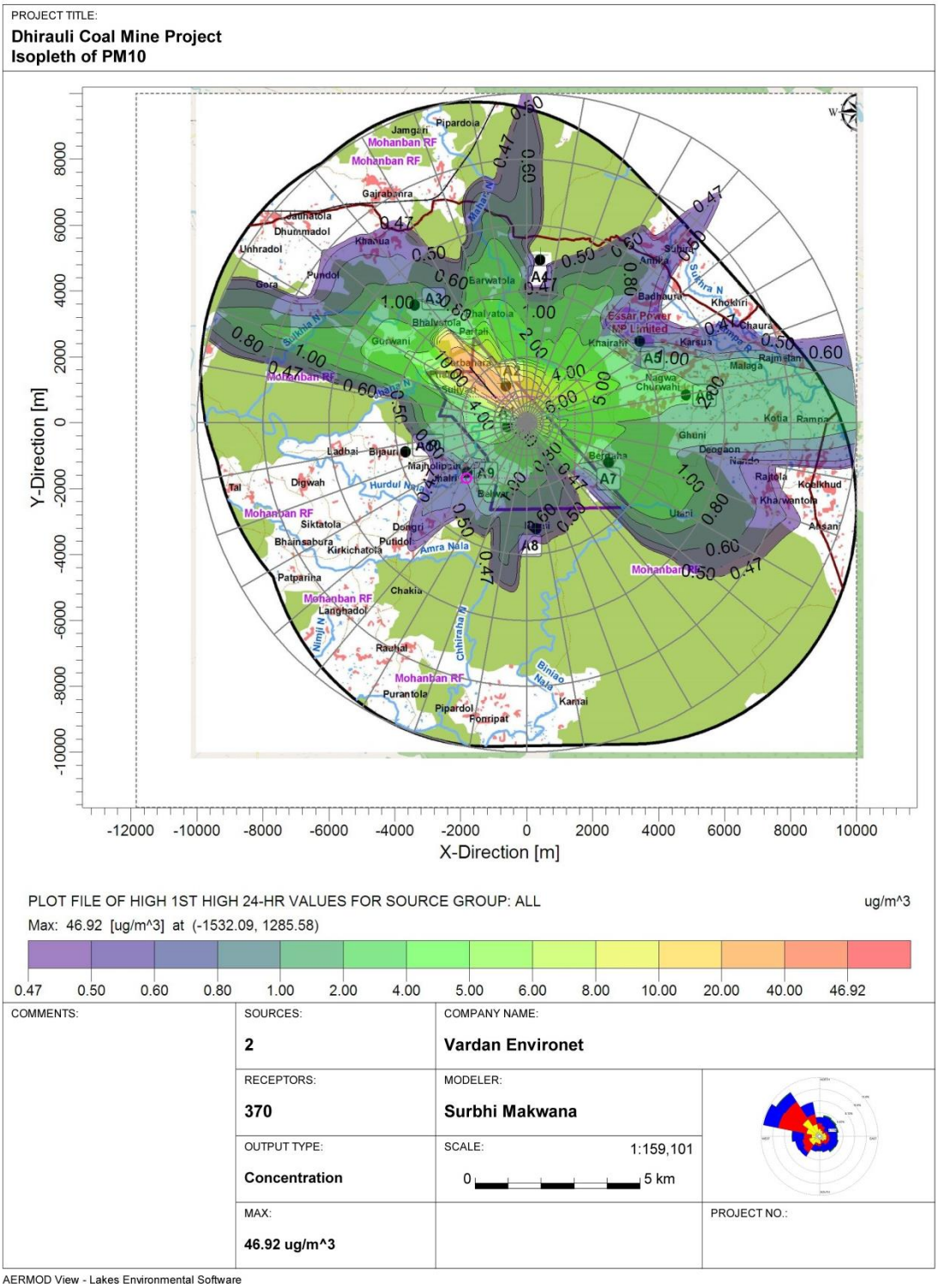


Figure 4.6: Controlled Condition Isopleths for 24 Hr. Incremental Conc. (µg/m^3) for PM_{10}

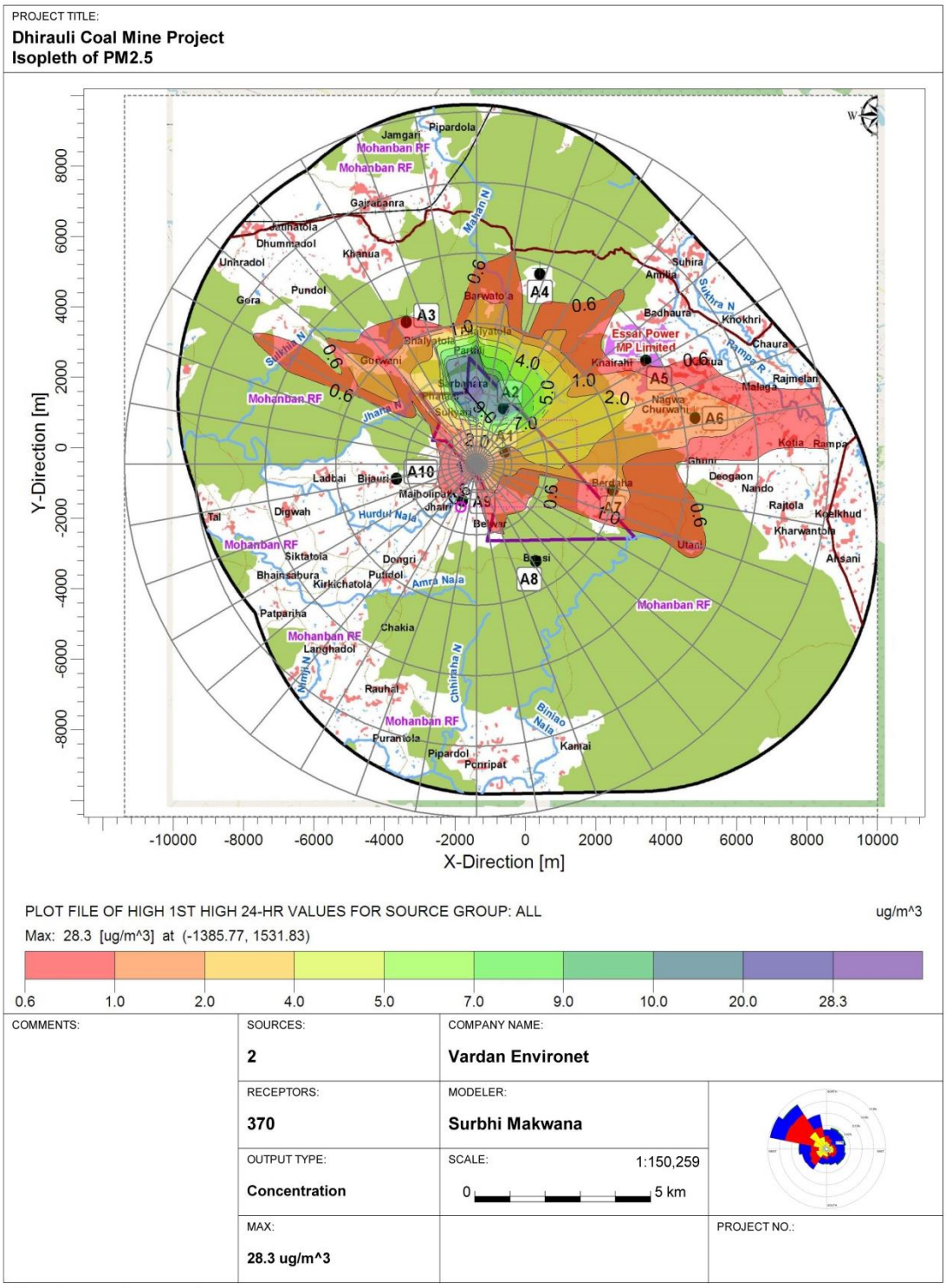


Figure 4.7: Controlled Condition Isopleths for 24 Hr. Incremental Conc. (µg/m^3) for $PM_{2.5}$

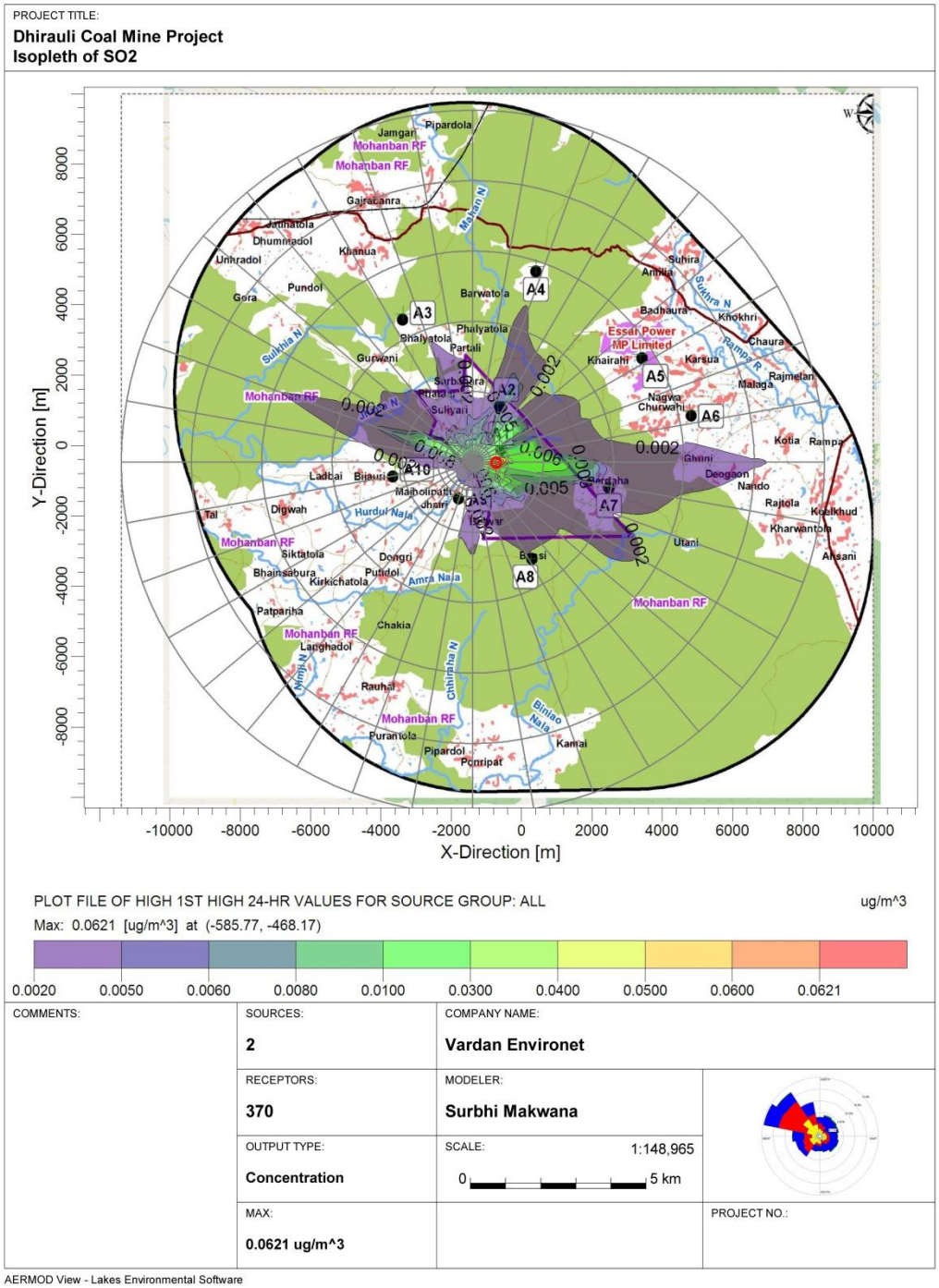


Figure 4.8: Controlled Condition Isopleths for 24 Hr. Incremental Conc. (µg/m^3) for SOx

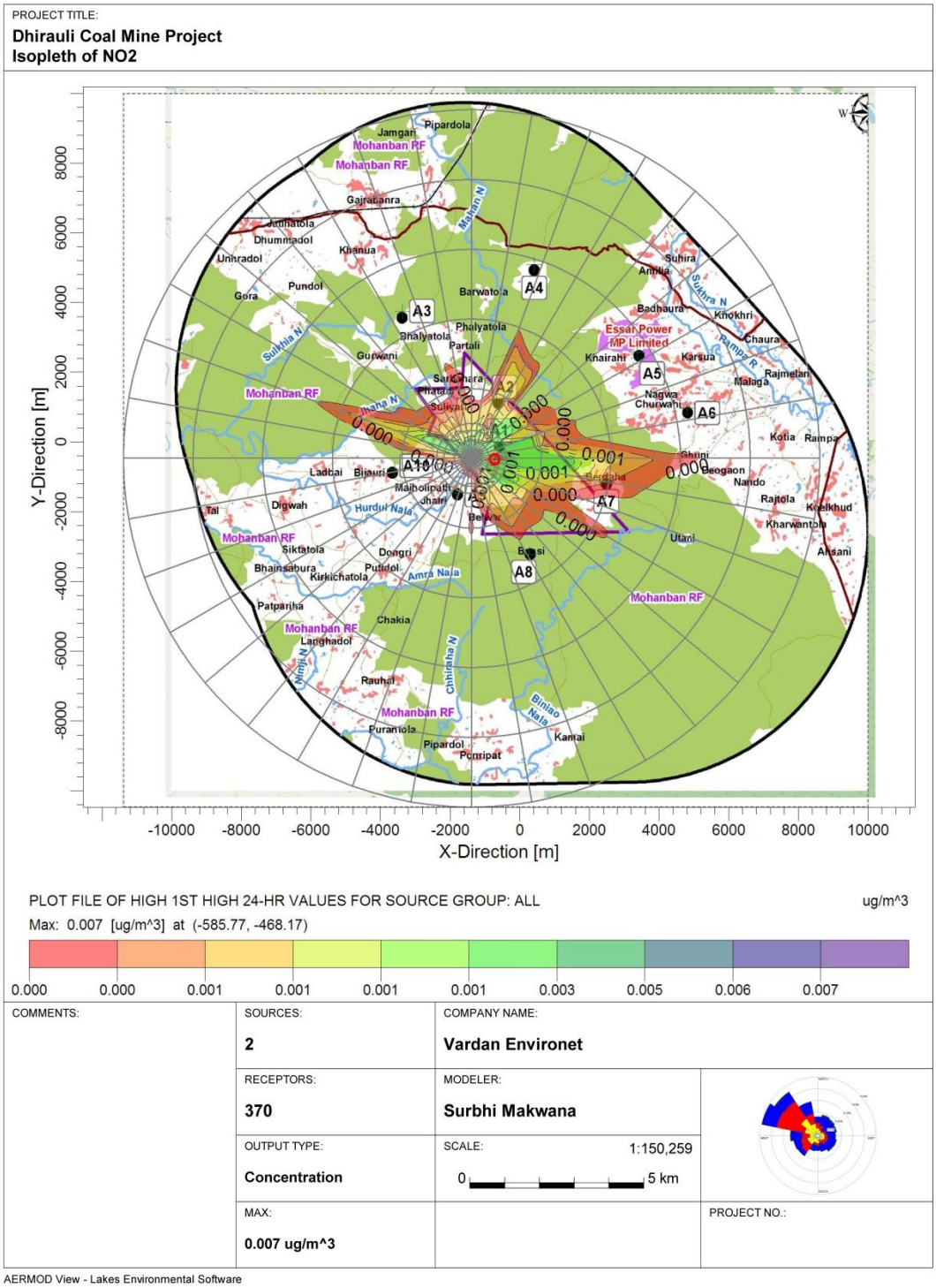


Figure 4.9: Controlled Condition Isopleths for 24 Hr. Incremental Conc. (µg/m^3) for NOx

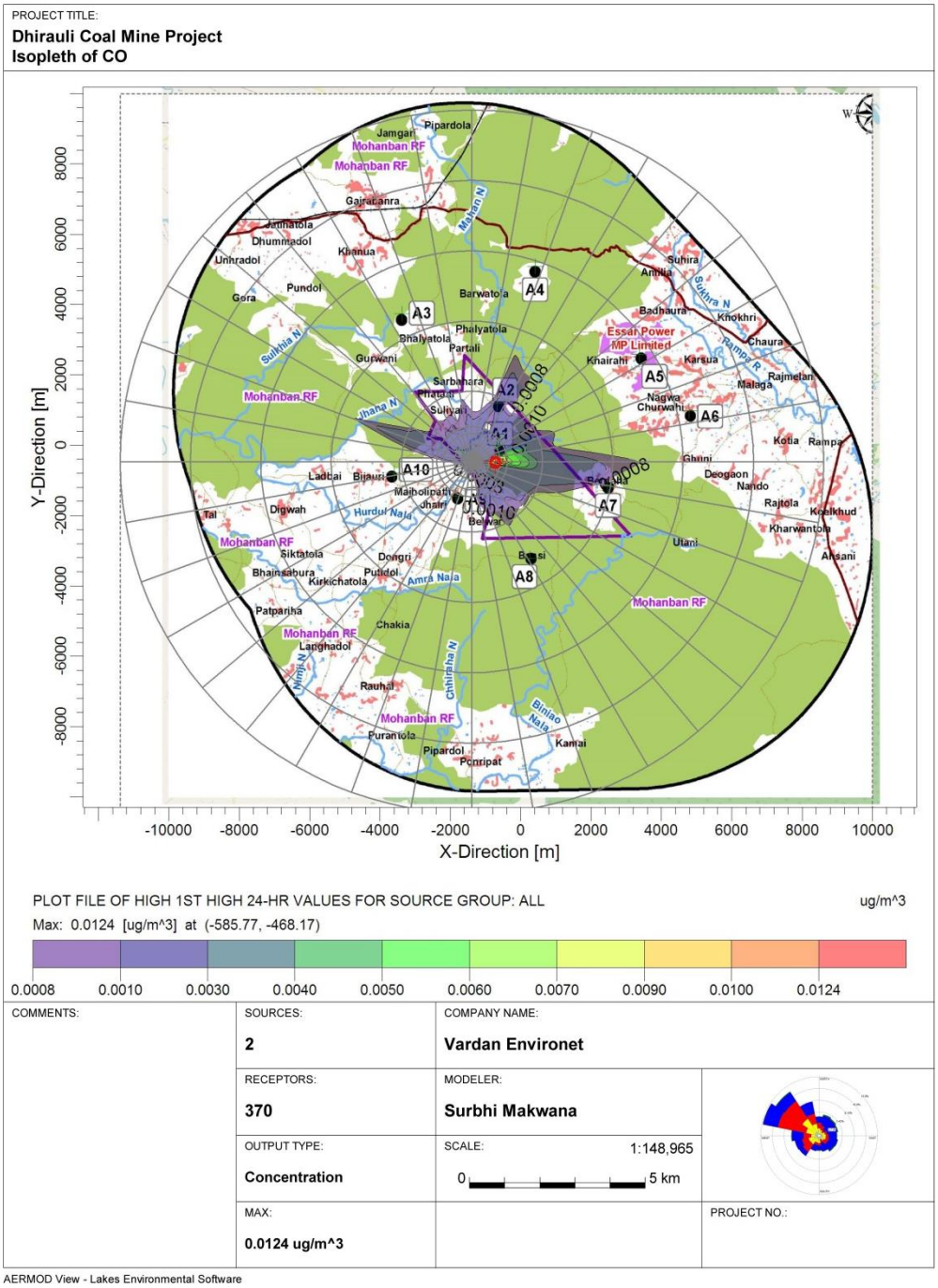


Figure 4.10: Controlled Condition Isopleths for 24 Hr. Incremental Conc. (mg/m^3) for CO

4.5.3.3 Air Quality Index

An air quality index (AQI) is a number used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. As the AQI increases, an increasingly large percentage of the population is likely to experience increasingly severe adverse health effects.

There are six AQI categories, namely Good, Satisfactory, moderately polluted, Poor, Very Poor, and Severe. The AQI for proposed project will consider five pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO) for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed. Based on the measured ambient concentrations, corresponding standards and likely health impact, a sub-index is calculated for each of these pollutants. The worst sub-index reflects overall AQI.

AQI will be calculated by using the following formula.

$$I= [I_{high}-I_{low}/C_{high}-C_{low}] (C-Clow) + I_{low}$$

Where,

I - The Air Quality Index
C - The pollutant concentration
C_{low} - The concentration breakpoint that is ≤ C
C_{high} - The concentration breakpoint that is ≥ C
I_{low} - The index breakpoint corresponding to C_{low}
I_{high} - The index breakpoint corresponding to C_{high}

The AQI values and corresponding ambient concentrations (health breakpoints) as well as associated likely health impacts for the identified eight pollutants are as follows:

Table 4.9: AQI Category Based on Pollutants Concentration

AQI Category, Pollutants and Health Breakpoints								
AQI Category (Range)	**PM_{10} 24-hr**	**$PM_{2.5}$ 24-hr**	**NO_2 24-hr**	**O_3 8-hr**	**CO 8-hr**	**SO_2 24-hr**	**NH_3 24-hr**	**Pb 24-hr**
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5 – 1.0
Moderately (101-200)	101-250	61-90	81-180	101-168	2.1- 10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0

AQI Category, Pollutants and Health Breakpoints								
AQI Category (Range)	**PM_{10} 24-hr**	**$PM_{2.5}$ 24-hr**	**NO_2 24-hr**	**O_3 8-hr**	**CO 8-hr**	**SO_2 24-hr**	**NH_3 24-hr**	**Pb 24-hr**
Very poor (301-400)	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430 +	250+	400+	748+*	34+	1600+	1800+	3.5+

(Ref: Table Info acquired from Ministry of Environment, Forests & Climate Change)

Table 4.10: Health Impacts Based on the AQI Values

AQI	Associated Health Impacts
Good (0-50)	Minimal Impact
Satisfactory (51-100)	May cause minor breathing discomfort to sensitive people.
Moderate (101-200)	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults.
Poor (201-300)	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease
Very Poor (301-400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases.
Severe (401-500)	May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease. The health impacts may be experienced even during light physical activity.

(Ref: Associated health effects taken by the MoEF&CC.)

In the present study only 4 parameters are taken such as PM_{10}, $PM_{2.5}$. By considering the above 5 pollutants the calculated AQI at 8 locations are given.

Table 4.11: Sub-Index Values for Each Air Pollutant at Selected Sites

Site	Conc.	Sub-Index	Category	Color	Health Impact
Name of the pollutant: PM_{10} ($\mu g/m^3$)					
A1	49.50	50	Good	Green	Minimal Impact
A2	52.30	52	Satisfactory	Light green	May cause discomfort to sensitive people
A3	49.30	49	Good	Green	Minimal Impact
A4	48.90	49	Good	Green	Minimal Impact
A5	58.60	59	Satisfactory	Light green	May cause discomfort to sensitive people
A6	61.30	61	Satisfactory	Light green	May cause discomfort to sensitive people

Site	Conc.	Sub-Index	Category	Color	Health Impact
A7	51.30	51	Satisfactory	Light green	May cause discomfort to sensitive people
A8	44.60	45	Good	Green	Minimal Impact
A9	51.80	52	Satisfactory	Light green	May cause discomfort to sensitive people
A10	48.90	49	Good	Green	Minimal Impact
Name of the pollutant: $PM_{2.5}$ ($\mu g/m^3$)					
A1	29.2	49	Good	Green	Minimal Impact
A2	30.3	51	Satisfactory	Light green	May cause discomfort to sensitive people
A3	27.9	47	Good	Green	Minimal Impact
A4	26.7	45	Good	Green	Minimal Impact
A5	33.6	56	Satisfactory	Light green	May cause discomfort to sensitive people
A6	40.2	67	Satisfactory	Light green	May cause discomfort to sensitive people
A7	39.2	65	Satisfactory	Light green	May cause discomfort to sensitive people
A8	28.2	47	Good	Green	Minimal Impact
A9	32.5	54	Satisfactory	Light green	May cause discomfort to sensitive people
A10	27.8	46	Good	Green	Minimal Impact
Name of the pollutant: SO_2 ($\mu g/m^3$)					
A1	16.3	20	Good	Green	Minimal Impact
A2	17.1	21	Good	Green	Minimal Impact
A3	15.9	20	Good	Green	Minimal Impact
A4	21.6	27	Good	Green	Minimal Impact
A5	25.1	31	Good	Green	Minimal Impact
A6	23.8	30	Good	Green	Minimal Impact
A7	22.8	28	Good	Green	Minimal Impact
A8	20.7	26	Good	Green	Minimal Impact
A9	23.4	29	Good	Green	Minimal Impact
A10	15.9	20	Good	Green	Minimal Impact
Name of the pollutant: NO_2 ($\mu g/m^3$)					
A1	23.6	30	Good	Green	Minimal Impact
A2	23.9	30	Good	Green	Minimal Impact
A3	25.4	32	Good	Green	Minimal Impact
A4	25.5	32	Good	Green	Minimal Impact
A5	34.2	43	Good	Green	Minimal Impact
A6	32.2	40	Good	Green	Minimal Impact
A7	30.9	39	Good	Green	Minimal Impact
A8	29.1	36	Good	Green	Minimal Impact
A9	31.5	39	Good	Green	Minimal Impact
A10	24.9	31	Good	Green	Minimal Impact
Name of the pollutant: CO (mg/m^3)					
A1	418	21	Good	Green	Minimal Impact
A2	419	21	Good	Green	Minimal Impact
A3	439	22	Good	Green	Minimal Impact
A4	378	19	Good	Green	Minimal Impact
A5	487	24	Good	Green	Minimal Impact
A6	472	24	Good	Green	Minimal Impact

Site	Conc.	Sub-Index	Category	Color	Health Impact
A7	415	21	Good	Green	Minimal Impact
A8	335	17	Good	Green	Minimal Impact
A9	437	22	Good	Green	Minimal Impact
A10	418	21	Good	Green	Minimal Impact
Name of the pollutant: O3 (µg /m^3)					
A1	8.3	8	Good	Green	Minimal Impact
A2	8.9	9	Good	Green	Minimal Impact
A3	7.9	8	Good	Green	Minimal Impact
A4	8.6	9	Good	Green	Minimal Impact
A5	9.6	10	Good	Green	Minimal Impact
A6	9.8	10	Good	Green	Minimal Impact
A7	9.4	9	Good	Green	Minimal Impact
A8	7.9	8	Good	Green	Minimal Impact
A9	8.9	9	Good	Green	Minimal Impact
A10	8.2	8	Good	Green	Minimal Impact

After assessing the impacts from each pollutant, the cumulative effect of all 4 pollutant AQI values and their health impacts for each site is summarized in **Table 4.12.**

Table 4.12: Cumulative Effect of all Pollutants Based on AQI Values

Site	Conc.	AQI value	Category	Color	Health Impact
A1	Baseline	50	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	124	Moderate	Yellow	Breathing discomfort to the people with lung, heart disease, children and older adults
A2	Baseline	52	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	103	Moderate	Yellow	Breathing discomfort to the people with lung, heart disease, children and older adults
A3	Baseline	49	Good	Green	Minimal Impact
	Cumulative	57	Satisfactory	Light green	May cause Discomfort to sensitive people
A4	Baseline	49	Good	Green	Minimal Impact
	Cumulative	54	Satisfactory	Light green	May cause Discomfort to sensitive people
A5	Baseline	59	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	63	Satisfactory	Light green	May cause Discomfort to sensitive people

Site	Conc.	AQI value	Category	Color	Health Impact
A6	Baseline	67	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	74	Satisfactory	Light green	May cause Discomfort to sensitive people
A7	Baseline	65	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	171	Moderate	Yellow	Breathing discomfort to the people with lung, heart disease, children and older adults
A8	Baseline	47	Good	Green	Minimal Impact
	Cumulative	58	Satisfactory	Light green	May cause Discomfort to sensitive people
A9	Baseline	54	Satisfactory	Light green	May cause Discomfort to sensitive people
	Cumulative	68	Satisfactory	Light green	May cause Discomfort to sensitive people
A10	Baseline	49	Good	Green	Minimal Impact
	Cumulative	56	Satisfactory	Light green	May cause Discomfort to sensitive people

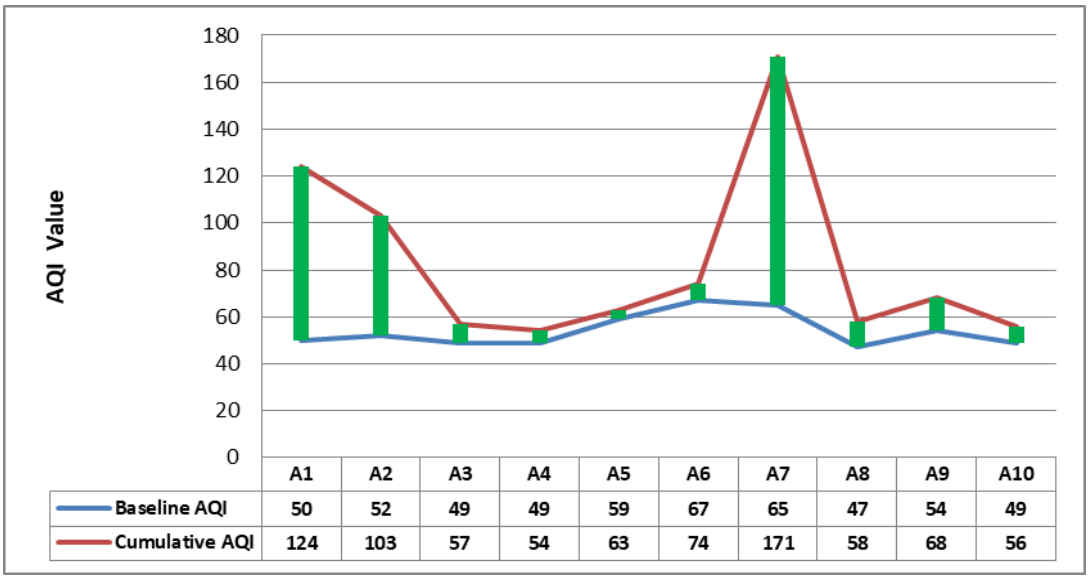


Figure 4.11: Comparison of AQI values with or without predicated GLC

4.5.3.3.1 Conclusions

As per the analytical reports of the project site and the surrounding areas, after the addition of cumulative GLC due to the proposed project and existing mining activity the ambient air quality exceeding the NAAQS limits, EMP will be taken to mitigate the air pollution.

From the above interpretation of Air Quality Index for study area falls under good, satisfactory, and moderate categorization as per the data obtained during baseline studies. Due to implementation of the project and activity of cluster mine the AQI index of the area will change from satisfactory to moderate on few locations. The health impact due to this AQI is very less and it may only cause discomfort to sensitive people

4.5.3.4 Air Pollution Mitigation Measures

Dust is the main air pollutant generated from the coal mining. The nature of mining operations is such that complete elimination of dust from mining process would not be possible. However, some preventive measures *i.e.,* control at source like provision of dust collectors, dust suppression during the course of various mining operations, shall be resorted to minimize fugitive dust emission. The details of source wise pollution prevention measures planned to implement during the proposed are as follows:

4.5.3.4.1 Drilling

Blast hole drilling generate considerable amount of dust in the open cast and underground mining. Drills will have dust extractors. Presently Blast- hole Drill manufacturers have provided for wet drilling arrangement, which will be used.

4.5.3.4.2 Blasting

4.5.3.4.2.1 Blasting in OB

Blasting is relatively minor contributor to total dust emissions. However, blasting dust in the form of concentrated cloud, that is highly visible and may have potential impact on neighbours at downwind of the blast. The blasting of near-surface weathered materials that contain a high proportion of fines, creates high dust emissions.

It is proposed to do blasting only once in a week for each excavator and only once in a day between shifts. Use of Raydet /Nolen and similar delay detonators and proper design of blast and using muffle, throwing up of blasted rock and consequent production of dust can be dramatically reduced.

4.5.3.4.2.2 Loading of O.B. and coal to Dumpers:

Since this operation takes place in a bench protected by highwall and since excavator bucket delivers material close to the bucket of the dumper, there is comparatively less generation of dust.

4.5.3.4.3 Haul Roads/Transportation of Coal

Loading of Coal then transport the coal to its next destination *i.e.* Coal Handling Plant through designated haul routes. Fugitive dust emissions are caused by the contact of the tyres with the unsealed road surface that affect the total distance travelled. Water sprinklers (28 Kl) will be deployed to sprinkle water on haul roads, both for coal and OB to suppress dust from this source. In dry seasons, it is proposed to sprinkle the haul roads at least twice in a shift. To make water sprinkling effective, Graders will follow water sprinklers in each run, so that the settled dust due to sprinkling, does not lie on the haul road but gathered to on the flanks of the roads, lest the same dust will be raised by the passage of successive dumpers. Suitable arrangement has been kept for water required for this purpose.

Haul Roads on the surface of the mine will be black topped. In addition to the above measures, plantation along both sides of haul roads on the surface of the mine, around CHP and the green belts formed around mining excavation will largely trap the airborne dust which escapes sprinkling operation.

In addition to these, the following measures will be adopted to minimise the fugitive dust emissions from the haul roads:

- Compaction & gradation and drainage on both sides of haul roads
- Proper maintenance of transport vehicles
- Avoiding overloading and enforcing speed limit on dumpers

4.5.3.4.4 Coal Handling plant

- Receiving Hopper, Apron Feeder and Feeder breaker is proposed to be enclosed in covered structure. A dust extraction collection and disposal system would be installed.
- At all transfer points in CHP, precision anti-clog nozzles shall be installed at suitable locations for suppressing dust by spraying water. Chutes provided to reduce the height of fall, thus reduce dust generation will be covered.
- Belt conveyor reclaiming coal from Apron feeder to Surge Bunker will be covered.

4.5.3.4.5 Measures to mitigate CO levels

The concentration of CO in the ambient air is negligible and is far below the prescribed limit of CPCB and is not anticipated to exceed it in future. Still all heavy and light vehicles shall be tested for pollutants concentration in their exhausts regularly and well maintained. Strict vigil will be kept in and around the operational area for any fire which shall be immediately controlled.

4.6 IMPACTS OF WATER POLLUTION AND ITS MITIGATION MEASURES

4.6.1 Impact of Mining on Water Usage

Water is most important resource. Maximum water requirement for the mine is 1760 m^3/day. It is envisaged that to meet the requirement of water for construction, drinking and sanitation as well as mine operation, at the initial stage of 2- 3 years, will be met from ground water. PP has obtained the NOC from Central Ground Water Authority (CGWA) vide NOC no. CGWA/NOC/MIN/ORIG/2022/15765 which is valid from 15.06.2022 to 14.06.2024. Use of water at various mining operation, run-off water after precipitation on 08 dumps. coal stockyard, over mined out areas and pumping discharge of percolated ground water in mine excavation, generate wastes of various quality and quantity, which need to be addressed to prevent pollution of surface water and contamination of groundwater system. The various source of wastewater and the pollution control measures are elaborated in the following paragraphs.

4.6.2 Impact of Mining on Surface Water

There is no major river near around the block. Most of nalla are being originated within block except few 2nd order streams which is planned to control by garland drain along the block boundary. Only Nala covering bigger catchment outside of block.

To arrest the sediments and prevent silting of the water courses by the run-off during rains, toe-walls, retaining walls with weepholes at strategic stretches will be constructed. The gullies will have check-dams to prevent erosion. Garland drain will convey the water to decantation ponds and after settling allowed to flow in diversion channels. If turbidity is still high, the water is to be conducted to Sedimentation Pond.

Technical justification for mining scheme considering Hurdul nala diversion:

Diversion of Hurdul nala is proposed from eastern side of block boundary (flowing northern side) which will join the Bardiya/Jharia Nala a tributary of Hurdul Nala. In this way complete external surface runoff will go into same Drainage Density System. A cost of Rupees Forty Crore Ninety-Three Lakhs Fifty Thousand Five Hundred & Eighteen Only for the diversion of nala and site levelling. Hurdul nala along with its tributary covers an area of 2.4 sq km out of 20.96 sq km of quarry area. Mining is proposed as single quarry operation which is the only feasible option to operate this block as opencast mining, and accordingly waste management plan is planned (with 87% as internal dump).

Table 4.13: Effective waste management plan as per approved Mining Plan

Year	External Dump (Mcum)		Internal Dump (Mcum)		Total OB (Mcum)	
	Progressive	Cumulative	Progressive	Cumulative	Progressive	Cumulative
Total	259.01	259.01	1704.54	1704.54	1963.55	1963.55
	259.01		**1704.54**		**1963.55**	

Total of 186 Mt coal extraction is estimated in single quarry (20.96 sq.km). The diversion is planned in such a way that Hurdul nala sanctity will be intact without affecting the flora and fauna. Hurdul nala is flowing across 4 coal blocks starting from Dhirauli to Dongrital through Suliyari followed by Dongrital II, and diversion is required in all coal block to operate the Opencast mines. The proposed diversion is taking the Hurdul nala along the periphery of Dhirauli coal block which will only marginally affect the mine operation and slight straightening may be required in other two blocks (Dongarital and Dongarital II). It is envisaged to divert the nala in such way that water will be discharged in original flow of nala. Hydrological Study has been carried by accredited consultant wherein it has been proposed to carry out diversion of Hurdul Nala in a manner so as to render an unaffected watershed and restore the aqua biodiversity in the region to its present condition.

4.6.3 PROPOSED MITIGATION MEASURES FOR HURDUL NALA DIVERSION

The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of nonrenewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff.

The total length of proposed diversion along boundary is 6900 m. The starting & ending RL are 555 m RL & 484 m RL respectively. The general slope will be 1:100 m. It is proposed to carry out surface excavation up to ground level along boundary side of 45 m width.

FOR ABATING WATER POLLUTION

(a) Effluent from mine

To prevent surface water contamination, following control measures are proposed in Environmental Management Plan:

- Mine water should be pumped to settling tank for settling and then the clean water will be pumped out and discharged.

- Leak proof containers should be used for storage and transportation of oil/grease.
- To avoid oil/grease spillage in the store, the container containing oil/grease should be kept in empty open containers of higher volume than these containers.
- The area over which oil/grease is handled should be kept effectively impervious.
- Any wash off from the oil/grease handling area or workshop should be drained through impervious drains, collected in specially constructed pit and treated appropriately.
- The sewage waste will be discharged to appropriately designed septic tanks and soak pits to prevent any pollution of surface or ground water.
- All the effluent tested regularly before discharging into the natural drains should meet the applicable standards and need regular monitoring.
- The surface and ground water in and around the mine, loading plant and infrastructure should be tested as per the monitoring schedule and appropriate control measures should be adopted, if required.
- All stacking and loading areas should be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

(b) Storm water

Control measures to be adopted are briefly discussed below:

- Check dams should be provided to prevent solids from wash off and screen, if any, from the mine related activities.
- Peripheral bunds should be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by storm water.
- A water gradient of about 1 in 100 will be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes causing serious erosion.
- Chutes should be constructed by using local stone masonry to guide the water in areas with loose soil to prevent suspended solid load in run-off and uncontrolled descent of water wherever necessary.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented.
- The mine water should be passed through specially constructed catch pits to arrest any loose material being carried away with water.
- Any areas with loose debris within the leasehold should be planted.

- Garland drains should be constructed surrounding the waste dumps and should be connected to the surface water reservoir to avoid the run-off mixing directly to natural water channels before settling.
- Run-off water from mine pit should be directed to the settling pond.

(c) Riverine Ecology Management

The planktonic population of the stream is inherently poor due to constant change in water flow as (Hurdul Nala is seasonal in mine lease area), habitat structure and thus has a less role to play in ecological niche. The aquatic species of Jharia/ Jhana Nala is similar to Hurdul nala. During the post impoundment period following measures shall be followed:

- Periodic monitoring of the changes taking place in the geomorphology and aquatic ecology and suggesting appropriate improvement measures for enrichment of fisheries and aquatic ecology as whole.
- Habitat / Eco-region-based improvement & management
- The diverted Nala route shall be vegetated to improve the habitat / landscape and to overcome soil erosion.
- Regular monitoring of water quality of Diverted Nala in upstream & downstream shall be undertaken.

S. No.	Particular	Capital (Rs.	Recurring (Rs. Lacs)
A) Physical Measures			
1	Construction of Garland Drains	-	(Already covered in
2	Construction of Hatchery	50	12.00
3	Sedimentation Tank/ Pond	60	15.00
4	Septic Tank	40	15.00
5	Online water sampling/Monitoring at discharge point and starting point	40	10.00
6	Construction of Retention wall/ check dams to avoid soil erosion	-	(Already covered in
B) Biological Measures			
7	Seeding/Inoculation of fisher lings	20	10.00
8	Greenbelt Development b/w the mining boundary and diverted route of Nalla	37	20.00
	Total in INR Lacs	**247.00**	**82.00**

4.6.4 Impact of Mining on Ground Water

The mining activity proposed to be carried out in next five years will not interfere anywhere with the natural drainage pattern. The reduced water levels in the study area range from 395.00 m amsl in the north-east to 574.50 m amsl in the central part

(southeast of Dhirauli block) during pre-monsoon and from 399.50 m amsl in the north-east to 580.00 m amsl in the central part of the study area. The reduced water levels in the project site range from 475.00 m amsl in the western part to 574.50 m in the south-east during premonsoon and from 482.00 m amsl in the western part to 580.00 m amsl in the south-east during post monsoon. The average water levels derived from reduced water level data during pre- and post-monsoon seasons in the ML area are observed to be around 524.75 m bgl and 531.00 m respectively.

A review of the topography and drainage pattern reveals that the regional slope in the study area is towards SE. The water table contours almost follow the topography of the study area showing the direction along surface drainage courses. The ground water flow direction in the ML area is towards west. The hydraulic gradient across the ML area is observed to be 15.66 m/km during pre-monsoon and 10.29 m/km during post monsoon.).

4.6.5 Impact due to Effluent Generation from the Mine

Wastewater from service facilities

Water used at various service facilities viz. office. canteen, etc is likely to generate wastewater with high suspended solids, BOD, etc. Estimated quantity of wastewater from this source will be 10 Kl/d. the waste generated from these units will be collected and treated in a Package. The waste generated from these units will be collected and treated in a Package Sewage Treatment Plant and the effluent will be Chlorinated and used for plan greeneries and dust suppression.

Waste from HEMM washing and Workshops

Wastewater/ industrial effluent coming out of the HEMM washing in Base Workshop and other repair and maintenance shops will be estimated 45 KLD. This effluent contains suspended solids, TSP, oil and grease and the same will be sent to a grease trap. After removal of grease, the effluent from the Grease Trap will be fed to a settling tank with oil skimming arrangement in the Effluent Treatment Plant (ETP). The effluent of the settling tank will be utilized in haul road dust suppression/forestation/green belt.

Waste from dust suppression at CHP and coal stockpile.

Wastewater from CHP system which will contain fine coal dust as suspended solid has been estimated as 30 KLD. This will be routed through a settling tank to the Sedimentation Pond for treatment.

Pyritic impurities in coal are a source of acid drainage. From the petrographic studies of the coal stated in the GR. Pyrite is there in the samples. It is proposed that during

the operation of the mine, effluent quality of CHP is to be sampled frequently to determine the pH and corrective action taken.

Pumped out water from the quarry Water accumulates in course of mining and has to be constantly pumped out for safety of men and machines Mine water is generated from two sources (a) ground water as the quarry goes deeper, more and more aquifers are intercepted, and volume of water increases.

Rainwater: direct precipitation over the excavated area and surface run-off flowing into the mine during rains. For reducing the run-off, garland drains will be constructed around the excavated area and the top of back-filled area will be given a grade, so that rainwater flows outwards. However, a portion of the rainwater will always find way in the quarry.

The pumped-out water of the quarry generally contains high TSP and in some cases dissolved minerals making the water acidic. Though a substantial portion of this water is used within the mine for industrial use viz. HEMM washing I workshop use / CHP and for dust suppression and forestation, it is not advisable to discharge the surplus water to the general drainage system without treatment, lest the surrounding will be contaminated. To mitigate this, it has been proposed to conduct the water to a Sedimentation Pond of 10,000 cu.m. from where the water will collect in clear water sump. During actual mining, it will be decided whether raw water treatment will be needed to avoid high turbid water supply. After treatment, the water is distributed by pumping to consuming points. And the surplus water allowed to flow out. Regular sampling of surplus water shall also be conducted.

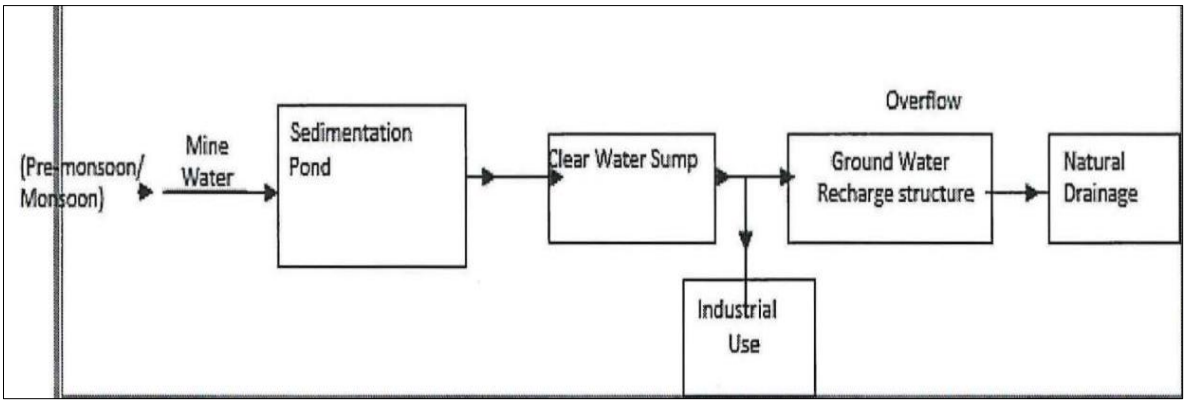


Figure 4.12: Mine water Treatment and Disposal

Rainwater Harvesting Potential of the Mine

Rainwater harvesting is the accumulation and deposition of rainwater for reuse on-site, rather than allowing it to runoff. Rainwater can be collected from surface runoffs or roofs, and in many places the water collected is redirected to a deep pit (well, shaft, or borehole), a reservoir with percolation, or collected from dew or fog with

nets or other tools. Depending upon the available contours at detailed engineering stage, the number of drainage outfall and extent of open drains etc. will be designed to discharge the water to the rainwater harvesting pond for reuse in dust suppression & greenbelt development. The calculation of rainwater endowment is presented here which shows the total rainwater harvesting potential of the plant area

Design parameters of Rainwater Recharge Structure:

Three most important components, which need to be evaluated for designing a rainwater harvesting structure, are

Hydrogeology of the area including nature and extent of aquifer, soil cover, topography, depth to water table and quality of ground water.

Area contributing to runoff i.e., total area and land use pattern, whether industrial, residential, or green belts and general built-up pattern of the area

Hydro meteorological characters viz. rainfall duration, general pattern of intensity of rainfall.

Circular pits have been proposed for our project.

To design the recharge structure, hourly intensity of rainfall is 30 mm/hr has been taken into account and the details are tabulated below.

Based on the Runoff Coefficient the water harvesting potential of a site could be estimated using the formula given below:

Water harvesting potential in m^3/year = Annual Rainfall (m) x Area of catchment (m^2) x Runoff coefficient.

Table 4.14: Data Assumed and/or Available for Rainwater harvesting

S. No.	Details	Values
Area Details:		
1	Rooftop Area(m^2)	41600
2	Road and Paved Area(m^2)	166400
3	Green Belt Area (m^2)	468000
4	Open Land Area (m^2)	26044000
Total Area (m^2)		26720000
1	Average Annual rainfall (m) (Source: CGWB-WRIS)	1.031
2	Peak One day Rainfall intensity (m)	107
Runoff coefficients:		
1	Runoff coefficient for roof top 0.80-0.90	0.85
2	Runoff coefficient for yard & paved area 0.60-0.65	0.65
3	Runoff coefficient for open land 0.15-0.25	0.20
4	Runoff coefficient for Green belt land 0.10-0.20	0.15

Table 4.15: Water Quantity of Runoff Water

Sr. No.	Details	Area (m2)	Annual Rainfall (m)	Run-off coeff.	Total Runoff (Cubic m per Annum)
1	Rooftop Area(m^2)	41600	1.031	0.85	36456.16
2	Road and Paved Area(m^2)	166400	1.031	0.65	111512.96
3	Green Belt Area (m^2)	468000	1.031	0.15	72376.2
4	Open Land Area (m^2)	26044000	1.031	0.20	5370272.8
Total Runoff water quantity/annum (m^3/year)					5590618.12
Potential harvested water (considering 20% loss due to evaporation, spillage, etc)					4472494.5

Table 4.16: Hourly Runoff

Sr. No.	Details	Area (m^2)	One day Rainfall (m)	Run-off coeff.	Total Runoff (Cubic m per Day)
1	Rooftop Area(m2)	41600	0.107	0.85	3783.52
2	Road and Paved Area(m^2)	166400	0.107	0.65	11573.12
3	Green Belt Area (m^2)	468000	0.107	0.15	7511.4
4	Open Land Area (m^2)	26044000	0.107	0.20	557341.6
Total Runoff water quantity/Day					580209.64
Total Quantum of water Available @20min.					464167.71

- Total 4472494 m^3 of Rainwater will be collected in the mine lease area.
- Garland drain will be provided around the mine lease area to arrest the drained rainwater and will be connected to settling tank or mine pits for the accumulation.
- Accumulated Rainwater in the mine pit recharges the ground water naturally.
- Harvested rainwater in the mine pit will be utilized for various activities like greenbelt area development, dust suppression and other activities as and when required.

4.7 IMPACTS OF NOISE/VIBRATIONS AND MITIGATION MEASURES

Ambient noise levels measured in and around the Mine during the study period indicated that the noise levels at all the locations were within the permissible limits at

most of the times. As stated in chapter 2, the proposed mine will be mechanized opencast cum underground mining with deep hole drilling & blasting for Overburden and Coal extraction. The mine will have following source of noise

- Drilling
- Blasting
- Operation of HEMM & Vehicular Movement

The impact of this airborne noise will be more on the operating personnel and on the persons working nearby and not so much on the surroundings. The noise of activities may also disturb animals/birds living in the surroundings forcing them to change their habitat. In the present case, the noise caused will be mainly restricted to the core zone. The noise level data recorded at various places in the study area is well within the desired limit. But the future increment in noise levels due the proposed project activity may pose some problem if project management does not adopt appropriate control measures.

4.7.1 Noise Dispersion from the Mine

The noise generation from the mine will be from various sources, which will be originating from various locations within the site. Hemispherical sound propagation has been assumed. To noise dispersion for worst case scenario, it is assumed that all the noise generating sources from the quarry are located within the mine site and will operate at the same time and can move within the mine boundary. Hence, the Centre point is taken as the starting point of noise. The dispersion of this noise is computed by using the noise dispersion model.

4.7.2 Mathematical Model for Sound Wave Propagation during Operation

For estimation of dispersion of noise in the ambient from the source point, a standard mathematical model for sound wave propagation is used. The sound pressure levels generated by noise sources decreases with increasing distance from the source due to wave divergence. An additional decrease in sound pressure level with distance from the source is expected due to atmospheric effect or its interaction with objects in the transmission path. For hemispherical sound wave propagation through homogenous loss free medium, one can estimate combined effect of noise levels at various locations, due to different sources using model based on the following equation:

Lp (total) = 10 Log (10^(Lp1/10) + 10^(Lp2/10) +……+ 10^(Lpn/10) + AE

Where Lp1, Lp2, Lpn are noise levels at a point due to different sources

The sound power level of various equipment proposed to be used in the mining operation is given in **Table 4.17**.

Table 4.17: Expected Noise Levels from Mine Operations

S.No.	Machines/Units	Expected Noise Levels
Mining		
1	Drilling	85
2	Shovel/Loader	75
3	Dumpers	80
4	Dozers	78

Note: As blasting noise is instantaneous and causes an overpressure, it is not put as input to day-night model.

The combined noise level when the above-mentioned machineries are operated at once is calculated to be 87.4 dB (A). Noise propagation model was used to calculate noise pressure levels from these activities to various distances from the project boundary. The Atmospheric Conditions and Ground effects were also considered as mentioned in ISO: 9613. The boundary plantation around the mine area was also considered while modelling. The results are shown in **Table 4.18 & 4.19**. The Noise level contour map is shown in **Figure 4.13 & 4.14.**

Table 4.18: Incremental Noise Level at Different Locations (Without EMP)

Location Codes	Distance from the project site (km)	Baseline Leq Values in dB(A)	Incremental Sound Pressure level in dB(A)	Resultant Sound pressure Level in dB(A)	Remarks
N1	--	47.8	67.8	68.3	Major Impact
N2	2.0	44.9	52.4	53.1	Major Impact
N3	3.9	46.9	54.5	55.2	Minor Impact
N4	4.5	64.6	54.8	65.1	Minor impact
N5	4.6	60.9	52.4	61.5	Minor Impact
N6	0.5	42.8	57.5	57.9	Major Impact
N7	0.8	41.7	59.1	59.8	Major Impact
N8	1.5	49.6	62.1	63.4	Major Impact

The combined noise level when the machineries are operated in shift wise time duration along with implementation of EMP is calculated to be 79.6 dB(A).

Table 4.19: Incremental Noise Level at Different Locations (With EMP)

Location Codes	Distance from the project site (km)	Baseline Leq Values in dB(A)	Incremental Sound Pressure level in dB(A)	Resultant Sound pressure Level in dB(A)	Remarks
N1	--	47.8	59.1	59.4	Major Impact
N2	2.0	44.9	39.1	45.9	Minor Impact
N3	3.9	46.9	41.1	47.9	Minor Impact
N4	4.5	64.6	41.3	64.9	Minor impact
N5	4.6	60.9	39.9	61.3	Minor Impact
N6	0.5	42.8	50.8	51.4	Major Impact
N7	0.8	41.7	45.6	47.1	Minor Impact
N8	1.5	49.6	48.5	52.1	Minor Impact

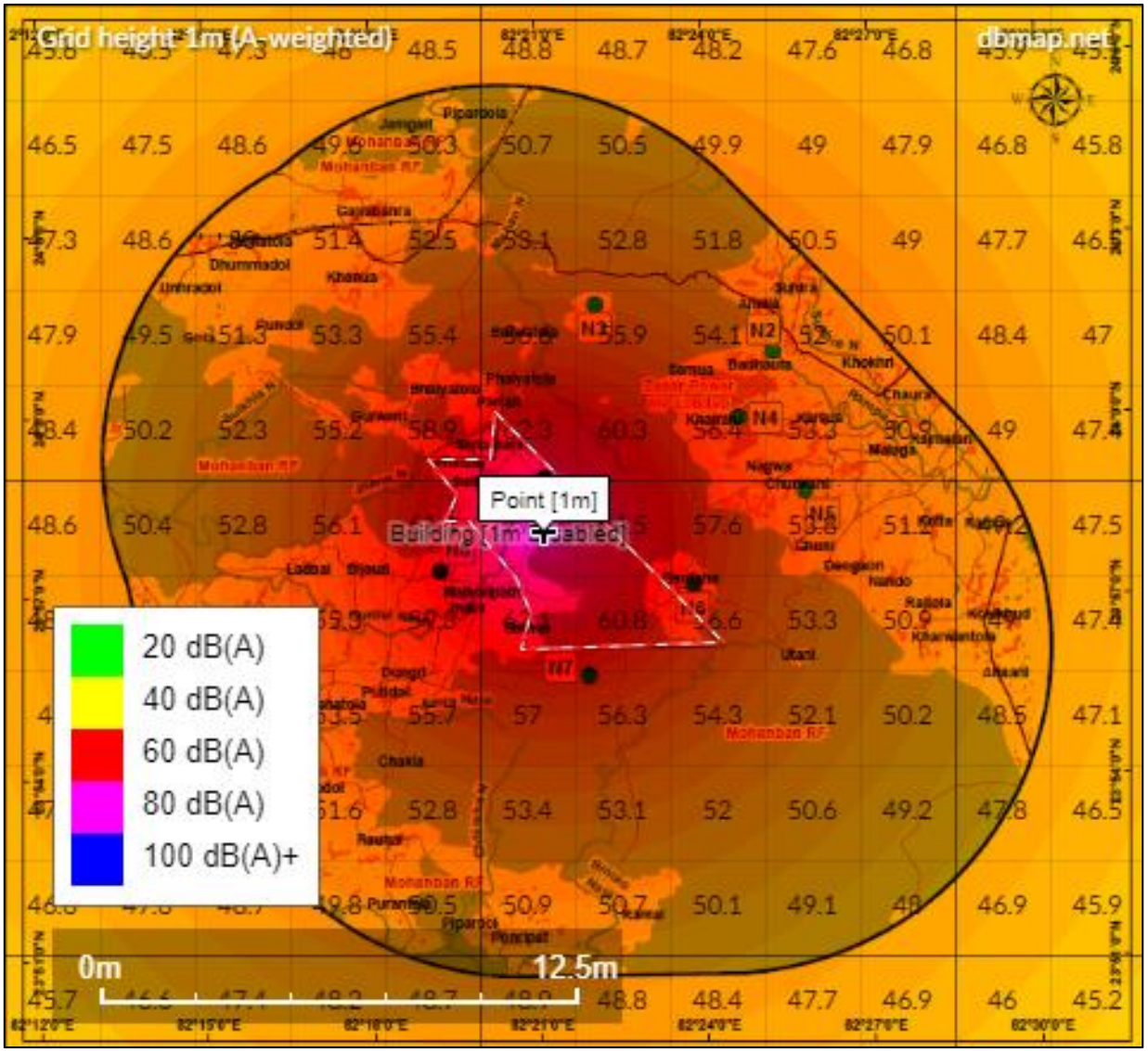


Figure 4.13: Noise Contours for 10 Km Radius Study Area (Without EMP)

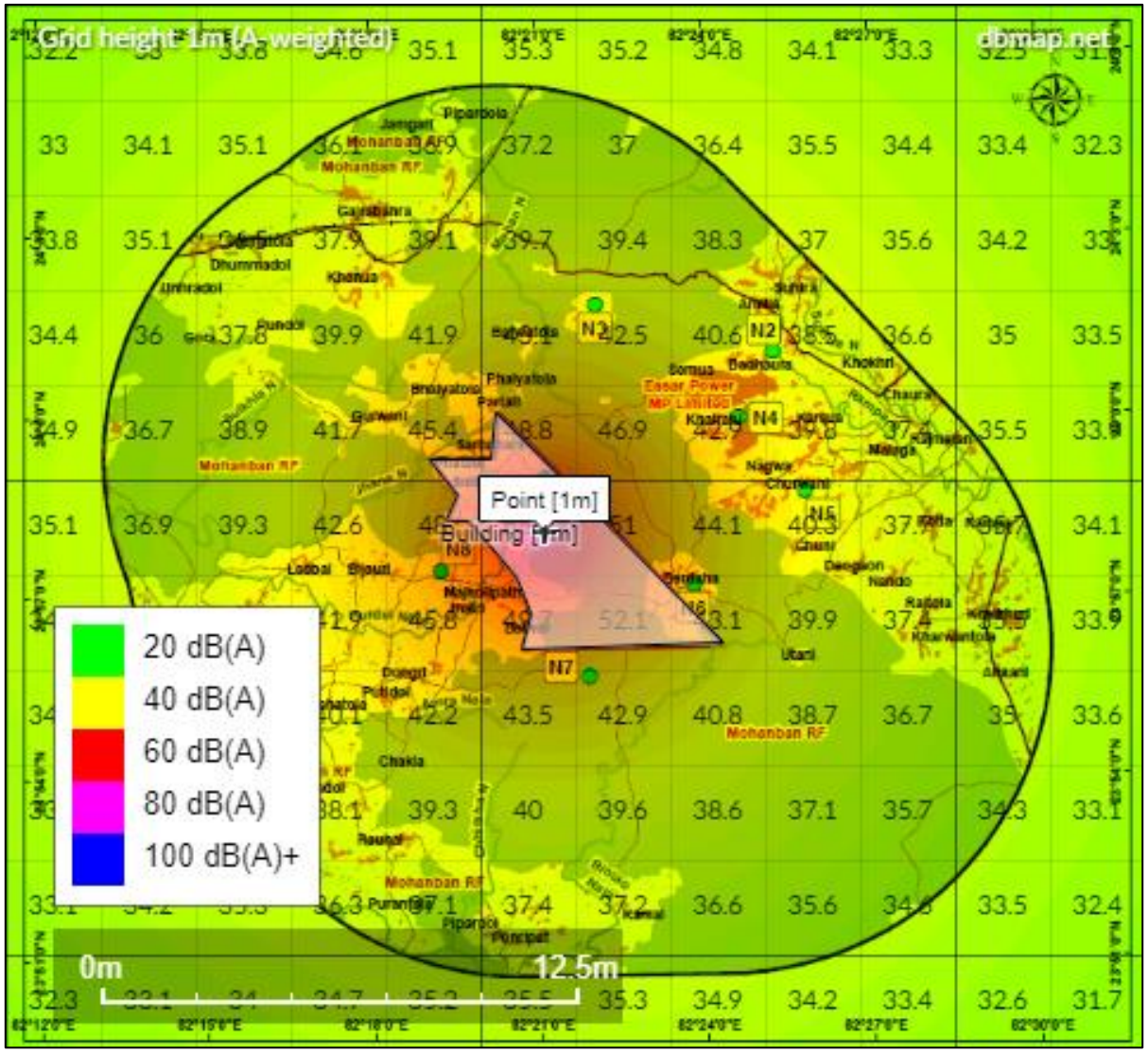


Figure 4.14: Noise Contours for 10 Km Radius Study Area (With EMP)

4.7.3 Observation

- Incremental noise level in nearest habitation Berdaha at a distance of 500 m from site is 51.40 dB (A).
- The noise levels are further reduced when the implementation of EMP and shift wise operation of machineries is considered.
- Beyond 500 m from the project area, increase in noise level, due to proposed activities, will be negligible.
- Noise level does not exceed the CPCB limit at any location due to mining activity.

4.7.4 Mitigation Measures

Control of Mine Machinery and Units

When attempting to attenuate noise, it should be borne in mind that noise radiates from most machinery as both airborne and as structure-borne sound at the same time. Following's mitigation measures will be adopted:

- Provision of sound-insulated chambers for workers deployed on machines producing higher levels of noise like bulldozers, drills, etc.
- Selection of new low-noise equipment from the manufactures failing which use of additional retrofits if available.
- Providing silencers or enclosures for noise generating machines such as DG sets, compressors, etc.
- Attenuation of Structure-Borne Sound: Preventing transmission of vibration from machines to the load-bearing structure can considerably reduce structure-borne sound:
  I. Large heavy machines should be mounted on foundations which are completely separated from buildings or other structures
  II. Placing other machines on a stable foundation and where possible using an elastic separation such as rubber blocks or steel springs.
  III. Severely vibrating machines may require separate foundations and isolation joints between floor slabs to prevent propagation of structure-borne noise.
- Sound Insulated Rooms: Cabins should be constructed of materials with good sound attenuation properties and ideally will have:
  I. Double glazed windows - (two 6 mm glass panes with 50 mm air space can give 10 dB (A) attenuation).
  II. Ventilation openings with attenuators such as acoustic louvers.
  III. An adequate air conditioning system, to avoid doors being left open.

Use of Protective equipment- Administrative Control

- As part of a hearing protection Adani Enterprises Ltd (AEL) shall consider:
- The need for hearing protectors.
- Defining hearing protector areas.
- Selection of hearing protectors
- Issuing of hearing protection to individuals.
- Cleaning, maintenance, and replacement of hearing protectors.
- Training and education of people wearing hearing protectors.
- Provision of job rotation in noisy areas that will reduce personal exposure.
- Planned plant maintenance specifically for noise control.
- Training on noise impact and consequences
- Including Noise aspects in work agreements with contractors.

4.7.5 Blasting

To loosen the material blasting in hard formations is the required. The noise produced by blasting will be for extremely short duration though with a high intensity. Noise of blast is site specific and depends on type, quantity of explosives, dimensions of drill holes, degree of compaction of explosive in the hole and rock. The noise levels during blasting operations are likely to be in the range of 120-140 dB (A) at 50-100 m distance from the blast site. The noise levels decrease substantially with distance. Blasting will be carried out maximum two times per week at noon time.



Figure 4.15: Optimized Blasting Cycle

4.7.6 Mitigation Measures

Due attention will be given to the following factors:

- Quantity of explosive: The quantity of explosive blasted will be decided as per IBM and trial blasting results
- Stemming material: Controlled blasting with proper spacing, burden and stemming will be maintained
- Stemming material to be used is sand. However, the drill cuttings and chips of triangular shape can be used as an effective stemming material with proper packing.
- Minimum quantity of detonating fuse will be consumed by using alternatively Excel non-electrical initiation system
- Delay system: Use of millisecond delay detonators that are initiated by shock tube initiation system, between rows and between holes in the same row.
- Blasting time: Blasting will be done in daytime during the shift change over period as per requirement.
- Warning: Before blasting is done, warning sound shall be given, and placards/flags will be displayed so that people can move to safe places.
- Secondary blasting will be totally avoided.

4.8 IMPACT DUE TO GROUND VIBRATIONS, AIR BLAST & FLY ROCK

4.8.1 Ground Vibration

Ground vibration, fly rock, air blast, noise, dust, and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants. It causes major damages to the pit configuration too. When an explosive charge is fired inside the blast hole, it is instantly converted into hot gases, which exert intense pressure on the blast hole walls. High intensity shock waves propagate radially in all the directions and cause the rock particles to oscillate. This oscillation is felt as ground vibration.

Blasting, in addition to easing the hard strata, generates ground vibrations and instantaneous noise. Ground vibration from mine blasting is expressed by amplitude, frequency, and duration of blast. The parameters, which exhibit control on the amplitude, frequency, and duration of the ground vibration, are divided in two groups as follows:

(a) Non-controllable Parameters

(b) Controllable Parameters

The non-controllable parameters are those, over which the Blasting Engineer does not have any control. The local geology, rock characteristics, type and depth of overburden and distances of the structures from blast site are the non-controllable parameters. However, the control on the ground vibrations can be established with the help of controllable parameters. The same have been produced below:

1. Charge weight per delay
2. Burden, spacing and specific charge
3. Delay Interval
4. Coupling
5. Type of Explosive
6. Confinement
7. Direction of blast progression
8. Spatial distribution of charges

The oscillation of rock particles is called Particle Velocity and its maximum value is called Peak Particle Velocity (PPV), which is measured in milli meter per second. The standards for safe limit of PPV are established by Director General of Mines Safety for safe level criteria through Circular No. 7 dated 29th August 1997. The safe level criteria PPV as mentioned in Circular No. 7 of DGMS is presented in **Table No. 4.20.**

Table 4.20: Permissible Peak Particle Velocity (mm/sec)

S.No.	Type of Structure	Dominant Excitation frequency, Hz		
		< 8	8 - 25	> 25
A	**Buildings / Structures not belonging to the owner**			
i.	Domestic houses / structures (kuchha brick and cement)	5	10	15
ii.	Industrial Buildings (RCC & Framed Structures)	10	20	25
iii.	Objects of historical importance & sensitive structures	2	5	10
B	**Buildings belonging to the owner with limited span of life**			
i.	Domestic houses / structures (kuchha brick and cement)	10	15	25
ii.	Industrial Buildings (RCC & Framed Structures)	15	25	50

Source: DGMS Circular No. 7 dated 29th August 1997

As the distance from blast site increases, the PPV value is likely to reduce. The ground vibrations generated by blasting during the mining operations will be kept within the standards prescribed by DGMS by adopting controlled blasting technique including suitable blast design. The impacts will also be minimized by choosing proper detonating system, optimizing total explosive charge and explosive charge / delay. Noiseless trunk delays to minimize the noise due to air blast, non-electric (NONEL) system of blasting for true bottom hole initiation, muffling by used conveyors to arrest the dust and fly rock will be adopted in the mines. Hence, the impact due to ground vibration will be significantly reduced. Thus, by keeping the

ground vibrations under control, the impact on the structures in the vicinity of mine lease area can be avoided.

4.8.1.1 Vibration Control Measures

The following measures shall be taken at the mines for control of vibrations due to blasting:

- Using optimum maximum explosive charge per delay to keep the ppv below the threshold limit.
- Using NONEL means of ignition for providing down the hole delay, row to row delay and hole to hole delay in the same row.
- Optimising blast design by exercising strict control over blast design parameters such as burden, spacing, proper stemming orientation of all blast drill holes and accurate drilling based on rock type, jointing pattern, proper face preparation etc.
- Ensure designed depth and inclination of blast holes, keeping the sub-grade drilling optimum.
- Ensure proper free face for first row of holes.
- Establish times of blasting to suit local conditions.

4.8.2 Fly Rock

Fly rock fragments shall be controlled to ensure safety of personnel, as well as to protect the structures/machineries within the blasting zone from damage. Depending upon the diameter of the holes, bench height, spacing & burden and the charge weight per delay, the maximum distance to which rock fragments usually fly has been observed to be within 100 to 150 m. The following measures will be taken to control the fly rock during blasting operations at the proposed mining blocks:

- Blasting will be performed strictly as per the guidelines specified under blasting technology.
- Overcharging will be avoided.
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts
- Blasting operations will be carried out only during daytime as per mine safety guidelines.
- A safe distance of about 500 m from center of blasting will be maintained.
- During blasting, other activities in the immediate vicinity will be temporarily stopped; and
- Drilling parameters like over burden, depth, diameter and spacing will be properly designed to give proper blast.

4.9 WASTE MANAGEMENT

The solid wastes generated from the mining operations are topsoil and over burden.

4.9.1 Waste Overburden Generation and Its Management

The opencast mine is planned upto 280 m depth on the floor of seam-VII with overall average stripping ratio of 10.55 m^3 /te.

The total volume of OB has been estimated as 1963.55 Mcum. The OB removed during initial years will be placed beyond the incrop of the seam VII as external dump. The total volume of external dump has been estimated as 259.01 Mm3

The internal dumping will start when about 100 m internal space is available on quarry floor. By adopting the proposed sequence of mining, as the quarry advances, the amount of internal dump will increase as more space for the internal dumping is created.

It is proposed to start internal dumping from 3rd year of mine operation along with external dumping to optimize lead. As the gradient of the seam is flat, during working of the quarry substantial amount of OB can be accommodated as internal dump. After 18th year of mine operation, no external dumping will be required. Hence, OB will be accommodated as internal dump for rest of the mine life.
During 1st year, height of external dump will be kept at only 60 m above the ground level. During 3rd year, height of eastern external dump and eastern in-pit dump will be merged by maintaining 90m height above the ground level (RL of 600). At the end of 5th year height of internal dump will be 90m above ground level. At the end of mine life, internal dump will be at 60 above the ground level for some part

Table 4.21: Year-Wise Dhirauli Coal Block Solid Waste Management

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-1	16.35	16.35	-	-	16.35	16.35
Yr-2	28.12	44.47	-	-	28.12	44.47
Yr-3	19.36	63.83	13.94	13.94	33.30	77.77
Yr-4	12.39	76.22	20.76	34.70	33.015	110.92
Yr-5	11.64	87.86	21.53	56.23	33.17	144.09
Yr-6	10.5	98.36	24.30	80.53	34.80	178.89

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-7	11.34	109.70	24.30	105.19	36.00	214.89
Yr-8	11.55	121.25	25.70	130.89	37.25	252.14
Yr-9	41.97	133.22	26.33	157.22	38.30	290.44
Yr-10	12.11	145.33	26.49	183.71	38.60	329.04
Yr-11	12.81	158.14	27.49	211.20	40.30	369.34
Yr-12	13.02	171.16	28.73	239.93	41.75	411.09
Yr-13	13.58	184.74	30.32	270.25	43.90	454.99
Yr-14	13.79	198.53	32.11	302.36	45.90	500.89
Yr-15	14.42	212.95	32.88	335.24	47.30	548.19
Yr-16	14.91	227.86	34.09	369.33	49.00	597.19
Yr-17	15.33	243.19	34.72	404.05	50.05	647.20
Yr-18	15.82	259.01	35.03	439.08	50.85	698.09
Yr-19	-	259.01	51.40	490.08	51.40	749.49
Yr-20	-	259.01	52.25	542.73	52.25	801.74
Yr-21	-	259.01	53.30	596.03	53.30	855.04
Yr-22	-	259.01	54.25	650.28	54.25	909.29
Yr-23	-	259.01	55.75	706.03	55.75	965.04
Yr-24	-	259.01	58.25	764.28	58.25	1023.29
Yr-25	-	259.01	60.75	825.03	60.75	1084.04
Yr-26	-	259.01	62.75	887.78	62.75	1146.79

Year	External Dump		Internal Dump		Total OB	
	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)	Progressive (Mcum)	Cumulative (Mcum)
Yr-27	-	259.01	64.00	951.78	64.00	1210.79
Yr-28	-	259.01	64.50	1016.28	64.50	1275.29
Yr-29	-	259.01	65.50	1081.78	65.50	1340.79
Yr-30	-	259.01	65.75	1147.53	65.75	1406.54
Yr-31	-	259.01	66.50	1214.03	66.50	1473.04
Yr-32	-	259.01	67.25	1281.28	67.25	1540.29
Yr-33	-	259.01	67.25	1348.53	67.25	1607.54
Yr-34	-	259.01	67.75	1416.28	68.50	1675.29
Yr-35	-	259.01	68.50	1484.78	68.50	1743.79
Yr-36	-	259.01	68.50	1553.28	69.25	1812.29
Yr-37	-	259.01	69.25	1622.53	68.50	1881.54
Yr-38	-	259.01	53.50	1676.03	69.25	1935.04
Yr-39	-	259.01	21.50	1697.53	53.50	1956.54
Yr-40	-	259.01	7.01	1704.54	21.50	1963.55
Total	**259.01**	**259.01**	**1704.54**	**1704.54**	**1963.55**	**1963.55**
	259.01		**1704.54**		**1963.55**	

Table 4.22: Waste Management

Year	Waste Management (Figures in Mm3)						
	Cumulative OB Removal			External Dump (Cumulative)		Internal dump/Backfilling (Cumulative)	
	Topsoil	OB	Total	Top soil	OB	Top soil	OB

Y-01	0.80	15.55	16.35	-	16.35	-	0.00
Y-03	2.20	75.77	77.77	-	53.83	-	23.94
Y-05	2.90	141.09	144.09	-	73.27	-	70.82
Y-10	5.36	3232.68	329.04	0.54	130.20	4.83	193.48
Y-15	7.65	540.55	548.19	0.76	197.60	6.88	342.95
Y-20	9.93	791.81	801.74	0.99	258.02	8.94	533.79
Y-25	12.51	1071.53	1084.04	1.81	257.20	10.71	814.33
Y-30	15.09	1391.45	1406.54	1.81	257.20	13.29	1134.25
Y-35	18.26	1725.53	1743.79	1.81	257.20	16.496	1468.33
Y-40	21.43	1942.12	1963.55	1.81	257.20	19.63	1684.91
Y-45	-	-	-	1.81	257.20	19.63	1684.91

Source: Approved Mining Plan, Dhirauli Coal Mine

4.9.2 Waste Dump Management

- Slope of spoil bank shall be determined by the natural angle of repose of the material being deposited, but in any case, shall not exceed 37 degrees from horizontal. In this plan, external dump for soil will have slope of 37 deq. As regards slope of the back-fill in Quarry, it is planned at 34 degrees.
- Any spoil bank exceeding 30 m in height shall be benched so that no bench exceeds 30 m in height and the overall slope shall not exceed 1 vertical to 1.5 horizontal.
- The toe of a spoil-bank shall not be extended to any point within 100m of a mine opening,
- All the waste dumps will be surrounded by garland drains to minimise wash-offs.
- In the final stages, to prevent wash-offs, the dump has been filled up to its holding capacity, these will be systematically rehabilitated with afforestation.
- Dump stability shall be monitored regularly, and necessary actions shall be taken in case of failures.

4.9.3 Wastes from Service Centres

The proposed mine will be equipped with the washing station, as well as repairs and replacement of components I assemblies of for Light Motor Vehicles (LMV). Medium scale repair and replacement of components, assemblies and subassemblies of Coal Handling Plant, pumps, and other electrical and mechanical equipment, viz. switchgear, motors etc. This will have support of machine shop, welding, smithy, battery charging etc. The metallic wastes generated during minor repair mainly iron & steel scrap, are collected & stored in a central store, and sold. Metal tray is being used during minor repairs to avoid land contamination due to spillage of oil. The non-metallic saleable wastes like, tyres, tubes etc. are also stored separately and sold. Oil contaminated hazardous wastes generated outside is being sent to TSDF. Used

Oil generated during maintenance outside the lease will be sold to the registered recyclers by MDO.

4.10 IMPACT ON TOPSOIL

Topsoil is proposed to be removed separately and dumped outside the quarry in a manner so as not to lose its fertility. The topsoil would be spread over the reclaimed land, afterward.

Topsoil will be removed and dumped on the area shown on surface plan. Topsoil will be stored for initial four years and during subsequent years it will be directly spread over the reclaimed area. The quality of the soils, at different land use patterns in the study area is discussed below:

4.10.1 Topsoil and Management

Year wise generation of Topsoil is given in **Chapter 2** of the Report.Topsoil extraction from lease area may also affect the soil fertility and productivity.

Due to low self-life is available, total topsoil generated during the ensuing period will be used for proposed plantation purpose. Minimum storage time shall be attempted to avoid nutrient loss.

4.11 Mitigation Measure for Critically Polluted Area

Introduction

Singrauli an Indian Energy Capital town in Singrauli district is famously known for its Coal mining and power plants which is located in North Eastern part of Madhya Pradesh. While the city is spread over an area of 2,200 sq km, the district of Singrauli covers an area of 5,672 sq km. It covers a region comprising of the eastern part of Sidhi district in Madhya Pradesh and the adjoining region in southern part of Sonbhadra District in Uttar Pradesh. Due to its immense natural potential and huge reserves of coal, it is also known as “Urjanchal‟ – the land of energy.

The coordinates of Singrauli is 24.1992^{o} north to 82.6645^{o} east longitude, at an altitude of 609 meter above sea level. The nearest district circle headquarter is at Rewa which is at a distance of 200 kms. The Son is the major river which traverses the region. The other rivers which are present here are Rihand, Gopad, Myar, Khachan, Bijul, etc. It experiences a warm tropical monsoonal climate with an annual temperature of 24.7^{o}C and annual rainfall of 1100 mm.

It is pertinent to mention that regarding CEPI 2018 evalution, as per the order dated 10.07.2019 passed in O.A. No. 1038/2018 by Hon. NGT, the CPCB had submitted the latest CEPI Scores, which mentions of the Singrauli (UP & MP) as polluted area. But during various meetings conducted in this regard by CPCB in compliance of the NGT order dated 13-12-2018, where NGT has ordered to prepare action plans for

the polluted areas no action plan was sought by CPCB for Singrauli (MP) prepare an action plan for the "Severely Polluted Area[SPA], Singrauli, MP". It needs to be made clear that up till now, CPCB has never asked State of M.P. that Singrauli, M.P. also falls in CEPI region and any action plan needs to be prepared.

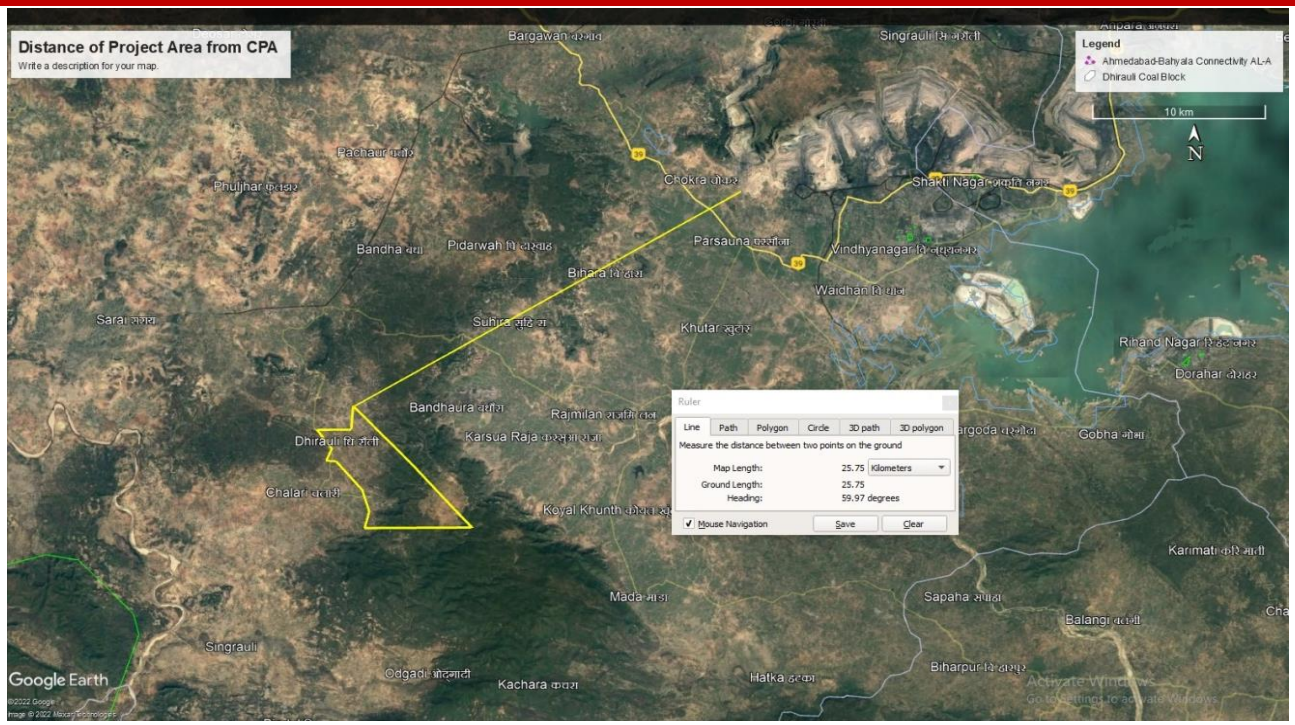
Singrauli (UP&MP) area jointly is a Severely Polluted Area (SPA) with CEPI 2018 score of 62.59. As per the analysis data of air/water/ground water for evaluation of CEPI provided by CPCB, the CEPI score of SPA Singrauli (MP) is 42.23 which is well within the prescribed standards i.e. 60. The same has also been informed to CPCB. Despite CEPI score being within the prescribed standards, the MPPCB has prepared this action plan as per the latest directions of CPCB

Location & demarcation of CEPI Area

According to the OM dated 15.3.2010, the boundaries of the CEPI (MP) areas were delineated as Vindhyachal Nagar and Jayant, Nigahi, Dudhichua, Amlori and Jhingurdah Townships. CEPI area Singrouli (MP) is an area of 114 Sq km covering mainly coal mines, their townships and one thermal power plant of NTPC and its township. This area falls in west of city. In the impact zone of 2 kms, there are 12 Red category of industries and one 17 category TPP are in operation. The red category includes 07 major coal mines which are working.

Dhhirauli Coal mine is a Greenfield opencast mining project spread over a lease area of 2672 Ha. at villages Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar, Teshil Sarai, District Singrauli, (Madhya Pradesh).

This Critically Polluted Area zone is in Singrauli which is at a distance of **25.75 Km from the Dhirauli coal block**. Therefore the project does not fall in CPA/SPA. Google Map showing given below.



The requirements of MOEF&CC for the critically polluted area vide F. No. 22-23/2018-IA.III (Pt) dated 31st October 2019 will be implemented for project, whose details are given below.

Environment	Mitigation Measures as stipulated in OM 22-23/2018-IA. III (pt) dated 31st October 2019	Proposed activities by the Project Proponent
	Stipulation of conditions such as:	
Air	Stack emission levels should be stringent than the existing standards in terms of the identified critical pollutants.	NA
	CEMS may be installed in all large/medium red category industries (air polluting) and connected to SPCB and CPCB server	CEMS will be installed which is connected to SPCB and CPCB server
	Effective fugitive emission control measures should be imposed in the process, transportation, packing etc.	• Use of dust aprons by drillers and adopting wet drilling methods. • The production of blast fumes containing noxious gases will be reduced by the following methods: • Use of adequate booster/primer; and • Proper stemming of the blast hole. • Scientific design of blast. • Drills fitted with dust collection system will be deployed or using wet drilling method. • Sprinkling of water on haul roads at

		regular intervals. • Installing permanent water sprinklers at strategic areas/locations/stretches. • Regular maintenance of vehicles and machinery will be carried out. • Cabins for shovel and dumpers and dust respirators to workmen will be provided. All HEMM cabins will be air-conditioned. • Dust suppression will be done on exposed area using water sprinkler. • Greenbelt development will be taken up all along the haul roads. • Separate storage of top soil for progressive reclamation of dumps and mined out area backfilled with overburden material. • Re-vegetation of mined out area and inactive dumps and • A good housekeeping and proper maintenance will be practiced which will help in controlling pollution. • Use of tarpaulin covered trucks for transportation of coal outside the ML area. • Regular water sprinkling on haul, access roads and all transfer points. • Haul roads to be maintained by surface grading to minimize excessive road surface wearing. • Roads no longer required will be re-vegetated as soon as possible. • Regular maintenance of all equipment to minimize particulate matter and gaseous emissions from diesel driven vehicles & equipment. • Use of non-electric initiation and computerized blast design to maximize the explosive energy for fragmentation and minimum fume generation in blast.
	Transportation of materials by rail/ conveyor belt, wherever feasible	Project proposed to develop a railway siding within the block after that Inpit conveyor belt with silo loading will be installed for transportation of coal. Till this period road transportation is proposed

	Encourage use of cleaner fuels (pet coke/ furnace oil/ LSHS may be avoided) vi Best Available Technology may be used. For example; usage of EAF/SAF/ IF in place of Cupola furnace. Usage of Supercritical technology in place of sub-critical technology.	M/s Stratatech Mineral Resources Private Limited is committed to increase the consumption of green energy which is environmentally sustainable. We further undertake that a detailed techno-economical study will be carried out regarding the retrofitting of diesel vehicles with LNG kits or CNG kits points towards the shift in adoption of greener vehicles to lower carbon emission. We, at SMRPL will work with various stakeholders across channels and investing in research and development of technology that enables efficiency and output through alternative fuels.
	Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever feasible.	Project proponent has proposed to plant 6030275 trees on 2412.11 ha area (2500 trees/Ha) till the conceptual period of the mine with 90% survival rate which is more than 40% of the total land area
	Stipulation of greenbelt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	Will be complied Planation will be done outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc., in consultation with forest department
	ix Assessment of carrying capacity of transportation load on roads inside the industrial premises. If the roads required to be widened, shall be prescribed as a condition	SMRPL is planning to set up Private Railway Siding to handle Coal.
Water	i. Reuse/recycle of treated wastewater, wherever feasible.	The generation of wastewater from the equipment is to be treated in the Effluent Treatment Plant (ETP). The generation waste water from domestic use from the canteen and domestic activities which will be treated in the sockpit/ septic tank/sewage treatment plant (STP). The treated water from sewage treatment plant will be reused for Plantation.
	ii Continuous monitoring of effluent quality/quantity in large and medium Red Category Industries (water polluting).	Online Continuous monitoring of effluent will be installed at ETP & STP
	iii A detailed water harvesting plan may be submitted by the project proponent	A detailed study of water harvesting plan is included in Hydrology study is attached as **Annexure-XI**

	iv Zero-liquid-discharge-wherever-techno economically feasible	Treated water from ETP & STP will be reused
	v In case, domestic waste water generation is more than 10 KLD, the industry may install STP.	The generation waste water from domestic use is initial phase is expected less then 10 KLD and during full operation the domestic waste water will be treated in the sewage treatment plant (STP) with capacity of 50 KLD.
land	i Increase of green belt cover by 40% of the total land area beyond the permissible requirement of 33%, wherever, feasible for new projects.	Project proponent has proposed to plant 6030275 trees on 2412.11 ha area (2500 trees/Ha) till the conceptual period of the mine with 90% survival rate which is more than 40% of the total land area
	Stipulation of greenbelt outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc.	Planation will be done outside the project premises such as avenue plantation, plantation in vacant areas, social forestry, etc., in consultation with forest department
	Dumping of waste (fly ash, slag, red mud, etc.) may be permitted only at designated locations approved by SPCBs/ PCCs.	Not applicable to our proposal
	More stringent norms for management of hazardous waste. The waste generated should be preferably utilized in co-processing	Hazardous waste will be managed as per Hazardous waste management rule. The hazardous waste likely to be generated from proposed project are used oil, discarded containers, ETP & STP sludge which will be managed as per Hazardous Waste Management Rules.
Other Condition (Additional)	Monitoring of compliance of EC conditions may be submitted with third party audit every year.	Monitoring of compliance of EC conditions will be submitted timely with third party audit
	ii The % of the CER may be at least 1.5 times the slabs given in the OM dated 01.05.2018 for SPA and 2 times for CPA in case of Environmental Clearance	As per Ministry's OM dated 30.09.2020, the Ministry has decided to deliberate on the and commitments made by the project proponent to address the issues raised in the Public Hearing held on 04.05.2022. Hence, the activities proposed by M/s Stratatech Mineral Resources Private Limited to address the issues raised in the Public Hearing for which

		a budget of Rs. 653 Lakh nhas been kept.

4.12 IMPACTS ON ECOLOGY & BIODIVERSITY AND ITS MITIGATION MEASURES

No National Park, Wildlife Sanctuary, Bio-sphere Reserve, Elephant Reserve, Tiger Reserve or Elephant Corridor etc. is present within 10 km of mining lease area. PP Has obtained the NOC from Principal Chief Conservator of Forest sidhi M.P vide letter no KRAMANK/MACHI./ 2022/3494 dated 20.05.2022 stating that there is no Eco-sensitive zone Elephants and Tigers corridor falls within the 10 m radius of the mine, same is attached as **Annexure-XIX**. There is Nine Mammals i.e Sloth bear, Elephant, Pangolin, Indian Wolf, Honey Badger, Leopard, Four-horned antelope, Chinkara, Mouse Deer, two reptiles Bengal Monitor Lizard, Python and eight birds i.e Indian Peafowl, Tawny Eagle, White Rumped Vulture, White Rumped Vulture, Pied Hornbill, White stork, White stork, King Vulture, Schedule-I species present in the study area. However, a conservation plan with budget of 12 crore has been prepared and submitted to DFO Singrauli for their approval**.** Details of the species present in the Study Area are given in the **Chapter-3** of the report. However, the Mine is dedicated and committed to conserve the species. The Conservation measures for protection of flora and fauna in Core and Buffer Zone of the Mine has been prepared in in consultation with local Forest. The same is being implemented in the area on the funding from the Mine for the conservation of the flora and fauna, present in the Study Area. The approved wildlife conservation plan basically focuses on the habitat improvement and wildlife management of mentioned species.

The project area will be reclaimed by greenbelt development, total 60,30,275 trees will be planted inside the mining lease area on waste dump & in backfilled area during the planned period and along approach road (details given at para 4.9 under Greenbelt Development Plan).

There may be some impact on the biological environment due to the air pollution during transportation of coal the end use plant. The dust deposition on the plants along the approach road may reduce the photosynthesis. This will be taken care by transportation of coal, covered truck with tarpaulin and regular water sprinkling on the approach road. Plantation along the approach road will further reduce the impact. There is no water discharge from the mine, hence impact due to effluent discharge in surrounding area is ruled out.

Noise and vibrations due to the blasting operations cannot be avoided. However, the blasting operations will be limited to day hours only and even before 15.00 hrs., so as to minimize disturbance to wildlife. All necessary precautions will be taken to

avoid flying off objects outside ML due to blasting operation. A minimum width of 500 m of danger zone will be maintained between the blasting site and mine lease boundary as prescribed by DGMS for such operations.

4.13 Socio economic impact of the project and safety measures

Critically analyzing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate both positive and negative impacts of the proposed project in the region that are stated below:

4.13.1 Positive Impacts

4.13.1.1 Rehabilitation and Resettlement

The The project involves rehabilitation and resettlement as there is acquisition of land from Dhirauli, Phatpani, Jhalari, Amraikhoh, Bansibridha, and Belwar villages in phased manner with monetory rehabilitation package & employment to one person from each family will be given.

4.13.1.2 Increase in Job Opportunities

As per the survey it has been observed that the non-worker population is high about 53% in the area so the project in general will help to provide direct and indirect job opportunities for auxiliary and ancillary works etc.

Employment Generation (Direct and Indirect) due to the project. Is about 970 persons will get direct and indirect employment will be generated from the proposed project

4.13.1.3 Minimal burden in the existing Infrastructure Facilities

Local work force will be given first preference in the activity due to which influx of the outsiders is not envisaged or it will be very minimal. Thus, there will not be the necessity of provision of housing facility for the local workers and not stressing on the existing civic amenities of the area. If enough local workers will not be available, then workers from outside will be engaged. For the outside workers if any, housing arrangement and the facilities will be provided at the project site

4.13.1.4 Improvement in Infrastructure

The activity will benefit the local people due to provision of more infrastructural facilities such as developments of approach routes within the village area, streetlight, health facilities etc.

4.13.2 Mitigation Measures of Socio-economic Environment

- Skill development programme for the local populace should be organized, so that they can earn their livelihoods, even after mine closure.
- Vocational trainings shall be for making local Artefacts, Sericulture, Medicinal Plant Cultivation, harvesting of non-Woog Forest produce like Bidi Patta (Tendu Leaves) and Mahua (Mahua Flowers, Fruits and Seed), Bamboo Cultivation, sewing etc. and implementing these Socio-economic activities scientifically for further Value Addition
- Mining in the area had an extensive impact on agriculture and forest environment of the area. To minimize negative effects of dust and particulate matter generated during mining and ancillary activities, provisions shall be made mining area and that should be kept mandatory.
- Buffer zone should be established by planting suitable plant species which can absorb/adsorb this dust and particulate matter borne by air pollution created by mining activity
- Whenever necessary, collaboration between project authority and local bodies will be done on regular basis with an objective to build and maintain a good relationship which is necessary for smooth functioning of the project as well as progress and welfare of the people in the study area
- Mining personnel and workers working in the mining areas shall be provided with protective respiratory devices like mask, filters etc. and they shall also be imparted adequate training, information and knowledge on safety and preventive health care aspects. Use of mask, filters and other health promoting precautions should be made mandatory at the mine site
- Sufficient supply of water fit for drinking shall be provided at suitable places.
- Sanitary facilities shall be provided at accessible place within the work zone and kept in a good condition.
- Medical facility should be organized by the mine owners, at least fortnightly, for the general medical health check-up of mine workers and surrounding populations. They should be educated to take preventive health precautions during mining activity.

4.14 Green Belt Development Plan

To minimize the environmental impacts arising due to the proposed project, especially from air pollution, noise pollution, soil erosion etc., the Greenbelt development around the project sites can provides the mitigation option. The green canopy not only absorbs some of these pollutants but also improves the aesthetic environment. Therefore, a “Green Belt Development Plan” has been proposed.

Under the afforestation plan, plantation will be done on both side of the approach roads, Safety zone, Waste dump and in mined out area as well as in nearest village. The species selected are dust tolerant and fast growing. Plantation along the roads

side is necessary as these areas will contain fine particulates resulting from mineral transportation activity.

Plantation Scheme

The core zone partly lies on hillocks and slopes and partly on plain land. After backfilling the mined-out areas and overburden dumps, saplings will be planted in pits at about 2.5 m intervals along contours so that the tree density is about 2500 trees per ha. Project proponent has proposed to plant 60,30,275 trees on 2412.11 Ha (2500 trees/Ha) area till the conceptual period of the mine with 90% survival rate.

- Along Mine Lease Boundary
- Plantation in Vacant Areas
- Around Office Buildings, Garage, Stores etc.
- Along the side of roads
- On over-burden dumps
- On backfill areas and on mining benches and after closure of the mine pit.

Table 4.23: Area of Plantation under Greenbelt Development Plan

Greenbelt Development	Proposed Plantation
Mine Lease Area (Ha.)	**2672**
Area for green belt development	**2412.11**
Plantation on waste dump and backfilled	2230.58
Plantation on other undisturbed area	181.53
No of plants per Ha	**2500**

Table 4.24: Location of Plantation

Year	Green belt		External Dump		Backfilled area		Other undisturbed area		Total	
	Area	No of trees	Area	No of trees	Area	No of trees	Area	No of trees	Area	No of trees
1st	8.2	20500		0		0	0	0	8.2	20500
3rd	11.26	28150		0		0	0	0	11.26	28150
5th	46.8	117000		0		0	6.9	17250	53.7	134250
10th	0	0	200.45	501125	343.12	857800	78.74	196850	622.31	1555775
15th	0	0	250.7	62690	519.75	129937	78.74	19685	849.25	212312

			6	0		5		0		5
20th	0	0	330.94	827350	664.33	1660825	78.74	196850	1074.01	2685025
25th	0	0	387.55	968875	771.97	1929925	78.74	196850	1238.26	3095650
30th	0	0	387.55	968875	931.35	2328375	78.74	196850	1397.64	3494100
35th	0	0	387.55	968875	1135.27	2838175	78.74	196850	1601.56	4003900
40th	0	0	387.55	968875	1596.23	3990575	115.24	288100	2099.02	5247550
45th	**0**	**0**	**387.55**	**968875**	**1843.03**	**4607575**	**181.53**	**453825**	**2412.11**	**6030275**

Table 4.25: Plan for the Afforestation

Year	No. of Saplings to be planted	Expected Survival (@ 90%)
1	20500	18450
3	28150	25335
5	134250	120825
10	1555775	1400198
15	2123125	1910813
20	2685025	2416523
25	3095650	2786085
30	3494100	3144690
35	4003900	3603510
40	5247550	4722795
45	**6030275**	**5427248**

Table 4.26: Budget for Greenbelt Development

Year	No. of Saplings to be planted	Capital Cost	Recurring Cost
1st	20500	20,50,000	20,500
3rd	28150	28,15,000	28,150
5th	134250	1,34,25,000	1,34,250
10th	1555775	15,55,77,500	15,55,775
15th	2123125	21,23,12,500	21,23,125
20th	2685025	26,85,02,500	26,85,025
25th	3095650	30,95,65,000	30,95,650

30th	3494100	34,94,10,000	34,94,100
35th	4003900	40,03,90,000	40,03,900
40th	5247550	52,47,55,000	52,47,550
45th	6030275	60,30,27,500	60,30,275

Along Mine Lease Boundary

The width of the green belt along the ML boundary will be maximum 7.5 m and 100m. In case the existing forest abuts the ML area, the same will be protected / maintained and the balance width will be planted to make the overall width of the safety zone as per the statutory provisions. The row of plants facing mine should be smaller species and those facing outside should be taller species. The species suggested for plantation is:

Small Species Yellow Kaneer (*Thevieta peruviana*) Pink Kaner (*Nerium sp*.) Bougainvellea (*Bougainvillea spp*.) Ber (*Zizyphus sp*.) Gulmohar (*Delonix regia*) Duranta (*Duranta sp.)* Kamayani (*Murriya exocitica*) Babool (*Acacia arabica*) Sharifa (*Annona squamosa*) Cassia (*Cassia auriculata*)

Tall Species Amaltas (*Cassia fistula*) Siris (*Albizzia lebbeck*) Neem (*Azadirachta indica*) Druping Ashok (*Polyalthia longifoila*) Aam (*Mangifera indica*) Peepal (*Ficus religiosa*) Palash (*Butea spp*) Cassia (*Cassia siamea*) Karanj (*Pongamia pinnata*) Subabool (*Leucaena leucocephala*).

Plantation for forest improvement in selected areas within lease

In the proposed mine lease, green belt will be developed in degraded forest and other vacant areas. Species suggested for such areas are:

Siris (Albizzia lebbeck) Pakar (Ficus racemosa) Imli (Tamarindus indica) Neem (Azadirachta indica) Aam (Mangifera indica) Peepal (Ficus religiosa) Bargad (Ficus bengalisis) Cassia (Cassia siamea) Karanj (Pongamia pinnata) Sita Phal (Anona squamosa) Kathal (Artocarpus heterophyllus) Palas (Butea spp.) Gular / Dumar (Ficus glomerata) Mahua (Madhuca longifolia) Jamun (Syzygium cuminii) Baheda (Terminalia bellirica) Harra (Terminalia chebula) Sal (Shorea robusta).

Plantation on Dump

Plantation on the large overburden dumps cannot start till dumping activities have ceased at least in a part of the dump and the site is prepared for plantation. Once dumping has been completed, a path will be cleared to the designated area so that the basic inputs (water, manure, and seedlings) can be carried up to the site. Next, a layer of topsoil must be spread over the area and roughly leveled. Grass seeds / seedlings will be planted on the soil layer to stabilize the soil. Plants selected for plantation in and around the waste dumps should have pollution hardy nature, fast

growth rate, glabrous/ pendulous leaves, and large crown volume to surface area of fluttering leaves.

On backfill areas and mining benches / slope (where back filling is not possible) of mine pits

Plantation on the mining pit benches cannot start till all the mining activities from the pit have ceased. Once the mining activities from a pit have been completed, a layer of topsoil must be spread over the area and roughly levelled. Grass seeds / seedlings will be planted on the soil layer to stabilize the soil

4.14.1 Selection of Plants for Greenbelts

The main limitation for plants to function as scavenger of pollutants are, plant's interaction to air pollutants, sensitivity to pollutants, climatic conditions, and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration must be given to the natural factor of bio-climate. Xerophytes plants are not necessarily good for greenbelts; they with their sunken stomata can withstand pollution by avoidance but are poor absorber of pollutants. Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows.

4.14.1.1 For Absorption of Gases

- Tolerance towards pollutants in question, at concentration, that are not too high to be instantaneously lethal.
- Longer duration of foliage.
- Freely exposed foliage.
- Adequate height of crown.
- Openness of foliage in canopy.
- Big leaves (long and broad laminar surface)
- Large number of stomatal apertures.

4.14.1.2 For removal of suspended particulate matter

- Height and spread of crown.
- Leaves supported on firm petiole.
- Abundance of surface on bark and foliage.
- Roughness of bark.
- Abundance of auxiliary hairs.
- Hairs or scales on laminar surface.
- Protected Stomata.

4.15 Mine closure plan

The mine closure plan is one of the most important requirements in the environmental management of mining projects. The closure operation is a continuous series of activities right from the commencement to decommissioning of the project. Therefore, the progressive mine closure plan is specifically included in the mining plan. The primary aim is to ensure that the following broad objectives along with the abandonment of the mine can be successfully achieved:

- Creation of a productive and sustainable after-use for the site, acceptable to mine owners, regulatory agencies, and most importantly to the community.
- Protection of public health and safety of the surrounding habitation.
- Minimization of environmental damage.
- Conservation of valuable attributes and aesthetics.
- Counter balancing the adverse socioeconomic impacts.

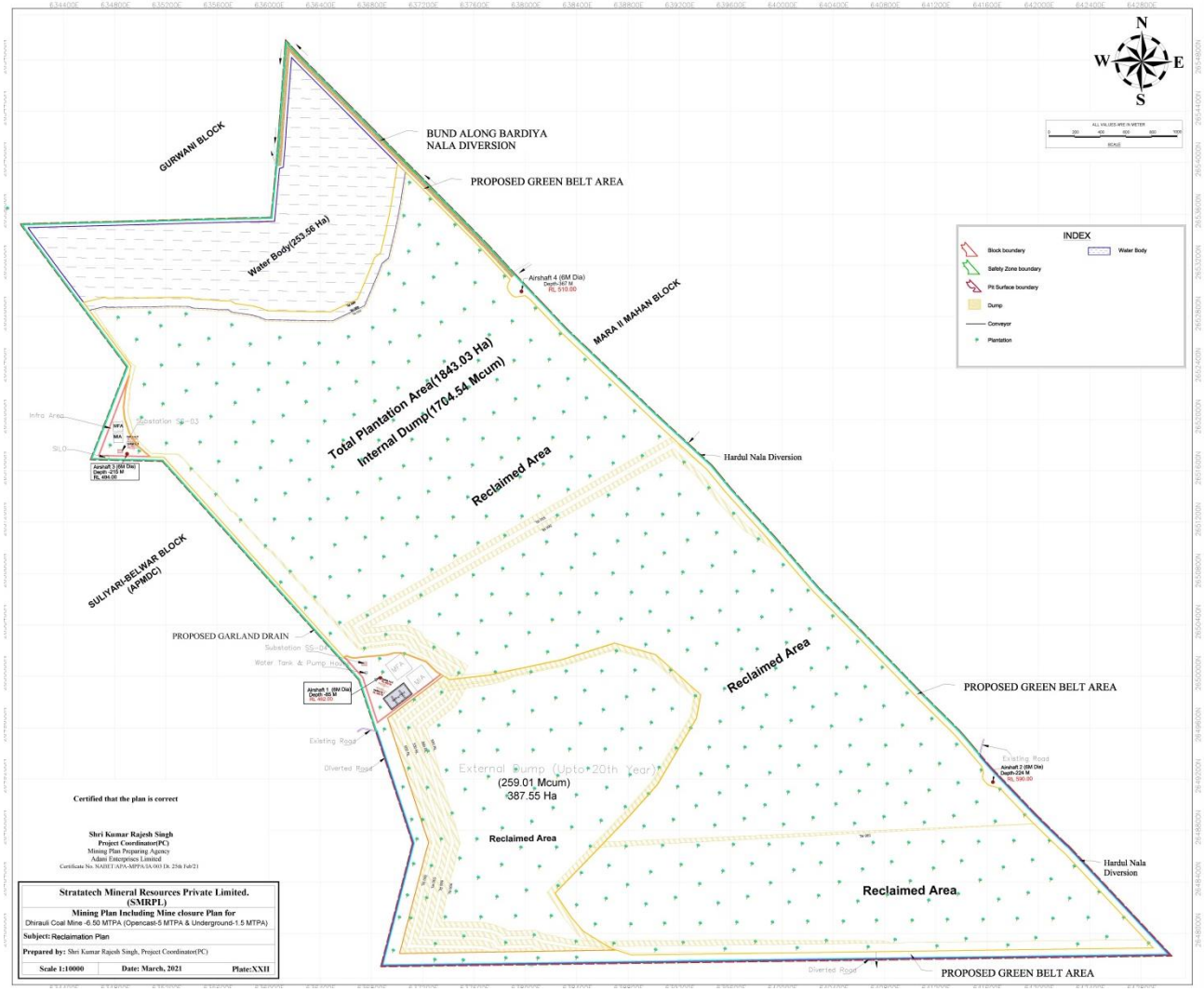


Figure 4.16: Plantation Map

4.15.1 Post Mining Land Use

During post mining stage, the excavated mining area will be partly backfilled from the existing waste dumps prevailing over the lease at the time to restore the natural profile. The back fill will be properly graded & traced and will be biologically reclaimed by the coir matting and plantation. The post mining land use, thereafter, is given below:

Table 4.27: Post Mining Land Use

Mining Activity	Proposed Land Use Area (Ha)	Land Use (End of Life) Area	Agriculture Land	Plantation	Water Body	Public Use	Forest land (Returned)	Undisturbed	Total
Excavation Area	2,096.59	2,096.59	-	1,843.03		-	1943.03	-	1843.03
Backfilled Area (in Excavation Area	1,796.23	1,796.23	-	1,843.03	-	-	18743.03	-	1843.03
Excavated Void (in Excavation Area)	300.36	300.36	-	-	253.56	-	-	-	253.56
Topsoil Dump	35.34 (Upto 5th Year)	35.34 (Upto 5th Year)	-	-	-	-	-	-	0.00
External Dump	387.55	387.55	-	387.55	-	-	387	-	387.55
Safety Zone	19.73	19.73	-	19.73	-	-	19.73	-	19.73
Haul Road between quarries	-	-	-	-	-	-	-	-	0.00
Road diversion	4.13	4.13	-	-	-	4.13	-	-	40.13
Settling pond	2.20	2.20	-	-	2.20	-	-	-	2.20
Road & Infrastructure area	20.80	20.80	-	20.80	-	-	20.80	-	20.80
CHP & Washery	8.10	8.10	-	8.10	-	-	8.10	-	8.10
Coal Evacuation Route & Approach Road	1.15	1.15	-	1.15	-	-	1.15	-	1.15

Garland drains	5.34	5.34	-	5.34	-	-	5.34	-	5.34
Embankment	7.50	7.50	-	7.50	-	-	7.50	-	7.50
Green Belt	46.80	46.80	-	46.80	-	-	46.80	-	46.80
Water Reservoir	-	-	-	-	-	-	-	-	0.00-
Rationalization area	72.11	72.11	-	72.11	-	-	72.11	-	72.11
Total (exclude back filled void & Topsoil area)	**2672.00**	**2672.00**	**-**	**2412.11**	**255.76**	**4.13**	**2412.11**	**-**	**2672.00**

Source: Approved Mining Plan, Dhirauli Mine

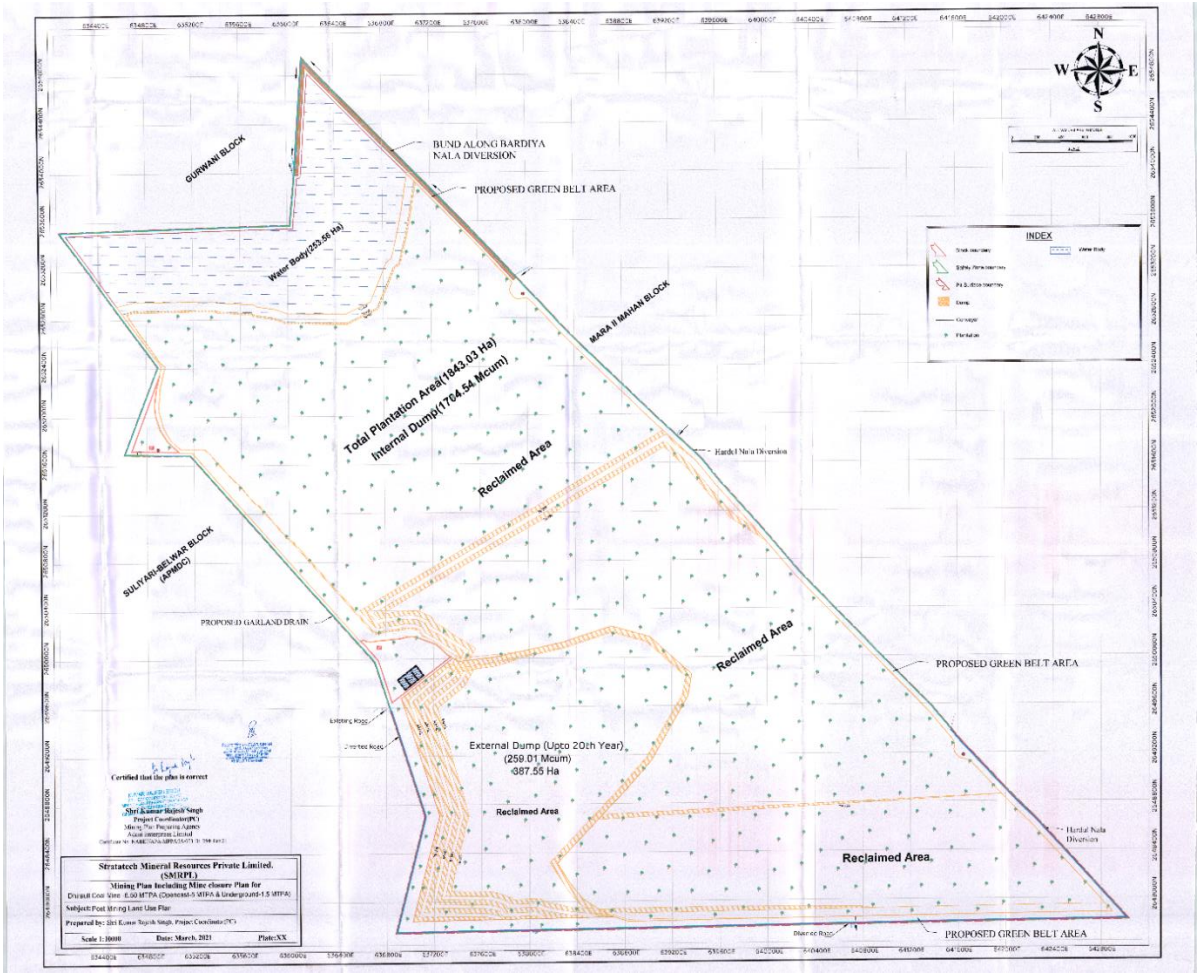


Figure 4.17: Post Mining Land Use Plan

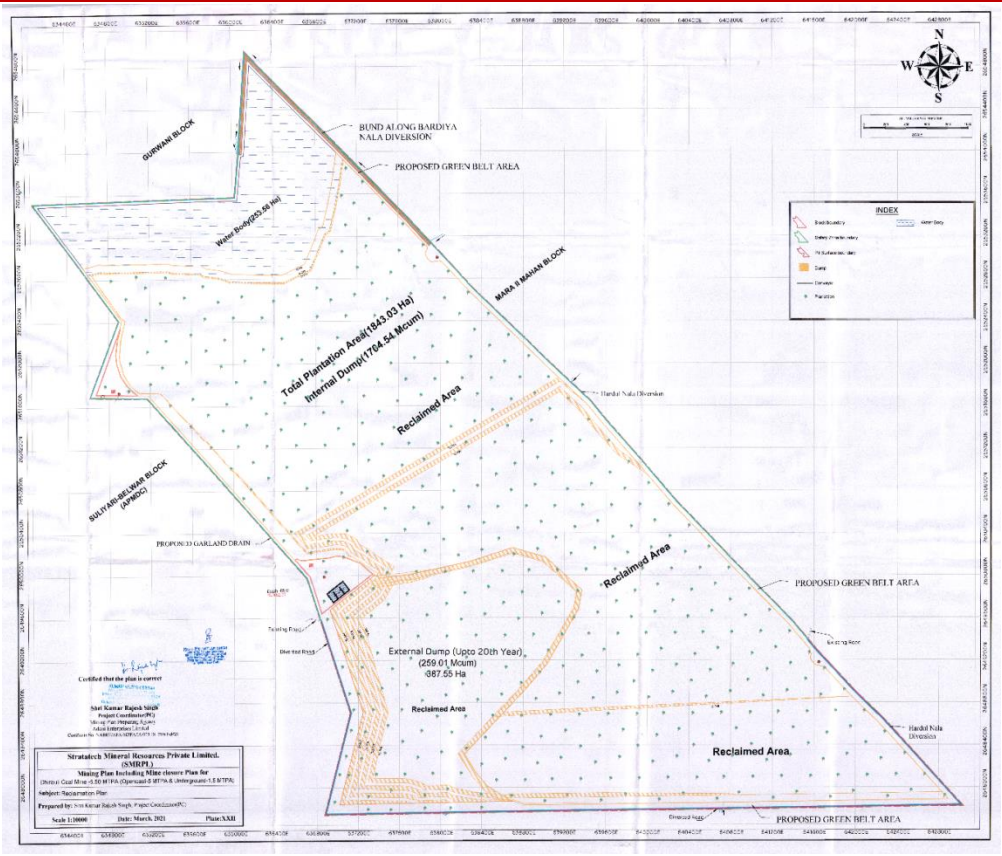


Figure 4.18: Reclamation Plan

Table 4.28: Reclamation and Rehabilitation

Land Degradation and Technical Reclamation								
		Land Degraded				Technically Reclaimed Area		
Year	Excav area	Dump (Ext +topsoil)	Infra /Others	Total	Backfill	Dump (Extn + Topsoil)	Other	Total
Y-01	57.21	163.34	141.06	361.61	-	-	8.2	8.2
Y-03	173.92	355.54	141.06	670.53	-	-	11.26	11.26
Y-05	323.79	548.15	141.06	1013	-	-	53.7	53.7
Y-10	536.33	274.34	141.06	951.73	343.12	200.45	78.74	622.31
Y-15	764.83	330.94	141.06	1236.84	519.75	250.76	78.74	849.25
Y-20	993.34	387.55	141.06	1521.95	664.33	330.94	78.74	1074.01
Y-25	1251.42	387.55	141.06	1780.03	771.97	387.55	78.74	1238.26
Y-30	1509.5	387.55	141.06	2038.1	931.35	387.55	78.74	1397.64
Y-35	1826.42	387.55	141.06	2355.03	1135.27	387.55	78.74	1601.56
Y-40	2096.59	387.55	187.86	2672	1596.23	387.55	115.24	2099.02
Y-45	2096.59	387.55	187.86	2672	1843.03	387.55	181.53	2412.11

Table 4.29: Biological Reclaimed Area (Ha)

			Biological Reclaimed Area (Ha)					
Year	Agri	Plantation	Water Body	Public /Company Use	Total	Forest Land (Return)	Undisturbed / to be left for Public /com use	Total
Y-01	-	-	2.2	-	2.2	-	-	-
Y-03	-	-	2.2	4.13	6.33	-	4.13	4.13
Y-05	-	-	2.2	4.13	6.33	-	4.13	4.13
Y-10	-	543.57	2.2	4.13	549.9	543.57	4.13	547.7
Y-15	-	770.51	2.2	4.13	776.84	770.51	4.13	774.64
Y-20	-	995.28	2.2	4.13	1001.6	995.28	4.13	999.41
Y-25	-	1159.52	2.2	4.13	1165.85	1159.52	4.13	1163.65
Y-30	-	1318.9	2.2	4.13	1325.23	1318.9	4.13	1323.03
Y-35	-	1522.81	2.2	4.13	1529.14	1522.81	4.13	1526.94
Y-40	-	1729.35	2.2	4.13	1735.69	1729.35	4.13	1733.49
Y-45	-	2412.11	255.76	4.13	2672	2412.11	4.13	2416.29

4.16 Carrying Capacity Study

As per condition no. (iv) of the Terms of References, Carrying Capacity study has been mandated. Outcome of the study clearly indicates that levels of all the parameters for Air, Water, Soil and Noise quality are within the permissible limit. Mining activities can be continued sustainably with mitigation measures already included in the EIA report. The ground level concentrations are computed for 1st high and 24-hr concentration values for all the baseline air quality monitoring stations by selecting them as discrete Cartesian receptors in the modeling area so that 10 receptors points taken for computation 24 -HR. Air Quality Index for study area falls under good, satisfactory and moderate categorization as per the data obtained during baseline studies. Due to implementation of the project and activity of cluster mine the AQI index of the area will Change from satisfactory to moderate on few locations. Carrying capacity study has been carried out. In concerned with Carrying Capacity particular habitat and its ecology of that environment can carry and sustain, considering its geography and physical status in a given time and space. Detailed report of carrying capacity study is attached as **Annexure XIII**.

4.17 Cumulative Impact Assessment

Cumulative study has been carried out, considering the impact on the environment due to operation of the mining block which are in a single Cluster i.e. (SULIYARI, DONGRITAL –II PHASE II, MARA II MAHAN, DONGRITAL –II PHASE II, MAHAN, CHHATRASAL, DONGRITAL, PATHPAHARIYA, SARAI EAST, BANDHA, BANDHA NORTH, GURBARA SOUTH, SARAI WEST, GURBARA CENTRAL, PACHAUR). Outcome of the study clearly indicates that levels of all the parameters for Air, Water, Soil and Noise quality are within the permissible limit. Carrying capacity study has been carried out. In concerned with Carrying Capacity particular habitat and its ecology of that environment can carry and sustain, considering its geography and physical status in a given time and space. Detailed report is attached as **Annexure XIV.**

4.18 Ecosystem Services

Ecosystem Services study has been mandated vide condition no. (iv) of the Terms of References reproduced below-

“Ecosystem services study of the area shall be carried over by project proponent considering the project being in Singrauli, having ~1400 ha of forest land and presence of other coal mining activity and industries.”

The assessment of impacts there were variations across the different phases of the mine, the details report is attached as **Annexure XV**.

The proposed project will improve the ecology by planting the trees of native species. it is proposed to cover the 2412.11 Ha area till conceptual stage. The backfills will be properly graded & terraced and will be biologically reclaimed by plantation. Remaining mined out benches will be afforested with dense plantation. Total area covered under waste dumps and mineral stacking & processing will be afforestated by plantation. Roads will be used for public transport facilities after clouser of mine. Plantation will be carried out on 7.5 m statutory barrier. Thus, at the post mining stage the area will have partly backfilled mined out voids surrounded from all the sides by plantation and dense avenue plantation.

As per list of The Indian Wildlife (Protection) Act, 1972, Fauna coming under the schedule - I is treated as endangered species. The schedule - I fauna as per reconnaissance survey are listed in report. Although these are very common species and found in every locality, even in villages, certain steps should be taken to conserve the critical wild life:

Programs for the conservation of wildlife will be formulated and implemented outside the protected areas by educating the local communities with help of local public agencies, and other stakeholders including the environment division officers of our company, in order to reduce the scope of man-animal conflict, the details report is attached as **Annexure XV.**

4.19 Nala Diversion

The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of non-renewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. The Hydrological study for estimation of peak flood runoff for Hurdul nala watershed inclusive micro watershed of external area of mine has been also studied. Detailed hydrology report is attached as **Annexure XVI** along with the NOC from the Chief Engineer Ganga Basin REA (M.P).

4.20 Subsidence Study

As per generic ToR condition no. A (XIII) of the Terms of References, Subsidence study has been suggested, it is reproduced below:

Study on subsidence, measures for mitigation/prevention of subsidence, modelling subsidence prediction and its use during mine operation, safety issues.

The study concludes that the depillaring operation will be carried out from 5th year of underground mining and it will continue upto 78 years of mining.

Prediction of subsidance has been carried out by 3D-numerical modelling based on FEM. The subsidence along with peak horizontal tensile strain has been predicated at the end of 20 years, 30 years, 40 years, 60 years, 70 years and 78 years (end of mining) of mining.

The peak predicted subsidence is 0.862 m at end of 20 years of mining, 2.384 m at end of 30 years, 2.391m at end of 40 years, 2.391m at end of 60 years and 2.716 mat end of 78 years of mining respectively. The predicted peak horizontal tensile strain is 4.95 mm/m at the end of 20 years of mining, 13.90 mm/m at the end of 30 years of mining and 17.47 mm/m at end of 78 years of mining. No surface feature is likely to get damaged as there is no important surface structure on surface except the overburden dump.

A Subsidence study report has been prepared and is attached as **Annexure XVII.**

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

Dhirauli Coal Block is proposed for production of 6.5 Million Tons Per Annum of coal. This project conduct mining operations through open cast mining with capacity of 5 MTPA and 1.5 MTPA through underground mining at Singrauli Coalfield. The production build up has been planned in such a way that it will meet the requirement peak production of 5.0 MTPA of Opencast in the 3rd year of mine operation.

5.1 ANALYSIS OF ALTERNATIVE SITE

Since the mining activity is site specific and it depends on occurrence of coal, as, therefore, alternate sites are not examined with respect to this project. Dhirauli Coal Block in Singrauli Coalfield has been allocated to M/s Stratatech Mineral Resource Private Limited (SMRPL) vide Letter No. NA-104/7/2020-NA dated 03.03.2021 by Ministry of Coal, Government of India. However, the site has following benefits:

- **Site Connectivity:** Mining site is well connected with Waidhan-Sidhi State Highway via Bargawan traverses 20 km north of the block. A metalled road from Parsona to Mara is located further east of the block. An un-metaled road branching out of this at Rajmelan culminates at Sarai. From this road to the west of River Mahan, a north-south running road leads to Langadda via Bhalyatola, Suliyari & Jhalri. The block is also accessible by an all-weather metalled road from Singrauli as well as from Waidhan. The distance of Sarai-Gram, the nearest major railway station on Chopan-Singrauli-Katni line of central railway is about 18 km from the block.
- Proximity to the electricity grid.
- Sub soil water is available at reasonable depth.

5.2 ENVIRONMENT SENSITIVITY OF THE LOCATION

1. There is no Wildlife Sanctuary / National Park / Bio-sphere Reserve / Habitat of Migratory birds within 10 km radius from the project site.
2. There is no Tiger Reserve / Elephant Reserve / Turtle Nesting Ground within 10 km radius from the project site.
3. There is no Archaeological Monument / Defence installation within 10 km radius from the project site.

5.3 ALTERNATIVE FOR TECHNOLOGY

The technology envisaged for the project is proven. Considering the geo-mining characteristics of the block and for conservation of resource, it is proposed to extract the coal reserves within the block using combination of open cast mining (up to seam VII) and underground mining (below Seam VII to Seam II) method. Mining method for extracting coal is surface miner from OCP and Continuous Miner from UG mine.

The technology is not new, easily available and working successfully in the vicinity of the project and elsewhere. A brief of the technology including method of work and design parameters is given in **Chapter-2.**

- All statutory requirements, guidelines, and recommendations of MPPCB/CPCB/MoEF&CC shall be complied.
- Wastewater to be generated shall be recycled in the proves and reused within the mine. No wastewater shall be discharged outside.
- Solid waste to be generated shall be disposed-off in environment friendly manner partly in the external OB Dumps and partly in Backfills.
- Air emission shall be controlled by providing adequate pollution control equipment.
- Continuous efforts shall be made for improvement of the socio-economic status of the surrounding area.

6. ENVIRONMENTAL MONITORING PROGRAM

6.1 INTRODUCTION

Environmental Monitoring is an essential tool for sustainable development and ensuring effective implementation of Environmental Management Plan and mitigation measures. The monitoring and evaluation of the management measures envisaged are critical in implementation of the Project. Monitoring involves periodic checking to ascertain whether activities are going according to the plans. The purpose of the environmental monitoring plan is to ensure that the envisaged purpose of the project is achieved and results in desired benefits.

To ensure the effective implementation of the proposed mitigation measures, the broad objectives of monitoring plan are:

- To implement the mitigative measures defined in EMP.
- To evaluate the performance of mitigation measures proposed in the EMP.
- To evaluate the adequacy of Environmental Management Plan.
- To suggest improvements in management plan, if required
- To improve environmental quality.

A detailed monitoring of emissions and effluent from different sources for different environmental parameters will be carried out as per the permitted norms and any further notification / direction from Chhattisgarh Environment Conservation Board, Central Pollution Control Board (CPCB) and MoEF&CC. Monitoring methodologies will follow standard methods prescribed by Central Pollution Control Board (CPCB), USEPA, AWWA etc.

6.2 PARAMETERS TO BE MONITORED

- Air quality
- Water and wastewater quality
- Noise level
- Soil quality
- Greenbelt development

6.2.1 Air Pollution and Meteorological Aspects

Both ambient air quality and meteorology will be monitored. The ambient air will be monitored following the guidelines of the Central Pollution Control Board at about six to eight locations in and around the mine lease area. Dust fall will be regularly monitored in and around the quarry area.

Meteorological parameters like wind speed, wind direction, temperature, relative humidity and rainfall will also be recorded at mine area.

Table 6.2: Monitoring Schedule for Environmental Parameters

Sr. No	Particulars		Monitoring Frequency	Duration of Sampling	Parameters
1	**Air Pollution and Meteorology**				
	Air Quality				
	A	Ambient Air Quality Monitoring			
		Ten locations in and around the mine lease	Twice in a week	As per SPCB "Consent to Operate Conditions	PM10, PM2.5, SO_2, NOx and CO
	B	Fugitive dust sampling at work zone	Monthly once	24 hr continuously	Particulate Matter
	Meteorology				
	a	Meteorological data to be monitored at the proposed mine and coal washery site.	Daily	Continuous Monitoring	Wind speed, direction, temperature, relative humidity and rainfall.
2	**Water and Wastewater Quality**				
	A	Industrial/Domestic			
	1	Sewage treatment plant from colony	Once in a month	24 hr composite	As per EPA Rules, 1989.
	2	Mine effluents (if any) during **Monsoon**	Once in a month	24 hr composite	As per EPA Rules, 1989.
	B	Water quality in the study area			
	1)	Ground Water quality (4 samples)	Once in a month	Grab	As per the parameters specified under IS:10500
	2)	Surface Water (3 samples)	Once in a month	Grab	Parameters specified under IS:10500
	3)	Water flows in major streams near to Mine lease	Once in a season	One time	As per IS specifications
	4)	Water level studies in well or bore wells or piezometers in	Once in a season	One time	Water levels and chemistry of water

Sr. No	Particulars		Monitoring Frequency	Duration of Sampling	Parameters
		Mine lease and surrounding areas			
3	**Industrial Noise Levels**				
	1	Major noise generating sources	Every fortnight	24 hr continuous with 1 hr interval	Noise level in dB(A)
	2	Near the blasting /drilling site	Fortnight	24 hr continuous with 1 hr interval	Noise level in dB(A)
	Ambient Noise Levels				
		Six Locations around mine lease area	Monthly once	24 hr continuous with one hr interval	Noise levels in dB(A)
4.	**Soil Characteristics**				
	1	Four samples in nearby villages	Pre-Monsoon	One Grab sample	Colour, textural class, grain size, distribution, pH, Electrical Conductivity, Bulk Density, Porosity, Infiltration rate, Moisture retention capacity, Wilting Co-efficient, Organic matter Na, N, K, PO_4, SO_4, SAR, Base Exchange Capacity, Pb, Cu, Zn, Cd, Fe.

6.2.2 Water and wastewater quality

The storm water will be analysed in the rainy season. The ground and surface water quality will be monitored in every season at selected locations. The water depths will be monitored in the wells of surrounding villages in every season.

6.2.3 Noise Monitoring

Noise levels in the work zone environment will be monitored regularly.

The ground vibration will be recorded at the time of blasting. The frequency of noise monitoring will be once in a month in the work zone. The ambient noise levels in the surrounding villages will be monitored once in six months.

6.2.4 Soil Characteristics

Soil samples will be tested before plantation/vegetation of the area. The environmental monitoring cell will co-ordinate all monitoring programs at site and data thus generated will be regularly furnished to the State as well as regulatory agencies.

The monitoring schedule for environmental parameters is given in Table-6.2. The post-project monitoring is being carried out for existing mine. This will be further strengthened as required.

6.2.5 Inspection / Monitoring of quarry slope and dump slope failure

Regular examination will be carried out to look after the slope failure on mine faces and overburden benches etc. Slope Stability is a critical safety and production issue for open-cut mines around the world to understand the probability of mine wall failures. Dump slope failure occurs mainly due to accumulation of water in dumping areas, formation of gullies in the dump slopes, improper terracing/dumping etc. with precision level instruments on regular interval.

6.2.6 Study of Blasting effect

Main reason of fly rock due to blasting is Improper blast design i.e., less stemming, inadequate burden & spacing, high charge concentration, improper delay, presence of geological discontinuities such as joints, faults, muds etc. Regular study shall be conducted for proper designing of blast (i.e., charge weight per blast, number of holes, spacing, stemming etc.). Ground vibration and sound overpressure will be compiled.

6.2.7 Plantation and green belt development

Plant growth, its maintenance and survival rate will be monitored.

Green belt development vis-à-vis safety zone management and progressive plantation in and around the mine will be done to improve the green cover in the area. The data on area of green cover, survival rate etc. shall be compiled for periodic review. Annual plans for plantation with specific number of tree saplings and shrubs to be planted shall be made. The progress shall be monitored by the EMC on six monthly bases. Plan for post plantation care will be reviewed in every monthly meeting. Any abnormal death rate of planted trees shall be investigated. Watering of the plants, manuring, weeding will be carried out.

6.2.8 Green House Gas (GHG) Monitoring

The monitoring of GHG emissions is becoming a standard requirement under international good practice. Monitoring team/expert will conduct annual monitoring of GHG emissions. It is likely that GHG monitoring during operations will involve inventories being developed using mass balance, stoichiometric calculations, and internationally accepted "factors". Key data that will be collected on a semi-continuous basis to support the inventory will include:

- Diesel consumption by mining vehicles.
- Explosives use.
- Extent of electricity import and export.
- Power generation/fuel type (emissions).
- Incineration (emissions).
- Employee road and air miles.

This data will be used to prepare an annual GHG emissions inventory and to track emissions over the course of project development.

6.2.9 Wildlife Monitoring

Wildlife and domestic livestock monitoring requirements are set out in the Wildlife Management Plan as follows.

- Wildlife and domestic livestock mortalities (e.g., from air strikes, vehicle strikes, shooting (i.e., military, or illegal), other sources).
- Wildlife monitoring – Yearly site inspections and wildlife counts. This will include the numbers and location of:
  - Large mammals.
  - Birds (including migratory birds).
  - Reptiles (watercourses and TMF).
  - Domestic livestock.

For livestock, a monitoring plan comprising the following will be undertaken:

- Annual qualitative assessment of livestock and herd health (e.g., surveys with local herders and livestock owners).
- Annual sampling programme for tissues (liver and kidney) from domestic livestock (i.e., goats and/or sheep); and
- Annual blood sampling program for domestic livestock (i.e., goats, sheep, donkeys, camels, cattle).

Livestock monitoring will be undertaken monthly if complaints relating to livestock are received.

Authorized person will report monthly to the monitoring team/expert on the implementation of this Management Plan during the construction phase.

The Environment Manager will be responsible for record-keeping.

Regular reporting will be undertaken via the monthly Report that will be prepared and submitted to the General Manager. Reporting will include:

- A summary of activities undertaken during the reporting period.
- Any material deviations or non-compliances to this Management Plan.
- Planned activities during the next reporting period.
- Any other issues of concern

6.2.10 Ecology and Habitat Monitoring

In addition to the wildlife monitoring team/expert will commission regular ecological & habitat monitoring. This will be undertaken on a six-monthly basis by a qualified ecologist. The baseline data on habitats will form the base case of the monitoring. The team/expert will maintain updated records on the following:

- Habitats lost and gained.
- Assessment of key causes for habitat loss and gain.

Based on the results of the monitoring team/expert will review management plans focused on or influencing ecology and habitat and revise these appropriately to improve the protection and promotion of habitats around the Project.

Record Keeping:

Environmental Officer will be responsible for record-keeping. Reporting of results will be undertaken via the monthly Report that will be prepared and submitted to the General Manager. Reporting will include:

- A summary of the ecological & habitat monitoring undertaken during the reporting period.
- Any material deviations or non-compliances to this Management Plan.
- Planned activities during the next reporting period.
- Any other issues of concern.

6.2.11 Reclamation & Closure

Reclamation and closure monitoring requirements are set out in the Reclamation & Closure Management Plan as follows.

Monitoring and Reporting Procedures

Closure and post-closure monitoring will document the progress of the closure and reclamation effort. The elements of these monitoring programs will include:

- Inspection of the physical conditions (e.g., for evidence of erosion and landslides) at the end of the initial rainy season post-closure.
- Inspection of the plantings after the first-year post-closure.
- After two years, evaluation of the effectiveness of the reclamation effort (e.g., number and type of plant species, plant heights, productivity).
- Demonstration that water quality objectives are met; and
- Assessment of the adequacy and performance of drainage structures and sediment control systems.

Closure and post-closure monitoring and control programs will be conducted twice per year (dry and wet seasons) for a period of five years after closure has been completed. If deficiencies in vegetation establishment are identified, appropriate mitigation measures will be taken to correct these deficiencies.

Monitoring will include field reconnaissance during the first growing season to evaluate re-vegetation success. The establishment of exotic plant species will also be monitored for at least a two-year period post-closure. Exotic or invasive plants will be physically, mechanically, or chemically removed or treated to limit their establishment. Monitoring will also be used to identify areas that may require supplemental irrigation or nutrients. Vegetation sampling methods will be specified as the Plan is refined but no later than five years before closure.

Monitoring program results will be used to inform and refine ongoing reclamation activities. Therefore, adjustments may need to be made to the programs based on observations in the field. The monitoring program will allow for the identification of problems and potential modifications of methods such as:

- Improvements in clearing methods.
- Improvements in methods of seed collection and preservation to increase species diversity.
- Replacement of plant species that do not thrive; and
- Improvement in sowing and planting methods.

Record Keeping:

Environmental Officer shall be responsible for record-keeping. Regular reporting shall be undertaken via the monthly Report that shall be prepared and submitted to the General Manager. Reporting shall include:

- A summary of activities undertaken during the reporting period.
- Any material deviations or non-compliances to this Management Plan.

- Planned activities during the next reporting period.
- Any other issues of concern.

6.2.12 PERFORMANCE INDICATORS

The physical, biological, and social components identified to be particularly significant in affecting the environment at critical locations have been suggested as Performance Indicators (PIs). The performance indicators will be evaluated under two heads:

a) Environmental condition indicators to determine efficiency of environmental management measures in control of air, noise and water pollution and solid waste disposal.
b) Environmental management indicators to determine compliance with the suggested environmental management measures.

The Performance Indicators and monitoring plans will be prepared for the project for effective monitoring. The performance indicators for the environmental attributes to be monitored areas are as follows:

Table 6.5: Short term and long-term performance indicators of Environmental attributes

Sl. No.	Environmental Attribute	Short Term Performance Indicators	Long Term Performance Indicators
1.	Ambient air quality	RPM, SO_2 & NOx levels exceeding norm	Health records
2.	Work-zone air quality	RPM, SO_2 & NOx levels exceeding norm	Health records
3.	Depth of ground water table	No short-term indicator	Depletion of ground water table (time series study of village well levels)
4.	Ground water quality	Followings exceeding norms 1. pH 2. Total dissolved solids 3. Fluorides 4. Nitrates 5. Iron	Health records
5.	Surface water quality	Followings exceeding norms 1. pH 2. Suspended solids 3. Oil & grease content 4. COD 5. Coliforms	Health records
6.	Flow of Hurdul	Reduction of flow	Less water in receiving

	nala		water body
7.	Effluent quality	Followings exceeding norms 1. pH 2. Suspended solids 3. Oil & grease content 4. COD	Time series trend of surface water quality parameters
8.	Ambient noise level	Exceeding norm	Health records
9.	Work zone noise level	Exceeding norm	Health records
10.	Occupational safety and health	1. No. of workers undergoing PME 2. No. of workers vis-à-vis PPEs issued	1. Incidence of respiratory diseases 2. Incidence of hearing loss 3. Incidence of disorders attributable to stress at workplace
11.	Plantation and green belt development	1. % survival rate of saplings	1. Increase of green cover (ha)
12.	Quarry slope failure	Cases reported in three months	Accidents due to slope failure
13.	Dump slope failure	Cases reported in three months	Accidents due to slope failure
14.	Ground vibrations due to blasting	ppv exceeding norms	Presence / absence of cracks in buildings
15.	Drainage system	Muck recovered	Suspended solids content of overflow water
16.	Socio-economic development	1. Complaints 2. Funds utilised	People's satisfaction level through questionnaire survey

6.2.13 Occupational Health & Safety Monitoring

Surveillance of workers health: An Occupational Health Centre (OHC) will be done at the Mine. A systematic program for medical check-up at regular intervals will be followed at the Occupational Health Centre (OHC) of the Mine for all workers (including contractor workers) to ascertain any changes in the health condition of workers due to the working conditions. Employee's health will be checked at the time of joining and at regular interval.

Inspection and Testing of Safety Appliances: All safety appliances shall be regularly inspected and tested as hazard control measures for mine operation. The

inspection shall verify that issued personal protective equipment (PPE) continues to provide adequate protection and is being worn as required.

6.2.14 Training

Training activities for employees and visitors shall be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills shall be documented adequately. Service providers and contractors shall be contractually required to submit to the Dhirauli coal mine adequate training documentation before start of their assignment.

6.2.15 Periodic Inspection of Effectiveness of Pollution Control Facilities

A detailed inspection schedule shall be drawn for checking the effectiveness all pollution control systems. The maintenance shall be done strictly as per schedule and guidelines furnished by equipment manufacturer.

6.2.16 Socio-Economic Development – Monitoring of the commitments made to address the concern of stakeholders during PH

The mining activities have improved the socio-economic conditions in the surrounding area. The communities, benefited by the mine, are the key stakeholders of the mining. It is suggested that SMRL should have structured interactions with the community to disseminate the measures taken by the mine and to elicit suggestions for overall improvement for the development of the area.

6.2.17 Accidents and Diseases Monitoring

Dhirauli coal mine shall establish procedures and systems for reporting and recording of Occupational accidents and diseases and dangerous occurrences and incidents.

These systems shall enable workers to report immediately to their immediate supervisor any situation they believe presents a danger to life or health. The systems and the employer shall further enable and encourage workers to report to management all:

- Occupational injuries and near misses.
- Suspected cases of occupational disease; and
- Dangerous occurrences and incidents.

All reported occupational accidents, occupational diseases, dangerous occurrences, and incidents together with near misses shall be investigated with the assistance of a person knowledgeable/competent in occupational safety. The investigation shall:

- Establish what happened.
- Determine the cause of what happened; and
- Identify measures necessary to prevent a recurrence

6.3 Budget allocation for monitoring

To maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary. For this the project proponent has constituted an Environmental Management Cell. The Cell will make appropriate budget for the purpose. Regular record review for any change in financial requirement of environment management will be done and appropriate budgetary provisions will be made. Along with other budgets, Budget for environmental monitoring will be prepared and revised regularly as per requirement.

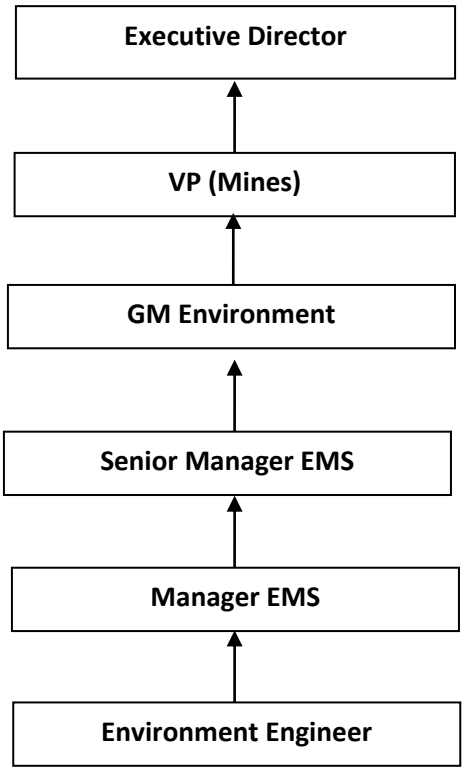
Table 6.1: Cost of Environmental Monitoring Program

S. No.	Item	Cost in Lakh Per year
1.	Cost of monitoring of environmental parameters for Air, Water, Noise and Soil	60
2.	Efficiency monitoring of Pollution Control Equipment	60
3.	Occupational Health & Safety	10
4.	Plantation	50
5	Socio-economic development	10
Total		**190**

6.4 Environmental management cell

Dhirauli coal mine is committed for implementation of all the mitigation and management measures suggested in Environmental Monitoring Program. A separate department "Environmental Management Cell" (EMC) has been established in Dhirauli coal mine to look after all environmental related matters of the mine. The EMC will supervise the reported activity from time to time for smooth implementation of Environmental Monitoring Program and Mitigation and Management measures and will take necessary actions if required. The cell will act to ensure the suitability, adequacy, and effectiveness of the Environment Management Program. It will also ensure to meet all the Statutory Requirements.

Organizational set-up of EMC is as follows:



Considering the statutory requirement and requirement of various operational departments the estimated manpower for the EMC is:

Table 6.2: Manpower at EMC

Description	Manpower
Senior Manager, Quality & Control	1
Environmental Engineer	1
Horticultural supervisor	1
Chemist	2
Laboratory assistant	2
Field assistant	2
Total	**09**

EMC will serve the following purpose:

- Identification of any environmental problem, which may occur in the mine or surrounding area.
- Initiating or providing solutions to those problems through designated channels and verification of the implementation status.
- Control of activities inside the mine, until the environmental problem has been corrected.
- Suitably respond to emergency situations. Provide details of the emergency and the actions taken to the top management.
- Suitably make modifications or alterations in the mine to meet regulatory standards as amended from time to time.

6.4.1 Monitoring & responsibility

The cell will be responsible for monitoring of the mine environment related requirements which include**:**

6.4.2 Interaction with the State Pollution Control Board

EMC shall be in regular touch with MPPCB and shall send them environmental monitoring reports regularly in the prescribed format, as per the prevailing practice. Any new regulations considered by State/Central Pollution Control Board for the mine shall be taken care of by EMC.

6.4.3 Providing Training

EMC would be responsible for the implementation of the EMP, needs to be trained on the effective implementation of the environmental issues. To ensure the success of the implementation set up proposed, there is a high requirement of training and skill up-gradation. For the proposed project, additional training facilities will be developed for environmental control. For proper implementation of the EMP, the officials responsible for EMP implementation will be trained accordingly.

To achieve the overall objective of pollution control it is essential not only to provide latest pollution control and monitoring systems but also to provide trained manpower resources to operate and maintain the same. So far, the practice with many mines is to utilize the mine operations and maintenance crew for operation of systems. This has shown adverse results due to lack of specialized knowledge in addition to priority selection. Therefore, apart from the ECD, specific training will be provided to personnel handling the operation and maintenance of different pollution control equipment.

In-mine training facilities will be developed for environmental control. Specialized courses at various Research / Educational institutes will be organized. The training will be given to employees to cover the following fields:

- Awareness of pollution control and environmental protection to all.
- Operation and maintenance of specialized pollution control equipment.
- Organize field monitoring, maintenance, and calibration of pollution monitoring instruments.
- Laboratory testing of pollutants.
- Repair of pollution monitoring instruments.
- Occupational health/safety.
- Disaster management.
- Environmental management.
- Afforestation / plantation and post care of mine.
- Knowledge of norms, regulations, and procedures.
- Risk assessment and Disaster Management.

The cell will also be responsible for monitoring of the mine safety and safety related systems which include

- Checking of safety related operating conditions.
- Visual inspection of safety equipment
- Preparation of a maintenance plan and documentation of maintenance work specifying different maintenance intervals and the type of work to be performed

Other responsibilities of the cell will include

- A MPPCB registered agency will be retained to generate the environment quality data in respect of air, water, noise, soil and meteorology and prepare the Environmental report.
- Submitting environmental monitoring report to MPPCB. The cell will also take mitigative or corrective measures as required or suggested by the Board.
- Timely renewal of Consents & Authorization will be taken care of.
- Conduct and submit annual Environmental Statement to MPPCB to the State Pollution Control Board in Form V under Rule 14 of the Environment (Protection) Second Amendment Rules 1992 of the Environment (Protection) Act, 1986.
- Prepare and submit six monthly report on the compliance with the conditions of the environmental clearance and submit to the Regional Office of MoEF&CC
- Comply with the conditions prescribed under the Consents and Authorization
- File timely return under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016, E-Waste (Management) Rules, 2016 and Batteries (Management and Handling) Rules, 2001.

- Keeping the management updated on regular basis about the findings / results of monitoring activities and proposes measures to improve environmental performance.
- Conducting regular safety drills and training programs to educate employees on safety practices. A qualified and experienced safety officer will be responsible for the identification of the hazardous conditions and unsafe acts of workers and advise on corrective actions, organize training programs and provide professional expert advice on various issues related to occupational safety and health.
- Conducting safety and health audits to ensure that recommended safety and health measures are followed.

Responsibilities for Environmental Management Cell (EMC) under Integrated Management System of the Mine

The responsibilities of the EMC include the following:

- Green belt development and inventory of flora
- Ensuring minimal use of water.
- Proper implementation of pollution control measures.
- Access the risk area.
- Implementation of QMS.
- Conducting Internal Audits.
- Closing of NCs and conduction of Management Review Meetings.
- Implementation of the control and protective measures.
- Coordination related to environment related activities within the project area as well as related outside agencies.
- Collection of health statistics of workers.
- Monitoring the progress of implementation of environmental management programme.
- Management of drainage system, dumps, reclamation, and restoration etc.
- To make continuous efforts to improve environment.

Table 6.3: Responsibility Matrix for Implementation of Environmental Management Cell (EMC)

<table>
<tr><th rowspan="2">Attributes</th><th colspan="5">Environmental Management</th><th colspan="2">Reporting and Receiving Feedback from Statutory Authority</th></tr>
<tr><th>Primary Responsibility and Report Generation</th><th>Short Term and Time Series Analysis and Generation of Status Report</th><th>Approval of Status Report and Decision on Actions</th><th>Implementation of Follow up Action</th><th>Verification of Follow up Action and Reporting Back to Approval Authority</th><th>Who will do?</th><th>Whom to report?</th></tr>
<tr><td>Environment Monitoring (Air, Water & Noise)</td><td>EMC [Monitoring cell]</td><td rowspan="8">Head (EMC)</td><td rowspan="8">GM (EMC)</td><td>EMC [Monitoring cell]</td><td rowspan="8">GM (EMC)</td><td rowspan="4">EMC</td><td rowspan="4">Regional MoEF&CC/SPCB</td></tr>
<tr><td>Plantation & Greenbelt development</td><td>EMC [Plantation cell]</td><td>EMC [Plantation cell]</td></tr>
<tr><td>Reclamation progress [Biological reclamation]</td><td>EMC [Plantation cell]</td><td>EMC [Plantation cell]</td></tr>
<tr><td>Social Welfare</td><td>CSR cell</td><td>CSR cell</td><td>CSR cell</td><td>State Government</td></tr>
<tr><td>Reclamation progress [Technical reclamation]</td><td>Mining & Excavation</td><td>Mining & Excavation</td><td>Mining & Excavation</td><td>DGMS</td></tr>
<tr><td>Drainage cleaning</td><td>Civil</td><td>Civil</td><td colspan="2" rowspan="2">NA</td></tr>
<tr><td>Water and Energy Utilization</td><td>Mechanical, Electrical and</td><td>Mechanical, Electrical and</td></tr>
</table>

Attributes	Environmental Management					Reporting and Receiving Feedback from Statutory Authority	
	Primary Responsibility and Report Generation	Short Term and Time Series Analysis and Generation of Status Report	Approval of Status Report and Decision on Actions	Implementation of Follow up Action	Verification of Follow up Action and Reporting Back to Approval Authority	Who will do?	Whom to report?
	Civil Maintenance			Civil Maintenance			
Occupational Health Monitoring	Health unit			Mining & Excavation		Mine safety	DGMS
Dump slope, Quarry slope inspection	Mine Safety	Mine Safety		Mining & Excavation			
Blast Monitoring	Mine Safety			Mining & Excavation			
Environmental and safety related training	Vocational training centre	Vocational training centre		Vocational training centre			

6.5 SUMMARY

The environment monitoring plan enables environmental management system with early sign of need for additional action and modification of ongoing actions for environment management, improvement, and conservation. The environmental monitoring points will be decided considering the environmental impacts likely to occur due to the operation of proposed project as the main scope of monitoring program is to track, timely and regularly, the change in environmental conditions and to take timely action for protection of environment Monitoring of environmental samples will be done as per the guidelines provided by MoEF&CC/CPCB/MPPCB. Separate records for water, wastewater, solid wastes, air emission, soil and manure/ compost will be prepared and preserved regularly. Along with other budgets, Budget for environmental management will be prepared and revised regularly as per requirement.

7. ADDITIONAL STUDIES

7.1 Preamble

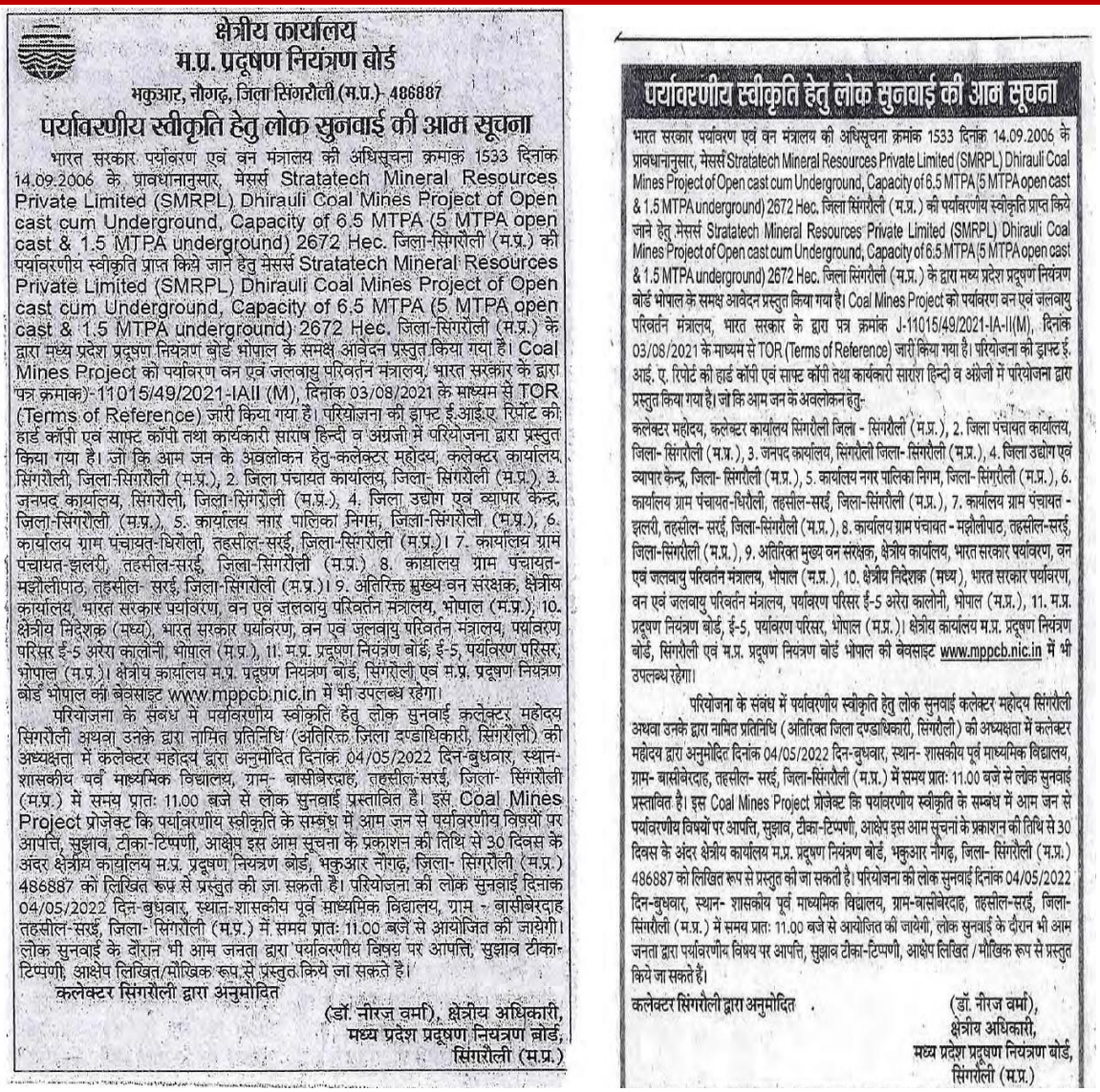
In this chapter followings have been discussed:

- Public consultation / Public Hearing
- Hazard Identification and Risk Management
- Carrying Capacity Study
- Cumulative Impact Assessment
- Ecosystem Services
- Wildlife Conservation Plan
- Nala Diversion
- Subsidence Study
- Social Impact Assessment (SIA)

7.2 Public hearing

7.2.1 Public Hearing Notice

The public hearing for the proposed coal mine was held under Chairmanship of Shree D.P Barman, ADM, Singrauli, at Senior secondary school Basi Bardah on 04.05.2022 at 11.00 AM as per the EIA Notification dated 14th September 2006, as amended on date by the Ministry of Environment Forest and Climate Change, New Delhi. The date, time and venue of the public hearing was published in Daily Newspapers, on 31.03.2022 in Singruli Bhaskar, & Times city by The Member Secretary, with project details, inviting objection, suggestions, views from the public regarding the proposed project. The copies of the notification for public hearing are given in **Figure 7.1.**



क्षेत्रीय कार्यालय
म.प्र. प्रदूषण नियंत्रण बोर्ड
भकुआर, नौगढ़, जिला सिंगरौली (म.प्र.)- 486887

पर्यावरणीय स्वीकृति हेतु लोक सुनवाई की आम सूचना

भारत सरकार पर्यावरण एवं वन मंत्रालय की अधिसूचना क्रमांक 1533 दिनांक 14.09.2006 के प्रावधानानुसार, मेसर्स Stratatech Mineral Resources Private Limited (SMRPL) Dhirauli Coal Mines Project of Open cast cum Underground, Capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground) 2672 Hec. जिला-सिंगरौली (म.प्र.) की पर्यावरणीय स्वीकृति प्राप्त किये जाने हेतु मेसर्स Stratatech Mineral Resources Private Limited (SMRPL) Dhirauli Coal Mines Project of Open cast cum Underground, Capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground) 2672 Hec. जिला-सिंगरौली (म.प्र.) के द्वारा मध्य प्रदेश प्रदूषण नियंत्रण बोर्ड भोपाल के समक्ष आवेदन प्रस्तुत किया गया है। Coal Mines Project को पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार के द्वारा पत्र क्रमांक)-11015/49/2021-IAII (M), दिनांक 03/08/2021 के माध्यम से TOR (Terms of Reference) जारी किया गया है। परियोजना की ड्राफ्ट ई.आई.ए. रिपोर्ट की हार्ड कॉपी एवं साफ्ट कॉपी तथा कार्यकारी सारांश हिन्दी व अंग्रजी में परियोजना द्वारा प्रस्तुत किया गया है। जो कि आम जन के अवलोकन हेतु-कलेक्टर महोदय, कलेक्टर कार्यालय, सिंगरौली, जिला-सिंगरौली (म.प्र.), 2. जिला पंचायत कार्यालय, जिला- सिंगरौली (म.प्र.), 3. जनपद कार्यालय, सिंगरौली, जिला-सिंगरौली (म.प्र.), 4. जिला उद्योग एवं व्यापार केन्द्र, जिला-सिंगरौली (म.प्र.), 5. कार्यालय नगर पालिका निगम, जिला-सिंगरौली (म.प्र.), 6. कार्यालय ग्राम पंचायत-धिरौली, तहसील-सरई, जिला-सिंगरौली (म.प्र.)। 7. कार्यालय ग्राम पंचायत-झलरी, तहसील-सरई, जिला-सिंगरौली (म.प्र.) 8. कार्यालय ग्राम पंचायत-मझौलीपाठ, तहसील- सरई, जिला-सिंगरौली (म.प्र.)। 9. अतिरिक्त मुख्य वन संरक्षक, क्षेत्रीय कार्यालय, भारत सरकार पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भोपाल (म.प्र.), 10. क्षेत्रीय निदेशक (मध्य), भारत सरकार पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, पर्यावरण परिसर ई-5 अरेरा कालोनी, भोपाल (म.प्र.), 11. म.प्र. प्रदूषण नियंत्रण बोर्ड, ई-5, पर्यावरण परिसर, भोपाल (म.प्र.)। क्षेत्रीय कार्यालय म.प्र. प्रदूषण नियंत्रण बोर्ड, सिंगरौली एवं म.प्र. प्रदूषण नियंत्रण बोर्ड भोपाल की वेबसाइट www.mppcb.nic.in में भी उपलब्ध रहेगा।

परियोजना के संबंध में पर्यावरणीय स्वीकृति हेतु लोक सुनवाई कलेक्टर महोदय सिंगरौली अथवा उनके द्वारा नामित प्रतिनिधि (अतिरिक्त जिला दण्डाधिकारी, सिंगरौली) की अध्यक्षता में कलेक्टर महोदय द्वारा अनुमोदित दिनांक 04/05/2022 दिन-बुधवार, स्थान-शासकीय पूर्व माध्यमिक विद्यालय, ग्राम- बासीबेरदाह, तहसील-सरई, जिला- सिंगरौली (म.प्र.) में समय प्रातः 11.00 बजे से लोक सुनवाई प्रस्तावित है। इस Coal Mines Project प्रोजेक्ट कि पर्यावरणीय स्वीकृति के सम्बंध में आम जन से पर्यावरणीय विषयों पर आपत्ति, सुझाव, टीका-टिप्पणी, आक्षेप इस आम सूचना के प्रकाशन की तिथि से 30 दिवस के अंदर क्षेत्रीय कार्यालय म.प्र. प्रदूषण नियंत्रण बोर्ड, भकुआर नौगढ़, जिला- सिंगरौली (म.प्र.) 486887 को लिखित रूप से प्रस्तुत की जा सकती है। परियोजना की लोक सुनवाई दिनांक 04/05/2022 दिन-बुधवार, स्थान- शासकीय पूर्व माध्यमिक विद्यालय, ग्राम - बासीबेरदाह तहसील-सरई, जिला- सिंगरौली (म.प्र.) में समय प्रातः 11.00 बजे से आयोजित की जायेगी। लोक सुनवाई के दौरान भी आम जनता द्वारा पर्यावरणीय विषय पर आपत्ति, सुझाव टीका-टिप्पणी, आक्षेप लिखित/मौखिक रूप से प्रस्तुत किये जा सकते है।

कलेक्टर सिंगरौली द्वारा अनुमोदित

(डॉ. नीरज वर्मा), क्षेत्रीय अधिकारी,
मध्य प्रदेश प्रदूषण नियंत्रण बोर्ड,
सिंगरौली (म.प्र.)

पर्यावरणीय स्वीकृति हेतु लोक सुनवाई की आम सूचना

भारत सरकार पर्यावरण एवं वन मंत्रालय की अधिसूचना क्रमांक 1533 दिनांक 14.09.2006 के प्रावधानानुसार, मेसर्स Stratatech Mineral Resources Private Limited (SMRPL) Dhirauli Coal Mines Project of Open cast cum Underground, Capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground) 2672 Hec. जिला सिंगरौली (म.प्र.) की पर्यावरणीय स्वीकृति प्राप्त किये जाने हेतु मेसर्स Stratatech Mineral Resources Private Limited (SMRPL) Dhirauli Coal Mines Project of Open cast cum Underground, Capacity of 6.5 MTPA (5 MTPA open cast & 1.5 MTPA underground) 2672 Hec. जिला सिंगरौली (म.प्र.) के द्वारा मध्य प्रदेश प्रदूषण नियंत्रण बोर्ड भोपाल के समक्ष आवेदन प्रस्तुत किया गया है। Coal Mines Project को पर्यावरण वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार के द्वारा पत्र क्रमांक J-11015/49/2021-IA-II(M), दिनांक 03/08/2021 के माध्यम से TOR (Terms of Reference) जारी किया गया है। परियोजना की ड्राफ्ट ई.आई.ए. रिपोर्ट की हार्ड कॉपी एवं साफ्ट कॉपी तथा कार्यकारी सारांश हिन्दी व अंग्रेजी में परियोजना द्वारा प्रस्तुत किया गया है। जो कि आम जन के अवलोकन हेतु-

कलेक्टर महोदय, कलेक्टर कार्यालय सिंगरौली जिला - सिंगरौली (म.प्र.), 2. जिला पंचायत कार्यालय, जिला- सिंगरौली (म.प्र.), 3. जनपद कार्यालय, सिंगरौली जिला- सिंगरौली (म.प्र.), 4. जिला उद्योग एवं व्यापार केन्द्र, जिला- सिंगरौली (म.प्र.), 5. कार्यालय नगर पालिका निगम, जिला- सिंगरौली (म.प्र.), 6. कार्यालय ग्राम पंचायत-धिरौली, तहसील-सरई, जिला-सिंगरौली (म.प्र.), 7. कार्यालय ग्राम पंचायत - झलरी, तहसील- सरई, जिला-सिंगरौली (म.प्र.), 8. कार्यालय ग्राम पंचायत - मझौलीपाठ, तहसील-सरई, जिला-सिंगरौली (म.प्र.), 9. अतिरिक्त मुख्य वन संरक्षक, क्षेत्रीय कार्यालय, भारत सरकार पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भोपाल (म.प्र.), 10. क्षेत्रीय निदेशक (मध्य), भारत सरकार पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, पर्यावरण परिसर ई-5 अरेरा कालोनी, भोपाल (म.प्र.), 11. म.प्र. प्रदूषण नियंत्रण बोर्ड, ई-5, पर्यावरण परिसर, भोपाल (म.प्र.)। क्षेत्रीय कार्यालय म.प्र. प्रदूषण नियंत्रण बोर्ड, सिंगरौली एवं म.प्र. प्रदूषण नियंत्रण बोर्ड भोपाल की वेबसाइट www.mppcb.nic.in में भी उपलब्ध रहेगा।

परियोजना के संबंध में पर्यावरणीय स्वीकृति हेतु लोक सुनवाई कलेक्टर महोदय सिंगरौली अथवा उनके द्वारा नामित प्रतिनिधि (अतिरिक्त जिला दण्डाधिकारी, सिंगरौली) की अध्यक्षता में कलेक्टर महोदय द्वारा अनुमोदित दिनांक 04/05/2022 दिन-बुधवार, स्थान- शासकीय पूर्व माध्यमिक विद्यालय, ग्राम- बासीबेरदाह, तहसील- सरई, जिला-सिंगरौली (म.प्र.) में समय प्रातः 11.00 बजे से लोक सुनवाई प्रस्तावित है। इस Coal Mines Project प्रोजेक्ट कि पर्यावरणीय स्वीकृति के सम्बंध में आम जन से पर्यावरणीय विषयों पर आपत्ति, सुझाव, टीका-टिप्पणी, आक्षेप इस आम सूचना के प्रकाशन की तिथि से 30 दिवस के अंदर क्षेत्रीय कार्यालय म.प्र. प्रदूषण नियंत्रण बोर्ड, भकुआर नौगढ़, जिला- सिंगरौली (म.प्र.) 486887 को लिखित रूप से प्रस्तुत की जा सकती है। परियोजना की लोक सुनवाई दिनांक 04/05/2022 दिन-बुधवार, स्थान- शासकीय पूर्व माध्यमिक विद्यालय, ग्राम-बासीबेरदाह, तहसील-सरई, जिला-सिंगरौली (म.प्र.) में समय प्रातः 11.00 बजे से आयोजित की जायेगी, लोक सुनवाई के दौरान भी आम जनता द्वारा पर्यावरणीय विषय पर आपत्ति, सुझाव टीका-टिप्पणी, आक्षेप लिखित /मौखिक रूप से प्रस्तुत किये जा सकते हैं।

कलेक्टर सिंगरौली द्वारा अनुमोदित

(डॉ. नीरज वर्मा),
क्षेत्रीय अधिकारी,
मध्य प्रदेश प्रदूषण नियंत्रण बोर्ड,
सिंगरौली (म.प्र.)

Figure 7.1: Notice for Public Hearing published on 31.03.2022 in Singruli Bhaskar, & Times City

7.2.2 Photographs of Public Hearing



Members



Project Proponent



Local villagers/Stakeholders

Figure 7.2: Photographs of Public Hearing

7.2.3 Action Plan as per Public Hearing Demand

The minutes of the meeting of the proceedings of the Public Hearing has been issued by the Regional Officer, MPPCB, Singrauli vide letter No. 457/TS/CECB/2021 dated 10.05.2022 Inline, the action plan has been prepared and given below and original proceeding minutes with attendance sheet is attached as **Annexure XVIII.**

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
1.	Mrs. Geeta Singh	Basi bardah	I am getting the privilege of learning sewing here after the arrival of Adani company in the and tricycles are being given to handicapped persons, arrangements for water filter, Anganwadi etc. have been done. I want the company to increase the land rate here and there should be a good English medium school in Basi Berdah so that children can study and hospitals should also be established.	Proper arrangement for education will be made by the company and in sector of health, facility will be increased in the local health center. According to the Provisions contained in the Right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013, arrangements for school and hospital will be made in the rehabilitation colony also.	Provision under the Land Acquisition Act 2013 will be followed for compensation and land acquisition. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health facilities to the health center in villages and arrangement of	---- FY 2025 -26 to FY 2028-29 FY 2025-26 to FY 2030-31.	---- 200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned) 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith)

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
					hospital in the rehabilitation colony.		
2.	Chanda Panika	Basi bardah	I want that the company shall fulfill our demands before establishing here, my demand is that good school, health and environment protection should be arranged. Hospital should be opened in the village, and most of the people here are above 18 years age. Employment should be arranged for them.	Work will be done as per the guidelines of Madhya Pradesh pollution control Board for Environment protection. There is provision to plant about 60 lakh trees of local species in a phased manner. Under the tree plantation program, a provision has been made to plant 30 trees instead of one tree felled. The Provisions contained in the Right to fair compensation	Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony. As Per Environment Management	FY 2025 -26 to FY 2028-29 FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned) 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith). 120.35 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				and transparency in land acquisition, rehabilitation and resettlement Act 2013.	Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department	FY 2025-26 to FY 2030-31	development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department)
3.	Kalpana Sharma	Bajauri	We are getting a lot of benefits due to arrival of Adani company here, earlier we did not think that sewing center would be opened but now we are able to run our	In order to protect the environment, work will be done on the prevention of water, air and soil pollution according to the environment management	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			own business while learning sewing. Here the trees are to be cut, first tress should be planted, only then it should be cut, the environment should be controlled.	plan in phased manner.	technically and biologically reclaimed mined out land and OB dump		
4.	Pradeep Kumari	Basi berdah	We are getting a lot of benefits from Adani company here, sewing center has opened. We have no objection for the company.	Program for social upliftment will be continued under Corporate Social Responsibility	--	---	---
5.	Saroj Gupta	Jhalri	On behalf of Adani Company, we got sewing center and many other facilities which were not there in this village till now, which company has given us opportunity to be self-reliant as well as launched an awareness campaign. We have	Program for social upliftment will be continued under Corporate Social Responsibility	----	----	----

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			no objection to this project.				
6.	Karishma Soni	Jhalari	A company has come to my village, it is very good, however water will be dried out after the coal is extracted from here, how the families get employment?	The Provisions contained in the Right to fair compensation and transparency in land acquisition, Rehabilitation and Resettlement Act 2013. For the conservation of ground water, studies will be conducted at prescribed time intervals. Open cast coal mining will not have any impact on ground water in next 40 years as per hydrological study conducted for the project.	As Per Environment Management Plan rainwater harvesting will be carried out in the lease area. Hydrological study already conducted for the lease area to study impact on ground water Total Employment of 970 (direct and indirect) during project	FY 2025-26 to FY 2064-65 Completed (Study will also be carried out at interval of 5 years) FY 2025-26 to FY 2064-65	Capital Cost of 80 Lakh and recurring cost of 10 Lakh per annum (as per Table 10.7 in Chapter 10 of EIA). 10 Lakh (Already completed) 10 Lakh at every five-year period Employment wages and benefits as per applicable rules and company policy.
7.	Gauri	Basi	Those who have	The Provisions	Total	FY 2025-26 to FY	Employment

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Singh	Berdah	educated and unemployed should be given jobs, and I support the company.	contained in the Right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement as well as employment.	Employment of 970 (direct and indirect) during project	2064-65	wages and benefits as per applicable rules and company policy
8.	Lilamati	Basi Berdah	I have got good offer from Adani company and I support Adani company.	Program for social upliftment will be continued under Corporate Social Responsibility	-----	-----	-----
9.	Rina Singh	Basi Berdah	Those who are educated should be given jobs.	The Provisions contained in the Right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement as well as	Total Employment of 970 (direct and indirect) during project	FY 2025-26 to FY 2064-65	Employment wages and benefits as per applicable rules and company policy

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				employment.			
10.	Ramrati Soni	Jhalari	The Sanitary Pads distributed by company that saved from diseases, and health of all the people has been taken care of.	Health and sanitation programs will be continued under corporate social responsibility.	Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony	FY 2025-26 to FY 2030-31.	300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith)
11.	Shyama Saket	Phatpani	Adani Company has divided coal block into two parts, Dhirauli & Phatpani has been separated, they should do it together, and they should fulfill all the demands.	In view of coal crisis in the country, the process of land acquisition has been divided into two phases with the aim of starting coal mining at the earliest, the process of land acquisition has been started, after the completion of first phase land	---	----	---

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				acquisition process, private land of the remaining villages will be acquired in the second phase.			
12.	Lilamati	Basi Berdah	Compensation is being given less by the company in my villages, if it is increased then we will support.	Under the provision contained in the section 26 of the right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013, the market value of the land will be determined by the collector.	-----	-----	----
13.	Rekha Shah	Dongri	To open a sewing center in Dongri, so I support the project.	10 kms of the project self-help group will be formed under corporate social responsibility	Company will support self-help group in the villages in 10 km of the project under CER	FY 2025-26 to FY 2030-31	CER Budget of 100 Lakh allotted to support self-help group for the said time frame in the villages of the

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
							study area
14.	Ramkali Shah	Dongri	I support Adani Company, I support what Didi has said in the earlier.	10 kms of the project self-help group will be formed under corporate social responsibility	Company will support self-help group in the villages in 10 km of the project under CER	FY 2025-26 to FY 2030-31	CER Budget of 100 Lakh allotted to support self-help group for the said time frame in the villages of the study area
15.	Saraswati Soni	Jhalari	The company has come now, we got an opportunity to move forward, with your cooperation, good hospital, school, and employment should be provided to people above 18 years of age. Our children also studied well and progressed. I support Adani company.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement.	Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony.	FY 2025 -26 to FY 2028-29 FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned) 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith). Employment wages and

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
					Total Employment of 970 (direct and indirect) during project		benefits as per applicable rules and company policy
16.	Devmati Shah	Amdand	English medium school should be started here also. and hospital like NTPC should be opened.	According to provision contained in right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013 school will be arranged in rehabilitation colony.	Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony.	FY 2025 -26 to FY 2028-29 FY 2025-26 to FY 2030-31.	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned) 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith).
17.	Sushila Soni	Jhalari	We should provide all the facilities to	In order to protect the environment	Implementation of Environment	FY 2025-26 to FY 2064-65.	Capital Cost of 1550 lakh and

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			public, minimize pollution, college should be arranged and trees and plants should be planted.	work will be done on prevention of water, air, and soil pollution according to environment management plan in phase manner	Management Plan. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department	 FY 2025-26 to FY 2030-31.	recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report. 1200 Lakh (submitted for Approval of Forest Department)
18.	Salita Soni	Basi Berdah	The people of Basi Berdah village depend on the forest; hence plantation shall be done. people should be given job even through interview. We are getting opportunity after arrival of Adani Company. We have no objection from the company.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement. In order to protect the environment	Implementation of Environment Management Plan. Conservation of Schedule I fauna	FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2030-31.	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report. 1200 Lakh (submitted for Approval of

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				work will be done on prevention of water, air, and soil pollution according to environment management plan in phase manner	as per the conservation plan approved by Forest Department		Forest Department)
19.	Angira Prajapati	Jhalari	I did not expect that I will ever be able to do a job, but today I am able to do a job. More women like us should be motivated. I support the company.	Social upgradation Program will be continued under Corporate Social Responsibility	-----	-----	-----
20.	Bela Soni,	Jhalari	Arrangements should be made to increase education, job etc.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement	Total Employment of 970 (direct and indirect) during project. Facilities will be increased in schools under the CER and arrangement of school in the	FY 2025-26 to FY 2064-65. FY 2025 -26 to FY 2028-29.	Employment wages and benefits as per applicable rules and company policy. 200 Lakh (For schools in the Villages in the study area and rehabilitation

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
					rehabilitation colony		colony area over the time frame mentioned).
21.	Hemlata Verma	Jhalari	Arrangements should be made to send the girls here to college or a college should be opened in this village.	Efforts will be made for this			
22.	Dhanmatia	Basi berdah	Compensation and jobs should be given in lieu of land	Proper arrangement of road, water, electricity will be made in the rehabilitation colony. Infrastructure will be developed.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
23.	Baikunth Dubey	Belwar	Compensation should be given in lieu of job and land.	Proper arrangement of road, water, electricity will be made in the rehabilitation colony. Infrastructure will	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition,	As per the Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				be developed.	Rehabilitation and Resettlement.		
24.	Sitaram Sahu	Belwar	Patta has been given by Madhya Pradesh Government, till today no hearing has been held nor has the money been given.	Non- intrusive lease holders will be provided facilities like others	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
25.	Shyamlal Shah	Phatpani	In which district 30 trees are being planted instead of one tree, in which district will these trees be planted? Water conservation should be arranged. Dhiroli has been left out of eight village.	Under the tree plantation program there is provision to plant 2500 trees in one hectare in phase manner in mining lease area. Water conservation shall be done as per guideline of CGWA. The guideline issued for the use of ground water will	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump.	FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for green belt development (Table 10.7 EIA). Capital Cost of 80 Lakh and recurring cost of

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				be followed. Instead of using ground water, arrangements will be made for water conservation like ponds and rain water conservation.	As Per Environment Management Plan rainwater harvesting will be carried out in the lease area		10 Lakh per annum for rain water harvesting in EMP (as per Table 10.7 in Chapter 10 of EIA).
26.	Bhagat Singh Khairwar	Dhirauli	If we do not take Mahua Tendu leaves, then how much will we get it compensation / compensation. Survey should be done for irrigated and unirrigated land.	Under the right of fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013, a rehabilitation and resettlement policy will be made, compensation will be provided as per provision contained therein.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
27.	Mr. Sanjay	Sirswah	All the trees that will be cut in these eight	Under the tree plantation	As Per Environment	FY 2025-26 to FY 2064-65.	37 Lakh Capital Cost of EMP &

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Kumar Gupta, Father of Kaushal Prasad Gupta		villages, all of them should be planted by the company so that the balance of the environment is maintained.	program, a provision has been made to plant 30 trees instead of one tree.	Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump.		50 Lakh recurring cost of EMP for green belt development (Table 10.7 EIA).
28.	Mr. Sukhdev Singh		Plantation should be done before the operation of coal mine; proper infrastructure should be arranged.	Plantation will be done in the area where office will be located and about 60 lakh saplings will be planted during entire excavation period.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump	FY 2025-26 to FY 2064-65.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for green belt development (Table 10.7 EIA).
29.	Bharat Lal Vishwaka	Belwar	The company should provide one	The provision contained in the	As per R&R plan Approved by	As per the Approved R & R	As per the Approved R & R

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
	rma		job to each displaced family, compensation to the displaced family not according to 2013 but according to the current guideline. Proper compensation should be given by the company to such families who are displaced.	right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement	Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	Plan.	Plan.
30.	Ramgulab Shah	Amraikhoh	Regarding cutting of trees in coal mining	Under the tree plantation program, a provision has been made to plant 30 trees instead of one tree	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump	FY 2025-26 to FY 2064-65.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for green belt development (Table 10.7 EIA).
31.	Rajesh Kumar	Basi Berdah	The problem of pollution in Singrauli	Every parameter will be followed	Implementation of Environment	FY 2025-26 to FY 2064-65.	Capital Cost of 1550 lakh and

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Shah		has increased highly that we will not remain health for more than 10 years. Pollution will lead to spread of the disease to a great extent.	for pollution control.	Management Plan. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Cost of Environmental Monitoring.	FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65.	recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report. INR 1200 Lakh (submitted for Approval of Forest Department. INR 190 Lakh per Year as per Table 6.1 of EIA report.
32.	Shri Baikuntha Prasad Dubey Father Durga Prasad Dubey (Written)	Belwar	Our only source of employment is wages. I request that I will be given employment as per Qualification.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement	----	----	----

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
33.	Mr. Aklesh Kumar Shah Amdar	Amdand, Jhalari	30 trees to be planted instead of one tree, but 30 trees should be planted instead of one tree by taking some land before the start of the mine. 200000 per annum should be given to affected family every year till end of mines. Mahua worth 40-50 thousand is earned by each family every year from the forest, what is being given in compensation?	Under the right of fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013, a rehabilitation and resettlement policy will be made, compensation will be provided as per provision contained therein.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
34.	Abhishek Kumar Pandey	Amraikhoh	Singrauli district is at number one in terms of pollution at the state label or central level. Employment should be given to 70 percent people.	According to Environment Management Plan work will be done on the prevention of water, air and soil pollution. Sprinkling	Implementation of Environment Management Plan.	FY 2025-26 to FY 2064-65. FY 2025-26 to FY	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report.

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
				machine, fogging machine will also be used.	Cost of Environmental Monitoring.	2064-65.	EIA report. INR 190 Lakh per Year as per Table 6.1 of EIA report.
35.	Devendra Pathak	Bandha	If any environmental hearing, is scheduled then the company has a zone of 10 km and an area of 50 km is called a buffer zone. Company should arrange announcement properly in 50 km radius. So, I request that this hearing be dismissed. The EIA report submitted to Sarpanch etc. are in English and not a regional language. The forest of Basi Berdah is the corridor of elephants, here	It was informed by regional officer, Madhya Pradesh Pollution Control Board that MP the provision of notification 2006 have been fully complied with. All panchayats have been informed 30 days before the date of public hearing on 04.05.2022. The information was published in six locals and one national newspaper.	-----	------	----

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			elephants come from Chhattisgarh, here wild animal etc. TB and asthma maximum cases in Singrauli region. Application for this public hearing has been submitted in collector Singrauli on 02.05.2022 on which no action has been taken. In Rewa division 30 percent land which is not suitable for environment, medicinal plants. Copy of whatever videography is being done should be made available to all gram panchayat.				
36.	Ramlal Shah	Basi Berdah	There is some land one lease and some government land. what facility will be	Compensation will be provided to Government lease holder as	As Per Environment Management Plan Plantation	FY 2025-26 to FY 2064-65.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			provided? no rate for compensation has been announced. They are distributing bed sheets somewhere and samosa somewhere. One family livelihood is provided by five Mahua tree, what we will do when these trees will be felled? There will be no rain due to tree cuttings.	per the provisions contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement. Trees will be planted under tree plantation program.	will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	green belt development (Table 10.7 EIA). As per the Approved R& R Plan.
37.	Mudsir Khan	Jhalari	Many rules have been made by the government for the protection of the environment, but the above rules are not followed by any	For the protection of Environment, the provision of notification of 2006 and the guidelines issued by Madhya	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation	FY 2025-26 to FY 2064-65.	37Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for green belt development (Table 10.7 EIA).

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			project, How can we be sure that the pollution will be reduced by the establishment of your project, fruit trees should be planted in those who set up the rehabilitation colony, so that people who are living here by planting fruit trees can get all those benefits. The natural herbs which are present in the forest will be completely destroyed, so a nursery should be made in the rehabilitation colony so that this type of extinct herbs can be saved.	Pradesh Pollution Control Board will be fully followed.	will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department	FY 2025-26 to FY 2030-31	INR 1200 Lakh (submitted for Approval of Forest Department)
38.	O.P	Village	People living in	The provision	As per R&R plan	As per the	As per the

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Chandra Tyagi	former Sarpanch	forest land for last three generation & they don't have single patta. There is not a single inch of forest land in the scheduled. 2003-04 schedule tribe area, they should be given lease by Madhya Pradesh government. Patta compensation should be given to the family and rehabilitation facility should be provided. The patta holder will commit suicide in future. The account holder should be compensated in coming time. The 14 days is being given, otherwise after 14 days we will fast unto death at Jhalari chock by taking people here.	contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement	Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement	Approved R& R Plan	Approved R& R Plan.

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
39.	Ajay Kumar Pathak	Zila Panchayat President, Singrauli	Ever since Adani Company come here, it has done door to door survey. Good schools should be made for the development of this area. Be a good college in the sector of education, in the field of health and in the field of employment more facilities should be given. There is also invaluable wood here, the type of tree that should be taken out same type of tree should be planted. People should be given employment according to their eligibility. People should be informed by going door to door and basic facilities should be	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			provided. More than one person should be given job in the house. More facilities should be given for education, health, employment, and appropriate steps should be taken in this regard.				
40.	Rupnaray an Singh Poya	Village - 60 km from here	This project is basically in tribal area, here no one listen to tribal people. Kusmi Majhauli, Sidhi Sihawal total 59 villages are tribal area in wiadhan blocks. We request the company to address the problem of tribal people here. Under the 2016 kusmi project, Majhauli, Sihawal is tribal area in which 59 villages are	The area affected by Dhirauli coal block does not come under the fifth schedule.	-----	-----	---

	Name	Village	Question Raised	Reply	Action Plan		
					Commitment	Time Frame	Budget
			covered. It comes under the fifth schedule in the tribal area. It is not the right of the government of India to get the land acquired. State and central government should conduct this survey, block wise. Here the landlock popular service if applicable.				

Action plan for written questions

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
1.	Ajay Kumar Gupta	Siraswah	The company should plant as many trees as will cut and destroyed in these eight villages so that environment remains balanced.	In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				afforestation scheme, plantation in an area of 1397.54 hectares will be done.	biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2030-31.	1200 Lakh (submitted for Approval of Forest Department)
2.	Sukhdev Singh	Basi Berdah	Plantation should be done before the opening of coal mines and basic facilities should be provided.	In the core zone and buffer zone of the affected areas, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54 hectares	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
					Schedule I fauna as per the conservation plan approved by Forest Department.		Forest Department)
3.	Bharat Lal Vishwakarma	Belwar	A permanent job to every displaced family by the company Such person whose house is there in the area of the company and their documents belong to same village they should provide the facility of displacement Fair compensation should be given by the company to such families who are displaced. Change the guide	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, Rehabilitation and Resettlement.	Total Employment of 970 (direct and indirect) during project.	FY 2025-26 to FY 2064-65	Employment wages and benefits as per applicable rules and company policy.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			lines of 2013 and give convenience and Compensation to the people as per new guidelines instead of the.				
4.	Ramgulab Shah	Amrai Kho	The cutting of trees in coal mines will end the environmental balance, so the company should first allot the land for plantation and plant trees even at least 20 percent more than the number of trees that are currently present. It should be done so that the balance of the surrounding environment is not disturbed. Due to destruction of trees, rain will not able rain properly in many villages, so it	In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54 hectares.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department)

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			would be appropriate for the company to plant more and more trees, so that environmental balance is maintain.				
5.	Durga Prasad Dubey	Belwar	Jobs in the company, facilities for children's education and medical facilities, allowance for the aged group, better place for resettlement, allowance and land, fair compensation, fair rate of compensation, fair rate of house should be given.	Under the corporate social responsibility and rehabilitation and resettlement plan approved by the commissioner, quality education, and better health facilities will be arranged and compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 will be followed in land	Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony under CER. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony	FY 2025-26 to FY 2030-35 FY 2025 -26 to FY 2028-29	300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith). 200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned)

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				acquisition, rehabilitation and resettlement.			
6.	Bekunth Prashad Shah	Belwar	That our profession is labour and we do not have any other source, I request the project proponent to provide us proper job as per the qualification	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement	Total Employment of 970 (direct and indirect) during project.	FY 2025-26 to FY 2064-65	Employment wages and benefits as per applicable rules and company policy.
7.	Ram Ashok Sen	Belwar	As many trees as there are in my village, should be planted in our resettlement colony. Good Schools for education like DPS, D Paul standard. All arrangements should be made in rehabilitation	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement. Facilities will be provided in rehabilitation colony under	Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Total Employment of 970 (direct and indirect) during project	FY 2025 -26 to FY 2028-29. FY 2025-26 to FY 2064-65	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned). Employment wages and benefits as per applicable rules and company policy

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			colony. Compensation of our house, land, tree made, Gataur, well should be assessed from the act of 2018. Jobs should be given and all the villages which have been allotted should be measured together and distribute compensation together. 2018 should be implemented by removing the 2013 Act, otherwise, we will all oppose the company.	schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013.			
8.	Alkesh Kumar Shah	Amdanad	All the facilities like NTPC and NCL should be provided to the displaced	Facilities will be provided in rehabilitation colony under	As per R&R plan Approved by Commissioner under the right to	As per the Approved R& R Plan	As per the Approved R& R Plan

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			person in the rehabilitation colony. 25 lakhs should be given at least for construction of house in the rehabilitation colony Land compensation should be given 4 times. All displaced family should be given jobs	schedule III of the right to fair compensation and transparency in land acquisition, Rehabilitation and Resettlement Act 2013. Compensation will be provided as per the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.	fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement.		
9.	Shivpunj Shah	Amraikho	The environment should be properly maintained.	For the protection of environment, the EIA notification 2006, and guidelines	Implementation of Environment Management Plan.	FY 2025-26 to FY 2064-65.	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				issued by Madhya Pradesh Pollution Control Board will be fully followed. Environment Management plan includes provisions for air pollution control and water pollution control etc.			Environment Management as per Table 10.7 in EIA report.
10.	Sitasharan Shah	Dhirauli	D.P.S. and D.A.V. standard Schools with higher secondary level shall be established. Company should acquire land of all the rural places together. Hearing is not valid as they are leaving some villages the entire area of all villages of Dhirauli, Basi	According to schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013, facilities will be provided in Rehabilitation colony. In view of coal	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, Rehabilitation and Resettlement. Facilities will be increased in	As per the Approved R& R Plan FY 2025 -26 to FY 2028-29	As per the Approved R& R Plan. 200 Lakh (For schools in the

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			Berdah, Phatpani, Jhalri should be acquired simultaneously. Entire arrangement of should be made for business. If the natural wealth is destroyed, the same number of trees should be planted, the entire family should be given a job in the company.	crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland acquisition has been started, after the completion of first phase land acquisition, private land of remaining villages will be acquired in second phase. In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh	schools under the CER and arrangement of school in the rehabilitation colony. As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and	FY 2025-26 to FY 2064-65	Villages in the study area and rehabilitation colony area over the time frame mentioned) 37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54 hectares will be done.	biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department	FY 2025-26 to FY 2030-31	1200 Lakh (submitted for Approval of Forest Department)
11.	Akhilesh kumar Shah	Amraikho	More and more trees should be planted in the project, youth should be given employment, only then the project is welcome.	In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54 hectares will be done.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement.	Schedule I fauna as per the conservation plan approved by Forest Department.		Forest Department)
12.	Ramsajivan Shah	Amraikho	Best residential facilities should be provided in the rehabilitation colony. All displaced families should be given permanent jobs. Compensation for our houses, properties and land should be given 4 times from the present value.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement. Total Employment of 970 (direct and	As per the Approved R& R Plan FY 2025-26 to FY 2064-65	As per the Approved R& R Plan. Employment wages and

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			The company should provide jobs as per their qualification, training those who are not skillful.		indirect) during project		benefits as per applicable rules and company policy
13.	Mudassir Husain	Amraikho	The trees that will be cut in the said project will increase the pollution and to minimize the pollution, four times the trees should be planted in the area around the coal block itself and nearby from the coal mining during operation, the herbs which are naturally grown here will be destroyed. Nursery should be established by planting the herbs at the settlement site of the displaced family, so that the	In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54hectares will be done. Nursery will be developed for plantation in which medicinal herbs will also be included. To	Implementation of Environment Management Plan. As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically	FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2064-65	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report. 37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			herbs can be preserved and protected, and committee should be formed to protect the environment, other measures should be taken to prevent pollution.	Prevent pollution EIA notification 2006, and guidelines issued by Madhya Pradesh Pollution Control Board should be followed. Environment Management plan includes provisions for air pollution control and water pollution control etc	reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department	FY 2025-26 to FY 2030-31	1200 Lakh (submitted for Approval of Forest Department
14.	Dependra kumar Shha	Majoliptha	All gram panchayats like Suliyari, Phatpani, Dhiroli should be acquired together and land rate and compensation should be given maximum, and after shifting the displaced from here	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			to R & R colony, work of the company like cutting of trees, digging soil should be minimized, so that people can be avoid pollution and the R&R policy should be made as best as possible, so that all the farmers get good benefits.	The approval of the rehabilitation and resettlement policy will be implemented after the approval of commissioner as per the provision of 2013.			
15.	Shyama Saket	Dhirauli	Dhirauli block should be acquired simultaneously, land acquisition of 3 villages is not being done by the company, however separating 5 villages. The affected 3 villages should be displaced simultaneously	In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland acquisition has been started, after the completion of first	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				phase land acquisition, private land of remaining villages will be acquired in second phase.			
16.	Chanda Panik	Basi Berdah	Proper arrangement of school and health and R&R Colony, till displacement does not take place, these facilities should be in the village and unemployed youth should be given employment.	The provision contained in the right to fair compensation and transparency Act 2013 will be followed in land acquisition, rehabilitation and resettlement. Facilities will be provided under schedule III in rehabilitation colony.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan	As per the Approved R& R Plan.
17.	Kalpna Sharma	Bajodi	Please give information about what is being done to control environmental pollution	For the protection of environment, the provisions of EIA notification 2006, and guidelines issued	Implementation of Environment Management Plan.	FY 2025-26 to FY 2064-65.	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				by Madhya Pradesh Pollution Control Board should be followed. Environment Management plan includes provisions for air pollution control and water pollution control etc			Management as per Table 10.7 in EIA report.
18.	Karishma Soni	Jhalari	Information regarding the provision of water facilities, pollution control, employment, education, and health	According to the provision contained in the right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013, facilities will be provided in rehabilitation colony.	Implementation of Environment Management Plan. Facilities will be increased in	FY 2025-26 to FY 2064-65. FY 2025 -26 to FY 2028-29.	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report. 200 Lakh (For schools in the

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				To prevent pollution the provisions of EIA notification 2006, and guidelines issued by Madhya Pradesh Pollution Control Board should be followed. Environment Management plan includes provisions for air pollution control and water pollution control etc	schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony.	FY 2025-26 to FY 2030-35.	Villages in the study area and rehabilitation colony area over the time frame mentioned). 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith.
19.	Jai Kumar Vishwakarma	Belwar	That, this application letter is being presented by the applicant, after passing the environment clearance public hearing, my son	Not related to this project	----	-----	-----

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			and daughter have not been able to get the displaced card in the past, whose name is given below. 1. Revathi Vishwakarma husband Pradeep kumar Vishwakarma 2. Nirmala Vishwakarma Husband Rajendra kumar Vishwakarma 3. Urmila Vishwakarma husband Geeta Prashad Vishwakarma 4. Prashant Kumar Vishwakarma Father Jai Kumar Vishwakarma				
20.	Sita Ram	Dhirauli	Demand form Adani	Compensation	As per R&R plan	As per the	As per the

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Shah		company should be resolve as follows- 1. Adani company should tell the rate of compensation and wages for job. 2. All facilities should be given under 2013 Act. 3. Company is not telling anything at which rate it will be given. 4. All facilities plot, electricity, road, hospital, school, should be provided free of cost.	will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. Facilities will be provided in rehabilitation colony as per Schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013.	Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	Approved R& R Plan	Approved R& R Plan.
21.	Ramjiyawan Jaiswal	Dhirauli	Compensation for 3-acre house is	Compensation will be determined under	As per R&R plan Approved by Commissioner	As per the Approved R& R Plan	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			needed (30 crores). Environment should be protected. Compensation should be given at the earliest.	the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. For the protection of Environment provisions of EIA notification 2006, and guidelines issued by Madhya Pradesh Pollution Control Board should be followed. Environment Management plan includes provisions for air pollution control and water pollution control etc.	under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement. Implementation of Environment Management Plan.	FY 2025-26 to FY 2064-65.	Capital Cost of 1550 lakh and recurring cost of 282 lakh per annum for Environment Management as per Table 10.7 in EIA report.
22.	Motilal	Dhirauli	Demand from the	Facilities will be	As per R&R plan	As per the	As per the

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Sahu		Adani company- Youth should be given jobs by Adani. Company provided plot, water and electricity facility. People here do the work of collection of tendu leaves, in exchange of that amount should be given also Mahua flower give money too.	provided in rehabilitation colony as per Schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013. Under the provision of right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013, the rehabilitation and resettlement policy will be approved by the commissioner,	Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	Approved R& R Plan	Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				according to which compensation will be provided.			
23.	Shyamlal Sahu	Dhirauli	1. Permanent job to local people 2. Rain water conservation 3. More and more tree species should be planted. 4. School should be like DPS English medium. 5. Hospital should be like Nehru 6. Compensation should be given at fair rate at 40 lakh hectares land should be given	Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. Facilities will be provided in rehabilitation colony as per Schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation, and	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. Company will organize health camps and increase health	As per the Approved R& R Plan. FY 2025 -26 to FY 2028-29. FY 2025-26 to FY 2030-35	As per the Approved R& R Plan. 200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned). 300 Lakh (For Villages in the study area and

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				resettlement Act 2013. The guidelines issued by CGWA for the use of ground water will be followed. Instead of using ground water, arrangements will be made for pond and rain water conservation through rain water harvesting etc.	facilities to the health center in villages and arrangement of hospital in the rehabilitation colony under CER. Total Employment of 970 (direct and indirect) during project.	FY 2025-26 to FY 2064-65. Employment wages and benefits as per applicable rules and company policy.	rehabilitation colony area over the time frame mentioned herewith.
24.	Anjani Kumar Shah	Dhirauli	Want a job in Adani company. Conveyor is Needed for coal transportation. Trees should be installed to avoid the spread of pollution. Ground water should not be exploited	Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				Conveyor belt is proposed to be used for transportation of coal. In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory afforestation scheme, plantation in an area of 1397.54 hectares will be done. The guidelines issued by CGWA for the use of ground water will be followed. Instead of using ground water,	out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Total Employment of 970 (direct and indirect) during project. As Per Environment Management Plan rainwater harvesting will be carried out in the lease area.	FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2064-65.	1200 Lakh (submitted for Approval of Forest Department). Employment wages and benefits as per applicable rules and company policy. Capital Cost of 80 Lakh and recurring cost of 10 Lakh per annum for rain water harvesting in EMP (as per Table 10.7 in Chapter 10 of EIA.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				arrangements will be made for pond and rain water conservation through rain water harvesting etc.			
25.	Rambhual Keval	Jhalari	Environment related application regarding Dhirauli coal mine. 1. Trees should be planted along the entire boundary, where the plot is being given of Dhirauli coal block. 2. Affected village of Dhirauli coal block should be removed together and after providing full facilities affected villages should be shifted.	A Proposal has been submitted to the collector for resettlement colony in village Jatha Tola for displaced people of Dhirauli coal block. In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			3. After providing complete facilities and displacement to the affected villages of Dhirauli coal mine, the work of coal mining should be done.	acquisition has been started, after the completion of first phase land acquisition, private land of remaining villages will be acquired in second phase. Quality education and better health facilities will be arranged and Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	Department. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
26.	Sipahi Lal Shah	Jhalari	Trees should be planted along the entire boundary where the plot is being given by Dhirauli coal block. Entire Villages of Dhirauli coal block shall be displaced together after providing complete facilities. Coal mining shall be started after providing all the facilities to villagers.	Trees shall be planted in the vacant area of R&R colony. In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland acquisition has been started, after the completion of first phase land acquisition, private land of remaining villages will be acquired in second phase.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. As per R&R plan Approved by Commissioner	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31. As per the Approved R& R Plan.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department). As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
					under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.		
27.	Krishnan and Shah	Basi Berdah	The land is being acquired by Adani Company in Basi Berdah, in lieu of that, employment should be provided in the permanent residence (house, road, road medicine) and compensation at the rate of 30,00,000 per acre, otherwise we will not give our land.	Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. Facilities will be provided in rehabilitation colony under schedule III of the right to fair	Total Employment of 970 (direct and indirect) during project. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony under CER.	FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2030-35. FY 2025 -26 to FY 2028-29.	Employment wages and benefits as per applicable rules and company policy. 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013.	Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned). As per the Approved R& R Plan.
28.	Yogendra Kumar Pandey	Amriakho	Fair compensation should be given to the affected land in the company and all the displaced families should be given jobs and benefits of all	Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			facilities and pension allowance and medical facilities and education should be provided and 6 times more trees should be planted than the number of trees that will be cut from the company. We agree.	acquisition, rehabilitation, and resettlement. Facilities will be provided in rehabilitation colony under schedule III of the right to fair compensation and transparency in land acquisition, rehabilitation and resettlement Act 2013. In the core zone and buffer zone of the affected area, there is a provision to plant about 60 lakh native species in a phased manner and under the Compensatory	technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	FY 2025-26 to FY 2030-31. As per the Approved R& R Plan.	1200 Lakh (submitted for Approval of Forest Department). As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				afforestation scheme, plantation in an area of 1397.54 hectares will be done			
29.	Shivdas Shah	Amriakho	If trees are being cut, then sapling should be planted and the displaced poor will have to be given complete arrangements, this is the basis of food for the poor, see, that there should not be any kind of problem and there should be some kind of employment.	In the core zone and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted. Quality education and better health facilities will be arranged.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department). Employment wages and benefits as per

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	Department. Total Employment of 970 (direct and indirect) during project.		applicable rules and company policy.
30.	Dheeraj Kumar Saket	Jhalari	The coal dispatching from Dongrital block of APMDC/Adani company, which is running on the highway / tailor / dumper etc., is generating dust, due to heavy oxygen and there is a lot of problem in agriculture, please resolve	Not Related to the project	------	------	-----
31.	Vinod Kumar	Jhalari	We get a lot of	Quality education and better health	As Per Environment	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP &

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Saket		benefits from the forest, like the fruit of Mahua and the fruit of Tendua. There should be fair compensation. To save us from the pollution, more and more trees should be planted around the rehabilitation displacement.	facilities will be arranged. Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. In the core zone and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area	Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2030-31.	50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				of 1397.54 hectares will be planted.			
32.	Mohd Hussain	Basi Berdah	The stratatech company should arrange for the development of the environment in proportion to the appropriate compensation and resettlement. In which village will you make arrangements for planting trees?	A Proposal has been submitted to the collector for resettlement colony in village Jatha Tola for displaced people of Dhirauli coal block. In the core zone and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				planted.			
33.	Rajesh Kumar Shah	Basi Berdah	New basic facilities should be provided to the residents in the land of Basi Berdah which is being acquired by Adani Company. Employment, education, medical, road environment protection, job allowance, payout etc. facilities should be provided on stamp paper to the permanent residents.	In the core zone and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted. Quality education and better health facilities will be arranged. Compensation will be determined under the provision contained in the right to fair compensation	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Total Employment of 970 (direct and indirect) during	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2030-35.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department). Employment wages and benefits as per applicable rules and company policy. 300 Lakh (For Villages in the

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	project. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the rehabilitation colony under CER. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. As per R&R plan Approved by Commissioner under the right to	FY 2025 -26 to FY 2028-29. As per the Approved R& R Plan.	study area and rehabilitation colony area over the time frame mentioned herewith). 200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned). As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
					fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.		
34.	Shrda Singh	Kanuwa Nava Tola	Government of India, Ministry Environment Ministry, as many trees are being affected by mines, it is requested to the Ministry of Environment that work of planting more and more trees should be done and if one tree is cut, 50 trees should be planted.	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
35.	Santosh Kumar Saket	Majholipath	Land acquisition should be done together, adding that the part of the village which is small, should be acquired simultaneously. Compensation of land given school like DPS and DAV open till 12.40 lakh for irrigated, and 20 lakh for uneducated and house rate should be given till date. Plant should be planted at par with the cutting plants.	In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland acquisition has been started, after the completion of first phase land acquisition, private land of remaining villages will be acquired in second phase. Quality education and better health facilities will be arranged. Compensation	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Company will organize health camps and increase health facilities to the	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2030-35.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department). 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted.	health center in villages and arrangement of hospital in the rehabilitation colony under CER. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	FY 2025 -26 to FY 2028-29. As per the Approved R& R Plan.	200 Lakh (For schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned). As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
36.	Indal Prasad Singh	Amdand	1.We want permanent job in the company 2. All kind of arrangements are needed in the R&R colony 3. Compensation of land should be given at the right rate	Quality education and better health facilities will be arranged. Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	Total Employment of 970 (direct and indirect) during project. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	FY 2025-26 to FY 2064-65. As per the Approved R& R Plan.	Employment wages and benefits as per applicable rules and company policy. As per the Approved R& R Plan.
37.	Umesh Kumar Jaiswal	Jhalari	We get 1.Mahua flower from the forest 2. Tendu leaves are obtained from the forest 3. If this forest will cut, then where will we get everything? 4. Displaced	Quality education and better health facilities will be arranged. Compensation will be determined under the provision contained in the right to fair compensation and transparency	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			families should get regular jobs	Act 2013 in land acquisition, rehabilitation, and resettlement.	out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Total Employment of 970 (direct and indirect) during project.	FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65.	1200 Lakh (submitted for Approval of Forest Department). Employment wages and benefits as per applicable rules and company policy.
38.	Anil Kumar Shah	Majholipath	Environmental Tree should be planted, employment should be provided to the people and arrangements should be made for good schools, colleges, health facilities, good	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			hospitals.	scheme, an area of 1397.54 hectares will be planted. Quality education and better health facilities will be arranged. Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. Total Employment of 970 (direct and indirect) during project. Company will organize health camps and increase health facilities to the health center in villages and arrangement of hospital in the	FY 2025-26 to FY 2030-31. FY 2025-26 to FY 2064-65. FY 2025-26 to FY 2030-35. FY 2025 -26 to FY 2028-29.	1200 Lakh (submitted for Approval of Forest Department). Employment wages and benefits as per applicable rules and company policy. 300 Lakh (For Villages in the study area and rehabilitation colony area over the time frame mentioned herewith). 200 Lakh (For

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
					rehabilitation colony under CER. Facilities will be increased in schools under the CER and arrangement of school in the rehabilitation colony.		schools in the Villages in the study area and rehabilitation colony area over the time frame mentioned).
39.	Sant Kumari	Amraikho	The valuation of the house which is located in Khasra no 135/1 is missed, please revalue it.	The Valuation of house will be done the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. The valuation work is not started yet.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan	As per the Approved R& R Plan
40.	Ram charan	Phatpani	It is our demand	In Core and buffer zone of the	As per R&R plan Approved by	As per the Approved R& R	As per the Approved R& R

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
	Pal		from the Adani company that more and more trees should be planted so that the environmental balance should not be disturbed and jobs and school and college should be given to the children of the village. Conveyors should be made for coal extraction and free health facilities, those who are not fit for the job, should be trained and given jobs.	affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted. Conveyor belt is proposed to be used for transportation of coal. Quality education and better health facilities will be arranged. Compensation will be determined under the provision contained in the	Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement. As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan	Plan. FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31	Plan. 37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	approved by Forest Department		
41.	Bhola Prasad Mishra	Khanuwa	Sir, it is requested that before the operational of coal mines, arrangements should be made for planting saplings, so that the environmental balance remains in future.	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
					Department.		
42.	Upendra Singh Sotiya	Dhangad	This area is tribal-dominate area, and our livelihood depends on water, forest, tress, mahua flowers, Tendu patta. Medicinal plants are used by us. If company will come, we eat flowers, fruits, from forest and fish.	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted. Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				resettlement.			
43.	Gopichandra	Khandhnauli	Compensation should be given by the Adani Company which has been occupied under Navgaon, Dongri, Jhalari, Berdah, Sulayri, Dhirauli, Bandha, total nine villages who have occupied land of job and revenue forest land patta for many years	Not related to this project	----------	-----	-----
44.	Rakesh Verma	Bajodi	1. To save environment from pollution 4 times number of trees planted, it is advisable to plant fruit trees in the area around this Coal block. 2. it is that, Natural herbs will also be cut in coal mining, so in order to	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB	FY 2025-26 to FY 2064-65 FY 2025-26 to FY	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			protect and preserve natural herbs, it is justified to plant herbs where displaced families will be resettled.	of 1397.54 hectares will be planted. Nursery will be developed for plantation in which herbs will also be included.	dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	2030-31.	1200 Lakh (submitted for Approval of Forest Department).
45.	Premlal Pal	Dhirauli	Along with the environment in all the villages from the acquisition area of Dhirauli coal block, all work like private land and MP Govt land measurement and valuation of the entire property should be done simultaneously. Facility should be given to the people of the displaced family for job and education.	In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland acquisition has been started, after the completion of first phase land acquisition, private land of remaining	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31. As per the	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				villages will be acquired in second phase. In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted. Quality education and good health facilities will be arranged and Compensation will be determined under the provision contained in the	approved by Forest Department. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement	Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.			
46.	Rajendra Shah	Amraikho	Our house is in Amarikho barely has acquired by APMDC, but company says that its Compensation will be given by Adani. Adani left my house during their valuation.	Not related to this project	-----	------	-----
47.	Aannadlal Pal	Dhirauli	Sir, I want a suggestion from Adani company that the person who is settled in the Government land and running his livelihood, for there or landless. what is the suggestion from the company's side	The compensation will be determined as per rehabilitation and resettlement plan approved by commissioner.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			for him?				
48.	Shardash ran Shah	Amraikho	Providing job to all the displaced family 2. Best facilities should be provided in the resettlement colony such as school, college, hospital, market 3. At the time of measurement my house has left out, it should be evaluated	Quality education and good health facilities will be arranged and Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
49.	Shiv Prasad Jaiswal	Dhirauli	1) On 28/12/2021, out of 7 villages, 5 villages have been notified, in which it is written that Dhirauli and Phatpani will acquired by the company after 15 years, so, we the people of the	In view of coal crisis in country the land acquisition has been divided in to two phases with the aim of starting the coal mining at the earliest, in the first phase eland	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			villages will only be able to cooperate after 15 years. 2) If all these villages are acquired together, then we are able to cooperate. 3. Trees related to fruits, leaves like Mahua, Tendu and Sal trees related to business should be planted	acquisition has been started, after the completion of first phase land acquisition, private land of remaining villages will be acquired in second phase. In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted.	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	1016.28 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
50.	Bhagwan das Prajapati	Bajodi	Road, school and hospital shall be provided. Environment plan shall include neem, Mango, Guava, Sal, Mahua, Char, Amla, Munga, Jamun, Tamarind, Sitaphal, Papaya, Bair, Tendu, Jackfruit trees present here, then we are agree for the project	Quality education and good health facilities will be arranged and Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement. As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna	As per the Approved R& R Plan. FY 2025-26 to FY 2064-65 FY 2025-26 to FY 2030-31.	As per the Approved R& R Plan. 37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				afforestation scheme, an area of 1397.54 hectares will be planted.	as per the conservation plan approved by Forest Department.		Department).
51.	Aashman Singh	Bajodi	Welcome to the project		-----	------	-----
52.	Jawala Singh	Bajodi	Provide employment, supporting to the project	Compensation will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement.	Total Employment of 970 (direct and indirect) during project.	FY 2025-26 to FY 2064-65.	Employment wages and benefits as per applicable rules and company policy.
53.	Raghuraj Singh	Bajodi	Mango, Guava, Neem, Mahua, Sal, Amla, trees should be planted.	In Core and buffer zone of the affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and	As Per Environment Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA).

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
				under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted.	technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2030-31.	1200 Lakh (submitted for Approval of Forest Department).
54.	Ram Singh	Bajodi	Employment, hospital should be built	Facilities will be provided in rehabilitation colony as per Schedule III of right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013.	As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation and resettlement.	As per the Approved R& R Plan.	As per the Approved R& R Plan.
55.	Indrapara tap Singh	Bajodi	School, Road, Environment,	In Core and buffer zone of the	As Per Environment	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP &

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			Mango, Sal, Neem, Mahua, Tendu, Char, Bell Should be planted	affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted	Management Plan Plantation will be carried out over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department.	FY 2025-26 to FY 2030-31.	50 Lakh recurring cost of EMP for greenbelt development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department).
56.	Shankhal Panika	Bajodi	Develop the area	All possible efforts will be made.			
57.	Vidha Nannd Shah	Amaraikho	After providing all facilities like school, hospital, electricity, water, drain, road etc in the R&R	Quality education and good health facilities will be arranged and Compensation	As Per Environment Management Plan Plantation will be carried out	FY 2025-26 to FY 2064-65	37 Lakh Capital Cost of EMP & 50 Lakh recurring cost of EMP for greenbelt

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			Rehabilitation colony, the details of plot and displacement of people should be done. 2. Rehabilitation work should be done only after giving fair compensation of entire asset to the displaced family. 3. In relation to the environment – the basis of our life is from water and environment in which the animals living on the surface such as humans, animals, birds, dogs, lions, monkey, and many other creatures which wandering from place to place for water and food. For all those	will be determined under the provision contained in the right to fair compensation and transparency Act 2013 in land acquisition, rehabilitation, and resettlement. Facilities will be provided in rehabilitation colony as per Schedule III of right to fair compensation and transparency in land acquisition, rehabilitation, and resettlement Act 2013. In Core and buffer zone of the	over virgin area and plantation will also be carried out on technically and biologically reclaimed mined out land and OB dump. Conservation of Schedule I fauna as per the conservation plan approved by Forest Department. As per R&R plan Approved by Commissioner under the right to fair compensation and transparency Act 2013 in land acquisition,	FY 2025-26 to FY 2030-31. As per Approved R&R Plan	development (Table 10.7 EIA). 1200 Lakh (submitted for Approval of Forest Department). As per Approved R&R plan

	Name	Village	Question	Reply	Action Plan		
					Commitment	Time Frame	Budget
			creatures who are wandering small and big ponds should be constructed for pastures, fruit trees, water at different places. Medicines and good hospital facilities should be provided for the animals.	affected area, plantation of about 60 lakh native species is proposed to be done in a phased manner and under the Compensatory afforestation scheme, an area of 1397.54 hectares will be planted.	rehabilitation and resettlement.		

7.2.4 Budget/ Scheme for the Public Hearing Commitments

As per Ministry's OM dated 30.09.2020, the Ministry has decided to deliberate on the and commitments made by the project proponent to address the issues raised in the Public Hearing held on 04.05.2022. Hence, the activities proposed by M/s Stratatech Mineral Resources Private Limited to address the issues raised in the Public Hearing vis-à-vis budget for the same is given below. Total budget for implementation of the activities is Rs. 653 Lakh.

Table 7.1: Activity-wise Phasing of Public Hearing Commitments Scheme

S. No.	Proposed Activities under public hearing commitment scheme		Phasing of Allocated proposed PH commitment Budget, Rs. Lakh					
			FY 2023-24	FY 2024-25	FY 2025-26	FY 2026-27	FY 2027-28	Total
1	Health Facility at village Dhirauli Jhalari, Amdand Belwar and rehabilitation colony	Providing infrastructure facilities such as beds, medical instruments in medical centers	25	50	50	75	75	275
		24x7 Ambulance to be made available to Basi bardah, Jhalari						
2	Educational Facilities (Dhirauli Village Basi bardah, Jhalari Amdand Belwar and rehabilitation colony and rehabilitation colony and rehabilitation colony)	Development of School	0	0	40	20	10	70
		Construction of Toilets in the schools	0	0	10	0	10	20
		Construction of Laboratory in the schools	0	0	0	10	10	20
3	Rural infrastructure development	Construction of Pucca roads, Waiting Shed,	0	0	50	0	50	100
		Construction of Overhead tanks, piping, drainages & internal roads	5	5	5	5	10	30
		Renovation of Temples (religious places)	0	0	2	3	3	8

4	**Employment Generation**	Skill Development Training for operators, fitters, electricians	10	10	10	10	10	50
		Training centers for Ladies (stitching, Embroidery, tailoring etc.)	10	10	10	10	10	50
6	**Livelihood Development & farmers productivity**	Farmer's training in recent crop specific training on cultivation, harvesting and marketing.	5	10	0	10	25	30
Total			**55**	**85**	**177**	**143**	**213**	**653**

7.3 Hazard identification & risk assessment

Risk assessment is the systematic study of uncertainties and risks encountered in various areas during any operation. Risk Assessment normally involves identification of hazards, assessment of risk associated with it, evaluation of its impacts and to suggest mitigation measures. As part of managing the health and safety of business, we must control the risks in our workplace and chalk out actions to reduce the significant consequences. Hence, it is necessary to understand what is 'Risk' due to mining operations and purpose of Risk Assessment.

This will not only ensure smooth operation and but also result in savings by reducing the lost man-hours due to accidents. The same thing is true for explosives, where the slightest negligence may cause premature initiation causing injury to persons or damage to equipment and due to sudden release of chemical energy can create havoc.

7.3.1 Hazard

'Hazard' has been defined as a source of potential harm to people, property or the environment. Alternatively, hazard is an agent (either chemical, biological, or physical) or it is a set of conditions that presents a source of risk. In any given situation hazards are fixed, they can vary in two ways-their intrinsic nature (e.g. high pressure/low pressure) and their scale (more or a less).

Use of High Voltage Electricity Equipment

In case of mechanized Mine, as we are very well aware, the use of high voltage electricity (3.3 KV and above) and use of explosives are the major sources of potential hazard. In case of high voltage electricity, the moment the earthing system fails, it becomes very hazardous. Every possible effort has to be made to make the system foolproof. Training on operation and maintenance of that electrical equipment shall be provided to the concerned persons and, advanced protective wear shall be procured.

Measures Suggested to avoid Accidents due to Blasting

- Shots will not be fired except during the hours of day light and the holes charged on a particular day will be fired on the same day;
- Shots, if fired after hours of daylight, should be muffled so that the flying fragments from the blasting material do not project beyond a distance of 10 m from the place of blasting;
- Adequate shelters or other protective structures will be provided to the workers at all times;
- The shot fired will give sufficient warning by effective signal over the entire area falling within a radius of 500 m;

- Where any permanent building or structure lies within the danger zone, the aggregate maximum change in all the holes fired at any particular time will not exceed 2 kg. But if blasting is done with at least half-second delay of the detonator, even a maximum charge of 2 kg can be used in each hole;
- If a single shot exploder is used or if blasting is done with ordinary detonator, the shot-firer will not fire more than fifty shots in one shift, but if multishot exploder is used, the number can go up to eighty; and
- During the approach and progress of an electrical storm, adequate precaution will be taken.

Measures to Prevent the Danger of Overburden

- A stone wall should be built around the toe of each active dump at a distance of about 50-m from the toe;
- To prevent the failure of overburden slopes, especially during the rainy season, the following precautions will be taken;
- Proper terracing of the dump slopes, with a maximum bench height of 30 m; and
- In flat areas where the dumping operations have come to an end, the slope angle should be flattened by about 5 degrees lower than the angle of repose which varies from site to site but not less than 25 deg.
- Planting vegetation as early as possible over the overburden dump slopes;
- Provide drainage channels along the overburden dump toe for additional protection, in such a way that a distance of 15 m should be maintained left between the overburden dump and the bench; and
- If a mine is abandoned, the bench and overburden dump should be separated from each other by digging a trench of 6 to 10 m width.

7.3.2 Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

7.3.3 Fuel Storage

Diesel will be stored and used in the Mine site for DG sets and Machineries.

7.3.4 Water Logging

Water logging in the mine site can be avoided by adopting following measures:

- Position of water body should be correctly known; and
- Draining of mine water by suitable capacity pumps.

7.3.5 Risk and Risk Assessment

Risk assessment is the systematic study of uncertainties and risks encountered in various areas during any operation. It is a process to identify potential hazards, evaluate impacts and suggest mitigations. Coal extraction, transport and processing can involve an array of health and safety hazards that can result in injury, illness and death, if not properly controlled. The following section describes various risks and hazards which can happen during open cast as well as underground mining of coal and a disaster management plan with an aim of taking precautionary steps to avert disasters and also take such action after disaster which limits the damage to minimum. The various safeguards to be taken to ensure the safety of the mine and that of employees are provided in the CMR 1957 (amended 2017), Mines Act, 1952. Moreover DGMS, Explosive act and rules to be strictly followed for mining operations.

7.3.5.1 Identification of Hazards

The health and safety risks to coalminers include but are not limited to: (a) mine explosions; (b) mine fires; (c) falls of the mine roof, face and sides (ribs); (d) disabling and deadly lung diseases caused by the inhalation of respirable coalmine dust; (e) noise-induced hearing loss; (f) crushing of a miner between machinery or machinery and the coal sides in confined spaces; (g) shock, burns and electrocution; (h) ignitions of methane which can explode during coal cutting; (i) inundations of dangerous gases, water or other free-flowing materials from old mine workings or geological faults; (j) outbursts of rock, coal or gases released from the earth under extreme pressure; (k) premature or improper detonation of explosives; and (l) exposure to harmful chemicals and harmful agents used in mines. Numerous other hazards in coalmines that can result in injury, illness or death include the following: (a) slips, trips and falls; (b) handling materials; (c) unguarded machinery; (d) falls from heights; (e) excessive temperatures/heat; (f) vibration; (g) ergonomics; (h) automation and remote movement; (i) inadequate inspection and prevention; (j) inadequate first aid, medical attention, emergency assistance; and (k) inadequate training.

7.3.5.2 Causes of firedamp explosion

- Negligence of miners
- Use of damaged safety lamps and their improper handling
- Blasting
- Mine fires
- Friction
- Electric sparks
- Other special causes

7.3.5.3 The various causes of direct ignition of a dust cloud can be classified

- naked flames
- friction
- electric sparks
- firedamp explosions

7.3.5.4 Subsidence

Subsidence is an important aspect of underground mining activity. Underground mining operations can give rise to undesirable effect, such as -

(1) Damage to surface installations like buildings, railways, roads, pipelines for water supply, power line, etc.,

(2) Produce fractures in another coal seam, immediately above the one being currently exploited.

(3) Cause fractures, on the surface, which may in turn cause flooding of the underground working by drawing water from the sources on the surface.

(4) Cause damage to other mining installations as well as affect roots of the vegetation.

Table 7.2: Mitigation Measures to prevent Fire/Explosion

Activity	Hazard	Mitigation measures
During underground coalmining, possibility of emissions of gasses like CH4, CO etc	Mine Fire	adequate quantity of water at sufficient pressure shall be provided to all working places belowground and all other places of fire risk such as coal stocks, spoil heaps containing carbonaceous material and exposed coal surfaces liable to heating, for the purpose of efficient firefighting;
		fire stations with suitable supply of fire-fighting equipment shall be established and kept maintained at convenient points, both on surface and belowground;

		Sufficient supply of sand or incombustible material and suitable portable fire extinguishers in sufficient quantity or automatically operated fire suppression devices shall be provided at suitable locations as per CMR.
		All types of firefighting and fire suppression systems including automatic fire detection and suppression systems to be used in machinery and plant including heavy earth moving machineries, materials and chemicals to be used in fire sealing, fighting or suppression systems in mines both on surface as well as belowground shall be of such type, standard and make, as approved by the Chief Inspector by a general or special order.
		Periodic and inspection of all fire suppression equipment
		Use of gas detectors as per CMR
		No lamp or light other than an approved safety lamp or torch or other installation permitted under the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 shall be used or permitted.
During underground coalmining, possibility of emissions of gasses like CH4, CO etc.	Mine/Fire damp explosion	stone dust barriers to prevent an ignition or explosion from extending from one part of the mine to the other
		Consider construction of explosion proof ventilation stoppings between the main intake and the main return airways and at such other places as may be specified by Chief Inspector.
		All apparatus, used as or forming part of the equipment of a mine, which contains or produces air, gas or steam at a pressure greater than atmospheric pressure shall be so designed (flame proof), constructed, installed and maintained as to obviate any risk of fire, bursting, explosion or collapse or the production of noxious gases.
		Automatic gas and leakage detectors fitted with audio-visual alarm shall be provided at the collar of the borehole to give warning in the event of any leakage of inflammable gas or any other noxious gas from the borehole into the atmosphere. Also competent person shall check for the leakage of inflammable or noxious gases using hand-held gas detector at regular interval during the shift.

		Air currents and methane emission should be checked by systematic measurement of air quantities and their methane concentration. If, at any time, the air at any working place contains a methane accumulation, changes or adjustments in ventilation should be made at once so that such air contains less than the prescribed value.
		Ventilation planning of the mine shall be done in consultation with the scientific body of repute
Coal Mining underground	Coal Fire/Explosion	Ensuring proper ventilation.
		Adoption of panel system working.
		Provision of gas detecting apparatus.
		Sealing off of worked out / depillared panels.
		Extraction of highly susceptible or thick coal seams in conjunction with sand stowing.
		Monitoring ambient mine environment conditions by sampling and analysis on regular basis.
		Stone dusting.
		Removal of spalled fallen coal regularly from workings, which are not sealed-off.
		Regular inspection of old workings.
		Adequate size coal pillars are being maintained in trunk roads.
		Panels are planned to extract within the incubation period.
		Continuous monitoring of CH4, CO2, CO at goaf edge and other strategic points.
		Flushing of Nitrogen / CO2 in the goaf, if needed.
		Filling of subsidence cracks on the surface by soil etc.

Note: Mining Regulations such as CMR/DGMS etc to be strictly followed

Measures against inundation: Surface Precautions

- All entries were planned above the HFL zone to avoid danger of inundation.
- Filling up of the subsidence cracks, if any, with OB or any other material is being practiced.

Underground Precautions

- The galleries in the panels are designed, rising towards the boundary of property so as to have self-drainage of water.
- The panels are planned to be extracted from boundary of mine, this ensures the water would flow through drains into the sump and avoiding the risk of water to

other panels. Adequate capacity of main sump and auxiliary sumps with pumps has been provided.

7.3.5.5 Identification of Hazards for Open Cast Mining.

There are various factors, which can cause disaster in the mines

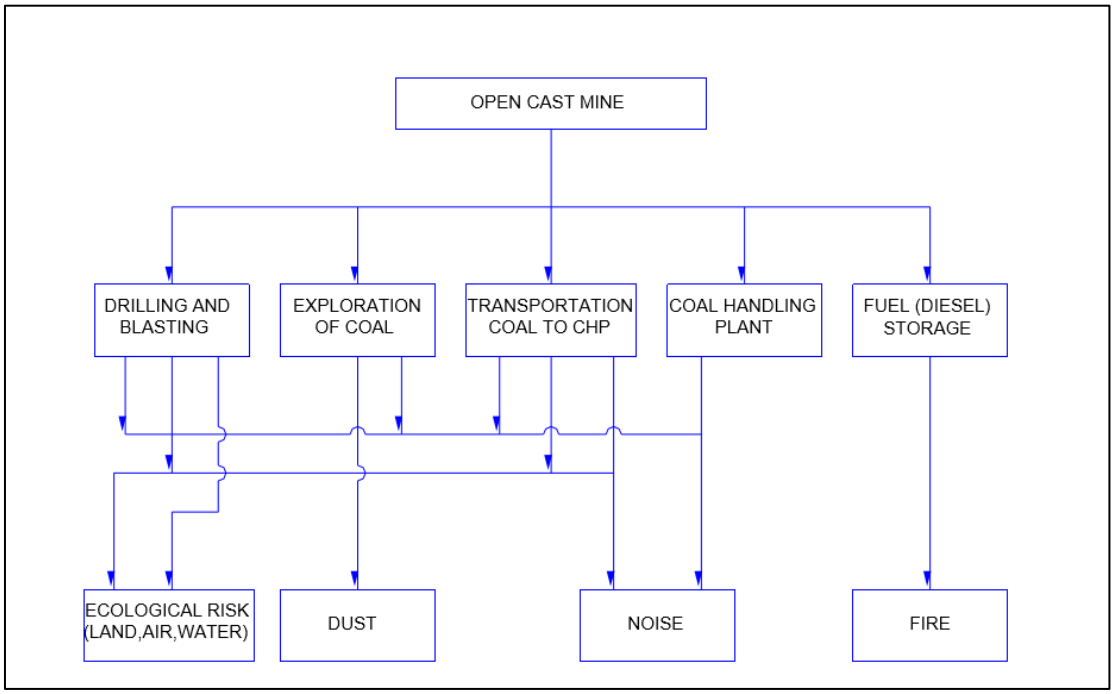


Figure 7.3: Identification of Hazards in open cast mine

7.3.5.6 Coal Handling Plant and Coal Processing Plant - Dust Explosion

Coal dust when dispersed in air and ignited will explode. Coal crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns);
- Dust concentrations need to be reasonably uniform; and
- Minimum explosive concentration for coal dust (33% volatiles) is 50 gm/m3.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulk head fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust.

Dust explosions may occur without any warnings with maximum explosion pressure upto 6.4 bar. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times, the secondary explosions are more damaging than primary ones.

The dust explosions are powerful enough to destroy structures, kill or injured people and set dangerous fires likely to damage a large portion of the coal handling plant including collapse of its steel structure, which may cripple the life line of the plant.

7.3.5.7 Safety Measures in Open Cast Mines

- The complete mining will be carried out under the management control and direction of a qualified and competent person. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:
- Accident due to explosives;
- Accident due to heavy mining equipment; and
- Sabotage in case of magazine
- Accidents due to coal handling etc.
- In order to take care of above hazard/disasters, the following control measures will be adopted:
- All safety precautions and provisions of the Mine Act, 1955, the Coal Mines Regulation, 1957 and the Mines Rules, 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons will be strictly prohibited;
- Firefighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use;
- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done;
- Handling of explosives, charging and blasting will be carried out by competent persons only;
- Provision of magazine at a safe place with fencing and necessary security arrangement;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads;
- Adequate safety equipment will be provided at explosive magazine; and
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
- In coal and explosives storage area, ignitions sources should be avoided. Use of mobile phones strictly prohibited.

- Adequate dust suppression measures should be provided. Firefighting measures should be provided to avoid any fire and ensure that there is no explosive in coal storage yard.
- Provisions should be made for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable depth. Restricted entry, use of sirens and cordoning of the blasting area are some of the good practices to avoid accidents.
- Risk of explosions in underground mines can be managed by good mine planning, methane gas monitoring, good ventilation and controlling dust levels.

For any type of above disaster, a rescue team will be formed by training the mining staff with specialized training.

7.3.5.8 Safety Measures at the Opencast Mining Project

- Shots will not be fired except during the hours of day light and the holes charged on a particular day will be fired on the same day;
- Shots, if fired after hours of daylight, should be muffled so that the flying fragments from the blasting material do not project beyond a distance of 10 m from the place of blasting;
- Adequate shelters or other protective structures will be provided to the workers at all times;
- Where any permanent building or structure lies within the danger zone, the aggregate maximum change in all the holes fired at any particular time will not exceed 2 kg. But if blasting is done with at least half-second delay of the detonator, even a maximum charge of 2 kg can be used in each hole;
- If a single shot exploder is used or if blasting is done with ordinary detonator, the shot-firer will not fire more than fifty shots in one shift, but if multishot exploder is used, the number can go up to eighty; and
- During the approach and progress of an electrical storm, adequate precaution will be taken.

7.3.5.9 Measures to Prevent the Danger of Overburden

- A stone wall should be built around the toe of each active dump at a distance of about 50-m from the toe;
- To prevent the failure of overburden slopes, especially during the rainy season, the following precautions will be taken;
- Proper terracing of the dump slopes, with a maximum bench height of 30 m; and
- In flat areas where the dumping operations have come to an end, the slope angle should be flattened by about 5 degrees lower than the angle of repose which varies from site to site but not less than 25 deg.
- Planting vegetation as early as possible over the overburden dump slopes;

- Provide drainage channels along the overburden dump toe for additional protection, in such a way that a distance of 15 m should be maintained left between the overburden dump and the bench; and
- If a mine is abandoned, the bench and overburden dump should be separated from each other by digging a trench of 6 to 10 m width.

7.3.5.10 Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents

7.4 Occupational health hazard

Open cast method/Underground involves dust generation by excavation, loading and transportation of mineral. At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. The workers in mine have high risk of the occupational diseases: Pneumoconiosis, due to inhalation of coal dust. can cause severe lung problems and lung cancer, dust allergy and asthma, Noise hazard such as temporary or permanent hearing loss, headache and high blood pressure.

Addressing the occupational health hazard means gaining an understanding of the source (its location and magnitude or concentration), identifying an exposure pathway (e.g. a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that is migrating).

Possible physical hazards are as below mention:

7.4.1 Physical Hazards Due to Mining Operations

Following health related hazards were identified in open cast mining operations to the workers: -

Light: - The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue. In present case, the mining activity is done during day time only.

Heat and Humidity: - The most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue and enhanced accident rates. Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer time up to 480C or above in the river bed mining area.

Eye Irritation: - During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.

Respiratory Problems: - Large amounts of dust in air can be a health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.

Noise Induced Hearing Loss: - Machinery is the main source of noise pollution at the mine site.

Particulars	Control Measures
Heat & Light	➢ The mine site will have adequate drinking water supply so that workers do not get dehydration. ➢ Lightweight and loose fitting clothes having light colors will be preferred to wear. ➢ Rigorous exercise and more physical activities will be avoided in hot weather.
Noise	➢ Noise exposure measurements will be taken to determine the need for noise control strategies. ➢ The personal protective equipment will be provided for each mine workers. ➢ Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment. ➢ At noisy working activity, exposure time will be minimized. ➢ Machineries will be labeled with noise levels.
Respiratory	➢ PPE's like face mask etc. will be provided during mining activity. ➢ Periodic medical examinations will be provided for all workers. ➢ Awareness program will be organized for workers.
Drilling and blasting	➢ Driller shall be equipped with a closed cabin to reduce exposure to noise and dust. In addition, the operators and other workers should be

Particulars	Control Measures
	provided with masks, helmets, gloves and earplugs.
Workers health surveillance	➢ Health survey programs for workers and local community. Regular training and awareness of employees to be conducted to meet health and safety objectives

7.4.2 General Control Measures

I. Regular maintenance and testing all the tools & equipments as per manufacturer's guidelines.
II. Provision of personal protective equipment to the workers working in the mine.
III. Periodical Medical Examination of all workers by medical specialists will be conducted.
IV. Awareness program will be organized for workers.

7.4.3 Training and Human Resources Development

I. Appointment and delegating qualified and experienced personnel in various disciplines.
II. Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985.
III. Personnel who have to operate and maintain HEMM, Trucks etc are to be trained under the guidance of the manufacturers and as per provisions of DGMS Circular Technical 1/1989 regarding accidents in opencast mines. Recommendation of Seventh Conference on Safety in Mines on "Safety in Open Cast Mining", "Traffic Rules and Procedures", "Mobile equipments and Highway Delivery Vehicles", "Operations and Operator Training" and other related circulars.
IV. The training of mine personnel shall be provided regularly with respect to environmental protection.
V. Special courses for employees will be arranged for afforestation, revegetation, reclamation, health hazards (identification), malaria eradication, HIV prevention etc in the training centre of the company

7.4.4 Medical Examination Schedule

To minimize the health impacts PPEs like dust masks, ear plugs/ muffs and other equipment's will be provided for use by the work personnel. All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 at the time of appointment. Periodical Medical Examination will be conducted at least once in five

years. Medical camps will be organized. The detail of health check-up and periodical medical examination schedule is given below in Table 2

Table 7.3: Medical Examination Schedule

S. No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1.	Initial Medical Examination (Mine Workers)					
A	Physical Check -up		-	-	-	-
B	Psychological Test		-	-	-	-
C	Audiometric Test		-	-	-	-
D	Respiratory Test					
2.	Periodical Medical Examination (Mine Workers)					
A	Physical Check -up	-				
B	Audiometric Test	-				
C	Eye Check -up	-				
D	Respiratory Test	-				
3.	Medical Camp	-				
	(Mine Workers & Nearby Villagers					
4.	Training (Mine Workers)					

Medical Follow Ups: Work force will be divided into three targeted groups age wise as follows:

Age Group	PME as per Mine Rule 1955	Special Examination
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 years	Once in a Three Years	In case of emergencies

Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.

7.5 Disaster management plan

The objectives of DMP is to describe the company's emergency preparedness, organization, the resource availability and response actions applicable to deal with various types of situations that can occur at mines in shortest possible time.

Thus, the overall objectives of the emergency plan are summarized as:-

- Rapid control and containment of Hazardous situation.

- Minimizing the risk and impact of event/ accident.
- Effective prevention of damage to property.
- In order to achieve effectively the objectives of emergency planning, the critical elements that form the backbone of Disaster Management Plan (DMP) are:-
- Reliable and early detection of an emergency and immediate careful planning.
- The command, co-ordination and response organization structure along with availability of efficient trained personnel.
- The availability of resources for handling emergencies.
- Appropriate emergency response action.
- Effective notification and communication facilities.
- Regular review and updating DMP.
- Training of the concerned personnel.

Steps taken for minimizing the effects may include rescue operations, first aid, evacuation, rehabilitation and communicating promptly to people living nearby.

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. The safety of the mine and the employees is taken care of by the Mines Act 1952, which is well defined with laid down procedure to ensure safety and constantly monitored and supervised by Directorate General of Mines Safety and Department of Mines, State Government.

7.5.1 Key Elements

a. Basis of Plan

Hazard Identification necessitates preparation and planning the prevention and methods by which accidental failure can be tackled without much damage to life. HAZID /HIRA and consequence analysis combines and requires planning for the following:

- Hazards from spread of fire or release of flammable from storage and process units
- Hazards due to formation of pressure waves due to vapour cloud explosion of flammable gases
- Hazards during handling of Hot Materials

b. Emergency planning and Response procedure

The Emergency Response Plan is plan for dealing with emergencies are implemented immediately whenever there is a fire, explosion, or release of a

hazardous substance etc. that threatens human health or the environment. The emergency response plan is reviewed and immediately amended whenever:

- The plan fails in an emergency
- The list of emergency contacts change
- The list of emergency equipment changes
- The facility changes in its design, construction, operation, maintenance, or other circumstances in a way that increases the potential for fire, explosions, or release of a hazardous substance

c. Incident Response Plan

It is the Frame work of addressing the emergency situation arose due to failure scenario.

- Incident Response Plan (IRP) and Emergency Preparedness Plan
- Incident Response Team (IRT)
- Emergency Response Team (ERT)
- Crisis Management Team (CMT)

7.5.2 On-Site Emergency Plan

Disaster management plan are prepared with an aim of taking precautionary step to control the hazard propagation, avert disaster, take action after the disaster which limits the damage to the minimum and follow the on-site emergency planning.

The onsite emergency is an unpleasant situation that causes extensive damage to plant personnel and surrounding area and its environment due to in operation, maintenance, design and human error. Onsite plan will be applied in case of proposed expansion.
Following point are taken into consideration:

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings.
- Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.
- Measures to protect persons and property of processing equipment in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them.

7.5.3 Disaster control Management System

Disaster Management group plays an important role in combating emergency in a systematic manner. Schematic representation Emergency Control Management system for proposed project is shown in following figure:

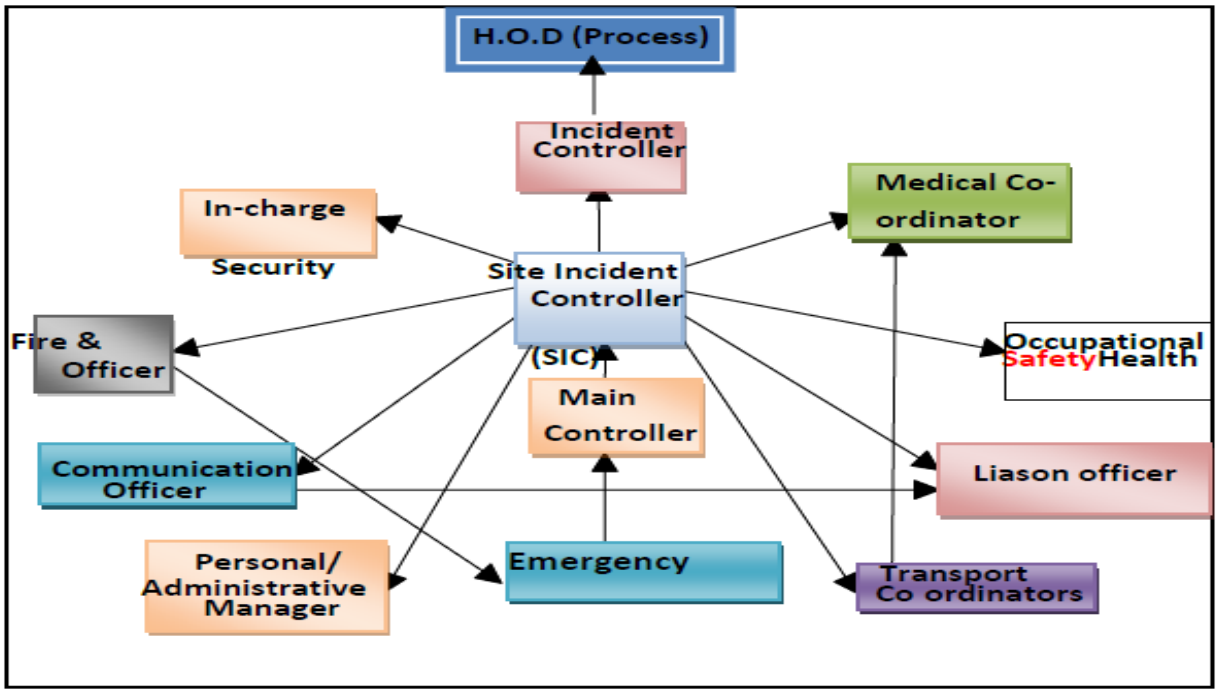


Figure 7.4: Onsite DMP - Disaster Control / Management System

7.5.4 Roles and Responsibility

A team of following Essential persons shall be taking necessary action in case of emergency. The roles and responsibilities of these personnel are defined subsequently:

- Main Controller
- Site Incident Controller (SIC)
- Incident Controller (IC)
- Liaison Officer
- Communication Officer
- Observer
- In-charge (Security)
- In-charge (Medical)
- Shift In-charge (Security)
- Ventilation Officer
- Manager
- Overman

a. Main Controller

The Primary Controller is the employee who gives the first information about the incident/accident. He will be responsible for:

- To inform the Security office (Main Gate), & Engineers/Sr. Engineers / Shift In Charges/HOD of Section of the aforesaid Department/Section from the nearest available telephone about the location and nature of incident.
- To assist rescue operation as well as clear obstruction, if any, in the same.
- To carry out all instructions from Incident Controller.

b. Site Incident controller (SIC)

The Unit Head shall have overall responsibility for the factory and its personnel. In absence of Unit Head, Chairman OHS Committee shall assume the responsibility of Site Controller. His duties during emergency shall be:

- To assess the magnitude of the situation and decide if employees need to be evacuated from assembly points.
- To give necessary instructions to Liaison Officer, HOD(HR&A) regarding the help to be obtained from outside agencies like Fire Brigade, Police and Medical.
- To advise Liaison Officer to pass on necessary information about the incident to News Media and ensure that the evidences are preserved for enquiry to be conducted by statutory authorities.

c. Incident Controller (IC)

The HOD of affected department shall have overall responsibility for controlling the incident and directing the personnel. Section In charge of the affected department shall assume the responsibility of Incident Controller (IC) in the absence of HOD of affected department. His duties during emergency shall be:

- To inform Communication Officer about the emergency, Control Center& Assembly point.
- To direct all operations` within the affected area with priorities for safety of personnel, to minimize damage to the Plant and environment and to minimize loss of material.
- To act as Site Controller till the later arrives.
- To advise and provide information to Fire Squad, Security Officer and Local Fire Services when they arrive.
- To ensure that all non-essential persons are sent to the assembly point.

d. Liaison Officer

HOD (HR&A) shall be the Liaison officer. He shall be responsible for: -

- To contact Fire Brigade, Police, and medical facilities on intimation from Site Controller & arrange for the rescue operation.
- To ensure that the casualties receive attention.
- To inform relatives of the affected employee at the earliest.
- To arrange for additional transport if required.

- To arrange for relief of personnel & organize refreshment/catering facility, in case the duration of emergency is prolonged.
- To issue authorized statements to news media and ensure that evidence is preserved for enquiry to be conducted.

e. In-charge (Medical)

On receiving the information, he will reach hospital immediately and take following actions:

- He will keep necessary first aid medicines and artificial respiration equipment ready.
- Inform doctors at other places to be ready, for attending serious injury, burn cases and food poisoning.

f. Observer

During Mock Drill for Emergency Situations, they shall be placed at different locations
in plant to note down the movement and action taken by people and give feed back
to the Site Controller.

g. Communication Officer

In-Charge (Safety) shall act as Communication officer. He shall work from Control Centre and maintain communication between relevant personnel. He shall be responsible for: -

- To apprise the site controller of the situation, based on the information received, suggest the evacuation of personnel from assembly points, if needed.
- To arrange for suitable persons to act as runners/messengers in case of failure of communication system.
- To carry out any other works as assigned by Site Controller/Incident Controller.

h. In-charge - Security

- The In-charge (Security) shall guide the crew, according to the condition of emergency site, for the actions required to handle the emergency i.e. for fire-fighting, removal of debris, arresting of dust, removal of oil soaked earth etc. He shall give instructions to Security Guards to cordon off areas as required by Incident Controller.
- He shall render all help to incident controller to handle the emergency and carry out the work as assigned to him. He shall be responsible for ensuring the discipline at control points and for preventing the entry of unauthorized persons inside the affected area as well as inside the factory during emergency.

i. Shift In charge – Security

He shall be responsible for

- To arrange the necessary help as requested by Primary Controller.
- To inform In charge (Security).
- To blow emergency siren, if instructed by the HOD (HR&A)/Incident Controller.
- To send Ambulance near accident area.

  To rush to the accident site with fire brigade along with available trained security Persons.

j. Ventilation officer

He shall be responsible for:

- To ensure the observance of all regulations and orders concerning ventilation, spontaneous heating, fire, gas and coal dust including dust suppression and shall advise the manager, if any alteration is required in the ventilation system to ensure adequacy of ventilation in compliance with CMR regulations or orders;
- To advise the manager on day-to-day problems of ventilation, gas, coal dust, spontaneous heating and fire;
- To maintain close liaison with the assistant managers and other officials, and assist them in their day-to-day ventilation problems;
- To carry out ventilation surveys of the mine and undertake any other special work relating thereto as may be directed by the manager from time to time; (e) take such steps as are necessary to ensure compliance with the ventilation standards required in terms of these regulations or otherwise;
- To check the speed of main mechanical ventilator, amperage drawn by its electric motor, and fan drift water gauge at least once in a day and he shall investigate any unusual change in the water gauge and report to the manager;
- To determine the efficiency of the main mechanical ventilator once at least in every three months and get the fan blades and the fan drift cleaned when necessary; (CMR to be followed for detailed responsibilities)

k. Overcame responsibilities:

- To ensure that every air-crossing, stopping, door, brattice and other ventilation device is maintained in good order;
- To ensure that the ventilation is effective in his district, and when brattices or air pipes or ducts are required to be used for the ventilation of the working places, he shall see that they are kept sufficiently advanced so that an adequate amount of air reaches every such working place;
- To have power to send out of the mine any person under his charge who infringes or attempts to infringe any provision of the Act or of the regulations or orders made thereunder, or fails to carry out any direction given with regard to safety,

and shall report such matter in writing to the manager; (CMR to be followed for detailed responsibilities).

7.5.4.1 Emergency Control Centre

An Emergency Control Centre (ECC) is established from which emergency operations are directed and co-ordinated. Centre will be activated as soon as on-site emergency is declared. The ECC will consist of one room, located in an area that offers minimal risk being directly exposed to possible accidents. During an emergency, the Emergency Management Staff, including the main controller will gather in the ECC. Therefore, the ECC will be equipped with adequate communication systems in the form of telephones and other equipment to allow unhampered organization and other nearby facility personnel.

The ECC will provide shelter to its occupants against the most common accidents; in addition, the ECC's communication systems will be protected from possible shutdown. The ECC will have its own emergency lighting arrangement and electric communication. The ECC will always be ready for operation and provided with the equipment and supplies necessary during the emergency such as:

- Hazard identification chart
- All Emergency response plans
- Population around factory
- Internal telephone connections and External telephone connections

Onsite Key Personnel Contact numbers

- A list of key personnel, with addresses, telephone numbers, etc.

Following is the list of Emergency Contact Number (Off Site):
STD Code Singrauli District: 07805

S.NO.	DESIGNATION	MOBILE 1	MOBILE 2	OFFICE
1.	COLLECTOR SINGRAULI	9425821181	-	234540 (O), 244110I
2.	SP SINGRAULI	9479998880	-	234601I
3.	DFO SINGRAULI	9424793525	9425821018	268606
4.	ASST. COLLECTOR	8435800040	-	-
5.	CEO, ZP	9425859477	7898290344	234686
6.	ASST. COLLECTOR & SDM SINGRAULI	9926386016	-	-
7.	ADD. COLLECTOR	9425168413	-	-
8.	DY. COLLECTOR, SINGRAULI	9425101407	-	-

9.	DY. COLLECTOR, SINGRAULI	9425655198	9713999170	-
10.	DY. COLLECTOR, SINGRAULI	9303370333	-	-
11.	CONTROL ROOM	9425035704, 7354088505	-	-
12.	FIRE BRIGADEVAN DRIVER	8959591005	-	-
13.	FIRE BRIGADEVAN DRIVER	9098356654	-	-
14.	FIREMAN	8108086443	-	-
15.	DISTRICT HOSPITAL WAIDHAN, SINGRAULI M.P.	07805-244815	-	-
16.	NEHRU SHATABDI CHIKITSALAYA	07805-266670	-	-

- Hotline connection to district collector, police control room, fire brigade, Hospital etc.
- Public address system (PAS)
- MSDS of all the materials used in site
- List of dispensaries and registered medical practitioners around factory
- Area map of surrounding villages
- Note pads and ball pens to record message received and instructions
- The blown-up copy of Layout plan showing areas where accident has Occurred
- Updated copies of the On-site Disaster Management Plan
- Emergency telephone numbers
- The names, phone number, and address of external agencies, response organizations and neighboring facilities
- The adequate number of telephones
- Emergency lights
- List of fire extinguishers with their type no. and location, capacity, etc
- Personal protective equipment (PPE)
- Safety helmets
- Clock
- Several maps of the facility including drainage system for surrounding area showing:
- Areas where hazardous materials are stored
- Plant layout
- Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.
- The locations where personal protective equipment are stored

- The position of pumping stations and other water sources
- Roads and plant entrances
- Assembly areas
- Lay out of Hydrant lines

7.5.5 Automatic Fire Detection system

Unattended vulnerable premises like electrical control rooms, cable tunnels, MCC, oil cellars, etc. will be provided with automatic fire detection and alarm systems.

7.5.5.1 Manual Call Point System

All major units and welfare/administrative building will be provide with manual call points for summoning the fire-fighting crew from the fire station for necessary assistance.

7.5.5.2 Fire Station

The following equipment will be provided in the fire posts.

- Water tender
- Foam tender
- Portable pump
- Wireless set
- Hoses
- Hot line telephone

7.5.6 Alarm System

A hooter installed at the Security Office shall be blown alternately with high and low pitch for 2 minutes to indicate major emergency in the plant. In such case, all non-essential employees are expected to gather at assembly point i.e. Company's Main Gate/Time Office. Signal for the clearance of emergency shall be given by blowing the hooter continuously for one minute.

7.5.6.1 First Aid

- Fully equipped Hospital with Ambulance Van is available. Doctors and nurse are available round the clock to handle any emergency in the plant. The Ambulance shall be periodically checked through preventive maintenance programme. To ensure that the system is strictly followed, In charge (Safety) shall cross check randomly once in a fortnight the preparedness of Ambulance as per the check list and counter sign.
- The injured shall be shifted to nearby hospital, as per the opinion of the Medical Officer.
- A list of First Aid boxes is available in every department as mentioned in ECC

- Medical Officer shall ensure that refilling is done on monthly basis and he shall maintain a record of refilling.
- The names & contact numbers of trained First Aiders are provided the same is displayed at all the prominent locations in the premises.

7.5.7 Mock Drill

For reviewing and assessing the level of preparedness, In-charge (Safety) shall conduct Mock trials twice in a year (one in each half) simulating the covered emergencies and will maintain records of the trials. Corrective and Preventive measures, if suggested/directed, will be initiated and relevant records of the same are maintained. Fire drills will be exercised once in every six months under the leadership of Incharge (Security). The records of Fire drill will be recorded & maintained. The findings of the mock drills shall be used for improvements in preparedness and response. All team leaders shall be responsible for implementing the suggestions based on mock drill findings within reasonable time frame.

7.5.8 Training

On yearly basis class room training for fire-fighting and mitigating measures to be adopted to reduce environmental impact & OHS risks, will be imparted covering at least 20% employee by the In-charge (Safety) and In-charge (Security). The records of the same are maintained.

7.5.9 Evacuation Plan

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape.

- Facility staff will be notified of evacuation by one or more of the following method(s):
- Verbal, Intercom, Portable Radio, Alarm, Other
- Notification to emergency services to ECC
- Staff will follow predetermined evacuation routes and assemble at designated areas.
- Evacuation maps must be displayed throughout the facility.
- Individuals responsible for **coordinating evacuations must confirm the process.**

7.5.10 Off-site emergency planning

The off-site emergency plan is an integral part of any hazard control system. It is based on those accidents identified by the works management, which could affect people and the environment outside the works. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority. Schematic representation of various organisation involved during emergency is shown below in Fig.

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation.
- If fire is escalating very fast it is necessary to evacuate people nearby as soon as possible
- In acute emergency people are advised to stay indoors and shield themselves from
- the fire.

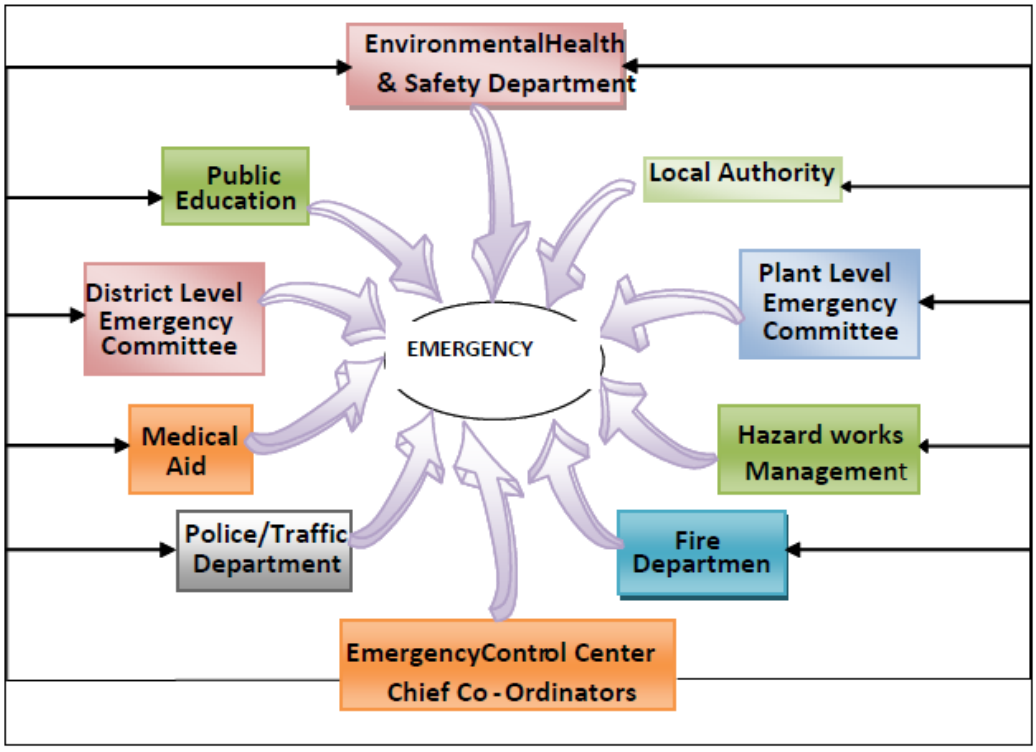


Figure 7.5: Various Organizations Involved During Emergency

7.5.11 Organization

Organizational details of command structure, warning systems, implementation procedures, emergency control centers include name and appointments of incident controller, site main controller, their deputies and other key personnel involved during emergency.

7.5.12 Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

7.5.13 Special Emergency Equipment

Details of availability and location of heavy lifting gear, specified fire-fighting equipment, fireboats etc.

7.5.14 Voluntary Organizations

Details of Voluntary organizations, telephone numbers nearby of hospitals, Emergency
helpline, resources etc are to be available with chief authorities.

7.5.15 Non-governmental Organizations (NGO)

NGO's could provide a valuable source of expertise and information to support emergency response efforts.

- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons

7.5.16 Chemical information

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them will be made available at respective site.

7.5.17 Meteorological information

There is to be arrangements for obtaining details of weather conditions prevailing at before the time of accident and weather forecasts updates.

7.5.18 Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

7.5.19 Public Information

- Dealing with the media-press office
- Informing relatives, etc.

7.5.20 Assessment

- Collecting information on the causes of the emergency
- Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.5.21 Role of local authority

Local Authorities like Panchayat, Sabha, Samity, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

7.5.22 Role of police

The police are to assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.

- Co-ordination with the transport authorities, civil defence and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication center with easy contact with ECC

7.5.23 Role of Fire Brigade

The fire brigade shall be organized to put out fires and provide assistance as required during emergency.

7.5.24 Media

- The media is to have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid commotion and confusion.
- Efforts are made to check the clarity and reliability of information as it becomes available, and before it is communicated to public.
- Public health authorities are consulted when issuing statements to the media concerning health aspects of chemical accidents.
- Members of the media are to facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances.

7.5.25 Role of health care authorities

- Hospitals and doctors shall be ready to treat all type of injuries to causalities during emergency.
- Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments

- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies

7.5.26 Conclusion

As discussed in above sections, adequate risk Control measures for process needs to be considered for to say that the proposed expansion or new proposed Project Activity is not likely to cause major significant risk to onsite, offsite & environment. Suitable Mitigation Measures will be taken by the proposed facility to ensure complete workplace safety. In the event of disaster onsite, offsite and all the emergency planning procedures will be followed so as to minimize the impact on working personnel, plant surrounding and environment.

7.6 Carrying Capacity Study

Expert Appraisal Committee (Coal Mining) of Ministry of Environment & Forest in its 15th meeting held on 6th July 2021, recommended Terms of References for EIA/EMP Study of Dhirauli Coal Block of M/s Stratatech Mineral Resources Pvt. Ltd. (SMRPL) District Singrauli, (Madhya Pradesh.

As per condition no. 4 (iv) of the Terms of References, Carrying Capacity study has been mandated.

Carrying capacity study has been carried out, considering the impact on the environment due to operation of the eleven-mining block which are in a single Cluster i.e. (Dhirauli, Amelia North, Amelia, Bandha, Chhatrasal, Dongrital, Mahan, Mara II Mahan, Sindharwa, West of Dongrital and Suliyari). Entire study area has been considered as single environmental unit owing to similar climatic factors for further study. Outcome of the study clearly indicates that levels of all the parameters for Air quality are within the permissible limit, coal blocks will not have any negative impact over ground water in and around the mine site in view of the ground water recharge measures as well as natural recharge phenomenon due to mining activities. Detailed report of carrying capacity study is attached as **Annexure XIII.**

7.7 Cumulative Impact Assessment

Cumulative study has been carried out, considering the impact on the environment due to operation of the eleven-mining block which are in a single Cluster i.e.

(Dhirauli, Amelia North, Amelia, Bandha, Chhatrasal, Dongrital, Mahan, Mara II Mahan, Sindharwa, West of Dongrital and Suliyari).

The study has been carried out to calculate the impact on environment due to the cumulative mine and the outcome of the study has interpreted by comparing the baseline with proposed and existing mine activity to define the sustainability of the project.

Outcome of the study clearly indicates that levels of all the parameters for Air quality are within the permissible limit, not also there is no negative impact over ground water in and around the mine site. Detailed report is attached as **Annexure XIV.**

7.8 Ecosystem Services

The idea that human society benefits from the environment or nature in various ways, both directly and indirectly, is certainly not a new one, and can be traced back several millennia. But the modern-day concept emerged in the 1970s as 'environmental services', was re-named 'ecosystem services' in the mid-1980s, and really gained momentum from 1997 onwards. The most popular current definition of ecosystem services (ES) is **'The functions and products of ecosystems that benefit humans, or yield welfare to society'** (MA 2005).

Ecosystem Services study has been mandated vide condition no. 15.3.4 (iv) of the Terms of References reproduced below-

"Ecosystem services study of the area shall be carried over by project proponent considering the project being in Singrauli, having ~1400 ha of forest land and presence of other coal mining activity and industries."

The assessment of impacts there were variations across the different phases of the mine, the details report is attached as **Annexure XV.**

The eco-system services include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other non-material benefits.

The most significant ecosystem service dependency of the mine, particularly during operation, is the need to use freshwater resources. Ground water in general occurs under unconfined to semi-confined conditions. The regional hydrogeological setting defined above holds good locally for the Dhirauli Coal Mine. Singrauli Coal Blocks

are categorized as Safe by Central ground Water Board, Govt. of India depending upon water table behavior and stage of ground water development.

7.9 Wildlife Conservation Plan

Wildlife conservation and management include "the management of wildlife populations in the context of the ecosystem, providing suitable habitat and resource to wildlife for feeding, breeding, roosting, nesting, and movement". It also refers to arrangement of food, water, cover and space to wildlife in a habitat to avoid over-competition for above vital resources among them. Some animals also need a certain amount of territorial space for mating and nesting. Most critical aspect of wildlife conservation is habitat management. Habitat loss presents the greatest threat to wildlife. Habitats management is the foremost need in order to support wildlife. Majority of the developmental activities are leading to reduction or depletion or deterioration of the natural wildlife habitats. It results in certain population of wildlife is put to pressure in their own habitat. Therefore, balance is needed to maintain between management of wildlife habitat and developmental activities. Detailed report is attached as **Annexure V.**

7.10 Nala Diversion

The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of nonrenewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. The Hydrological study for estimation of peak flood runoff for Hurdul nala watershed inclusive micro watershed of external area of mine has been also studied.

Overview of the nala diversion is described in Section Chapter 4, Section 4.6.2 and 4.6.3. Detailed hydrology report is attached as **Annexure XVI.**

7.11 Subsidence

As per generic ToR condition no. A (XIII) of the Terms of References, Subsidence study has been suggested, it is reproduced below:
Study on subsidence, measures for mitigation/prevention of subsidence, modelling subsidence prediction and its use during mine operation, safety issues.

The study concludes that the depillaring operation will be carried out from 5th year of underground mining and it will continue upto 78 years of mining.

Prediction of subsidance has been carried out by 3D-numerical modelling based on FEM. The subsidence along with peak horizontal tensile strain has been predicated at the end of 20 years, 30 years, 40 years, 60 years, 70 years and 78 years (end of mining) of mining.

The peak predicted subsidence is 0.862 m at end of 20 years of mining, 2.384 m at end of 30 years, 2.391m at end of 40 years, 2.391m at end of 60 years and 2.716

mat end of 78 years of mining respectively. The predicted peak horizontal tensile strain is 4.95 mm/m at the end of 20 years of mining, 13.90 mm/m at the end of 30 years of mining and 17.47 mm/m at end of 78 years of mining. No surface feature is likely to get damaged as there is no important surface structure on surface except the overburden dump.

A Subsidence study report has been prepared and is attached as **Annexure XVII.**

7.12 Social Impact Assessment (SIA)

As per additional ToR condition no. A (X) of the Terms of References, SIA study has been suggested, copy of the SIA is attached as **Annexure XII.**

Details of probable Project Affected Persons and Families are described below-

7.13 REHABILITATION AND RESETTLEMENT PLAN

M/S Stratatech Minerals resources pvt. Ltd has been selected as a successful bidder for Dhirauli Coal Block by Ministry of Coal. Which is in Sarai Tehsil of Singrauli District of Madhya Pradesh state.

The details of the notifications issued under the provisions of Land Acquisition Act 2013 for the for the acquisition of private land for the Dhirauli coal mining project are as follows:

- Notification dated 02 .06. 2021 issued under Section 4
- Notification dated 15. 02.2022 issued under Section 11

Land acquisition work has been completed for Suliyari Coal Mine project and Amelia coal mine project in Singrauli district and both the projects in the year 2018 and 2019 under Madhya Pradesh Rehabilitation Policy 2002 and Land Acquisition and Rehabilitation and Resettlement Policy considering the provisions of LARR Act 2013 which has been approved by Honourable Commissioner. Therefore, considering the provisions of both the projects and to bring equality in compensation facilities for displaced persons Rehabilitation and Resettlement of Dhirauli Coal Mining Project has been prepared which will be effective from the date of approval.

According to the proposals submitted by project authority the Dhirauli Coal Block, M/S Stratatech Minerals resources Pvt. Ltd has made Land acquisition of the villages proposed under the provisions of right to fair compensation and transparency in land acquisition rehabilitation and resettlement Act 2013. The list of villages is given below:

Details Of The Project Affected Villages In Dhirauli Coal Block

Sr. No	TEHSIL	NAME OF THE VILLAGES	TOTAL AREA OF PRIVATE ACQUIRED LAND
1.	Sarai	Amdand	5.17
2.	Sarai	Sirswah	0.62
3.	Sarai	Belwar	11.60
4.	Sarai	Basi Berdaha	147.67
5.	Sarai	Amrai Khoh	43.056
Total			**208.116**

As Mentioned above, Rehabilitation and Resettlement of affected/displaced families is expected to be done for Private land acquisition for Dhirauli Coal Block Project.

There are 8 effected villages, Land Acquisition will be carried out in phase manner.

A) Families affected by Land Acquisition

Sr. No.	Village	PAHs Socal stratification	PAP	%	No. of Family
1.	Amraikhoh	Scheduled Tribe (ST)	0	0	0
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	0	0	0
		General	0	0	0
		Sub Total	0	0	0
2.	Aamdand	Scheduled Tribe (ST)	17	100	4
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	0	0	0
		General	0	0	0
		Sub Total	**17**	**100**	**4**
3.	Basiberdah	Scheduled Tribe (ST)	3	17	3
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	10	55	3
		General	5	28	1
		Sub Total	**18**	**100**	**7**
4.	Belwar	Scheduled Tribe (ST)	0	0	0
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	0	0	0
		General	0	0	0
		Sub Total	**0**	**0**	**0**

Sr. No.	Village	PAHs Socal stratification	PAP	%	No. of Family
5.	Dhirauli	Scheduled Tribe (ST)	10	76.9	5
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	3	23.1	1
		General	0	0	0
		Sub Total	**13**	**100**	**6**
6.	Jhalari	Scheduled Tribe (ST)	4	80	3
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	1	20	1
		General	0	0	0
		Sub Total	**5**	**100**	**4**
7.	Phatpani	Scheduled Tribe (ST)	9	50%	7
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	9	50%	2
		General	0	0	0
		Sub Total	**18**	**100**	**9**
8.	Sirsawah	Scheduled Tribe (ST)	37	47	15
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	42	53	12
		General	0	0	0
		Sub Total	**79**	**100**	**27**
		Grand Total	**150**		**57**

B) Families affected due house or house & land acquisition

Sr. No.	Village	PAHs Socal stratification	PAP	%	No. of Family
1.	Amraikhoh	Scheduled Tribe (ST)	68	4.3	18
		Scheduled Cost (SC)	10	0.6	3
		Other Backward Cast (OBC)	1211	76.2	388
		General	300	18.9	101
		Sub Total	**1589**	**100**	**510**
2.	Aamdand	Scheduled Tribe (ST)	5	2.2	1
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	206	92.4	61
		General	12	5.4	4
		Sub Total	**223**	**100**	**66**
3.	Basiberdah	Scheduled Tribe (ST)	463	29.73	139
		Scheduled Cost (SC)	7	0.47	4
		Other Backward Cast (OBC)	916	58.8	275
		General	172	11	66

Sr. No.	Village	PAHs Socal stratification	PAP	%	No. of Family
		Sub Total	**1558**	**100**	**484**
4.	Belwar	Scheduled Tribe (ST)	39	5.5	12
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	528	75	171
		General	137	19.5	44
		Sub Total	**704**	**100**	**227**
5.	Dhirauli	Scheduled Tribe (ST)	1255	39.7	422
		Scheduled Cost (SC)	157	5	59
		Other Backward Cast (OBC)	1495	47.3	522
		General	256	8.1	114
		Sub Total	**3163**	**100**	**1117**
6.	Jhalari	Scheduled Tribe (ST)	407	46.1	130
		Scheduled Cost (SC)	32	3.6	12
		Other Backward Cast (OBC)	438	49.7	164
		General	5	0.6	2
		Sub Total	**882**	**100**	**308**
7.	Phatpani	Scheduled Tribe (ST)	238	33	75
		Scheduled Cost (SC)	171	24	55
		Other Backward Cast (OBC)	236	32	83
		General	82	11	43
		Sub Total	**727**	**100**	**256**
8.	Sirsawah	Scheduled Tribe (ST)	0	0	0
		Scheduled Cost (SC)	0	0	0
		Other Backward Cast (OBC)	18	100	6
		General	0	0	0
		Sub Total	**18**	**100**	**6**
		Grand Total	**8864**		**2974**

REHABILITATION AND RESETTLEMENT POLICY

Definitions:

1. **Company**: Company means M/S Stratatech Minerals Resources Pvt. Ltd Dhirauli Coal Block Mine Project, District Singrauli.
2. **Affected Area**: Affected area means such village or Township which is acquired for setting up the project which may be either private or government land or forest land under the provision of land acquisition Act 2013. Whether the land has been purchased directly from the owners or government land has been allotted or forest land has been diverted by the government but the land that has been released from the project will not be considered as affected area, which has been marked in the revenue records, maps and Khasra.

3. **Displaced Persons**: any person who resides in the affected area for three years prior to the date of publication of section 11 notification dated 15.02.2022, will be said to be displaced person. If the land has been purchased by the company directly from the land owners and land acquisition has not been done for that land then the registry date of the land will be considered as the cut-off date and for in that case the definition of family will be as per clause 4 (a) of this policy.
4. **Displaced Families**:
   - **(a)** Families made up of displaced persons as defined above (in clause 3), including husband, wife, and minor children and other persons dependent on the head of the family for example widowed mother, widowed sister, unmarried sister, unmarried daughter or aged parents are included herewith.
   - **(b)** Every adult unmarried daughter, unmarried sister and brother of the displaced family who has become major (18 years or above) on 15.02 2022 under section 11 will be considered as a separate family.
   - **(c)** Orphaned minor children (who do not have parents) of the Project Affected areas will be treated as separate unit for providing rehabilitation benefits.
5. **Land Displaced Families:**

   The landowner whose award has been passed for the acquisition of private land or his private land has been purchased for the project his family will be called as land displaced family though he may not be living in the acquisition area. The adult land owners who has made Vaarisan certificate as on 15.02.2022 will also be considered as separate displaced families.
6. **Affected Person:**

   Such a Person in the affected area who has been doing farming or other activity for 3 years before the publication of notification of section 11 dated 15.02.2022 temporarily/ permanently shall be considered as affected person.
7. **Affected Family:**

   The family consisting of affected persons as defined above (paragraph 06) including husband wife and minor children and other persons dependent on the head of the family eg- widowed mother abandoned, widowed sister unmarried sister unmarried daughter or aged parent.
8. **Displacement Date:**

The date on which the affected family hands over the physical possession of land completely to the company by vacating the residential houses shall be considered as displacement date.

9. **Category of Affected people of the Project:**

(a) Such families who have been doing farming in the project affected area continuously for 3 years before the date of publication of the notification under section 11 but are not living permanently or temporarily in the village and their full or partial land has been acquired in land acquisition.

(b) Such families who have been living permanently in the villages in their own house or rented house in the last 3 years prior to the date of publication of the notification under section 11 and doing some small business or any other business

(c) Such families who are Agriculture Labour and landless and have been living in the village for 3 years prior before the date of publication of the notification under section 11 and has been living in the village for his livelihood by doing agriculture activity

(d) Such families who are Agriculture Labour and landless and do not do work related to agriculture for 3 years prior before the date of publication of the notification under section 11 and has been living in the village by doing some other work related to agriculture.

(e) Such families who do not do agriculture work by living temporarily in the village for 3 years prior to the date of publication of notification of section 11 but are dependent on their livelihood by forest produce.

10. **Conditions of Rehabilitation Grant**- Affected families classified under clause 9 falls in one or more of the above categories, then they shall be given rehabilitation grant benefits by treating them as affected by the same category.

11. **Residential House**-Residential house refers to a house in which a family or a person permanently resides with essential items for their household life from 3 years prior to the date of initial notification of land acquisition as on 15.02.2022

(PART 2)

PERSONAL BENEFITS

01. Rehabilitation Grant-

Rehabilitation grant will be paid in the form of one-time amount calculated at the rate of Minimum Agriculture Wages (MAW) prevailing on the date of award by the Government of Madhya Pradesh for after displacement will be paid to each displaced family.

02. (A-1) Allotment of House / Plot-

90X 60 square feet plot will be given to the family displaced by the project in Jatha tola village, Tehsil Sarai selected for rehabilitation, in which houses will be constructed by the company. If the houses constructed by the company is not taken by the displaced family, then Rs.6 lakhs will be payable by the company for the construction of the house. If any family does not want to buy a plot in the rehabilitation colony, then they will be paid and amount of Rs.2. 50 lakhs in lieu of the plot. If a displaced family does not want to take both the plot and the house, then Rs.2.50 lakh will be payable for the plot and Rs.6.0 lakhs for the house in total 8.50 lakhs.

(A-2) Grant for Cattle shed/Petty shops cost

Each affected family having cattle or having a petty shop shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum financial assistance of Rs.75,000/- for construction of cattle shed or petty shop.

03. Ownership of Plot-

Based on the allotment letter of the company to the oustees in the rehabilitation colony, patta will be issued on the prescribed format by concerned Tehsildar. On which that is placed person will get all the rights of land ownership based on the lease issued by the tehsildar the nomination can be done.

04. Transportation Expenses for Displacement Families: Financial assistance of lump sum amount of Rs.60,000.00/- (Rupees Sixty Thousand) will be provided to each displaced family as a transportation expense to take building materials, household items and family and animals to another place.

05. Old Age Pension- Every displaced female and male member whose age has been 60 years on the date of displacement, they will be given old age pension for the lifetime or till the closure of the Dhirauli Coal Block at the rate of Rs. 2000 every year in the month of April according to the index of agricultural labourers.

06. Education and Scholarship - For the education of the children of each family displaced from the project area, a school building with all facilities including a playground will be constructed by the rehabilitation company in Jathha tola village, Tehsil Sarai. In this school the classes will be from nursery to 10+2 level in Hindi / English medium (CBSE Board and DPS Standard or its equivalent) and free education will be provided to the children. Books, stationery, school uniform will be arranged free of cost by the company for each child studying in the displaced family. To encourage the students to study in the school, the company will also provide scholarship every month as follows-

CLASS	BOYS	GIRLS
Nursery to 12th Class	700	900

Students of class 10th and 12th who have passed in first division will be given Rs.50,000 by the company.

07. Medical facility- The company will run a primary health centre (PHC) with 20 beds in rehabilitation village Jathha tola, tehsil Sarai, in which maternity home, pathology lab, emergency medical room, outpatient medical room, medical store, administrative office and waiting room, provision of drinking water etc. in this hospital. Free medical facilities will be provided to the family members displaced/affected by the project.

08. Mahua and Tendu Leaf Collection Allowance- Every displaced family who used to earn their livelihood by collecting Mahua or Tendu Patta or other forest produce, which is confirmed by the proper documents issued by the Forest Department, will be given an amount calculated from the prevailing minimum agricultural wage rate by the Government of Madhya Pradesh for at least 500 working days from the award date or lumpsum amount which shall not be less than Rs.100000.00 (one lakh), will be payable to the affected person.

09. Self-employment- Skill development related training will be organized by the company to develop the ability to establish self-employment among the oustees.

A. Displaced family members will be engaged in work through co-operative societies or through individual contracts.

b. As per the requirement of the company, priority will be given to use the vehicles purchased by the oustees for the company's work.

C. Allotment of shops constructed in rehabilitation village Jattatola Tehsil Sarai will be done free of cost to the displaced families, 90 percent reservation will be made for them. The above reservation will be mainly done for grocery general store, medicine, milk, bread, laundry, vegetable, fruit etc. shops. Out of these shops, one shop will be kept safe for fair price shop. Shop allotment will be done in priority order in the following classes by drawing lottery under the internal reservation system. The said allotment will be done for 03 years. The process of re-allotment will be done after 03 years. The allottee will have to operate the shop himself, will not be able to transfer it to others. The allotment will be cancelled on misuse of the shop by the allottee.

The priority order of shop allotment is as follows: -

1. Self-help groups run by women (for all classes)
2. Physically Handicapped (for all categories)
3. Scheduled Tribe persons
4. Scheduled caste persons
5. Persons belonging to other backward classes
6. Members of the household headed by a woman (for all classes)
7. General category people.

But if large number of applications are received from all the categories fixed from the said number 01 to 07 to get the shop, then lottery according to the availability of the shop lotter system will be carried out to select the person of that category to get the shop.**10. Formation of Labour Contract Committees-** Labour contract committees will be formed only by the family members displaced from the project. The members of these committees will be given priority in getting small construction or other works done as per the requirement of the project. All action related to the formation of such self-employment committees and groups will be done by the company. The registration of these societies will be done by the Deputy Registrar Co-operative Societies. A tripartite agreement will be made between the district administration

company and the registered labour committee, based on which work can be given to such committee in the project.

11. Exemption in Stamp and Registration Fee: If agricultural land is purchased by project-affected/displaced persons after their displacement, under clause (29.3) of Madhya Pradesh's Model Rehabilitation Policy 2002, to encourage displaced families to buy agricultural land the stamp duty and registration fee for the acquired land will be payable by the company. With this the compensation received by the project affected persons will be properly utilized and agricultural activity will also be promoted in the area.

PART-3

RESETTLEMENT COLONY AND FACILITIES TO BE PROVIDED IN THE COLONY.

01. The following facilities will be made available in the colony prepared for resettlement of displaced persons in Jathh tola village of Sarai tehsil:

(a) School building- The higher secondary school building with all facilities will be constructed by the company for free education for the children of displaced persons in the rehabilitation colony. A playground with sports equipment will be arranged for the students studying in this school. Every year Rs 50000/- (fifty thousand) fund will be given in the library which will be used by the principal of the school to buy books.

(b) Primary Health Centre – A 20-bed Primary Health Centre will be operated by the company in rehabilitation village Jathh tola of Sarai Tehsil, in which maternity home, pathology lab, emergency medical room, outpatient medical room, dispensary store, administration, office, waiting room and provision of drinking water etc. will be available. In this hospital, free medical facilities will be provided to the family members displaced/affected by the project.

c) Community building- A community building will be constructed for the resettlement colony, which will include a hall, an office room, a library and a store house.

d) Haat Bazar Complex: For the access of daily essential things required for the displaced persons a 5000 sqm complex shall be constructed for setting up a weekly

market in the resettlement colony. The complex shall be well equipped with light, Platform, Tin Shed, drinking water facility and parking facility.

(e) Public playground: Land measuring 10,000 square meters (01 hectare) will be reserved for the playground in the resettlement colony for the children of the displaced. The development and improvement of the playground will be done by the company. Toilet and RO plant will be installed. A fund of Rs 20,000 will be given every year for sports in the school.

(f) Pure drinking water system: Supply of water through pipeline will be ensured by making an overhead tank for drinking water arrangement for the displaced. If this scheme is not successful, then priority will be given to install one hand pump for every 20 families.

(g) Fair price shop- A fair price shop will be set up to provide food grains to the displaced people at government rate.

(h) Anganwadi Centre: Anganwadi centre will be established in the rehabilitation colony for easy arrangement of nutritional food for the children of displaced families, girls, and pregnant women.

(i) Establishment of Temple/Mosque/Church: Temple/Mosque/Church will be constructed as per the need of displaced persons in the resettlement colony.

(j) Road: To facilitate the movement of displaced people a 12-meter-wide metalled road will be constructed to connect the resettlement colony with the main road and a 9-meter-wide metalled road will be constructed inside the colony.

(k) Streetlight: Internal and external roads will be illuminated with electricity to facilitate light movement of the displaced.

(l) Paved Drains: Paved drains will be constructed on the side of the road for the drainage of residential houses built in the colony of the displaced.

(m) Crematorium/Cemetery Complex: For the use of displaced people, a crematorium/graveyard will be constructed in the outer limits of the colony premises as per the consent of the displaced people in which water system and access road will be constructed.

Note:- All the facilities of the rehabilitation village established by the project and road panchayat building etc. will be the property of the gram panchayat.

(n) Arrangement of Toilets - Provision of toilet facility has been kept in every house constructed by the company to be allotted to the oustees in the resettlement colony and in all public buildings like school, health centre, community hall, anganwadi, Haat market complex etc. and separate toilets will be constructed for men and women in appropriate numbers.

2. Special Benefits: Project affected person who has been doing farming in the acquisition area of the project since 03 years prior to the date of publication of the notification under section 11, and whose private land has been acquired, and he has been resettled by providing house. Whose authenticity is proved from the revenue records of the year 2018-2019, then in addition to the compensation amount of the land, they will be given a special package by the company as follows: -

A- 0.01-to-0.99-hectare land will be given Rs.1500 per family per month.

B- On 1.00 hectare to 1.99-hectare land will be Rs.2000 per family per month.

C - On 2.00 ha to 3.99 ha land will be Rs.2500 per family per month.

D- above 4.00 ha will be Rs.3000 per family per month.

The above amount will be given to the head of the affected family till he attains the age of 50 years or till the age of 20 years or till the closure of the company, whichever is earlier. But the above special benefit will not be given to the family whose one member is employed in the company. The rank of the person eligible for the special package will be determined from the rank mentioned in the award.

PART-4

SETTLEMENT OF DISPUTES

If a situation of dispute arises in any case regarding the determination of eligibility for displacement or in any other matter related to displacement, then on the application made by the affected person, it will be resolved by the Collector, which will be acceptable to both the parties. The order of the Collector will be final and binding on both the parties.

8. PROJECT BENEFITS

8.1 INTRODUCTION

Coal is the primary source of energy supply in India. About 55% of the current commercial energy use is met by coal. Rising demand for energy and coal as the primary energy source make it a significant resource in the country.

As the block has been allocated by Ministry of Coal (MoC) for sale of coal, coal extracted from the same shall be used for commercial purpose. The project will meet rising demand for coal, as for 2018-19 demand for coal estimated to be 957 million tonnes (Mt), whereas the domestic availability is estimated at 750 million tonnes (Mt).

8.2 EMPLOYMENT POTENTIAL

Proposed mine shall provide an opportunity of direct employment and indirect employment of approx. 970 persons.

8.2.1 Direct Employment

Employment scenario of the study area is largely dependent on the agriculture. The present project has employment generation potential by way of recruiting local people directly for different activities of the mining. The proposed project will improve the rural employment.

Estimated manpower requirement shall be 970. Both skilled & un-skilled workers will be employed by the company through contractors.

Local people will be given the opportunity in employment as per their qualification and expertise. Priority will be given to scheduled tribe families including women. This will enhance the present socio economic status of the local people.

8.2.2 Indirect Employment

Indirect employment and income effects of any mining activity usually remain widespread across a long region. SMRPL will provide employment opportunities in the vicinity of the mine, specifically, transport and commercial establishments. Employment generation potential by way of recruiting local people directly for different activities of the mine, specifically at the construction phase. It is expected that substantial portion of the investment in this project will trickle down to the local people in the form of employment and income.

The project is expected to generate substantial indirect employment in other sectors such as service units etc. employment and income effects indicates that the project has strong positive direct as well as indirect impact on employment and income generation of the area. Since the infrastructure for maintenance of the specialized plants and machinery may not be readily near site, adequate maintenance facilities for day-to-day and minor plant maintenance including a well-equipped labs and trained technicians shall be developed for the project. Major maintenance and annual overall maintenance will be contracted out to reputed agencies or will be done departmentally.

8.3 IMPROVEMENT IN INFRASTRUCTURE

The proposed proposal will enhance the following physical infrastructure facilities in the adjoining areas:

a. **Road Transport:** The existing road will be maintain regularly for better road communication.
b. **Market:** Generating useful economic resource for construction. Excavated minor mineral will provide a good market opportunity.
c. **Infrastructure:** Maintenance of community assets (infrastructure) like village roads/ linked roads, dispensary and health center, market place etc., as a part of corporate environment responsibility.
d. **Green Belt Development:** PP has proposed to plant 60,30,275 trees till conceptual stage of mine.
e. **Increasing other business opportunities for local people:** There will be scope of hiring vehicle like tractors & trolleys, JCB, excavators, loaders during construction phase of the project and excavators, trucks / trailers during operation phase.
f. **Medical facilities**: First Aid Centre with ambulances, providing 24x7 assistance, will be provided at the mine site. Further, in case of major illness, accidents etc. employees and their family members alongwith local villagers have been facilitated by medical treatment.These medical facilities are also extended to local people in the nearby villages in case of emergencies.

8.4 EDUCATION

The local peoples' interest towards education will increase due to the expectation of getting jobs, especially from non-agricultural sources. The project is expected to increase such aspirations by bringing opportunities of some direct and indirect employment for the local people. The general awareness towards the importance of education is expected to increase as a result of the proposed expansion. The project will have positive impact on the level of education of the people.

8.5 BENEFITS TO THE STATE

The proposed project shall contribute towards developmental needs of the State. The project would support Government's endeavour in bringing up the assigned area in terms of growth indices such as power generation and employment generation. Also, the revenue generated from coal Mining may get reinvested by the State Govt. in further developmental works of the State. Moreover, the proposed project will also boost the economic development of a predominantly backward region of the state.

8.6 ACTION PLAN WITH TIME FRAME AND BUDGET FOR COMMITMENTS MADE DURING PUBLIC HEARING

Company is responsible for carrying out social activities and encourages a positive impact on the stakeholders. Plant authorities have provided support for local schools and local groups, for health care, sports, water supply, job opportunity, etc. in the recent past and will continue to do so in future.

As per Ministry's OM dated 30.09.2020 the Ministry has decided to deliberate on the commitments made by the project proponent. Hence, the commitments made by SMRPL to address the concerns raised during the Public hearing of the proposed coal Mine held on 04.05.2022, are given in **Chapter-7** along with the detailed action plan and cost break-up. The total budget for the proposed activities to meet the commitments made by the PP in the public hearing to adderess the concern of stake holders is **Rs. 653 lakhs.**

8.7 IMPROVEMENTS IN THE SOCIAL INFRASTRUCTURE

The mining activity in the region will have a positive impact on the social, economic condition of the area by way of providing employment to the local inhabitants; wages paid to them will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

A detailed program for socio economic development of the area has been framed. The salient features of the program are as follows:

Sl. No.	Proposed for Socio Economic Development Activities	
1.	**Health Facility**	• Providing infrastructure facilities such as beds, medical instruments in medical centres in Khanua Nawa, Medical centre in Sarai. • Distribution of Health Devices such as Wheel Chairs, Crutches, Walking Sticks, Hearing aids, Artificial Limbs • Ambulance 24x7 to be made available to the villages in

		emergency cases • Health checkup programs and provision of medicines shall be made available to the villagers
2.	**Educational Development**	• Installation of water coolers in Government High schools in villages • Construction of Toilets in the schools of rural areas • Distribution of computers in government schools in villages • Distribution of Classroom Desks in Govt. Schools • Lab Equipments in Government High school at villages • Distribution of Sports Kits to the school students for promoting sports in villages • Supply of Desk benches to Govt. schools • Scholarship to Students for promoting education • Construction of Playground in schools
3.	**Infrastructure Development**	• Construction of Pucca roads, Bridges, Waiting Shed, Community Hall, Cultural Centre etc in villages • Construction of CC drainages & internal roads • Provision of Solar Street Light • Beautification and construction of village • Construction of Girls Toilet Block.
4.	**Employment Development**	• Establishment of Skill Development Institute for providing Industrial trades- Electrician, Welder, Filtter, Compputer Skills • Skill Training Centre-Plumbing, Masonary, Welding • Training centres for Ladies (stitching, Embroidery, tailoring etc.)
5.	**Sanitation and Hygiene**	• Construction of Nallas for proper drainage system in core area villages • Community Garbage Disposal system • Providing sanitation infrastructure and other facilities under Swachh Bharat Abhiyan
6.	**Community Development**	• Developing Rain Water Harvesting System in villages • Construction of Pond, concrete wall for storing of rain wat e

		• Supply of Drinking water by installation of Hand PumPrimary school, Tap water system in villages with the issues of quality of water • Providing sanitation facilities at Common area near Panchayat Bhavan
7.	**Afforestation PrograMiddle school**	• Plantation of trees at road side of project site • Distribution of seeds to the villagers for development of agricultural croPrimary school • Development of Parks in the rural areas

8.8 ECOLOGICAL BENEFITS

The proposed project will improve the ecology by planting the trees of native species. it is proposed to cover the 2412.11 Ha area till conceptual stage. The backfills will be properly graded & terraced and will be biologically reclaimed by plantation. Remaining mined out benches will be afforested with dense plantation. Total area covered under waste dumps and mineral stacking & processing will be afforestated by plantation. Roads will be used for public transport facilities after clouser of mine. Plantation will be carried out on 7.5 m statutory barrier. Thus, at the post mining stage the area will have partly backfilled mined out voids surrounded from all the sides by plantation and dense avenue plantation.

8.9 OTHER TANGIBLE BENEFITS

The proposed plant by nature serves as the nuclei for development of small-scale industries in the areas around them. These small-scale units usually have input-output linkages with the other industries.

The present project is likely to accelerate such industrialization through “Bubble Effects” in the study area. It is important to note that the small-scale units are usually labour-intensive and high-priority industries from social point of view. This is expected to play a major role in the future economic and social development of this area. The proposed project is expected to serve as Centre of significant small-scale industrial economy around it complemented by the services sector. This is expected to play a major role in the future economic and social development of this area. Project will encourage industrial growth of this sector specifically in formulation units in the region.

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping Stage.

As per the ToR issued by MoEF&CC for the project, vide F. No. J-11015/49/2021-IA-II (M) Dated 3rd August 2021, the Environmental tentative Cost Benefit Analysis for the project is as below:

Table 9.1: Category of Proposals for which Cost Benefit Analysis are applicable at Dhirauli Coal Block, Tehsil -Sarai, Dist - Singrauli & Singrauli Forest Division of Madhya Pradesh

Sr. no.	Nature of Proposal	Applicable / Not applicable	Remarks
1.	All categories of proposals involving forest land up to 20 hectares in plains and up to 5 hectares in hills	Not Applicable	NIL
2.	Proposal for defence installation purposes and oil prospecting (prospecting only)	Not Applicable	NIL
3.	Habitation, establishment of industrial units, tourist lodges / complex and other building constructions.	Not Applicable	NIL
4.	All other proposals involving forest land more than 20 Ha in plain and more than 5 ha in hills including roads, transmission lines, minor medium and major irrigation projects, hydel projects, mining activities, Railway lines, location specific installation like Micro-wave station, auto repeater center, TV towers, etc.	Applicable	These are cases where a Cost benefit analysis is necessary to determine when diverting the forest land to non-forest use is in the

			overall public interest.

Table 9.2: Estimation of cost of forest diversion

Sl.No.	Parameters	Cost in Cr Rs.	Remarks
1.	Ecosystem services losses due to proposed forest diversion.	170.010	Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted (1397.54 Ha) as prescribed by the Central Government, (MoEF & CC).
2.	Loss of Animal Husbandry	17.002	1. As per the calculation, Loss of animal husbandry productivity including loss of fodder is Rs.11.354 Crores.
			a) Estimated Quantity of fodder / grasses = Average production fodder / grasses in M.T. x Area Applied (based on the assumption that on closer an area is capable of yielding an average 2 to 4 MT of grass per ha. (MT): 3mt. x 1397.54 = 4192.62 mt.
			b) Value of fodder = Estimated quantity x market rate = 4192.62 MT x Rs.4500/Ha= Rs.1.88 Crores)
			2. Considered 10% NPV which is maximum: Rs 170.01 Crores x 0.1 (10%) = Rs.17.001 Crores
3.	Cost of Human Resettlement	NIL	Though there are no human resettlement in Forest land, Cost of human resettlement (R&R) in Tenancy land is included in Project cost estimates

4.	Loss of public facilities and administrative infrastructure (Roads, building, schools, dispensaries, electric lines, railways etc) on forest land, which would require forest land if these facilities were diverted due to the project.	Nil	Though there are no loss of public facilities & administrative infrastructure on forest land but Cost of public facilities & administrative infrastructure in Government land in outside the forest area is included in Project cost estimates
5.	Possession value of forest land diverted.	204.37	1.Circle rate of adjoining area in the district as a cost component as possession value of forest land is arrived as **Rs 204.370 Crores.** 2. 30% of environmental costs (NPV) due to loss of forests (170.010x0.30=Rs 51.003 Crores) 3. Circle rate of adjoining area is Rs.204.370 crores which is maximum compared to 30% of NPV. **Hence Rs.204.370 Crores is considered as possession value of forest land diverted.**
6.	Cost of suffering to Oustees	NIL	No human habitation exists on forest land proposed to be diverted as such there is no social cost of rehabilitation of oustees. However, cost likely to be incurred in R&R plan is provided in Project Cost.
7.	Habitat Fragmentation Cost.	85.005	The cost due to fragmentation has been pegged at 50% of NPV applicable as thumb rule. i.e.

			170.010x0.50=Rs.85.005 Crores
8.	Compensatory afforestation and soil & moisture conservation cost.	Nil	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance in future at present discounted value is **Rs 71.81 Crores** which is included in Project Cost
Total		**476.38**	

Table 9.3: Project Cost Estimates

Abstract of the Project cost estimates:			
S.no.	**Particulars**	**Value in Crores**	**Remarks**
1.	Capital Investment including preoperative expenses	2459.649	
2.	R&R	131	Cost of human resettlement (R&R) in Tenancy land
3.	Cost of Public facilities and administrative infrastructure	24	Cost included in the part of Land Cost of the Project
4.	Net Present Value (NPV) payable to Forest Dept	170.01	Cost included in the part of Forest Cost of the Project
5.	Cost of Compensatory Afforestation payable to Forest Dept. Total Cost of Afforestation on Revenue Forest land	71.81	Cost included in the part of Forest Cost of the Project
Project Cost		**2856.47**	

Table 9.4: Estimation of benefits of forest diversion

Life of Project		: 87 years (40 Yrs open Cast & 87 Years for Underground Mines				
Construction period		: Excluding 2 Years of Construction Period				
Sl.	**Parameters**	Calculations / Particulars				
		Net revenues due to Coal				
1.	**Increase in Net revenues due**	SL.	Parameters	Rate (Rs.)	Unit	Amount (Rs.Cr.)

	to Coal productivity SL attribute to the Dhirauli Coal Block	I	Gross revenues from ROM Coal for Life-of-Mine (G9 Grade) 200.41 MT @ Rs.3269 / tonne (Basic Selling Price)	3269	Rs/MT	104653.766
		ii.	Tentative Operative Cost including depreciation, interest on loan payment & tax liability. etc. for 42 Years @ (298.12 MT x Rs. 1985 per tonne)	1985	Rs/MT	59176.82
			Net Revenues (Benefits) due to Coal (1-2)			**45476.946**
2.		**SL**	**Parameters**	**Rate (Rs.)**	**Unit**	**Amount (Rs/Cr)**
		iii	Royalty (14% of base price)	457.66	Rs./MT	14651.53
		iv	M.P. Adhosanrachna Tax (5% Of base price)	163.45	Rs./MT	5232.69
		v	Forest Transit Fees	57.00	Rs./MT	1824.80
		vi	DMF (District Mineral Fund - 10% of royality)	45.77	Rs./MT	1465.15
		vii	NMET (National Mineral Exploration Trust - 2% of royality)	9.15	Rs./MT	293.03
		viii	Compensation Cess	400.00	Rs./MT	12805.60
		ix	GST @ 5%	200.10	%	6406.05
						42678.84
3.	**No. of population Benefited due to the Project**	Approx Population indirectly benefited				**3000.00**
4.	**Economic benefits due to direct &**	Benefits due to direct employment for 910 persons (910x40Yrsx131352 /Year)				**478.12**

	indirect employment due to the Project		
5.	**Economic benefits due to Compensatory Afforestation**	Benefits from Compensatory Afforestation (CA) accruing over next 50 years monetize and discounted to the Present Value has been included as benefits from CA.	**1051.65**
		Total Benefits {1+2+3+4+5) = **89685.56** Crores.	

9.1 CALCULATION OF COST BENEFIT RATIO:

Total Benefits (As per Table C: Estimation of benefits of Forest Diversion) =Rs 89685.56 Crores

Total Cost {As per Table (B+Bl)} losses of forests + Cost of the Project = Rs. 3332.85 Crores**.**

Hence, Benefit/ Cost Ratio= 26.91

Thus, the project gives positive Benefit/ Cost Ratio. The monetary returns of the Project are positive over the environmental losses.

10. ENVIRONMENT MANAGEMENT PLAN

10.1 INTRODUCTION

Any development project is associated with certain positive impacts as well as some negative impacts on the environment. However, the negative or adverse impacts cannot possibly rule out scientific development. At the same time adverse impacts cannot be neglected. The Environmental Management Plan describes the administrative aspects of ensuring that mitigation measures are implemented, and their effectiveness monitored. EMP ensure that set of mitigation measures taken to eliminate the adverse environmental impacts or reduce them to acceptable levels. During the implementation and operation of the project have been effectively implemented. The plan helps in formulation, implementation, and monitoring of the environmental parameters during and after commissioning of the project. The Environmental Management Plan describes in brief, the management plan for proper and adequate implementation of treatment and control system for air, water, and noise pollution and for maintaining the environment. It also includes the development of green belts in and around the plant, proper safety of the workers, noise control, fire protection systems and measures.

10.2 PURPOSE OF ENVIRONMENTAL MANAGEMENT PLAN

The environment management plan is prepared with a view to facilitate effective environment management of the project, in general and implementation of the mitigation measures. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works. For each stage of the program, the EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each operation, which could otherwise give rise to impact, the following information is presented:

1. To treat and dispose-off all the pollutants viz. liquid, gaseous, and solid waste to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology
2. Abatement treatment and disposal off all the pollutants viz. liquid, gaseous, and solid waste to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology.
3. To support and implement work to achieve environmental standards and to improve the methods of environmental management.
4. To promote green-belt development.
5. To encourage good working conditions for employees.

6. To reduce fire and accident hazards.
7. Budgeting and allocation of funds for environment management system.
8. To adopt cleaner production technology and waste minimization program.

10.3 ENVIRONMENT MANAGEMENT POLICY & ENVIRONMENT COMMITTEE

For effective implementation of environmental policy and its objectives, necessary guidelines and targets will be framed from time to time. Initially, certain guidelines have been framed in different facets of environmental management for bringing uniformity in planning, execution and monitoring systems thereby ensuring environmentally sustainable coal mining operations.

The Environmental Policy, objectives and guidelines were circulated to all the mines, departments, and other units for implementation. Also, necessary arrangements were made for display of the same at the conspicuous places for bringing awareness among the employees of APMCD.

Sources / Activities	Recommended control measures
A. Planning of New / Expansion Projects	
1. Planning	i. Due care shall be taken in addressing all the environmental issues while formulating a project proposal. ii. Conservation of ecologically sensitive areas, if any, located near the project area shall be given due consideration. iii. EIA/EMP shall be prepared with proper environmental safeguards along with sufficient fund provision.
B. Air Pollution Control	
1. Drilling	i. Wet drilling mechanism shall be adopted.
2. Blasting	i. Blasting for removal of OB shall be conducted during favorable weather conditions using NONELs with proper design of blast hole geometry & optimum quantity of explosives.
	ii. Use of delay detonators shall be adopted to reduce ground vibrations.
	iii. Blast site shall be wetted before and after blasting.
3. HEMM	i. Regular maintenance of all diesel operated HEMMs shall be done as per the manufacturer's schedule for effective control of exhaust emissions.
4. Haul Road	i. All service roads shall be metalled and well maintained.
	ii. All haul roads and service roads shall be regularly sprayed with water.
	iii. Plantation shall be done alongside the haul and service roads.
5. Over burden	i. Stabilization of dump surface till re-handling of the dump by grass turfing and species of small plants/

Sources / Activities	Recommended control measures
	shrubs to ensure stability of slopes and prevention of dust generation by wind action. ii. Re-handling of the waste from the external dump to nearest backfilled surface as soon as possible.
6. Coal Handling	i. Belt conveyors shall be enclosed, and mist spray arrangement installed at all receiving points, transfer points, ground bunkers and loading points.
	ii. Plantation shall be done all around the Coal Handling Plant (CHP)
C. Water Pollution Control	
1. Surface Water	i. Garland drains shall be made around quarry and OB dump to collect run-off water and siltation points of sufficient size shall be provided for collection of silt.
	ii. OB dump run-off to be de-silted through settling tanks before discharge into natural streams.
	iii. Contour drains to be constructed along the slopes of OB dumps.
	iv. Toe walls to be constructed around the OB dump with boulders collected from OB material.
2. Mine Water	i. Mine water shall be treated properly prior to reuse for industrial purposes. Excess mine water shall be treated in settling ponds before discharging into natural streams.
3. Workshop & CHP	i. Effluent coming out from workshops shall be treated in an Effluent Treatment Plant containing an oil / grease trap and sedimentation tank. The treated water is to be stored and reused in the workshop itself.
	ii. ETP shall be constructed for treating CHP effluents and adoption of closed water circuit in CHP shall be adopted thereby ensuring zero discharge.
4. Domestic Effluent	i. In isolated building or housing complexes septic tanks and soak pits to be provided.
	ii. In the township, complete sewerage system including sewage treatment facilities shall be adopted.
	iii. Community and service building shall be provided with adequate sewage treatment facilities.
5. Hazardous and Bio-medical wastes	i. Hazardous wastes like used oil with barrels, waste oil with barrels, used transformer oil with barrels, scrapped batteries, iron scrap, copper cables, scrapped cap lamp accumulators, empty oil and grease drums shall be handled and disposed of in accordance with the procedure laid down in HWM Rules.
	ii. Used oil, spent oil, batteries and copper cables shall

Sources / Activities	Recommended control measures
	be disposed-off to the recyclers having valid registration from CPCB/MPPCB for recycling or recovery, whereas the empty oil and grease barrels shall be detoxified prior to their disposal to outside agencies.
	iii. Bio-medical wastes shall be handled and disposed of as per the latest guidelines issued by MoEF&CC.
D. Noise Pollution Control	
1. Drilling	i. Controlled blasting methods with proper spacing, burden and stemming shall be adopted to get optimum results.
	ii. Blast holes should be judiciously charged to control noise and blast vibrations
2. HEMM	i. Providing of sound proof cabins for the workers deployed on machines producing higher levels of noise like dozers, shovels, dumpers, and drills etc.
	ii. The engine exhausts of HEMM to be fitted with mufflers.
	iii. HEMM to be properly maintained and operators to be provided with ear mufflers / ear plug.
	iv. Reducing the exposure time of workers to the higher noise levels shall be practiced.
3. CHP	i. Belt drive or roller drive systems shall be used instead of gear train system which results in considerable noise reduction
E. Energy/ Water Conservation Measures	
1. Electricity	i. CFLs and energy efficient appliances shall be used at mines, allied units, and colonies
	ii. Efforts shall be made for utilization of renewal sources of energy like solar and wind power
2. Oil	i. Periodical maintenance of vehicles including fine tuning of engines shall be done to improve their fuel efficiency
	ii. Leakage and spillage of oils during transport and usage shall be avoided
3. Water	i. Wastage of water resulting from leakages through distribution pipelines and overflow from overhead tanks shall be arrested
	ii. Summer storage tanks shall be constructed in all the mining areas for rainwater harvesting and augmentation of ground water recharge.
F. Land Management	
1. Topsoil	i. Topsoil shall be stacked at earmarked place and shall be used for reclamation of backfilled area. ii. Topsoil shall invariably be removed from the site

Sources / Activities	Recommended control measures
	allocated for external dumping of OB material, to conserve precious natural resource and ensure better stability of dumps.
2. Reclamation	i. Reclamation of mined out areas including back filled areas shall be taken up concurrent with progress of mining operations as per the EMP. ii. Native species shall be selected for plantation to achieve better survival rate.
3. Green Belt Development	i. Extensive plantation shall be taken up in the township, vacant lands and degraded forest lands. ii. Gap plantation shall be taken up wherever the survival rate is poor. iii. Avenue plantation shall be taken up alongside the roads.
G. Environmental Monitoring	
1. Environmental Monitoring for pollution mitigation	i. Monitoring of ambient air quality, ground & surface water quality, effluent discharge quality, noise & blast vibrations, phreatic surface levels, HEMM exhaust emissions shall be carried out as per the stipulated norms and corrective measures shall be taken for mitigation of pollution.
2. Satellite Surveillance	ii. Satellite surveillance of all opencast mines shall be carried out once in three years for change detection analysis in land use / land cover in core and buffer zone of the project
H. Environmental Awareness	
1. Environmental Awareness	i. Environmental awareness programmes shall be conducted in all mining areas to bring awareness among the employees regarding the environmental policy, its objectives, and measures to be taken to safeguard the environment
	ii. Awareness programmes shall be conducted on energy, oil, and water conservation
	iii. Awareness shall be created in the employees and public on the ill-effects of plastics usage and educate them to use alternatives

An Environment Management Committee (EMC) shall be constituted at the project level consisting of following members to monitor the implementation of EMP and other environmental protection measures.

i. Project Officer
ii. Staff Officer to General Manager
iii. Environmental Officer
iv. Forestry Officer

v. Civil Engineer
vi. Survey Officer

M/s Stratatech Mineral Resources Private Limited will implement the following Standard operating procedures (SOP) at the project level EMC

vii. Procedure for work zone and ambient air quality monitoring and control measures.
viii. Procedure for work zone and ambient noise level measurement and control measures
ix. Procedure for vibration measurement and control measures.
x. Procedure for measurement and control of blast induced noise, vibration and fly rock.
xi. Procedure for greenbelt development.
xii. Procedure for developing social amenities.
xiii. Procedure for environmental reporting system.
xiv. Procedure for environment auditing.
xv. Procedure for review and updating EIA/EMP.
xvi. Procedure for environment related communication with stakeholders.
xvii. Procedure for evaluating continual improvement in environment quality.
xviii. Procedure for access to updated norms and standards.

The above SOPs will ensure effective monitoring of environmental safeguards and compliance of conditions stipulated in Environmental Clearance, Forest Clearance, Consent for Establishment and Operation, Ground water Clearance, No Objections Certificates (NoCs) from any other department, etc. Review of the compliance of above conditions during periodical review meetings. Reporting of non-compliances and action plan for rectification to the General Manger.

Hierarchical system of the company to deal with environmental issues and for ensuring compliance with EC conditions

Project Officer /Agent, in-charge of the Opencast Mine is responsible for implementation of the approved EMP and various conditions of EC, FC and CFO. Environmental Officer will assist the Project Officer /Agent in ensuring the compliance of conditions. Area General Manager will be reviewing the environmental issues for ensuring compliance of norms/conditions. The reporting structure, both functional and administrative of the project level EMC is given in Fig. 10.1.

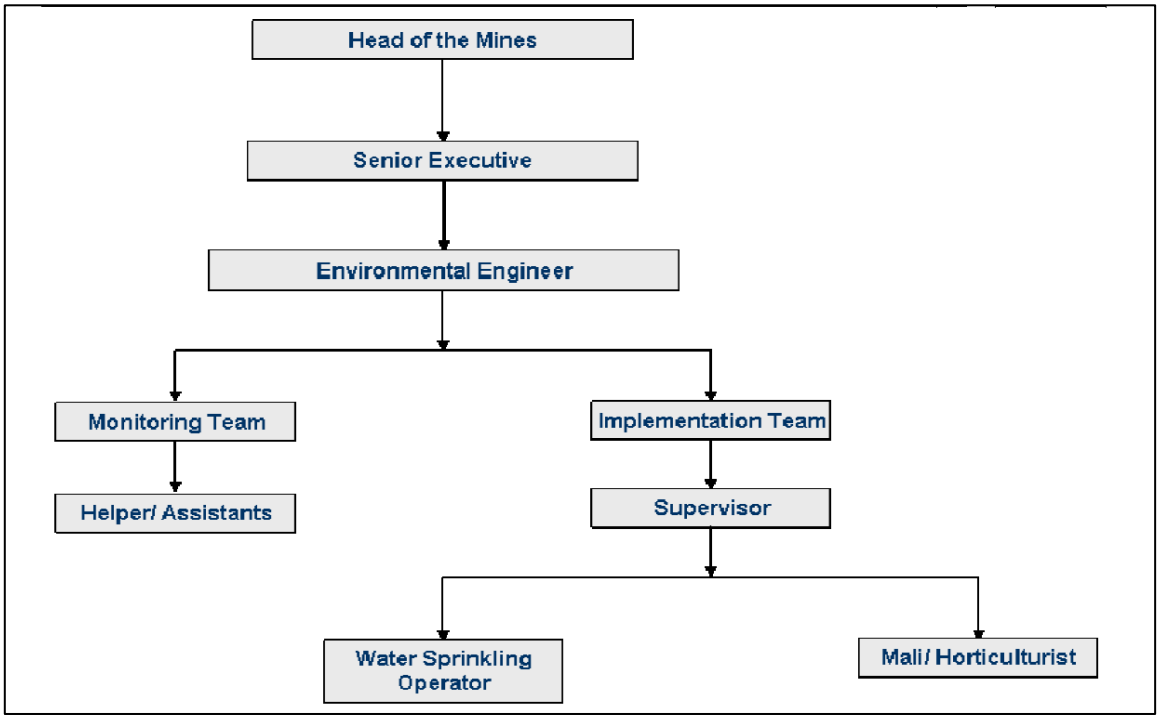


Figure 10.1: Reporting Structure for ensuring compliance with EC conditions

System of reporting non-compliances/violations of environmental norms to the board of directors and/or shareholders or stakeholders

Environmental Management Committee will monitor the implementation of environmental norms/conditions and shall report any deviations to the concerned Project Officer. The Project Officer will take suitable corrective measures with the guidance of Environmental Officer. The non-compliances, if any, which require the intervention of higher authorities will be brought to the notice of General Manager (Coal). General Manager (Coal) will inform the deviations / non-compliances to the Vice Chairman & Managing Director and Chairman.

The main aims of the said Policy are to

1. Effectively manage, monitor, improve and communicate the environmental performance.
2. Take all reasonable steps to prevent pollution.
3. Set realistic and measurable objectives and targets for continual improvement of the environmental performance.
4. Ensure that all employees and contractors are trained to understand their environmental responsibilities and create an environment that adheres to the Company's Policies, procedures, and applicable regulations.
5. Hold leadership accountable for good environment performance of our operations and projects. Inherent in that accountability will be the commitment

of management to provide resources and successfully create an appropriate environment.

6. Comply fully with all relevant legal requirements, codes of practice and regulations.
7. Reduce, recycle, and reuse natural resources.
8. Minimize waste generation and increase reuse within the framework of waste management procedures.
9. Identify and manage environmental risks and hazards.
10. The project proponent shall regularly review this policy and ensure the effectiveness of the.
11. Those corrective and preventative actions are taken to ensure continual improvement.
12. To treat all the pollutants viz. air, gaseous and noise, which contribute to the degradation of the environment, with appropriate technologies.
13. To comply with all regulations stipulated by the Central / State Pollution Control Boards related to air emissions and liquid effluent discharge as per air and water pollution control laws.
14. To handle hazardous wastes as per the Hazardous Waste Hazardous & Other Wastes Rules, 2016 of the Environment (Protection) Act, 1986
15. To encourage support and conduct developmental work for the purpose of achieving environmental standards and to improve the methods of environmental management.
16. To make continuous \efforts to improve environment.
17. The system of reporting of Non-conformances/ violation of any Environmental Law/Policy will be as per the management system.

Table 10.1: Manpower at Environmental Management Cell (EMC)

Description	Manpower
Senior Manager, Quality & Control	1
Environmental Engineer	1
Horticultural supervisor	1
Chemist	2
Laboratory assistant	2
Field assistant	2
Total	**09**

For successful implementation of the environmental management plan other agencies of the State will also involved by SMRPL, if required (for regulatory

requirement or technical support). The coordinating agencies, which may be involved for specific environmental, and project related activities, are as follows.

Table 10.2: List of Coordinating Agencies, Involved for Specific Environmental Activities

State/ Regional Level Agency	SFD	SPCB	MoEF&CC	DGMS	RPDAC	WRD	DoH
District / Local Level Agency	DFO	-	-	RO	DCAC	RO	Civil Surgeon
Project Area: Plantation Programme	✔						
Study Area: Air, noise, water quality, wastewater discharge quality monitoring.		✔	✔			✔	
Project Area: Ambient air monitoring, work-zone air, work-zone noise, effluents from outlet of effluent treatment plants, fugitive emissions		✔	✔			✔	
Project Area: Solid waste / overburden		✔		✔			
Project Area: Human Health		✔	✔				✔

Index:

SFD	-	State Forest Department
SPCB	-	State Pollution Control Board
MoEF&CC	-	Ministry of Environment, Forest & Climate Change
DGMS	-	Director General of Mines Safety
RPDAC	-	Rehabilitation and Periphery Development Advisory Committee
DCAC	-	District Compensation Advisory Committee
WRD	-	Water Resource Department
NHAI	-	National Highway Authority of India
PWD	-	Public Works Department
DoH	-	Department of Health
RDA	-	Regional Development Authority
DFO	-	Divisional Forest Officer
RO	-	Regional Office

10.3.1 Interaction with State Pollution Control Board

EMC always remains in regular touch with SPCB/Regional Office, MoEF&CC and sends them periodic compliance report on EMP compliance in the prescribed format. Any new regulations/ guidelines considered by SPCB / CPCB shall be taken care of by EMC.

10.3.2 Training

Training facilities has already been developed for environmental control. For proper implementation of the EMP, the environmental officers, mining engineers, geologists, horticulturists, field executives etc. responsible for EMP implementation are trained as per the need.

The training is given to employees covering the following areas:

1. Awareness of pollution control and environmental protection (for all employees)
2. Operation and maintenance of specialized pollution control equipment to the concerned employees
3. Field monitoring, maintenance, and calibration of pollution monitoring instruments
4. Laboratory testing of pollutants.
5. Repair of pollution monitoring instruments.
6. Awareness Training on Environment Management System.
7. Environmental management.
8. Afforestation / plantation and post care of plants.
9. Knowledge of norms, regulations, and procedures.
10. Risk assessment and Disaster Management.
11. ISO 9001:2015
12. OSHAS 45001:2018
13. EMS 15001: 2015

Table 10.3: Training Schedule of Mining Engineers, Environmentalists, Diploma Engineers, Geologists, Supervisors etc.

			Duration in month											
Area of Training	**Persons to be covered Under Training**	**Duration, Month**	**1st**	**2nd**	**3nd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**	**11th**	**12th**
Awareness Campaign of pollution control and environmental protection	Management& Non Management Employees (Upto Supervisors)	12												
Operation and maintenance of specia lized Pollution control equipment.	Management & Non Management Employees (Upto Supervisors Level)	3												
Field monitoring, maintenance and calibration of pollution monitoring instruments	Environmental officers,Chemists	4												
Laboratory testing of pollutants.	Environmental Officers,Chemists	3												
Repair of pollution monitoring instruments.	Mechanical & Electrical Supervisors (Diploma Holders)	2												
Risk assessment and Disaster Management.	Mining Engineers, Environmental Officers,Mechanical Engineers, Electric£1 Engineers,sts etc	6												
Environmental management.	Mines Manager, Mining Engineers, Environmental Officers,Geologists	3												
Afforestation / plantation and post care of plants.	Horticulturists,Environment Officers	2												
Knowledge of norms, regulations and procedures.	Management & Non Management Employees (Upto Chemist Level)	3												
ISO 9001:2015	Management & Non Management Employees (Upto Supervisors)	4												
OSHAS 45001, 2018	Management & Non Management Employees (Upto Supervisors)	4												
EMS 14001:2015	Management & Non Management Employees (Upto Supervisors)	4												

10.3.3 Plan for reduction of Specific Diesel Consumption

Specific Diesel Consumption of SMRPL Mines is 105 litre/day of excavation. Following major site specific measures will be taken in a phased manner to reduce the specific diesel consumption in a phased manner in Dhirauli Coal Mining.

1. Regular monitoring of equipment-wise diesel consumption, running hours of equipment and their hourly production to check any abnormal change in the diesel consumption pattern.
2. Reduction of idling of the dumpers at face, Dumpers shall be in OFF position during idling except for the 1st dumper near excavator for loading.
3. Reducing the unnecessary movement of dumpers during shift change time.
4. Prevention of diesel leakage.
5. Regular check-up of tyre pressure to maintain it as per manufacturers recommendations.
6. Implementation of maintenance schedule and fixation of equipment –wise norms for diesel consumption based on periodic review of collected data.
7. Maintaining proper haul road width & gradient, removing potholes in the road.
8. Maximising the backfilling and reducing the lead distance by proper haul road planning.
9. As effectiveness of implementation measures depend mostly upon the attitude of operators, awareness programmes will be conducted for conservation of fuels.

Year-wise proposed rate of Specific Diesel Consumption for the proposed excavation plan for the 1st five years of plan period is given below.

Table 10.4: Year-Wise reduction plan for Specific Diesel Consumption for Next Five Years

Year	Total Excavation, Mt	Diesel Consumption, kl	Specific Diesel Consumption, Litre/t
2025-26	2	4900	7.00
2026-27	4	9240	7.00
2027-28	5	10850	7.00
2028-29	5	10150	6.9
2029-30	5	9450	6.8

10.3.4 Specific Diesel Consumption reduction target till conceptual period

Table 10.5: Specific Diesel Consumption target

Year	Specific Diesel Consumption, Liter/ton of Excavation
2025-26	7.00

Year	Specific Diesel Consumption, Liter/ton of Excavation
2026-27	7.00
2027-28	7.00
2028-29	6.9
2029-30	6.8
2030-31	6.8
2031-32	6.8
2032-33	6.8
2033-34	6.8
2034-35	6.8
2035-36	6.8
2036-37	6.8
2037-38	6.8
2038-39	6.8
2039-40	6.8
2040-41	6.8
2041-42	6.8
2042-43	6.8
2043-44	6.8
2044-45	6.8
2045-46	6.8
2046-47	6.8
2047-48	6.8
2048-49	6.8
2049-50	6.8
2050-51	6.8
2051-52	6.8
2052-53	6.8

Year	Specific Diesel Consumption, Liter/ton of Excavation
2053-54	6.8
2054-55	6.8
2055-56	6.8
2056-57	6.8
2057-58	6.8
2058-59	6.8
2059-60	6.8
2060-61	6.8
2061-62	6.8
2062-63	6.8
2063-64	6.8
2064-65	6.8
2065-2113	6.8

It is vividly indicated from above table that average specific diesel consumption over the FY 2025-26 to 2029-30 is likely to be reduced from 7.00 to 6.8 liter per ton of excavation.

10.3.5 Water Reduction Plan

And year wise water reduction plan through water conservation measures like rainwater harvesting and other management control measures in the mine is given below:

Table 10.6: Water Reduction Plan: Decrease in Ground Water Drawl

Year	Total Water Requirement, cu. m/day	Proposed Water drawl from Ground Water, cu. m/day	Proposed Water drawl from Mines Pit, cu. m/day	% reduction in ground water drawl
1st Year	1936	1936	0	0
2nd Year	1936	1936	0	0
3rd Year	1936	50	1886	98
4th Year	1936	50	1886	98
5th Year	1936	50	1886	98

10.3.6 Standard Operating Procedures on Environment, implemented under IMS

Standard Operating Procedures (SOP) in the Mine, related to Environment, under Integrated Management System:

- Procedure for work zone and ambient air quality monitoring and control measures.
- Procedure for work zone and ambient noise level measurement and control measures
- Procedure for vibration measurement and control measures.
- Procedure for measurement and control of blast induced noise, vibration and fly rock.
- Procedure for greenbelt development.
- Procedure for developing social amenities.
- Procedure for environmental reporting system.
- Procedure for environment auditing.
- Procedure for review and updating EIA/EMP.
- Procedure for environment related communication with stakeholders.
- Procedure for evaluating continual improvement in environment quality.
- Procedure for access to updated norms and standards.
- Procedure for operation of excavators, dumpers, drills, CHP etc.
- Procedure for transportation of explosives, issue of explosives, blasting, control blasting etc.

adani™

ENVIRONMENT, HEALTH & SAFETY POLICY

We at Adani, strive to make our businesses sustainable, that benefits our customers, our employees, our shareholders and society in general. We believe that in addition to integrated infrastructure business, there is a bottom line in performing our operations according to prescribed standards, specifications and regulations on governance, which are safe in working and environmental friendly for the well-being of the working community.

As a responsible corporate, we at ADANI have a firm conviction that the industrial injuries, occupational hazards as well as safety and environmental incidents are preventable. We recognize and trust people as our most important asset and have commitment to provide safe and healthy work environment impacting not only those, who are working in our industry but also community, which is living in the vicinity.

To achieve this objective, we shall

a. Develop, implement, maintain and sustain EHS Management System across the Group to set up new benchmarks for the respective sector of operations, which superimpose the regulatory and statutory requirements.

b. Verify, audit and periodically review EHS performance and set new targets to revise these benchmarks.

c. Formulate EHS objectives and targets for continual improvement and to have a periodic review for ensuring that these are in conjunction with the individual business and corporate levels.

d. Conduct all our operational activities in such a manner as to avoid harm to employees, contractors, stakeholders and community at large.

e. Inculcate safety & health as a personal value through behavioral intervention and recognize it across levels with continuous correction of unsafe behavior.

f. Provide adequate training and resources so as to bring awareness and ability to carry out work safely.

g. Emphasize responsibility and accountability to all employees and contractor workforce for safe performance on the job and encourage safe behavior off the job.

h. Evolve ways to reduce or eliminate the use or release of toxic and hazardous material and prevent pollution by conserving natural resources, recovering and recycling the raw materials for safe, healthy and clean environment.

GAUTAM S ADANI

Date: 01.01.2016

Figure 10.2: Environment Policy

10.4 IMPLEMENTATION OF ENVIRONMENT MANAGEMENT PLAN

SMRPL Mine is responsible for implementation of all the mitigation and management measures. A separate department "Environmental Management Cell" (EMC) exists to look after all environmental related matters of the plant. The EMC will supervise the reported activity from time to time for smooth implementation of Environmental Mitigation and Management measures and will take necessary actions if required. The cell will act to ensure the suitability, adequacy, and effectiveness of the Environment Management Program. It will also ensure to meet all the Statutory Requirements. Roles & responsibilities of Environment Monitoring Cell (EMC) has been discussed in detail in Chapter-6.

10.4.1 Budgetary provisions for implementation of Environment Management Plan

Following provisions are proposed to be taken for improving, control and monitoring of environment protection measures.

Table 10.7: Environmental Management Plan for Operation

Sl. No.	Environmental Protection Measures	Capital Cost	Recurring Cost
		(Rs. In lakhs)	(Rs. In lakhs/year)
1.	Air Pollution Control Measures (Dry fog Dust Suppression Systems at CHP, and Loading Point)	100	60
2.	Water Pollution Control Measures (Construction of Garland drain, Construction of Garland drain around the OB dump, Toe wall around the dump)	118	50
3.	Noise Pollution Control Measures	15	10
4.	Greenbelt/ Nursery Development	37	50
5.	Rainwater Harvesting	80	10
6.	Fire Fighting and Safety measures	100	10
7	Installation of Online Ambient Air Quality Monitoring System & Online Monitoring ETP	200	10

8	Hurdul Nala diversion, Habitat / Eco-region-based improvement & management	247	82
9	Budget/ Scheme for the Public Hearing Commitments	653	0
Total EMP Budget*		**1550**	**282**
*** The EMP capex budget shall be utilized with in 5 years from the date of operation.**			

***As per Mining Plan – Page 82**

Table 10.8: Mine Closure Cost

Sl. No.	Environmental Protection Measures	Capital Cost	Recurring Cost
		(Rs. In lakhs)	**(Rs. In lakhs/year)**
1	**Technical and Biological reclamation of Mines out land & OB dump plantation	979.28	50
Mine Closure Cost		**979.28**	**50**

11. SUMMARY & CONCLUSION

11.1 INTRODUCTION

The chapter discusses about the summary of whole EIA/EMP report along with recommendation and conclusion. Mining lease area of Dhirauli Coal Mines is 2672 hectare out of which 1397.54 hectare is forest land. Forest Diversion proposal applied - Proposal No.FP/MP/MIN/142344/2021 dated 08th June 2021.

The present proposal is for coal mine has been planned to conduct mining operations through open cast mining with capacity of 5 MTPA and 1.5 MTPA through underground mining and setting up of Coal Handling Plant with 850 TPH rated capacity and 935 TPH design, keeping the peak production capacity in mind at Singrauli Coalfield, Singrauli District, Madhya Pradesh.

The proposed project is listed under activities 1(a) under the Schedule of EIA Notification, 2006 and categorized as Category-A.

11.2 PROJECT DESCRIPTION

Block has a gross Geological Reserve of 620.013 MT and net geological reserve of 558.011 MTPA (OCP-260.263 MTPA; UG-297.748 MTPA). The mining plan envisages for mining of 313.79 MTPA (OCP-195.74 MTPA, UG-118.05 MTPA) of mineable coal reserves within the area where the reserves are proved at an average stripping ratio of 10.55. The total life of the mine is underground 87 years, life of Opencast mine is 40 years (excluding 2 years of construction period). Mining will be done by the Opencast mining is proposed by Surface miners (SM)-FEL-Truck for coal and drill blast for OB. Underground mining is proposed by Continuous miner (CM). Detail of the project is summarized ijn below attached table:

Table 11.1: Detail of the Project

S. No.	Description	Particulars
1.	**Name of the Project**	Dhirauli Coal Mining
2.	**Type of the Project**	Opencast and underground mine
3.	**Mining lease area**	2672 Ha
4.	**Forest Area**	**Forest land**

		1397.54 ha (Protected Forest Land: 1335.35 ha, Revenue Forest land: 62.19 ha) Forest Diversion proposal applied - Proposal No. FP/MP/MIN/142344/2021 dated 08th June 2021 **Non-Forest land:** Tenancy Land– 553.540 ha Govt Non-Forest Land- 720.92 ha.
5.	**New / Expansion**	New
6.	**Category as per EIA Notification**	"A"
7.	**Location**	
8.	**Villages**	Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar
	Tehsil	Sarai
	District	Singrauli
	State	Madhya Pradesh
	Latitude	23°56'8.050"N to 23°58'59.036"N
	Longitude	82°19'4.382"E to 82°24'20.086"E
	Toposheet No.	64 I/5
9.	**Name of the Organization**	M/s. Stratatech Mineral Resources Private Limited
10.	**Coal Field**	Singrauli Coal Field
11.	**Coal Block**	Dhirauli Coal Block
12.	**Borehole density**	5 boreholes per sq.km
13.	**No. of coal seams**	A total of 21 coal seams are present in Dhirauli block including 7 local seams viz. Seam-L-1, Seam-VIII Top, VIII Bottom, VIII-Combined, L-2, VII Top, VII Bottom, VII Combined, VI, L-3, L-4, V-Top, V-Bottom, L-5, IV, III Top, III Bottom, L-6, L-7, II & Seam-I.
14.	**Seams no considering for mining**	12 (<1m Thickness and inconsistence in nature)
15.	**Maximum Thickness of seams**	9.08 (Seams VII COMB)
16.	**Geological Reserves**	Gross Geological Reserve – 620.013 Mt Net Geological reserves – 558.011 Mt Opencast Mine – 260.263 Mt Underground Mine – 297.748 Mt
17.	**Net Minable Reserves**	Total- 313.79 Mt Opencast Mine – 195.74 Mt Underground Mine – 118.05 Mt

18.	**Reserves extracted by UG**	298.12 Mt (OCP- 186.06 Mt, UG- 112.07 Mt)
19.	**Extractable Reserves by OC**	298.12 Mt (OCP- 186.06 Mt, UG- 112.07 Mt)
20.	**Average GCV & Grade of Coal**	G8 (overall)
21.	**Average gradient of the seams**	Gradient of 2^0-4^0
22.	**Total OB/Inter burden to be excavated**	1963.55 MBCM
23.	**Average Stripping Ratio**	10.55 m^3/te.
24.	**Bench width**	Working : 20 m -30 m ; Non-working: 12 m - 20 m
25.	**Bench height**	OBR: 10-12 m; Top soil : 3-6 m
26.	**Peak Production Capacity**	6.5 MTPA (5 MTPA Open Cast & 1.5 MTPA Underground)
27.	**Life of the Mine**	Open Cast:- 40 years; Underground:- 87 years
28.	**Forestland requirement**	1397.54 ha of forest land (Protected Forest Land 1335.35 ha Revenue Forest land: 62.19)
	Non-forestland within ML Area	Non-forestland - 1274.46 ha
	Total Land requirement	2672 ha
29.	**Details of Wildlife Sanctuaries, National Park, eco-sensitive Zones, within 10 km radius?**	None
30.	**R & R Involved**	All eight villages (Dhirauli, Phatpani, Sirswah, Amdand, Jhalari, Amraikhoh, Bansibridha, and Belwar) lying within the block has been identified to be rehabilitated and resettled. The displaced families are proposed to be rehabilitated and resettled colony in a nearby area after discussion with villagers.
31.	**No. of affected families**	No. of Project Displaced Families - 1581 No. of Project Affected Families - 1456
32.	**Technology**	Opencast mining is proposed by Surface miners (SM) -FEL-Truck for coal and drill blast for OB. Underground mining is proposed by Continuous miner (CM).
33.	**Area of Excavation**	2,096.59 Ha
34.	**Depth of the quarry**	280 M

<table>
<tr><td>35.</td><td>Details of External OB Dumps</td><td colspan="3">The OB removed during initial years will be placed beyond the incrop of the seam VII as external dump. The total volume of external dump has been estimated as 259.01 Mm^3.
<table>
<tr><td>Place</td><td>Area in ha</td><td>Max. Height</td><td>Quantity OB in M.Cum</td></tr>
<tr><td>Seam VII</td><td>387.55</td><td>60m</td><td>259.01</td></tr>
</table></td></tr>
<tr><td>36.</td><td>Details of backfilling

(at the end of mine)</td><td colspan="3">Commenced from 3rd year of coal production
<table>
<tr><td>Place</td><td>Area in ha</td><td>Max. Height</td><td>Quantity OB in M.Cum.</td></tr>
<tr><td>BF-1</td><td>1,796.23</td><td>500m</td><td>1,843.03</td></tr>
</table></td></tr>
<tr><td rowspan="4">37.</td><td>Details of Final Mine Void (at the end of mine)</td><td>At final stage</td><td rowspan="4">Out of total 2,096.59 Ha excavated area 1796.23 ha will be backfilled upto a level of 350– 500 mRL. Remaining 300.36 ha (mine void) area to be converted into water body (253.56 ha).</td></tr>
<tr><td>Area</td><td>300.36 ha</td></tr>
<tr><td>Depth</td><td>280 m bgl</td></tr>
<tr><td>Void Volume</td><td>-</td></tr>
<tr><td rowspan="5">38.</td><td>Details of afforestation</td><td colspan="2">-</td></tr>
<tr><td>Plantation on External OB Dumps</td><td colspan="2">Nil; the area will conceptually come under backfilled surface</td></tr>
<tr><td>Plantation of Backfilled surface</td><td colspan="2">1,843.03 Ha</td></tr>
<tr><td>Other area</td><td colspan="2">-</td></tr>
<tr><td>Total Plantation</td><td colspan="2"></td></tr>
<tr><td>39.</td><td>Density of Plantation</td><td colspan="2">2500 No./Ha</td></tr>
<tr><td>40.</td><td>Coal Linkage</td><td colspan="2">Direct sale to long term buyers</td></tr>
<tr><td rowspan="5">41.</td><td colspan="3">Coal Evacuation</td></tr>
<tr><td>In-Pit</td><td colspan="2">Dumpers</td></tr>
<tr><td>Surface to Siding</td><td colspan="2">Trucks</td></tr>
<tr><td>Siding to Loading</td><td colspan="2">Loading to wagon</td></tr>
<tr><td>Road Diversion</td><td colspan="2">There are 4 roads passing from block having total length of approx. ~18 km which needs to be diverted along southern, western and northern boundary of the block.</td></tr>
<tr><td>42.</td><td>Employment potentiality</td><td colspan="2">Total 970 (Direct/Indirect)</td></tr>
<tr><td>43.</td><td>Total cost of the project</td><td colspan="2">Rs 2800 Crores</td></tr>
<tr><td>44.</td><td>Fund Provision for EMP</td><td colspan="2">Capital - 1550 Lakhs</td></tr>
</table>

		Recurring - 282 Lkahs **Mine Closure Cost** Capital - 979.28 Lakhs Recurring - 50 Lkahs
45.	**Name of the EIA Consultant Organization**	M/s Vardan EnviroNet
46.	**QCI / NABET Accreditation**	Certificate No. NABET/EIA/ 2023/SA 0158, Valid up to 05.05.2023

11.3 DESCRIPTION OF THE ENVIRONMENT

Environmental data have been collected in relation to proposed mining for Air, Noise, Water, Soil, Ecology and Biodiversity. The generation of primary data, as well as collection of secondary data and information from the site and surroundings was carried out during pre monsoon Season, i.e. March to May 2021. The EIA study is being done for the Mine Lease (core zone) and area within 10 Km distance from the mine lease boundary (buffer zone), both of which together comprise the study area.

Table 11.2: Baseline Environment Status

Parameters	Baseline Status
Ambient Air Quality	PM_{10} – 61.30 to 26.50 µg/m^3 $PM_{2.5}$ – 40.2 to 15.8 µg/m^3 SO_2 – 25.1 to 12.5 µg/m^3 NOx – 34.2 to 16.4 µg/m^3
Noise Level	Noise Level During Day Time – 65.2 and 42.2 dB (A) Noise Level During Night Time – 62.1 to 39.3 dB(A)
Water Quality	**Ground Water:** All the Parameters Like pH varies from 6.61 to 7.54, Total Hardness varies from 77.9 to 263.4 mg/L,Total Dissolved Solids varies from 162 to 389 mg/L, Chlorides – 27.4 to 66.4 mg/l etc.are found within the permissible limits.
	Surface Water: All the Parameters Like pH varies from 7.34 to 7.67,Total Hardness varies from 48.1 to 93.1 mg/L, Total Dissolved Solids varies from 97 to 152 mg/L, Dissolved Oxygen – 5.1 mg/l to 5.7 mg/l etc. are found within the permissible limits.
Soil Quality	pH- 4.89 to 7.06 Organic Matter- 0.43% to 1.34 %
Ecology And Biodiversity	There is no wildlife sanctuary/biosphere reserve/national parks present within 10 Km radius of the study area. No species of Schedule-I was observed during study.

Parameters	Baseline Status
Socio Economic	The proposed expention case will provide positive impact to the nearby area. The project will provide direct and indirect employment to nearby villagers.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. However, the measures are suggested to mitigate any harmful impacts of pollutants, like the plantation of trees along haul roads especially near settlements, to help to reduce the impact of dust on the nearby villages; planning, transportation routes of mined material so as to reach the nearest paved roads by shortest route; regular water sprinkling on unpaved roads to avoid dust generation during transportation etc. The mining activities is likely to increase the per capita income of local people by which the socioeconomic status of the people will be improved. The local people have been provided with either direct employments or indirect employment such as transport & other business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply etc. Except dust generation, there is no source which can show a probability for health related diseases. Regular water sprinkling will be done with water sprinklers and dust masks will be provided to the workers. All workers will be subjected to a medical examination as per Mines Rule 1955 both at the time of appointment and at least once in a year. Medical camps will be organized for this activity. Insurance for all employees as per the rules will also be carried out.

Table 11.3: Anticipated Environmental impacts and mitigation

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
Air Quality	Drilling and Blasting	PM_{10}, $PM_{2.5}$, SO_2 and NO_2	Adverse	Use of dust aprons by drillers and adopting wet drilling methods. A. The production of blast fumes containing noxious gases will be reduced by the following methods: • Use of adequate booster/primer; and • Proper stemming of the blast hole. • Scientific design of blast. B Drills fitted with dust collection system will be deployed or using wet drilling method. C. Development of greenbelt.
	Overburden removal	Increase in SPM levels in ambient air due to dust generation and NO_2, HC, SO_2 and CO concentration levels in ambient air due to vehicular emissions.	Adverse	• Sprinkling of water on haul roads at regular intervals. • Installing permanent water sprinklers at strategic areas/locations/stretches. • Regular maintenance of vehicles and machinery will be carried out. • Cabins for shovel and dumpers and dust respirators to workmen will be provided. All HEMM cabins will be air-conditioned. • Dust suppression will be done on exposed area using water sprinkler. • Greenbelt development will be taken up all along the haul roads. • Separate storage of top soil for progressive reclamation of dumps and mined out area backfilled with overburden material. • Re-vegetation of mined out area and inactive dumps and • A good housekeeping and proper maintenance will be practiced

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
				which will help in controlling pollution.
	Transportation of overburden	-do-	Adverse	• Use of tarpaulin covered trucks for transportation of coal outside the ML area. • Regular water sprinkling on haul, access roads and all transfer points. • Haul roads to be maintained by surface grading to minimize excessive road surface wearing. • Roads no longer required will be re-vegetated as soon as possible.
	General equipment operations	Increase in SPM, NO_2 and CO concentrations in ambient air.	Adverse	• Regular maintenance of all equipment to minimize particulate matter and gaseous emissions from diesel driven vehicles & equipment. • Use of non-electric initiation and computerized blast design to maximize the explosive energy for fragmentation and minimum fume generation in blast.
	All activities	Excessive exposures to airborne particulate matter.	Adverse	Personal protective equipment (PPE) will be provided to all workers working in dusty environment.
Noise Levels and Ground Vibrations	Drilling and Blasting	High impulsive noise levels, overpressure and ground vibrations impacts and noise related community annoyance	Adverse	➢ **Noise Control Measures** • Controlled blasting with proper spacing, burden and stemming will be maintained; • NONEL will be used for initiation of explosives in blasting • The blasting will be carried out during favorable atmospheric condition and less human activity timings;

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
	Machine and transportation of overburden within the ML area.	Increase in noise levels occupational hazard due to noise exposures and increase in ambient noise levels.	Adverse	• Provision of sound insulated chambers for the workers deployed on machines (HEMM) • Green belt has been developed all along the lease boundaries to attenuate noise. • A thick tree belt will be provided in phased manner around the periphery of the mine to attenuate noise; • Trees will be planted on both sides of haul roads. • Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM; and • Reducing the exposure time of workers to the higher noise levels. • Regular monitoring of Noise level will be carried out. ➢ **Measures to Control Ground Vibration** • Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting. Computerized blast design to be used. • A safe blasting zone is kept around the periphery of the quarry. • Overcharging will be avoided; • The charge per delay will be minimized and preferably more number of delays will be used per blasts;
Water Resources and Quality	Mining will intersect the ground water table.	Depletion of ground water	Adverse	Main source of industrial water will be through borewells and mine water. ➢ **Mine Drainage:** • The garland drains will be developed in advance for each mine

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
	Water required for mine, (dust suppression systems, workshop, domestic facilities and greenbelt development)	Except water demand for drinking & domestic purpose or quarry discharge.	Adverse	stage such that water is collected in these garland drains and discharged properly into settling tanks to settle out suspended solids in the storm water. The clarified water is reused for green belt development. • The overall drainage planning will be done in such a manner that the existing drainage conditions should be maintained to the extent possible, so that run off distribution is not affected. • Working faces will be laid such that the water from the working areas will flow into a sump by gravity from where it will be pumped out to settling ponds. • The pumped out water from mines shall be channelized through storm water drains • Pumps of adequate capacity will be provided at sump to keep these areas dry. • Stone pitching shall be made at suitable places to regulate water flow. • The settling tank and drains are cleaned periodically, especially during monsoons. ➢ **Surface Water Pollution Control Measures** • Retaining walls of adequate dimensions will be provided at the toe of dumps and the unstable OB benches within the mine to prevent wash off from dumps and sliding of material from benches. This will help in preventing silting of water drains/channels;
	Waste water generated from mine &domestic usage at mine.	Depletion of ground water level and soil quality when used untreated water for greenbelt development.	Adverse	

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
				• The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water; • The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes. This will help in preventing wash-off from these slopes; • The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB; ➢ **Ground Water Pollution Control Measures** • The domestic sewage from the canteen and toilets will be routed to septic tanks followed by soak pits. • Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.
Drainage pattern and Hydrogeology	Quarries, stack yards and waste dump	Catchment area inside the mine will be affected.	Adverse	2 Nala passing through the mine and drainage study for the same has been conducted. Hardul Nala have been proposed to be diverted for the project.
Landuse and Soil Characteristics	Mining & allied activities	Existing landuse of the core zone will alter.	Adverse	Following measures will be taken: • Construction/ Installation of diversion drains and settlin ponds • Dust suppression on exposed areas using water tankers and automatic sprinkling systems. • Properly terracing of overburden dump to minimize erosion.

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
		Land degradation due to disposal of waste materials.		• Plantation around service building, along road in and around the safety zone using native plant sapling. • Backfilling & re-handling of external OB dump as per approved Progressive Mine Closure Plan. • Compliance with mine decommissioning plan.
Flora and Fauna	Mine development and operations Mineral Transportation	Displacement of existing fauna. Loss of vegetation	Adverse	• Since, mining operations are in vogue since several decades and no new additional area is required outside the lease during the expansion phase, also the lease area comprises of forest land, the vegetation mainly comprises of trees, bushes, shrubs and creepers. Attempts will be made to avoid any further damage and loss of flora and displacement of fauna. • However, progressive afforestation and green belt development in the ML area has been carried out and shall continue till the life of the mine.
Occupational Health & Safety	Overall Mining& allied activities	Occupational health problems due to dust & noise. Accident probability due to slope failure,	Adverse	• Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drilling etc. • Plantation • Avoid blasting during unfavorable wind & atmospheric conditions • Use of personal protective equipment. • Periodical training of workers • Compliance with DGMS circulars Emergency response plan that includes installation of emergency response equipment to combat events such as fire. All personnel

Environmental Component	Project Activities	Impacts	Adverse / Beneficial	Mitigative Measures
		movement of HEMM, handling of explosives.		required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled. On-site first aid facilities have been provided to employees and are being extended to the local community in emergencies.
Socio-economic Aspects	Land acquisition for mine site	No displacement of people & loss of properties.	-	The project does not envisage any leasing or acquisition of private land. Hence, there won't be any land oustees who have to be resettled or rehabilitated.
	Mining operations	Increase in economic status of local people & in the region due to Increase in employment opportunities both direct and indirect.	Beneficial	The project will provide ample opportunity to the local people for direct and in-direct employment. The proposed expansion may create opportunities for indirect employment in the field of transportation business, vehicle hiring, labours, trading of construction materials, carpenters etc. Corporate Social Responsibility plan has been prepared and the necessary budgetary allocations have been made for the upliftment of villages.

11.5 ANALYSIS OF ALTERNATIVES

We have analyzed all the option for technology alternatives of the proposed project. since it is a mineral specific project therefore analysis of alternative site is not applicable.

11.6 ENVIRONMENTAL MONITORING PROGRAM

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will comply as per conditions. For this the lessee M/s. Stratatech Mineral Resources Private Limited has taken the decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed expansion mine with the objectives mentioned in approved Environment Policy. EMP 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. Regular Monitoring of all the environmental parameters viz., air, water, noise, SE,EB and soil, as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year. The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature. A budget for monitoring of Air, water, Noise and Soil will be Rs. 60 Lakhs per annum which is to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity. A budget of Rs. 1550 Lakhs as a Capital Cost and Rs 282 lakhs for Recurring Cost for plan period has been kept for EMP.

11.7 ADDITIONAL STUDIES

The Public Hearing for the proposed coal mine was held at Senior secondary school Basi Bardah on 04.05.2022 at 11.00 AM as per the EIA Notification dated 14th September 2006, as amended on date by the Ministry of Environment Forest and Climate Change, New Delhi. The date, time and venue of the public hearing was published in Daily Newspapers, on 31.03.2022 in Singruli Bhaskar, & Times city by The Member Secretary, with project details, inviting objection, suggestions, views from the public regarding the proposed project. The main conser during the public hearing was Education development, Livelihood, infrastructure development and Health facalicy.

Carrying capacity, cumulative and ecosystem study has been carried out, considering the impact on the environment due to operation of the eleven mining block which are in a single Cluster i.e. (SULIYARI, DONGRITAL –II PHASE II, MARA II MAHAN, DONGRITAL –II PHASE II, MAHAN, CHHATRASAL, DONGRITAL, PATHPAHARIYA, SARAI EAST, BANDHA, BANDHA NORTH, GURBARA SOUTH, SARAI WEST, GURBARA CENTRAL, PACHAUR). Entire study area has been considered as single environmental unit owing to similar climatic factors for further study. Outcome of the study clearly indicates that levels of all the parameters for Air quality are within the permissible limit, coal blocks will not have any negative impact over ground water in and around the mine site in view of the ground water recharge measures as well as natural recharge phenomenon due to mining activities.

The Hydrological study for estimation of peak flood runoff for Hurdul nala watershed inclusive micro watershed of external area of mine has been also studied.

A Subsidence Study report has been prepared and is attached as **Annexure XVII.**

11.7.1 Carrying Capacity Study

Expert Appraisal Committee (Coal Mining) of Ministry of Environment & Forest in its 15th meeting held on 6th July 2021, recommended Terms of References for EIA/EMP Study of Dhirauli Coal Block of M/s Stratatech Mineral Resources Pvt. Ltd. (SMRPL) District Singrauli, (Madhya Pradesh.

As per condition no. 4 (iv) of the Terms of References, Carrying Capacity study has been mandated.

Carrying capacity study has been carried out, considering the impact on the environment due to operation of the eleven-mining block which are in a single Cluster i.e. (Dhirauli, Amelia North, Amelia, Bandha, Chhatrasal, Dongrital, Mahan, Mara II Mahan, Sindharwa, West of Dongrital and Suliyari). Entire study area has been considered as single environmental unit owing to similar climatic factors for further study. Outcome of the study clearly indicates that levels of all the parameters for Air quality are within the permissible limit, coal blocks will not have any negative impact over ground water in and around the mine site in view of the ground water recharge measures as well as natural recharge phenomenon due to mining activities. Detailed report of carrying capacity study is attached as **Annexure XIII.**

11.7.2 Cumulative Impact Assessment

Cumulative study has been carried out, considering the impact on the environment due to operation of the eleven-mining block which are in a single Cluster i.e. (SULIYARI, DONGRITAL –II PHASE II, MARA II MAHAN, DONGRITAL –II PHASE II, MAHAN, CHHATRASAL, DONGRITAL, PATHPAHARIYA, SARAI EAST, BANDHA, BANDHA NORTH, GURBARA SOUTH, SARAI WEST, GURBARA CENTRAL, PACHAUR).The study has been carried out to calculate the impact on environment due to the cumulative mine and the outcome of the study has interpreted by comparing the baseline with proposed and existing mine activity to define the sustainability of the project.

Outcome of the study clearly indicates that levels of all the parameters for Air quality are within the permissible limit, not also there is no negative impact over ground water in and around the mine site. Detailed report is attached as **Annexure XIV.**

11.7.3 Ecosystem Services

The idea that human society benefits from the environment or nature in various ways, both directly and indirectly, is certainly not a new one, and can be traced back several millennia. But the modern-day concept emerged in the 1970s as ‘environmental services’, was re-named ‘ecosystem services’ in the mid-1980s, and really gained momentum from 1997 onwards. The most popular current definition of ecosystem services (ES) is **‘The functions and products of ecosystems that benefit humans, or yield welfare to society’ (MA 2005).**

Ecosystem Services study has been mandated vide condition no. (iv) of the Terms of References reproduced below-

“Ecosystem services study of the area shall be carried over by project proponent considering the project being in Singrauli, having ~1400 ha of forest land and presence of other coal mining activity and industries.”

The assessment of impacts there were variations across the different phases of the mine, the details report is attached as **Annexure XV.**

The eco-system services include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other non-material benefits.

The most significant ecosystem service dependency of the mine, particularly during operation, is the need to use freshwater resources. Ground water in general occurs under unconfined to semi-confined conditions. The regional hydrogeological setting defined above holds good locally for the Dhirauli Coal Mine. Singrauli Coal Blocks are categorized as Safe by Central ground Water Board, Govt. of India depending upon water table behavior and stage of ground water development.

11.7.4 Wildlife Conservation Plan

Wildlife conservation and management include "the management of wildlife populations in the context of the ecosystem, providing suitable habitat and resource to wildlife for feeding, breeding, roosting, nesting, and movement". It also refers to arrangement of food, water, cover and space to wildlife in a habitat to avoid over-competition for above vital resources among them. Some animals also need a certain amount of territorial space for mating and nesting. Most critical aspect of wildlife conservation is habitat management. Habitat loss presents the greatest threat to wildlife. Habitats management is the foremost need in order to support wildlife. Majority of the developmental activities are leading to reduction or depletion or deterioration of the natural wildlife habitats. It results in certain population of wildlife is put to pressure in their own habitat. Therefore, balance is needed to maintain between management of wildlife habitat and developmental activities. Detailed report is attached as **Annexure V**.

11.7.5 Nala Diversion

The need for Hurdul Nala diversion for external surface runoff water from northern boundary of mine is required for conservation of nonrenewable coal resources. The nala diversion will also require avoiding mine inundation from peak flood runoff. The Hydrological study for estimation of peak flood runoff for Hurdul nala watershed inclusive micro watershed of external area of mine has been also studied.

Overview of the nala diversion is described in Section Chapter 4, Section 4.6.2 and 4.6.3. Detailed hydrology report is attached as **Annexure XVI.**

11.7.6 Subsidence

As per generic ToR condition no. A (XIII) of the Terms of References, Subsidence study has been suggested, it is reproduced below:

Study on subsidence, measures for mitigation/prevention of subsidence, modelling subsidence prediction and its use during mine operation, safety issues.

The study concludes that the depillaring operation will be carried out from 5th year of underground mining and it will continue upto 78 years of mining.

Prediction of subsidence has been carried out by 3D-numerical modelling based on FEM. The subsidence along with peak horizontal tensile strain has been predicated at the end of 20 years, 30 years, 40 years, 60 years, 70 years and 78 years (end of mining) of mining.

The peak predicted subsidence is 0.862 m at end of 20 years of mining, 2.384 m at end of 30 years, 2.391m at end of 40 years, 2.391m at end of 60 years and 2.716 mat end of 78 years of mining respectively. The predicted peak horizontal tensile strain is 4.95 mm/m at the end of 20 years of mining, 13.90 mm/m at the end of 30 years of mining and 17.47 mm/m at end of 78 years of mining. No surface feature is likely to get damaged as there is no important surface structure on surface except the overburden dump.

A Subsidence study report has been prepared and is attached as **Annexure XVII.**

11.7.7 Social Impact Assessment (SIA)

As per additional ToR condition no. A (X) of the Terms of References, SIA study has been suggested, copy of the SIA is attached as **Annexure XII**.

11.8 PROJECT BENEFIT

In addition to the existing workers management will recruit the semi-skilled and unskilled workers from the nearby villages. The project activity and the management will definitely support the local Panchayat and provide another form of assistance for the development of public amenities in this region. The company management will contribute to the Educational Development, Infrastructure Development etc. for the welfare of the villagers. It has proposed to plant 60,30,275 no of trees till the mine clouser. The officers of the State pollution control Board will strictly monitor the compliance of the lease holder in this regard. Other than this social development of the village will be considered as per social requirement of locality.

11.9 ENVIRONMENTAL MANAGEMENT PLAN

As per Above discussion there is no major impact on the environment due to mining except fugitive emission in the form of dust generated during mining of its allied activity. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. In addition to the existing plantation development will be carried out which will be an effective pollution mitigate technique, and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals only occupational from the mine site is the only prevailing source of income for their livelihood. A budget for monitoring of Air, water, Noise and Soil will be Rs. 60 Lakhs per annum which is to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity. A budget of Rs. 1550 Lakhs as a Capital Cost and Rs 282 lakhs for Recurring Cost for plan period has been kept for EMP.

11.10 CONCLUSION

From the baseline study and various above discussions on the probable impacts of all the operational activity, it has been concluded that this project will have more positive impact and will generate the revenue and employment in the area. On the above facts and baseline study, the proposed activity is recommended for the commencement with proper mitigation measure as suggested.

12. DISCLOSURE OF CONSULTANT

12.1 INTRODUCTION

Vardan Environet is a pioneer consulting organisation of India specializing in Environmental Protection, Industrial Pollution Control, Environmental & Mechanical testing and engineering field. Vardan assists clients in comprehensive environmental and engineering services ranging from conceptual planning and preliminary investigation to detailed engineering designs. Local knowledge coupled with national and international experience of proven technical know-how and a strong commitment from our team of experts enables Vardan to assist in solving the clients environmental and engineering problems successfully with competence by first analysing then visualizing and finally utilizing technically strong and dedicated skill.

Vardan has successfully completed a wide range of multi-disciplinary assignments/reports. The company's project formulation requires preliminary and detailed project investigation. The objective of the investigation is to assess the technical viability and cost effectiveness of the proposals vis-à-vis the objective and benefit. Vardan was founded in 2012 and brought together a number of consultancy services with a track record of performance in the environmental Science and Engineering field.

Headquartered in Gurugram, Vardan has prominent presence in Delhi-NCR, Rajasthan, Maharashtra, Madhya Pradesh, West Bengal and Jharkhand. With a man-power of over more than 200 professionals, the organization comprises of senior retired government officers from various departments like Pollution Control Board, Mines & Geology, Civil Services, SAIL, GAIL, NEERI who have decades of experience in the field of environmental management. The team also Comprises of young, dynamic and progress driven Environment, Civil, Mechanical & Chemical engineers, Geologists, GIS experts, Ecologists and Auditors.

Vardan Envirolab, a sister concern provides reliable and precise testing services for a wide range of Environmental, Chemical, Food testing, Microbiology and Building Materials with in-house Equipment/Instruments of advance technology along with experienced technical staff.

12.2 SERVICES OF VARDAN ENVIRONET

- Environmental Impact Assessment (EIA), Environmental Management Plan (EMP), Environmental Compliance, Mining Plan, Social Impact Assessment,

- Testing of water, Waste water, Ambient & work zone air, stack emissions, noise, soil, limestone, dolomite, iron ore, coal, cement, bricks, concrete, blocks, steel bars & wires, Indoor Air Quality monitoring, Sludge.
- Hydrological surveys for ground water clearance.
- Approvals/NOC/Clearances from various Government Authorities.
- Detailed Project report/Feasibility report/Plans/Designs.
- Environmental Quality Monitoring and analysis.
- Geotechnical investigations, Topographical Survey, Planning and Designs.
- EHS, Energy and water Audit, risk/hazard studies and disaster management plan (both onsite and off-site)

12.3 RECOGNITIONS

- Approved by NABET in 21 sectors for preparation of EIA/EMP reports.
- Vardan EnviroLab is recognized by Ministry of Environment, Forest & Climate Change, Govt. of India under Environmental Protection Act 1986.
- Vardan EnviroLab is accredited by NABL in the field of Testing.
- Vardan EnviroLab is certified by OHSAS 18001:2007.
- Vardan EnviroLab is certified by ISO 14001:2015.
- Vardan EnviroLab is certified by ISO 9001:2015.
- Vardan EnviroLab is approved by HSPCB & RSPCB.

12.4 LIST OF SOFTWARE MODELS FOR ENVIRONMENTAL STUDIES

- Multisource Dispersion Model based on Gaussian Model (ISCST3, AERMOD)
- Noise Propagation Model (Dhawani Pro)
- Risk and Hazard studies through Aloha model
- GIS mapping through Arc GIS, watershed & area drainage mapping, cadastral mapping, DGPS survey, 3D modelling, Urban/Rural area planning & management and Digital Elevation Model.
- Transect and line intercepts for Ecology and Biodiversity studies
- Extrapolative method & Intuitive technique (Delphi technique) in socio-economic assessment.

12.5 KEY MANAGEMENT PERSONNEL OF VARDAN

Table 12.1: Key Management Personnel of Vardan

S. No.	Name	Designation	Experience (Years)
1.	R.S. Yadav	Managing Director	31
2.	Roopika Sharma	CEO	11
3.	Aman Sharma	Partner	13

S. No.	Name	Designation	Experience (Years)
4.	Anshul Yadav	Partner	7
5.	K.M. Khare	EIA Coordinator	38
6.	Shurbhi Makhwana	EIA Coordinator	7
7.	Dr. Niteesh Kumar	General Manager-Jaipur	12

12.6 EMINENT CLIENTELE OF VARDAN

Vardan has executed around 1000 projects across all over India in a short span of time covering both public and private sectors. Following are some of our reputed clients.

Indian Oil, HPCL, NTPC, NHPC, BPCL, Delhi Metro, GAIL, GPIL, SAIL, NHAI, APCPL, RITES, MPPGCL, Indian Railways, JK Lakshmi Cement Ltd., L&T, Tata, Adani, Hero, Honda, HCL, Panasonic, Jaypee group, DLF, Godrej, Haldiram's, Unitech, JBM, Trident hotels, Lanco, Aditya Birla, Mangalam cement, JW Marriot, Eros group and many others**.**

12.7 CERTIFICATIONS OF VARDAN

QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

NABET

National Accreditation Board for Education and Training

NABET

Certificate of Accreditation

Vardan Environet

Plot No. 82-A, Sector 5, IMT Manesar, Gurgaon-122051, Haryana

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/ underground mining	1	1 (a) (i)	A
2	Offshore & Onshore Oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	B
5	Coal washeries	6	2 (a)	A
6	Mineral beneficiation	7	2 (b)	A
7	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	A
8	Cement Plants	9	3(b)	A
9	Coke oven plants	11	4 (b)	A
10	Synthetic organic chemicals industry	21	5 (f)	A
11	Distilleries	22	5 (g)	A
12	Sugar Industry	25	5 (j)	B
13	Oil & gas transportation, passing through national parks/ sanctuaries/coral reefs /ecologically sensitive Areas including LNG terminal	27	6 (a)	A
14	Isolated storage & handling of hazardous chemicals	28	-	B
15	Airports	29	7 (a)	A
16	Bio-medical waste treatment facilities	32A	7 (d a)	B
17	Highways	34	7 (f)	A
18	Common effluent treatment plants (CETPs)	36	7 (h)	B
19	Common municipal solid waste management facility (CMSWMF)	37	7 (i)	B
20	Building and construction projects	38	8 (a)	B
21	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Mar. 16, 2022 posted on QCI-NABET website

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2311 dated Apr.13, 2022. The accreditation needs to be renewed before the expiry date by Vardan Environet, Gurgaon following due process of assessment.

Sr. Director, NABET
Dated: Apr. 13, 2022

Certificate No.
NABET/EIA/2023/SA 0158

Valid up to
May. 05, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

12.8 ENVIRONMENTAL MONITORING AND ANALYSIS LABORATORY

Environmental Baseline data generation has been carried out by NABL Accredited laboratory Vimta Labs Limited, Hyderabad. The laboratory has also been accorded recognition as Environment Laboratory by MoEF &CC. NABL Accreditation Certificate of Vimta labs limited is given below. Validity of the certificate was extended by the NABL due to Covid Pandemic.,



National Accreditation Board for Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

NABL

QCI

CERTIFICATE OF ACCREDITATION

VIMTA LABS LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

LIFE SCIENCES FACILITY, PLOT NO. 5,M.N.PARK, GENOME VALLEY, SHAMIRPET, HYDERABAD, MEDCHAL, TELANGANA, INDIA

in the field of

TESTING

Certificate Number: TC-5418

Issue Date: 31/03/2019 Valid Until: 30/03/2021

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer