

# ENVIRONMENTAL IMPACT ASSESSMENT

FOR

Takli-Jena-Bellora (North) & Takli-Jena-Bellora (South) Opencast cum Underground Coal Mine of overall capacity 1.5 MTPA in total area of 936 Ha (OC-236.9 Ha ; UG-699.10 Ha) of M/s Aurobindo Realty & Infrastructure Pvt Ltd (ARIPL) in Village Bellora, Tehsil Bhadravati, District Chandrapur, Maharashtra

## EXECUTIVE SUMMARY

**Environmental Consultant:**



Vimta Labs Ltd.

Hyderabad-500051, Telangana State

(QCI/ NABET Accredited EIA Consultant Organization.

Sr.No.145 as on 5<sup>th</sup> January 2022

NABL Accredited & ISO 17025 Certified and MoEF&CC

Recognized Laboratory)




(Approved Consultant)

**Project Proponent:**



M/s. AUROBINDO REALTY &  
INFRASTRUCTURE PVT LTD,  
1-121/1, Survey Nos. 66, (Part),  
Miyapur,  
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Telangana – 500049,  
India.

March, 2022

 <p><b>aurobindo</b> REALTY INFUSING LIFE TO SPACES</p>	<p><b>Environmental Impact Assessment for Takli-Jena-Bellora (North) &amp; Takli-Jena-Bellora (South) Opencast cum Underground Coal Mine of overall capacity 1.5 MTPA in total area of 936 Ha (OC-236.9 Ha; UG - 699.10 Ha) of M/s Aurobindo Realty &amp; Infrastructure Pvt Ltd (ARIPL) in village Bellora, Tehsil Bhadravati, District Chandrapur Maharashtra</b></p>
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## 1.0 INTRODUCTION

Takli Jena Bellora (North) and Takli Jena Bellora (South) coal block is situated in Wardha coalfields of Maharashtra. The Mine was allotted to M/s Aurobindo Realty & Infrastructure Private Limited (ARIPL) in 2020-21 auction process initiated by Govt of India. After fulfilling all vesting conditions as mentioned in the Coal Mine Development and Production Agreement, the office of the nominated authority, MoC, GoI has issued the vesting order to M/S Aurobindo Realty and Infrastructure Private Limited with effect from 03<sup>rd</sup> March 2021 vide vesting order No. 104/19/2020-NA dated 03<sup>rd</sup> March 2021.

The Takli Jena Bellora (North) and Takli Jena Bellora (South) coal mine is proposed to produce a rated production capacity of 1.5 MTPA along with two nos. of 200 TPH mobile crushing units in ML area of 936 ha. The total capital investment is Rs. 655.2 crores which include mine development including other utility facilities.

As per Environmental Impact Assessment (EIA) Notification dated 14<sup>th</sup> September 2006, proposed project falls under schedule Mining of Minerals- '1(a)' of category- 'A' requires prior Environmental Clearance (EC) to be obtained from Ministry of Environment, Forest & Climate Change (MoEF&CC).

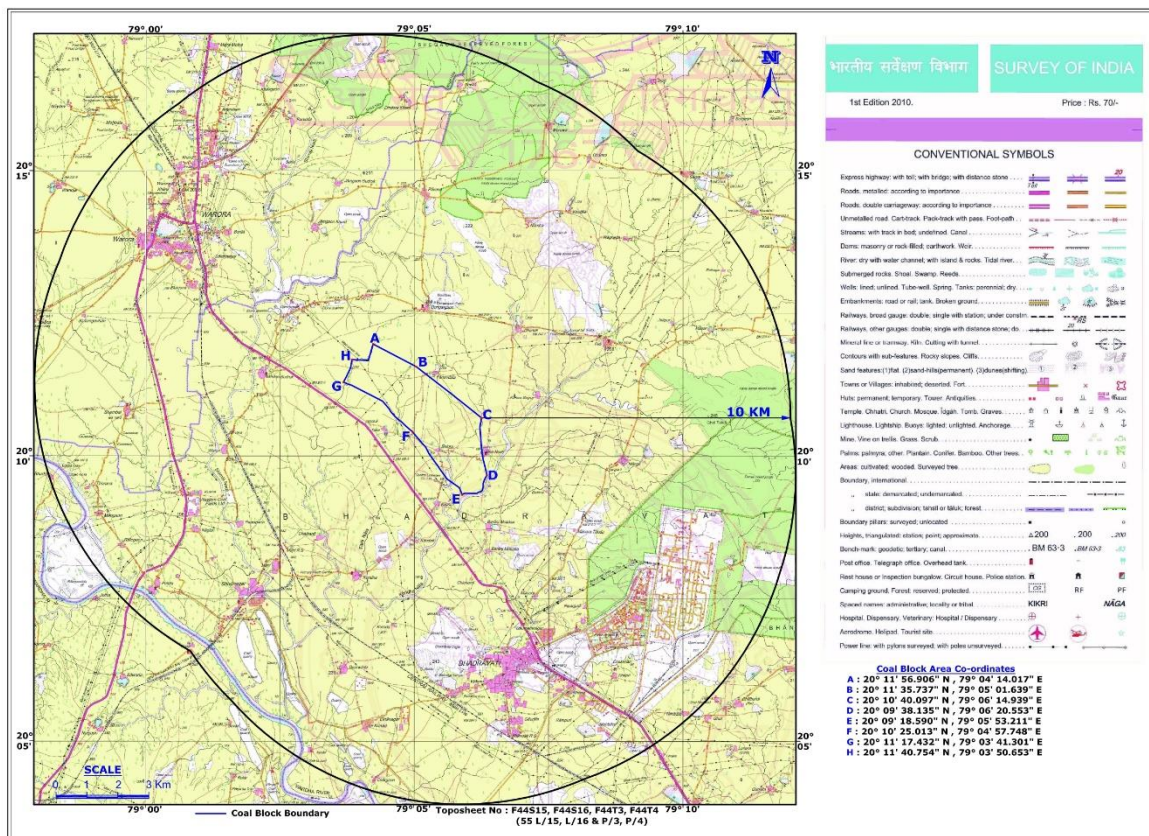
The TOR application was submitted to MoEF&CC on 10<sup>th</sup> August 2021 and same was reviewed by the 18<sup>th</sup> Expert Appraisal Committee (Coal mining sector) in meeting held during 02<sup>nd</sup> September 2021 to prescribe Terms of Reference (TORs) for the preparation of EIA/EMP report. TOR has been issued by MoEF&CC vide letter reference F.No. J-11015/62/2021-IA. II (M) dated 04<sup>th</sup> October 2021 further which amendment in TOR was requested and the revised TOR has been issued by MoEF&CC vide letter reference F.No. J-11015/62/2021-IA. II (M) dated 28<sup>th</sup> March 2022.

### 1.1 Environmental Setting


The key geo-physical aspects related to the project environmental settings are highlighted below:

- The encompassing geographical coordinate of the project area comprise of the coal mine of mine lease area 936 ha lie within Latitude: 20°09'16" N - 20°11'57" N, Longitude: 79°3'41" E - 79°6'21" E;
- Land use of ML area includes Forest: 0 ha and Non-Forest: 936 ha;
- Two seasonal nalas are passing in ML area Bellora nala is passing through the southern side and other one Takli Nala is passing through Northern side of ML area. Konda Nala (Adjacent) runs along the southern periphery of the block.

- Pandwadala, Takli, Bellora, Jena Niwali, Asthi Rith, Gotala Rith, Govardip Rith, Khandala Rith, Kiloni, Dongargaon Khardi and Somnala are the villages located within ML area;
- The SH-264 passes at 0.7 km SW and SH-233 passes at 5.8 km W of the project site;
- Nearest major railway stations is Majri RS 12 km;
- There are 3 RFs identified within the study area of the project site (Bhandak R.F, Salori R.F, Shegaon R.F);
- There are no National parks/Wildlife sanctuaries within the 10 km radius of the project site;
- Tadoba Andhari Tiger Reserve (TATR) is located at about 19.6 km from the mine lease area in NE direction;



**FIGURE-1**  
**STUDY AREA MAP OF 10 KM RADIUS FROM TAKLI JENA BELLORA MINE LEASE AREA**

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## **2.0 PROJECT DESCRIPTION**

### Salient Features of the Mine

- The mine will be operated by fully mechanized open cast cum underground method;
- Life of the mine is 34 years (O.C – 18 years; UG – 34 Years)
- The total water required for the project is estimated 1580 KLD of industrial water including 94.03 KLD of potable water
- Total Net Geological reserves: 92.32 MT, Mineable reserves: 63.56 MT. Percentage of Extraction: 41.13 %
- Total Manpower requirement is about 1130

### **Technology and Process Description**

About 132.18ha land will be excavated during mining operation and 80.60ha will be backfilled in the excavation area post mining. Out of total 936ha, plantation will be done in 283.84ha, water body will be in 1.56ha. 643.60ha of the land will be undisturbed as major part of mining will be proposed by underground mining method. Total 26.32 Ha of land will be allotted for Greenbelt along with safety zone that will be developed along the road, office building and in reclaimed OB dump and will be further strengthened.

## **3.0 DESCRIPTION OF THE ENVIRONMENT**

The baseline data monitoring studies have been carried out for three months covering 1<sup>st</sup> October 2021 to 31<sup>st</sup> December 2021 represents post-monsoon season.


### **3.1 Land Use**

The preparation of landuse/land cover thematic map for this project is by use of monoscopic visual interpretation of IRS-RS2A Geo-Coded FCC on LISS-IV satellite image the 10 km study area of the project is presented below:

- Built-up-land: The total built-up-land constitutes 9.7% of total study area.
- Forest Land: 5.1% of land is occupied by Scrub forest land
- Agricultural land: The part of the study area is occupied by agricultural land which constitutes about 58.3%.
- Waste Land: 18.8% of land is waste land
- Water Body: 8.1% of land is covered by water bodies.

### **3.2 Soil Quality**

Eight soil samples were collected and analyzed in and around the mine lease area and 10 km study area to assess the present soil quality of the region. The

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textural classes of all the soil samples range from clay loam to sandy clay (fine texture). The pH value ranges between 7.11 to 7.86 indicating soils are neutral to moderately alkaline and the EC ranges between 55 to 296  $\mu\text{S}/\text{cm}$  and are below the limits to be called as saline and hence the soils are normal for crop growth.

The samples contain 0.35 to 0.48% organic carbon which ranges as less to medium and 0.60 to 0.83% organic matter. As per crop requirements the soils are low to medium in organic matter content. Similarly, the available nitrogen in the samples ranges between 84.6 to 132.4 kg/ha showing low to good nitrogen content for crop growth. The available phosphorus content ranges between 121.6 to 241.6 kg/ha and falls under more than sufficient category for crop growth and the available potassium ranges between 365.4 to 511.4 kg/ha and is more than sufficient for crop growth.

Also, the concentration of heavy metals like Cr, Pb, Ni, Cd, As, Hg etc. are found to be within normal or permissible limits indicating that there is no heavy metal contamination in the soil.

### 3.3 Meteorology

The minimum and maximum temperatures recorded near site during post monsoon (October 2021 to December 2021) was 12.8 °C and 36.2 °C and the relative humidity observed at the site range between 42 – 69% during the study period.

The site-specific pre-dominant winds during Post-monsoon season the predominant winds are mostly from NE (21.3 %), ENE (14.5 %) & ESE (9.8 %) direction while 8.2% calm condition was observed during the monitoring period. Wind pattern of the study area is broadly in comparison with the IMD data. The data generated at project site when compared with the data recorded at IMD, it is observed that the data generated at the site is broadly in comparison with regional meteorology, except for minor variations.

### 3.4 Ambient Air Quality


Ambient Air Quality Monitoring (AAQM) was carried out at 10 locations with a frequency of two days per week for three months during post monsoon (October to December 2021) as per CPCB standards.

**Particulate Matter (PM<sub>2.5</sub>):** The minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 15.1  $\mu\text{g}/\text{m}^3$  and 31.3  $\mu\text{g}/\text{m}^3$  respectively.

**Particulate Matter (PM<sub>10</sub>):** The minimum and maximum concentrations for PM<sub>10</sub> were recorded as 29.9  $\mu\text{g}/\text{m}^3$  and 61.2  $\mu\text{g}/\text{m}^3$  respectively.

**Sulphur Dioxide (SO<sub>2</sub>):** The minimum and maximum SO<sub>2</sub> concentrations were recorded as 12.4  $\mu\text{g}/\text{m}^3$  and 19.5  $\mu\text{g}/\text{m}^3$ .

**Nitrogen dioxide (NO<sub>2</sub>):** The minimum and maximum NO<sub>2</sub> concentrations were recorded as 16.2  $\mu\text{g}/\text{m}^3$  and 25.7  $\mu\text{g}/\text{m}^3$ .

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**Carbon Monoxide (CO):** The minimum and maximum CO concentrations were recorded as 190 µg/m<sup>3</sup> and 431 µg/m<sup>3</sup>.

**Ozone (O<sub>3</sub>):** The minimum and maximum O<sub>3</sub> concentrations were recorded as 3.9 µg/m<sup>3</sup> and 9.3 µg/m<sup>3</sup>.

*Lead (Pb), Ammonia (NH<sub>3</sub>), Benzene (C<sub>6</sub>H<sub>6</sub>), BAP, Arsenic (As), Nickel values are observed to be well within permissible limits*

The ambient air quality has been observed to be within permissible limits.

### 3.5 Water Quality


Nine water samples consisting of bore wells and dug wells (ground water sources) and seven surface water sources covering 10 km radial distance from the mine lease boundary were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the effect of operations from mine and other activities on surface and ground water quality.

#### **Ground Water Quality**

- The analysis results of ground water samples showed the pH in range of 7.25-7.83. The maximum value was observed at ML area (GW1) and the minimum value observed at Dhanoli (GW3) whereas the prescribed limit is 6.5 to 8.5.
- Electrical conductivity of the samples ranged from 954-3190 µS/cm.
- The total dissolved solids of the samples ranged from 589.80 -1935.40 mg/l. The maximum value was observed at Dhanoli (GW3) and the minimum value observed at Kandoli (GW5) whereas the prescribed limit of 500-2000 mg/l.
- The total hardness of the samples ranged from 296.20-582 mg/l. The maximum TDS was observed at Dhanoli (GW3) and whereas the minimum value observed at Kandoli (GW5). The TDS values are well within the prescribed limit of 600 mg/l.
- Range of Chlorides concentrations at all the locations 102.46-622.30 mg/l whereas the prescribed limit is 250 - 1000 mg/l.
- Fluoride concentrations are ranging in between 0.8 – 1.3 mg/l and whereas the prescribed limit is 1.0 - 1.5 mg/l.
- All other metal concentrations are observed to be below detectable limits.

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

#### ▪ **Surface Water Quality**

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- The analysis results of water samples indicate that the pH value was observed to be 7.56 – 7.99.
- The dissolved oxygen was observed about 5.4 mg/l – 6.0 mg/l.
- Total hardness was observed in the range of 66.6 mg/l – 234.4 mg/l.
- Chloride concentration were found to be in the range of 21.8 mg/l - 81.5 mg/l which are within the prescribed limits only.
- Fluoride concentration was found to be 0.6 - 0.9 mg/l at all the locations.

The surface water quality does not indicate any external industrial contamination in the study area.

### 3.6 Noise Levels

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. The noise levels at each of the locations were recorded for 24 hours for November 2021.

#### **a) Day Time Noise Levels ( $L_{day}$ )**

The noise level at all of the sampling locations ranged from 44.8 dB(A)– 56.7 dB(A), with the maximum 56.7 dB(A) was recorded at Bhadravati Town (N6) and the minimum 44.8 dB(A) was recorded at Pandvala village (N3).

#### **b) Night Time Noise Levels ( $L_{night}$ )**


The noise level at all of the sampling locations ranged from 41.8 – 53.8 dB (A), with the maximum 53.8 dB(A) was recorded at Bhadravati Town (N6) and the minimum 41.8 dB(A) was recorded at Pandvala village (N3).

### 3.7 Ecological Environment

From the primary survey and as per forest department records and review of literature, there are no wildlife sanctuaries, national park, biosphere reserves in the study area of 10 km radius.

The flora in the study area is diversified and the ecological dominance also varied from place to place. *Abrus precatorius*, *Acacia nilotica*, *Calotropis gigantea*, *Carissa spinarum*, *Erythrina suberosa*, *Hemidemus indicus*, *Phoenix Sylvestirs*, *Gardenia turgida*, *Haldina cordifolia*, *Jasminum multiflorum*, *Nyctanthes arbor-tristis*, *Pongamia pinnata* are commonly observed.

The fauna of the study area includes Common mongoose, langur, jackal, squirrel, Ashy Prinia, Common cuckoo, Cattle egret, Parakeet, crow, Indian peacock, Greater coucal, lizards and skinks. Snakes were rarely spotted. Among the frogs, common toad was found as mostly present in human environments. No rare or endemic or threatened (RET) species or Schedule I species were noticed during the survey, other than listed below.

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Among the vertebrate fauna of the mine lease (core area), Common monitor lizard (*Varanus bengalensis*) and Peacock (*Pavo cristatus*) are in Schedule I of the Wildlife (Protection) Act.

However, in case of the buffer zone of the study area, a good number of RET and Schedule I species have spilled over from the TATR. Species including Tiger, Leopard, Wolf, Sloth Bear and a few large Mammals were reported from areas around the forests of the buffer zone. They seem to have spilled over from the TATR. There is no chance of conserving them in unprotected areas of the mine lease or its buffer zone and rest of the species belong to Schedule-II, III, IV and V of the Indian Wildlife (Protection) Act, 1972.

### 3.8 Social Environment

As per 2011 census, the study area consisted of 179274 population that has a household size of 4.23. The density of population reveals that the study area has an overall density of 406 persons per km<sup>2</sup> (PP km<sup>2</sup>). The population density within the range of 0-03 kms is 202 and for 3-7 kms is 459. The density of population of Chandrapur district is 193 and Maharashtra state's density of population is 365.

The total work participation in the project study area is 38.32% and the non-workers constitute 61.48% of the total population respectively. The work participation of the study area is less than the Chandrapur district (48.00%). The distribution of total workers by occupation indicates that the non-workers are the predominant working population in the study area. The main workers to the total workers are 84.56% and the marginal workers constitute to 15.44% to the total workers.

## 4.0 **ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

### 4.1 Impact on Soil Quality


The coal mine developmental activities will result in loss of topsoil to some extent. This topsoil requires proper handling like separate stacking so that, it can be used for green belt development. Apart from this, no significant adverse impact on soil in the surrounding area is anticipated during site preparation.

### 4.2 Impact on Topography and Drainage Pattern

Topography of Takli Jena Bellora (North) and Takli Jena Bellora (South) has a mildly undulating topography with altitudes varying between 192 m and 207 m above MSL. General slope of the ground is towards Konda nallah which is a seasonal tributary of Wardha River and flows in South-Westerly direction at the southern end of the block. The HFL of Konda nallah is 192.5 m recorded in 1994 on the bridge over the nallah crossing SH 264.

Subsidence due to total extraction of coal may cause changes in topography and drainage by developing micro basins, subsidence fractures, ridges, pot holes etc. This may alter the drainage of the area in micro level.



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Care will be taken during mining activity to leave enough pillars in underground as barriers below main drainage/water body to avoid any damage to surface water bodies.

#### 4.3 Impact on Land Use

The mining is proposed to be carried out by combination of both Opencast and Underground mining as per schedule mentioned in the approved mine plan.

After the proposed changes during mining, the changed land uses shall be subjected to progressive reclamation and also during the post mining period as final mine closure activities. The post-mining land-use at the end of mine life covers 283.84 ha for Plantation, 1.56 ha for waterbody, 7.00 ha for Public use, 643.60 ha will be undisturbed.

##### *Mine Closure and Land Reclamation*

Land degradation is one of the major adverse outcomes of mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation strategy is not adopted. This is carried out in two phases:

1. Physical /technical reclamation; and
2. Biological reclamation.

##### *Physical/Technical Reclamation*

Two external dumps are planned one (dump 2) in the eastern side of the pit and other (dump 1) in the southeastern side of the pit in sector 9. Before dumping protective bunds of height of at least 3 m will be formed at regular intervals at the ground. After protective bunds, drains will be cut. Drains are to be provided with silt traps. Water will drain to the settling ponds.


After due treatment, it will be let out into the course of the diverted nallah. Water will be tested for the norms stipulated by CPCB before letting out into the nallah. After completion of the external dumping in Dump 1, technical reclamation activity will commence from year 3.

The dump will be terraced grass mat, either coir or Jute mat will be laid.

##### *Biological Reclamation*

For successful biological reclamation of the area, preference will be given to native species and mixed culture. The species will be selected from the following groups for quick reclamation.

Nitrogen fixing tree species for fuel wood, timber and fodder, Fruit bearing tree species, Tree species with dense foliage for shade and Flowering and ornamental tree species.

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### *Topsoil Management*

Topsoil is planned to be stored in designated top soil dumps which will have a height of 3m. Two such dumps in Takli Jena Bellora (North) & Takli Jena Bellora (South) coal mine are proposed, one in Sector 2 (in the northern part of the pit) and another in southern part of the proposed pit. Provision of slope monitoring radar will be explored during actual operation of the mine. Top soil from both the north and south pit will be used for reclamation purpose and excess will be stacked separately for reclamation purpose

### *Over Burden management*

Blasted OB will be carried from face by dumpers to OB dumps both in pit and out of pit. The material will be disposed in external dumps during the initial years (5 Years) because of lack of sufficient space inside the mine.

As the mine widens and deepens, backfilling of the decoaled area will be done and gradually increased depending on the layout of in-pit haul roads (which will have to be kept clear from the toe of the dumps) and location of main sump which will have to be protected from excessive accumulation of silt.

External dumping space is proposed to accommodate 16.43 Mbcum of OB which will be stored on the eastern part of the open pit in sector 9. The average stripping ratio of coal to overburden is 6.73 cum/t.


### *Mitigation Measures:*

Provision of garland drains all around the dump base shall be made. A retaining wall will be erected around the periphery of the dump to arrest the washed fines. The top of dump as well as slope surface would be vegetated for stability. This would prevent erosion as well as dust generation.

## 4.4 Impact on Air Quality

Opencast mining operations with two nos. of 200TPH crusher contribute towards air pollution in two ways: addition of gaseous pollutants to the atmosphere and the dust particles. The gaseous pollutants include NO<sub>2</sub>, SO<sub>2</sub> and CO. The modelling results indicate that the maximum incremental concentration of PM<sub>10</sub> without controlled measures will be about 38.64 µg/m<sup>3</sup> within the Takli Jena Bellora mine lease area and with controlled measures the predicted air emission levels are observed to be about 15.5 µg/m<sup>3</sup>.

Similarly, that the maximum incremental concentration of PM<sub>2.5</sub> without controlled measures will be about 11.60 µg/m<sup>3</sup> within the Takli Jena Bellora mine lease area and with controlled measures the predicted air emission levels are observed to be about 6.96 µg/m<sup>3</sup>.

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The resultant GLC concentration of PM<sub>10</sub> & PM<sub>2.5</sub> were found to be 76.70 µg/m<sup>3</sup> and 38.26 µg/m<sup>3</sup> occurring within the mine site. The predicted incremental concentrations (Max GLC's) when superimposed over the existing baseline concentrations, the resultant concentrations are observed to be within the NAAQ's Standards.

*Mitigation Measures:*

Dust suppression system in the form of water jets will be installed in all the drill machines for reduction in dust generation during drilling, dry fog & chem-jet systems in mobile crusher for dust suppression, suitable Chemical will be proposed which is of an organic-based surfactant and tackifier which is mixed with water and used for dust suppression on Haul Roads, good housekeeping and proper maintenance practice will be further helping in controlling pollution;

**4.5 Noise Levels and Ground Vibrations**

With the mining operations, due to machinery, drilling and blasting for mine development, excavation, transportation and crushing of ore, it is imperative that noise levels would increase. Mathematical noise modeling has been carried out and the high noise levels are confined to the mining areas only. The nearby villages and other community areas are not likely to have any major adverse impact. The incremental noise levels at villages located within and nearby the mine lease area varies from 52 dB (A) to 61.8 dB (A).

Mitigation Measures

The green cover/proposed green belt all around the mine lease area act as noise barrier and keep the community noise levels with the tolerable limits.


**4.6 Impact on Surface Water and Groundwater Quality**

*i.) Impact on Water Resources*

Total requirement of water is estimated as 1674.43 KLD for the block (Potable-94.03 KLD; Industrial-1580.4 KLD).

Water Source: Borewells/Ground water/Rainfall has been assumed to be the source of potable water requirement. For all industrial usage of water, the treated mine water pumped out from the sumps will be used after treatment of suspended solids.

In usual condition of the mining, this mine will operate in a "Zero Discharge" Scenario. The mine pit accumulated water will be pumped and stored in the central sump for workshop, sprinkling and plantation use. Water discharge may happen only in the rainy season due to sudden inrush of storm water.

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The following measures will substantiate the water requirement of the project and enhance ground water recharge to reduce the impact of lowering of water table due to mine dewatering in the vicinity and downstream:

Rainwater harvesting from infrastructure, dumps and backfilled area, Settling cum Harvesting ponds, recharge wells and water collection sumps in mine pits

#### *Mitigation Measures*

This mine will work on zero effluent discharge and Garland drains will be provided around the pit to prevent the entry of rainwater into the mining pit;

#### ii.) Impact on Drawing Surface/Ground Water Resources

##### Surface Water

The surface run-off during monsoon is drained by a number of small limbs of Konda nallah which flows in the south-eastern part of the block while the north-western part of the block is drained by Takli nallah joining Konda nallah towards south of the ML area. These nallahs dry up after monsoon.


Drainage courses of Takli nallah draining the western part will not be disturbed due to open cast or other mining activities. The Bellora Nallah flowing across the block is proposed to be diverted near the eastern end of the pit and will be connected to the Konda Nallah as a protection against danger of inundation from surface water. The diversion is proposed at sector 9 near the culvert between both the external dumps. It will be diverted around the perimeter of the external dump 2 and will be taken out of the boundary near the southern end of the pit. An area of 1.56 ha has been proposed for nallah diversion and necessary permission for diversion is awaited. The entire nallah section within the ML area will be protected with a vegetative corridor of 5 - 10 m.

The amount of rainfall available from the roof tops and open area in infrastructure area estimated using average rainfall of 1,248.10 mm as per IMD data and run-off coefficients suggested by Central Ground Water Authority (CGWA) is 87,925.52 m<sup>3</sup>

Considering only 80% of the run-off available volume after evaporation, spillage and first flush wastage, 70,340.42 m<sup>3</sup> (0.070 MCM) is the run-off volume estimated as available for project activities. The capacity of storage structure for the heaviest rainfall received in 24 hours (400.00 mm) shall be 28,200 m<sup>3</sup> whereas for the rainfall received during the wettest month of July (363.70 mm) shall be 26,000 m<sup>3</sup>.

##### Ground Water

Agriculture practiced in and around ML area is water intensive and dependent on ground water through bore wells. The number of bore wells has drastically increased during last three decades resulting in water level decline around the

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areas having dense bore well numbers. Associated fertilizer and pesticide application in heavy doses further deteriorated ground water quality.

Though hydrographs of the water levels in the study area for last 10 years show a marginal increasing trend, as per CGWBs long term water level trend, in major part of Chandrapur district, falling trend is observed, which may be due to poor rainfall (CGWB publication, 2013).

As water and rock are removed from mines, the support they give to underground features is gone. Sinkholes can develop, where the roofs of underground openings are weakened or collapse. Collapse can be gradual or sudden. Although natural sinkholes develop over time, man-made ones predominate in mine areas. Sinkhole formation can cease after mine dewatering is stopped and the water table is allowed to return to normal levels.

The mine working area including protective bund during 5th year and at the conceptual stage will be 63.29 ha and 132.18 ha up to a depth of 109.00 m and 130.00 m respectively. Backfilling will be done in 80.60 ha leaving 51.58 ha of void/water reservoir at the conceptual stage.


The radius of influence from the center of mine pit due to mine seepage dewatering ranges from 797.48 m during 1st year to 1089.93 m during 18th year (Stage 6). The distance of influence from the mine pit wall will be from 424.08 m during 1<sup>st</sup> year to 870.20 m during 18<sup>th</sup> year (Stage 6).

#### 4.7 Flora and Fauna

The Takli Jena Bellora coal mining involves 893 ha of Agricultural land area. Hence, there is bound to be loss of three types of wild vegetation in the core area. The weed flora associated with dry or rainfed crops like Cotton, Red gram, Sunflower, Chillies etc., the weeds associated paddy fields and the wild vegetation in wastelands including residential areas. The landscape is going to undergo drastic change.

However, there will be no loss of any RET flora or fauna on account of both vertical and horizontal development of mining in view of implementation of site-specific wildlife plan. There is no wildlife corridor in the project area. Predator-prey relationships may not be considerably altered. But there shall be a substantial local decline of agricultural area, loss of fodder and firewood, which will be compensated as per norms of statutory clearances.

The list of flora and fauna, distance of project from protected areas and site-specific wildlife conservation plan along with financial outlay are being submitted along with the EIA report. 26.32 ha greenbelt will be developed in the backfilled area, bench plantation, safety zone along both sides of the road. Greenbelt will be developed in non-operating areas. Shrubs and trees will be planted in encircling rows around the project site.

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#### 4.9 Socio-Economic Aspects

The proposed mine will result in improvement of infrastructure as well as overall socio-economic development in the area. The people residing in the nearby areas will be benefited directly and or indirectly due to the Takli Jena Bellora (North) & Takli Jena Bellora (South) opencast cum underground coal mine. The total employment will be 1130 out of which for common operations the requirement of man power will be 199 and for department operations the employment would be 931. Direct employment opportunities will also be generated in project, besides indirect and ancillary employment opportunities.

#### 4.10 Occupational Safety and Health

All occupational health and safety issues will be managed as per the "Quality, Environment and Occupational Health & Safety Management System Policy" of ARIPL.

### 5.0 **ENVIRONMENTAL MONITORING PROGRAMME**

A detailed post project monitoring in respect of air, water, soil, land use, occupational noise, etc. to assess the changes has been evolved covering various phases of project advancement.

### 6.0 **ADDITIONAL STUDIES**


#### **Socio-Economic & Rehabilitation and Resettlement Study**

The Takli Jena Bellora (North) & Takli Jena Bellora (South) coal mine project of M/S ARIPL comprises of total 11 villages namely Pandwadala, Takli, Bellora, Jena Niwali, Asthi Rith, Gotala Rith, Govardip Rith, Khandala Rith, Kiloni, Dongargaon Khardi and Somnala. Out of these villages Bellora village requires rehabilitation and resettlement as opencast mining activity will take place. The project will acquire 271.58 Ha of private land from the Bellora village. Total PAFs 822 (Out of 822 PAFs, 25 only Homestead affected PAFs, 85 homesteads along with agriculture lands/waste lands affected PAFs from Bellora village of Takli panchayat) of Bellora village will be affected as either their lands or houses will be acquired for the mining. The compensation and other R&R benefits will be fixed as per the Right to Fair Compensation and Transparency in land acquisition, Rehabilitation and Resettlement Act, 2013 (RFCT LARR Act, 2013).

M/s ARIPL is committed to help the population displaced for execution of its projects and has been making efforts to improve the Socio-economic status of project Affected Families (PAFs). In line with its social objectives, the company has focused on effective Rehabilitation and Resettlement (R&R) of PAPs and also on Community Development (CD) works, in and around its projects.

#### **Wildlife conservation Plan**

Total mine lease area of 936 ha out of which 893 ha is of agricultural land. There are no eco-sensitive areas such as the Biosphere Reserves, National Parks,

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Wildlife Sanctuaries, Ramsar wetlands within 10 km from the project site. There are no Tiger or Elephant corridors within the 10 km radius. The Tadoba- Andhari Tiger Reserve (TATR) is located at about 19.6 km from the mine lease area in NE direction which is yet to be notified.

Blackbuck, Indian Gaur / Bison, Indian Wolf, Sloth Bear, Mouse Deer, Leopard, Tiger, Four Horned Antelope, Shikra, Peacock, Rock Python and Bengal Monitor Lizard belonging to Schedule I of the Wildlife (Protection) Act, 1972 were reported in the study area wherein Bengal Monitor Lizard and Peacock are the Schedule I species found in the core zone.

### **Land Subsidence Study**

Numerical simulation study is carried out using Finite element analysis. Finite element method is an effective tool for the analysis of mechanical and structural components of machinery. This method is now adopted in all branches of engineering where complex structures, fluid dynamics problems, mine and tunnel structures and similar problems to be addressed.

From the findings the estimated properties of in-situ sandstone and shale overburden material, it was seen that minimalistic subsidence is observed in all the simulation scenarios. The maximum surface subsidence of 0.78mm was observed during the slicing operation of shallow 120m deep pillars with 5.8m gallery width. In most of the other simulation cases, the effective surface subsidence was below 0.5mm.


## **7.0 PROJECT BENEFITS**

Large number of populations of study area will be employed in mining operations including tribal people either directly or indirectly earning their livelihood. Upcoming project shall further add to their social and economic up-liftment in terms of indirect income generation opportunities. CSR activities run by ARIPL will further strengthen in various sectors which include:

- Rural/ Community Development;
- Health & Nutrition;
- Water & Sanitation;
- Livelihood & Skill Development; and
- Education & Sports;

ARIPL has proposed Rs. 436 Lakhs under CSR for 2022-23. As per the new notification, Office Memorandum No F.No.22-65/2017-IA.III dated 30<sup>th</sup> September, 2020, which supersedes the Previous Office Memorandum dated 1<sup>st</sup> May 2018, public hearing issues will be addressed and action plan along with budget allocation will be made.

## **8.0 ENVIRONMENT MANAGEMENT PLAN**

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The mine will be supervised and controlled by mines manager supported by adequate team of technically and statutorily qualified personnel apart from the operating staff of skilled, semi-skilled, unskilled and other categories. Implementation of the Environment Management Plan (EMP) will be the responsibility of the environment department consisting of well-qualified professionals who are reporting directly to the mine's manager.

The total cost proposed to spend for Environmental Protection Measures is about 52.42 crores for the entire life of mine.

ARIPL is proposed to spend a total of Rs.9.76 Crores towards environmental protection measures during the next five years and the total recurring cost of EMP will be Rs. 2.5 crores respectively.

## **9.0 CONCLUSION**

The Takli Jena Bellora (North) and Takli Jena Bellora (South) opencast cum underground mining activity of rated production capacity of 1.5 MTPA along with two nos. of 200 TPH mobile crusher has certain level of impacts on the local environment. However, the proposed project has significant beneficial impact/effects in terms of providing the employment opportunities and various CSR practices to be followed by ARIPL. Growth and development, in harmony with the environment, has always been the approach of ARIPL.

The conclusions of EIA are:

- The proposed project will meet the compliance requirements of various environmental regulations;
- Adoption of environmental friendly best management practices results in minimising the impacts on environment;
- Community impacts of the project will be beneficial, as the project will generate significant economic benefits for the region;
- The post mining, commercial developmental activities of ARIPL can reduce the demand supply gap of coal within the country
- With the effective implementation of the Environment Management Plan (EMP) during the planning, design, construction and operation phases, the mining project can proceed without significant negative impact on the environment.