

**SUMMARY  
OF  
ENVIRONMENTAL IMPACT ASSESSMENT  
AND  
ENVIRONMENTAL MANAGEMENT PLAN  
FOR**

**BHIVKUND COAL MINE**

(UNDERGROUND MINING METHOD)

(CAPACITY: RATED: 0.72 MILLION TONNES PER ANNUM,  
PEAK: 1.08 MILLION TONNES PER ANNUM,  
ML AREA: 802.00 HECTARE)

AT

VILLAGES VISAPUR AND NANDGAONPODE  
AND URBAN AREA OF BALLARPUR,  
TEHSIL BALLARPUR, DISTRICT CHANDRAPUR, MAHARASHTRA

*Project Proponent:*



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amendment dated 1<sup>st</sup> June 2023

**Project Schedule as per EIA Notification 2006 : 1(a)**

Baseline data period: 1<sup>st</sup> October 2022 to 31<sup>st</sup> December 2022 and  
10<sup>th</sup> March 2023 to 9<sup>th</sup> June 2023

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## SUMMARY

### 1.0 INTRODUCTION

#### 1.1 General background

The Bhivkund Coal Mine has been allocated to M/s Sunflag Iron & Steel Company Ltd. under auction vide Vesting order no. NA-104/2/2021-NA dt. 18-11-2021 by Ministry of Coal for commercial sale of coal. The project area of 802 ha is an undisturbed/ new land. Mining Plan for both underground and opencast method had been approved for 0.72 MTPA vide Application No. BHIVKUND COAL MINEMHMR008/APP00224/2022 dated 28.02.2023. However, EIA is being prepared for mining operation by underground method only as per the amendment in Terms of Reference dated 01.06.2023. Total cost of the project is Rs. 125 crores.

#### 1.2 Location of the Project

Bhivkund Coal Block is located in villages Visapur and Nanadgaonpode and urban area of Ballarpur in District Chandrapur, Maharashtra. The mining lease area falls in the Survey of India Toposheet no. 56 M/05 (Equivalent open series map no. E44B5). The location map of the project is shown in **Fig 1**. The project area is bound by the coordinates as given in **Table 1**.

**TABLE 1: BOUNDARY COORDINATES OF THE PROJECT AREA**

Pillar No.	Pillar Location	Latitude	Longitude
P-29	North most	19°54'04.133"N	79°18'16.663" E
P-46	South most	19°51'19.911"N	79°20'18.444" E
P-44	East most	19°51'25.039"N	79°20'29.486" E
P-18	West most	19°53'41.797"N	79°18'08.744" E

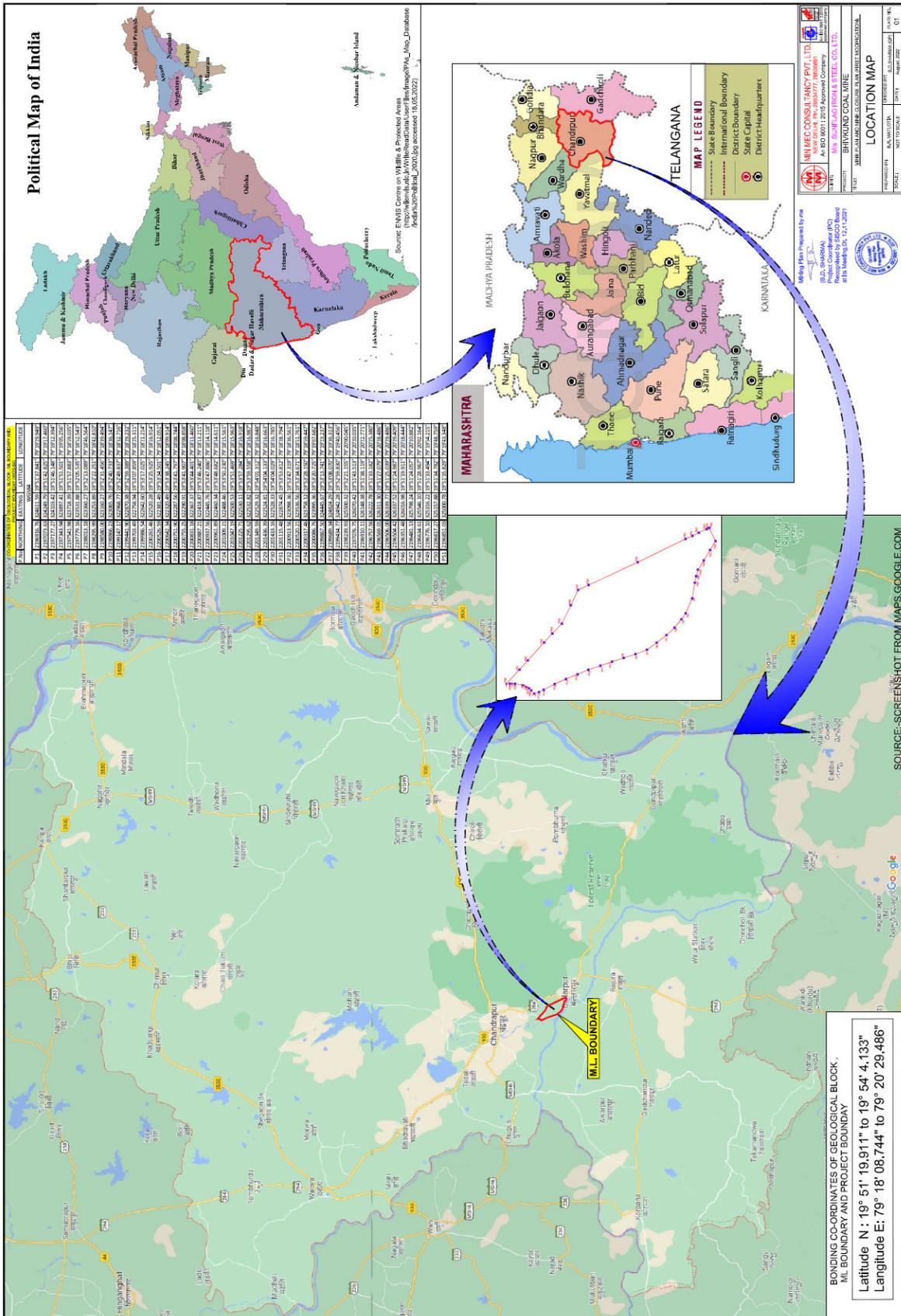
### 2.0 PROJECT DESCRIPTION

#### 2.1 Geology and reserves

The Bhivkund Coal mine is located in the central part of eastern limb of Wardha Valley Coalfield. The geology of the block is in conformity with the regional set up.

This coalfield has elliptically aligned coal prospects within the Barakar Formation around the core of Talchirs, which occupies the central part of the coalfield. The eastern limits of this anticlinal structure is constituted by Konda/ Bhandak blocks towards north and Wirur/ Subai/ Chincholi blocks towards south. The western limb is constituted by Majri/ Kawadi/ Kolar Pimpri blocks towards north and Ghugus/ Nakoda/ Mugoli/ Kolgaon-Sawangi towards south.

FIG 1: LOCATION MAP OF THE PROJECT



Source: Plate 1 of Mine Plan and Mine Closure Plan (First Modification/Revision) for Bhivkund Coal Mine dated 23/08/2022

The entire area of the block is covered by black cotton soil. Hence, the geological sequence is established from the sub-surface data generated from the boreholes drilled in the block. There are 4 seams and 8 number of faults within Bhivkund Coal Mine. Most of the faults are dip slip faults rendering the block into a series of step fault blocks. The general strike of the coal seam is NE-SW, NW-SE to NNE-SSW, NWW-SSE in the entire block and dipping towards SE to ESE. The dip of the formation ranges from 2° to 9° (Gradient 1 in 6 to 1 in 30).

Net Geological Reserve of the block is 102.264 million tonnes and extractable reserve of the block by underground method will be 43.45 million tonnes. Underground mining shall be carried for 64 years at the rate of 0.72 million tonnes per annum.

## 2.2 Mining

The block is divided into 6 nos. of Sectors (Sector-I to VI) by faults. Seams are incropping only in Sector-V and occurrence of coal here is restricted within about 100 m depth {stripping ratio 3.1:1 (cum:Te)}. Hence, opencast mining was envisaged in it. The coal occurrence in other sectors (other than Sector-V) being relatively at greater depths, is not favourable for opencast method. Hence, these sectors are proposed to be mined by underground method. In compliance to additional condition (i) of Terms of Reference dated 15.03.2023 issued by MoEF&CC, the EIA report has been prepared only under ground mining proposed for first 64 years in the block.

**Underground mining method:** Mechanised bord and pillar for development and extraction.

**Inclines:** The entry to the underground workings is proposed through a pair of inclines (intakes) in sector-II. Shaft No.1 (Up-cast), also in Sector II, will be sunk in the initial stage along with the inclines. The pair of inclines shall be located almost in the north central part of the block, aligned almost parallel to the Fault F2-F2. The inclines shall be parallel to each other and placed 30 m apart. The bottom area of inclines at floor of Section-III will virtually serve as hub of the underground mining operations almost through the life of mine. All the sectors of the block will be connected to this hub through four main haul routes from all the four sides of the block. A man riding system will be installed in main incline from surface to the bottom seam.

**Sequence of mining:** Section-III (developed and extracted with stowing) and II will be mined in sequence. The sectors will be developed by driving 4-heading main dip drives (4.3 m X 3 m) with the help of Load Haul Dumper sets, complete with pony conveyor, feeder breaker and the evacuation conveyor.

**Panels:** The panels will be developed by driving 6-heading galleries (4.2 m X 3 m) starting from the main dip drives (towards the end of the flank) with the help of Continuous Miners after which the pillars of sizes, depending

upon the depth from surface, will be carved out. Each set of continuous miner will comprise of 2 shuttle cars, feeder breaker, gathering conveyor and gate conveyors connected to the main trunk conveyors.

**Support System:** Typical support system consists of 4 nos. X 1.8 m length full column resin grouted roof bolts in galleries.

**Drilling and blasting:** Blasting will be required for driving the inclines, shaft, drifts, bunkers, etc. and also for drivage of 4 heading main dips in each sector by Load Haul Dumper. Only permitted safe explosive as given in the approved list of Directorate General Of Mines Safety will be used for blasting. The daily requirement of explosives for mining will be 0.12 tonnes per day. A 2.5 tonnes magazine will be there for the storage of explosives.

**Coal storage and Transport to surface:** 1000 mm trunk conveyors, with average 500 tonne per hour capacity, are proposed for coal transportation from mine to surface. 2 numbers of underground bunkers shall be provided having 15 m height. They will be provided at 69 m floor RL of Section-III at the landing of the inclines (about 500 m east of the western boundary of block in Sector-II). 2 nos. bunkers of 15 m height shall be provided at 60 m floor RL of Section-III at a distance of about 235 m SE of the intersection of Fault F2 and Fault F3.

**Ventilation:** Both inclines will be kept as intake while the Shaft-1 will be used as up-cast. The inclines and the shaft will be connected through the workings in Section-III. It will continue to serve the mine till the end of the underground mine operation. Considering 25% additional requirement (for pump houses, haulage rooms, resting places, underground workshop, other unaccounted, etc.) and 40% leakage during circulation, total air requirement works out to 10,325 m<sup>3</sup> per minute. To meet this requirement, it is proposed to install one mechanical ventilator of total capacity of 10,000 m<sup>3</sup> per minute on surface through evacuee. The exhaust fan will have the provision of variable pitch of blades to improve the quantity of air required in future. Two mechanical ventilators will be required out of which one will be standby.

**Transportation to consumer:** A coal handling plant is proposed at the top of incline where the outcoming conveyor will discharge coal into the pithead bunkers. From here, coal will be dispatched from the bunkers of coal handling plant into the consumer's trucks for onward transportation to their destinations or to the nearby railway sidings (Babupeth/ Ballarshah/ Chandrapur/ Padhar Pavni, etc), as the case may be.

### 2.3 Site services

As it is a new mine, no infrastructure facility is available. Complete site facilities are important for smooth working of any mine. Core infrastructure like first aid station, rest shelter, canteen, adequate lighting arrangement, store, mines office, etc. shall be provided. For underground operations, facilities shall be provided in an area of 9.09 ha.

Total requirement of water is estimated at 106 kilo litres per day. Potable water requirement will be met from tube well. The industrial water requirement will be met from mine sump water.

The required 10 MVA power supply will be drawn by at 33 kilo volt overhead transmission line from nearest sub-station of Maharashtra State Electricity Distribution Co. Ltd. at Nandgaon (located at a distance of about 2 km). It will be brought to local sub-station (2X10 MVA) near the mouth of the inclines. From there the power will be supplied to the mine and other functional buildings. An emergency arrangement for power supply shall be provided through 1000 KVA and 500 KVA DG sets, which will take care of ventilation and pumping and other essential services.

## 2.4 Manpower

Total manpower requirement has been calculated as 700 for underground operation. Project is likely to generate additional several indirect employments. The employment opportunities will be there in various categories, viz. management, supervisory, highly skilled, skilled, semi-skilled, unskilled workmen, etc.

## 3.0 PRESENT ENVIRONMENTAL SCENARIO

For the description of baseline environmental scenario, the mine lease (802 ha) area has been considered as the “core zone”. The area falling within a distance of 10 km from the boundary of the core zone has been considered as the “buffer zone”. Together they comprise the “study area” which can be seen in **Fig 2**.

### 3.1 Topography and drainage

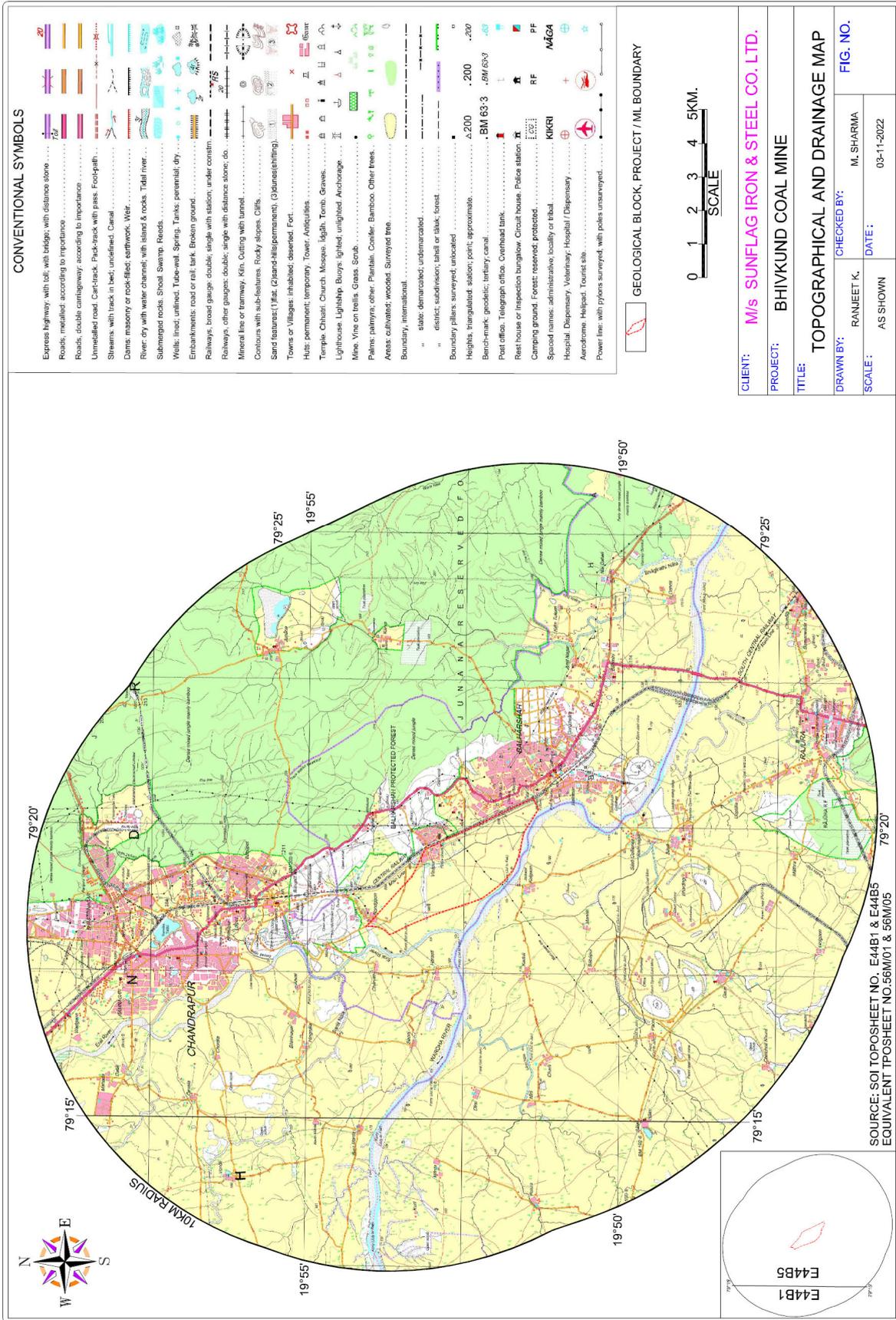
**Topography:** The topography of Bhivkund Coal Mine is almost plain with few undulations. The general ground elevation of the block varies between 182 m above mean seal level on the western part of project area to 195 m on the eastern part of project area as seen in Surface Plan.

The topography of the buffer zone is also plain as well as undulating with general slope towards south west. The surface elevation varies from minimum 174 m above MSL (SE of mine area, near Bahmini village) to maximum 224 m above MSL (North of Junana Village) as per Toposheet.

The topography and drainage map of core and buffer area is shown in **Fig 2**.

**Drainage:** The drainage of the block is mainly controlled by the easterly flowing Wardha River and its tributaries. As per surface plan, six seasonal streams (six) of various length are present within project area. The total length of these streams is 7756 m.

FIG 2: TOPOGRAPHY AND DRAINAGE MAP



The drainage pattern in the study area is dendritic in nature. The main drainage of the area is governed by Erai and Wardha rivers which are flowing N-S and NW-SE, respectively. Major sources of surface water in the study area are ponds and streams in villages.

### 3.2 Climate and micro-meteorology

The climate of the region is tropical monsoon type. As per data available of India Meteorology Department, Chandrapur for 1991-2020, the average annual rainfall is 1255.8 mm. Monthly average of minimum temperatures ranges from 13.7°C to 28.5°C and maximum temperature ranges from 32.7°C to 46.4°C. Annual average humidity is found to be 69% at 8:30 hrs and 49% at 17:30 hrs.

The micro-meteorology of the core zone has been recorded for the post monsoon season from October 2022 to December 2022. The temperature ranged between 10.94°C to 34.11°C and relative humidity ranged between 24.70% to 90.00% during the monitoring period. The wind speed varied between calm to 16.16 km/hr and the predominant wind direction was observed from north east with 21.78% of occurrences (including calm).

### 3.3 Ambient air quality

Ambient air quality monitoring was undertaken at 9 locations in post monsoon season (October 2022-December 2022) and at 3 additional locations in summer season (9<sup>th</sup> March 2023 to 8<sup>th</sup> June 2023). Two stations were established in project area and ten stations in the buffer zone. These locations were (i) Kolgaoni (0.7 km, SW), (ii) Manoli (2.9 km, SW), (iii) Hadasti (1.7 km, W), (iv) Nandgaonpode (0.3 km, N), (v) Visapur (0.5 km, NE), (vi) Karva (6.1 km, E), (vii) Charvat (0.9 km, NW), (viii) Bahmani (4.3 km, SE), (ix) Ravindarnagar Ward near Ballaharshah (1.2 km, SE) and (x) Tekri village near Babupeth railway station (2.3 km, N).

Twenty four hour average PM<sub>10</sub> level was found to range from 43.4 to 88.2 µg/m<sup>3</sup>, PM<sub>2.5</sub> was found to vary from 20.0 to 47.0 µg/m<sup>3</sup>, SO<sub>2</sub> from below detectable limit to 13.3 µg/m<sup>3</sup> and NO<sub>2</sub> from below detectable limit to 20.3 µg/m<sup>3</sup>. All the values were within the National Ambient Air Quality Standard 2009. Chromium, Nickel, Mercury, Lead and Arsenic were also measured and found to be below detectable limit.

### 3.4 Water environment and quality

The main drainage of the area is controlled by the Wardha River. It is located adjoining the southern boundary of the mine. Erai river is one of its tributary and it's located at a distance of 0.4 km west of the mine. There are many nalas and other water bodies present in the study area. Within project area, no perennial source of surface water exists.

The pre-monsoon water level in the study area is found to range from 2 m bgl (Karwa village) to 17.4 m bgl (Kadholi village), while the same for post

monsoon season ranges from 0.5 m (Karwa and Kosara villages) to 11 m bgl (Kadholi village). The average water level fluctuation is found to be 5.5 m.

**Surface water:** Eight surface water samples were collected. These are Pond in Nandgaonpode Village (Core Zone), Near Ballarpur Graphic Paper Product Industry, Balharshah (Core Zone), Nala near Visapur village (Core zone), Wardha River Near Bara Marda (Upstream), Wardha River Near Ram Nagar Village (Downstream), Erai River near Charvat Village, Laoni Nala near Nirli Village, Ramla Talao, Chandrapur and Junana lake in Junana.

**Ground water:** Eight ground water samples were collected. These are from handpumps at Visapur, Nandgaonpode Hadasti, Kolgaon Karva, Sakhari villages and Balharshah Town near Gandhi Chowk and from borewells at Arvind nagar, Chandrapur and Rajura Town, Ward No. 1, It is observed that the surface water and ground water quality is within the permissible limits specified by IS: 10500 - 2012 for drinking purposes.

### 3.5 Land use pattern and soil quality

**Land use:** The project land lies in villages Visapur and Nanadgaonpode and urban area of Ballarpur, District Chandrapur of Maharashtra. The total project area is 802 ha. Out of total area, 753.46 ha (93.94% ) is agricultural land.

Land use pattern of study area is available from Census 2011. The data shows that the agricultural land (net sown + current fallows + other fallows) accounts for a major portion (45.23%) followed by areas under non agricultural uses (26.86%), forest land (17.95%) and culturable waste land (4.92%).

**Soil quality:** Top soil samples were collected from four locations. Two from project site, third from Balharshah protected forest land near Visapur Toll Plaza and fourth from Kolgaon village. Texture of soil is medium grained Sand. The results of soil quality indicate that the soil is of slightly basic in nature. Salinity is negligible in forest land and Organic carbon is optimum in nature.

### 3.6 Noise and Traffic density

**Noise level:** Noise levels at nine stations were observed. Two stations were within the core area and seven within buffer area. The noise levels ranged from 45.80 to 53.93 dB(A) during day time and at night time it varied from 36.15 to 42.83 dB(A).

**Traffic volume:** A traffic volume survey was conducted round the clock on 11-12/11/2022 at 2 locations i.e. Nandgaonpode to Chandrapur Road (T1) and Nandgaonpode to Nandgaonpode Railway Siding -WCL Road (T2).

Total number of equivalent passenger car units were found as 1466 and 4992, respectively.

### **3.7 Ecology**

There is no forest within the project area. The core zone is mostly (93.94%) agricultural land and has sparse trees. Only 7 trees and 8 grasses, herbs and shrubs are found in the project site. Total of 66 species of terrestrial plants are observed in the study area. These include 41 species of trees, 14 species of shrubs and herbs, 6 species of climbers and 5 species of grasses and bamboo.

The core zone has common species of reptiles like chameleon and house lizard, birds such as, common myna, house sparrow, crow and mammals such as mongoose and squirrel. A total of 168 species of terrestrial fauna were recorded in the study area. These comprise 28 species of mammals, 17 species of reptiles and 120 species of avifaunal species and 3 amphibians. As per Wildlife (Protection) Act 1972, Amendment 2022 there are 18 Schedule I species present in buffer zone which includes 10 mammals, 2 aves and 6 reptiles. Leopard and Tiger are most significant in these. There are no National parks/ Wildlife Sanctuary/ Biospheres reserves within the 10 km radius of the project site. The eco sensitive zone of Tadoba – Andhari Tiger Reserve is at 8.1 km NE and Tadoba-Andhari Tiger Reserve core zone is at 25 km NE from the project boundary.

### **3.8 Socio-economic condition**

There is no habitation within the project area. There are 60 inhabited villages and census towns in the buffer zone of the study area. The total population within the study area is 5,17,277 persons, as per Census 2011. It includes 2,66,053 males and 2,51,224 females.

The schedule caste population is 20.35% and schedule tribe population is 8.52%. The average literacy rate is 78.95%. The literacy amongst women is lower at 36.31%. Main workers are 30.05% of the total population. Marginal workers are 4.82% and 65.13% are non workers.

### **3.9 Industries around the project area**

There are several mines, industries and, industrial areas present within 10 km radius of the study area. Mines belong to Western Coalfield Limited, namely, Visapur, Hindustan Lalpeth, Durgapur, Padmapur and Bhatadi. Industrial area of MIDC and various ferro alloy and steel manufacturers are present. Chandrapur Super Thermal Power Station and BILT Paper Products Ltd. are two of the largest industries in the study area at a distance of 8.4 km in north and 0.05 km in east respectively. There are two critically/ severely polluted areas namely MIDC Chandrapur (10 km, NW) and MIDC Ballarpur area (0.03 km, E) the ML area.

### 3.10 Places of archaeological/ historical/ tourist/ religious importance

There are important archaeological (ASI)/ historical place or religious importance within the study area. These include Ballarshah Fort Wall at a distance of 0.5 km, in SSE direction. Achaleshwar Temple (5.0 km, N), Lalpeth monoliths consisting of the sixteen colossal stone images (3.4 km, N), Mahadev Temple close to the Municipal office (3.0 km, N), Mahakali Temple (4.6 km, N) and Chanda Fort (3.8 km, N) are present in study area. Tourists also visit buffer of Tadoba–Andhari Tiger Reserve located at 13.3 km NE and Tadoba-Andhari Tiger Reserve core zone located at 25 km NE of project. The eco sensitive zone of Tadoba – Andhari Tiger Reserve is at 8.1 km NE.

## 4.0 ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

### 4.1 Topography and drainage

**Impact on Topography:** The mine has 802 ha of project area. Project area is a new mining area in which underground mining shall be carried out for 64 years. Land required for underground entry and related facilities will be 9.09 ha (1.13% of project area). It is an agricultural land. Creation of facilities will cause partially permanent and partially reversible changes in topography. Another impact due to underground operation can be subsidence which can lead to damage of structures on surface, cracks in land on surface, cracks in another coal seam, etc.

**Management of topography:** At post mine closure stage, the entire area 9.09 ha will be converted to agricultural land and returned to owners. By adopting an appropriate method of mining, there will not be any subsidence and hence no damage on the surface. In case any impact of subsidence does occur, it will be mitigated by monitoring of ground during extraction of panels, filling of any visible cracks immediately, constructing drainage system to avoid any water logging over the mine area, etc. Recommendations of subsidence study shall be followed. 792.91 ha is expected to remain undisturbed.

**Impact on drainage:** Six numbers, first and second order seasonal streams originate from the project area, which will not get disturbed due to mining activities. Sheet flow in the facility area (9.09 ha) may get obstructed due to other mining related activities, if proper drains and channels are not provided. Mining activities will not affect the pathways of any streams outside the project area.

**Management of drainage:** Drainage shall be ensured within the facility area by providing garland drains around the incline entry, coal handling plant, bunkers, administration building, etc. The rainwater will be conveyed to a settling pond for settlement of suspended solids. This water shall be reused to the extent possible and excess released to the nearby natural drain ultimately flowing into Wardha River.

## 4.2 Climate and meteorology

**Impact:** The climatic conditions including temperature variations, wind direction, wind speed, rainfall and humidity are governed by regional factors and the monsoon. As such mining and other allied activities will not tend to influence the climate. However, emission of greenhouse gases will be there due to combustion of fossil fuels in transportation of coal to consumer.

**Management:** Development of greenbelt during operation will contribute in a positive manner towards mitigation of greenhouse gases. The trees planted over life of mine will help sequester carbon. After mine closure, the facility area land will be restored for agricultural use. The company will also undertake measures to minimise the CO<sub>2</sub> emissions during operation. These will include regular maintenance of all vehicles and surface machinery and ensuring their emissions remain within limit. Underground machinery will be electricity based. Solar lighting within the facility area and nearby villages will also help reduce the carbon footprint of the project.

## 4.3 Air quality

**Impact:** Since mining shall be carried by underground method, impact on ambient air quality will be minimum. The sources of air pollutants will be coal handling plant, loading and transportation. Road shall be used for transportation of coal using 20 T capacity tipping trucks from Bhivkund coal mine to open market or nearest railway siding at Nandgaonpode. Air quality prediction modelling by Caline 4 has been carried out due to transportation of coal by roads in core and buffer area. The maximum incremental values due to transportation, have been estimated as 0.39 µg/m<sup>3</sup> for PM<sub>10</sub> and 0.09 µg/m<sup>3</sup> for PM<sub>2.5</sub>, 0.002 µg/m<sup>3</sup> for SO<sub>2</sub> and 0.010 µg/m<sup>3</sup> for NO<sub>2</sub> in Visapur village within project area. When these incremental GLCs are added to the baseline air quality level, the resultant 24 hours average air quality has been found well within the limits specified in the National Ambient Air Quality Standards 2009.

**Management:** Dust suppression systems (like mobile water sprinkling systems) will be adopted on internal roads, at coal handling plant, loading & unloading points of coal and village. Green belt shall be planted around the facility area. Green belt shall act as a sink for pollutants. Tipping trucks will be optimally loaded and covered with tarpauline. Tyre wash facility shall be provided. PPE kits having masks, goggles, safety shoes, helmets, etc. will be provided to the workers. Ambient air quality will be regularly monitored during operation so that immediate remedial actions can be undertaken to ensure all air pollutants remain within limits.

## 4.4 Water environment

The impact and mitigation on surface drainage has been described in section 4.1 earlier.

**Impact on ground water:** Mine seepage is anticipated as the mine workings will go below the water table. Hence, mine water will have to be pumped out and collected in mine sump at surface. Ground water pollution can take place only if stock piles contain harmful chemical substances, which may get leached by precipitation of water and percolate to the ground water table, thus, causing water pollution.

**Management:** During monsoons, surface run-off bearing suspended solids around facility area and its infrastructure will be collected via garland drains and settled in sedimentation pond. Thereafter, it will be reutilised to the extent possible and balance released to natural drain leading to Wardha river, after settlement of solids as per the applicable norms/ standards. The mine water pumped to surface reservoir will be utilized, after proper treatment (if required), for sprinkling, washing, plantation, etc. The domestic waste water from facilities in the mines will be treated in sewage treatment system. Rainwater harvesting shall be carried out within facility area.

#### 4.5 Land environment

**Impact:** Mining activities introduce changes in the land use pattern. However, being an underground mine, the impact on land use will be limited. Out of total area of 802 ha, landuse of 9.09 ha will change for creation of underground entry and related facilities on the surface. The undisturbed area shall be 792.91 ha from start till the end of life of underground operation (64 years). Thus, land degradation during underground mining is minimum. Top soil generated during construction of facilities will have to be managed. The other significant impact likely will be subsidence at surface, leading to cracks.

**Management:** At the post mine closure stage, 9.09 ha area disturbed will be rehabilitated and converted into agricultural land. The top soil generated for construction of facilities will be used simultaneously in plantation. Subsidence study has been carried out and its recommendations shall be followed. Impact of subsidence will be mitigated by monitoring of ground during extraction of panels, filling of any visible cracks immediately, constructing drainage system to avoid any water logging in mine area. By adopting an appropriate method of mining, no subsidence will occur and hence no damage at surface.

#### 4.6 Noise and ground vibration

**Impact:** Noise will be generated from mining operations & vehicle movement. The impact of noise will be limited to the mine development and operation area only. Vibrations will also be generated during operation due to drilling, blasting (due to a limited extent), machine movement on surface, conveyor movement, coal handling plant operation and truck movement.

**Management:** The noise shall be mitigated by development of green belt along facilities area. Plantation acts as a noise absorbing medium. Noise generating activities shall be monitored and any measures such as

maintenance, repair, provision of enclosures, etc shall be implemented during the course of operation.

The vehicles shall have closed air conditioned operator cabins and will be maintained periodically. All the mine workers will be provided with PPE such as earmuffs/ ear plugs. Entry shall be restricted in high noise zones. Entry restriction signs and speed limit signs shall be displayed. Controlled blasting technique with delay shall be followed to optimize maximum powder factor while working in underground mine. All the norms shall be followed and complied regularly.

#### 4.7 Traffic

**Impact:** When coal production will start from underground mine, coal will be coming out through a conveyor. A Coal Handling Plant (CHP) is proposed at the top of incline where the outcoming conveyor will discharge the coal into the pit head bunkers. The coal will be dispatched from the bunkers of CHP through consumer's trucks for onwards transportation to their destinations or to the nearest railway siding (Nandgaonpode), as the case may be. It is assumed that coal will be transported by 20 T trucks/tippers.

**Management of traffic:** It will be ensured that trucks/dumpers carry optimum weight, undergo periodic maintenance, undergo "Pollution Under Control (PUC)" checks periodically and be covered with tarpaulin. Water sprinkling and regular maintenance of roads within project area shall be done to mitigate dust. Plantation will be carried out along the road passing within project boundary. Tyre wash facility shall be provided.

#### 4.8 Solid waste impact & management

**Impact:** Meagre top soil (0.027 Mcum) will be generated from construction of underground entry and related facilities in 9.09 ha land. 0.11 Mcum waste will be generated from driving the main inclines and the shaft sinking. The other wastes generated will be various sludge from settling pond in mine, sludge from sewage treatment system, municipal solid waste from mine offices and others (e-waste, batteries, hazardous waste, biomedical waste, etc).

**Management:** The top soil excavated will be simultaneously reutilized in plantation of green belt along facility area. The waste produced from driving the main inclines and the shaft sinking will be used to construct the transportation (coal evacuation) roads, to fill low lying areas within ML, for improving safety against inundation, to construct platforms housing incline mouth, shaft and fan drift, etc. For municipal solid waste, segregation shall be done. The biodegradable component will be composted and utilized as manure in greenbelt. The recyclable component of the waste shall be sold to authorised recycling vendors. The sludge from settling ponds, deposits in the sewage treatment system will be periodically removed and used as manure. E-waste, batteries, hazardous waste and biomedical waste shall be giving to respective authorised recyclers/ disposing agencies.

#### 4.9 Ecology

**Impact:** Ecological impacts from under ground mining will result in minimum loss of vegetation and generation of pollutants, both in air and water. Loss of agricultural land shall take place on 9.09 ha where facilities for UG mining will be constructed. Also animals and birds may migrates to other places due to enhanced noise and lights at site. Schedule I fauna are present in the study area but mining activity will not take place outside project area.

**Management:** It is envisaged that no tree will be uprooted for construction of facilities. Plantation around various facilities and along periphery shall be under taken in 0.9 ha area. Local ethno botanical species shall be planted such as Neem, Jamun, Mango, etc. Plantation will attract small fauna and birds and serve as micro habitats. Wild life conservation plan for the conservation of Schedule I species present in study area shall be there. Awareness activities for villagers, drivers and mine workers related to wildlife protection shall be a part of the social welfare activities.

#### 4.10 Socio-economics - Impact and Management

No household is envisaged to be displaced to construct facilities for underground mining activities. Only land losers will be there for 9.09 ha land comprising approximately 18 plots. Company will provide direct employment to about 700 people during operation phase. Mining and allied activities will provide job opportunities for eligible persons and many will find employment in service sector. Preference will be given to the local people for employment in the unskilled and semi-skilled categories. The proposed long term activity will open up market and opportunities for growth of self employed and small businesses. Corporate Social Responsibility activities shall be undertaken as per The Companies Act 2013.

#### 4.11 Occupational Health

The Company will have qualified mine manager, mining engineers and other statutory manpower. They will plan, supervise, control, manage and direct mining operations as per mining regulations. First aid rooms and necessary medicines shall be procured as per DGMS norms. All safety norms shall be followed. Personal protective equipment (PPE) will be issued to workers. A safety officer, medical officer and environmental officer will be appointed for effective implementation of environment health & safety rules and regulations. Regular Safety Committee meetings will be held at the mines to review the status of implementation of statutes. Regular safety training and mock drills will be conducted. Safety posters and pamphlets in English and local language will be displayed and distributed to workers. Company shall put 100% efforts for a zero accident rate.

#### 5.0 ANALYSIS OF ALTERNATIVES

Mining industry is very much a site specific activity. A mineral has to be mined at the place where it exists in economically feasible quality and

quantity. Therefore, no alternative site can be chosen. In terms of technology alternatives, underground mining system with bord and pillar has been chosen. There will be solid blasting in panel development using Load Haul Dump (LHD). There will be chain and belt conveyor. Continuous cutting technology using continuous miner shall be used since the floor of the seam appears to be good with gentle gradient through the proposed mine.

## **6.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANISATION**

Since mining is proposed, an environmental management and reporting system shall be put in place to monitor and implement the environmental management programme by the company. At the project level, Project Manager (Mines) of Bhivkund Coal Mine will have the responsibility for environmental compliances within the project area. Project Manager (Mines) will be assisted by Environmental Engineer, Safety Officer, Medical Officer and supporting staff such as supervisors, helpers, water sprinklers, horticulturists, gardeners, etc. To evaluate the effectiveness of environmental management programme, regular monitoring of important environmental parameters will be taken up.

The capital investment on environmental monitoring activities for the proposed project is envisaged as Rs. 38.95 lakhs. The recurring cost on environmental monitoring activities for project is estimated as Rs. 22.11 lakhs per year.

The capital investment on environmental managed for the proposed project is envisaged as Rs. 228.28 lakhs. The recurring cost on environmental management for project is estimated as Rs. 271.02 lakhs per year.

## **7.0 ADDITIONAL STUDIES: DISASTER MANAGEMENT PLAN**

There are various factors which can cause a disaster in a mine. In underground mine, the hazards are accidents due to subsidence, roof fall, inundation, mine gases etc. Disaster management plan is proposed to be formulated with an aim of taking precautions to control hazard propagation and avert disaster. It also instructs to take action after the disaster to minimize the damage. To tackle the situation, a disaster control room will be established having links with all control rooms of the mine. An up-to-date communication facility will be provided to control rooms. The Emergency Coordinator shall be there headed by Project Manager (Mines).

## **8.0 PROJECT BENEFITS**

For the proposed project, around 700 persons will required for operation. As majority of unskilled and semi-skilled persons will be from the surrounding villages, social & infrastructural benefits will extend to the local population. Improvement is expected in terms of improvement in education facilities, health care services, infrastructure, drinking water facilities, skill development etc. through proposed Corporate Social Responsibility (CSR).

Company will spend 2% of the average annual profit of the previous three years on CSR.

## **9.0 CONSULTANTS**

The consultants engaged for the preparation of the EIA/EMP of the project are Min Mec Consultancy Pvt. Ltd. It was registered in July 1983 with the Registrar of Companies, Delhi & Haryana, India. In 1994, Min Mec established a modern R&D Laboratory. Min Mec is ISO 9001: 2015 certified under ANZ-JAS. In June 2006, the laboratory received accreditation from NABL (latest certificate no. TC-6337 valid upto 16.03.2024). In 2012, lab had been recognized under Environment Protection Act (EPA) by Ministry of Environment, Forest & Climate Change, Government of India and has been renewed till 2024. On 25.02.2021, Min Mec Consultancy is accredited by QCI-NABET as Mine Plan Preparing Agency (MPPA). Min Mec received accreditation from QCI-NABET vide Certificate No. NABET/ EIA/2225/IA 0096 (Rev 01) for preparing EIA-EMP Reports valid upto 29.03.2025.