M/s DAMODAR VALLEY CORPORATION

P.O. BOKARO THERMAL- 829 107, DIST. BOKARO, JHARKHAND

PRE-FEASIBILITY REPORT

FOR

BERMO COAL MINES

AT

VILLAGES BAIDKARO, KARGALI, KARO AND AMLO BLOCK BERMO, DISTRICT BOKARO, JHARKHAND

(EXTENT : 167.434 Ha., EXPANSION FROM 0.4 TO 2.62 MTPA)

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PRE-FEASIBILITY REPORT

1.0 EXECUTIVE SUMMARY

The salient features of the project are given below:

<table>
<tr><td>Project name</td><td>DVC Bermo Mine</td></tr>
<tr><td>Project proponent</td><td>Damodar Valley Corporation</td></tr>
<tr><td>Villages in the ML area</td><td>Baidkaro, Kargali, Karo & Amlo of Bermo circle</td></tr>
<tr><td>Latitude</td><td>23°46’42.6288” to 23°47’24.0324”</td></tr>
<tr><td>Longitude</td><td>85°57’28.9008 to 85°59’9.5784”</td></tr>
<tr><td>Total ML Area</td><td>413.74 acres / 167.434 Ha</td></tr>
<tr><td>Land ownership break up</td><td>
<table>
<tr><th>Land pattern</th><th>Area (ha)</th></tr>
<tr><td>Agricultural land (Private land)</td><td>27.166</td></tr>
<tr><td>Waste Land (Govt. Land)</td><td>18.292</td></tr>
<tr><td>Water body (Govt. land)</td><td>0.935</td></tr>
<tr><td>Forest Land (GMK land recorded as Jungle) (Govt. land)</td><td>120.313</td></tr>
<tr><td>Others (Govt. land)</td><td>0.728</td></tr>
<tr><td>Total</td><td>167.434</td></tr>
</table>
</td></tr>
<tr><td>Reserve</td><td>Total geological reserve = 148.548 MT
Total extractable reserves = 81.38 MT
Reserves already extracted = 11.22 MT
Balance extractable reserves = 70.16 MT</td></tr>
<tr><td>Rated capacity</td><td>Expansion from 0.4 MTPA to 2.62 MTPA</td></tr>
<tr><td>Life of the mine</td><td>28 years</td></tr>
<tr><td>Stripping ratio</td><td>1.45 cum/t</td></tr>
<tr><td>Annual OB Generation</td><td>3.8 Mcum</td></tr>
<tr><td>Method of Mining</td><td>Opencast Mechanized</td></tr>
<tr><td>Blasting</td><td>Overburden requires drilling and blasting prior to excavation.</td></tr>
<tr><td>Storage of explosives</td><td>Shed/Magazine</td></tr>
<tr><td>Working days</td><td>330 days, 6 hours, 3 shift</td></tr>
<tr><td>Manpower</td><td>510 proposed and existing 128</td></tr>
<tr><td>Transportation</td><td>By road</td></tr>
<tr><td>Expected cost of the project</td><td>Rs. 50 Cr</td></tr>
<tr><td>Elevation</td><td>The elevation based on RLs of Bore holes drilled in Bermo seam in 1950 varies between 233.17 and 243.84 m.</td></tr>
<tr><td>Topography</td><td>The topography is gentle and is almost flat and general slope is towards South.</td></tr>
<tr><td>Drainage diversion</td><td>Two nalas (Karo and Amlo) are proposed to be diverted.</td></tr>
</table>

Water requirement	Potable water 320 m^3/day & Industrial water 389 m^3/day
Source of water	Potable water is met from bore well and industrial water requirement is met from mine sump and surface water reservoir of the existing Mine.
Power requirement	11 KVA
Power source	Power is received from DVC BTPS (located about 15 km from mine) through 33 KVA overhead line. It is stepped down to 11 KVA/440v.

2.0 INTRODUCTION

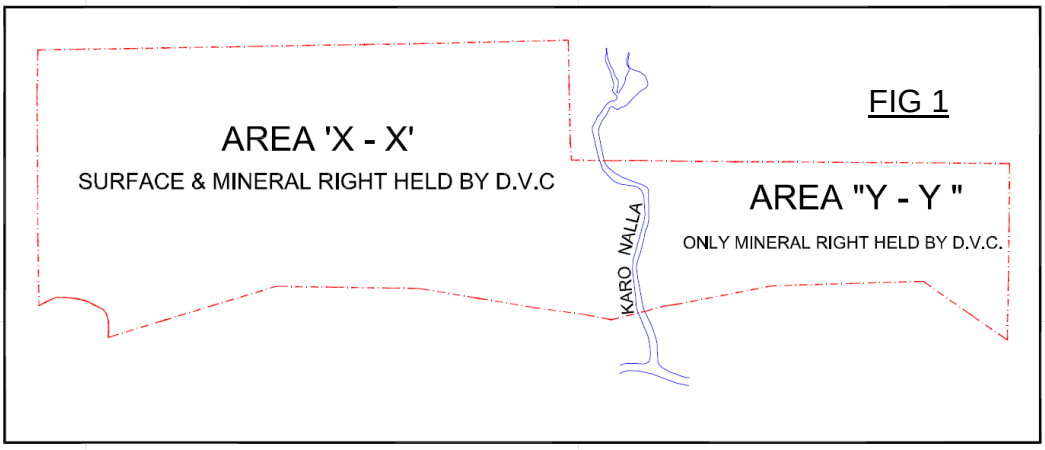
2.1 Identification of project and project proponent

The Damodar Valley Corporation (DVC) is Public company which operates several power stations in the Damodar River area of West Bengal and Jharkhand states of India. The company operates both thermal power stations and hydel power stations under the Ministry of Power Govt of India. DVC is headquartered in the city of Kolkata, West Bengal. With time DVC developed and expanded its infrastructure- six thermal power stations, three hydro-electric power stations with a capacity of 144 MW and one gas turbine station with a capacity of 82.5 MW contribute to a total installed capacity of 6357.3 MW. Presently DVC has 35 sub-stations and receiving stations more than 5500-circuit km of transmission and distribution lines. DVC has also four dams, a barrage and a network of canals that play an effective role in water management. The construction of check dams, development of forests and farms and upland and wasteland treatment developed by DVC play a vital role in eco conservation and environment management. ***(Source: https://en.wikipedia.org/wiki/Damodar_Valley_Corporation)***

Damodar Valley Corporation is operating Bermo Mines of East Bokaro Coalfield, located in the Bokaro district of Jharkhand state, since last 50 years. Prior to that, this mine was owned by the Indian Railways and DVC had taken over this mine from the Indian Railways in 1951. It is a captive mine for Bokaro Thermal Power Station (BTPS)/Chandrapura Thermal Power Station (CTPS) of DVC. Opencast mining was done in the past and the mining was restricted in the low cover area of the incrop zone, which was later abandoned and coal mining continued exclusively by underground method. Thus, from 1951 to 1975, Coal winning was done by opencast method and from 1976 to 1992, by underground Bord & Pillar method (development only). From 1993 onwards, Coal winning is being done by mechanized Opencast method.

All the mining operations referred to are confined to Bermo seam only. This seam has been extensively developed in two sections by U/G Bord & Pillar Method.

Looking at Present Surface Plan given in Annexure IV to Form 1, presently, opencast working is being done in X-X area (west of Karo river), which is almost exhausted. The Y-Y area (east of Karo river) is fully virgin and is occupied by surface build-up/quarters of Central Coalfields Ltd which is to be shifted/rehabilitated before exploitation of this area by opencast method. For future planning the total area of the block has been considered as one block and X-X and Y-Y portions have not been considered separately for simplicity of planning and operation. The X-X and Y-Y areas are shown in Fig 1 for quick view:



DVC Bermo Mine is a captive mine for Bokaro Thermal Power Station (BTPS) at Bokaro/Chandrapura Thermal Power Station (CTPS) at Chandrapura of D.V.C. To meet the increased demand of coal in above captive power stations, it has become necessary to enhance the capacity from 0.4 MTPA to 2.62 MTPA.

2.2 Brief description of nature of the project

Damodar Valley Corporation possesses coal block DVC Bermo Mine with lease area of 167.434 Ha in villages Baidkaro, Kargali, Karo & Amlo of Bermo circle in District Bokaro, Jharkhand. The production level of DVC Bermo Mine has already been achieved at 0.4 MTPA during 2015-2016. Now the production is proposed to be expanded to 2.62 MTPA without any change in lease area. Anticipated life of mine would be 28 years. Opencast mining method is selected. Mine is captive to the Bokaro Thermal Power Station (BTPS) at Bokaro having capacity of 630 MW {(3x 210) + 550 MW (proposed)} and Chandrapura Thermal Power Station (CTPS) at Chandrapura of D.V.C. having capacity of 890 MW (2x 250 + 130x3).

2.3 Need for the project and its importance to the country and or region

Coal is regarded as the backbone of power generation in India. There is huge demand for power in India. Power is essential and most important factor for industrial and business set up. India's coal position is quite encouraging and it offers good prospects for the development of this industry. During 2011, India was the third largest coal producing country in the world. Hence, coal is an important constituent of the present Indian economy. The total reserves of coal in India have been over 290 billion

metric tons. The coalfields in India are located mostly in Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Meghalaya, Telangana, West Bengal, Sikkim, Arunachal Pradesh and Bihar. India has the fifth largest coal reserves in the world. Of the total reserves, nearly 88% are non-coking coal reserves, while tertiary coals reserves account for a meager 0.5 % and the balance is coking coal. The Indian coal is characterised by its high ash content (45%) and low sulphur content. The power sector is the largest consumer of coal followed by the iron and steel and cement segments.India is the world's fifth largest energy consumer, accounting for 4.1% of the global energy consumption. Maharashtra is the leading state in electricity generation. The current per capita consumption of energy in India is 0.5 toe against the global average of 1.9 toe, indicating a high potential for growth in this sector. Of the total electricity consumed in the country, approximately 80% is produced from coal. ***(Source:https://www.pwc.in/assets/pdfs/industries/power-mining/icc-coal-report.pdf)***

2.4 Demand-supply gap

The overall long-term demand of coal is closely linked to the performance of the end-use sectors. In India, the end-use sectors of coal mainly include electricity, iron and steel and cement. Demand from the unorganised small scale sector comprising primarily of the brick and ceramic industry is relatively large though infirm as users switch between coal, firewood and biomass depending on their relative prices. Other industries using coal have only a marginal impact on the long-term demand for coal. The report of the Working Group of Coal and Lignite for the 12th Five Year Plan projects the coal demand in India to grow at a CAGR of 7.1% till 2016-17 and reach 980.5 MT annually under realistic demand. At a CAGR of 7.0%, the demand is expected to reach 1,373 MT by 2021-22.The current shortage of coal stands at 84 MT and the same is expected to rise to 300 MTPA in medium-term if all the letters of assurance issued by the state-owned coal companies materialise. Some of this shortfall will be met by supplies from captive coal blocks and rest through imports. Also, the choice between the supplies from domestic and imported coal is mainly driven by timely availability of coal from domestic sources, quality requirements and the economics of landed cost of coal at the end-use plant. Captive coal mining in India was, gradually, being permitted by amending the Coal Mines Nationalisation Act, primarily in iron and steel making, power generation and cement production. However, the capacity augmentation from captive coal blocks was dismal as only 30 mines could come online as compared to a targeted 76 mines. Hence, it became important for India to secure coal through imports from international market to meet their significantly rising coal demand. However, import is mainly dependent on availability of coal in global market, increasing competitive scenario and affordability. ***(Source:https://www.pwc.in/assets/pdfs/industries/power-mining/icc-coal-report.pdf)***

2.5 Imports vs. indigenous production

There will not be any import for the proposed enhancement in capacity from 0.4 to 2.6 MTPA of mine.

2.6 Export possibility

There will not be any export of coal from the coal block. Mine is captive to the Bokaro Thermal Power Station (BTPS) at Bokaro having capacity of 630 MW {(3x 210) + 550 MW (proposed)} and Chandrapura Thermal Power Station (CTPS) at Chandrapura of D.V.C. having capacity of 890 MW (2x 250 + 130x3).

2.7 Domestic / export markets

Entire coal produced from the mine shall be used for power plant of the company.

2.8 Employment generation (direct and indirect)

As the production is proposed to be enhanced from 0.4 MTPA to 2.62 MTPA, additional manpower is envisaged. Total manpower after expansion shall be about 500. The existing mining establishment provides employment opportunities under various cadres viz. management, supervisory, highly skilled, skilled, semi skilled and unskilled workmen etc.

3.0 PROJECT DESCRIPTION

The DVC mining area is divided into two sections, namely. “X-X area” and “Y-Y area” as seen in Fig 1 earlier and the Present Surface Plan given in Annexure IV to Form 1.

The mine is being worked by mechanized Opencast method over developed underground galleries with diesel operated shovels/backhoes (1.9 – 3.0 cum bucket capacity) working with 25 T rear dumpers. The mine is working in close proximity of dwelling houses, which has restricted the bench height, diameter of the holes, total charge per blast and no. of holes per blast. The OB and coal bench height is 6 m as permitted by the DGMS & 100 mm dia. holes are drilled.

Diesel operated shovels/backhoes (2.5 cum bucket capacity) working with 25 T rear dumpers has been proposed for coal production and for OB removal 4.5 cum diesel operated shovels with 35 T rear dumpers.

3.1 Type of Project including interlinked and interdependent projects

The coal from the mine will be used for power generation in captive power plants.

3.2 Location with coordinates

DVC Bermo Mine is present in villages Baidkaro, Kargali, Karo & Amlo of Bermo circle. Please refer Annexure I of Form 1 for the location map of the project.

The mining lease area falls in the Survey of India Toposheet no. No. 73 E/13 and bounded by following co-ordinates:

Latitude	:	23° 46' 42.6288" to 23° 47' 24.0324"
Longitude	:	85° 57' 28.9008" to 85° 59' 9.5784"

3.3 Details of alternate sites & Environmental considerations

Mining being site specific, no alternatives site is under consideration. Moreover, it is the expansion of an existing mine. Environmental considerations and protection measures assume greater importance for the project. DVC Bermo Mine shall ensure that the proposed mine causes minimum adverse impact on the area.

The proposed project is planned to meet all environmental norms and further improve the environs in the area. Regular monitoring is being carried out by DVC Bermo Mine at the mine site in line with the requirements of the Jharkhand Pollution Control Board and Ministry of Environment, Forests and Climate Change.

3.4 Size or magnitude of operation

The total extent of the proposed mining lease area is 167.434 Ha and the project area is 269.094 Ha. 100 Ha area outside ML area is proposed to be used for surface dump, facilities and exclusive part of access road to dump area (located on north side at about 3.5 km) and pithead facilities over 1.66 ha. From the lease area, there will be increase in production from 0.4 million tonnes to 2.62 million tonnes per annum.

3.5 Project description with process details

The total extent of the mining lease area is 167.434 Ha. From the lease area, there will be increase in production from 0.4 MTPA to 2.624 MTPA. To achieve this rate of production it is proposed to adopt mechanised opencast method on three-shift basis. The coal production process from the mine will involve deployment of shovels, dumpers and levelling machinery respectively (Drill machines are deployed wherever necessary to deal with hard strata), loading and transportation of coal and OB to respective destination viz. coal to the captive power plants and OB to the external dumps as the internal dumping can be started only after sufficient void with sufficient safety barrier from the working bench is generated. Overburden, is mined with 4.5 cum diesel hydraulic shovel and 35 T dumpers. Coal is also mined by using 2.5 cum diesel hydraulic shovel and 25 T dumpers. Overburden benches are to be worked by shovel-dumper combination with bench height of 10 m. the cut width of shovel benches is proposed to be 20m.

Presently, the mine has reached to a depth of 150 m from surface. Controlled blasting operation has been adopted, as proposed by CMRI, Dhanbad in June, 1994. Wet operated drills are in operation. Provision has

been made for one magazine of 10 T for storage of explosive. Partly backfilling will be started from 11th year. The overall slope of the surface dump would be maintained at 26°.

Year wise production for the life of the mine is tabulated in Table 1.

TABLE 1
CALENDAR PROGRAMME OF DVC BERMO MINES
(PRODUCTION OF 2.62 MTPA)

Year	Year No.	Coal (MT)		OB (Mcum)		Stripping ratio
		Progressive	Cumulative	Progressive	Cumulative	
2017-18	1	1.00	1.00	1.45	1.45	1.45
2018-19	2	1.80	2.80	2.70	4.15	1.50
2019-20	3	2.50	5.30	3.68	7.83	1.47
2020-21	4	2.62	7.92	3.80	11.63	1.45
2021-22	5	2.62	10.54	3.80	15.43	1.45
2022-23	6	2.62	13.16	3.80	19.23	1.45
2023-24	7	2.62	15.78	3.80	23.03	1.45
2024-25	8	2.62	18.40	3.80	26.83	1.45
2025-26	9	2.62	21.02	3.80	30.62	1.45
2026-27	10	2.62	23.64	3.80	34.42	1.45
2027-28	11	2.62	26.26	3.80	38.22	1.45
2028-29	12	2.62	28.88	3.80	42.02	1.45
2029-30	13	2.62	31.50	3.80	45.82	1.45
2030-31	14	2.62	34.12	3.80	49.62	1.45
2031-32	15	2.62	36.74	3.80	53.42	1.45
2032-33	16	2.62	39.36	3.80	57.22	1.45
2033-34	17	2.62	41.98	3.80	61.02	1.45
2034-35	18	2.62	44.60	3.80	64.82	1.45
2035-36	19	2.62	47.22	3.80	68.61	1.45
2036-37	20	2.62	49.84	3.80	72.41	1.45
2037-38	21	2.62	52.46	3.80	76.21	1.45
2038-39	22	2.62	55.08	3.80	80.01	1.45
2039-40	23	2.62	57.70	3.80	83.81	1.45
2040-41	24	2.62	60.32	3.80	87.61	1.45
2041-42	25	2.62	62.94	3.80	91.41	1.45
2042-43	26	2.62	65.56	3.80	95.21	1.45
2043-44	27	2.62	68.18	3.80	99.01	1.45
2044-45	28	1.98	70.16	2.74	101.75	1.39

Life of the mine considering a capacity of 2.62 MT Coal production per annum, is 28 years and the average stripping ratio of the mine works out to1.45 cum/t. Coal is being dispatched by road through trucks from Opencast quarry-head to Power plants.

3.6 Mining method

Opencast mining method has been selected for the proposed enhancement of production. Shovel Dumper Mining Technology shall be used for coal and overburden.

For Coal - Shovel Dumper Mining Technology

Due to existence of inseam bands contributing for coal seam thickness, selective band removal may not be feasible while mining by continuous miner, therefore combination of shovel dumper is preferred. Moreover, for production of better grade coal and requirement of sized coal, mining by continuous mining technology may not be the most suitable option. However, a hydraulic backhoe/shovel has been proposed to meet the selective mining requirement.

For Overburden - Shovel Dumper Mining Technology

Overburden has been proposed to be mined by this technology. Application of shovel dumper technology for OB is envisaged due to the following reasons:

a) Moderate thickness of coal seam.

b) Parting thickness averaging between 0.36 – 21.40m.

c) Flexible and easy operation.

3.6.1 Blasting pattern

Three diesel drills of 100 mm size is required for drilling OB benches. Coal is being mined by shovel/ backhoe deployed on coal benches, drilling and blasting is performed by a 160 mm drill provided for the purpose. Magazines for storing explosives has been kept.

3.7 Raw material required along with estimated quantity, likely source, marketing area of final product's, Mode of transport of raw material and Finished product

No raw material is required. Only diesel is required for transportation vehicles, operation of HEMM and generators in case of emergency. Coal is being dispatched for captive use in BTPS and CTPS located at Bokaro and Chandrapura by Road.

3.8 Resource optimization/ recycling and reuse envisaged in the project

The Coal does not require any beneficiation. The ROM coal is processed at CHP useable in TPS. The resources which are used in the mining will be recycled by various methods. Spent oil from transformers, once in one or two years is sold to the authorized vendors. Mine water is discharged from

quarry through adequate number of pumps (as required) and is being used for mining activity.

3.9 Availability of water its source, energy / power requirement and source

3.9.1 Water

Requirement: Water requirement after expansion will be 320 KLD for potable and 389 KLD for industrial purpose.

Source: The mine water is collected in sump and dewatering is done to keep mine working dry. Dewatered water as well as any surface run off during rain is led to settling tank for settlement of suspended solids. Thereafter, the water is used for industrial purpose, sprinkling, greenbelt watering, etc. Excess water is and will be discharged to natural drain after settlement of suspended solids. The potable requirement will be met through borewells. The waste water in Workshop will be treated and recycled.

3.9.2 Power

The total power is being sourced from Bokaro Thermal Power Station which is about 15 km from the Mine through 33 KVA over head line. It is stepped down to 11KVA then to 440v.

3.10 Quantity of wastes to be generated (liquid and solid) and scheme for their management / disposal

101.75 MCum of overburden will be generated during life of mine. Out of this, 45 Mcum shall be taken to outside OB dump and 56.75 Mcum shall be used for backfilling of the excavated area.

Solid waste generated from manpower is mostly of organic and recyclable in nature. The organic waste is and will continue to be composted and used as manure while recyclable component are and will be sold to recycling agencies. The waste water from mine site offices is and will continue to be treated in septic tank- soak pit system.

The mine sump water is regularly monitored for pH level and treated, if required, prior to discharge. The waste water from workshop is treated in oil water separator followed by settling tank and reused in washing. It is planned to relocate workshop outside ML and install an ETP in addition to oil-water separator at new location.

3.11 Schematic representations of the feasibility drawing which give information of EIA purpose

The conceptual plan of mine lease is given in Annexure VI to Form 1.

4.0 SITE ANALYSIS

The Mine site is located in Block Bermo New, villages Baidkaro, Kargali, Karo & Amlo of Bermo circle, District Bokaro, Jharkhand.

The Coordinates of mine are:

Latitude : 23° 46' 42.6288" to 23° 47' 24.0324"
Longitude : 85° 57' 28.9008" to 85° 59' 9.5784"

The topography is gentle and is marked by the absence of any high hill or deep depressions. The general slope of the ground is towards south. The elevation based on RLs of Bore holes drilled in Bermo seam in 1950 varies between 233.17 and 243.84 m.

4.1 Connectivity

Road: The coal mine is located in the East Bokaro coalfield near Kargali and other mines of CCL. The mine is well connected with BTPS by a metalled road. The mine is located about 50 km away from Bokaro township. Bermo Railway Station is connected through road.

Railway Line: The nearest Railway Station is Bermo at a distance of about 3 Km towards south from the block on Gomoh-Chandrapur, Barkakana-line of the East Central Railway.

Airport: The nearest airport is Ranchi and Kolkata at a distance of about 120 and 330 km. respectively.

4.2 Land form, Land use and land ownership

Total project area is 267.434. This includes Mine Lease area of 167.434 Ha and 100 Ha is proposed to be used for surface dump, facilities and exclusive part of access road to dump area (located on north side at about 3.5 km). No additional land is proposed to be acquired for increase capacity of production.

Pre Mining, present and post mining landuse is given in Table 2, 3 and 4 respectively.

TABLE 2
PRE-MINING LAND USE

Land pattern	Area (ha)
Agricultural land (Private land)	27.166
Waste Land (Govt. Land)	18.292
Water body (Govt. land)	0.935
Forest Land (GMK land recorded as Jungle-Govt. land)	120.313
Others (Govt. land)	0.728
Total	**167.434**

TABLE 3
PRESENT LAND USE

Land use pattern	Area (ha)
Area under habitation	59.893
Area under backfill	52.609
Area under excavation	54.932
Total	**167.434**

TABLE 4
POST-MINING LAND USE

Land use pattern	Area (ha)
Backfilled area	49.50
Void area	102.94
Green Belt	6.110
Facility area	8.884
Total	**167.434**

4.3 Topography

Topography is gentle, no high hills or deep depression being present. However the area has a footprint of mining due to presence of coal mines of Central Coalfields Ltd and DVC in the coalfields. The elevation in the 10 km radius of the project (also referred to as buffer zone) varies from 312 m to 211 m MSL. The elevation based on RLs of Bore holes drilled in Bermo seam in 1950 varies between 233.17 and 243.84 m.

4.4 Existing infrastructure

Complete site facilities are important for smooth working of any mine. Core infrastructure like Office Building, Coal Stockyard, Weigh Bridge, CHP, Workshop, Diesel Pump, Workers Accommodation etc. is present at the mine as mine is operational for 0.4 MTPA coal production.

Habitation/colonies of CCL/DVC that are present inside the ML area, shall be subsequently shifted as mine workings are progressed.

Residential Buildings: At present, 2126 quarters are already built and the location-wise details of colonies within the leasehold area are given in Table 5 below:

TABLE 5
COLONIES WITHIN THE LEASEHOLD AREA

Sl. No.	Particulars	Area*	No.
1	DVC Quarters	XX	450
2	CCL Quarters	YY	1676
	Total		**2126**

**** Refer Fig 1 earlier or Present Surface Plan in Annexure IV of Form 1.***

Out of the above, most of the quarters are falling within the mining area and need to be vacated/shifted.

Most of the current facilities will be also be shifted to outside ML area and a new colony is proposed near dumping site to house the operational workers and their family.

4.5 Soil classification

Regular monitoring of soil quality is being carried out by third party laboratory at the mine site. Analysis of soil samples reveals that there is no wide variation in the natural material. Particle size analysis shows that the texture of the soil is of sandy loam in nature with moderate water holding capacity. Electrical conductivity has been observed to be in the normal range while the values of organic carbon is found to be lower. Available phosphorus and potassium have been found in medium range.

4.6 Climatic data from secondary sources

The climate of the area is dry humid and sub-tropical. It is characterised by hot and dry summer from March to May, rainy season from June to October and cold winter spreading from November to February.

Temperature

In summer, the temperature rises up to 42.5°C to 44.6°C on some summer days. During winter, the temperature drops down to 5-7°C at times. Dust storms are common in dry season (May and June) before the onset of monsoon with increase in temperature and wind speed in the afternoon coupled with low humidity.

Rainfall

Annual rainfall is about 1200 mm, a major portion of which occurs during the monsoon period and the maximum rainfall occur in the month of August. The number of rainy days in a year are about 100.

Wind Speed and wind direction

The wind speed of the area varies from 1.5 to 2.8 ms^{-1}.

Relative Humidity

The average annual relative humidity is about 67%. In summer months the relative humidity varies between 32 to 73%.

4.7 Social infrastructure available

Hospitals, school, banks etc are present in the villages in buffer zone (within 10 Km of project area). Social infrastructures are existing as per Census 2011 and are listed in Annexure X to Form 1.

5.0 PLANNING BRIEF

5.1 Planning concept

The Damodar Valley Corporation is the first multipurpose river valley project of independent India which came into being on July 7,1948 by an Act of The Constitution Assembly (Act No XIV of 1948) and is equally owned by Govt. of India, Govt. of West Bengal and Govt. of Jharkhand (earlier Bihar). It is planned to use the coal produced from the mine for Captive use by thermal power plant of the Corporation.

5.2 Population projection

Manpower position of DVC Bermo Mines as on 01.01.2016 is 128. The proposed estimated manpower strength of the mine for enhanced production of 2.62 MTPA will be around 510.

Unskilled and semi skilled (after training) are hired from in and around the mine while skilled, engineers, managerial staff and technical experts are hired from outside.

5.3 Land use planning (break up along with green belt etc.)

The pre mining and present land use of the mine lease is referred in Table 2 and Table 3. Landuse at the end of life of mine is given in Table 4 in Section 4.2 earlier.

5.4 Assessment of infrastructure demand (physical & social)

An assessment of the current facilities available in the villages in and adjacent to the mine lease area in education, health, drinking water, power supply, post and telegraph, banks, communication and approach road has been done using Census 2011 data and presented on Annexure X to Form 1.

Core infrastructure, like power distribution system, road, telecommunication, housing, service buildings viz. office, store, First Aid centre, canteen etc. have been established at the mine site.

5.5 Amenities / facilities

Education, Hospitals, drinking water, power supply, post and telegraph, banks, communication and approach roads are present in the villages in buffer zone within 10 Km of project area. Office Building, Coal Stockyard, Weigh Bridge, CHP, Diesel Pump, Workers Accommodation etc. has been constructed.

The First Aid Room, Rest Shelters, Toilets, Tool /Store Rooms etc has been provided at mine site.

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial area (processing area)

The activity wise detail of present landuse is given in Table 3 and at the end of life of mine is given in Table 4 of Section 4.2 earlier.

6.2 Residential area (non processing area)

As Bermo mine is captive to the BTPS, most of the mine employees live in BTPS colony except the few which are presently living within the ML area. It is proposed that in future, all the employees will live in BTPS colony and the existing quarters of DVC within the ML will be dismantled to mine the coal underneath them.

6.3 Green belt

In order to combat pollution effects arising out of the mining operations and to improve the ecological and aesthetic status of the area, a comprehensive three tier green belt development programme will be implemented. Keeping in view the environmental problems, plantation programme has been prepared to mitigate the problems. The areas considered for plantations are:

- All along the roads and around office, stores, workshop etc.
- In all vacant/barren places near the quarry area
- Waste dump in stages
- Over the backfilled area
- Peripheral portion of mining lease.

6.4 Social infrastructure

With the mine already in operation for over 6 decades, amenities for communication, education, health, canteen, etc have developed by BTPS and will continue to be developed and maintained in and around the project area. These amenities are and will be available to local people also, who are directly associated with the project. Even those not associated in the project related activities are benefited by these amenities. With the continuation and expansion of the mine, there will be substantial improvement in the overall economy of the local people in the form of additional income through employment, development of infrastructure in surrounding areas such as transport facility, health and education, shops and ancillary industries. Over and above, the people can avail any of the medical/ educational facilities that will be established by the company in the area. Water can also be supplied free of cost on festive occasions. Overall, the rest of the villagers will be encouraged to be self sufficient.

The objective of CSR is to:

- Significantly improve the physical quality of life
- Create opportunities for livelihood
- Improve the level of education including adult education
- Create health awareness among women and
- Ensure availability of safe drinking water

6.5 Connectivity

Road

Refer section 4.1.

Railway Line/Airport

Refer section 4.1.

6.6 Drinking water management (source & supply of water)

Refer section 3.9.1

6.7 Sewerage system & industrial waste management

A sump of adequate capacity has already been created at the present mining pit to accommodate seepage water as well as to accommodate any sudden torrential rainfall. Heavy duty pumps are operational in this sump. Water is being discharged into the main garland drain by pipeline. The pumping capacity is presently sufficient to handle any torrential rain in the mining area. Pumps of similar capacities have been kept as standby. Water is now being utilized in sprinkling the mine working area.

6.8 Solid waste management

Refer section 3.10.

6.9 Power requirement & supply / source

Refer section 3.9.2.

7.0 REHABILITATION AND RESETTLEMENT PLAN

This matter has been covered under para 4.4 earlier. In old Colony within mining lease area approx (200 quarters) of DVC with un-authorised occupancy exist which will be taken care by DVC, These have been identified for rehabilitation and resettlement.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Cost of production

The cost of production at pit head is about Rs. 500/ tonne of coal approximately.

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

This is an opencast mine of capacity 2.62 MTPA, and the extent of mine is 167.434 Ha. The life of mine will be 28 years. The environmental impacts are kept at minimum by adopting proper mitigation measures.