PRE- FEASIBILITY REPORT

FOR

GOURANGDIH ABC COAL MINE

AT

RANIGANJ COALFIELD

DISTRICT PASCHIM BARDHAMAN,

WEST BENGAL

(Proposed Capacity: 2.5 MTPA
Allotted block area = 370 Ha
Required Mine Lease Area= 213.27 Ha
Area required Outside lease= 143.305 Ha
Project Area= 356.575 Ha)

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Submitted by:

West Bengal Mineral Development and Trading Corporation Limited
13, Neille Sengupta Sarani, 2nd Floor. Kolkata-700087

Prepared by :

Min Mec Consultancy Pvt. Ltd., New Delhi
(Based on Approved Mining Plan and Forest Clearance Application)

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1.0 EXECUTIVE SUMMARY

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SALIENT FEATURES OF THE PROJECT

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<tr><td>Project proponent</td><td>West Bengal Mineral Development and Trading Corporation Ltd.</td></tr>
<tr><td>Villages in block area</td><td>Panuria, Kantapahari, Jamgram, Shibdhawra, Banddhawra, Lalbandh, Gourangdih and Bhuiapara</td></tr>
<tr><td>Coordinates (as per allotment letter)</td><td>23° 48' 30" to 23° 49' 45" N
85° 57' 45" to 85° 00' 15" E</td></tr>
<tr><td>Allotted block area</td><td>370 Ha</td></tr>
<tr><td>Required Mine Lease Area</td><td>213.27 Ha</td></tr>
<tr><td>Area required Outside lease</td><td>143.305 Ha</td></tr>
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<tr><td>Reserve
(table 4.1, 4.3 & 4.5 of approved mining plan)</td><td>Net geological reserve, Quarry A, B & C = 129.51 MT

Net available geological reserves, Quarry A&C = 68.37 MT (Gourangdih A-27.18 MT+ Gourangdih C-41.2 MT and Gourangdih B-Nil as the area is heavily built up)

Net mineable reserves = 61.53 Ha</td></tr>
<tr><td>Rated capacity</td><td>2.5 MTPA (para 4.8 of approved mining plan)</td></tr>
<tr><td>Life of the mine</td><td>27 years (para 4.8 of approved mining plan)</td></tr>
<tr><td>Stripping ratio</td><td>2.91 cum/t (table 4.7 of approved mining plan)</td></tr>
<tr><td>Total OB Generation</td><td>179.37 Mcum (table 4.7 of approved mining plan)</td></tr>
</table>

Method of Mining	Opencast Mechanized
Blasting	Overburden requires drilling and blasting prior to excavation.
Storage of explosives	Shed/ Magazine
Working days	330 days, 3 shifts *(Chapter VII of mining plan)*
Manpower	494 *(Chapter XIII of mining plan)*
Transportation	By road or rail to consumers
Expected cost of the project	Rs. 621.71 crores *(Table 19.1 of Mining Plan)*
Elevation	135 m to 174 m a.m.s.l. *(Para 2.2.1 of Approved Mining Plan)*
Topography	Gentle undulations and general northerly slope
Constraints	The area is thickly populated and a number of developed villages are situated within the proposed mining areas. Especially, the area of Gourangdih B is thickly populated due to the presence of 2 villages namely Gourangdih and Panuria. Apart from the villages, different types of industries are also present. A number of power lines, important roads connecting Jharkhand and from Chittaranjan to Asansol also pass over the property.
Water requirement	530 KLD for potable and 454 KLD for industrial purpose.
Source of water	Ajoy River till mine sump water becomes available to meet the demand
Power requirement	11 KVA
Power source	Power is received from WBSEB through 33 KVA overhead line. It is stepped down to 11 KVA

2.0 INTRODUCTION

2.1 Identification of project and project proponent

West Bengal Mineral Development and Trading Corporation Limited (WBMDTC Ltd.), a government of undertaking was incorporated in the year 1973 and has been engaged in the field of mining and trading of minerals in West Bengal since inception.

WBMDTC Ltd. has adopted and implemented new business strategies in its different sectors which have started yielding positive results. With the enactment of Coal Mines (Special Provisions) Act, 2015, WBMDTC Ltd has became eligible to get allocation of coal mines for sale of coal. WBMDTC Ltd has been declared by the Ministry of Coal, the allottee of Gourangdih A, B & C Coal Mine located in Paschim Bardhaman district. WBMDTC Ltd. hopes to revive its financial stability by venturing into coal mining and marketing activities. Participation is also being sought with KIOCL Ltd (A Govt of India Mini Ratna Company) for joint venture for sourcing and mining of Iron Ore in Paschim Midnapore, Purulia, Bankura and Burdwan District, West Bengal

with many other future plans. (*Source: http://www.wbmdtc.com/# assessed on 01.05.2017*)

Company has been allocated Gourangdih ABC Coal Mine vide F. No. 103/6/2016/NA dated September 29, 2016. Mine was earlier allotted to Gourangdih Coal Ltd. (A Joint Venture of HEPL and JSW Steel Ltd.). The mine has been exploited by both underground and opencast mining method since long. Due to insufficient geological information, mining activities in different time period were scattered. During pre-nationalization period private companies like M/s Bird & Co., Burrakar Coal Company and others worked extensively the B-V seam by underground mining. B-VI seam were also developed in certain areas. B-II, B-IV and B-VI seams have also been exploited by open cast workings at places. (*Source : Para 1.2 of Mining Plan*)

Apart from exploitation of coal, some private lessees worked fire clay quarries along the outcrop of B-V seams in the western part of the area. The extent of these quarries is limited in the west and east by faults F2-F2 and F6-F6 respectively. They are now abandoned. (*Source : Para 1.2 of Mining Plan*)

2.2 Brief description of nature of the project

Gourangdih Coal Mine of Raniganj Coalfield, is present in villages Panuria, Kantapahari, Jamgram, Shibdhawra, Banddhawra, Lalbandh, Gourangdih and Bhuiapara, Barabani CD Block of District Paschim Bardhaman, West Bengal. Geological Area of the block is 370.00 Ha. Gourangdih block is considered in three sub blocks namely Gourangdih A (Area 127.53 Ha.), Gourangdih B (Area 90.83 Ha.) and Gourangdih C (Area 151.64 Ha.). Among the 3 sub blocks, Gourangdih A and Gourangdih C have been worked partially both by Underground and opencast method. Gourangdih B being the most thickly populated and built up area, the underlying seams were not worked and are mostly virgin. Proposed production from the mine is 2.5 MTPA. Anticipated life of mine would be 27 years. Opencast mining method is selected. Coal from the proposed mine shall be used by various consumers.

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)***

Raniganj Coalfield, is the birth place of coal mining in the country. Area of Raniganj Coalfield is 1530 Sq.Kms spreading over Burdwan, Birbhum, Bankura and Purulia Districts in West Bengal and Dhanbad District in Jharkhand. Heart of Raniganj Coalfield is, however, in Burdwan District bounded by Ajoy River in North and Damodar River in South. Raniganj Coalfield of E.C.L. has special characteristic containing the best type of non-coking coal reserves in the country. All the heat intensive industries like Glass, Ceramic, Refractories, Forging etc. are exclusively dependent on Raniganj Coal. Other industries also prefer Raniganj Coal. The entire Export of Coal from the country is being done from Raniganj Coalfield. (*Source: http://bardhaman.nic.in/mines/mines.htm*)

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 from the proposed mine.

2.6 Export possibility

There will not be any export of coal from the coal mine. Coal shall be used by various domestic consumers.

2.7 Domestic/ export markets

Entire coal produced from the mine shall be used by various domestic consumers.

2.8 Employment generation (direct and indirect)

Total manpower required for the mine will be 494 persons and the project is likely to generate several times more indirect employment. The employment opportunities will include almost all categories, viz. management, supervisory, highly skilled, skilled, semi skilled, and unskilled workmen etc.

3.0 PROJECT DESCRIPTION

Gourangdih ABC Coal Block covering an area of 370 ha lies in the north central part of Raniganj Coalfield, Paschim Bardhaman District in West Bengal. The area is well connected by rail and road. The project area will be 356.575 ha. The total life of mine works out to 27 years at peak target annual capacity of 2.5 MT of coal. The project will achieve target capacity in 3rd year. Detailed exploration in Gourangdih ABC Block has proved 8 co-related and laterally persistent coal seams in three Barakar formation.

In view of the surface constraints of built up areas, the Gourangdih ABC block has been considered in 3 sub blocks namely, Gourangdih A, Gourangdih B and Gourangdih C.

Opencast mining will be done for seams B-II to B-VII in Gourangdih A and Gourangdih C quarries. Working for Gourangdih B has been kept out due to densely populated/ heavily built up Gourangdih, Panuria & Kantapahari villages. Extractable reserves of coal between Gourangdih A and Gourangdih C quarries is 61.54 MT for an annual production target of 2.5 MT at an overall stripping ratio of 2.91 cum/te. Out of total extractable reserves, the extractable reserves in Gourangdih A is 24.46 MT and that of Gourangdih C is 37.08 MT (*Source: Table 4.7, Mining Plan*).

3.1 Type of Project including interlinked and interdependent projects

There are no interlinked or interdependent projects.

3.2 Location with coordinates

Gourangdih Mine is present in villages Panuria, Kantapahari, Jamgram, Shibdhawra, Banddhawra, Lalbandh, Gourangdih and Bhuiapara of Barapani CD Block in Paschim Bardhaman District of West Bengal. Please refer ***Annexure I*** of Form 1 for the location map of the project.

The project area falls in the Survey of India Toposheet no. No. 73 I/18 and bounded by following co-ordinates:

Latitude : 23° 48' 30" to 23° 49' 45" N
Longitude : 85° 57' 45" to 85° 00' 15" E

3.3 Details of alternate sites & Environmental considerations

Mining being site specific, no alternatives site is under consideration. Environmental considerations and protection measures assume greater importance for the project. Company 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 shall be carried out by the company at the mine site in line with the requirements of the West Bengal Pollution Control Board and Ministry of Environment, Forests and Climate Change.

Environmental considerations: There are no National parks, Wildlife Sanctuary, Biospheres reserves within 15 km radius. The nearest National Park is Simlipal at a distance of 228 km in SSW direction. The nearest wildlife sanctuary is Ramnabagon at a distance of 70 km in SE. There are several water bodies and forest present within the study area of the project. The distance to various water bodies, forest, etc are given in **Table 2**.

TABLE 2
DISTANCE AND DIRECTION (WITHIN 15 KM) OF WATER BODIES, FORESTS & MOUNTAINS FROM PROJECT BOUNDARY

	Descripton	**Distance, km**	**Direction**
I.	**River/Nala/Drain/Water Body**		
1.	Ajay River	2.5	NW
2.	Nonia Khal	2.4	S
3.	Suriabani Jhor	5.2	NE
4.	Punta Khal	7.9	SE
5.	Maithon Reservoir	10.2	W

	Descripton	**Distance, km**	**Direction**
6.	Nanid Jhor	12.9	SE
7.	Damodar Nala	14.2	SSE
8.	Mara Jhor	14.5	ENE
9.	Kuruli Nadi	14.6	NE
II.	**Forest**		
1.	PF Near Gaurangdih	Within	
2.	PF Near Narayanpur	0.6	NE
3.	PF Near Kashidanga	0.8	E
4.	PF Near Bankhet	5.6	NE
5.	PF Near Chhota Rampur	5.9	ENE
6.	PF Near Sarbedia	5.9	ENE
7.	PF Near Petuashal	6	NNE
8.	PF Near Horelpahari	6.5	NE
9.	PF Near Shialjuri	6.5	NNE
10.	PF Near Baralia	8	ENE
11.	PF Near Bagchhera	8.6	NE
12.	PF Near Nimdangel	9.7	ENE
13.	PF Near Pahargora	10	E
14.	PF Near Narithol	11.3	ENE
15.	PF Near Eklabpur	11.8	ENE

3.4 Size or magnitude of operation

Allotted block area	370 Ha
Required Mine Lease Area	213.37 Ha
Area required Outside lease	143.305 Ha
Project Area	356.575 Ha
Reserve (table 4.1, 4.3 & 4.5 of approved mining plan)	Net geological reserve, Quarry A, B & C = 129.51 MT Net available geological reserves, Quarry A&C = 68.37 MT (Gourangdih A-27.18 MT+ Gourangdih C-41.2 MT and Gourangdih B-Nil as the area is heavily built up) Net mineable reserves = 61.53 Ha
Rated capacity	2.5 MTPA (para 4.8 of approved mining plan)
Life of the mine	27 years (para 4.8 of approved mining plan)

3.5 Project description with process details

MECL has drilled 57 boreholes within the block during the course of detailed exploration. Mining shall be done by opencast method using shovel and dumper combination is considered to be the most suitable technology due to occurrence of multiple coal seams, parting of varying thicknesses, multiplicity of faults (17 numbers) and steep gradient (8° to 13°) and blasting restrictions in the proximity of built up areas (*Source : Para 5.2, Approved Mining Plan*).

The geological plan and section is given in ***Annexure IV*** to Form-1. Proposed mine closure plan and section is given in ***Annexure V*** to Form-1.

For opencast operation the top soil will have to be removed first with the help of 5 m^3 backhoe in conjunction with 60 T rear dumpers. This top soil shall be dumped separately and to be used at a later date for capping of backfilled area for land reclamation. After stripping of top soil hard overburden will be worked in benches of 12 m height.

The overburden benches will be worked with 5m^3 hydraulic shovels and 60T dumpers. 160 mm dia RBH drills will be used for drilling and blasting will be done with SMS explosives.

All the partings less than or equal to 12 m will also the drilled by 160 mm blast hole drills. Backhoe shoves of capacity 5 m^3 in conjunction with 60 T rear dumpers will be deployed there.

The dumpers will haul the O.B. material initially to the de-coaled zone of Khairabad mine in case of Gourangdih-A quarry and external waste dump in the rise side in case of Gourangdih-C quarry.

For winning coal, conventional application of shovel/dumper mining with drilling and blasting shall be adopted.

The mining operation will be started first in the Gourangdih-A quarry from the north-west. The mining operation will start from the existing Khoirabad face. B-II seam being the thickest among all will contribute the major share of production.

Gourangdih-C will start operation from the 2nd year of mining activity from south west side of the quarry. Gourangdih-C will yield more coal than Gourangdih-A due to its having more reserves

After the development of box cut mining operation will be continued in Gourangdih-A quarry. The quarry will be advancing along the strike as well as towards the dip. As the quarry advances towards dip the upper seams will gradually be met with. The overlying seams R-III(B), R-III(T) and part of R-IV will be available in the first year of working.

The overlying seams B-III(B), B-III(T) and B-IV will intersect in the first year and B-V will met in the third year of quarry operation, B-VI seam will met with the quarry after 11th year of operation.

Calender programme of excavation for the life of the mine is tabulated in Table 3.

TABLE 3
CALENDAR PROGRAMME OF MINE

Year	Gourangidh-A			Gourangidh-C			Gourangidh-A & C		
	Coal (Mte)	OB (Mm^3)	SR (m^3/te)	Coal (Mte)	OB (Mm^3)	SR (m^3/te)	Coal (Mte)	OB (Mm^3)	SR (m^3/te)
1.	0.50	2.50	5.00				0.50	2.50	5.00
2.	1.00	2.70	2.70	0.50	2.50	5.00	1.50	5.20	3.47
3.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
4.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
5.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
6.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
7.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
8.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
9.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
10.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
11.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
12.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
13.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
14.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
15.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
16.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
17.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
18.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
19.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
20.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
21.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
22.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
23.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
24.	1.00	2.70	2.70	1.50	4.55	3.03	2.50	7.25	2.90
25.	0.96	2.04	2.12	1.50	4.55	3.03	2.46	6.59	2.68
26.				1.50	4.55	3.03	1.50	4.55	3.03
27.				0.58	1.03	1.79	0.58	1.03	1.79
Total	**24.46**	**66.64**	**2.72**	**37.08**	**112.73**	**3.04**	**61.54**	**179.37**	**2.91**

Source: Table 7.3, Approved Mining Plan

3.6 Mining method

Opencast mining method has been selected for the proposed mine. Shovel Dumper Mining Technology shall be used for coal and overburden. Mining operation shall be started first in Gourangdih A quarry for the north west. The mining operation will start from the existing Khoirabad face. B-II seam being the thickest among all will contribute the major share of production. Some quantity of devolatilized coal (Jhama) may also be produced during extraction of coal. The other overlying seams will be worked within five years. The nature of the deposit being moderately steep and to minimize

the dilution during mining as far as possible, a combination of horizontal and inclined stripping has been proposed.

After the development of box-cut, mining operation will be continued in Gourangdih-A quarry. The quarry will be advancing along the strike as well as towards the dip. As the quarry advances towards dip the upper seams will gradually be met with. The overlying seams R-III(B), R-III(T) and part of R-IV will be available in the first year of working.

The quarry will reach its full strike length in the third year and it will subsequently narrow down as it advances towards the dip side, the quarry will reach its target (1.00 MTY) in the third year and will continue till 25th year.

The existing road connecting Asansol to Runakuraghai passes over the eastern flank of Gourangidh-C quarry. This road is proposed to be diverted towards further east of the quarry.

The main access trench in Gourangidh-C will be made from the north western part of the quarry. Initially a narrow strip on the floor of B-II along the strike direction will make a link between the entry point and quarry end this will be continued till the 5th year of operation. During this period the evacuation and rehabilitation of part of the Panuria village envisaged in the mining plan is required to be completed. The quarry will continue till the end of the mine life. The target of 1.5 MTY from Gourangdih-C will be achieved in 3rd year of its operation.

In overburden, depending upon the thickness of strata, number of benches will be formed. Development of all OB benches above coal seam other than thin partings will follow definite horizons.

Both in overburden and coal (thick seam) alternate benches will be working and transporting bench. Round the year 3 shifts working is envisaged for coal extraction and overburden removal.

Haul roads for rear dumpers of 60 T is proposed with double lane and shoulders on both sides for movement of dumpers and ancillary equipment.

3.6.1 Blasting pattern

For drilling in top OB and partings 160 mm dia drills have been provided. For soft and medium hard sand stone and bench height of 12 m the burden and spacing have been assumed 5m and 6m respectively. Consumption of explosive would be about 7 te/day assuming specific consumption of 0.32 kg/m^3 in OB. The specific consumption of explosives in coal is adopted as 0.2 kg/m^3. Permission from DGMS for sleeping of holes shall be taken, so that advance charging can be done and all required blasting round can be completed in the desired time.

3.6.2 Mode of transport

Coal will be transported from mine to various consumers across the state. The roads used will depend upon the end use consumer. Railway siding situated about 15 km from the quarry head can also be used.

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 shall be dispatched to various consumers.

3.8 Resource optimization/ recycling and reuse envisaged in the project

The Coal shall not be beneficiated in the ML area. The ROM coal shall be crushed at CHP. The resources which are used in the mining will be recycled by various methods. Spent oil from transformers, once in one or two years shall be sold to the authorized vendors. The used oil from vehicles will also be recycled through authorized vendors. The sump shall be made at one end of strike on the floor of the quarry. The working benches shall be graded suitably so that the entire water will flow down to the sump. The sumps shall be cleaned periodically.

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

3.9.1 Water

Requirement: Total requirement of water is estimated as 530 KLD (0.14 MGD) for potable and 454 KLD (0.12 MGD) for industrial purpose.

Source: Source of raw water required for the project and residential colony shall be Ajoy River. Water from Ajoy River is proposed to be stored in bulk reservoir through intake well and pump arrangement at Ajoy River. The water shall be treated and stored in Overhead tank for domestic use. Till such time mine seepage water becomes available in sufficient quantity for use, above source will be used.

3.9.2 Power

Mine will receive power at 33 kv from West Bengal State Electricity Board. The main sub station shall be located at the dip side of quarry so that two independent 11 kv feeders can be there for Gourangdih A and C respectively.

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

Total quantity of OB including access trenches has been estimated as 179.37 Mcum which includes 3.19 Mcum of soft OB and 176.18 Mcum of hard OB. The OB shall be dumped externally (47.10 hard+3.09 soft= 50.19 Mcum) and internally (129.08 hard + 0.10 soft = 129.18 Mcum). At the end of mining operation the height of external dumps and internal dumps would be about 60 m above adjacent sea level. The maximum RL of internal dump at the end of mining operation would be 220 m AMSL.

However, at the mine closure stage, the dump will be regraded so as to make the top of the dumps nearly level with adjacent ground topography. The areas of both the quarries will be fully reclaimed. The RL of the top at this stage will be 150-160 m above MSL for both the quarries.

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

The mine sump water shall be regularly monitored for pH level and treated, if required, prior to discharge. The waste water from workshop shall be treated in oil water separator followed by settling tank and reused in washing. It is planned to have workshop for maintenance of equipments .

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

The present surface plan is given in ***Annexure III*** to Form 1. The geological plan and section is given in ***Annexure IV*** and the mine closure plan of mine lease is given in ***Annexure V*** to Form 1.

4.0 SITE ANALYSIS

The mine site is located in villages Panuria, Kantapahari, Jamgram, Shibdhawra, Banddhawra, Lalbandh, Gourangdih and Bhuiapara, Barabani CD block, District Paschim Bardhaman, West Bengal.

The Coordinates of mine are:

Latitude	:	23° 48' 30" to 23° 49' 45" N
Longitude	:	85° 57' 45" to 85° 00' 15" E

The topography has gentle undulations and general slope is towards north. The elevation as per approved Mining Plan varies between 135 m a.m.s.l to 174 m a.m.s.l.

4.1 Connectivity

Road: The area is well connected by road. The existing road connecting Asansol to Runakuraghat passes over the eastern flank of Gourangdih C quarry. This road is proposed to be diverted further towards east of the quarry. The other roads in the area are as follows:

Road	Distance &Direction from Project
Jamgram-Baraboni Road	Within
NH-2, Kulti to Durgapur	13.4 km, SSW
Domahani-Jamuria Road	7.2 km, SSE
NH-419, Kulti to Gobindpur	7.8 km, W

Railway Line: Gourangdih was the terminal railway station of Andal Gourangdih section of the Eastern railway and is located about 38 km from Andal, on the Howrah-Delhi line of Eastern Railway. The railway line connecting Gourangdih Station and Andal has since then been abandoned. The nearest railway lines and stations are listed below:

I.	**Railway lines**	**Distance, km**	**Direction**
1.	Sitarampur to Tapasi	7.1	S
2.	Jamtara to Asansol	7.7	W
3.	Dhanbad to Asansol	12.4	SSW
II.	**Railway Stations**		
1.	Rupnarayanpur R.S.	7.8	W
2.	Sitarampur R.S.	12.5	SW
3.	Asansol R.S.	13.0	S

Airport: The nearest civilian airport is Kolkata at a distance of about 195 km SE. Panagarh has an airport for defence purposes at a distance of 57 km SE.

4.2 Land form, land use and land ownership

The area of the block, mine lease, outside mine lease and total project area is given below:

Description	**Area**
Allotted block area	370 Ha
Required Mine Lease Area	213.27 Ha
Area required Outside lease	143.305 Ha
Project Area	356.575 Ha

Present and proposed land use for mining is given in Table 4 and 5 respectively.

TABLE 4
PRESENT LAND USE

Land pattern	Area (ha)
Agricultural Land	48.43
Fallow land (Danga)	44.07
Degraded land (Old quarry area)	61.316
Built up area	60.86
Water body	15.44
Forest land (protected & jungle)	109.459
Non agricultural land for colony (outside core area)	5.00
Non agricultural land for Rehabilitation (outside core area)	12.00
Total	**356.575**

Source: Table 1.4, approved Mining Plan, FC application & WBMDTCL

TABLE 5
PROPOSED LAND USE (HA)

Land use pattern	Total Area (ha)
Quarry area	214.00
External Dump	62.97
Infrastructure	9.5
Rehabilitation colony	12.0
Workers colony	5.0
Road	8.0
Others including safety zone	45.1
Total	**356.57**

Source: Table 1.3, approved Mining Plan, FC application & WBMDTCL

4.3 Topography

The topography has gentle undulations and general slope is towards north. The elevation as per approved Mining Plan varies between 135 m a.m.s.l to 174 m a.m.s.l.

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. shall be provided.

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

4.5 Soil classification

Different types of soil are encountered in different topographical biological and hydrological as well as geological condition within the Paschim Bardhaman district. In the west, coarse gritty soil blended with rock fragments is formed from the weathering of pegmatites, quartz veins and conglomeratic sandstones, where as sandy soil characteristic of granitic rocks and sandstones. This soil is of reddish colour, medium to coarse in texture, acidic in reaction, low in nitrogen, calcium, phosphate and other plant nutrients. Water holding capacity of this soil increases with depth as well as with the increase of clay portions.

Towards the east alluvial soil attains an enormous thickness in the low level plains to the east. This alluvial soil is formed of alluvium brought down by the Ajay, Damodar, Bhagirathi and numerous other rivers. These soils are sandy, well drained and slightly acidic in nature. (*Source: http://bardhaman.nic.in/geography.html assessed on 05.05.2017*)

4.6 Climatic data from secondary sources

The district experiences a climate which is transitional between CWg3 and AW1 types, where 'C' stands for 'warm temperate rainy climates with mild winter', 'W' for 'dry winter not compensated for by total rain in the rest of the year', 'g3' for 'eastern Ganges type of temperature trend' and 'AW1' for 'tropical savanna climates'.

The cold season starts from about the middle of November and continues till the end of February. March to May is dry summer intervened by tropical cyclones and storms. June to September is wet summer while October and November is autumn. (*Source: http://bardhaman.nic.in/geography.html assessed on 05.05.2017*)

Temperature :

The area is situated close to the Tropic of Cancer and thus has tropical climate. In summer, the temperature ranges from 34°C to 37°C. During winter, the temperature varies from 25°C to 28°C.

Rainfall

Average annual rainfall is about 1180 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.

4.7 Social infrastructure available

Hospitals, school, banks etc are present in the villages in buffer zone (within 15 Km of project area). Social infrastructures are existing as per Census 2011 and are listed in ***Annexure VII*** to Form 1.

5.0 PLANNING BRIEF

5.1 Planning concept

Gourangdih ABC Mine has been allotted to West Bengal Mineral Development and Trading Corporation Ltd. It is planned to use the coal produced from the mine for all types of consumers- small, medium and large through commercial sale.

5.2 Population projection

Manpower required for 2.5 MTPA production based on 330 working days shall be 494. Services for security, canteen rest house, colony maintenance, biological reclamation and sanitation are proposed to be out sourced. This will give rise to indirect employment generation by the company.

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

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

The present land use of the project area is referred in Table 4. Proposed Landuse at the end of life of mine is given in Table 5 in Section 4.2 earlier.

5.4 Assessment of infrastructure demand (physical & social)

An assessment of the current social infrastructure available in the villages in and adjacent to the mine lease area in education, health, post and telegraph, banks and communication has been done using Census 2011 data and presented on ***Annexure VII*** to Form 1.

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

5.5 Amenities / facilities

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

The First Aid Room, Rest Shelters, Toilets, Tool /Store Rooms etc shall be 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 4 and at the end of life of mine is given in Table 5 of Section 4.2 earlier.

6.2 Residential area (non processing area)

The area of 5 ha for the colony has been proposed on the north of project boundary. An area of 12 ha has been proposed for rehabilitation and resettlement on the north of project boundary for those persons, who are directly affected and have to be evacuated.

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 shall be prepared to mitigate the problems. The areas considered for plantations shall be as follows:

- 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 operation, amenities for communication, education, health, canteen, etc shall be developed by Company developed and maintained in and around the project area. These amenities will be available to local people also, who are directly associated with the project. Even those not associated in the project related activities shall be benefited by these amenities. With the continuation 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 shall be created to accommodate seepage water as well as to accommodate any sudden torrential rainfall. Heavy duty pumps shall be operated in the sump. Water shall be discharged into the main garland drain by pipeline. The pump of sufficient capacity shall be there to handle any torrential rain in the mining area. Pumps of similar capacities shall also be kept as standby. Water shall be 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

Shibhaora, Bandhdhaora, Lalband falling in Gourangdih A and part of Panuria and Kanta Pahari villages, Bhuia Naupara and Upperpara falling in Gourangdih -C are required to be shifted. These have been identified for rehabilitation and resettlement.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Cost of production

The specific investment will about Rs. 2486.83/ tonne of annual output of coal based on the estimated capital investment. (*Source : Para 19.1.2 of approved mining plan*)

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

This is an opencast mine of capacity 2.50 MTPA, and the extent of project is 356.575 Ha. The life of mine will be 27 years. The environmental impacts can be kept at minimum by adopting proper mitigation measures.