

M/S GUJARAT INDUSTRIES POWER COMPANY LTD.

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PRE-FEASIBILITY REPORT FOR MANGROL-VALIA LIGNITE MINE

AT

VILLAGES: MANGROL, SHAH, CHERETHA, AMANDERA,
HARSANI, TIMBERWA, BHILWADA, NANI PARDI, LUNA,
DANSOLI, RAJGARH AND KOSMADI

DISTRICTS: SURAT AND BHARUCH

STATE: GUJARAT

{[EXTENT: 2059.6829 HA.] (CAPACITY: 5.4 MTPA)}

OCTOBER 2018

(Issue 1, Rev 0)

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PRE-FEASIBILITY REPORT

1.0 EXECUTIVE SUMMARY

The salient features of the project are given below:

Project name	Mangrol-Valia Lignite Mine					
Project proponent	M/s Gujarat Industries Power Company Ltd. (GIPCL)					
Villages in the ML area	Mangrol, Shah, Cheretha, Amandera, Harsani, Timberwa, Bhilwada, Nani Pardi, Luna, Dansoli, Rajgarh and Kosmadi in Mangrol and Valia Taluka of Districts Surat and Bharuch, respectively.					
Latitude (N)	21°23'29.5" to 21°31'16.3"					
Longitude (E)	73°04'40.5" to 73°12'44.0"					
Total ML Area	2059.6829 Ha.					
Existing land use pattern	Present Land Use of ML area as on 01-04-2017:					
	Sl. No.	Particulars	Area in Hectares			
			North Pit	Central Pit	South Pit	Total Area
	1	Mining Pit	150.00	0.00	134.53	284.53
	2	Dumps including top soil dump*	197.00	0.00	80.14	277.14
	3	Infrastructure (Site office, Contractor's Camp, First Aid Centre, Shelters, Pumping Station, Lignite Crusher, Lignite Stack, Weighbridge, Electric Substation)	0.42	0.00	3.48	3.90
		Sub Total (1 to 3)	347.42	0.00	218.15	565.57
	4	Green Belt (common for all pits)				129.97
	5	Service Road, Lignite Transport Road (Common for all pits)**				9.92
	6	Settling Pond				3.45
		Sub Total (4 to 6)				143.34
		Total Disturbed Area (1 to 6)				708.91
	7	Undisturbed area (out of 2059.6829 ha)				1350.7729
		Total ML/ Project area				2059.6829
	* Top soil dump area near North Pit is 20 Ha (part of OB dump) and near South pit is 10 Ha (Part of OB dump).					
** Out of 9.92 Ha, 3.00 Ha belongs to North pit and 6.92 Ha belongs to South pit.						
Lignite Reserve	Reserves				Amount (Mt)	
	Mineable Reserves				163.29	
	Extracted Lignite up to 31-03-2017				15.01	
	Balance Extractable reserve as on 01-04-2017				148.28	
Rated capacity	5.4 MTPA					
Life of the mine	30 years considering 2017-18 as the 1st year. (38 years since the start of production (2009))					
Stripping ratio	5.78 cum/t (since inception)					

Total Waste Generation	8.72 MCum (B) (Top soil) 934.97 MCum (B) (OB)
Method of Mining	Opencast mechanized mining
Blasting	Not required as the strata is soft
Working days	3 shifts of 8 hour each for 270 days
Manpower	1279 (total after expansion)
Transportation	By road through dumpers
Expected cost of the project	Rs. 760.00 Crores
Water requirement	736 KLD (633 KLD Industrial and 103 KLD potable water)
Source of water	The mine sump for industrial and ground water for potable
Power requirement	The power requirement of the mines will be 2000 KVA. It will be met from 11 KV Mangrol and Valia sub stations of DGVCL.
Power source	11 KV DGVCL's Mangrol & Valia Sub- Station

2.0 INTRODUCTION

2.1 Identification of project and project proponent

Project: Mangrol-Valia Lignite Mine

GIPCL is operating Mangrol-Valia Lignite Mine in villages Mosali, Mangrol, Shah, Charetha, Amandera, Harsani, Timberwa, Bhilwada, Nani Pardi, Luna, Dansoli, Rajgarh and Kosmadi in Mangrol and Valia Taluka of Districts Surat & Bharuch since December, 2009. The Mine got Environment clearance from Ministry of Environment and Forest vide letter No. J-11015/38/99-IA.II(M) dated July 231, 2003 for 4.2 MTPA in an area of 2059.6829 Ha. Lignite from the mine is being used for Surat Lignite Power Plant (SLPP) Station-1 of 2X125 MW and SLPP Station-2 of 2X125 MW at Nani Naroli, Dist. Surat. The distance of the power plant from South Pit (Mangrol area) and North Pit (Valia mine) is 6 km and 18 km respectively.

The 1st Mining Plan (2000 version) was approved for a production of 4.2 MTPA over an area of 2080 ha, on the basis of which an ML of 2059.6829 ha was granted.

Subsequently, with the increased forecast of demand of the additional 600 MW TPS, an additional area was sought and the 2nd (2009 version) and the 3rd (2015 version) Mining Plans were approved for 7.4 MTPA for an area of 3710 ha and 3019 ha respectively. The lesser area in the 3rd Mining Plan was arrived by reducing dump area as suggested by MoEF&CC's Expert Appraisal Committee.

The Mining Plans for the expansion capacity could not be implemented due to pending environmental clearance; and on account of non acquisition of additional 959.00 Ha area of the additional applied leases, the decision for one of the approved end use plants, viz. Phase-2 SLPP 2X300 MW, has been deferred indefinitely. Now, GIPCL has decided to setup additional

2x125 MW units instead of 2x 300 MW as Phase-2 expansion of SLPP. Therefore, coal requirement has been revised downwards to 5.4 MTPA.

Therefore, a Revised Mining Plan and Mine Closure Plan (3rd Revision) has been planned for 5.4 MTPA with reduced land requirement of 2059.6829 Ha. This mining lease area had already been granted subsequent to the approval of 1st Mining Plan (2000). However, the depth of Mining has been increased from 110 m to 150 m in line with the Revised Approved Mining Plan (2015).

Project proponent

GIPCL was incorporated in 1985 as Public Limited Company under the auspices of Government of Gujarat. The company is engaged in business of Electrical Power Generation. The total installed capacity of GIPCL is 1009.4 MW inclusive of Thermal, Wind and Solar Power Plant and ordered for expansion of another 75 MW Solar Power Plant. The company has a vision to transform itself into a national level power sector enterprise. The company is having its registered office at P.O. Petrochemical, Vadodara, Gujarat.

It commissioned its first power project, a 145 MW gas based Combined Cycle Power Plant in February, 1992 at Vadodara. Power from this plant is distributed to its promoters in proportion to their original equity holding. The company has set up 112.4 MW capacity of Wind Power Projects as on 31.03.2017 in the State of Gujarat at different sites. (Source: <http://www.gipcl.com/company-profile.htm>, accessed on 05.05.2018)

Lignite for the Power Plant is obtained from captive lignite mines operated by GIPCL at Vastan and Mangrol-Valia in Surat District and Bharuch Districts, respectively. (source: *Revised Mining Plan (3rd Revision) and Mine Closure Plan for Mangrol-Valia Lignite Mine, 2018*)

2.2 Brief description of nature of the project

Mangrol-Valia is a Lignite mine and is an operation mine since December 2009, over an area of 2059.6829 Ha by GIPCL in village Mangrol, Shah, Charetha, Amandera, Harsani, Timberwa, Bhilwada, Nani Pardi, Luna, Dansoli, Rajgarh and Kosmadi in Mangrol and Valia Talukas of Districts Surat and Bharuch, respectively. The project falls under category “A” and item 1(a) as per Schedule of EIA Notification 2006. Mining is being and will be carried out through mechanized opencast mining with HEMM like diesel hydraulic shovels/ dumpers for waste removal and lignite production.

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

Lignite, often referred to as brown lignite, is a soft, brown, combustible, sedimentary rock formed from naturally compressed peat. It has a carbon content around 60–70 percent. Indian lignite deposits occur in the Tertiary sediments in the southern and western parts of peninsular shield

particularly in Tamil Nadu, Puducherry, Kerala, Gujarat, Rajasthan and Jammu & Kashmir. In view of (1) rapidly increasing demand for energy, (2) non availability of lignite deposits for exploitation in the above mentioned states, (3) problems faced in the lignite transportation from far off lignite fields and (4) high cost involved in lignite transportation over a long distance, the scope of using lignite as an alternative source of energy is immense. It is, therefore, considered advantageous to develop lignite mines in these states and utilize them for generation of power as well as for meeting the energy of other industries.

(Source <https://researchreports.careratings.com/industries/annual-review/industry-section-29-2014/lignite-81.html> accessed on 15.05.2018)

The total geological resource of lignite of the country stands at 44,698.14 million tonne as on 01.04.2017. Bulk of the lignite resource of Gujarat (0.71 billion tonne) is found to occur within 150 m depths. (Source: <https://gsi.gov.in/cs/groups/public/documents/document/b3zp/mtyx/~edisp/dcport1gsgovi161863.pdf> accessed on 14.05.2018)

During the year 2012-13, the production of lignite at 46.5 million tonnes increased by 9.7% in comparison to that of the previous year. The production from Tamil Nadu alone accounted for 53.5%. The share of Gujarat in lignite production was 31.3% and that of Rajasthan was 15.2 percent. 27 captive lignite blocks with 1,996.8 million tonnes geological reserves have been allocated in Gujarat (12) and Rajasthan (15) till 31.3.2013. In Gujarat, 5 blocks (701.70 million tonnes) are allocated for power generation and 7 blocks (343.60 million tonnes) for commercial end use. Out of the total 16 mines for lignite that reported production in 2012-13, seven are located in Gujarat, six in Rajasthan and remaining three in Tamil Nadu.

(Source: http://ibm.nic.in/writereaddata/files/01192015114434IMYB_2013_Vol%20III_lignite%202013.pdf assessed on 15.05.2018)

2.4 Demand-supply gap

The XII Plan Working Group for lignite has assessed a lignite demand of 980.50 million tonnes by terminal year i.e. 2016-17. The indigenous lignite supply projection in the terminal year is projected to be 715 million tonnes. The demand-supply gap emerging from these projections would be 265.50 million tonnes, which would have to be met by imports of 35.50 million tonnes of coking lignite and 230 million tonnes of non-coking lignite. The quantum of despatches of lignite was 46.3 million tonnes during the year 2012-13, which was higher by 10.6% as compared to that in the previous year. The mine-head stocks of lignite at the end of 2012-13 were 1,493 thousand tonnes which was 42.06% more than that at the beginning of the year.

(Source: http://ibm.nic.in/writereaddata/files/01192015114434IMYB_2013_Vol%20III_lignite%202013.pdf assessed on 15.05.2018)

2.5 Imports vs. indigenous production

There will not be any import from the proposed expansion of mine.

2.6 Export possibility

There will not be any export of lignite from the block. The entire lignite generated shall be used for the captive use of Thermal Power Plants i.e. at existing Surat Lignite Power Plant (SLPP) Station -1 of 2X125 MW, SLPP Station-2 of 2X125 MW and proposed Expansion of SLPP i.e. Station-3 of 2X125 MW of GIPCL located at a distance of 6 km and 18 km, respectively, from South Pit (Mangrol area) and North Pit (Valia mine) at Nani & Naroli, District Surat, Gujarat.

2.7 Domestic/ export markets

Entire lignite produced from the mine shall be used for the power plants of the company.

2.8 Employment generation (direct and indirect)

Existing and the expansion project shall give total direct employment to 1279 persons. 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 Mangrol-Valia Lignite Block has been allotted by “Industries and Mines Department”, Govt. of Gujarat vide letter no. MCR-1098-1108-CHH-1 dated 06/04/2004 for 350 Ha, MCR-1098-1109-CHH dated 06/04/2004 for 507.48 Ha and MCR-1092-(G-8)-3626-CHH-1 dated 25/10/2005 for 1210 Ha totalling to 2067.48 Ha. However, the actual lease granted (signed) by the Gujarat Government (2004/2006) is for 2059.68.29 Ha and the same has been considered in the current study.

Considering the nature of the Mangrol-Valia Lignite deposit, parameters like depth of occurrence, gentle dip, thin seam thickness, split seam occurrence, environmental characteristics, etc., the lignite deposits will be worked by Mechanized Opencast Mining through Conventional Mining Equipment/ Machinery.

3.1 Type of Project including interlinked and interdependent projects

The project is expansion of lignite mine from 4.2 to 5.4 MTPA. The lignite from the mine will be used for power generation of Surat Lignite Power Plants.

3.2 Location with coordinates

Mangrol-Valia Lignite Mine is present in villages Mangrol, Shah, Cheretha, Amandera, Harsani, Timberwa, Bhilwada, Nani Pardi, Luna, Dansoli, Rajgarh and Kosmadi of Mangrol and Valia Taluka, Districts Surat and

Bharuch of Gujarat state. Location map is given in **Annexure I** of Form 1 of this application.

The mining lease area falls in the Survey of India Toposheet no. 46 G/2 and G/3 and bound by following co-ordinates:

Latitude : 21°23'29.5" to 21°31'16.3"
Longitude : 73°04'40.5" to 73°12'44.0"

3.3 Details of alternate sites & Environmental considerations

Mining being site specific, no alternatives site is under consideration. This is an expansion project. The proposal is for expansion of production of lignite from 4.2 MTPA to 5.4 MTPA.

Environmental considerations: Environmental considerations and protection measures assume greater importance for the project. GIPCL shall ensure that the proposed expansion of mine causes minimum adverse impact on the area. The existing and expansion project is planned to meet all environmental norms and further improve the environment in the area.

Regular monitoring is being carried out by GIPCL at the mine site in line with the requirements of the Gujarat Pollution Control Board and Ministry of Environment, Forests and Climate Change for the existing production as part of EC compliance report. It is being submitted regularly after every six months

There are no National parks, Wildlife Sanctuary, Biospheres reserves within 15 km radius. The nearest National Park is Vansda at a distance of 76 km in SSE direction and wildlife sanctuary is Shoolpaneswar (Dhumkhal) at a distance of 37 km in NE. 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 1**.

TABLE 1
LIST OF WATER BODIES AND FORESTS WITHIN
15 KM OF PROJECT BOUNDARY

Sl. No.	Description	Distance, km	Direction
I	River/ Nala/ Drain/ Water Body		
1.	Bhaga Khadi	Within	
2.	Toksi Nadi	0.5	N
3.	Kim Nadi	1.0	NW
4.	Ukai Right Bank main canal	0.6	W
5.	Amrawati Nadi	8.5	N
6.	Dolatpura main canal	1.5	NW
7.	Kakadapar Right Bank main canal	7.8	SSW
8.	Wasethi Branch	11.6	WSW

Sl. No.	Description	Distance, km	Direction
9.	Walesa Branch	14.2	WSW
10.	Kavery Nadi	13.6	N
11.	Kondhki Khadi	12.1	NW
12.	Vare Khadi	14.6	ESE
13.	Kevaliya Talav	12.0	NW
14.	Isar Dam	14.6	SE
15.	Ratadiya Talav	7.7	NNE
16.	Kadva Talav	14.1	N
II	Forest		
1.	Kalmoi Reserve Forest	9.9	SE
2.	Reserve Forest Near Tuked	8.6	SSE
3.	Reserve Forest Near Lindia	10.0	SE
4.	Reserve Forest Near Ratoti	10.6	SE
5.	Reserve Forest Near Kantavav	7.4	SE
6.	Reserve Forest Near Vad	4.0	ESE
7.	Reserve Forest Near Kevdikund	7.6	ESE
8.	Reserve Forest Near Zankhvav	10.7	SE
9.	Reserve Forest Near Balethi	13.1	SE
10.	Reserve Forest Near Ghodbar	12.2	SE
11.	Reserve Forest Near Wadi	12.8	E

3.4 Size or magnitude of operation

The total extent of the mining lease area is 2059.6829 ha. From the proposed lease area there will be 5.4 million tonnes per annum lignite production. To achieve this rate of production it is proposed to operate the mine in 3 shifts of 8 hour each for 270 days.

The pit wise estimated extractable reserves, overburden (OB) waste quantity and stripping ratio (SR) within pit boundary as per current mining plan is summarised in **Table 2**.

TABLE 2
SUMMARISED RESERVES, WASTE QUANTITY AND STRIPPING RATIO

	NORTH PIT			SOUTH PIT			CENTRAL PIT			TOTAL		
	Lignite (Mt)	OB (MCuM)	SR Cum/t	Lignite (Mt)	OB (MCuM)	SR (Cum/t)	Lignite (Mt)	OB (MCuM)	SR Cum/t	Lignite (Mt)	OB (MCuM)	SR Cum/t
Extracted till 31-03-2017	8.5	44.1	5.19	6.51	45.88	7.05				15.01	89.98	5.99
Current Mining Plan	124.41	623.51	5.01	21.5	191.16	8.89	2.37	39.04	16.47	148.28	853.71	5.76
Total	132.91	667.61	5.02	28.01	237.04	8.46	2.37	39.04	16.47	163.29	943.69	5.78

Source: Table 5.2 of Revised Mining Plan (3rd Revision) and Mine Closure Plan for Mangrol-Valia Lignite mine), 2018

3.5 Project description with process details

Considering the nature of the Mangrol-Valia Lignite deposit, parameters like depth of occurrence, gentle dip, thin seam thickness, split seam occurrence, environmental characteristics, etc., the lignite deposits will be worked by mechanized opencast mining through conventional mining equipment/machinery. No drilling and blasting operations are envisaged for the proposed mine as the Overburden and Interburden in these areas are soft and medium hard in nature and it can be excavated directly by shovels/hydraulic excavators.

Three pits have been planned, South Pit, Central Pits and North Pit (refer Present Surface Plan given in **Annexure IV to Form 1**). From the three pits, there will be peak targeted production of 5.4 MTPA of lignite and total life of mine worked out to 30 year (considering 2017-18 as starting year in calendar program).

The project will achieve target capacity in 9th year. In case the commencement of production is delayed beyond 2017-18 due to lack of statutory clearances, the calendar program will appropriately shift and the mine will end at 30th year from commencement of expansion calendar program.

The access trench (Haul Road) to initial mine cut (IMC) for Mangrol and Valia area has an overall gradient of 1 in 16.

South Pit (Mangrol Area) started operation from the year 2009-10 and the North Pit (Valia Area) started operation from 2012-13. These pits will last till 18th years and 30th year, respectively, after implementation of expansion. The Central Pit which also falls in Mangrol area will start operation from the 22nd year and last till 27th year.

The bench heights (both over burden and lignite) shall be 3 to 6 m which is commensurate with the cutting height of the excavators to be deployed i.e. 3.2 m³ hydraulic excavators for OB and 3.2 m³ hydraulic excavators for lignite. Bench width shall be 9 to 12 m, and individual bench slopes shall be 45° to 60° depending upon the nature of strata. However, overall bench slope will be maintained at 23° to 27°.

The study of slope stability of dump was carried out by CIMFR in August, 2011. The ultimate dump heights of External dump area were assumed upto 50 m i.e. 30 m (with 3 lifts of 10m each) and 48 m (with additional upper 3 lifts of 6 m each). Waste dumps of 50 m and 30 m height shall be sloped at angle of 16° and 20.5°, respectively. The top soil dump will have a maximum height of 30 m and will have an angle of slope at 37° (Angle of Repose).

Year wise production for the life of the mine is tabulated in **Table 3**.

TABLE 3
CALENDAR PROGRAMME OF TOTAL LIGNITE AND OB (INCLUDING
TOP SOIL) FROM NORTH, SOUTH AND CENTRAL PITS
(LIGNITE IN MT AND OB IN MBCUM)

Sl. Year	Calender Year	Lignite Progressive	Lignite Cumulative	OB Progressive	OB Cumulative	SR Progressive	SR Cumulative
	2009-10	0.00	0	5.30	5.30	5.30	5.30
	2010-11	0.68	0.68	15.23	20.53	22.40	30.19
	2011-12	1.33	2.01	11.59	32.12	8.71	15.98
	2012-13	2.40	4.41	9.48	41.60	3.95	9.43
	2013-14	2.34	6.75	14.09	55.69	6.02	8.25
	2014-15	2.77	9.52	12.70	68.39	4.58	7.18
	2015-16	2.68	12.2	11.77	80.16	4.39	6.57
	2016-17	2.81	15.01	9.82	89.98	3.49	5.99
	Past total	15.01		89.98		5.99	
1	2017-18	3.00	3.00	18.85	18.85	6.28	6.28
2	2018-19	3.60	6.60	22.00	40.85	6.11	6.19
3	2019-20	3.60	10.20	22.00	62.85	6.11	6.16
4	2020-21	3.60	13.80	21.60	84.45	6.00	6.12
5	2021-22	4.60	18.40	27.96	112.40	6.08	6.11
6	2022-23	4.60	23.00	27.45	139.85	5.97	6.08
7	2023-24	4.60	27.60	27.45	167.30	5.97	6.06
8	2024-25	4.60	32.20	27.45	194.75	5.97	6.05
9	2025-26	5.40	37.60	34.47	229.22	6.38	6.10
10	2026-27	5.40	43.00	33.75	262.97	6.25	6.12
11	2027-28	5.40	48.40	33.75	296.72	6.25	6.13
12	2028-29	5.40	53.80	33.75	330.47	6.25	6.14
13	2029-30	5.40	59.20	33.75	364.22	6.25	6.15
14	2030-31	5.40	64.60	33.76	397.98	6.25	6.16
15	2031-32	5.40	70.00	33.97	431.95	6.29	6.17
16	2032-33	5.40	75.40	33.97	465.92	6.29	6.18
17	2033-34	5.40	80.80	33.99	499.91	6.29	6.19
18	2034-35	5.40	86.20	25.45	525.36	4.71	6.09
19	2035-36	5.40	91.60	20.79	546.15	3.85	5.96
20	2036-37	5.40	97.00	28.08	574.23	5.20	5.92
21	2037-38	5.40	102.40	28.08	602.31	5.20	5.88
22	2038-39	5.40	107.80	33.08	635.39	6.13	5.89
23	2039-40	5.40	113.20	33.08	668.47	6.13	5.91
24	2040-41	5.40	118.60	38.08	706.55	7.05	5.96
25	2041-42	5.40	124.00	38.08	744.63	7.05	6.01
26	2042-43	5.40	129.40	34.40	779.03	6.37	6.02
27	2043-44	5.40	134.80	25.44	804.47	4.71	5.97
28	2044-45	5.40	140.20	25.43	829.90	4.71	5.92
29	2045-46	5.40	145.60	18.00	847.90	3.33	5.82
30	2046-47	2.68	148.28	5.81	853.71	2.17	5.76
Total current mining plan		148.28		853.71		5.76	
Total Including past production		163.29		943.69		5.78	

Presently, 0.60 MTPA is supplied from Vastan Lignite Mine of GIPCL which will exhaust by 2024-25

Source: Table 5.4 of Revised Mining Plan (3rd Revision) and Mine Closure Plan for Mangrol-Valia Lignite mine), 2018

Balance life of the mine, considering a capacity of 5.4 MT lignite production per annum, will be 30 years. Lignite is being dispatched by road through dumpers 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 lignite and overburden. Three pits have been planned, South Pit and Central Pits in Mangrol area separated by Moti River and North Pit in Valia area separated by the railway line. South Pit (Mangrol Area) started operation from the year 2009-10 and the North Pit (Valia Area) started operation from 2012-13. These pits will last till 18th and 30th, respectively. The Central Pit which also falls in Mangrol area will start operation from the year 22nd and last till 27th year. The annual targeted production of 5.4 MTe will be achieved from the year 2025-26 (9th year).

As the overburden and interburden in these areas are soft and medium hard in nature it can be excavated directly by shovels/ hydraulic excavators. As such no drilling and blasting operations are envisaged for the proposed mine.

Stage wise development plan

1st to 5th year stage

South Pit will be operational in 5th year and shall generate 1.00 MT lignite and 11.18 Mcum overburden (including top soil).

North Pit shall be operational from 1st year and shall generate 3.60 MT lignite and 16.78 Mcum overburden (including top soil).

6th to 10th year stage

Total OB generation (including top soil) from the mine will be 150.57 mcum out of which 143.78 mcum pure OB will be backfilled {23.03 Mcum backfilled into Vastan Pit, 120.75 Mcum will be backfilled into South Pit and North pit} and 5.89 Mcum will be disposed into crown dump. 23.30 Mcum OB will be re-handled from D4 and disposed into Vastan pit.

Total lignite production will be 24.6 MT out of which 6.60 MT from South Pit and the balance 18.0 MT from North Pit.

11th to 15th year stage

Total OB generation from South Pit and North pit including TS will be 168.98 Mcum. All the OB generated will be backfilled into the two pits.

Total lignite production from South Pit and North pit will be 27 MT.

16th to 20th year stage (2032-33 to 2036-37)

Total OB generation including Topsoil will be 142.28 Mcum and 27.00 MT lignite will be produced. Total backfilled OB will be 140.76 Mcum.

South pit will generate 31.08 Mcum OB with lignite production of 4.90 MTPA. South pit will exhaust in the 18th year.

North pit will generate 111.20 Mcum with a lignite production of 22.10 MT.

21st to 25th year stage

Total OB generation including TS will be 170.40 Mcum and lignite production will be 27.00 MT.

North pit will remain operational and will generate OB 140.40 Mcum including TS with lignite production of 25.60 MT.

Central pit/area will be started in 22nd year but will not produce any lignite in this year. Lignite production will start from 23rd year. Total OB generated will be 30.00 MCuM and lignite 1.40 MT.

26th to 30th year stage

Total OB generation including TS will be 109.08 MCuM and 24.28 MTe lignite will be produced.

North pit will generate OB 100.05 MCuM OB including TS during this period with lignite production of 23.31 MT.

The Central pit will operate only for 6 years (22nd to 27th year). The pure OB volume of 21.62 MCuM will be rehandled from dump D3 and disposed off into South pit void during the last two operational i.e. 7 MCuM during 29th year and 14.62 MCuM during 30th year.

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.

ROM lignite from hydraulic shovels will be transported by 35 T body trucks up to pit head where feeder breakers are installed. Sized lignite from the Mine feeder breaker will be transported to the Power Plants. Lignite from the North Pit to TPP will be transported through the internal road and public road which is black topped and is capable to transport the lignite. The internal roads are fenced with drains on either side. The distance of the TPP from South Pit (Mangrol area) and North Pit (Valia mine) is 6 km and 18 km respectively.

3.8 Resource optimization/ recycling and reuse envisaged in the project

The lignite does not require any beneficiation as sized lignite is directly useable in power plant. The resources which are used in the mining are and will be recycled by various methods. Spent oil from DG Sets, is and will be 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: The net water requirement of the project is 736 KLD out of which 633 KLD is industrial water requirement and 103 KLD is the potable water requirement.

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 recycled after vehicle washing.

3.9.2 Power

The mine will receive power from 11/ 440 KV DGVCL's Mangrol & Valia Sub- Station to cater to the power requirement.

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

Total waste includes over-burden, intercalations in all the three horizons and also the inter-burden between two successive horizons.

The total topsoil generated will be 8.72 MCuM (B) during the life of the mine. Unutilized part of the same will be stacked separately in a soil stack pile located near the pits. The excavated top soil from Mangrol and Valia areas will be kept an area of 30 Ha as earmarked. The height of the dump will be maintained 6 m. The angle of slope will be maintained at 36°.

There are 4 dumps existing at present, D1, D2, D3 and D4. Dumps D1, D2 and D4 belong to North pit. Dumps D1 and D2 are located on the east of the North Pit over non- lignite bearing area, which will not be re-handled. But Dump D3 located on the SE of South Pit and Dump D4 located on the SW of North pit over the lignite bearing area, will have to be re-handled later.

Total area under surface dumps at present is 267.12 Ha which will increase to 286.80 Ha by the end of 5th year. Later it will reduce to 56.56 ha by the end of life of mine due to rehandling of D3 and D4 as 230.24 Ha area will be re-handled. Out of total Surface OB dump 144.80 ha, 64.66 ha will be planted and 80.14 ha will be converted into agriculture during post mine closure.

Solid waste generated from manpower is and will be mostly of organic and recyclable 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. The same will be continued in future also.

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

4.1 Connectivity

Road: SH 166 passes through the property and runs almost along the railway line and joins Bombay-Ahmedabad NH8 (towards west) at Kosamba at a distance of about 23 km on west. The district HQ Surat is about 55 km by road and Bharuch about 50 km. Rajpardi is at about 48 km south.

Railway Line: Kosamba is the nearest Rly station (about 28 km west) on Baroda-Mumbai railway line of western railway.

Airport: The nearest airport is Surat and Vadodra at a distance of about 52 and 90 km. respectively.

4.2 Land form, Land use and land ownership

The area of Mangrol Valia Lignite Block is 2625 ha. The Mining Lease was executed for 2059.6829 ha out of which 1778.3629 ha falls within the block and the remaining 281.32 ha outside the block in non-lignite bearing area. No increase in existing ML area is proposed for increasing the production from 4.2 to 5.4 MTPA.

Pre Mining, present and post mining landuse is given in **Tables 4, 5 and 6** respectively.

TABLE 4
PRE-MINING LANDUSE AS PER MINE LEASE DEED

Particulars	Area in Hectares
Protected Forest land (social forestry along existing SH166)	4.80
Agricultural land	1953.34.26
Waste land	23.53.93
Nallah / River	00.50.00
Road	10.11.92
Gaucher	67.3818
Total ML	2059.68.29

TABLE 5
PRESENT LAND USE OF ML AREA AS ON 31-03-2017

Sl. No.	Particulars	Area in Hectares			
		North Pit	Central Pit	South Pit	Total Area
1	Mining Pit	150.0000	0.0000	134.5300	284.5300
2	Dumps including top soil dump*	197.0000	0.0000	80.1400	277.1400
3	Infrastructure (Site office, Contractor's Camp, First Aid Centre, Shelters, Pumping Station, Lignite Crusher, Lignite Stack, Weighbridge, Electric Substation)	0.4200	0.0000	3.4800	3.9000
	Sub Total Disturbed area (1 to 3)	347.4200	0.0000	218.1500	565.5700
4	Green Belt (common for all pits)	129.9700			129.9700
5	Service Road, Lignite Transport Road (Common for all pits)**	9.9200			9.9200
6	Settling Pond	3.4500			3.4500
	Sub Total Disturbed area (4 to 6)	143.3400			143.3400
	Total Disturbed Area (1 to 6)	708.9100			708.9100
7	Undisturbed area	1350.7729			1350.7729
	Total ML area as per GPICL's land use (1 to 7)	2059.6829			2059.6829

* Top soil dump area near north pit is 20 ha (part of OB dump) and near south pit is 10 ha (part of OB dump).

** Out of 9.92 ha, 3.00 ha belongs to North pit and 6.92 ha belongs to South pit.

TABLE 6
PROPOSED LAND USE AT END OF LIFE OF MINE (30 YEARS)

Break-up as per proposed land use	Area in Hectares				
	Mangrol Area		Valia Area	Common for the project	Total Area
	South Pit	Central Pit	(North Pit)		
I. Disturbed Area					
1. Mining Pit Excavation	348.65	71.41	1032.94	-	1453.00
2. OB Dumps including Black cotton soil	80.14	0.00	64.66	-	144.80
3. Top Soil Stacking (included in OB dump)**	0	30.00	0	0	30.00
4. Infrastructure i.e. Site office, Contractor's Camp, First Aid Rooms, Shelters, Pumping Station, Feeder Breaker, Weighbridge, Electric Substation	0.42	0.00*	3.48	0	3.90
5. Service Road, Lignite Transport Road	3.00	0.00*	6.92		9.92
6. Settling ponds combined	0		0	10	10
7. Green Belt combined	0		0	151.82	151.82
Sub Total (I)	432.21	101.41	1108	161.82	1803.44
II. Undisturbed Area					256.2429
Grand Total (I+II) equal to ML granted					2059.68.29

* Area common with South Pit

** Top soil stack area is common with OB dump areas (10 ha in Mangrol area) South Pit, 20 ha in Valia Area (north pit).

4.3 Topography

The area is more or less flat with minor undulations. The general ground elevation is in the range of 36 to 46 m above MSL. However, in the North-Eastern part of the Block the elevation is in the range of 45 to 52 m above MSL. The general slope of the area is from north-East to south-west.

4.4 Existing infrastructure

The mine is already operational as per the 1st Mining Plan (2000 version approved on 23/01/2001 by MoC) for a production of 4.2 MTPA. It is proposed to be operated at enhanced capacity of 5.4 MTPA. The facilities are already in place. However, they will be further strengthened to take care of the additional about 30% of excess production.

Since all the three pits are away from each other, it is proposed to have three sets of service facilities, i.e. one set for each Pit. However, as the Central pit will be started after 3 years of exhaustion of the South Pit, only shifting of location will be required.

Group Vocational training centre at Vastan Lignite Mine will also cater to Mangrol-Valia Lignite Mine. Site service facilities such as Mine office, stores, workshop, canteen, first- Aid Centre, Rest Shelter and Pithead Bath will be provided in each pit.

For access to the buildings, good roads shall be planned with proper paving, drainage system and good landscaping through barriers of green belt, which will help abate pollution levels as well as help easy operability.

4.5 Soil classification

Alluvium composed of silty loam, black cotton soil and also Bentonitic clay or Kankar constitute the unconfined or phreatic aquifer system in the Mangrol North and Valia mining areas. The most important chemical property of the soil as a medium of plant growth is the pH of the soil. Results of the soil samples show that the pH values are normal (not alkaline or acidic). Soil conductivity of all the samples are below 1.0 which is normal for crop response. The soil samples are generally silty or loamy, which is good for crops. The organic matter of all samples is low in nature which would require attention.

4.6 Climatic data from secondary sources

The area is warm & humid and is having sub-tropical climate.

Temperature

Temperature variations as studied for the period from 1992 to 2006 show that the temperature is as high as 40.20°C in summer and as low as 12.60°C in winter. However, the normal summer temperature varies from 33.0°C to 40.0°C and winter temperature from 14.0°C to 17.0°C.

Wind Speed and wind direction

The wind direction is mostly from South and South-West in summer and North and North-East in winter but occasionally from other direction depending on prevailing atmospheric conditions.

Relative Humidity

Relative humidity as observed at Surat Observatory shows a value of about 60% humidity in the morning in all months except November when it was marginally lower at 59%. In the evening, except for the months from May to September, the values are less than 50%.

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

After the first approval, the Mining Plan was revised twice (increase in area and production) but neither of them could be implemented due to pending environmental clearance. One of the approved end use plant, viz. Phase-2 SLPP 2X300MW is not coming up, as the decision has been deferred indefinitely on account of non acquisition of additional 959.00 Ha area of the additional applied leases.

Instead, GIPCL has decided to setup 2x125 MW units as Phase-2 expansion of SLPP. Therefore, coal requirement has been revised downwards to 5.4 MTPA. However, the depth of Mining has been increased from 110 m to 150 m in line with the Revised Approved Mining Plan(2015). This application has been planned for 5.4 MTPA with reduced land requirement of 2059.6829 Ha, the mining lease for which had already been granted subsequent to the approval of 1st Mining Plan (2000).

5.2 Population projection

Although all the mining machineries will be outsourced/ hired as being practiced at present, for manpower estimation, three shift-working for all the seven days of a week has been envisaged for operating the main equipment required. Office and allied functions are already computerized. Security, canteen and some other services are also out-sourced. Modern communication facilities are adopted. The manpower for 5.4 MTPA productions works out to about 1279 persons. The manpower has been kept to minimum focusing on safety, environment and production supervision.

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 4** and **Table 5**. Landuse at the end of life of mine is given in **Table 6** 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. The site service facilities such as mine office, stores, workshop, canteen, first- Aid Centre, rest shelter and pithead bath will be provided in each Pit.

6.0 PROPOSED INFRASTRUCTURE**6.1 Industrial area (processing area)**

The activity wise detail of present landuse is given in **Table 5** and at the end of life of mine is given in **Table 6** of Section 4.2 earlier.

6.2 Residential area (non processing area)

Colony of the company is already present near mine area and that will be sufficient to cater for additional manpower

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 is being and 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, amenities for communication, education, health, canteen, etc have been developed by GIPCL 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

There are no additional inhabited villages to be rehabilitated for increase in production. There are Vadsol hamlets with 83 hutments and Kosmadi Falia (Rajgarh Gram Panchayat) with 35 hutments in the executed ML lease area, which are proposed to be shifted as per the R & R policy.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Cost of production

The cost of production at pit head is about Rs. 949.00 per tonne of lignite approximately.

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

This is an opencast mine of existing capacity of 4.2 MTPA. The expansion is proposed to 5.4 MTPA without increase of lease area but with increase of depth of mine. The life of mine will be 35 yrs (production) + 3 yrs for final closure of mine Total = 38 years since inception. The environmental impacts will be kept at minimum by adopting proper mitigation measures.