MAHARASHTRA STATE POWER GENERATION CO. LTD.

MAHAGENCO
Maharashtra State Power Generation Co. Ltd.
CIN: U40100MH2005SGC153648

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Ref: CGM /E&S/Coal Con./EC Amdt./Khaperkheda/ 143/ 1821 Date: 12 FEB 2018

To
The Director,
IA. Division (T)
Ministry of Environment , Forest & Climate Change
Indira Paryavaran Bhavan,
Jor Bagh Road, Aliganj,
New Delhi -110003

Sub:-Application for Amendment in Environmental Clearance issued to Mahagenco's 1x500 MW Coal Based Thermal Power at Khaperkheda District Nagpur Maharashtra.

Ref: 1. (File No.: J-13011/24/2005-IA.II(T) & Online No.: IA/MH/THE/10223/2005) (item no:11.5)

2. MoM of 11th EAC held on 26/10/2017.

Dear Sir,

Mahagenco's proposal for Change of mode of transportation of coal from Gondegaon and adjacent coal mines of WCL to the Khaperkheda TPS was discussed in the 11th EAC held on 26/10/2017. The project was deferred to submit the additional document / information for re-consideration.

As per the requirement, the related documents are enclosed herewith for ready reference and further needful action. It is requested to reconsider the amendment in the EC condition for change of mode of transportation of coal.

Submitted for your kind consideration please.

Thanking you,

Yours faithfully

Shri. Nitin S. Wagh
Chief General Manager (E&S)
Mahagenco

Brief Summary

Item No. 11.5

1x500 MW Coal based expansion project at Khaperkheda Thermal Power Station at Khaperkheda, Nagpur, Maharashtra by M/s Maharashtra State Power Generation Company Limited - reg. Amendment in Environment Clearance. File No: J-13011/24/2005-IA.II(T) & Online No: IA/MH/THE/10223/2005

Maharashtra State Power Generation Company Limited proposed to amend the transportation mode of raw coal from Gondegaon and Bhanegaon mines of WCL. Presently the coal is being transported by road by tarpaulin covered trucks/tippers. The proposed mode will be Cross Country Conveyor System from Gondegaon and Bhanegaon mines to Khaperkheda Thermal Power Plant. The length of new transportation mode will be 8.2 km. The transport system will pass over 8 nallahs, two rivers – Khanhan and Pench; 5 major roads, 4 HT lines and 16 LT lines. During transportation water will be sprinkled over the coal to minimize the dust spreading which will reduce the chances of air pollution. . The pipe conveyor system will pass through villages Gondegaon, Ghatrohana, Dorli, Bina, Bhanegaon, Khaparkheda.

The transported coal will not come in direct contact with the river or nallah water, so there will not be water pollution also.

The basic parameters for the conveyor are as follows.

Basic Parameter for the Pipe Conveyors

Sl. No.	Description	Details
1.	Material to be conveyed	Coal
2.	Bulk density	0.8 T/m3 – 1.2 T/m3
3.	Maximum lump size	(-) 100 mm
4.	Moisture content	8 %
5.	Material Temperature	Ambient
6.	Type of conveyor	Pipe Conveyor.
7.	Conveyor design capacity	1200 TPH.
8.	Conveyor c/c distance (For External pipe Conveyors)	A. Gondegaon mines to IP – 5.36 KM B. IP to Khaparkheda – 2.84 KM
9.	Conveyor lift	20 m, each
10.	Troughing angle	35°,for troughed portion

Sl. No.	Description	Details
11.	Belt type	Steel Cord
12.	Pipe dia.	450 mm
13.	Belt speed	4.75 MPS
14.	Type of take-up	Horizontal Loop Take-up.

The cost of the project will be approx. Rs 516 Cr. 2.79ha of private land will be purchased on mutual agreed terms. The other source of coal from SECL and Gare Palma and its transportation mode i.e. by rail will remain same.

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CHAPTER 1: INTRODUCTION

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CHAPTER 1: EXECUTIVE SUMMARY

This chapter encapsulates the background information about the project ,brief description of the scheme. Investment requirement and benefits of the project have also been highlighted.

1.1 CONTEXT

Maharashtra State Power Generation Co Ltd (MSPGCL) is engaged in the business of power generation and has been vested with power generation assets. It has the overall highest generation capacity amongst all the state power generation utilities in India.

Western Coalfields Limited (WCL) is one of the eight Subsidiary Companies of Coal India Limited (CIL) which is under administrative control of Ministry of Coal. The Company incorporated under the Companies Act, 1956 has its registered office at Nagpur. It has mining operation spread over the states of Maharashtra (in Nagpur, Chandrapur & Yeotmal Districts) and Madhya Pradesh (in Betul and Chhindawara Districts). The Company is a major source of supplies of coal to Mahagenco.

MSPGCL intends to find out the most techno-economic conveying system for transporting the Coal from WCL's open cast mines to its Koradi & Khaperkheda Thermal Power Stations near Nagpur. Coal from WCL's Gondegaon, Kamptee & Inder mines will be taken from a single point feeding at Gondegaon to be provided by WCL. It was decided that combined coal from Gondegaon will be delivered at an intermediate junction point at Bhanegaon where coal from other two mines i.e. Singhori & Bhanegaon mines will also be fed. From this junction point, coal will be feed into Khaperkheda for consumption at Khaperkheda plant. One diversion line is envisaged from Khaperkheda to Koradi plant replacing the existing ropeway route.

1.2 Technical details of the project

System Description:

Refer drawing No 15C12-001-DWG-P-FS01, Rev 03 entitled "Flow Sheet "attached.

Coal from Gondegaon and adjacent mines will be delivered to a coal dump hopper (1000 HP-01) by 30 Tons tipping trucks. The Hopper will be in twin section, each section will have a capacity of 150 M^3. Below the dump hopper one apron feeder (1000 AF-01) will be provided which will carry coal @ 1200 TPH and will feed to Conveyor no. 1001-CCPC 01 tail end. A transfer point has to be fabricated and erected at tail end of 1001 CCPC-01. This transfer point will accommodate discharge of conveyors from Inder & Kamptee Mine end which will come at later date. Conveyor No. 1001 CCPC-01 is of about 5.36 KM long and will feed coal at a common point (hereinafter

called as Intermediate Point or I.P), where coal from Bhanegaon and Singhori mines will also be delivered through conveyors 1000 BC-01 & BC-02 which are included in the scope of this tender specification.

From I.P, coal will be delivered to conveyor no. 1003 CCPC-01 which is approximately 2.84 Km long and will deliver coal to Coal bunker no. 1003 BN-01 at Khaparkheda TPS.:

Khaparkheda:

In Khaparkheda,, Coal from long distance conveyor 1003 CCPC-01 will feed to bunker no. 1003 BN-01 inside Khaparkheda TPS. This bunker will have twin mouth. One mouth will feed to long distance cross country conveyor no. 1003 CCPC-02 for transport to Koradi TPS. The other mouth will be fed to a diverter gate. One path will be to deliver coal to 1003 BC-02 for onwards discharge to existing conveyor 103 A/B. The other path will convey coal by conveyor no. 1003 BC-01 and discharge to a coal stock pile through a telescopic chute. Bulldozer will transfer these piled coal and will discharge to conveyer no. 1003 BC-02 via emergency hopper and vibrating feeder.

Five no. coal sampling unit and five no. coal analyzer are to be provided at the locations as shown in refer flow diagram.

Koradi:

Coal from long distance conveyor 1003 CCPC-02 (approx. 7.9 KM long) will feed to bunker no. 1002 BN-01 inside Koradi Plant. Coal from coal bunker (1002 BN-01) will be fed to a belt conveyor no. 1002 BC-02 and will be fed to existing conveyor No. 2A/2B. Another stream will be taken from 1002 BN-01 and will be fed to either of two vibrating screen at crusher/screen house. The undersize will be fed to conveyor 1002 BC-01 and the oversize after crushing will be fed to same conveyor for discharge into a coal stock pile through a telescopic chute.

1.3 Investment Requirement

Investment requirement of the project has been worked out be Rs.516 Crores (Excluding cost of mandatory spares, taxes, duties & IDC) considering the most suitable option of conveying as the basis i.e. pipe conveyor. The cost estimates have been estimated in two parts as presented under.

- EPC cost : Rs.439 Crores

  This is the cost component which shall be incurred on the EPC scope of the scheme. The same includes the following majorly.

- Electro-mechanical machinery
- Erection
- Mandatory Spares.
- Civil Work
- Civil & soil testing cost
- GST

- **Non EPC Cost: Rs.77 Crores**

  This is the cost component which shall be incurred on the Non-EPC scope of the scheme.

  This includes the cost against enabing cost, Contingency, IDC, etc.

1.4 Key Benefits & Risk

Existing transport by trucks involves multiple problems which are presently being faced by Mahagenco. The same are listed below:

- Multiple Handling of coal
- Safety Issues
- Soft Factors like truck union problems, dependability over contractors.
- Environment Sustainability
- Poor maintenance of crusher & power availability

To avoid above said problems the mechanization of coal transport system has been proposed. The installation of pipe conveyor will improve the system technically. Reliability of the system and environment degradation due to manual handling of coal can be avoided.
The same are explained below:

Elimination of multiple handling: Transfer by trucks involves series of handling which induces problems like stoppage time, delayed delivery of coal, environment sustainability issue. Mechanized transfer by pipe conveyor will eliminate such problems.

Consistency: The transfer by trucks do not have transfer of coal at a consistent rate since it depends upon multiple factors like trucks availability, breakdowns, factors affecting road transport.

Mechanization of transport system will eliminate the problems related to below said factors increasing the reliability of the system significantly.

- Truck Union Problems
- Dependability on the contractors
- Downtime due to sudden breakdown of vehicles
- Inconsistency in the capacity of the transport system etc.

- Tracking the incoming material flow to the plant Environment Sustainability: Open dumping, crushing, multiple loading, and transportation in open trucks results into degradation of environment and justifies the installation of a totally closed conveying system i.e. pipe conveyor.
- Safety Issues: A large fleet of trucks plying Mines to Plant and vice versa increases chance of accidents and loss of man & material. A mechanized system can possibly reduce the risk of accidents due to movement of trucks.

  Key risk of the project installation involves the interference of unauthorized persons since the pipe conveyor will pass through nearby villages. The same has been taken care by providing elevated pipe conveyor gallery and restricted access to pipe conveyor level. The route selection has been done considering minimum traversal through private land having twin benefits of low CAPEX cost and problems expected due to human interference.

1.5 Cost Benefit Analysis

Cost benefit analysis for the said project is non-significant, due to the fact that such Infrastructure project, are more for the reliability of transport system and hassles involved with road transportation rather than economic benefits.

Presently the coal is being handled by trucks. The benefits achieved by installing proposed conveying system are more qualitative in nature rather than quantitative, hence cannot be quantified in terms of monetary value. Existing system of road transport leads to many operational problems.

1.6 Implementation Plan

An implementation period of **21 months** is expected for the project execution from the date of effectiveness of the Contract to EPC Contractor till completion of the project.

As project is spread over a large area, some portion under WCL, some portion in the vicinity of private control requiring acquisition, and land of Mahagenco under different usages the project implementation requires close monitoring of the project.

Construction and execution of project is spread over long distance in various soil conditions, crossing of water bodies requiring (through a long span bridge), crossing of high tension power distribution lines etc. Will entail varieties of approval from various local/state and government bodies.

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17.0 Project Cost

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Annexure – 1.2: Project Cost – Electrical Ex-works.

Annexure – 1.3: Project Cost – C&I Ex-works.

Annexure – 1.4.1: Enabling Cost.

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Annexure – 2.1: Project Implementation Schedule

Annexure – 2.2: Phasing of Expenditure

Drawings

DCPL Drawings

1.0 Introduction:

The Techno Economic Feasibility Report for coal transportation from Gondegaon mine to Koradi & Khaperkheda prepared by Development Consultants (P) Ltd. and submitted to MSPGCL has already established that most preferred techno-economic mode of transport of coal from WCL's open cast mines at Gondegaon, Bhanegaon & Singhori to Koradi & Khaperkheda will be thru' long distance pipe conveyor.

This Detail Project Report works out a scheme for coal transportation from mines to Koradi & Khaperkheda Power Plant with a view to the following:

- FOR KHAPARKHEDA TPS
  - Cross Country transport from Mines to Khaperkheda plant and transport to Koradi TPS
  - Unloading
  - Stockpiling
  - Reclaiming
  - Conveying and feeding to new plant.
- FOR KORADI TPS
  - Cross Country transport from Khaparkheda to Koradi TPS
  - Unloading at Koradi TPS
  - Crushing and screening
  - Stockpiling
  - Reclaiming
  - Conveying and feeding to existing conveyors

2.0 Need For The Project:

Presently Koradi TPS and Khaperkheda TPS are receiving coal from various sources through various modes. One of the modes is coal transportation from nearby mines through road transport. Such road transport not only incurs high amount of cost / km / Ton of coal but also the associated social and environmental problems are huge. The roads become congested, prone to accidents, the environment becomes dirty and greenhouse gas emission through transport system is also alarming.

With a view to find out alternate mode of transport, which will be most appropriate for this length of travel, the techno economic feasibility report has already been prepared which establishes pipe conveyor as the most preferred mode of transport for bringing coal to the power plant.

Moreover, after unloading at the plant, it is essential to deliver coal to the existing conveyors through additional conveying system. Some storage at plants is also envisaged to take care of any emergency shutdown of cross country conveyor system.

Therefore, a system is needed which can bring coal from mines to plant by pipe conveyors and subsequently deliver to the existing stations through additional conveying and stacking / reclaiming system.

Preliminary survey for the route alignment was taken up by Mahagenco.

The primary route survey for finalization of the transportation route was awarded to MNEC Consultants Pvt. Ltd . They carried by the survey and submitted the same to DCPL in the kick off meeting dated 02.11.15. MNEC proposed two routes Route – I & Route – II from Gondegaon Mines to Koradi TPS. Route – I consisting 11 nos of TP's & having around 11 Km distance. Route – II is around 14.7 Km long having 9 nos of TP's. Out of two routes, Route – I was selected as most suitable route for transportation by MNEC as the same follows the old dismantled ropeway route, no major obstacle to existing Koradi TPS, less habitation, no forest, etc. The summary of crossings of Route – I is tabulated below:

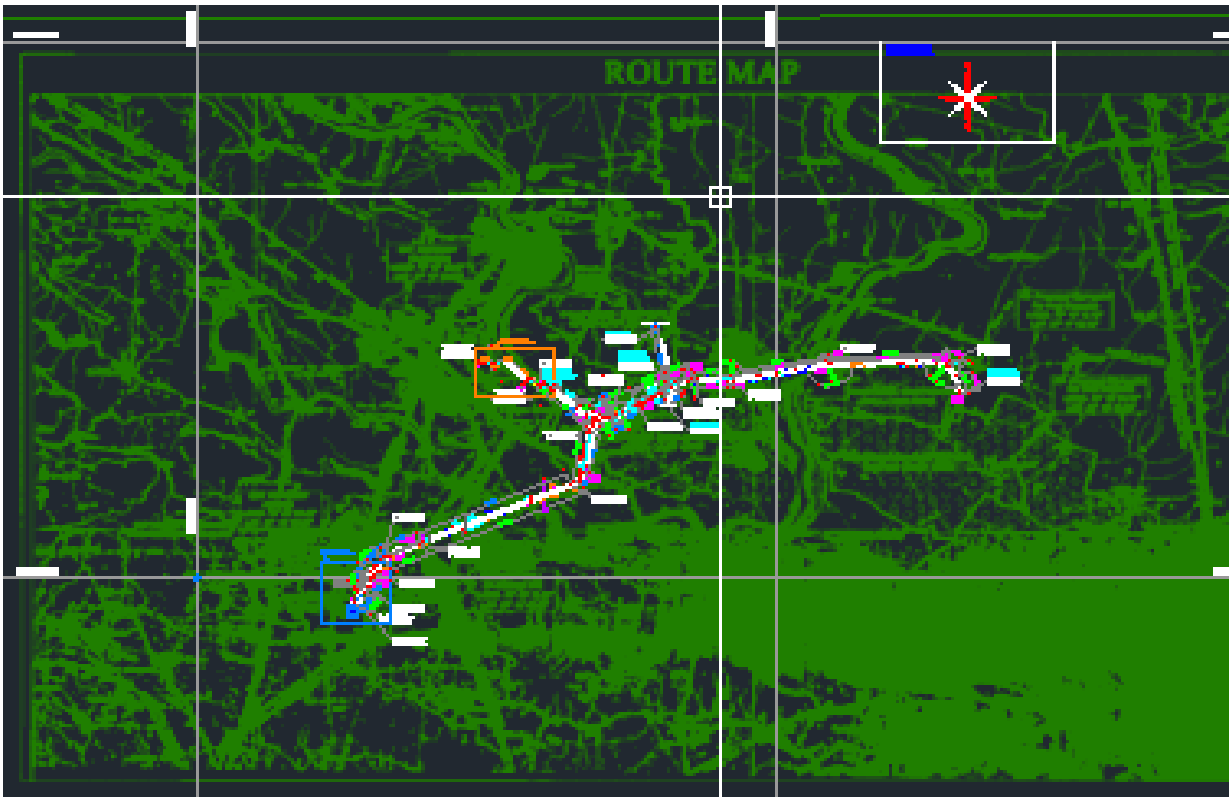
Sl. No.	Description of Crossings	Route No. – I
1.	Road	03
2.	SH	00
3.	NH	00
4.	Railway	02
5.	HT lines	02
6.	LT Lines	15
7.	River	03
8.	Canai / Nalah / Stream etc.	05
9.	Length in Km	11.035
10.	WCL Land Crossing Length (Km)	4.13
11.	Forest (Zudapi Jungle) in Km	Nil

12.	Ash Pipeline Crossing	02
13.	Old dismantled ropeway length in Km	3.065
14.	Length of Existing Ropeway (km)	Nil
15.	No. of Turning Points	11

In Route No. – I MNEC has indicated the survey route from Gondegaon to Koradi TPS Old units.

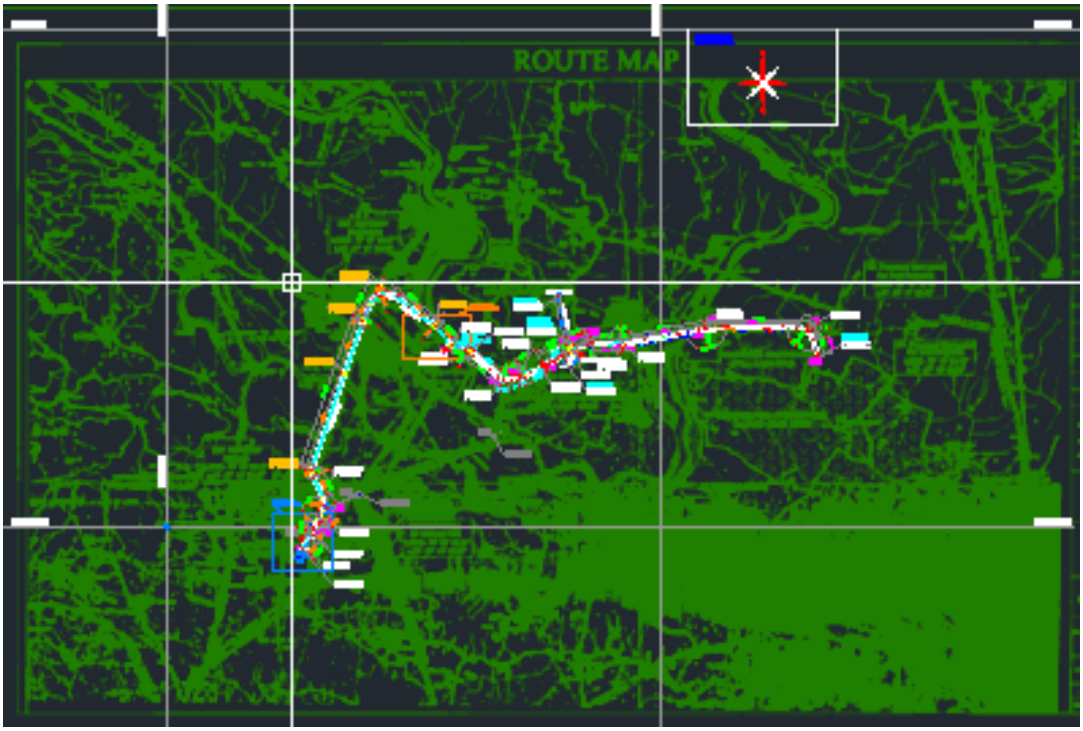
As suggested by MNEC, This report considers Route – I to transfer coal from Gondegaon / Bhanegaon to Koradi TPS. The total route distance of coal transportation from Gondegaon mines to Koradi TPS is around 14.7 Km. as per MNEC route survey map. (dwg. no. ROUTE MAP/MNECC/MAHAGENCO/01) which was sent to DCPL thru' mail dated 04.11.2015.

Based on the fact that conveying system runs close to Mahagenco plant boundary and along with existing ropeway route, it does not affect other operations, The proposed route has been depicted below:-



Proposed route . Part of this route from TP-7 to Koradi TPS has been objected by Local people & panchayat body

However after finalization of above route, objection from local people & panchayat came into picture regarding part of the route from TP-7(N~2352934.100M, E~306825.740M) to Koradi TPS. As a result new route by passing proposed route (TP-7 to Koradi TPS) is searched. After consultation, it was finalized that existing ropeway route from Khaperkheda TPS to Koradi TPS will be utilized and existing ropeway may be dismantled, if found necessary. Accordingly new route was surveyed & finalized. New route has been depicted below -



Final conveying route

As explained earlier generally four modes of transportation appears feasible, viz.

Road Transport By Truck

Transportation By Ropeway:

Transportation By Overland Belt Conveyor (OLBC)

Transportation By Pipe Conveyor

Road Transport By Truck:

At present coal is transported over road by truck from WCL's mines to both thermal power stations. But it has limitations like higher operating cost, restriction on capacity i.e. more no. of trucks will be required based on truck capacity, more spillage during transportation, maintenance high & frequent, high environmental pollution impact, increased truck movement will cause traffic hazards and the roads will be more prone to accident. However, road transport by trucks also has its inherent advantages like no fixed installation cost (as roads are already existing), route flexibility etc.

Transportation By Ropeway:

Ropeway may be considered as another mode of conveying. But it has capacity limitations of carrying coal of 250 TPH on monocable & 350 to 400 TPH on bicable ropeway system. Therefore, to achieve carrying capacity of 1200TPH, 3 streams of bicable ropeway system will be required. This needs wider Right of way, more installation cost. Pollution will be significant (but not so as for truck transport).Also there will be high possibility of theft & pilferage while carrying.

Transportation By Overland Belt Conveyor (OLBC):

Over land belt conveyor (OLBC) is another good option for conveying. In general the overland curved trough belt conveyor can carry a higher capacity of material than any other conveying system. OLBC is also capable of taking up vertical and horizontal curves with required radii. OLBC is cost competitive and uses less power to move a ton of material. Again it has dis-advantages like it requires higher horizontal radius to turn, it is not fully covered & hence chances of spillage is there. Theft and pilferage cannot be stopped in such open conveyors. Pollution cannot be avoided however; belt turning stations eliminates spillage on return strand. Intermediate transfer towers may be required in OLBC system to negotiate sharp turns which may again incur dust generation & civil cost. There is also possibility of belt theft during its long run.

Conceptual conveyor route is available in attached drawing

Conceptual Pipe Conveyor Routing, Dwg. No. 15C12-000-DWG-M-LA01-Rev 5

Transportation By Pipe Conveyor:

Since, coal feed size is (-) 100 mm, Pipe Conveyor is also an alternate choice for conveying long distance. Pipe conveyors are fully enclosed & hence no chance of spillage or dust generation which is a great advantage over conventional belt conveyor system. It is also capable of overcoming topography challenges with incline & decline angles. It can also accommodate sharp horizontal radius eliminating transfer points. However it has limitation of maximum capacity & more costly than OLBC for per ton material, both for installation cost as well as running cost.

Conceptual conveyor route is available in attached drawing

Conceptual Pipe Conveyor Routing, Dwg. No. 15C12-000-DWG-M-LA01_Rev.5

Recommendation:

Analyzing the above options, it is established that Overland Belt Conveyor (OLBC) will be the most cost effective and suitable mode of transportation. But there is some major negative effect of OLBC like, it is not environment friendly, theft and pilferage is unavoidable. Therefore, it is suggested to select Pipe Conveyor system as a suitable mode of transfer in spite of higher installation & power cost.

In this connection it is pointed out, that for cross country conveyor, the following projects Pipe Conveyor has been selected though it was not most cost effective:

JPL 21.0 Km long, 3 flight pipe conveyor to transport 1500 TPH of coal.

MONNET pipe conveyor 4.7 Km & 5.1 Km having capacity of 2000 TPH & 1200 TPH respectively.

JPL 7.0 Km long pipe conveyor of 1500TPH capacity (in operation since 2009)

This Detailed Project Report elaborates the above concept with cost figures also.

3.0 Route Survey:

The primary route survey for finalization of the transportation route was carried out by MNEC Consultants Pvt. Ltd. Based on drawings submitted by MNEC Consultants Pvt. Ltd, a composite drawing CONCEPTURAL PIPE CONVEYOR ROUTING, Dwg. No. 15C12-000-DWG-M-LA01_R5 is prepared:

Total Route distance from survey drawing is coming around 16.522 KM & the total pipe conveyor length is 16.1 KM

4.0 Coal Parameter:

- Material to be conveyed : Sub-bituminous coal in carrying side only. [Conveying has not been considered thru' return side]
- Bulk Density : 0.8 T/M^3 – 1.2 T/M^3

- Maximum Lump size : (-) 100 mm
- Moisture content : 8 %
- Material temperature : Ambient.
- Conveying Capacity : 1200 TPH for all conveyors except 1000 BC-01 & 1000 BC-02 this will have capacity of 250 TPH.

5.0 System Description:

Refer drawing No 15C12-001-DWG-P-FS01, Rev 03 entitled "Flow Sheet "attached.

Coal from Gondegaon and adjacent mines will be delivered to a coal dump hopper (1000 HP-01) by 30 Tons tipping trucks. The Hopper will be in twin section, each section will have a capacity of 150 M^3. Below the dump hopper one apron feeder (1000 AF-01) will be provided which will carry coal @ 1200 TPH and will feed to Conveyor no. 1001-CCPC 01 tail end. A transfer point has to be fabricated and erected at tail end of 1001 CCPC-01. This transfer point will accommodate discharge of conveyors from Inder & Kamptee Mine end which will come at later date. Conveyor No. 1001 CCPC-01 is of about 5.36 KM long and will feed coal at a common point (hereinafter called as Intermediate Point or I.P), where coal from Bhanegaon and Singhori mines will also be delivered through conveyors 1000 BC-01 & BC-02 which are included in the scope of this tender specification.

From I.P, coal will be delivered to conveyor no. 1003 CCPC-01 which is approximately 2.84 Km long and will deliver coal to Coal bunker no. 1003 BN-01 at Khaparkheda TPS.:

Khaparkheda:

In Khaparkheda,, Coal from long distance conveyor 1003 CCPC-01 will feed to bunker no. 1003 BN-01 inside Khaparkheda TPS. This bunker will have twin mouth. One mouth will feed to long distance cross country conveyor no. 1003 CCPC-02 for transport to Koradi TPS. The other mouth will be fed to a diverter gate. One path will be to deliver coal to 1003 BC-02 for onwards discharge to existing conveyor 103 A/B. The other path will convey coal by conveyor no. 1003 BC-01 and discharge to a coal stock pile through a telescopic chute. Bulldozer will transfer these piled coal and will discharge to conveyer no. 1003 BC-02 via emergency hopper and vibrating feeder.

Five no. coal sampling unit and five no. coal analyzer are to be provided at the locations as shown in refer flow diagram.

Koradi:

Coal from long distance conveyor 1003 CCPC-02 (approx. 7.9 KM long) will feed to bunker no. 1002 BN-01 inside Koradi Plant. Coal from coal bunker (1002 BN-01) will be fed to a belt conveyor no. 1002 BC-02 and will be fed to existing conveyor No. 2A/2B. Another stream will be taken from 1002 BN-01 and will be fed to either of two vibrating screen at crusher/screen house. The undersize will be fed to conveyor 1002 BC-01 and the oversize after crushing will be fed to same conveyor for discharge into a coal stock pile through a telescopic chute.

6.0 Basic Conveyor Parameter:

The basic conveyor parameter for each conveyor has been worked out as below:

6.01.00 PIPE CONVEYORS

6.01.01 For Cross Country Pipe Conveyors From Mine To Power Plant:

As per WCL, there will be 2 coal feeding points, one, at Gondegaon, where coal from Kamptee and Inder mines will also be fed. The combined feed rate of coal received from Gondegaon, Kamptee & Inder mines is 5.5 MTPA. The other feeding point of WCL will be from rest two mines i.e. Shinghori & Bhanegaon from which, the total estimated coal received will be 1.85 MTPA. Based on the above capacity configuration, the required capacity of conveyor is tabulated below:

Conveyors	Receipt of coal from mines	Individual coal receiving capacity	Total evacuation capacity required	Required coal carrying rate
1001CCPC-01	Gondegaon	2.3 MTPA	5.5 MTPA	1076 TPH*
	Kamptee	2.0 MTPA		
	Inder	1.2 MTPA		
1003CCPC-01	Singhori Bhanegaon	0.85 MTPA 1.0 MTPA	1.85 MTPA	316 TPH*

*Considering Coal conveying system will work in 2 shifts with effective conveying time as 14 hours.

From the above conveyor capacity configuration, the carrying capacity of Conveyor 1001 CCPC-1 is selected as 1200 TPH. Since the conveyor system – 1003 CCPC-01 and 1003 CCPC-02 should also be capable to transport material received from Conveyor System – 1000 BC 01 & 1000 BC 02, capacity of all the conveyors (except for 1000 BC 01 and 1000 BC 02) selected is 1200 TPH.

The basic parameters for the conveyors are as follows:

Sl. No.	Description	Details
1.	Material to be conveyed	Coal
2.	Bulk density	0.8 T/m3 – 1.2 T/m3
3.	Maximum lump size	(-) 100 mm
4.	Moisture content	8 %
5.	Material Temperature	Ambient
6.	Type of conveyor	Pipe Conveyor.
7.	Conveyor design capacity	1200 TPH.
8.	Conveyor c/c distance (For External pipe Conveyors)	A. Gondegaon mines to IP – 5.36 KM B. IP to Khaparkheda – 2.84 KM C. From Khaparkheda to Koradi – 7.9 KM
9.	Conveyor lift	20 m, each
10.	Troughing angle	35°,for troughed portion
11.	Belt type	Steel Cord
12.	Pipe dia.	450 mm
13.	Belt speed	4.75 MPS
14.	Type of take-up	Horizontal Loop Take-up.

Sl. No.	Description	Details
15.	Drive Requirement	Please refer below table.

6.01.02 **Tentative Long Distance Pipe Conveyors Rating**

Pipe Conveyor	Application	No. of motor at head pulley & KW of each motor	No. of motor at tail pulley & KW of each motor	Total Power
1001CCPC01	From Gondegaon to I.P at Bhanegaon	2 x 600 KW**	1 x 600 KW**	1800 KW**
1003CCPC01	From Bhanegaon I.P to Khaparkheda TPS	1 x 600 KW**	1 x 600 KW**	1200 KW**
1003CCPC02	From Khaparkheda TPS to koradi TPS	3 x 600 KW**	2 x 600 KW**	3000 KW**
1000 BC-01	From Shingori to Bhanegaon IP	1x350 KW**	1x350 KW**	700 KW**

As per preliminary calculations, following results are obtained:

Conveyor No.	Length (M)	Lift (M)	Total Motor Power (KW)	Selected Motor (No. x KW each)	Required Belt Rating
1001CCPC01	5361	20	1800	3 x 600	ST 1800
1003CCPC01	2840	20	1200	2 x 600	ST 1000
1003CCPC02	7902	20	3000	5 x 600	ST 2000
1000 BC-01	1120	27	700	2x350	ST 1000

****NOTE: Pipe Conveyor design is proprietary in nature. Hence, the final figures should be calculated and vetted by the manufacturer. The above figures provide a tentative guideline for selection.**

Based on above, suggested conveyor component parameters will be as tabulated below:

	1001CCPC-01	1003CCPC-01	1003CCPC-02	1000 BC-01
• Belt :				
Normal pipe diameter (mm)	450	450	450	450
Belt speed (M/sec)	4.75MPS			
Fill factor	70 %			
Belt rating	ST 1800	ST 1000	ST 2000	ST 1000
Factors of Safety	6.5			
Cover grade	FR			
Top Cover thickness (mm)	8			
Bottom Cover thickness (mm)	7			
Note-Bottom rubber cover of low rolling resistance(LRR)/ energy optimized belt(EOB) is recommended.				
• Drive rating	3 x 600	2 x 600	5 x 600	2 x 350
• Idler - PSK				
- Spacing (Normal) mm	2000			
- Spacing at curve, mm	1000			
➢ Tube dia , mm	139.7			
➢ Arrangement	6 + 6 / 6 + 3 ,Alternatively			
• Belt Protection Switches				
- Pull Cord	@ 50 M			
- Belt sway	@ 30 M, only at head & tail end			

	1001CCPC-01	1003CCPC-01	1003CCPC-02	1000 BC-01
- Zero speed	2			

6.02.00 **BELT CONVEYORS:**

6.02.01 **For Khaparkheda TPS – (in-plant) :**

From the discharge point of cross-country conveyor from IP, coal will be transported to either to a pipe conveyor 1003 CCPC-02 of 7.9 KM long for onward transport to Koradi TPS, or to diverter gate 1003 DG-01 for either feeding to 106 M long Belt Conveyor No. 1003 BC-01 with a telescopic chute at head end or to Belt Conveyor No. 1003 BC-02 which will feed to a diverter gate 1003 DG-02 for feeding to existing conveyor no. 103 A/B. A manual stock pile have been proposed at discharge of 1003 BC-01. Manual reclaiming with the help of bulldozer have been provided which will discharge coal to already referred conveyor 1003 BC-02 which is approximately 248 M long.

Parameters of these conveyors are tabulated below:

Description	Stock Piling Conveyor	Reclaiming Conveyor
Eqpt. No.	1003 BC-01	1003 BC-02
Conveyor design capacity	1200 TPH	1200 TPH
Conveyor Type	Belt	Belt
Conveyor Lift	Horizontal	12 M
Troughing angle	35°	35°
Belt Type	Nylon-Nylon	Nylon-Nylon
Belt Width / Pipe dia	1400 mm	1400 mm
Belt Speed	3 MPS	3 MPS
Belt Rating	NN 500/4	NN 630/4

Description	Stock Piling Conveyor	Reclaiming Conveyor
Cover Grade	FR	FR
Cover thickness (top / bottom)	5 MM / 3 MM	5 MM /3 MM

6.02.02 **For Koradi TPS – (in-plant) :**

For Koradi coal from coal bunker (1002 BN-01) will be fed to a belt conveyor no. 1002 BC-02 and will be fed to existing conveyor No. 2A/2B. Another stream will be taken from 1002 BN-01 and will be fed to either of two vibrating screen at crusher/screen house. The undersize will be fed to conveyor 1002 BC-01 and the oversize after crushing will be fed to same conveyor for discharge into a coal stock pile through a telescopic chute.

Basic parameters for the in-plant conveyors are as follows:

Description	Stacking Conveyor	Feed Conveyor to existing Conv. 2A/2B
Eqpt. No.	1002 BC-01	1002 BC-02
Conveyor design capacity	1200 TPH	1200 TPH
Conveyor Type	Belt	Belt
Conveyor Lift	8 M	10 M
Troughing angle	35°	35°
Belt Type	Nylon-Nylon	Nylon-Nylon
Belt Width	1400 mm	1400 mm
Belt Speed	3 MPS	3 MPS
Belt Rating	NN 630/4	NN 500/4
Cover Grade	FR	FR

Description	Stacking Conveyor	Feed Conveyor to existing Conv. 2A/2B
Cover thickness (top / bottom)	5 MM / 3 MM	5 MM /3 MM

6.02.03 **External Belt conveyors**

Description	Belt Conveyor from Bhanegaon mine
Eqpt. No.	1000 BC-02
Conveyor design capacity	250 TPH
Length of Conveyor (M)	As per layout dwg
Conveyor Type	Belt
Conveyor Lift	10 M
Troughing angle	35°
Belt Type	Nylon-Nylon
Belt DIA/Width	1000 mm width
Belt Speed	3 MPS
Belt Rating	NN 500/4
Cover Grade	FR
Cover thickness (top / bottom)	5 MM /3 MM

7.0 Selection Of Drive System:

7.1 For Long Distance Pipe Conveyor:

In long distance conveyors, the commonly used drive system is VVVF drives. These provide the following characteristics:

a) The required S-Curve can be programmed and fed to the system to ensure that the transient at various loading scenarios can be mitigated by generating gentle, smooth starting, preventing over-stressing in the conveyor system.

b) It can provide creep speed, facilitating inspection of belt.

c) It can be programmed to run at reduced speed on continuous basis. This facility is of excellent advantage, when, the conveyor flow rate needs to be varied to meet the production capacity in supply side and / or consumption pattern in the demand side. Operating the conveyor at lower speed with respect to operating at reduced percentage loading provides energy economy in addition to less wear and tear due to operation at reduced speed.

d) Cost of VVVF system is comparable with Controlled Start Transmission (CST) drive.

e) Space requirement is higher.

f) Reliability is good, but requires regular maintenance.

g) VVVF panels should be placed is controlled, air-conditioned atmosphere.

Controlled start Transmission (CST drive) also can be used which can provide almost all the benefits for VVVF drives. However, the limitation of the system is, this is basically a fixed speed drive and hence can not be run at reduced speed at reduced load. Reduced speed running at reduced load provides energy economy apart from causing less wear and tear.

From the above, it is clear that unless prolonged operation and reduced load is envisaged, both the above can provide all necessary attributes of drive related to long distance conveyor. It is suggested to proceed with procurement stage with both the alternatives and the most optimum techno-economic solution can be made on obtaining cost of both the alternatives and necessity of variable speed operation.

7.2 For Conventional Belt Conveyor:

In case of in-plant traditional troughed belt conveyors Fluid couplings shall be used for drive motors. Helical / Bevel helical gearboxes shall be used for drive. However, bevel helical type gear box is preferred. No geared motor is acceptable for troughed belt conveyor. Hold backs shall be provided in the gear box for all inclined conveyors.

8.0 Surge Hopper:

For long distance conveyor, the provision of surge hopper at discharge end is a necessary requirement, as, the conveyor needs to stop gently & smoothly thru' VVVF / CST so that sudden deceleration / jerk is avoided. The exact required stoppage time can be decided by the manufacturer as per their design. However, presently, the capacity has been provided to take care of 2 – 3 minutes stoppage time. As a result, 100 Tonne surge hopper at the discharge Transfer Points end of all coal carrying pipe conveyors has been envisaged. These hoppers will be made of steel.

9.0 DELETED

10.0 Fire Protection &Dust Suppression:

10.1 FIRE PROTECTION SYSTEM

For IP(Bhanegaon) and Gondegaon end –

The contractor will supply one borewell pump at each location which will pump water and collect in a RCC underground tank of adequate capacity to hold volume of water as per norms of fire protection manual of TAC and also to hold water for dust suppression.

Fire protection system as per TAC norms to cover hydrant and spray system for IP and Gondegaon and Bhanegaon feed point area including open belt portion will be provided by the Contractor.

For In-Plant system-

One tapping from existing hydrant mains will be provided to the Contractor at each of the plants at Koradi and Khaperkheda. The Contractor will provide required hydrants and MVWS as per norms of TAC and NFPA 850 to cover all the conveyors and stock pile being supplied by the Contractor.

10.2 DUST SUPPRESSION SYSTEM

For IP (Bhanegaon) and Gondegaon end-

The contractor will supply one borewell pump at each location which will pump water and collect in a RCC underground tank of adequate capacity to hold volume of water as per norms of fire protection manual of TAC and also to hold water for dust suppression.

One no dust suppression pump will be provided at each location which will supply dust suppression water for each point.

For in-plant system-

For in-plant dust suppression system ,water will be made available to the contractor at one point at Koradi and at one point in Khaparkheda. The contractor will provide RCC storage tank at each of these locations. Dust Suppression system to cover each of the transfer points and stockpile area will be provided by the Contractor

11.0 Electrical System:

11.01 The Electrical Power Distribution system is envisaged at 11 KV, 690V & 415V, 3-phase; and 240V, 1-phase, voltage levels for supplying power to the drives and other electrical equipment/system throughout the entire Cross Country Pipe Conveyor Route from Gondegaon mines end to Khaparkheda 500MW plant end as well as Koradi (3 x 660MW) TPS to ensure smooth operation of the plants. Suitable sequence controlling facilities is envisaged in the Control room of each pipe conveyor substation building adjacent to each transfer point at pipe conveying route for proper control of the entire electrical system operation in addition to the process.

11.02 For Complete Power Distribution system throughout the Pipe Conveying Route, "Overall Power Distribution Scheme (15C12-000-DWG-E-0101) drawing shall be referred.

11.03 VFD motor for Pipe Conveyor 1001 CCPC-01 are envisaged at each transfer point from Gondegaon mines end to Intermediate Point (I.P) at Bhanegaon and for Pipe Conveyor 1003 CCPC-01 & 02, transferring coal from I.P at Bhanegaon to Khaperkheda unloading point and Khaperkheda to Koradi TPS respectively. Belt conveyor (1003 BC - 02) route to Khaperkheda 500MW plant is proposed to be operated by LT motor fed from substation at Khaperkheda 1003 CCPC – 01 unloading point. Distributed LT loads are envisaged in the respective transfer point including adjacent Substation Building as well as vicinity area.

11.04 Pipe conveyor drives are proposed to be fed from 12 pulse 11/0.0.725 kV converter transformers and to be located at each of the aforesaid Substation cum control room building near respective Transfer Point. These converter transformers & LT distribution transformers are proposed to be fed through 1 X 100 % rated feeder from 11kV Switchgear also to be located at same substation building.

A) Unloading Point At Koradi End:

A substation is proposed to be constructed at Koradi side to cater VFD motor load of the pipe conveyor (1002 CCPC - 01) & other LT loads. It is assumed that power to this substation will be fed at 11kV from existing 11kV CHP switchboard board at Koradi (3 x 660MW) TPS end. Extension of existing 11kV CHP switchboard will be required since there is no spare feeder available for this purpose.

B) Unloading Point At Khaparkheda 500 MW TPS End:

A substation is proposed to be constructed at 1003 CCPC - 01 unloading point at Khaparkheda end to cater VFD motor load of the pipe conveyor (1003 CCPC - 01) & other LT loads. It is assumed that power to this substation will be fed at 11kV from existing 11kV switchboard board at Khaparkheda (1 x 500MW) TPS end. Extension of existing 11kV switchboard will be required since there is no spare feeder available for this purpose.

This proposed substation will also cater load (VFD motor & other LT) of intermediate point at Bhanegaon & Gondegaon mines.

C) Intermediate Point (I.P) At Bhanegaon:

A substation is proposed to be constructed near this intermediate transfer point. It is proposed that this substation shall be fed from the substation at 1003 CCPC – 01 unloading point at Khaparkheda and further distributed to substation at Gondegaon mines area.

In addition to the above, one no of belt conveyor (each of 3000Tonnes/day) from Bhanegaon and another pipe conveyor from Shingori are proposed to be terminated at this intermediate point. However, it is proposed that these conveyors shall be fed from the substation located at this intermediate point. Hence head end electrical load of these two conveyors have been included in this substation.

D) Mines AT Gondegaon:

A substation is proposed to be constructed at Gondegaon mines area. It is proposed that this substation shall be fed from the substation at intermediate transfer point (I.P) at Bhanegaon.

In addition to the above, one no belt conveyor (1200Tonnes/day) from WCL mines is proposed to be terminated at Gondegaon mines. This conveyor is not in the scope of this report. However, it is proposed that this conveyor shall be fed from the substation located at Gondegaon. Hence head end electrical load of this conveyor have been included in this substation.

11.05 Each drive pertinent to all Pipe Conveyor Segment at Head-End as well as Tail-End is proposed to be provided with VVVF Unit including 3-winding Isolation Transformer of adequate rating. Primary side of the transformer shall be 11kV whereas secondary & tertiary side shall be of adequate rating so as to fulfill VFD Unit input requirement.

11.06 It is envisaged that all LT loads pertinent to each Transfer Point along with adjacent Substation Building will receive power from one (1) no. 415V Power Cum Motor Control Centre (PMCC) installed in the respective Substation Building. This PMCC will receive power from 11kV Switchgear in the same Substation Building via 1 X 100 % of suitably rated 11/0.433 KV or Auxiliary Distribution Transformers through non-segregated phase bus-duct or cable as required. These transformers will be dry type.

11.07 DC controls for HT / LT Switchgear are considered from 110V DC ungrounded system. A dedicated 110V DC system comprising DC battery, chargers and DBs are proposed to be provided in each of the Substation Building near each Transfer Point at Pipe Conveying Route. Proposed DC Battery shall be of Lead – Acid type / Ni-Cd Type.

11.08 Illumination is proposed to be provided only for Transfer Point, Substation Building along with in the vicinity within 30 M range. Illumination system with non-explosion proof lighting fixtures is proposed. Lighting fixtures are proposed to be supplied power from a number of local lighting panels, which are in turn being fed from the main lighting distribution boards located in the respective Substation Building. Proposed lighting fixtures shall be of Metal Halide type only whereas lighting fixtures for Control room shall be energy efficient T5 type lamp.

11.09 All material and accessories including cable trays, and its supports shall be of hot dip galvanized type. Cables are proposed to be routed generally through overhead cable trestle. However cables shall also be considered through following cable routes.

i) 11kV Cable through Pipe Conveyor Gallery.

ii) LT Cable through conveyor gallery for safety switches upto 100 m range from head end as well as tail end of each pipe conveyor segment.

iii) Cable through TP / Substation / Other Building for local requirement.

iv) The bottom of the steel supporting structure of overhead trestle is generally at 2.5 m above the grade level except for road crossing where it is 6.5 m above grade level. Minimum 600 mm. Walkway shall be provided all along the route of cable trestles.

11.10 Earth grid is proposed to be provided on each floor of building, transfer point, Substation etc. for equipment earthing. These will interconnected to the buried grid of building / transfer point / Sub-stations and the earth conductor running along the cable trays of pipe conveyor which in turn will be connected to buried earth conductor. All indoor and outdoor electrical equipment and associated non-current carrying metal works, supporting structures, columns, fence and system neutrals are proposed to be connected to the plant ground system. All electrical equipment are proposed to be provided with two separate ground connections for connection with suitably sized ground conductors. It is envisaged that a continuous 50x6 mm GI flat earthing conductor will run along the cable trays connected to each tier of tray and connected to the ground grid by 50x6 mm GI flat.

11.11 Lightning Protection system is proposed in the form of horizontal conductor network and/or vertical air terminal rod on the top of various buildings with suitable down-comers grounded through test terminal links. Lightning protection system is proposed to be provided for structures/ buildings higher than 55 meters and/or where the calculated risk index exceeds 10^{-5}.

11.12 BUILDINGS FOR ELECTRICALS & CONTROL EQUIPMENT

Each zone is proposed to be provided with following building/house/room where the required 11Kv switchgear/415V PMCC including other electrical equipments will be located suitably.

- Substation at unloading point of 1003 CCPC-01 at KHAPARKHEDA (18M x 35M)
- Substation at unloading point of 1002 CCPC-01 at KORADI TPS end near TP-13 (18M x 30M)
- Substation at intermediate point at BHAHEGAON near TP-6 (25M x 35M)
- Substation at GONDEGAON mines near TP-0 (18M x 30M)

All these proposed substations will be two (2) storied building. It is proposed that ground floor will be cable spreader room and the first floor will accommodate HT Switchgear (11kV), 690V VFD (12 Pulse), 415 V PMCC, 11/0.433 KV LT Dry type Transformers, Main Lighting Distribution Board (MLDB), lighting panel, D. C. Distribution Board (DCDB), Battery, Battery Charger, A. C. Distribution Board (ACDB), DCS/PLC etc.

DCS/PLC, RIO Panel, Control Panel, Operating Station, Engineering Station, UPS, Fire Alarm Panels including intercom panels, etc. are proposed to be located in separate air conditioned room in the respective substation whereas P&V system shall be adopted for cable cellars & equipment floor housing other electrical equipment such as HT switchgear, LT switchgear etc.

All Sub-station and Central Control Rooms will be interconnected through Fiber optic cable link, for control and monitoring purpose and exchange of Signals with the existing plant system. It is proposed that transformers will be located in the transformer yard adjacent to each Substation Building.

11.13 Power Requirement (Tentative):

SL NO.	AREA	HT LOAD	LT LOAD	TOTAL LOAD
1	Mines at Gondegaon	600	200	800
2	Intermediate transfer Point at Bhanegaon	2500	400	2900
3	Koradi end	1800	400	2200
4	Unloading point at Khaperkheda	1800	500	2300

11.14 Brief Technical Specification of Major Electrical Item:

A. 11kV Switchgear Panel:

1.1 **General**

Type : Metal Clad, draw out

	Service	:	Indoor
	Enclosure	:	IP4X
	Bus bar	:	Single
1.2	**System**		
	Service Voltage	:	11kV
	Highest system Voltage	:	12kV
	Phase	:	3
	Frequency	:	50Hz ± 5%
	System Grounding	:	Non-effectively earthed through resistance
1.3	**Rated Current at 50°C**		
	Bus bar	:	As required
	Circuit Breaker	:	As required
1.4	**Short Circuit Rating**		
	Interrupting	:	44kA
	Short time for 3 sec	:	44kA at 11kV.
1.5	Insulation level	:	75/28kV (peak/r.m.s.) for 11kV system
1.6	AC/DC Power Supply		
	Control Voltage	:	110V DC
	Service Voltage	:	240V + 10% Single phase A.C.
1.7	**Circuit Breaker**		
	a) Duty Cycle	:	O-3'-CO-3'-CO
	b) Type	:	Vacuum, Drawout type
	c) Breaking Current:		

i) AC Symmetrical	:	44 kA for 3 second at 11kV
ii) AC Asymmetrical	:	As per IEC
d) Operation Time		
i) Break time	:	Not more than 3 cycle
ii) Make time	:	Not more than 5 cycle
e) Auxiliary Voltage		
Closing	:	110 V DC (85% - 110%)
Tripping	:	Coil 1 - 110 V DC (70% - 110%)
		Coil 2 – 110V DC (70% - 110%)
Spring Charging	:	240VAC

B. Transformer:

1)	Application	:	LV Distribution Transformer (ONAN)
2)	Service	:	Indoor, Distribution, step down
3)	Type	:	Dry
4)	Rated output	:	To be decided by the Bidder
5)	Cooling	:	AN
6)	No-load voltage (line to line)	:	11/0.433 KV, 11/0.725kV,
7)	Highest system voltage	:	12 KV/7.2kV/ 11kV
8)	Number of phases	:	3 Ph, 4 Wire
9)	Rated frequency	:	50 Hz
10)	Frequency variation	:	+ 5%
11)	Insulation level -	:	
			H.V : 75/35KV (peak/rms) / 60/20kV(peak/rms)
		:	L.V : 3 KV (rms)
		:	H.V. neutral : -

		:	L.V. neutral	:	3 KV (rms)
12)	Vector group	:	Dyn11		
13)	Parallel operation of transformer		:	No	
14)	Type of taps provided	:	Off circuit		
15)	Taps provided on	:	H.V. winding		
16)	Range of taps	:	+2 x 2.5%		

C. PMCC:

1.1 **General**

Type & Service	:	Metal Clad, Fixed, PMCC/MCC draw out, DB fixed, Double front (preferable),Indoor type.
Enclosure	:	IP52

1.2 **System**

Service Voltage, Phase, Frequency	:	415 V ±10%, 3 Phase,4 Wire, 50Hz
System Grounding	:	Solidly Grounded

1.3 **Rated Current at 50°C ambient within cubicle**

Bus bar	:	To be decided by bidder
Circuit Breaker	:	To be decided by bidder
Switches	:	To be decided by bidder

1.4 **Short Circuit Rating**

Interrupting	:	50 kA.
Short time for 1 sec	:	50 kA symm for 1 sec.

1.5	Insulation level	:	2.5 KV for 1 min.

1.6 **AC/DC Power Supply**

Control Voltage for circuit breaker	:	220/24V DC
Control voltage (AC) for MCC modules	:	240V
Auxiliary Power Voltage for PMCC/MCC	:	415V.

1.7 **Circuit Breaker**

a) Duty Cycle	:	O-3'-CO-3'-CO
b) Type	:	Air Break, Drawout type
c) Breaking Current		
AC symmetrical	:	50kA
AC asymmetrical	:	50kA
d) Making current	:	2.1x 50kA Peak
e) Control Voltage		
Closing	:	220/24V DC
Tripping	:	220/24V DC
Spring Charging	:	220/24V DC

1.8	**Contactor Duty**	:	Class-III category AC3 for unidirectional drives and AC4 for bi-directional and inching duty drives.
1.9	**MCCB/Switch Duty**	:	Motor feeder : AC23 Other feeder : AC22

12.0 Civil & Structural:

Design Philosophy

A. Structural Steel Design:

Structural steel design will be carried out as per the National Building Code with specific consultation to IS-800 unless noted otherwise.

The following loads shall be taken care in the design with proper load combinations:

a) Dead Load

b) Live Load

c) Dust Loads

d) Wind Loads*

e) Seismic Load**

f) Temperature load

g) Load due to friction of belt on idlers on gallery structures

h) Belt tension on Transfer tower

Note: * Wind loads shall be in accordance with I.S: 875.

**Seismic loads shall be as per I.S: 1893

Structural Steel

- All structural steel for general construction work shall be Grade A or B or as appropriate conforming to IS: 2062.
- M.S bolts and fasteners shall be provided as per IS 1367 & 1363. Welding shall be carried out in accordance with IS: 9595.
- 6 mm chequered plates conforming to IS: 3502 and steel conforming to Grade A IS: 2062.
- Hand rail pipes conforming to medium grade of IS: 1161 shall be provided at the sides of stairs / walkways.
- Seal plates shall conform to IS:1079 (semi-skilled quality)
- Galvanized Mild Steel Barbed Wire A-6 (As per IS:278) line wire dia. 2.24 mm, point wire 2.0 mm, min. Wt. 0.078 Kg/m

Type of construction

Shop connections will be all welded and field connections will generally be bolted unless specified otherwise.

Painting

All structural steel work shall be painted with Zinc silicate primer after surface preparation. An intermediate coat of epoxy based paint as per specification shall be applied before two coats of finish paints as per specification.

B. Design of RCC Structures:

- All RCC Superstructures and Foundations shall be designed as per limit state method of IS 456-2000.
- Grade of concrete to be used – M25
- Grade of steel to be used – Fe 500

C. Soil Data:

The bore log data furnished by MPGCL does not indicate the bearing capacity of soil. Hence it is noted, that upon award of the job, sub soil investigation shall be carried out by the vendor engaging a specialized agency with prior approval of the owner. All foundations shall be designed considering the recommendations of the soil report. However, for estimation purpose, we have considered the Safe Bearing Capacity (S.B.C) of soil at a depth of 2.0 m from existing ground as 20.0 T/m2.

D. Description of Major Plant Structures:

- **Transfer Towers:**

The super structure for TPs shall be structural steel framed with adequate bracing arrangement. All intermediate floors and roof shall be of RCC. The cladding shall be of colour coated profiled sheets with AZ150 Zn-Al alloy coating (zincalume or equivalent) having 0.45 mm base metal thickness and 550 MPa yield strength. The paint shall be of super durable polyester type having a total thickness of 35 microns and the product shall conform to IS 15961/ 15965. Transfer Towers shall be provided with independent steel stair block with steps of M.S. grating from ground to roof with access to roof.

The transfer Tower shall be so designed that the transverse deflection at places where conveyor galleries meet should be equal to the respective transverse deflection of the conveyor supporting trestle. The permissible vertical deflection for beams supporting drive machinery shall be restricted to span / 500 and for other beams it shall be within span / 325.

- **Over Ground Pipe Conveyor Galleries & Trestles:**

For pipe conveyor trestles, there are two options for providing trestles. One is steel trestles over concrete pedestal and other is concrete trestles directly from foundation to support pipe conveyor gallery. For economy & comparatively maintenance free than steel trestle, concrete trestle is being preferred. Though time required for concrete trestle is more, but if sufficient labour could be mobilized, time constraints could be managed.

Foundation for Pipe Conveyor supporting Trestles (Concrete Trestles approximately 5.5 m to 6.0 m from existing ground level @ 22.0 m have been considered and after every 110 m four legged concrete trestles are considered to transfer the longitudinal force to ground) and other trestles for in-plant conveyor.

Over ground and on ground conveyor galleries shall be of open type. There will be no walkways in the galleries. Movable walkway shall be provided. All galleries supporting trestle shall be so proportioned that the transverse deflection of gallery due to wind/seismic load should not be exceeded height/1000 as stipulated in IS: 11592. The maximum span of gallery shall not exceed 22 m unless higher span is required due to site condition subject to the approval of Owner. Overhead conveyor will be located in a suitable enclosed gallery of structural steel and will consist of two latticed girders having rigid jointed portal frames at both ends. Sliding PTFE bearing supports shall be provided at one end of the gallery for relieving forces due to temperature variation. Accordingly for the purpose of analysis one end (end gallery which is connected to transfer tower in one end & to the two legged trestle in other end) of the gallery shall be taken as hinged and other on roller. And for the purpose of analysis both ends (intermediate gallery which is connected to two legged trestle on both the ends) of the gallery shall be taken as hinged. The End of conveyor gallery which will be supported over transfer point shall be so detailed that no horizontal force in longitudinal

direction is transferred from conveyor gallery and vice versa. This side of the gallery shall therefore be supported on sliding PTFE support.

- **Substation:**

25 m x 10 m x 9.0 m two storied framed structure has been considered for Substation. 230 mm thick brick cladding has been considered. One steel stair for entry at first floor & one steel stair for roof have been considered.

- **Road:**

3.0 m wide road with 300 mm thick moorum has been considered along the length of Cross Country Pipe Conveyors.

13.0 Operation Philosophy

VVVF units will be provided for each of the main drive motors of pipe conveyor. These units will be complete with the necessary converter / inverter modules and other accessories. The VVVF units will operate on a master-slave principle to ensure that all the drives will be synchronized properly for speed and load. One unit will be selected as master and the other units will follow as slaves. VVVF will also ensure gradual increase of the speed to the required full speed and that all the motors are running at the same speed. The VVVF units provided for the drive will be suitable for speed variation from 10% to 100% of the motor synchronous speed. Similar facility is available for CST drive except speed variation.

14.0 Control Philosophy:

14.1 The operation and control of the Cross Country Pipe Conveying system from Gondegaon Mines end to Khaparkheda and Koradi Thermal Power Plant end will be achieved through DCS/PLC based Control System. This will cover the total functional requirement of sequence control, interlock & protection, monitoring, alarm, data logging etc. DCS/PLC will provide with mode of operations such as auto-mode, manual mode, operator guide mode, and simulation mode. Control room for operation of each pipe conveyor segment will be located at each Substation Building near Transfer points (TP-8, TP-9, TP-3 and TP-1) in the Pipe Conveyor Route. Man machine communication will be through 2 X 22" coloured LCD (TFT based) monitors, Mouse & Keyboard mounted on ergonomically designed control desk. Location of the DCS/PLC CPU cabinets will be in the aforesaid control room (s).

14.2 Following Equipment will come under interlock scheme and will be controlled & monitored from operator workstation in the aforesaid Control Room with indication / fault annunciation facility on LCD monitors:

a) All Pipe Conveyors.

b) Belt Conveyors

c) Stacker & Reclaimer

d) Vibrating Feeders.

14.3 However, all the above mentioned equipment will have its local control panels / local control station / local push button station for start & stop and / or any other function required with suitable lockable type local / remote selector switch. L/R Switch shall be housed in 6.6 KV / 3.3 KV Switchgear / 415 V PMCC for drives controlled from SWGR / PMCC. The same shall be located in LCP / LSP where the drives / feeders are controlled from LCP / LSP.

Dedicated PLC to serve the function of a flexible control and monitoring system and to offer easy programming, communication possibilities with high reliability and safety will be provided located within the E - House of the Stacker /Reclaimer.

14.4 Following equipment shall not generally be under interlock scheme and shall be started / stopped / controlled from their local control panel / local starter panel with status indication on Operating Station:

a) Bore well Pump : On indication area-wise

14.5 Following equipment shall not come under interlock Scheme and shall be operated from its respective local panel without any indication in operator workstation.

a) Electric Hoist

14.6 Coal Bunker at intermediate point at Bhanegaon will be provided with Radar type level transmitter(s).

14.7 Adequate number of pull-cord switches will be provided at suitable intervals along the length of each pipe conveyor and Belt Conveyor. Each pull chord switch shall be identified by a specific number on HMI.

14.8 Interplant telecommunication & public address system will be considered for better & efficient communication between various Sub-station Rooms, control rooms, plant office, security factory gates and fire stations.

14.9 IP based Closed Circuit Television System (CCTV) with all equipment and accessories is envisaged for the purpose of surveillance of areas as mentioned below so that, by and large, all important areas & equipment can be brought under surveillance.

14.10 Power Distribution System:

Remote controlling, synchronization, metering & annunciation of 6.6 KV &3.3 KV Power Switchgear and 415V PMCC/MCC shall be implemented through Operating Station of Programmable Logic Controller (PLC) located at Control room of Substation Building. Electrical status and monitoring parameters such as voltage, current, power shall be available in control room.

Uninterrupted Power Supply System (UPS), with adequate capacity is envisaged for a regulated and uninterrupted single phase 230V AC power within specified tolerances to C&I System located at various Sub-station Rooms and CCR. It will mainly consist of battery back-up (60 minutes) system with static inverter, bypass switches and battery charger. The system will consist of 100% redundant electronic unit.

15.0 Procurement Philosophy:

The entire work will be executed on a single EPC Contract which will include design, manufacture, supply, erection, testing and commissioning of the whole system from Gondegaon / Bhanegaon Mines to Power Plant.

16.0 Key Benefits Of Project:

The key benefit of this conveying system is as follows:

- Lesser cost of transport per Km / Ton.
- Social benefit by eliminating congestion of connected road.
- Environmentally more friendly.
- More reliable, does not depend on vagaries of weather.
- Less pilferage.

The project, when implemented, will provide a better cost of transport per Ton / Km compared to alternate mode of transport via roadways. Also the social and environmental benefit will be substantial.

17.0 Project Cost:

Refer Annexure 1 for Summarized Project Cost and Annexures 1.1, 1.2, 1.3 and 1.4.1 & 1.4.2 for break-ups for Mechanical, Electrical, C&I and Civil and Structural cost respectively. The lump sum Project Cost comes as **516 Crores** of Rupees including design, manufacture, supply, erection, testing and commissioning of mechanical, electrical, C&I and Civil and Structural items including interest during construction.

18.0 Cost Benefit Analysis:

As per TEFR submitted on 28.11.2015, the cost of transport per Km / Ton for cross country conveyors will be more economic compared to road transport or ropeway. Added to this is the environment benefit which cannot be quantified.

19.0 Project Planning * Phasing Of Expenditure:

The proposed project implementation and planning schedule along with phasing of expenditure have been furnished vide Annexure 2.1 & 2.2 respectively.

20.0 Drawings:

Following drawings may be refered :

a) 15C12-000-DWG-M-LA01_R5--- CONCEPTUAL PIPE CONVEYOR ROUTING

b) 15C12-001-DWG-P-FS01_Rev.3--- FLOW SHEET FOR COAL TRANSPORTATION SYSTEM FROM GONDEGAON MINE TO KOARDI & KHAPARKHEDA TPS EXPANSION

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CHAPTER 3: INVESTMENT REQUIREMENT

INTRODUCTION

The total investment cost estimated for the proposed mechanized material handling system has been explained as below:

COST CONSIDERATIONS

LAND & SITE DEVELOPMENT

Land and site development cost refers to the cost incurred in land or infrastructural development of indirect component. For our project following will be required for land and site development.

- Land acquisition by Mahagenco: Mahagenco may require land from private land owners and land from WCL for putting up this system. The cost for above have been included in the cost estimates.

- Service road: WBM Service road with bituminous carpeting of approximately 7.5 KM & approach roads of approximately 2 KM length is considered. Construction of road inside premises of Khaperkheda & Koradi plants is not feasible & not considered in the project. Service road passing through private land is also not considered.

- A lumpsum provision has been considered in cost for site preparation, grading and leveling.

GONDEGAON MINES

One bifurcated dump hopper, Apron feeder and tail end of pipe conveyor will be installed in the Gondegaon mines.

- The cost of mechanical equipment, electrical & instrumentation equipment, auxiliary equipment & power distribution equipments etc. engineering work associated to equipments and freight charges shall be included for the equipments which are to be installed in Bhatadi mines.

- Civil & structures include the foundation & gallery of belt conveyors, dump hopper building and platform thereof. Foundations and support required for tail end of pipe conveyor has been considered under this cost head.

- Dump hopper(RCC), few platforms and structures have been envisaged in steel construction. Cost of the same has been included

- Cost estimates for fire fighting system (including fire hydrant and MVWS system) & dust suppression system has been worked out considering storage & distribution of water at both the mines.

- **PIPE CONVEYOR (FROM GONDEGAON TO INTERMEDIATE POINT)**

Pipe conveyor (1001CCPC-01) will run along the finalized route) from Gondegaon mines to Intermediate point which is situated near D point. D point is a junction which receives coal also from Singhori & Bhanegaon mines

- Cost of electromechanical equipments includes the cost of pipe conveyor, technological structures of conveyor, Walkway on conveyor, drives arrangement of the pipe conveyor including VFD and field instruments has been included in the cost estimates.

- Cost of Civil support has been considered in RCC with bottom of gallery at 4 m level. At the road crossings it shall be 5.5/6m level from top of the road.

- For open portion of the conveyor, closed gallery in steel structure has been considered in cost estimates.

INTERMEDIATE POINT

- One 100T capacity coal bunker & one vibro feeder to be installed at intermediate point. Intermediate point will also consist of tail portion of pipe conveyor (1003CCPC-01) . Pipe conveyor (1003CCPC-01) length is 2.84KM.

- Cost of electromechanical equipments includes the cost of pipe conveyor, technological structures of conveyor, Walkway on conveyor, drives arrangement of the pipe conveyor including VFD and field instruments has been included in the cost estimates.

- Cost of one trough conveyor transporting coal from Bhanegaon & one pipe conveyor from Shingori CHP to Intermediate point at Bhanegaon.

- Cost estimates for firefighting system (including fire hydrant and MVWS system) & dust suppression system has been worked out considering storage & distribution of water.

PIPE CONVEYOR (FROM INTERMEDIATE POINT TO KHAPERKHEDA)

Pipe conveyor (1003 CCPC-01) will run along the finalized route) from Intermediate point to Khaperkheda

Cost of electromechanical equipments includes the cost of pipe conveyor, technological structures of conveyor, Walkway on conveyor, drives arrangement of the pipe conveyor including VFD and field instruments has been included in the cost estimates.

- Cost of Civil support has been considered in RCC with bottom of gallery at 4 m level. At the road crossings it shall be 5.5/6m level from top of the road.

- For open portion of the conveyor, closed gallery in steel structure has been considered in cost estimates.

KHAPERKHEDA

- One 100T capacity coal bunker & three vibro feeder , two open belt conveyor (1003 BC-01 & 1003 BC-02, one emergency hopper to be installed at Khaperkheda plant end. Khaperkheda end also consists of tail portion of pipe conveyor (1003CCPC-02) . Pipe conveyor (1003CCPC-02) length is 7.9KM.

- Cost of electromechanical equipments includes the cost of pipe conveyor, technological structures of conveyor, Walkway on conveyor, drives arrangement of the pipe conveyor including VFD and field instruments has been included in the cost estimates.

- Cost estimates for fire fighting system (including fire hydrant and MVWS system) & dust suppression system has been worked out considering storage & distribution of water. .

KORADI

- One 100T capacity coal bunker , two vibro feeder , two ring granulator type crusher two open belt conveyor (1002 BC-01 & 1002 BC-02, one telescopic chute to be installed at Koradi plant end.

- Cost of electromechanical equipments includes the cost of pipe conveyor, technological structures of conveyor, Walkway on conveyor, drives arrangement of the pipe conveyor including VFD and field instruments has been included in the cost estimates.

- Cost estimates for fire fighting system (including fire hydrant and MVWS system) & dust suppression system has been worked out considering storage & distribution of water.

- **ESTIMATE OF INVESTMENT**

3.1 BILL OF MATERIALS & COST ESTIMATES

3.1.1 EPC COST

As explained in cost considerations above the following costs have been considered as EPC costs i.e. which will be covered by EPC contractor.

- Electro-mechanical machinery
- The civil support structures required
- Pillars at river/nallah
- Service road
- Aproach road
- Statutory approvals

Table: 3.1- Estimated Project Cost

Sl. No.	DESCRIPTION	Revised Estimated Cost Rs. in. Crores
1	Mechanical equipment	203.35
2	Electrical equipment	20.99
3	C&I	2.22.
4	**Total Equipment Cost (1 + 2 + 3)**	**226.56**
5	Erection, Testing & Commissioning @ 8 % of (4)	18.12
6	Mandatory spares @ 4 % of Sr. 4	9.06
7	Civil Work	113.13
8	Design Engineering	4.75
9	Survey & Soil testing cost	0.4
10	**SUB-TOTAL (4+5+6+7+8+9)**	**372.02**
11	GST @18% of sub total	66.96
12	Statutory Approvals cost	0.15
13	**Total Estimated EPC Cost**	**439.14**

14	Enabling cost	5
15	Contingency 10% of Sr. No.10	37.20
16	**Total without IDC**	**481.34**
17	Interest during construction (IDC)	34.34
18	O&M contract for two years	35.13(Not included in project cost)
19	**GRAND TOTAL**	**515.68**
		Say 516 Cr.

3.1.2 NON-EPC COST

The investment cost estimates which will be directly borne by Mahagenco are explained as under

- Land acquisition by Mahagenco: Mahagenco will require land from private land owners and land from WCL for putting up this system.

- The cost of re-routing of HT LT & MV lines is a non-EPC cost and will be directly borne by the Mahagenco. The same has been considered for rerouting of the 14 Low and medium voltage power transmission lines amounting to approximately Rs **3 Crores** (considering average Rs 20 lakhs for each rerouting). The final estimation & execution of the rerouting job will be done by MSEB (Maharashtra State Electricity Board).

- A Route survey & Geotechnical investigation being taken up by Mahagenco. This cost is a non-EPC cost and will be borne by Mahagenco directly.

- The charges for consultancy and PMC services as indicated in project cost estimates are not covered under EPC cost and hence is a non-EPC cost. M/s DCPL has been assigned only the design and engineering consultancy services for the coal transport system,

- The Project management of the project can be directly taken up by Mahagenco personnel or alternatively a PMC services can be hired. Cost for PMC services has not been included in cost estimation

- O&M Contract for two years cost is not included in NON EPC cost.

NON-EPC cost has been worked out as presented in the table below:

INVESTMENT COST ESTIMATES- NON EPC			
(In Rs Lakh unless Specified Otherwise)			
Sr no	**Description**	**Cost**	**Remarks**
1	Land Cost	81.90	
2	Land Registration Cost	8.19	
2	Topographical survey	5	
3	Cost of LT/MV lines re-routing	300	
4	Geo technical Investigation	20	
5	Miscellaneous works	50	
6	**Total**	465.09	**Say Rs.5 Crores**

Total 2.79 Ha of private land will be purchased on mutual agreed terms.

3.1.3 TOTAL PROJECT COST

Sr No	Description	Hard Cost (Rs Cr.)	Estimated Taxes & Duties @ 18% (Rs Cr.)	Total (Rs Cr.)
1	EPC Cost	372.18	66.96	439.14
2	Non EPC Cost	5	0	5
3	Provision for Contingencies (10% of total cost)	37.2	0	37.2
4	Total cost excluding IDC(1+2+3)	414.38	66.96	**481.34**
5	IDC	34.34	---	34.34
	Total Estimated Cost including IDC	**448.72**	**66.96**	**515.68**

Total project cost shall be the sum of EPC Portion, Tax components and cost towards Non EPC portion of the project.

3.1.4 ASSUMPTION FOR COST ESTIMATES

- The estimates of investment have been worked out based on assumption that project shall be ordered in EPC mode.
- As soil investigation report is not available hence civil BOQ has been estimated on the basis of soil bearing capacity provided by Mahagenco based on their previous experience.
- Cost of land acquisition from private land owners has been considered under project cost.

- For the above estimates, power availability has been assumed within 200 m from the considered Load Centres. Water has been assumed as available till the water tanks at Bhatadi as well as Padmapur.

- Topographical features have been considered based on the Survey report of MNEC. In case of any additional obstructions, any additional demands of Mahagenco and re routing, the cost shall be suitably adjusted.

3.1.5 ESTIMATE OF INVESTMENT

The estimates of investment (for EPC portion of the cost) have been worked out based on consultant experience, data base of similar project duly escalated/ prorated to match the selected material handling capacities and are to be understood with an accuracy range ± **10%.**

3.1.6 OPERATIONAL COSTS

Total operational cost of the coal transport system has been estimated as under:

OPERATIONAL COST			
(In Rs Lakh unless Specified Otherwise)			
	Component	**Cost per annum**	**Remarks**
1	Cost of Power @ 5.65 MW consumed power	624.00	
2	Cost of operational spares @ 2 % of the EPC cost	878.00	
3	Pipe conveyor steel cord belt replacement cost.	230.00	
	Total	17.32	

- The cost of power consumption has been calculated considering 12 hrs usage per day @ 1200 tpH for 330 days/annum. Assumed cost of power for estimation has been considered as Rs 2.79/KWH.

- The cost of belt replacement has been calculated considering life of steel cord belt for 12 KM of belting as 7 years. Cost/annum has been considered on prorata basis.

- Cost of spares, maintenance & lubrication etc have been calculated as lumpsum amount of 2 %/annum of EPC cost.

- Estimate of operating cost for Railway operations and conveying system operation & maintenance has not been made in above table. Manpower requirements for conveyor operation has been covered under Chapter 4 of this report.

3.2 BUDGETARY OFFERS & QUOTATIONS

The detailed cost estimates for selected option of pipe conveyor has been annexed to the report as Annexure 1.

EPC cost has been estimated based on the consultant experience and offers placed on suppliers for other similar projects. Civil cost has been estimated based on the BOQ worked out and cost assumed thereof.

3.3 SUMMARY OF INVESTMENT AND PHASING

The following investment phasing is envisaged for the schemes in the DPR Investment Phasing (Amount in Crores)

Particulars	Q1 (Month 1 to 3)	Q2 (Month 4 to 6)	Q3 (Month 7 to 9)	Q4 (Month 10 to 12)	Q5 (Month 13 to 15)	Q6 (Month 16 to 18)	Q7 (Month 19 to 21)
Loan Drawal Schedule	10%	9.36%	18.72%	24.30%	23.04%	5.58%	9.00%
Opening Loan	0.00	38.56	74.65	146.84	240.54	329.38	350.90
Loan Drawal during the period	38.56	36.09	72.18	93.70	88.84	21.52	34.70
Closing loan	38.56	74.65	146.84	240.54	329.38	350.90	385.60
Average loan during period (Rs. Crs)	19.28	56.61	110.74	193.69	284.96	340.14	368.25
Interest during the period	0.48	1.42	2.77	4.84	7.12	8.50	9.21
Interest during construction (Rs.Cr)	34.34						

CHAPTER 4: KEY BENEFITS OF THE PROJECT

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CHAPTER 4: KEY BENEFITS OF THE PROJECT

4.0 INTRODUCTION

Benefits of pipe conveyor for the selected route for other two options have already been explained in previous chapters. This chapter encapsulates the benefits of the pipe conveyor conveying system as compared to existing system of truck transport.

4.1 TECHNICAL BENEFITS

As explained in chapter 2 regarding the existing problems faced by Mahagenco owing to expansion of mines and present transport system by Trucks the mechanized coal transport system is definitely better than manual handling of coal owing to following reasons.

- Elimination of multiple handling: Transfer by trucks involves series of handling which induces problems like stoppage time, delayed delivery of coal, environment sustainability issue. Mechanized transfer by pipe conveyor will eliminate such problems.

- Consistency: The transfer by trucks do not have transfer of coal at a consistent rate since it depends upon multiple factors like trucks availability, breakdowns, factors affecting road transport.

4.2 FINANCIAL BENEFITS

Such infrastructure projects are more for the reliability of transport system and hassles involved with road transportation. The financial benefits will be realized in the long term however there are immediate intangible benefits like environmental sustainability, improved transport time. No transit losses, theft, pilferage etc.

4.3 RELIABILITY IMPROVEMENT

Manual transfer of coal from mines to the Khaperkheda/koradi site by trucks also induces a number of soft factors in the system. The soft factors related to truck transport are mentioned below:

- Truck Union Problems
- Dependability on the contractors
- Downtime due to sudden breakdown of vehicles
- Inconsistency in the capacity of the transport system etc.
- Tracking the incoming material flow to the plant
- Incidences of slippage of grade of the coal in road transport.

Mechanization of transport system will eliminate the problems related to above said factors increasing the reliability of the system significantly.

4.4 Environment Sustainability :

Open dumping, crushing, multiple loading, and transportation in open trucks results into degradation of environment and justifies the installation of a totally closed conveying system i.e. pipe conveyor.

The Maharashtra State Power Generation Company Limited proposed to transport raw coal by Cross Country Conveyor System from Gondegaon and Bhanegaon mines to Koradi Thermal Power Plant. The total length of the route is 16.1 km. During transportation, water being sprinkled over the coal, will prevent air pollution due to coal dust. The route will cross 17 nallahs, 3 rivers (Pench,kanhan and Kolar), 16 main roads, 13 HT lines and 20 LT lines. During nallah and river crossing, at no point the coal will come in direct contact with water, so there will be no any effect on the aquatic flora – fauna.

4.5 Safety Issues:

A large fleet of trucks plying to khaperkheda/Koradi from Gondegaon/Bhanegaon Mines and vice versa increases chance of accidents and loss of men & materials. A mechanized system can possibly reduce the risk of accidents due to movement of trucks.

COST BENEFIT ANALYSIS

Computation of cost for coal transportation through piped conveyor				
Particulars	UoM	First 13 years	Remaining 5 years	Total for 18 years
No. of years		13.00	4.00	
Annual O&M Cost	Rs. Crs.	17.32	17.32	
Annual Fixed Cost	Rs. Crs.	88.86	41.86	
Coal quantity handled per day	Ton	16800	16800	
Annual Coal quantity handled	Million Ton	5.54	5.54	
Cumulative quantity	Million Ton	72.07	27.72	99.79
Cumulative Cost for piped conveyor system	**Rs. Crs.**	**1380.34**	**295.9**	**1676.24**
Computation of cost for coal transportation through current system (road transport)				
		First 13 years	remaining 17 years	Total for 30 years
Current transportation cost	Rs./Ton	140.00	140.00	
Cumulative quantity	Million Ton	71.5	93.5	165
Cumulative cost Road Transport	**Rs. Crs.**	**1751.34**	**673.596**	**2424.94**
Saving over the project life	**Rs. Crs.**	**371**	**377.69**	**748.71**

Note-1 : No escalation factor considered for O&M as well as for road transport charges

Note-2:The Break Even is achieved between 4th & 5th Year over the existing transportation by Road.

BREAK EVEN / PAY BACK PERIOD :

Payback period without considering escalation is between 4th & 5th year.

4.7 IMPACT ON CHANDRAPUR TARIFF :

Impact on tariff of Chandrapur CSTPS is as below

Tariff Component	Impact in Rs./KWh for First 13 years	Impact in Rs./KWh for remaining 05 years.
Fixed cost	0.046	0.026
Variable Cost	0.000	0.000
Total	0.046	0.026

4.8 KEY RISKS & MITIGATION MEASURES :

Key risk of the project installation involves the safety of machinery and interference of unauthorized persons since the pipe conveyor will pass through distant locations within the plant where security can be of concern.

To eliminate the expected problems of theft of material and machinery / safety of operation following measures have been considered in the system.

- Route Optimization: Route optimization has been carried out i.e. route selection have been done keeping in mind minimum acquisition of private land to minimize the cost of the project and lead time in delivery of the project. Route selected passes through Mahagenco land / Govt land/Private land .

- Elevated Corridor: The pipe conveyor gallery has been considered at an elevation of + 4 m from ground level to avoid access to pipe conveyor easily. This will avoid the problem of interference of unwanted personnel.

- Restricted access: The access to the pipe conveyor has been considered with locking arrangement so that unauthorized access to the pipe conveyor can be avoided.

Introduction:

This study addresses potential short and long-term water quality, sediment quality and biological impacts from the various activities associated with the cross country conveyor system. Sediments threaten the integrity of many rivers and coastlines. In this study the threat to Kanhan and Pench River ecosystem is investigated.

The Kanhan River originates from the high lands of Chindawara District and flows in south east direction for about 160 kms before it enters the state of Maharashtra near Raiwari village in Saoner Taluka of Nagpur District. Nagpur city is presently getting water from two major sources namely Kanhan & Pench. Kanhan River is at its widest at Kamptee where it receives the Pench River- a left bank tributary and its largest one. Another tributary connecting it at its right bank is Kolar River - the spill off from Kolar Dam. The river now comes to be at the northeast of Nagpur from which it receives the metropolitan city's effluent waste by way of the Nag River.

Hydrophytes and other macrophytes were observed and then identified in the Erai river. Common hydrophytes found are Chara, sagittaria, Typha, Eichhornia, Najas, Sagittaria, Spirodela.

Common fish found in the river are as below.

Sr.No.	Common names	Scientific names	Local Status
1.	Rohu	*Labeo rahita*	C
2.	Mrigal	*Cirrhinas mrigala*	C
3.	Catla	*Catla catla*	C
4.	Olive barb	*Puntius sarana*	C
5.	Padan/Boal	*Wallago attu*	R
6.	Magur	*Clarias batrachus*	C
7.	Singhi	*Heteropneustis fossilis*	R
8.	Banded snake head	*Channa striatus*	C
9.	Spiny eel	*Mastcembelus armatus*	C
10.	Gat fish	*Xenentodon cancila*	R
11.	Striped dwarf catfish	*Mystus vittatus*	C
12.	Chandni	*Chanda nama*	C

Project background:

Maharashtra State Power Generation Company Limited (MAHAGENCO) has proposed Amendment in source and transportation route of raw coal by constructing 8.2 Km Pipe conveyor system from Gondegaon and Bhanegaon mine to existing 1 x 500MW Thermal Power Plant for coal transportation at Khaparkheda TPS. The conveyer system is crossing to Kanhan and pench river at village Dorli.

As a part of construction of pipe conveyer system 16 pillars are proposed to be constructed inside the river bed of Pench & Kanhan River (8 pillars in each river).4 pillars will be constructed at the edge of each river. These pillars will be inserted at the depth of 6 to 8 mtrs inside the river bed with the foundation size 6 x 7 m and the distance between two pillars will be kept 36 mtrs. An average depth river is 2.5 to 3.0 mtr.

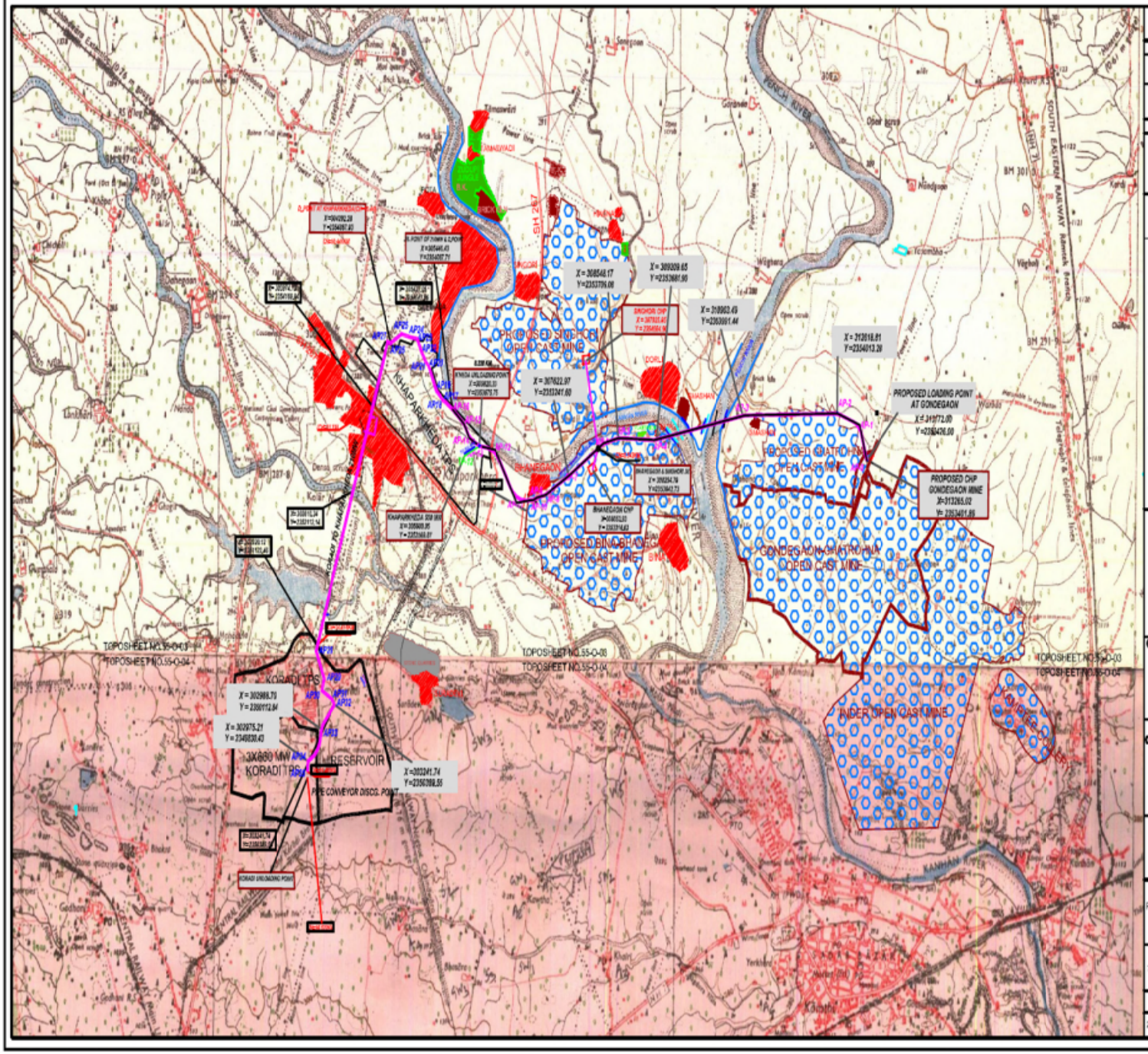
Impact of construction activity on Kanhan River and Pench River:

The following potential Environmental Impact is envisaged:

- Clogging gills,
- Decreasing visibility, and
- Preventing oxygen diffusion.

However, since the increased turbidity is expected to be short term and only cover a limited area, the impact should not be significant. . Proper care will be taken for loading and transportation of excavated material in time bound planning.

ROUTE MAP



MNEC Consultants Pvt. Ltd., Nagpur

MAHAGENCO, KORADI

TOPOSHEET NO.
55-O-03,55-O-04

LEGEND

	State Highway		Trees
	Asp/Metal Road, Cart track		Temples, Bridge, Culvert etc.
	Canal Nala/River		Habitation, Residences & Huts etc.
	Railway Line		Power Plant Area
	LT/11 KV Power Line 33 KV Power Line		Brick Kiln
	66 KV Tower Line 220/400 KV Tower Line		Smashan
	Mine areas		Stone areas
	Plantation		Forest areas
	Kanhan River bank as on date		Ash Pipeline

ROUTE FROM GONDEGAON O/C MINE TO KORADI TPS

ROUTE FROM KHAPARKHEDA 500 MW TO KHAPARKHEDA TPS

ROUTE FROM SINGORI CHP & BHANEGAON & SINGORI JN.

ROUTE FROM BHANEGAON CHP & BHANEGAON & SINGORI JN.

ALTERNATE ROUTE FROM BHANEGAON JN. POINT TO KORADI TPS= 6.000KM

ROUTE FROM KORADI TO KHAPARKHEDA 500MW= 6.000KM

CLIENT

MAHARASHTRA STATE POWER GENERATION COMPANY LIMITED
KORADI, DISTRICT - NAGPUR (MAHARASHTRA)

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FINAL ROUTE FOR
TRANSPORTATION OF COAL THROUGH CONVEYOR SYSTEM

Project : Survey using modern survey techniques and preparation of report for Coal transportation System From Gondegaon Mine, Pandurna Tehsil, to 3X660 MW Koradi TPS Expansion

TITLE- ROUTE MAP

DATE	SCALE	DRG.NO.	SHEET NO.	Rev
21.07.2017	1 : 25,000	ROUTE MAP/MNECC /MAHAGENCO/KORADI/01	1/1	R - 2