

# Katghora-Dongargarh New Railway Line

Traffic Study and Financial Analysis

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## Chapter 0

### Executive Summary

#### 1 Mineral Potential in Chhattisgarh and rail network

Chhattisgarh is one of the foremost mineral rich States in the country. Almost 29 varieties of minerals have been reported in the State, most important being precious stone diamond, gold, iron ore, limestone, dolomite, tin ore, bauxite and coal. The world's best quality of iron ore is found in Bailadila deposits of Dantewara district. The limestone deposits contribute a major share of mineral deposits in the State. The largest share of mineral revenue is contributed by coal. It is being exploited and marketed by Coal India Ltd. Evacuation of these minerals require a very extensive and efficient railway system. The entire railway network spread over the state comes under the geographical jurisdiction of the South East Central Railway Zone of Indian Railways having headquartered at Bilaspur. The length of rail network in the state is 1,196 km; which is less than half of the national average of rail density. Rail Density (km/ 100 sq. km area) of Chhattisgarh is 0.89 against National avg. of 1.95. Only 16 out of 27 districts are connected with Rail. Construction of some new railway lines is under progress. These include Dalli-Rajhara–Jagdalpur rail line, Pendra Road-Gevra Road Rail Line, Raigarh-Mand Colliery to Kharsia rail line.

The Chhattisgarh government has now formed a joint venture company with the Ministry of Railways for the expansion of railway tracks in the state. The state government have 51% share and the railways remaining 49% share. The joint venture company Chhattisgarh Railway Corporation Limited will identify viable rail projects in the state and implement them. CRCL has identified the following 4 projects covering a length of 884 kms. On commissioning of the ongoing and newly planned projects the rail density in Chhattisgarh will reach the national average.

- ▶ Dongargarh–Khairagarh–Kawardha–Mungeli–Kota–Katghora linking Bilaspur (270 km)
- ▶ Raipur - Jharsuguda via Balodabazar (310 km)
- ▶ Ambikapur – Barwadih (182 km)
- ▶ Surajpur-Parsa-East/East-west corridor (122 km)

#### 2 Coal Mining by SECL and Non CIL Blocks

South Eastern Coalfields Ltd, a subsidiary of Coal India Limited is operating in the state of Chhattisgarh for mining of coal, apart from private coal mining by private developers. Korba and Raigarh coalfields in the state of Chhattisgarh have large coal deposits and are part of the four fastest growing coalfields in the country. Coal India Limited is targeting coal production of 908 Mt by 2019-20. SECL has fixed target of 239.59 Mt of coal production by 2019-20 up from current figure of 138.73 Mt in FY 2016. The modal share of rail is anticipated to go up from current figure of 34% to 59%. Growth in SECL coal production and transportation is heavily dependent on development of rail infrastructure and connectivity, as 200% growth is estimated in coal transportation by rail in the next 4 years, giving a CAGR of 32%. As per current trends of coal mining and off take, realistic growth of rail traffic of 13% per annum is estimated. Gare Pelma and Hasdev Arand coalfields have significant Non CIL blocks. They have 61 Mt and 30 Mt mine capacity allocated for private/non CIL mining. For the purpose of network planning, it is necessary to consider all mine capacity augmentation works in coherence with network expansion.

Gare Pelma I & II in Mand Raigarh coalfields are 2 big coal mining blocks allocated to Gujarat State Electricity Company Limited and MAHAGENCO having capacity of 21 and 23 Mt respectively. SECL has peak mine capacity of 85 Mt from Mand Raigarh coal fields. Combined capacity of allocated blocks from Mand Raigarh region is 146 Mt. At present evacuation of coal from Hasdev Arand coal fields is done through Ambikapur-Annupur Katni rail route.

### **3 Fuel Supply Agreement by SECL for rail based coal supply to Power House and Non Power House users and rail network capacity**

SECL has signed FSA/ LOA of significant quantity for power house users and non power house users to be transported by rail. The total quantity of coal to be supplied to 78 Non Power users is 11.64 Mt. The coal FSA/LOA to 74 power houses will generate demand for coal transportation by rail to the tune of 172.60 Mt. These FSAs establish that there is adequate demand for coal transportation by rail in tune with the mining projections.

Coal transportation demand by rail from SECL and private coal blocks is significantly higher than the current transportation capacity. SECL has signed agreement for coal supply to PH

and Non PH sector by rail to the tune 184.24 Mt. In addition Gare Pelma I & II coal blocks of GSECL & MHAGENCO will generate transportation demand to the tune of 44 mt. After swapping the existing linkages of nearly 20 Mt for Mahagenco and GSECL, the net addition of

coal transportation demand is 24 Mt. Total coal transportation demand works out to be 208 Mt. This is to be largely evacuated through Kharasia-Champa-Bilaspur-Raipur/Annupur routes. These routes will require considerable strengthening through construction of additional lines/alternative routes. Besides coal, these routes will have significant growth in cement movement, as significant additional capacity is being commissioned.

#### 4. New Cement Capacity

The following new cement/clinker capacity is getting commissioned. 50% of the cement production can be easily allocated to the project line Raipur to Kharsia.

**Table 1: New Cement Capacity**

S. No.	Company	Location	Capacity in MT
1	JSPL	Kirodimal Nagar	4
2	Emami Cement Ltd.	Bhatapara	3.0
3	Shree Cement	Hathband	2.275
4	Dalmia Bharat	Balodabazar	4

#### 5. Iron Ore Movement

With development of mining of iron ore in Bailadila sector and Rowghat area significant movement of iron ore and steel will take place. On completion of Jagdalpur-Rowghat-Dalli-Rajahra line new iron ore and steel traffic will flow on main line route. A summary of new traffic streams from Rowghat and Jagdalpur area is presented in the table below:

**Table 2: Iron ore coal movement from Jagdalpur and Rowghat area**

S. No.	Mining Company/Steel Plant	Commodity	Origin	Destination	Qty Mt
1	JSPL	Iron Ore	Bacheli	Raigarh	5
2	Jayaswal Neco	Iron Ore	Jugani	Siltara	2
3	Baldev Alloys	Iron Ore	Gidam	Raipur	0.5
4	Baldev Alloys	coal	Korba	Jagdalpur	1.5

5	Sarda Energy and Minerals	Iron ore	Narayanpur	Raipur	4
6	NMDC+CMDC	Iron ore	Kirandul	Raipur	14.5
	Total				27.5

The above details indicate that the entire network around Bilaspur will be under severe pressure from new traffic comprising power house coal, Non Power House Coal, iron ore, steel and cement. This requires a serious effort at the infrastructure strengthening.

## 6. Rail Network Analysis in Bilaspur/ Raipur Divisions of SECR

All the sections of Bilaspur and Raipur divisions of SECR are saturated and are having line capacity utilization ranging from 100% to 160%. It is noteworthy that movement through these routes puts tremendous pressure on Bilaspur station and yard. Bilaspur will be the busiest junction on Indian Railways, with hardly any relief. The flyover construction project is much delayed due to non availability of land. The following projects are sanctioned by Ministry of Railways for capacity augmentation on SECR leading to the project section, which are in various stages of implementation/project planning.

- i. Bilaspur-Annupur Doubling
- ii. Jharsuguda-Bilaspur 4<sup>th</sup> Line
- iii. Bilaspur-Katni 3<sup>rd</sup> Line

Even after construction of 4<sup>th</sup> line between Jharsuguda-Bilaspur, it will not be possible evacuate growth in coal production via this route due to the following reasons.

- i) The DPR prepared by SECR of 4<sup>th</sup> line project estimates 70 Mt of additional traffic, which cannot be run on construction of only one additional line.
- ii) Over saturation of Kharsia-Champa-Bilaspur section even after construction of 4<sup>th</sup> line due to additional 46 trains from Dharamjaigarh- Kharsia East Line on commissioning of Chhattisgarh East Rail project. (This justifies construction of Kharsia –Raipur rail Corridor)
- iii) Capacity limitation of Bilaspur yard in passage of additional trains. Bilaspur will pose to

be a bottleneck.

## **7. Capacity of Bilaspur yard**

Bilaspur yard is currently handling about 70 freight trains each from Champa and Raipur side and 21 freight trains from Annupur side. In the final analysis after commissioning of ongoing projects and if SECR decides to go for Bilaspur-Urkura 4<sup>th</sup> line, the Bilaspur yard will be handling more than 130 trains (freight and passenger) each way from Champa side and Urkura side. On Annupur side it will have capacity to handle about 80 trains each way. It will make Bilaspur as the busiest station on IR. As per present planning no additional facility is being developed at Bilaspur. The proposed 4<sup>th</sup> line between Jharsuguda-Bilaspur will simply get connected with the existing UP main line. The same is likely to happen if 4<sup>th</sup> line is planned between Bilaspur and Urkura. This will make Bilaspur as a bottleneck in the operation and full capacity gains due to 4<sup>th</sup> line will remain unrealized. The proposed flyover, which is designed to eliminate conflict due to cross movement towards Annupur side, is inordinately delayed due to non availability of land from school. It is not likely to materialize in near future. The Bilaspur yard will therefore pose a serious bottleneck in transportation of different streams of traffic on SECR.

## **8. Katghora- Dongargarh New Line rail project**

The traffic study of Chhattisgarh East Railway has made coal movement projections of 62.7 Mt to be handed over by CERL to SECR at Kharasia. It does not include 44 Mt of coal from Gare Pelma I & II. About 20 mt of coal from Mand Raigarh is projected to be consumed in the nearby region of Chhattisgarh. This in addition to coal traffic to be supplied to Chhattisgarh power plants from Korba via Champa rail route. Presently 16 coal trains from SECL are moving towards Raipur/Nagpur from Bilaspur. The traffic projections of Chhattisgarh East Railway give 12 additional coal freight trains. Coal blocks of MAHAGENCO and GSECL will offer additional traffic of 20 coal trains. In addition there is cement traffic from new plants and iron ore traffic from Baildila mines to steel making facilities in Raipur area and JSPL plant. The line capacity utilization shows that it is in the range of 130% between Bilaspur and Durg. No line capacity work is sanctioned between Bilaspur and Durg. This establishes the need for

construction of additional lines for movement of existing traffic and the projected traffic. Macro analysis establishes need of 2 lines for movement of coal traffic alone. Kharsia-Naya Raipur- Durg being one of them. Cement and iron ore transportation demand will only add to the viability of these new line projects.

## 9. Traffic Projections

The rationale for allotment of traffic, for the purpose of projections, to the two new rail corridors is described as under:

- i) For the purpose of traffic projections it is assumed that Katghora-Dongargarh section will be a through section for traffic to the states of Maharashtra, Telangana and beyond. This corridor will primarily be utilized for movement of traffic on account of MAHAGENCO. MAHAGENCO is expected to participate in the project SPV as equity partner.
- ii) Kharasia-Raipur route will be through route for traffic to Gujarat and will be primarily used on account of GSECL coal traffic. GSECL will consider financial participation in the equity of SPV on finalization of DPR. This route in addition serves new cement plants located in Balodabazar district.
- iii) The traffic will be through in nature and the proposed corridors will act as high speed through corridors, without the need of shunting at most of the stations except for cement traffic.
- iv) The existing coal traffic on account of MAHAGENCO and GSECL moving over the existing rail route of Bilaspur-Nagpur and via Katni route will not be counted for financial appraisal, though it will be routed on the project corridor and the project corridor offering shorter route.
- v) The additional coal traffic other than on account of MAHAGENCO and GSECL, which is required to travel on the existing saturated Bilaspur –Durg section is allotted to the project corridor to the extent of available capacity. It is assumed as overflow from the existing route.

The traffic projections of Katghora- Dongargarh rail line are given in the table below:

**Table 3: Traffic Projections Katghora-Dongargarh New Line**

S. No.	Power Plant	Destination	Chargeable Km	Traffic FY24 in Mt
1	India Bulls Realtech Ltd.	Nasik	1296	2.9
3	Koradi 5 to 10	Koradih	651	6.5
4	Nasik 3 to 5	Nasik	1296	1.5
5	Bhusawal 2 to 5	Bhusawal	1039	3.5
6	Paras 3 & 4	Paras Vidyutnagar	919	1.2
7	Parli 4 to 8	Parli	1198	2.9
8	K'KHEDA 1 to 5	Khaperkheda	656	3.3
9	Chandrapur 3 to 9	Chandrapur	780	4.1

## 10. Master planning of capacity on SECR

It must be understood that there are several levels of constraints in working out line capacity of a single line, double line, three line or a four line section. When a long section is provided with a third line or a fourth line, the traffic flow does not multiply in the same ratio. While in doubling, there is a manifold increase in the capacity to discharge traffic( because of directional advantage), the same is not true with a third or fourth line as nodal/junction station congestion comes into play. It is known fact that on this Mumbai-Howrah main line, Raipur, Bilaspur and Jharsuguda are major congested nodes. Justification of the fourth line between Jharsuguda and Bilaspur included a projection of additional 70 MTPA (about 100 additional trains duly accounting for empty trains). At present, there is no way that this additional traffic can pass through either Bilaspur or Raipur. Hence, it is imperative that network expansion is planned to avoid Bilaspur and Raipur.

## 11. Conclusion

Apart from the first mile connectivity which is planned through SPVs like CERL, CEWRL and BRPL, the existing network must be expanded to avoid bottlenecks. Since, the cities are heavily built up areas, the nodes can't be expanded, any further capacity enhancement must be planned outside or beyond these nodes. Planning new routes avoiding congested nodes

affords multiple advantages of reaching out to unconnected areas, opening them up for industrial growth as well as quicker and speedier evacuation of traffic. It is recommended that based on the commercial and technical rationale, new rail corridor between Katghora to Dongargarh and Kharsia to Naya Raipur to Durg need to be taken up.

## 12. Financial Analysis

Total cost of the project is estimated at Rs. 4821 Cr, and is proposed to be funded in the Debt to Equity ratio of 80:20 by way debt of Rs. 3857 cr. and Equity of Rs. 964 Cr. The project **does not** require support by way of inflated mileage to achieve bankability. Project is estimated to achieve commercial operation by 1<sup>st</sup> April 2023. Cost of debt depends on the prevailing bank rate and the level of confidence the project is able to generate. Since the project is backed entirely by government entities, the spread (percentage higher than bank rate) is likely to be small. Keeping in view the recently concluded terms of financial closure of Chhattisgarh East Railway Company Limited, and the down trend being witnessed, interest rate of 9.25% is assumed. The tenure of the debt is taken as 20 years with 5 years of construction period and moratorium of 2 years.

12.1 Snapshot of Project IRR and DSCR are illustrated in the table below.

**Table 4: Project IRR and DSCR with 60% revenue share to SPV**

Output	
Avg DSCR	1.6
Min DSCR	1.37
PIRR (Post Tax)	12.35%
Equity IRR	19.73%

**Table 4.1: Project IRR and DSCR with 50% revenue share to SPV**

Output	
Avg DSCR	1.35
Min DSCR	1.17
PIRR (Post Tax)	10.60%
Equity IRR	14.84%

Sensitivity analysis shows that the project is sound under normal variations of various assumptions.



varieties. Almost 29 varieties of minerals have been reported in the State, most important being precious stone diamond, gold, iron ore, limestone, dolomite, tin ore, bauxite and coal.

The sole occurrence of tin ore in the country is reported from the State to the tune of 28.89 M.T. in southern part of Bastar region. Iron ore contemplates to form backbone for industrialization of any State. At present, its small portion is being worked out and vast potential still remains to be utilized through export promotion and putting up steel manufacturing industries. The world's best quality of iron ore is found in Bailadila deposits of Dantewara district. The other important deposits of iron ore are located in Kanker, Durg and Rajanandgaon districts. The State is endowed with its huge reserves to the tune of 1969 MT. At present NMDC is exploiting iron ore for export to Japan and catering to the needs of Visakhapatnam Steel Plant. Dalli-Rajhara group of mines is being exploited by BSP for their Steel plant at Bhilai. The bauxite ore of magic metal Aluminium is found abundantly in Surguja, Jashpur, Korba, Kawardha and Bastar region. It can support export orientation unit in the State. At present, public undertaking company BALCO has exploited Phutka Pahar deposit and now the Mainpat deposit is catering to the needs of BALCOP through MPSMC for their aluminium plant at Korba.

The limestone deposits contribute a major share of mineral deposits in the State. It sustains 9 major cement plants with an installed capacity of 14.75 million tones and contributes to minor cement plants also. Cement grade limestone registered a significant presence in Raipur, Durg, Bilaspur, Bastar, Anger, Kawardha and Raigarh districts. The reserves to the tune of 3580.6 MT have been proved and vast area still remains to be explored. The low-grade limestone is used as building material abundantly. The other important industrial mineral dolomite, which is mostly used in steel plants and refractoriness, is located in Bastar, Durg, Bilaspur and Anger districts and has total 606 MT reserves in the State. The largest share of mineral revenue is contributed by coal. It is being exploited and marketed by Coal India Ltd. The following table reflects the primacy of Chhattisgarh in mineral reserves and its potential for industrial growth.

Table 1: Mineral Reserves in the state of Chhattisgarh

S.No.	Mineral	India	Chhattisgarh	% in India
1.	Coal* (MT)	306595	54912	17.91
2.	Iron ore (MT)	17882	3292	18.41
3.	Limestone (MT)	184935	8959	4.84
4.	Dolomite (MT)	7731	847	10.96
5.	Bauxite (MT)	3480	171	4.91
6.	Quartzite (MT)	1251	27	2.15
7.	Diamond (Lakh Carat)	319	13	4.07
8.	Tin (000 kg)	102275	15487	15.14

**Source: India Mineral Year Book 2012 published on March 2014**

**\* Coal GSI (As on 1.04.2015)**

## 1.2 Economic Activity in the State of Chhattisgarh

Chhattisgarh state is the most mineral rich state in the country with rich deposits of coal, iron ore, lime stone. This leads to host of industrial and manufacturing activity. Favourable investment climate has accelerated the mining and manufacturing activity. The following table indicates the projected spurt in the mining/manufacturing activity in select commodities/products.

**Table 1A:** Projected Growth in main minerals and products

S. NO.	Item	Production in MT 2015-16	Estimate in MT in 2021-22	% growth
1	Coal	138	362	162
2	Iron Ore	30	60	100
3	Cement	25	40	60

It is understood that present movement of coal from the adjoining state of Odisha to Maharashtra and western states will shift to Chhattisgarh via all rail route. This highlights the need for creation of rail infrastructure to evacuate the minerals and finished products efficiently.

### 1.3 Rail network

Almost the entire railway network spread over the state comes under the geographical jurisdiction of the South East Central Railway Zone of Indian Railways centred around Bilaspur, which is the zonal headquarters of this zone. The main railway junctions are Raipur, Durg and Bilaspur Junction, which is also a starting point of many long distance trains. These three junctions are well-connected to the major cities of India. The state has the highest freight loading in the country and one-sixth of Indian Railway's revenue comes from Chhattisgarh. The length of rail network in the state is 1,196 km, while a third track has been commissioned between Durg and Raigarh. Construction of some new railway lines are under process. These include Dalli-Rajhara–Jagdalpur rail line, Pendra Road-Gevra Road Rail Line rail line, Raigarh-Mand Colliery to Kharsia rail line. Freight/goods trains provide services mostly to coal, cement, steel and iron ore industries in east-west corridor (Mumbai-Howrah route).

#### 1.3 Rail Network Expansion

Presently, Chhattisgarh has 1,196 km long railway line network, which is less than half of the national average of rail density. Rail Density (km/ 100 sq. km area) of Chhattisgarh is 0.89 against National avg. of 1.95. Only 16 out of 27 districts are connected with Rail. Chhattisgarh being a resource rich state needs extensive Rail network for realisation of its full potential. The construction of new 546 km long rail network includes Rajhara-Rowghat rail project, 311 km long East and East-West Rail Corridors and 140 km long Rowghat-Jagdalpur rail project are underway in the state.

The Chhattisgarh government has now formed a joint venture company with the Ministry of Railways for the expansion of railway tracks in the state. The state government have 51% share and the railways remaining 49% share. The joint venture company Chhattisgarh Railway Corporation Limited will identify viable rail projects in the state and implement them. CRCL has identified the following 4 projects covering a length of 884 kms. On commissioning of the ongoing and newly planned projects the rail density in Chhattisgarh will reach the national average.

- ▶ Dongargarh–Khairagarh–Kawardha–Mungeli–Kota–Katghora linking Bilaspur (270 km)
- ▶ Raipur - Jharsuguda via Balodabazar (310 km)
- ▶ Ambikapur – Barwadih (182 km)

- ▶ Surajpur-Parsa-East/East-west corridor (122 km)

#### **1.4 Dongargarh-Katghora New Line Project**

This new line project of length 236 kms was included in 2016-17 Rail Budget at an estimated cost of Rs. 1250 Crores. It covers 5 districts of Chhattisgarh out of which 2 are not having any rail connected. Line capacity utilisation of existing Raigarh- Dongargarh section of main line is more than 100%. It will bypass major bottlenecks like Bilaspur and Raipur. The proposed alternative route is equal in route length when compared to the existing route. Government of Maharashtra is planning to take 48% equity in the project SPV for ensuring smooth transportation of 23 Mt coal from Gare Pelma II block.

#### **1.5 Kharsia- Naya Raipur- Durg Railway Line.**

It is 182 kms long railway line. Survey and DPR preparation is under progress. This line serves not only as through line for coal movement but also for evacuation of cement from the new cement plants of Shree Cement, Emami Cement and Dalmia. The cement traffic could be in the range of 10 Mt. In addition through coal movement from MCL will utilize this line in addition to coal evacuation from Mand Raigarh coal fields.

### **2.0 Status of rail based coal evacuation network**

South Eastern Coalfield Limited has three major coalfields, namely Korba, Central India Coalfields (CIC) and Mand-Raigarh under its fold. It is one of the major and fastest growing coalfields. Presently, the coal from Korba is evacuated through Gevra Road-Champa railway line. The coal from CIC is evacuated through Ambikapur-Anuppur rail line. To evacuate coal from Mand-Raigarh coalfield a new railway line from Dharamjaygarh to Kharsia is under construction by Chhattisgarh East Railway Limited. To augment rail network in Korba region another railway line from Korba to Pendra Road is under construction by Chhattisgarh East West Railway Limited. For providing another rail evacuation route to Mand-Raigarh coalfields, Chhattisgarh East Railway Phase II, envisages to connect the two under construction railway lines by connecting Dharamjaygarh with Uрга ( a station on Champa-Gevra Road rail line) having length of 62 kms. The schematic map showing the rail network (all the 3 rail links) is placed as Annexure I. These projects serve the need of first mile connectivity. However, transportation to the destinations in Maharashtra will use the busy Howrah-Mumbai corridor, which is facing congestion at most of the stretches. There is need to create capacity along the

entire route in addition to focus on the first mile connectivity. It is well recognized that construction of additional lines alongside the existing tracks may not be feasible due to structures and habitation. This fact is evidenced by the PET survey report of East West DFC. The alignment of DFC in most of the stretches is taken quite far away from existing alignment. The project under consideration therefore, selects two independent alignments between SECL coal mining area and stations beyond Raipur, thereby avoiding the existing industrial corridor for movement of through traffic for destinations in the state of Maharashtra and Gujarat. It examines the financial viability of Katghora to Dongargarh and Kharsia to Raipur rail corridors, taking off from East West Railway and East Railway network.

### **3.0 Coal Mining by SECL**

South Eastern Coalfields Ltd, a subsidiary of Coal India Limited is operating in the state of Chhattisgarh for mining of coal, apart from private coal mining by private developers. Korba and Raigarh coalfields in the state of Chhattisgarh have large coal deposits and are part of the four fastest growing coalfields in the country. Coal India Limited is targeting coal production of 908 Mt by 2019-20. However, as per the present trends and slow down in coal demand, this production target may be delayed by about 5 years. The coal production target for 2017-18 is 660 Mt by CIL. It is estimated that CIL will produce 750 Mt of coal by 2019-20. Taking incremental coal production of 50 mt per year, it will produce about 1 Bt by 2025. South Eastern Coalfield Limited, the coal company responsible for major coal mining in Korba, CIC and Raigarh coalfields is expected to contribute to the extent of 25% in coal production by CIL. The coal production by SECL from Korba and CIC mines was 140 MT during 2016-17 against the target of 149.67 Mt growing @ 1.5% over the previous year and is expected to grow to 240 MT by 2024-25 after opening up of new mines in Raigarh coalfields and expansion of mines in Korba coalfields. The overburden removal during the 2015-16 was 175.37 M Cu m. The coalfields wise production in the year 2015-16 and target for the year 2019-20 is indicated in the table below:

**Table: 2 Coal Production SECL (figures in MT)**

Coalfields	Production 2015-16	Target 2019-20
Korba	101.8	157.35
CIC	25.5	52.54
Raigarh	10.6	29.70
<b>Total</b>	<b>137.93</b>	<b>239.59</b>

Source: SECL

### **Mand Raigarh Coalfields**

Mand Raigarh Coalfield, along with Korba and Hasdeo Arand Coalfields forms the South Chhattisgarh Coalfields. Mand Raigarh Coalfield includes the areas earlier known as North Raigarh, South Raigarh and Mand River Coalfields. Of at least twelve seams in the Mand Valley, the Mand and Taraimar seams are important. Mand Raigarh Coalfield is spread over an area of 520 square kilometres (200 sq mi). The field has a potential for mining of power grade coal, much of which can be extracted through open cast mining. Gare block has been identified for captive mining by private companies.

According to the Geological Survey of India, total reserves (including proved, indicated and inferred reserves) of non-coking coal in the Mand Raigarh Coalfield are 18,532.93 million tonnes. Out of this 13,868.20 million tonnes is up to depth of 300 metres, 4569.51 million tonnes is at a depth of 300-600 metres and 95.22 million tonnes is at a depth of 600–1200m.

### **3.1 Coal Evacuation Infrastructure**

It is estimated that keeping in view the current coal mining growth situation and subdued growth of coal based thermal generation; the target for 2019-20 will be delayed by about 5 years. Evacuation of coal from new coal blocks is a major constraint at present, which is one of the reasons for hold up of mining. At present there exist two railway lines for coal evacuation. The Korba coalfield is served by Gevra Road-Korba-Champa rail line. The CIC is served by Ambikapur-Anuppur rail line. Gevra Champa line has its limitations as it is now saturated. Routing of via Katni traffic through Champa-Bilaspur also has limitations in passing of traffic through Bilaspur yard. The construction of flyover at Bilaspur to grade separate movement towards Katni is stuck due to land acquisition problem. As per current assessment, the land acquisition may not materialize, which endangers the project execution. To

strengthen the evacuation through rail, SECL in JV with Government of Chhattisgarh and IRCON International Limited has planned to construct two railway lines; namely, Chhattisgarh East Railway Corridor and Chhattisgarh East West Railway Corridor. Chhattisgarh East Rail corridor provides coal evacuation to Mand-Raigarh coalfields via Kharasia station on main line. East West corridor provides alternative/additional rail route to Korba coalfields via Pendra Road avoiding Bilaspur. Further a shorter and direct connectivity to Raigarh coalfields for coal movement via Katni, Dharamjaygarh-Korba rail link as phase II of East Rail Corridor is being planned, which provides rail connection between Mand- Raigarh coalfields at Dharamjaygarh to East West Railway line at Urga.

### 3.2 Modal Share

The coal transportation scenario in 2015-16 and 2019-20 as projected by SECL is illustrated in the table 3 below:

**Table 3: Modal Transport Share**

Mode	Actual in Mt	% Share	Projections 2019-20 in Mt*	% Share
Rail	46.69	34%	141	59%
Road	57.13	41%	60.8	25%
Belt	7.13	5%	27.8	12%
MGR	25.07	18%	6.6	3%
Own Wagon	2.71	2%	3.8	2%
<b>Total</b>	<b>138.73</b>	<b>100%</b>	<b>240</b>	<b>100%</b>

Source: SECL

\*Estimated to be delayed by 5 years

From the table above it is evident that growth in SECL coal production and transportation is heavily dependent on development of rail infrastructure and connectivity, as 200% growth is estimated in coal transportation by rail in the next 4 years, giving a CAGR of 32%. As per current trends of coal mining and offtake, realistic growth of rail traffic of 13% per annum is estimated. Higher rail share is assumed on the assumptions that missing rail links and first/first mile connectivity will be commissioned early facilitating transportation of coal by rail. This does not include private coal mining blocks. Existing transportsystem has significant

movement by road, which is obviously not appropriate to handle such large quantity of coal. Line capacity augmentation has to be simultaneously undertaken in congested sections. Early construction of railway lines assumes significant importance in view of these developments.

#### 4.0 Major Contributors (coal blocks) of the coal in SECL.

Table 4 captures the major coal blocks contributing in SECL coal production forecast for 2019-20.

**Table 4: Major SECL Coal Blocks**

Coal Block	Contribution in MT
Gevra	70
Kusmunda	50
Pelma	15
Jagannathpur	3
Kartali East	2.5
Jampali	2
Chhal OC Seam III	6
Bijari	1.5
Madan Nagar	12
Amritdhara	2
Rampur Batura	4
Saraipali	1.4
Malachua	3
<b>Sub Total</b>	<b>172.4</b>
<b>Future Projects</b>	
Batura West	1.5
Baroud Exp	15
Chirmiri OC Expn.	2
Vijay West	3
<b>Sub Total</b>	<b>21.5</b>
<b>Total</b>	<b>193.9</b>

Source: SECL

#### 5.0 Sector wise off take of raw coal 2015-16

Table 5 illustrates sector wise coal off take from SECL during 2015-16.

**Table 5: Sectorwise coal off take from SECL**

Sector	Off Take in Mt
Power	105.4
Cement	2.96
Colliery consumption	0.01
Others	30.37
<b>Total</b>	<b>138.74</b>

Source: SECL

**6.0 Private Coal Blocks**

The influence area of the project also has private coal blocks Gare Pelma sector of Mand Raigarh coalfields as well as Hasdev Arand Coalfields spread over Korba, Surajpur and Sarguja Distts. Many of these mines have since been allotted through auction. The details are presented in Table 6.1 and 6.2:

**Table 6.1: Private Coal Block-Gare Pelma Area**

S. No.	Coal Block	Peak Capacity MT	Winner	End Use
1	Gare Pelma IV/1	6	BALCO	CPP:2X300MW, Balco Nagar, Korba
1	Gare Pelma IV/2	6-7	JSPL	Being operated by SECL, CPP at pit head
1	Gare Pelma IV/3		JSPL	
2	Gare Pelma IV/4	1	Hindalco	CPP: 4X100+
3	Gare Pelma IV/5	1	Hindalco	6X150+1X67.5 MW, Sambalpur
4	Gare Pelma IV/7	1.2	Monnet Ispat	May not materialise
5	Gare Pelma IV/8	1.2	Ambuja Cement Ltd.	CPP at Ropar, Gujarat
6	Gare Pelma I	21	GSECL	TPPs in Gujarat
7	Gare Pelma II	23	Mahagenco	TPPs in Maharashtra

**Table 6.2: Private Coal Block-Hasdev Arand Area**

S. No.	Coal Block	Peak Capacity MT	Winner	End Use
1	Parsa Kete	6	RRVUUNL	Powerplants in Rajasthan
2	Parsa East	8	RRVUUNL	do
3	Parsa West	6	RRVUUNL	do
4	Madanpur South	6	APMDC	Commercial
5	Gidmuri Puturiya	6	CSPGCL	Powerplant at Champa
6	Tara	6	To be auctioned	

Details of end use and destinations of the coal from these mines are indicated in the table. The mines are supposed to be operationalised in 48 months. These two coalfield are about 200kms apart, yet the traffic flows get interlinked at important nodes like Champa, Matin, Surajpur, Pendra Road and Anuppur. For the purpose of network planning, it is necessary to consider all mine capacity augmentation works in coherence with network expansion.

**6.1 Evacuation pattern of Gare Pelma Coalfields:** JSPL had these coal blocks even before the same were cancelled and offered for bidding. They have conveyor belt system for transporting coal to nearly 7 km away to their power plant. Broad survey has revealed that the coal from these private coal blocks will largely move by road and other means and may not use project railway. Coal of BALCO shall move to Korba, while coal of Hindalco will move to Sambalpur. Two major coal blocks in Gare Pelma have been allocated to MAHAGENCO and GSECL. Coal from these coal blocks will generate demand for transportation using the proposed rail links. Gujarat State Electricity Corporation Limited has been allotted Gare Palma Sector-1 coal block. They are planning to mine 21 Mt coal; 15 Mt through open cast mining and 6 Mt through underground mining. The end use of the coal is power generation in Gujarat as per details captured in the table 7 below. It is expected that the mining of coal to full capacity will start by 2023-24.

**6.2 Evacuation pattern of Hasdev Arand Coalfields:** About 30MTPA coal blocks will start production by 2023-24. A major portion of about 20MTPA will be Rajasthan bound and may take Parsa-Surajpur-Anuppur -Katni route. There is another possibility of opening up a new route vis East West Corridor evacuating towards Pendra Road or Champa. This route offers a

shorter lead to consumers towards Pendra road Katni. However, a 50km missing link (between Parsa and Matin station on E\_W Corridor) is to be connected. Again, the same route Parsa-Matin-Katghora-Gevra Road-Champa suits CSPGCL to reach its PP at Champa or for commercial coal mining for AP Mineral Development Corporation.

**Table 7: GSECL Thermal Power Plants**

S. No.	End Use Plant	Location	Configuration	Status	Capacity
1	Ukai Thermal Power Plant U1 to U6	Songarh, Tapi	2x120 MW 2x120 MW 1x210 MW 1x500 MW	Operating	1350 MW
2	Gandhinagar TPP U1 to U5	Gandhinagar	2x120 MW 3x210 MW	Operating	870 MW
3	Wanakbori TPP U1 to U7	Distt. Kheda	7x210 MW	Operating	1470 MW
4	Sikka TPP, U1,2 & U3,4	Distt. Jamnagar	2x120 MW 2x250 MW	Operating	740 MW
5	Wanakbori TPP U8	Distt. Kheda	1x800 MW	Under Const.	800 MW
6	Dhuvaran TPP	Dhuvaran, Anand	2x800 MW	Under proposal	1600 MW
7	Sinor TPP U2	Sinor, Distt. Vadodara	1x800 MW	Under clearance	800 MW
	<b>Total</b>				<b>7630 MW</b>

Source: Mining Plan by CMPDI Ranchi

MAHAGENCO has been allocated GP-II. They are planning to mine 23 MT of coal for power plants in the state of Maharashtra. 13 Mt of coal will be used as an alternative to earlier allotted coal blocks, which was to be used for expansion of capacity at Koradih, Chandrapur and Parli. 10 MT of existing linkage with SECL will be surrendered and replaced by GP-II. It is learnt that the cost of mining by the private coal block owners is comparatively less as compared to the cost of coal charged by CIL. It makes business sense to mine coal from non CIL blocks, even if it leads to longer lead of transportation. The installed power generation capacity of MAHAGENCO is illustrated in the table 8.

**Table 8: Installed Capacity of MAHAGENCO**

SR. NO.	POWER STATION	UNITS & SIZE(MW)	INSTALLED CAP.(MW)
	<b>THERMAL POWER STATIONS</b>		
1	KORADI 5 TO 10	1x200 + 2x210 + 3x660	2600
2	NASIK 3 TO 5	3x210	630
3	BHUSAWAL 2 TO 5	2x210 + 2x500	1420
4	PARAS 3 & 4	2x250	500
5	PARLI 4 TO 8	2x210+ 3x250	1170
6	K'KHEDA 1 to 5	4x210 + 1x500 MW	1340
7	CHANDRAPUR 3 TO 9	2x210 + 5x500	2920
	<b>MAHAGENCO THERMAL</b>		<b>10580</b>

Source: MAHAGENCO

## **7.0 Mining Projections-Mand Raigarh SECL Coal Blocks**

The reserves and projected year wise production from Mand Raigarh area by SECL are indicated in the table placed as Annexure II. The projections gradually rise to the level of 85 Mt. The coal production from Chirra (15 Mty), Syang(20 Mty) and Durgapur (6 Mty) mines of Raigarh area, which are served through Dharamjaygarh station, is to be partly evacuated via East West line, as the East Rail line gets saturated. 40% of the coal production from these three mines was planned for East West Rail Line in the traffic study of East West Rail Line. Rest was planned through Chhattisgarh East Railway Line towards Kharsia. With opening of private mines, and expansion of rail transport network, the original assumptions may not hold good anymore. There may be a better redistribution of traffic leading to optimization of distances travelled. These issues have been dealt more comprehensively in the last chapter.

## 8.0 Fuel Supply Agreement by SECL for rail based coal supply to Power House and Non Power House users

SECL has signed FSA/ LOA of significant quantity for power house users and non power house users to be transported by rail. The total quantity of coal to be supplied to 78 Non Power users is 11.64 Mt. Details of FSA to NPH users are placed at Annexure III. The coal FSA/LOA to 74 power houses will generate demand for coal transportation by rail to the

tune of 172.60 Mt. The details of FSAs for PH are placed at Annexure IV. These FSAs establish that there is adequate demand for coal transportation by rail to fulfill the mining projections made in Table 2 &3.

## 8.1 Coal, cement, iron ore, steel transportation demand from the entire catchment area

Coal transportation demand by rail from SECL and private coal blocks is significantly higher than the current transportation capacity. From the above details, it is summarized that SECL has signed agreement for coal supply to PH and Non PH sector by rail to the tune 184.24 Mt. In addition Gare Pelma I & II coal blocks will generate transportation demand to the tune of 44 mt. After swapping the existing linkages of nearly 20 Mt for Mahagenco and GSECL, the net addition of coal transportation demand from these 2 blocks is 24 Mt. Total coal transportation demand works out to be 208 Mt. This is to be largely evacuated through Kharasia-Champa-Bilaspur-Raipur/Annupur routes. These routes will require considerable strengthening through construction of additional lines/alternative routes. Besides coal, these routes will have significant growth in cement movement, as significant additional capacity is being commissioned. The following new cement/clinker capacity is getting commissioned. 50% of the cement production can be easily allocated to the project line Raipur to Kharsia.

**Table 9: New Cement Capacity**

S. No.	Company	Location	Capacity in MT
1	JSPL	Kirodimal Nagar	4
2	Emami Cement Ltd.	Bhatapara	3.0
3	Shree Cement	Hathband	2.275
4	Dalmia Bharat	Balodabazar	4

With development of mining of iron ore in Bailadila sector and Rowghat area significant movement of iron ore and steel will take place. On completion of Jagdalpur-Rowghat-Dalli-Rajahra line new iron ore and steel traffic will flow on above routes. A summary of new traffic streams from Rowghat and Jagdalpur area is presented in the table below:

**Table 10: Iron ore coal movement from Jagdalpur and Rowghat area**

S. No.	Mining Company/Steel Plant	Commodity	Origin	Destination	Qty Mt
1	JSPL	Iron Ore	Bacheli	Raigarh	5
2	Jayaswal Neco	Iron Ore	Jugani	Siltara	2
3	Baldev Alloys	Iron Ore	Gidam	Raipur	0.5
4	Baldev Alloys	coal	Korba	Jagdalpur	1.5
5	Sarda Energy and Minerals	Iron ore	Narayanpur	Raipur	4
6	NMDC+CMDC	Iron ore	Kirandul	Raipur	14.5
	Total				27.5

The above details indicate that the entire network around Bilaspur will be under severe pressure from new traffic comprising power house coal, Non Power House Coal, iron ore, steel and cement. This requires a serious effort at the infrastructure strengthening.

## 9.0 Rail Network Analysis in Bilaspur Division of SECR

### 9.1 Network Congestion

The coal from SECL is being shipped to power plants in the states of Chhattisgarh, Maharashtra, Madhya Pradesh, Gujarat, Rajasthan and Punjab. The trunk rail network is

saturated in most of the stretches. The line capacity utilization of few of the indicative sections of South East Central Railway is illustrated in the table below.

**Table 11: Line Capacity Utilisation of SECR sections 2014-15**

S. No.	Section	Length Kms	No of lines	Capacity with MB	Average no of trains				Capacity Utilisation %
					Pass	Goods	Others	Total	
1	Champa-Bilaspur	53	3	81	38	67.9	1	107	<b>132</b>
2	Bilaspur-Annupur	151	2/1	27	21	21.4	1	43.4	<b>161</b>
3	Annupur-Sahdol	41	2	58	23	33.7	0.5	57.2	99
4	Sahdol-Katni	125	2	54	22	33.5	1	56	104
5	Bilaspur-Urkura	105	3	84	43	68.9	2	113.9	<b>135</b>
6	Urkura-Sarona	9.4	2	40	1	50	2	53	<b>133</b>
8	Sarona-Bhilai	17.3	3	81	52	50.5	2	104.5	<b>129</b>
9	Bhilai-Durg	13.6	3	79	52	44.6	2	98.6	<b>125</b>
10	Durg- Gondia	135	2	62	42	41.2	3.5	86.7	<b>140</b>
11	Gondia-Tumsar Road	50	2	59	38	41.4	1.8	81.2	<b>138</b>
12	Tumsar Road-Kalmuna	74	2/1	62	41	35	2	78	<b>126</b>
13	Kalmuna-Nagpur	6	1	50	41	25.2	2	68.2	<b>136</b>

Source: SECR

## 9.2 Capacity augmentation works

The following projects are sanctioned by Ministry of Railways for capacity augmentation on SECR leading to the project section, which are in various stages of implementation/project planning.

- iv. Bilaspur-Annupur Doubling
- v. Jharsuguda-Bilaspur 4<sup>th</sup> Line
- vi. Bilaspur-Katni 3<sup>rd</sup> Line

The last two projects were included in the budget for 2015-16 and are at the initial stage of planning and financial sanction.

As per line capacity statement, at present 68 freight trains are running on Bilaspur- Champa section, which has three lines. Even after construction of 4<sup>th</sup> line, it will not be possible evacuate growth in coal production via this route due to the following reasons.

- iv) The DPR of 4<sup>th</sup> line project estimates 70 Mt of additional traffic, which cannot be run on construction of only one additional line.
- v) Saturation of Gevra Road-Champa Section (justifies rail corridors from Korba to Pendra Road and Katghora to Dongargarh)
- vi) Over saturation of Kharsia-Champa-Bilaspur section even after construction of 4<sup>th</sup> line due to additional 46 trains from Dharamjaigarh- Kharsia East Line on commissioning of Chhattisgarh East Rail project. (This justifies construction of Kharsia –Raipur rail Corridor)
- vii) Capacity limitation of Bilaspur yard in passage of additional trains. Bilaspur will pose to be a bottleneck.

As can be seen from the table above, the sections Bilaspur- Annupur and Annupur-Katni to be used by traffic from the project area are having capacity utilization of more than 100%. The route from Annupur to Katni is operating at saturation. Railway Board has sanctioned 3<sup>rd</sup> line construction on this route. The additional traffic will find it difficult to move on saturated sections unless line capacity enhancement works are carried out in a time bound manner.

The additional traffic from Korba on expansion of existing mines and from Dharamjaygarh area of Raigarh mines through phase II of East Rail Line will be evacuated through East West Corridor. Traffic from Gare Pelma coal block of MAHAGENCO is proposed to be evacuated

through proposed Katghora- Dongargarh rail corridor.

### **9.3 Capacity of Bilaspur yard**

Bilaspur yard is currently handling about 70 freight trains each from Champa and Raipur side and 21 freight trains from Annupur side. In the final analysis after commissioning of ongoing projects and if SECR decides to go for Bilaspur-Urkura 4<sup>th</sup> line, the Bilaspur yard will be handling more than 130 trains (freight and passenger) each way from Champa side and Urkura side. On Annupur side it will have capacity to handle about 80 trains each way. It will make Bilaspur as the busiest station on IR. As per present planning no additional facility is being developed at Bilaspur. The proposed 4<sup>th</sup> line between Jharsuguda-Bilaspur will simply get connected with the existing UP main line. The yard layout with 4<sup>th</sup> line connection is placed as Annexure V. The same is likely to happen if 4<sup>th</sup> line is planned between Bilaspur and Urkura. This will make Bilaspur as a bottleneck in the operation and full capacity gains due to 4<sup>th</sup> line will remain unrealized. The proposed flyover, which is designed to eliminate conflict due to cross movement towards Annupur side, is inordinately delayed due to non availability of land from school. It is not likely to materialize in near future. The Bilaspur yard will therefore pose a serious bottleneck in transportation of different streams of traffic on SECR.

### **9.4 Capacity constraints at Raipur yard**

Raipur station is a junction with line joining from Titlagarh, & Bilaspur. There is a goods avoiding by-pass between Urkura and Sarona stations. This presently takes care of goods traffic between Durg and Bilaspur. The proposed corridor cannot be terminated at Raipur as it will interfere with passenger traffic. This is sought to be achieved by diverting goods traffic from Naya Raipur towards Durg side via under construction Naya Raipur-Kendri line.

## Chapter 2

### Katghora-Dongargarh New Rail Line Project

**1.0** SECL is developing huge coal mining capacity in Mand Raigarh coalfields. In addition, private coal Blocks in Gare Pelma will generate significant demand of coal transportation. The traffic study of Chhattisgarh East Railway has made coal movement projections of 62.7 Mt to be handed over by CERL to SECR at Kharasia. It does not include coal from Non CIL blocks, mainly 23 MT coal block of MAHAGENCO in GP II and 21 MT coal block of GSECL in GP I. With the addition of these 2 huge coal blocks, the traffic projections will go up further by about 25 Mt. 20.1 Mt of the traffic projections of Chhattisgarh East Railway is having destinations in Chhattisgarh state. Remaining 42.6 MT are having destinations in the State of Maharashtra and Ukai in Gujarat. In terms of trains it will amount to 28 freight trains. Presently 16 coal trains from SECL are moving towards Raipur/Nagpur from Bilaspur. The traffic projections of Chhattisgarh East Railway give 12 additional coal freight trains. Coal blocks of MAHAGENCO and GSECL will offer additional traffic of 20 coal trains. In addition there is cement traffic from new plants and iron ore traffic from Baildila mines to steel making facilities in Raipur area and JSPL plant. The line capacity utilization shows that it is in the range of 130% between Bilaspur and Durg. No line capacity work is sanctioned between Bilaspur and Durg. This establishes the need for construction of additional lines for movement of existing traffic and the projected traffic. Macro analysis establishes need of 2 lines for movement of coal traffic alone. Cement and iron ore transportation demand will only add to the viability of these new line projects.

### **2.0 System details of the project lines**

#### **Katghora-Dongargarh New Line**

The Chainages and station details of Katghora-Dongargarh line are illustrated in the table 1 below:

**Table 1: Station details of Katghora-Dongargarh New Line**

STN .NO	NAME	INTER DIST.
1	KATGHORA	0.0
2	BANDHAKHAR	14.09
3	KARTALI	8.99
4	BELTARA	8.9
5	NEVSA	6.77
6	RATANPUR	8.20
7	LAMER	7.86
8	GANIYARI	8.62
9	TAKHATPUR	14.1
10	KOSMA	9.800
11	MUNGELI	12.900
12	BANKI	5.850
13	PAUNI	11.750
14	SOMNAPUR	9.360
15	BORDULI	10.140
16	KAWARDHA	9.900
17	DHANELI	11.600
18	DHANGAON	9.500
19	JANGALPUR	8.650
20	GANDAI	12.850
21	MURAI	9.000
22	CHHUIKHADAN	9.300
23	KHAIRAGARH	8.700
24	JAWARTALA(PRAKASHPUR)	11.850
25	GHOGHEDABRI	7.990
26	BELGAON	12.160
27	DONGARGARH	6.110

This gives the length of critical block section as 14 kms. This gives total line capacity of 24 trains each way and 21 paths after maintenance block. We get 17 paths for freight trains. Taking new design of coal wagon with pay load to tare ratio of 4:1 and axle load of 25 tonnes, and 330 days operation in a year, the total coal traffic of 26 Mt can be moved annually.

### 3.0 Traffic Projections

The rationale for allotment of traffic, for the purpose of projections, to the two new rail corridors is described as under:

- vi) For the purpose of traffic projections it is assumed that Katghora-Dongargarh section will be a through section for traffic to the states of Maharashtra, Telangana and beyond. This corridor will primarily be utilized for movement of traffic on account of MAHAGENCO. MAHAGENCO is expected to participate in the project SPV as equity partner.
- vii) Kharasia-Raipur route will be through route for traffic to Gujarat and will be primarily used on account of GSECL coal traffic. GSECL will consider financial participation in the equity of SPV on finalization of DPR. This route in addition serves new cement plants located in Balodabazar district.
- viii) The traffic will be through in nature and the proposed corridors will act as high speed through corridors, without the need of shunting at most of the stations except on Kharasia- New Raipur new line, which will have loading potential for cement traffic.
- ix) About 8 Mt of cement traffic will be produced by new cement plants of Shree cement, Emami Cement and Dalmia (Bharat). This cement will be evacuated through the project line Raipur-Kharasia. 50% of the traffic is allocated to the project section.
- x) The existing coal traffic on account of MAHAGENCO and GSECL moving over the existing rail route of Bilaspur-Nagpur and via Katni route will not be counted for financial appraisal, though it will be routed on the project corridor and the project corridor offering shorter route.
- xi) The additional coal traffic other than on account of MAHAGENCO and GSECL, which is required to travel on the existing saturated Bilaspur –Durg section is allotted to the project corridor to the extent of available capacity. It is assumed as overflow from the existing route.

**3.1** Based on above criteria the traffic routing is considered on the new corridors using the following distance tables. It is based on assumption that there is no inflated mileage on the project sections and 10% inflated mileage on Dharamjaygarh to

Katghora route of Chhattisgarh East Railway phase II and Chhattisgarh East West Railway.

**Table 2 : Distance via the project lines**

Comparative length of GP-I/II to Dongargarh								
Via Kharsia-Raipur					Via Dharamjaigarh-Katghora			
Section	Length	Inflated Mileage	Net	Section	Length	Inflated Mileage	Net	
GP-I to Gharghoda	20	1.6	32	GP-II to Gharghoda	20	1.6	32	
Gharghoda-Kharsia	35	1.6	56	Gharghoda-Dharamjaigarh	40	1.6	64	
Kharsia-Dongargarh	314	1	314	Dharamjaigarh-Katghora	98	1.1	108	
				Katghora-Dongargarh	239	1	239	
			402				443	

#### 4.0 Traffic Projections on Katghora-Dongargarh New Line Project

Table 3 gives the traffic projections on Katghora-Dongargarh rail line. It is largely utilized by 23 Mt of coal on Mahagenco account. To fill the balance capacity coal for Nasik power plant of India Bull is projected on this line. This makes the total projections of 25.9 Mt.

**Table 3: Traffic Projections on Katghora-Dongargarh rail corridor**

S. No.	Power Plant	Destination	Chargeable Km	Traffic FY24 in Mt
1	India Bulls Realtech Ltd.	Nasik	1296	2.9
3	Koradi 5 to 10	Koradih	651	6.5
4	Nasik 3 to 5	Nasik	1296	1.5
5	Bhusawal 2 to 5	Bhusawal	1039	3.5
6	Paras 3 & 4	Paras Vidyutnagar	919	1.2
7	Parli 4 to 8	Parli	1198	2.9
8	K'KHEDA 1 to 5	Khaperkheda	656	3.3
9	Chandrapur 3 to 9	Chandrapur	780	4.1
10	<b>Total</b>			<b>25.9</b>

The traffic projections on Katghora-Dongargarh corridor are 25.9 Mt. The actual coal traffic moved for the MAHGENCO and GSECL plants during 2015-16 from SECL is as illustrated in the table 4 below:

**Table 4: Actual traffic movement to MAHAGENCO and GSECL**

Maharashtra TPP	Dispatches from SECL (000 tonnes)	Gujarat TPP	Dispatches from SECL (000 tonnes)
<b>MSPGCL Nasik</b>	831.51	GSECL Gandhinagar	1986.75
<b>MSPGCL Khapaskheda</b>	1401.54	GSECL Sikka	292.61
<b>MSPGCL Koradih</b>	1392.81	GSECL Ukai	3400.41
<b>MSPGCL Chandrapur</b>	460.69	GSECL Wanakbori	4693.06
<b>MSPGCL Khapaskheda</b>	234.46		
<b>MSPGCL Bhusawal MFSG</b>	1069.74		
<b>Total</b>	5390.75		10372.83

It is seen that 5.4 Mt of MAHAGENCO coal traffic was transported during 2015-16. If this quantity is reduced from the projections, the balance traffic projections are 20.5 MT on Dongargarh line for the purpose of financial appraisal.

## Chapter 3

### Railway Master plan of Chhattisgarh Area

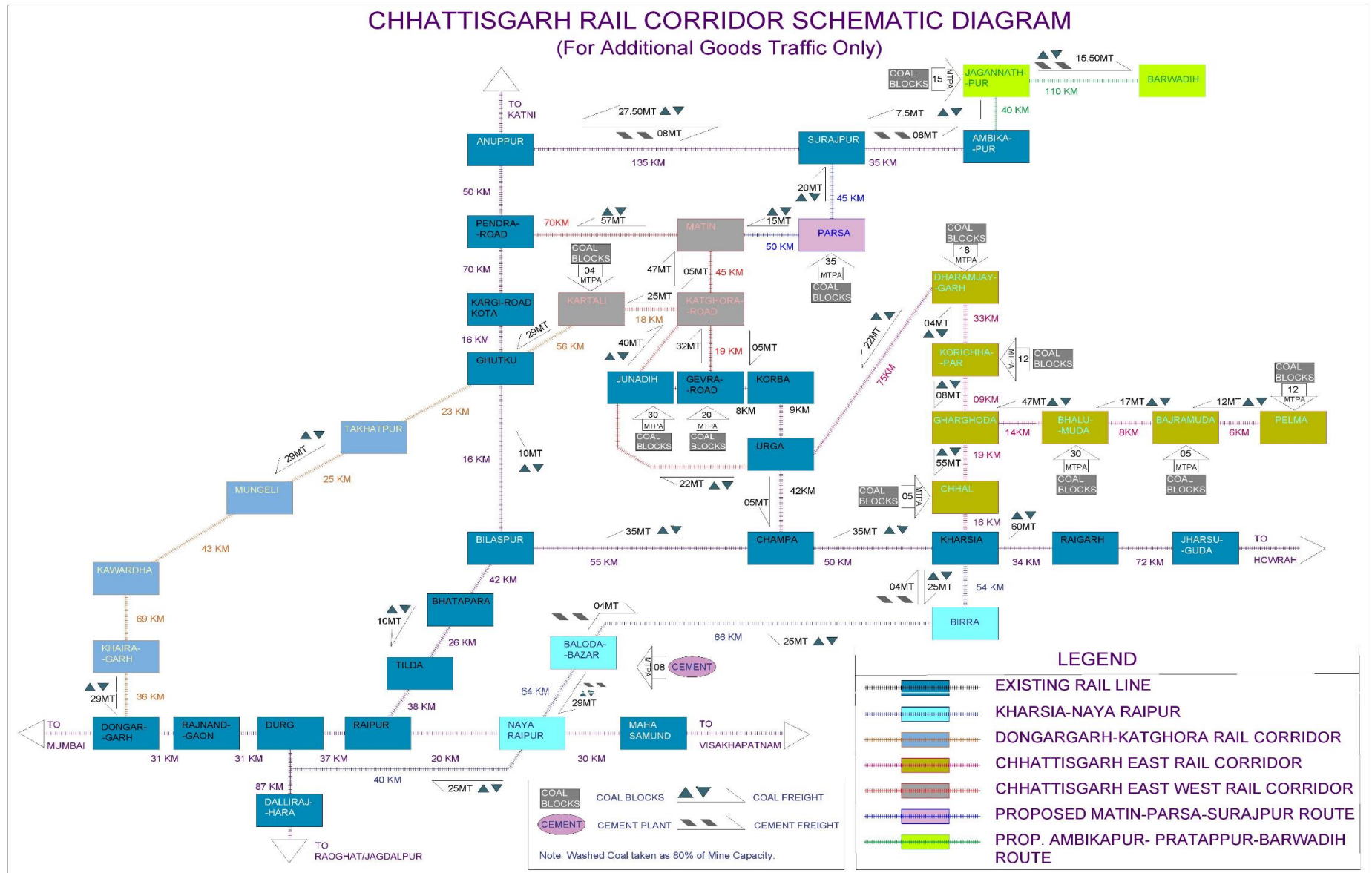
**1.0** In the light of the foregoing, it is necessary that a comprehensive masterplan is presented to the stakeholders to be able to ascertain that there are no missing links in the jigsaw puzzle as well as there is no over planning or double counting of the same traffic. For this purpose, reliance has been made on the following documents:

- 1.1** Traffic Survey Report for the fourth line between Jharsuguda and Bilaspur prepared by SEC Railway 2014-15.
- 1.2** Traffic Survey Report prepared for CERL, 2014-15
- 1.3** Traffic Survey Report prepared for CEWRL, 2015-16
- 1.4** Traffic Survey Report prepared for BRPL 2016-17
- 1.5** Allotment letters of Ministry of Coal for coal blocks in Gare-Pelma area

**2.0** In a mixed traffic scenario, we can't always speak in terms of MTPA of freight traffic movement, as there are a large number of passenger trains competing with goods traffic for the path (occupancy of railway track for moving between two points). The issue of line capacity utilization between Jharsuguda and Dongargarh (the two ends of zone of consideration of Chhattisgarh mineral producing region) has been highlighted in chapter 1. However, there are certain premises which may differ from experience of one agency to the other. The most important being related to 'Line capacity augmentation' works. In brief, it must be understood that there are several levels of constraints in working out line capacity of a single line, double line, three line or a four line section. When a long section is provided with a third line or a fourth line, the traffic flow does not multiply in the same ratio. While in doubling, there is a manifold increase in the capacity to discharge traffic (because of directional advantage), the same is not true with a third or fourth line as nodal congestion comes into play. It is known fact that on this Mumbai-Howrah

main line, Raipur, Bilaspur and Jharsuguda are major congested nodes. It is a known fact that the average speed of goods train in SEC Railway is below 25kmph. It would mean that an average goods train will take around 16 hours to cross from Jharsuguda to Dongargarh (a distance of nearly 400km).

**3.0** Justification of the fourth line between Jharsuguda and Bilaspur included a projection of additional 90MTPA (about 160 additional trains duly accounting for empty trains). At present, there is no way that this additional traffic can pass through either Bilaspur or Raipur. Hence, it is imperative that network expansion is planned to avoid Bilaspur and Raipur. A Schematic plan of expanded network planned for 2023 onwards is attached as Annexure. It must be appreciated that it is based entirely on traffic projections from reputable and reliable sources and there is no double counting. It may be matter of a little debate whether this traffic will materialize as early as 2023 or as late as 2025. However, the principle of avoid ability of congested nodes like Bilaspur and Raipur for the purpose of through good traffic cannot be disputed.



## Chapter 4

### Conclusion and Recommendations

- 1.0** Based on the traffic projections both on supply side and demand side, it is clear that SEC Railway should be handling about 200 MTPA additional traffic in the year 2025. This will mostly consist of coal, iron ore, finished steel and cement/clinker. The points of origin of this traffic are mostly within the territory of SEC Railway and destinations are mostly outside the Railway.
- 2.0** Apart from the first mile connectivity which is planned through SPVs like CERL, CEWRL and BRPL, the existing network must be expanded to avoid bottlenecks. Since, the cities are heavily built up areas, the nodes can't be expanded, any further capacity enhancement must be planned outside or beyond these nodes.
- 3.0** Planning new routes avoiding congested nodes affords multiple advantages of reaching out to unconnected areas, opening them up for industrial growth as well as quicker and speedier evacuation of traffic.
- 4.0** It is recommended that based on the commercial and technical rationale, new rail corridor between Katghora to Dongargarh and Kharsia to Naya Raipur to Durg must be taken up at the earliest.
- 5.0** This Report considers the Financial Viability of Katghora-Dongargarh New Railway line.

## **Chapter 5**

### **Financial Analysis of Katghora-Kawardha-Dongargarh New Railway Line**

#### **1.0 INTRODUCTION**

Ministry of Railways and Government of Chhattisgarh have jointly set up this Company by the name, Chhattisgarh Railway Corporation Limited at Raipur. This is an umbrella Company with a mandate to form SPVs to execute projects identified by it. The stakeholder governments have committed to invest minimum 26% equity in financially viable projects. The rest may be invested by any other strategic partners such as mining companies, ports or manufacturing industry. Chhattisgarh has immense potential as far as mining and manufacturing industry is concerned. It has been established in the foregoing chapter that growth in the demand and output of coal and cement over the next 5-7 years alone will put tremendous strain on the present railway system despite their internal plans of capacity augmentation. This would call for seeking newer routes for evacuation of traffic as well as reaching out to unserved areas. For this end in view, the planning of Katghora-Mungeli-Kawardha-Dongargarh route (258km) is very timely and opportune. It is likely to tap surplus coal traffic arriving at Katghora from Raigarh-Mand as well as Korba coalfields and on the other, it opens new areas and unconnected districts of Kawardha and Mungeli for industrial growth by catalysing setting up of mineral based industry.

The project is being implemented based on the Design Build Fund Operate Transfer (DBFOT) model of PPP projects. The Concession Agreement shall be executed between project specific SPV ( a subsidiary of CRCL) and MOR. MOR as a policy is providing additional support in terms of Inflated Mileage for the projects being implemented under JV model to make them bankable, in case the projects face bankability issue. This is considered for the projects after detailed financial analysis before the financial closure.

Total cost of the project is estimated at Rs. 4821 Cr, and is proposed to be funded in the Debt to Equity ratio of 80:20 by way debt of Rs. 3857 cr. and Equity of Rs. 964 Cr. The project **does not** require support by way of inflated mileage to achieve bankability. Project is estimated to achieve commercial operation by 1<sup>st</sup> April 2023.

## 2.0 PROJECT COST

2.1 The project cost for development of Katghora-Dongargarh rail corridor is estimated by Aarvee Associates Architects Engineers & Consultants Pvt. Ltd in July 2017. The summary of the components of the cost is presented in the Table 1.

**Table 1: Project Cost Break up**

Cost Summary				
	Main Line Kartali to Dongargarh	Main Line Katghora to Kartali	Total for Base Year	Adjusted for Inflation
Deposit towards land	900.00	82.00	982.00	982.00
Construction Costs				
Civil Engineering Works	1,613.00	135.50	1,748.50	2,205.21
Signaling & Telecomm Works	193.59	16.20	209.79	264.59
Electrical Works	290.10	21.80	311.90	393.37
Mechanical Works	20.00	2.00	22.00	27.75
Contract Addition to PMC	127.00	10.53	137.53	173.46
Other Fees for DPR	16.73	1.50	18.23	18.23
Preliminary and Pre-Operative Costs	21.20	2.00	23.20	23.20
<b>Sub-Total</b>	<b>3,181.62</b>	<b>271.53</b>	<b>3,453.15</b>	<b>4,087.81</b>
Contingencies	21.17	1.76	22.92	22.92
Margin Money	-	-	11.13	11.13
<b>Total Costs without IDC</b>	<b>3,202.79</b>	<b>273.29</b>	<b>3,487.21</b>	<b>4,121.86</b>
IDC				699.09
<b>Total</b>				<b>4,820.95</b>

## 2.2 Inflation adjustment of Project Cost

The project cost estimated in the DPR considers 2017-18 as the base year. The construction cost expenditure will be phased over 5 years, which is the construction period of the Project.

The package contracts for construction rates will have provision for price adjustment linked to consumer price index/wholesale price index, as applicable. Keeping this in view provision for escalation in construction cost has been built into the project cost.

Construction related inflation has been assessed based on the RBI indices for All Commodities as well as for Industrial Workers. Appropriate weightage has been assigned based on labour component in construction activity. The current trends show declining inflation rate. Hence, an assumption of 5% per annum is appropriate keeping in view the current stability in prices of steel and cement. The inflation rate for construction activity is calculated based on the past data as tabulated below:

**Table 2: Estimation of Escalation Factor**

Date	WPI: All Commodities	CPI: Industrial Workers
Mar-09	123.5	148
Mar-10	136.3	170
Mar-11	149.5	185
Mar-12	161	201
Mar-13	170.1	224
Mar-14	180.3	239
Mar-15	176.1	254
Mar-16	174.6	268
CAGR	5.00%	6.00 %
Assumed Weights as per PVC formula	80%	20%

Inflation Rate works out to 5.2%. An escalation of 5% is used for the project cost during construction.

### 2.3 Construction Cost and Project Capex Phasing

Construction period of 5 years is assumed. The phasing of construction cost is done as illustrated in the table 3 below:

**Table 3: Phasing of construction cost**

	FY2019	FY2020	FY2021	FY2022	FY2023	TOTAL
Phasing	10%	14%	25%	29%	12%	100%
Land Deposits	245	737				982

<b>Construction Cost (Base Year)*</b>	-	97	923.5	923.5	486	2430
<b>Inflation Adjusted Const. Cost plus IDC</b>	-	180.5	1241.5	1410	1007	3542
<b>Project Capex</b>	245	917.5	1241.5	1410	1007	4821

\*Excluding Preliminary, Contingency & Other Fee

## 2.4 Means of Funding

Taking into account the overall funding requirements and the project cash flows the project cost of Rs. 4821 Cr is proposed to be funded in Debt Equity ratio of 80:20. It requires debt of Rs. 3857 Cr., and Equity of Rs. 888 Cr.

### Equity

Based on the proposed capital structure, the Equity contribution from promoters works out to Rs. 964 Cr. As per the present understanding, 48% of this equity is to be contributed by M/s Maharashtra State Power Generation Company Limited, Mumbai, a State PSU of the State of Maharashtra and the rest will be contributed by M/s Chhattisgarh Railway Corporation Limited Raipur which in turn will be divided amongst State and the Central Govt in the ratio of 51:49. This will give indirectly 26.52% equity contribution by the state government and 25.42% equity contribution by MOR. Minimum 50% equity is brought in upfront before the first draw down of debt.

### Debt

CRCL, on behalf of its SPV proposes to approach banks and Public Financial Institutions to raise Rs. 3857 Cr. of debt. Debt draw down will start after exhausting at least 50% equity and subordinate debt if so decided by the promoters. It is proposed to have door to door tenor of 20 years for the debt with 5years of construction+15 years repayment. The repayment is done after a moratorium of 2 years over the next thirteen years in the range of Rs. 538 cr per annum.

## 2.5 Term Loan and Cost of Capital:

Cost of capital depends on the prevailing bank rate and the level of confidence the project is able to generate. Since the project is backed entirely by government entities, the spread (percentage higher than bank rate) is likely to be small. Keeping in view the recently

concluded terms of financial closure of Chhattisgarh East Railway Company Limited, and the down trend being witnessed, interest rate of 9.25% is assumed.

**Table 4: Assumptions: Term Loan**

Scheduled Construction Start	1-Apr-2018	Unit
Construction Period	60	Months
Project Development and land acquisition	12	Months
Construction Period	48	Months
Scheduled Operations Start	1-Apr-2023	
Concession Period	30	Years
Schedule Operations End	1-Apr-2051	
Interest During Construction	9.25%	
Interest During Operation	9.25%	
Moratorium	2	years
Tenure of Debt Door to Door	20	Years
Repayment Period	52	Quarters

### 3.0 Major Assumptions and profitability projections

The rationale for major assumptions viz: revenue and O&M expenses are detailed out below:

#### 3.1 Revenue Assumptions

##### *Revenue without inflated mileage*

The revenue is calculated using the Inter Railway Freight Adjustment methodology adopted by Indian Railways. The base freight rates for coal is taken from the latest rate circular TCR/1078/2015/07 DT. 24.08.2016 further amended on 10.10.2017 for coal traffic. Other elements of freight; viz: Terminal surcharge, development surcharge, busy season surcharge etc. are not taken. The base freight per tonne is taken from the rate table for each stream of traffic for the corresponding lead of movement. The terminal cost of Rs. 26 per tonne for each end of the traffic stream is deducted. The balance freight is apportioned on pro rata basis on the project section distance. The terminal cost of Rs. 26 per tone is added in case of traffic movement loaded from Cement sidings of Baloda Bazar area, which will be loaded from good sheds and other facilities of the project Railway. For the purpose of revenue projections, the annual escalation factor of 3% on revenue has been applied. The freight on coal has grown @7.9% over the past 5 years. There was no change in April 2016 and 2017. This has subdued the tariff escalation expectations. However, there has been change in coal transportation tariff by way of giving relief to long lead customers. The latest being in the month of July 2017. For the purpose of this analysis, the rate of freight

escalation has been moderated to 3% per annum.

#### *Revenue with Inflated mileage*

MOR's policy on 'Participative Model for Rail Connectivity and Capacity Augmentation Projects' issued on December 12, 2012 by the Railway Board provides that inflated tariff to improve bankability of railway projects being implemented under JV model would be approved by the Railway Board on case to case basis. Recently MOR has given support of 50% inflated mileage for the rail connectivity projects of Dighi port and Jaigarh port and 60% inflated mileage to CERL phase I project under this policy. As the project financial parameters appear to be sound at this stage, unless cost of the project gets revised due to considerations other than the project essentials, there is no need of inflated mileage in this project.

#### *Sharing of apportioned earnings*

At present, there are two models governing sharing of apportioned earnings between the Railways (towards reserved services) and the Concessionaire (towards access charge for the fixed infrastructure and its maintenance). These are popularly called: 1. The JV Model and 2. The NGR Model. Essentially, in the first model, the earnings calculated on the basis of base freight are divided equally (without providing a substantive calculation of cost of essential services) while in the second model only 5% is retained by the railways in addition to the cost of providing reserved services. It need to be noted that significant amount of revenue by way of various surcharges is excluded from the purview of apportionment and is retained by the IR in JV model. Hence, the actual apportionment is much less than 50%. Apparently, the second model is more transparent and leaves something on the table for attracting potential investors. In the case of majorly freight running Railway system like SEC Railway, the share of Operations and Maintenance including depreciation( of fixed assets) is around 47%. When maintenance and depreciation both are to the account of the Concessionaire, the share to be retained by the Railway generally should be limited to 40%. This premise is open to discussion with Ministry of Railways as the umbrella JV Company is having freedom of choice on this subject to develop a specific PPP model suiting specific project requirement.

### **3.2 Operation and Maintenance Expenses**

The project has to bear the operation and maintenance cost of fixed infrastructure. On the pattern of operational Joint Venture SPV projects, it is assumed that the maintenance will

be done by using benchmark practices following Konkan Railway and other best practices. The maintenance cost is taken largely fixed and is broken in terms of staff and material following the approach used in operational SPVs. Total deployment of staff is taken as 302, which is in line with other similar projects. The line is largely freight line and as per concession agreement the concessionaire will have to freedom to maintain the line. However, overheads as per norms of IR have been taken for calculation purpose though fully recognizing the fact that the the overhead of Project Railway will be lower than the Railways. The material cost is taken for maintenance of civil engineering, signaling, telecom, Electrical General, Electrical TRD and Traffic related operation and maintenance activities including activities undertaken through contracts. The figures are derived from the actual expenditure figures of South East Central Railway for the year 2014-15 under various accounting head from Accounts Statement 15. The expenditure figures are escalated to the year 2016-17 using escalation factor as notified by Railway Board. The maintenance cost at 2020-21 prices is Rs. 30.9 Cr. Moreover, a contingent provision of 3% of the apportioned income has been kept for unforeseen liability, which is not unusual but difficult to quantify, such as a breach due to rains, an OHE entanglement or a derailment due to several reasons. The O&M estimates also have a provision of periodic maintenance such as renewals and tamping of track. During the project operation period an annual escalation of 4.5% is used on maintenance cost keeping in view that the staff cost constitutes the major part of the O&M cost. The entire procedure is in line with financial appraisals methodology adopted for CERL project (since been approved by MoR).

#### 4.0 Project Financials Snapshot

The financial projections, profit and loss account and the detailed financial statements are given in the Annexure. Snapshot of Project IRR and DSCR are illustrated in the table below.

**Table 5: Project IRR and DSCR taking 60% share of revenues to SPV**

OUTPUT				
Min DSCR	1.37			
Average DSCR	1.60			
Project Cost	4,820.95			
Project IRR (post Tax)	12.35%			

FY	2024	2025	2026	2027
Revenues	737.02	759.13	781.91	805.36
EBIDTA	692.48	712.92	731.09	755.61
Interest	356.75	356.75	354.08	344.28
PAT	124.92	140.89	156.98	184.58
Cash	74.35	241.78	176.28	144.23

**Table 5.1: Project IRR and DSCR taking 50% share of revenues to SPV**

OUTPUT				
Min DSCR	1.17			
Average DSCR	1.35			
Project Cost	4,820.04			
Project IRR (post Tax)	10.60%			
Equity IRR	14.84%			
FY	2024	2025	2026	2027
Revenues	614.19	632.61	651.59	671.14
EBIDTA	573.33	590.20	604.68	625.41
Interest	356.68	356.68	354.02	344.21
PAT	31.49	43.34	56.54	81.19
Cash	0.00	144.27	75.53	40.19

## 5.0 Sensitivity Analysis

The sensitivity tables below show the base case, increase in O&M cost by 20%, reduction in traffic by 10% and a combination of both only in case of 60% sharing of revenues. In case of only 50% sharing of revenues MoR may have to build in Traffic Assurance in the Concession Agreement.

**Table 6: Sensitivity Analysis with share of revenue as 60:40**

The sensitivity tables below show the base case, increase in O&M cost by 20%, reduction in traffic by 10% and a combination of both.

Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.58
Increase in O&M Costs by	0%	Min DSCR	1.35
Increase in Traffic by	0%	PIRR (Post Tax)	12.19%
		PIRR (Pre Tax)	13.52%
		Equity IRR	19.36%

Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.57
Increase in O&M Costs by	20%	Min DSCR	1.34
Increase in Traffic by	0%	PIRR (Post Tax)	11.85%
		PIRR (Pre Tax)	13.10%
		Equity IRR	19.84%

Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.45
Increase in O&M Costs by	0%	Min DSCR	1.25
Increase in Traffic by	-10%	PIRR (Post Tax)	10.99%
		PIRR (Pre Tax)	12.09%
		Equity IRR	17.30%

Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.43
Increase in O&M Costs by	20%	Min DSCR	1.23
Increase in Traffic by	-10%	PIRR (Post Tax)	10.81%
		PIRR (Pre Tax)	11.91%
		Equity IRR	16.83%

The above sensitivity table indicates that project financials are least sensitive to increase in

O&M cost and most sensitive to decrease in traffic.

**Table 7: Sensitivity Analysis with share of revenues as 50:50**

Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.35
		Min DSCR	1.17
Increase in O&M Costs by	0%	PIRR (Post Tax)	10.60%
		PIRR (Pre Tax)	11.70%
Increase in Traffic by	0%	Equity IRR	14.84%
Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.33
		Min DSCR	1.15
Increase in O&M Costs by	20%	PIRR (Post Tax)	10.44%
		PIRR (Pre Tax)	11.53%
Increase in Traffic by	0%	Equity IRR	14.40%
Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.23
		Min DSCR	1.07
Increase in O&M Costs by	0%	PIRR (Post Tax)	9.69%
		PIRR (Pre Tax)	10.65%
Increase in Traffic by	-10%	Equity IRR	12.31%
Sensitivity		Output	
Increase in Interest Rate by	0%	Avg DSCR	1.21

Increase in O&M Costs by	20%
Increase in Traffic by	-10%

Min DSCR	1.05
PIRR (Post Tax)	9.52%
PIRR (Pre Tax)	10.48%
Equity IRR	11.89%

## 6.0 Conclusions

Based on above financial analysis and subject to sensitivity analysis provided herein, and based on various financial, operating and regulatory assumptions, barring unforeseen circumstances, the project is viewed to be financially viable with 60% share of apportioned revenue.

The Project is also viable with 50% sharing of revenues to the SPV by MoR but this is not able to accommodate any downward variation in traffic. Hence, MoR must build in some form of traffic assurance to the SPV for its viability.

## **FINANCIAL ANNEXURES**

**Revenue Forecast**

FY	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>Revenue to CRCL</b>										
Revenue excluding Terminal Charge	672.68	692.86	713.65	735.05	757.11	779.82	803.21	827.31	875.09	901.34
Revenue from Terminal Charge	-	-	-	-	-	-	-	-	-	-
<b>Total Revenue</b>	<b>672.68</b>	<b>692.86</b>	<b>713.65</b>	<b>735.05</b>	<b>757.11</b>	<b>779.82</b>	<b>803.21</b>	<b>827.31</b>	<b>875.09</b>	<b>901.34</b>
FY	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
<b>Revenue to CRCL</b>										
Revenue excluding Terminal Charge	928.38	956.23	984.92	1,014.47	1,044.90	1,076.2	1,108.54	1,141.79	1,176.05	1,211.33
Revenue from Terminal Charge	-	-	-	-	-	-	-	-	-	-
<b>Total Revenue</b>	<b>928.38</b>	<b>956.23</b>	<b>984.92</b>	<b>1,014.47</b>	<b>1,044.90</b>	<b>1,076.</b>	<b>1,108.54</b>	<b>1,141.79</b>	<b>1,176.05</b>	<b>1,211.33</b>
FY	2044	2045	2046	2047	2048	2049	2050	2051		
<b>Revenue to CRCL</b>										
Revenue excluding Terminal Charge	1,247.67	1,285.10	1,323.65	1,363.36	1,404.26	1,446.39	1,489.78	1,534.47		
Revenue from Terminal Charge	-	-	-	-	-	-	-	-		
<b>Total Revenue</b>	<b>1,247.67</b>	<b>1,285.10</b>	<b>1,323.65</b>	<b>1,363.36</b>	<b>1,404.26</b>	<b>1,446.39</b>	<b>1,489.78</b>	<b>1,534.47</b>		

**Annexure****Profit and Loss Statement**

FY	Year	2024	2025	2026	2027	2028	2029	2030	2031	2032
<b>Profit and Loss Statement</b>										
Revenues from Operation	INR Crores	672.68	692.86	713.65	735.05	757.11	779.82	803.21	827.31	875.09
Other Income	INR Crores	-	-	-	-	-	-	-	-	-
Interest on Cash Balance	INR Crores									
Total Income	INR Crores	672.68	692.86	713.65	735.05	757.11	779.82	803.21	827.31	875.09
O&M Expenses	INR Crores	42.61	44.22	48.77	47.64	52.59	51.34	56.72	55.34	102.94
Other Expense	INR Crores	-	-	-	-	-	-	-	-	-
EBIDTA	INR Crores	630.07	648.64	664.88	687.41	704.52	728.48	746.49	771.97	772.15

FY	Year	2033	2034	2035	2036	2037	2038	2039	2040	2041
<b>Profit and Loss Statement</b>										
Revenues from Operation	INR Crores	901.34	928.38	956.23	984.92	1,014.47	1,044.90	1,076.25	1,108.54	1,141.79
Other Income	INR Crores	-	-	-	-	-	-	-	-	-
Interest on Cash Balance	INR Crores									
Total Income	INR Crores	901.34	928.38	956.23	984.92	1,014.47	1,044.90	1,076.25	1,108.54	1,141.79
O&M Expenses	INR Crores	60.37	156.43	65.08	72.03	70.18	77.74	75.69	142.31	81.65

Other Expense	INR Crores	-	-	-	-	-	-	-	-	-	-
EBIDTA	INR Crores	840.97	771.95	891.15	912.89	944.29	967.16	1,000.56	966.23	1,060.14	

FY	Year	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
<b>Profit and Loss Statement</b>											
Revenues from Operation	INR Crores	1,176.05	1,211.33	1,247.67	1,285.10	1,323.65	1,363.36	1,404.26	1,446.39	1,489.78	1,534.47
Other Income	INR Crores	-	-	-	-	-	-	-	-	-	-
Interest on Cash Balance	INR Crores										
Total Income	INR Crores	1,176.05	1,211.33	1,247.67	1,285.10	1,323.65	1,363.36	1,404.26	1,446.39	1,489.78	1,534.47
O&M Expenses	INR Crores	90.61	88.10	870.11	95.07	105.69	102.62	197.21	107.35	119.78	115.88
Other Expense	INR Crores	-	-	-	-	-	-	-	-	-	-
E B I D T A	INR Crores	1,085.44	1,123.23	377.56	1,190.02	1,217.96	1,260.73	1,207.05	1,339.04	1,370.00	1,418.59

### Annexure Project Operation and Maintenance Cost

FY	Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>Periodic Maintenance (Loaded Line)</b>											
Tamping	INR Crores	-	-	2.87	-	3.13	-	3.42	-	3.73	-
TFR	INR Crores	-	-	-	-	-	-	-	-	41.06	-
Deep Screening/TBR	INR Crores	-	-	-	-	-	-	-	-	-	-
TRR	INR Crores	-	-	-	-	-	-	-	-	-	-
<b>Total Periodic Maintenance</b>	<b>INR Crores</b>	-	-	2.87	-	3.13	-	3.42	-	44.79	-

### Annual O&M Expenses

Regular O&M	INR Crores	22.43	23.44	24.49	25.59	26.74	27.95	29.21	30.52	31.89	33.33
Contingent O&M	INR Crores	20.18	20.79	21.41	22.05	22.71	23.39	24.10	24.82	26.25	27.04

FY	Year	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
<b>Periodic Maintenance (Loaded Line)</b>											
Tamping	INR Crores	4.08	-	4.45	-	4.86	-	5.31	-	5.80	-
TFR	INR Crores	-	-	-	-	-	-	58.39	-	-	-
Deep Screening/TBR	INR Crores	89.67	-	-	-	-	-	-	-	-	-
TRR	INR Crores	-	-	-	-	-	-	-	-	-	-
<b>Total Periodic Maintenance</b>	<b>INR Crores</b>	93.75	-	4.45	-	4.86	-	63.70	-	5.80	-

### Annual O&M Expenses

Regular O&M	INR Crores	34.83	36.40	38.03	39.75	41.53	43.40	45.36	47.40	49.53	51.76
Contingent O&M	INR Crores	27.85	28.69	29.55	30.43	31.35	32.29	33.26	34.25	35.28	36.34

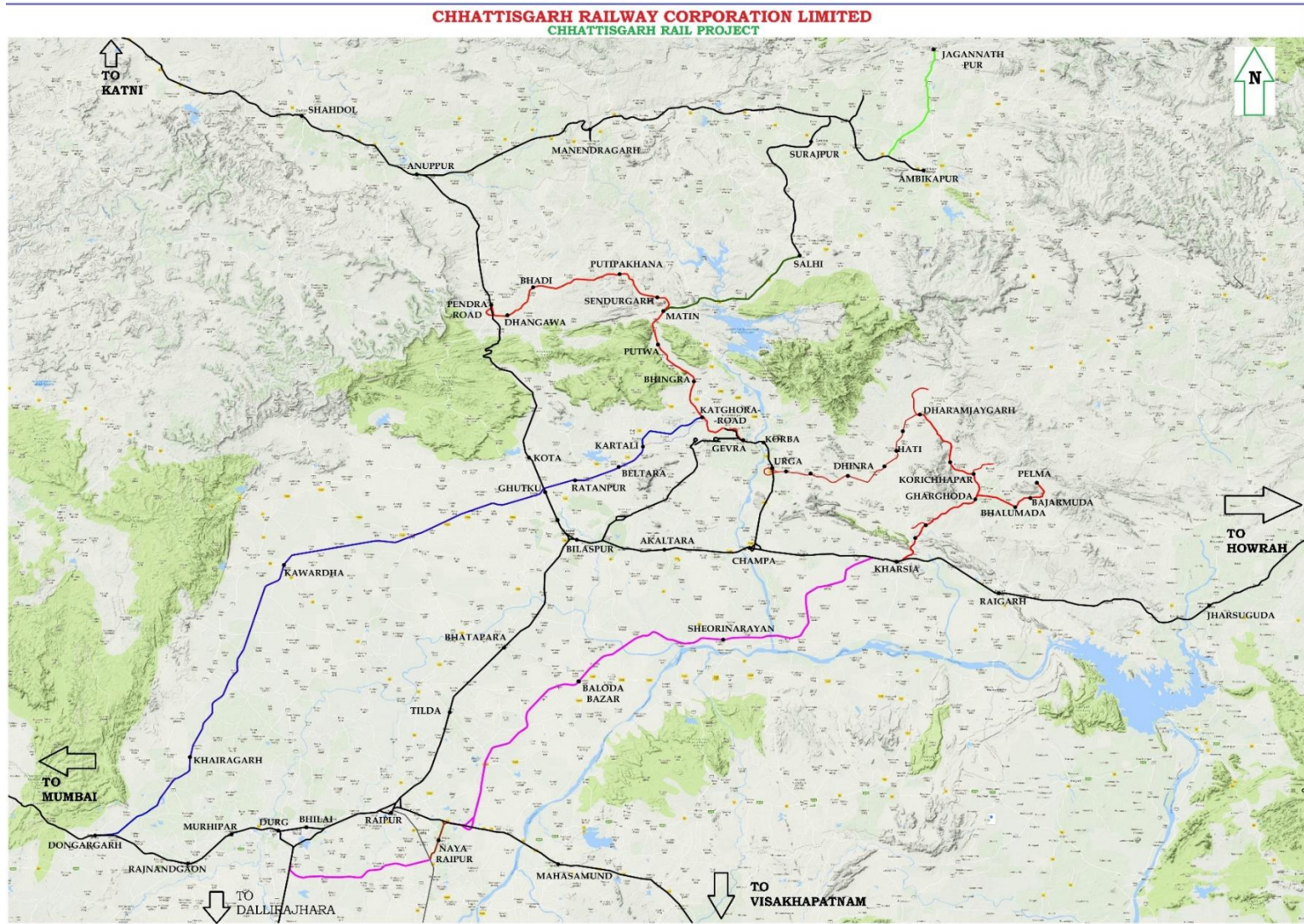
FY	Year	2044	2045	2046	2047	2048	2049	2050	2051		
<b>Periodic Maintenance (Loaded Line)</b>											
Tamping	INR Crores	6.33	-	6.91	-	7.55	-	8.24	-	-	-
TFR	INR Crores	-	-	-	-	83.03	-	-	-	-	-
Deep Screening/TBR	INR Crores	139.26	-	-	-	-	-	-	-	-	-
TRR	INR Crores	633.00	-	-	-	-	-	-	-	-	-
<b>Total Periodic Maintenance</b>	<b>INR Crores</b>	<b>778.59</b>	<b>-</b>	<b>6.91</b>	<b>-</b>	<b>90.58</b>	<b>-</b>	<b>8.24</b>	<b>-</b>	<b>-</b>	<b>-</b>

### Annual O&M Expenses

Regular O&M	INR Crores	54.09	56.52	59.07	61.72	64.50	63.96	66.84	69.85	-	-
Contingent O&M	INR Crores	37.43	38.55	39.71	40.90	42.13	43.39	44.69	46.03	-	-

## **OTHER ANNEXURES**

Annexure I



## Annexure II

TENTATIVE PRODUCTION DATA OF MAND-RAIGARH COALFIELDS																	
Area	Project	UG/OC		Coal Reserve	XII PLAN PERIOD		XIII FIVE YEAR PLAN					XIV FIVE YEAR PLAN					
					2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	
<b>RAIGARH</b>	<b>UNDER GROUND</b>																
	CHHAL	UG	Completed														
	DHARAM	UG	Completed	3.77	0.15	0.15											
	TOTAL UG			3.77	0.15	0.15	0	0	0	0	0	0	0	0	0	0	
	<b>OPENCAST</b>																
	BAROD(3.5mty)	OC	Ongoing	50	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
	CHHAL	OC	Completed		3.5	1.75											
	CHHAL OC Seam III Expn (6 MTY)	OC	Ongoing	151.36		1.75	4	5	6	6	6	6	6	6	6	6	6
	JAMPALI(2mty)	OC	Ongoing	31.3	1.15	3	3	3	3	3	3	3	3	3	3	3	1.3
	PELMA (15mty)	OC	Ongoing	219.14			1.6	4	10	15	15	15	15	15	15	15	15
	PELMA EXTN		Future	190													
	BIJARI (1.5mty)	OC	Ongoing	31.55		1	1.5	2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	DURGAPUR OC(6mty)	OC	Ongoing	140.5						6	6	6	6	6	6	6	6
	RAI OC (15 Mty Fut.)	OC	Future	238.308				3	5	8	10	12.5	15	15	15	15	
	RAI OC EXTN		Future	220													
	CHIRA OC GROUP (15-Mty -FUT)	OC	Future	500						1.5	3	5	8	12	15	15	
	SYANG OC GROUP (20 Mty Fut.)	OC	Future	520.69						3	6	10	15	20	20	20	
	CHIMTA PANI (07- Mty Fut.)	OC	Future	200													
	PUSULDA/JAMPALI (15-Mty FUT)	OC	Future	400													
	ONGAON POTIA (10 Mty -FUT)	OC	Future	550													
	BASIN FATEHPUR (20 Mty-FUT)	OC	Future	1400													
	CHIMTAPANI EXTN(6Mty-FUT)	OC	Future	300													
	<b>TOTAL OC</b>			<b>5142.848</b>	<b>8.15</b>	<b>11</b>	<b>13.6</b>	<b>20.5</b>	<b>29.7</b>	<b>48.2</b>	<b>54.7</b>	<b>63.2</b>	<b>73.7</b>	<b>82.7</b>	<b>85.7</b>	<b>84</b>	
	<b>TOTAL AREA</b>			<b>5147</b>	<b>8.3</b>	<b>11.15</b>	<b>13.6</b>	<b>20.5</b>	<b>29.7</b>	<b>48.2</b>	<b>54.7</b>	<b>63.2</b>	<b>73.7</b>	<b>82.7</b>	<b>85.7</b>	<b>84</b>	

**Annexure III****NON PH FSA**

<b>S. NO.</b>	<b>STATE</b>	<b>CONSUMERS</b>	<b>FSA NO</b>	<b>MODE</b>	<b>PRIORITY</b>	<b>ACQ</b>
1	CG	Aarti Sponge & Power	0115	RAIL	SPNG	57600.00
2	CG	ACC Jamul Cement Works	0005	RAIL	CMT CPP	120000.00
3	CG	Ambuja Cement, Rawan	0037	RAIL	CMT CPP	66000.00
4	CG	B.S. Sponge Pvt. Ltd.	0121	RAIL	SPNG	57600.00
5	CG	Bhilai Semi Coke		RAIL	SC II	173000.00
6	CG	Bhilai Steel Plant CPP Unit-1	0112	RAIL	STL CPP	294387.00
7	CG	BSPC Unit-2 (NSPCL)	0113	RAIL	STL CPP	305613.00
8	CG	Century Cement Tilda	0019	RAIL	CMT	180000.00
9	CG	Century Cement Tilda-I	0016	RAIL	CMT CPP	92253.00
10	CG	Century Cement Tilda-II	0015	RAIL	CMT CPP	64632.00
11	CG	Godawari Power & Ispat	0136	RAIL	SPNG	64500.00
12	CG	Godawari Power & Ispat	0133	RAIL	CPP	98064.00
13	CG	Gopal Sponge & Power	0138	RAIL	SPNG	57600.00
14	CG	Hira Ferro Alloys ltd	0075	RAIL	CPP	117520.00
15	CG	Hira Power & Steel	0078	RAIL	CPP	117520.00
16	CG	Indsil Energy & El. Che.	0077	RAIL	CPP	59928.00
17	CG	Jagdamba Power & Alloys.	9003	RAIL	CPP	73500.00
18	CG	Lafarge Arasmeta	9075	RAIL	CMT CPP	109050.00

Captive						
19	CG	Lafarge Arasmeta Captive	0053	RAIL	CMT CPP	224652.00
20	CG	MSP Steel & Power Ltd.	0154	RAIL	SPNG	108000.00
21	CG	Real Ispat & Power Ltd.	0091	RAIL	SPNG	57600.00
22	CG	Sharda Energy & Minerals-I	0067	RAIL	CPP	120000.00
23	CG	Sharda Energy & Minerals-II	0068	RAIL	CPP	130752.00
24	CG	Shri Bajrang Power &Ispat Ltd.	0098	RAIL	SPNG	100800.00
25	CG	SKS Ispat & Power	0093	RAIL	SPNG	158400.00
26	CG	SKS Ispat Ltd	0092	RAIL	CPP	293800.00
27	CG	Sunil Sponge	0196	RAIL	SPNG	72000.00
28	CG	Topworth Steel	9017	RAIL	SPNG	99000.00
29	CG	Ultra Tech Cement Raipur	0066	RAIL	CMT	300000.00
30	CG	Vasavani Industries	0111	RAIL	SPNG	57600.00
<b>CG Total</b>						<b>3831371.00</b>
31	GJ	Ambuja Cement	0036	RAIL	CMT	243000.00
32	GJ	G.N.F.C. Bharuch	0065	RAIL	FRTZ	912022.00
33	GJ	Shri Ram Fertilizer Kota	0062	RAIL	FRTZ	337622.00
<b>GJ Total</b>						<b>1492644.00</b>
34	HP	Ambuja Cement Solan (ROOP.)	0034	RAIL	CMT	244500.00
<b>HP Total</b>						<b>244500.00</b>
35	MP	ACC Kymore Cement	9096	RAIL	CMT	51412.50

Works						
36	MP	ACC Kymore Cement Works	0008	RAIL	CMT CPP	146900.00
37	MP	ACC Kymore Cement Works	0004	RAIL	CMT	360000.00
38	MP	Birla Satna Cement Works	0012	RAIL	CMT CPP	158652.00
39	MP	Birla Satna Cement Works	0010	RAIL	CMT	346500.00
40	MP	Century Maihar Cement- I	0020	RAIL	CMT	138750.00
41	MP	Century Maihar Cement- II	0021	RAIL	CMT	176250.00
42	MP	Grasim Industries(Chem.),NGD	0031	RAIL	CPP	96756.00
43	MP	Grasim Industries(fibre),NGD	0029	RAIL	CPP	110000.00
44	MP	HEG Ltd. Mandideep, MP	9043	RAIL	CPP	90000.00
45	MP	HEG Ltd. Mandideep, MP	0071	RAIL	CPP	146900.00
46	MP	Heidelberg Cement-I	0022	RAIL	CMT	135000.00
47	MP	Heidelberg Cement-II	0023	RAIL	CMT	135000.00
48	MP	Nepa Ltd., Nepanagar	0085	RAIL	PAPER	64796.00
49	MP	Nepa Ltd., Nepanagar	0084	RAIL	CPP	69204.00
50	MP	UTC (Grasim Vikram Cement)	0028	RAIL	CMT CPP	125304.00
51	MP	Vardhman Fabrics BNI	9040	RAIL	CPP	70500.00
52	MP	Vardhman Yarn BNI	9049	RAIL	CPP	70500.00
<b>MP Total</b>						<b>2492424.50</b>

53	OR	OCL Cement	0056	RAIL	CMT	75000.00
	<b>OR Total</b>					<b>75000.00</b>
54	PB	Ambuja Cmt. Roopnagar	0039	RAIL	CMT CPP	100000.00
	<b>PB Total</b>					<b>100000.00</b>
55	RJ	ACC Lakheri Cement Works	0003	RAIL	CMT	67500.00
56	RJ	ACC Lakheri Cement Works	0006	RAIL	CMT CPP	146900.00
57	RJ	Ambuja Cement KRW	9095	RAIL	CMT	55335.00
58	RJ	Ambuja Cement KRW	0035	RAIL	CMT	157500.00
59	RJ	Ambuja Cement, MTD/KRW	0038	RAIL	CMT CPP	88140.00
60	RJ	Banswara Sintex Ltd	9050	RAIL	CPP	53000.00
61	RJ	Birla Cement Chandaria	0014	RAIL	CMT CPP	147000.00
62	RJ	Birla Cement Chandaria	0011	RAIL	CMT	132000.00
63	RJ	DCM Shri Ram Cement	0059	RAIL	CMT	60000.00
64	RJ	Hindustan Zinc , 1*80 MW	9019	RAIL	CPP	219500.00
65	RJ	Hindustan Zinc , 2*80 MW	9057	RAIL	CPP	395350.00
66	RJ	J.K. Cement Nimbahera	9119	RAIL	CMT	154087.50
67	RJ	J.K. Cmt. Nimbhera, CTGH	9042	RAIL	CMT CPP	64500.00
68	RJ	J.K. Cmt. Shambhupura CTGH	0047	RAIL	CMT CPP	39600.00
69	RJ	Manglam Cement	0054	RAIL	CMT	112500.00

70	RJ	Manglam Cement	0055	RAIL	CMT CPP	102830.00
71	RJ	RSWM Limited	9009	RAIL	CPP	135000.00
72	RJ	Sangam Spinners,	0096	RAIL	CPP	76695.00
73	RJ	Shriram Fert. &Chem.- I, Kota	0060	RAIL	FRTZ CPP	248544.00
74	RJ	Shriram Fert. &Chem.- II, Kota	0061	RAIL	FRTZ CPP	208980.00
75	RJ	UTC (Grasim Aditya Cement)	0027	RAIL	CMT CPP	125304.00
76	RJ	UTC (Grasim Aditya Cement)	9065	RAIL	CMT CPP	141000.00
77	RJ	UTC (Grasim Aditya Cmt.)	9127	RAIL	CMT	336600.00
78	RJ	UTC. (Kotputli Cement)	9064	RAIL	CMT CPP	135000.00
<b>RJ Total</b>						<b>3402865.50</b>
<b>Grand Total</b>						<b>11638805.00</b>

**Annexure IV****FSA/LOA from SECL to PH sector**

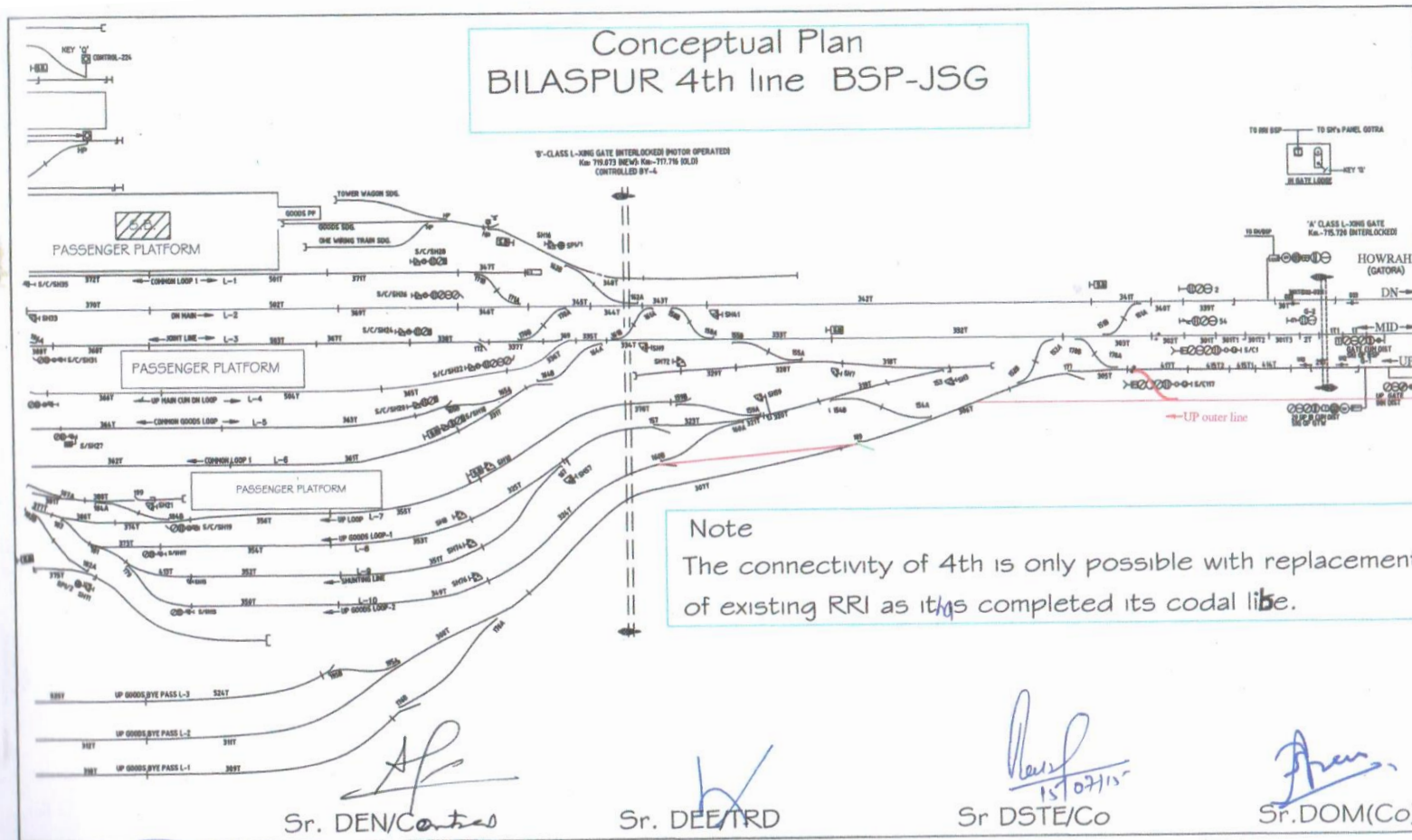
Sl.	Name of Power House	ACQ lakh tonnes	MODE
1	Korba East (EXPN.)	26.00	Rail
2	Korba West TPs Extn. III	23.12	Rail
3	Bharat Aluminium Com. Ltd. Korba	26.01	Rail
4	Lanco Amarkatak Unit - I	13.40	Rail
5	Lanco Amarkatak Unit - II	14.45	Rail
6	Lanco Amarkatak Unit - III	24.97	Rail
7	Lanco Amarkatak Unit - IV	27.47	Rail
8	Maruti Clean Coal Power Ltd. Korba	13.00	Rail
9	SKS Power Gene.Ltd.Unit - 3&4, Raigarh	28.32	Rail
10	Vandana Vidhyut I&II , Korba	11.94	Rail
11	Athena Chhattisgarh Power Ltd Unit -1	24.97	Rail
12	Chhattisgarh Power Ventures Pvt. Ltd. Janjgir	13.00	Rail
13	Chhattisgarh State Power Genr. Com.Ltd. Janjgir	46.20	Rail
14	DB Power Ltd. Janjgir	24.97	Rail

15	KSK Mahanadi Power Com.Ltd. Janjgir	49.94	Rail
16	R.K.M. Powergen Prit. Ltd. Janjgir Unit 1	16.90	Rail
17	R.K.M. Powergen Prit. Ltd.Unit - 2&3 Janjgir	23.84	Rail
18	R.K.M. Powergen Prit. Ltd.Unit - 3&4 Janjgir	21.67	Rail
19	Dheeru Powergen Pvt. Ltd. Katgora Unit -1	16.86	Rail
20	Dheeru Powergen Pvt. Ltd. Katgora Unit -2&3	30.34	Rail
		<b>477.4</b>	
21	Sudha Agro Oil Belha, Bilaspur	0.001	Rail
		<b>0.001</b>	
22	Jindal Power Unit - 1	24.97	Rail
23	Korba West Power Ltd. Raigarh	27.40	Rail
24	SKS Power Gene.Ltd. Raigarh	13.00	Rail
25	SKS Power Gene.Ltd.Unit - II, Raigarh	13.00	Rail
26	TRN Energy Prvit.Ltd. , Raigarh	26.01	Rail
27	ATPS AMLAI	9.20	Rail
28	M.B. Power Ltd. Unit - I &II Anuppur	49.94	Rail
29	SGTPS BIRSINGPUR	64.00	Rail
30	Real Power Pvt. Ltd. Mungeli	0.001	Rail

31	NSPCL, Bhilai Unit - I & II	24.08	Rail
32	Neeraj Power Pvt.Ltd., Raipur	0.001	Rail
33	Adani Power UNIT - I II	49.10	Rail
34	Adani Power UNIT - I II (Tap)	5.40	Rail
35	Adani Power UNIT - III (Tap)	27.47	Rail
36	Ideal Energy Proj. , Nagpur (MH)	3.90	Rail
		<b>337.47</b>	
37	JP Bina Thermal Power	10.84	Rail
38	Koradih	24.78	Rail
39	Khaperkhera	10.01	Rail
40	Khaperkhera (LOA))	10.00	Rail
41	NTPC MOUDA	19.17	Rail
42	Shree Siingaji TPP (MP) (1&2)	49.94	Rail
43	Emco Energy Ltd.. (MS) - I	13.00	Rail
44	Emco Energy Ltd.. (MS) - II	13.00	Rail
45	Jhabua Power Ltd. Seoni (MP)	18.72	Rail
46	Indiabulls Amaravatil - I To V	54.95	Rail
47	Chandrapur	9.10	Rail
48	Dhariwal Infrastructure Pvt.Ltd. Chandrapur (MS)	13	Rail

49	Dhariwal Infrastructure Pvt.Ltd. Chandrapur (MS)	14.3	Rail
50	Meja TPS Unit 1&2 Allabhabad UP	54.93	Rail
51	Chhabra Extn. Unit - 3	21.67	Rail
52	Chhabra Unit - I & II	23.12	Rail
53	Bhusawal (LOA)	23.12	Rail
54	Kota	23.50	Rail
55	Kota Unit - 7	9.58	Rail
56	Ramagundam	5.00	Rail
		<b>421.73</b>	
57	Kalisindh TPP Unit -1 RRVUNL ,Nimoda	24.97	Rail
58	Sikka	12.20	Rail
59	Indiabulls Nasik TPS (MH)	27.47	Rail
60	Indiabulls Nasik TPS Unit - 5 (MH)	6.79	Rail
61	Indiabulls Realtech Ltd., Nasik (MH)	27.16	Rail
62	Nasik	7.24	Rail
63	Ukai	32.40	Rail
64	Wanakbori	85.20	Rail
65	AEC Torrent (SBT)	13.40	Rail
66	Gandhinagar	34.60	Rail
67	Lanco Vidarbha TPS Unit -1 (MS)	27.47	Rail
68	Lanco Vidarbha TPS Unit -2 (MS)	27.47	Rail

69	Ropar	10.05	Rail
		<b>336.42</b>	
70	Rajpura TPP - I&II (Nabha Power)	55.50	Rail
71	Suratgarh	61.00	Rail
72	Suratgarh Unit - 6	12.04	Rail
73	Reliance Infrastructure Limited	24.52	Rail
		<b>153.06</b>	
	<b>Sub Total Rail Mode</b>	<b>1726.05</b>	



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