F. No. CPAM-55020/10/2020-CPIAM-Part(2) (iii)
Government of India
Ministry of Coal
(CPIAM Section)
***

Shastri Bhawan, New Delhi
Dated 29th June 2021

OFFICE MEMORANDUM

Subject: Seeking comments on Draft National Coal Logistics Plan submitted by SBICaps/Primus Partners -reg.

The undersigned is directed to enclose herewith the Draft National Coal Logistics Plan submitted by SBICaps/ Primus Partners.

2. All stakeholders are requested to provide their comments on the above draft report to this Ministry within 30 days from the date ofplacing on the website of this Ministry at e-mail id: hitlar.singh85@nic.in. Comments received thereafter shall not be considered.

Encl.: As above.

(Hitlar Singh)
Under secretary to the Government of India
Email: hitlar.singh85@nic.in

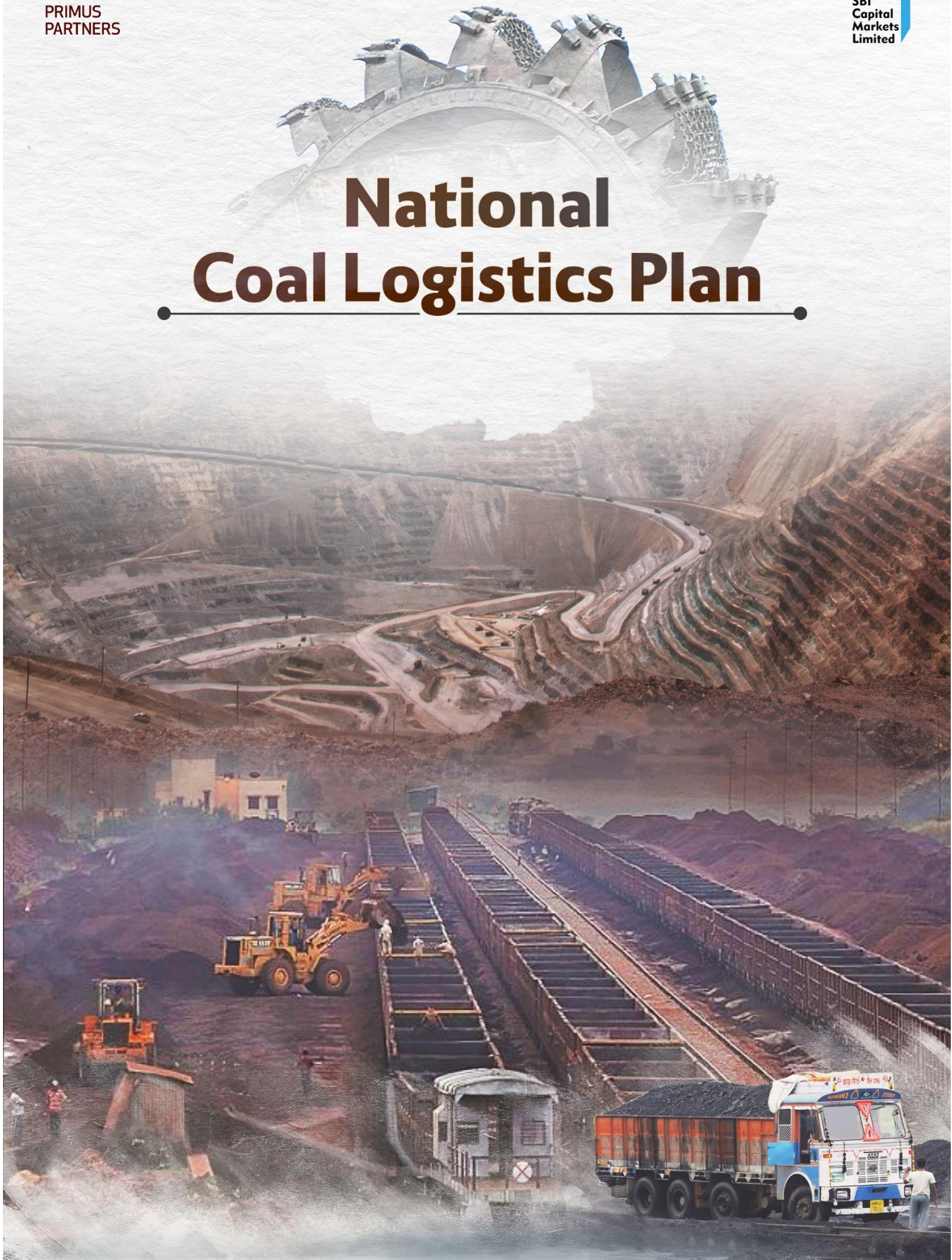
To,

1. NIC - for placing on website of MoC for stakeholder consultation
2. All Stakeholders (CIL and its subsidiaries/SCCL/NLCIL/Captive block allocatees)

PRIMUS PARTNERS

SBI Capital Markets Limited

National Coal Logistics Plan



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Abbreviations

ABS	Automatic Block Signalling
ABVTPS	Atal Bihari Vajpayee Thermal Power Station
AML	African Minerals
APMDCL	Andhra Pradesh Mineral Development Corporation
ATLS	Automated Truck Loading System
BALCO	Bharat Aluminium Company
BT	Billion Tonnes
CAPEX	Capital Expenditure
CCL	Central Coalfields Limited
CEO	Chief Operating Officer
CERL	Chhattisgarh East Railway Limited
CESC	Calcutta Electric Supply Corporation
CHP	Coal Handling Plant
CIL	Coal India Limited
CM	Chief Minister
CMPDI	Central Mine Planning and Design Institute
CMSP	Coal Mines (Special Provisions) Act
CR	Central Railways
CSIR	Council of Scientific & Industrial Research
CSP	Concentrated Solar Power
CTC	Centralized Traffic Control
DFC	Dedicated Freight Corridor
DFCCIL	Dedicated Freight Corridor Corporation of India
DL	Double Line
DMF	District Mineral Foundation
DPR	Draft Project Report
DWT	Deadweight Tonnage
ECL	Eastern Coalfields Limited
ECoR	East Coast Railway
ECR	East Central Railway
EMMIL	Essel Mining & Industries Ltd
EPC	Engineering, Procurement, and Construction
ETPS	Ennore Thermal Power Station
EUP	End-User Plant
FMC	First-Mile Connectivity
FOIS	Freight Operations Information System
FY	Financial year
GCV	Gross Calorific Value

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GIS	Geographic Information System
GOI	Government of India
GPWIS	General Purpose Wagon Investment Scheme
GSI	Geological Survey of India
HDN	High-Density Network
HUN	Highly Utilised Networks
ICPL	Indian Cane Power limited
IDCO	Odisha Industrial Infrastructure Development Corporation
IFFCO	Indian Farmers Fertiliser Cooperative
IIT	Indian Institute of Technology
INR	Indian Rupee
IR	Indian Railways
IRCON	Indian Railway Construction Limited
IWAI	Inland Waterways Authority of India
JSW	Jindal South West
JV	Joint Venture
KPCL	Karnataka Power Corporation
LA	Land Acquisition
LOP	Layout Plan
LTL	Less than truckload
MCL	Mahanadi Coalfields Limited
MCRL	Mahanadi Coal Railway Limited
MD	Managing Director
MDO	Mine Developer and Operator
MGR	Merry-Go-Round
MMDR	Mines and Minerals (Development and Regulation) Act
MMT	Metric Million Tonnes
MMTPA	Metric Million Tonnes Per Annum
MoC	Ministry of Coal
MSH	Maharashtra State Highway
MSME	Ministry of Micro, Small & Medium Enterprises
MT	Million Tonnes
MW	Mega Watt
NALCO	National Aluminium Company Limited
NFR	Northeast Frontier Railway
NGR	Non-Government Railway
NH	National Highway
NHAI	National Highways Authority of India
NITI	National Institution for Transforming India
NKCF	North Karanpura Coalfield
NLC	Neyveli Lignite Corporation Limited

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NRP	National Rail Plan
NTPC	National Thermal Power Corporation
NW	National Waterway
OC	Open Cast
OCP	Open Cast Project
OHE	Overhead Line
OLC	Overland Conveyor
PCS	Port Community System
PMGSY	Pradhan Mantri Gram Sadak Yojana
PPP	Public–Private Partnership
PRC	Peak rate Capacity
PSU	Public Sector Unit
PUVNL	Purvanchal Vidyut Vitaran Nigam Limited
PWD	Public Works Department
QL	Quadruple Line
RE	Renewable Energy
RITES	Rail India Technical and Economic Service
RLS	Rapid Loading System
ROW	Right of Way
RR	Rural Roads
RSR	Rail-Sea-Rail
RVNL	Rail Vikas Nigam Limited
SCCL	Singareni Collieries Company
SECL	South Eastern Coalfields Limited
SECR	South East Central Railway
SER	South Eastern Railway
SEZ	Special Economic Zone
SH	State Highway
SKCF	South Karanpura Coalfield
SPV	Special Purpose Vehicle
SRCPL	Sarguja Rail Corridor Private Limited
STPP	Super Thermal Power Project
TANGEDCO	Tamil Nadu Generation and Distribution Corporation Limited
TCAS	Traffic Collision Avoidance System
TDC	Target Date of Commissioning
TEU	Twenty-Foot Equivalent Unit
TL	Triple Line
TPS	Thermal Power Station
UMPP	Ultra-Mega Power Projects
VOC	Valliyappan Olaganathan Chidambaram
VR	Village Roads

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WBPDCL	West Bengal Power Development Corporation
WCL	Western Coalfields Limited
WCR	West Central Railway
YoY	Year On Year

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1. Approach and Methodology

This study provides a comprehensive analysis of coal blocks allocated to private players across 17 coalfields located in 7 states of India. As part of this study, we have analysed the existing and planned infrastructure around the blocks, focusing on road and rail connectivity infrastructure projects to enhance the evacuation capacity of the selected mines. In addition to surface connectivity, we have also examined coastal shipping and inland water transport routes, wherever the potential for such modal usage exists.

Coal India Limited (CIL) and its subsidiaries operate in most of these coalfields and have primarily developed the existing evacuation infrastructure. This report has, within its scope, the coal blocks assigned to private players under the Coal Mines (Special Provisions) Act, 2015 and the Mines and Mineral (Development and Regulation) Act, 1957. The private investors must be provided with the optimum evacuation infrastructure in the future so that such stakeholders are encouraged to commit continuing investments to achieve the nation's ambitious coal production targets.

This study encompasses a detailed analysis of non-CIL coal blocks and the coalfields in which such coal blocks are located. At the macro level, this study considers all existing and planned infrastructure projects required for coal evacuation in the country until FY 2029-30. The report includes an analysis of the potential of coal production in the country from CIL as well as non-CIL mines, including the mines that are to be allocated a part of the second tranche for commercial mining. As a result, the projected demand is forecasted up to FY 2029-30. This report also analyses and identifies additional infrastructure requirements to augment existing connectivity and provide additional evacuation capacities.

A series of stakeholder consultations, literature reviews, and information exchanges were conducted to understand the current state of coal evacuation infrastructure. The following steps present our methodology in detail:

- With the report's key focus on private miners and significant reforms in the coal sector, the primary interactions with industry representatives were vital to understanding the present scenario and infrastructure bottlenecks. Multiple channels, including virtual outreach, meetings, and questionnaires, were used to contact the successful bidders.
- Secondary data sources were analysed, and the evacuation needs of non-CIL miners were extrapolated based on existing infrastructure and anticipated future needs.
- Plans for national infrastructure prepared by the respective central ministries and organisations were analysed. These included the National Rail Plan, the National Rail Vision 2024, the Bharatmala Pariyojana, the National Maritime Vision 2030, and reports from the Inland Waterways Authority of India (IWAI).
- The initial findings were discussed with the Ministry of Railways, Ministry of Road Transport & Highways, and the Indian Inland Waterways Authority, under the guidance of the Ministry of Coal.
- An additional exercise was conducted at the request of the Department of Logistics, and a draft Coal Logistics Policy was prepared and circulated among stakeholder ministries. This report incorporates the key learnings from this exercise.

This report comprises two sections. The first section of the report has an introduction, sector outlook and finally, an executive summary proving details of significant conclusions from the study and the recommendations. The second part of the report discusses state-wise, coalfield-wise, and mine-wise (non-CIL) evacuation plans as well logistics arrangements by CIL for coal evacuation. The maps provided for each coalfield depict the

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road and railway connectivity, as well as the network utilisation details.

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2. Introduction

Coal remains the basic fuel that drives the Indian economy by providing a reliable source of energy that is produced by a domestically mined mineral. While other sources of fossil fuel energy, such as petroleum, must be imported by India, coal provides a secure bedrock to Atma Nirbhar energy security for India.

In addition to energy security, this mineral also generates significant impetus that aids India's economic growth. In its upstream sectors, coal drives the economy in mineral mining with demand for mining equipment and machinery, and in the downstream sectors, it supports major national infrastructure networks of Indian Railways, National and State Highways, Ports, and Inland Waterways – as the largest single commodity being transported across the country.

This helps the Indian Railways as the freight charges for coal subsidize passenger transport, and coal provides 44 per cent of freight revenues, despite being only 40 per cent of total freight tonne-kilometres. Coal commodity traffic also generates demand at ports and for highway services and creates jobs across a wide swathe of industrial activity, including demand for commercial vehicles and in the shipping industry.

Coal has also been a driver of regional development in traditionally under-served areas, opening large parts of low-income regional economies to the benefits of industrialisation and urbanisation. In the coal-producing regions in India, some of the best urban centres have mining companies as the nuclei of industrial development, thereby creating vibrant and large local economies.

Fossil fuels are facing headwinds of sustainability and climate change, and coal is no exception. The Government of India has established an ambitious program of the sustainable energy transition for India and is moving forward on establishing renewable energy as an important component of India's energy basket. India's achieving of 100 gigawatts of installed RE capacity is rightly hailed as taking a leadership position amongst emerging market economies with respect to India's commitments towards a sustainable energy basket. However, it is well recognized that coal will remain the stabilizer, and its share in energy supply will remain at 50% of the total basket, even past 2040.

Along with the increase in energy supply from renewable sources, it is important to recognize that the importance of coal will sustain for some more time. It, therefore, becomes important to examine ways and means to impact greater efficiency in the entire cycle of coal mining, supply, and consumption in the coming years.

In this regard, it is critical to examine and bring in methods for efficient coal evacuation and supply chain logistics. It has to be done in a manner that makes the process greener, and at the same time, decreases costs.

Coal Ministry Vision

To strengthen India's energy security and to push forward on Atma Nirbhar Bharat by replacing imported coal with domestically mined coal, Ministry has launched a program to achieve 1 Billion Tonne production by 2024.

Mission

- To augment production through Government companies as well as captive mining routes by adopting state-of-the-art and clean coal technologies with a view to improving productivity, safety, quality, and ecology.
- To augment the resource base by enhancing exploration efforts with the thrust on increasing proved resources.
- To facilitate the development of necessary infrastructure for prompt evacuation of coal.

This report addresses the third component of 'Mission 1 Billion Tonne' and Atmanirbharta in India's coal sector: that of facilitating necessary infrastructure in coal evacuation. Further, the Ministry has given a clear mandate: this report is not in the nature of a study document but should present a plan of action.

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3. Sector Outlook

Production: CIL Mines

CIL is the major indigenous coal producer and the single largest coal producer in the world. CIL accounts for more than 80% of coal production in the country. In FY 21, it produced a total of 596.22 MT of coal.

As per the estimates, CIL is planning to produce 1,218 MT of coal during FY 30 from its all subsidiary. Data shows that the majority production of coal from CIL subsidiaries by FY 30 will be from the states of Odisha, Jharkhand, Chhattisgarh, and Madhya Pradesh.

Production: Non- CIL Mines

Presently under the CMSP Act of 2015 and the MMDR Act, 113 coal blocks have been allocated, of which 6 are allocated to CIL. Hence 107 coal blocks stand allocated to non-CIL entities.

In addition to this, 45 operational and 7 upcoming mines of Singareni Collieries Company Limited (SCCL) are expected to contribute about 71.7 MT of coal by FY30

Collectively it is estimated that non-CIL mines have the potential to produce approximately 480 MT of coal by FY30. This number has been estimated based on the assumption that coal mines whose production details are not available will start production by FY30 and achieve their peak rate capacity.

There is an additional potential of around 470 Mt (considering PRC) from the mines, which are to be allocated and listed under the 2nd tranche. For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve and assuming mine life of 25 years PRC is calculated. Odisha has the largest output potential from mines to be allocated.

Figure 1 All India Coal Production Potential

States	Expected Production in FY 30 (In MT)		
	CIL Mines Production	Non- CIL Mines Production	To be Allocated in 2nd Tranche
Chhattisgarh	234.42	108.10	74.1
Jharkhand	344.6	119.2	28.1
Odisha	340.9	120.7	318.0
Madhya Pradesh	171.9	47.0	39.1
Maharashtra	72.1	5.6	12.3
West Bengal	54.1	11.0	0.0
Telangana	0.0	70.2	1.5

Source: Ministry of Coal, Coal India Limited, SCCL, Coal Block Allocatee

Demand

As per studies conducted, the overall coal demand is estimated to be about 1300 – 1900 MT by 2030. The demand scenario is influenced by economic growth, energy efficiency and the emergence of alternatives to coal. By FY 2030, out of the overall coal demand, thermal coal demand is estimated to be about 1150 – 1750 MT.

The forecast is based upon official data from coal India and from primary data gathered through stakeholder consultation for private miners and cross-checked with allocation data provided by the Ministry of Coal.

Path-breaking Changes in Coal Sector

The coal sector reform process is based on the following pillars:

- Open and transparent auctions
- Encouraging privare investment
- Removal of captive mining conditions
- Sector regulation as a facilitative regime that coal sector as commodity for market-based production, supply, and sale.

These bold steps, when viewed against the principles of theory of change, exhibit the following parameters:

- A quamtum jump in production to 1.5 billion tonnes per annum
- Emtry of new and multoiple smaller entrepreneurs as MDOs
- The privare sector MDOs will produce a high volume at 400 million tonnes per annum by 2030
- Adoption of total landed cost-centric approach to coal logistics, as against a mode of transport-centric view
- Increasing use of multi-modal approach to lower costs and emissions.

The rapidly changing sector outlook has formed the basis of this study, and its recommendations.

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4. Executive Summary

Analysis and Findings

Multi-Modal Transportation

First and Last Mile Connectivity

First-mile connectivity involves coal movement from pithead to despatch points. In contrast, last-mile connectivity includes transportation from receiving points to the end-use plant.

In some cases, first-mile, trunk, and end mile connectivity overlap where coal is transported end to end using a single mode of transportation. For example, this could include a mine with an end-use plant in its vicinity and coal is transported from the mine to the end-use plant using road or conveyor as the mode of transportation. Similarly, when the mine and the end-use plant have railway siding connectivity, rail can be used as the sole mode of transportation.

Conveyor Belt

Wherever end-use plants or processing plants such as coal handling plants, coal washeries or dispatch points such as railway sidings/stations are located is within the surrounding area of the mine, the conveyor can be one of the preferred modes of transportation depending on the volume of the coal and distance.

The conveyor systems are being popularly used in countries like the USA, China, Russia, Brazil for bulk mineral transportation. In India, the conveyor is an upcoming mode of dispatch and is proposed in CIL as well as non–CIL mines. The table below provides details of mines where the conveyor is being considered as a mode of transportation

Table 1 Mines using conveyor as a mode of transportation

Coalfield	Coal mine	Stage	Status	Remarks
North Karanpura	**Chatti Bariatu & Chatti Bariatu South**	First-mile connectivity	Under Construction	The coal from the mines will be transported until railway siding using a pipe conveyor of 17 Km length.
North Karanpura	**Kerandari coal block**	First-mile connectivity	Proposed	It is proposed that coal from the mine will be transported until railway siding using a pipe conveyor.
Mand Raigarh	**Gare Palma IV/1 coal block**	Last Mile Connectivity	Proposed	The coal to Tamnar steel plant will be evacuated using a truck or a mix of truck and pipe conveyor, i.e., 15 km by road or using road till CHP and then use a 7 km pipe conveyor.
Hasdeo Arand	**Gidhmuri, Paturia coal blocks**	Last Mile Connectivity	Proposed, Feasibility Study	Initially, coal will be evacuated by road; however, based on the viability of a 24 km long coal conveyor system can be considered. A common user private rail siding is available connecting coal field to Surajpur railway station. Gidhmuri Paturia block can access this line by building a first-mile infrastructure of the conveyer, rail line or road.

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Source: Primus Partners Analysis, Primary Research

While the use of conveyors for carrying coal over long distances from production to consumption centres is uncommon, it is not uncommon to find conveyors transporting coal from mines to barge loading stations.

Conveyors can cross challenging terrain with greater ease than trucks or rail systems, and they can also be extended easily and have the advantage of continuous transport. Globally conveyors with wide belts and high operating speeds can have enormous capacities, varying from 2,000 to 5,000 tons per hour[1].

Given the economic and environmental benefits of conveyors, their use should be promoted wherever it is economically feasible in CIL mines.

Road

Railway, as well as other modes of transportation such as ports and inland waterways, cannot reach every region for connectivity and hence, the road infrastructure needs to be synchronized with the railway/port/waterway's infrastructure. In some cases, when end-use plants are within the vicinity of the mine, coal is transported either through road or conveyor belt only.

Wherever other modes are not economical, road movement plays a critical role in the evacuation of coal. The roads can mainly be classified into five main categories

1. National Highway (N.H)
2. State Highways (S.H)
3. Major District Roads (M.D.R)
4. Other District Roads (O.D.R)
5. Village Roads (VR)

Both ODRs and VRs are combined and called Rural Roads (RR). These roads provide connectivity to villages and habitations and access to economic and social infrastructure services. Respective State Governments (PWDs and RWDs) are responsible for their construction and maintenance. The Public Works Departments of states are mandated to look after State Highways.

On the other hand, National Highways, irrespective of whether such roads passage through a city or not, are the responsibility of central governments unless it is specifically declared through a gazette notification that management of a particular stretch of the highway has been handed over to another entity.

Most of the roads connecting the coalfields are rural roads. Some of the coalfields are even connected through roads that are developed under Pradhan Mantri Gram Sadak Yojana (PMGSY). The PMGSY is a nationwide plan in India to provide good all-weather road connectivity to unconnected villages. The width of these roads varies from 10-12 ft which is not sufficient for the movement of coal trucks.

Presently, most of the coal produced in CIL is transported from pitheads to despatch points through road transport, and it is not considered under road mode of transportation as it is a very short distance lead in comparison to end-use plants.

To load a single rake of coal (capacity of about 4,000 tonnes), it requires around 250-300 round trips of coal tippers, assuming the capacity range of tippers from 15 metric tonnes to 18 metric tonnes.

The mixing of the traffic of the local public with cycle, motorcycle, four-wheeler, etc., with coal loaded trucks and multi-axle heavy vehicles, regularly causes fatal traffic accidents on these roads. In order to avoid such a situation, dedicated road projects need to be taken up by stakeholders.

In coalfields like Talcher coalfield of Odisha, Korba Coalfield, Hasdeo Arand Coalfield in Chhattisgarh, North Karanpura, West Bokaro

[1] https://www.britannica.com/technology/coal-mining/Coal-transportation

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in Jharkhand apart from railway infrastructure road plays a significant role in coal evacuation.

It is necessary to construct a special design of First-mile Connectivity (FMC) road with adequate width, increased truck axle load-bearing capacity, and a special plan for regular maintenance of roads connecting the coalfields.

Accordingly, the various parameters for these FMC roads need to be well defined. The District Mineral Foundations (DMF) or cess on fuel or truck tariff can be considered for developing, maintaining and operating such roads. The development and maintenance committees having representation of CIL and other mine owners as well as the state representatives need to be formulated for regular monitoring of such infrastructure.

Proposed road development parameters for transporting bulk minerals, including coal, are:

1. Material for the construction of road
2. Width of road
3. Truck axle load-bearing capacity
4. The time period for maintenance

Trunk Mile Connectivity

A trunk line is a circuit connecting the main railway line either through the dispatch point or directly to the mine where railway siding starts from the mine itself.

Railway connectivity

Once trains have cleared coal-bearing areas, delays on the run can happen if mainline capacities are restricted. These are typically High-Density Networks (HDN) and High Use Networks (HUN). HDN/HUN was analysed as per data obtained from Budget papers, Pink Book of sanctions and under construction, and in the National Rail Plan (NRP) up to 2031 as part of this study.

While cascading improvements have been identified for execution, the NRP works will require budgetary approvals and active pursuit, as post FY28, we find track capacity constraints reappearing. As per the projected coal demand up to 2030, current rail line capacity utilisation is adequately addressed up to FY26, subject to works under execution being completed to schedule.

Beyond FY26, Indian Railways has identified network upgrades in the National Rail Plan. These works need sanction and inclusion in the Works Program, and the Ministry of Coal (MoC) must actively advocate these projects.

The Ministry of Railways has issued a document, Vision 2024, with a view to building capacity to transport 2024 MTPA by the year 2024, which categorizes the ongoing projects as super critical, critical and projects required for coal transportation. Further plans of railways and the proposed railway projects are evaluated from perspective to handle anticipated coal production.

Private rail sidings connect mines to the Indian Railways network. As a standard practice, it is always preferable to have a dedicated private rail siding for coal evacuation directly from the mine pit head.

As an important component of this report, network congestion analysis was done in two stages for the rail network – a) for the immediate vicinity of the coal block, basically feeder routes and b) sample main line sections leading to the coal mining area. The analysis and new proposals are illustrated in detail in the subsequent chapters of the report.

The study has identified 28 railway projects on which work is currently ongoing. These projects include 14 railways projects whose progress is monitored regularly by the Ministry of Coal (MoC) in discussions with the Ministry of Railways (MoR) and other concerned JV partners on a quarterly basis.

In addition to these projects, we have proposed six new lines based on our analysis that must be built to ensure the efficient evacuation of coal from the respective coal fields. The Government of India should sanction these six new projects.

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It is critical to developing dedicated coal corridors for each cluster. There is a need to convert the third and fourth lines in the East Coast Railway, South East Central Railway, and East Central Railway to the DFC standards, as well as to segregate freight and passenger traffic, which will aid in improving coal transportation performance.

Whenever the infrastructure requirement for rail transport exceeds four lines, we should switch to automatic signalling, train protection, and run heavier and longer trains.

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Table 2 List of an ongoing first-mile & feeder route projects to coalfields

State	Coalfield EPC Agency	Railway	Project Name	Type	Project Cost (INR Crore)	Length in Km	Source of funding	Target Date of Commissioning	Capacity MTPA
Telangana	Godavari Collieries SER	South Central Railway	Bhadrachalam – Sattupalli NL	Ongoing	928	56	Pink Book Page 7.2.2 item 13	Feb 2022 Forest clearance and LA are critical issues	5
		South Central Railway	Balharshah Belampalli 3rd line	Ongoing	2065	201	Pink Book Page 7.2.4 item 36 It was sanctioned in 2015-16	March 2024	17
		South Central Railway	Belampalli Kazipeth 3rd line	Ongoing				March 2024	17
Odisha	Talcher ECoR	East Coast Railway	Jarapada Budhapank 3rd &4th Line With a flyover at Talcher	Ongoing	810	101	Pink Book Page 11.2.3 item 24	March 2024, Forest clearance and LA are critical issues	130
	ECoR	East Coast Railway	Budhapank Rajatgarh Salegaon 3rd & 4th Line	Ongoing	1172	86	Pink Book Page 11.2.3 item 25	-Do-	130
	ECoR	East Coast Railway	Sambalpur-Jarapada doubling incl Talcher Angul A super Critical project	Ongoing	1539	174	Pink Book Page 11.2.2 Item 18 NRP	March 2022	65
	JV	Inner Corridor	Angul Balram Line	Ongoing	145	13	SPV	December 21.	25
	SECR	South East Central Railway	3rd and 4th line between Jharsuguda Bilaspur	Ongoing	Put correct figure.	206	Railway funded project	Dec 2023	130

State	Coalfield EPC Agency	Railway	Project Name	Type	Project Cost (INR Crore)	Length in Km	Source of funding	Target Date of Commissioning	Capacity MTPA
	Deposit/SE Railway	South Eastern Railway	Jharsuguda-Barpali-Sardega Rail Link	Ongoing	3770	50.3	Deposit basis	Doubling of Rail Line - December 2022, Connectivity for Bulb - March 2026, Double line Fly-over - December 2024	Presently 25 and will be extended to 65 FY26
Jharkhand	North Karanpura ECR	East Central Railway	Koderma Tilliya NL	Ongoing	300	65	Pink Book Page 10.2.2 Item 12	30 km complete March 2022	23
	ECR	East Central Railway	Gaya Kiul Doubling	Ongoing	1200	124	Pink Book Page 10.2.5 Item 53	20 km complete March 2023	
	ECR	East Central Railway	Kiul Tal Rajendrapul additional bridge and doubling	Ongoing	893	14	Pink Book Page 10.2.4 item 48		
	ECR	East Central Railway	Barkakana Muri Double Line	Ongoing	870	58			43
	IRCON	East Central Railway	Tori Shivpuri Railway Line 3rd Line/Doubling commissioned	Ongoing	895	44.37	Deposit Basis	Nov-22	25(Long route)
		East Central Railway	Shivpur Kathautia Line	Ongoing	1799.64	49.09	SPV	The project will be commissioned in 3 years after FC	25*

State	Coalfield EPC Agency	Railway	Project Name	Type	Project Cost (INR Crore)	Length in Km	Source of funding	Target Date of Commissioning	Capacity MTPA
	North Karanpura ECR RVNL	DFCCIL	DFC- Dadri to Sonenagar & extension upto Koderma	Ongoing	30358	1318	Railway funded project	2023	120
		East Central Railway	Third line between Barkakhana-Garwaha Road-Sonenagar	Ongoing	3406	291	Railway funded project	Mar-24	25*
	Rajmahal Coalfield	Eastern Railway	Rampur Hat Nalhati (Muraroi) 3rd line	Ongoing	210	14	Indian Railways		25*
	Auranga	East Central Railway	Barkakana-Sonenagar 3rd line	Ongoing	4525	291	Pink Book Page 10.2.5 Item 50	March 2024	25*
Maharashtra	Wardha Valley CR	Central Railway	Wardha Ballarshah 3rd line	Ongoing	640	234	Pink Book Page 1.2. Item 23	March 2024	25*
Chhattisgarh	Mand Raigarh SECR	South East Central Railway	Raigarh-Champa 4th Line	Ongoing	2070	206	Pink Book Page 14.2.2	3rd line complete 4th line March 2024	43*
		South East Central Railway	Champa-Naila 4th Line	Ongoing			Item 19		43*
	JV	South East Central Rail Corridor	Kharsia-Korichapar-Dharamjaigarh	Ongoing		132	SPV	Kharsia Gharghoda Dharamjaigarh commissioned. Ghargoda- Gare Palma spur and 3 feeder routes will be commissioned	65

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State	Coalfield EPC Agency	Railway	Project Name	Type	Project Cost (INR Crore)	Length in Km	Source of funding	Target Date of Commissioning	Capacity MTPA
								by September 21.	
	Korba, Gevra Coalfield	Chhattisgarh East Railway Ltd.	East-West corridor rail corridor -Gevra Road-Pendra Road Line	Ongoing	4970.11	135	SPV	Mar-23	65
Madhya Pradesh	Singrauli Coalfield	East Central Railway	Doubling from Singrauli to Shaktinagar via Karaila Road	Ongoing	Rs 529	45	Railway funded project	Mar-23	43*
	IRCON	West Central Railway	Doubling Singrauli Madhaiya- Katni	Ongoing	1758	260	Railway funded project	March 2023	43*

Source: Primus Partners Analysis, Pink Book - Ministry of Railway

Table 3 Mainline Railway Projects important for coal evacuation

Railway line Section	Length	Configuration	Capacity WMB	Capacity WOMB	Total Train	% Utilisation WMB	% Utilisation WOMB	Ongoing work	Pink Book	NRP 26	NRP 31
Sini-Rajkharswan	15.3	DL	138	115	92.3	66.88	80	TL	3rd Line with Normal Signalling	3rd Line with ABS+TCAS+CTC Signalling	3rd Line with ABS+TCAS+CTC Signalling

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Railway line Section	Length	Configuration	Capacity WMB		Total Train	% Utilisation WMB	WOMB	Ongoing work	Pink Book	NRP 26	NRP 31
Rajkharswan-Chakradharpur	20.3	DL	75	62	59.4	79.20	95	TL	3rd Line with Normal Signalling	3rd Line with ABS+TCAS+CTC Signalling	3rd Line with ABS+TCAS+CTC Signalling
Chakradharpur- Bondmunda	92.9	DL	67	56	51.1	76.27	91.6	Tripling	3rd Line with Normal Signalling	3rd Line with ABS+TCAS+CTC Signalling	3rd Line with ABS+TCAS+CTC Signalling
Bondamunda-Rourkela	8.5	TL	67	56	68.7	102.5	123.1	4th_Line	4th Line with Normal Signalling	4th Line with ABS+TCAS+CTC Signalling	4th Line with ABS+TCAS+CTC Signalling
Rourkela-Jharsuguda	101	DL	70	58	72.4	103.43	124.2	Tripling	4th Line with Normal Signalling	4th Line with ABS+TCAS+CTC Signalling	4th Line with ABS+TCAS+CTC Signalling
Jharsuguda Road-Sambalpur	47	DL	51	48	52.15	102.3	108.6	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Kiul-Rampur Dumra	22	DL	54	46	77	142.6	167.8	DL_EL	2nd Line with Normal Signalling	2nd Line with TCAS Signalling	2nd Line with TCAS Signalling
Rampur Dumra-Tall	7	DL	48	41	53	110.4	129.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Tall-Mokama	5	DL	54	46	65	120.37	141.6	DL_EL	2nd Line with Normal Signalling	2nd Line with	2nd Line with Normal Signalling

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Railway line Section	Length	Configuration	Capacity WMB		Total Train	% Utilisation WMB	WOMB	Ongoing work	Pink Book	NRP 26	NRP 31
										Normal Signalling	
Champa - Gevra Road	47	DL	50	45	54.9	109.8	122	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Balharshah-Bellampalli	108	DL	63	55	63	111	114.3	Tripling	3rd Line with Normal Signalling	3rd Line with ABS+TCAS+CTC Signalling	3rd Line with ABS+TCAS+CTC Signalling
Anuppur – Kotma	31.6	DL	65	58	33.2	51.08	57.24	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Kotma – Boridand	25.4	DL	65	58	31.9	49.08	55	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Boridand - Ambikapur	118.8	SL	25	22	20.2	80.8	91.8	SL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Khana-Andal	66.53	QL	123	131	133.5	108.5	101.9	ML	4th Line with Normal Signalling	4th Line with ABS+TCAS+CTC Signalling	4th Line with ABS+TCAS+CTC Signalling
Andal-Asansol	25.71	QL	117	123	138.5	118.4	112.6	ML	4th Line with Normal Signalling	4th Line with ABS+TCAS+CTC Signalling	4th Line with ABS+TCAS+CTC Signalling

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Railway line Section	Length	Configuration	Capacity WMB		Total Train	% Utilisation WMB	% Utilisation WOMB	Ongoing work	Pink Book	NRP 26	NRP 31
Sini-Kandra	12.9	DL	91	76	32.5	35.71	42.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Kandra-Chandil	15.6	DL	84	70	64.3	76.55	91.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling

Source: Primus Partners Analysis, Pink Book and National Rail Plan 2031 - Ministry of Railways

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Table 4 New projects required for efficient evacuation of coal

State	Coalfield	Railway	Project Name	Type	Project Cost (INR Crore)	Length in Km	Source of funding	Capacity MTPA
Telangana	Godavari Collieries	South Central Railway	Karepalli-Bhadrachalam Road Doubling	New Work	600	39	Deposit Work	40*
Jharkhand	North Karanpura	East Central Railway	Muri Chandil Double Line	New Work	1005	67	IR	43*
	Rajmahal	Eastern Railway	Khana Sainthia 3rd line	New Work	1065	71	IR	25*
		East Railway	Nalhati Gumani3rd line	New Work	870	58	IR	25*
Chhattisgarh	South Eastern Coalfield ltd	South Eastern Central Railway	Bilaspur Raipur 4th Line/ DFC	New Work	1237	82.5	IR	43*
Odisha	Talcher Coalfield	East Cost Railway	Outer Coal Corridor	New Work	To be estimated	60 approx.	SPV/IR	50*

***Only additional capacity**

Source: Primus Partners Analysis, Ministry of Railways

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Availability of Wagons

CIL has loaded 241.4 rakes/day during 2020-21 against the Annual Action Plan target of 273.5 rakes/day. It has been observed that the availability of wagons remains a constant constraint in the efficient evacuation of coal from the mine to the end-use plants.

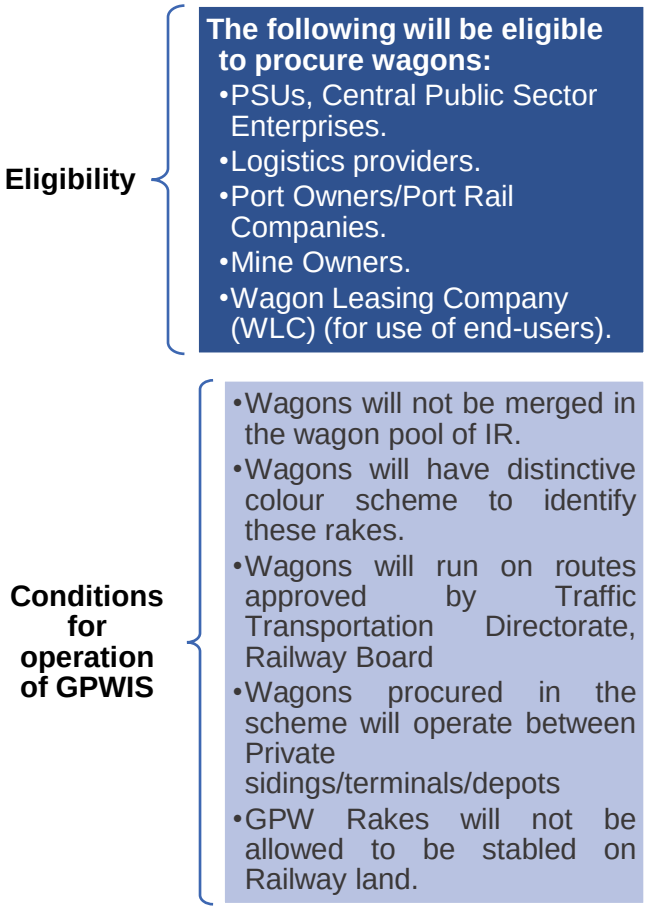
Wagon Turn Around is projected at 5 days till FY23 and drops to 4 in FY24 and further to 3.5 in FY27. Based on the analysis, there seems to be relief in FY25 as turnaround improves because of increasing average speeds. However, constraints related to wagon availability will re-surface from FY 27 onwards.

One way to address this concern is to lease wagons to IR as per the scheme. This can be further evaluated.

To meet the rise in demand post-launch of Dedicated Freight Corridor (DFCs), in April 2018, Indian Railways launched the General-Purpose Wagon Investment Scheme (GPWIS). Below are the benefits of wagon ownership schemes:

- Investors can now move commodities that were restricted earlier without the need for any special approval.
- The earlier investment schemes were applicable for Special wagons; now, it is applicable for General purpose wagons giving more flexibility in terms of usage.
- Carrying multiple commodities will insulate investors from the volatility of the commodity market.
- The timely availability of wagons will address the problem of wagon shortage.
- Increased quantities of coal can be moved, especially to Power Sector, through rail.
- This will increase the reliability of delivery times.

Figure 2 Eligibility and Conditions for Operation of GPWIS



Source: Ministry of Railways

New wagon design can be considered as a long-term measure to increase through put from 68 Ton per wagon today to 80 Ton per wagon moving forward by designing a lightweight aluminium body.

Coastal Shipping

Coastal movement is environmentally friendly and has lower transportation costs. The major load port for coal traffic travelling down the coast is Paradip Port, with ports in Vizag and Haldia serving as secondary load ports for originating coastal cargo.

Thermal power plants in Andhra Pradesh and Tamil Nadu have coal links to MCL mines in Odisha, which are close to the Paradip port, allowing for coastal transit. In addition to this, there is potential for additional coastal coal

movement to plants in Gujarat, Maharashtra, Goa, and Karnataka in western India.

While rail is now the primary mode of long-distance coal transportation, a study based on research data and industry expert opinions indicates that shifting the modal mix to coastal shipping could result in significant cost savings. As a result, a focus on coastal thermal coal shipments has been designated as a vital component of the Sagarmala Project's overall objective.

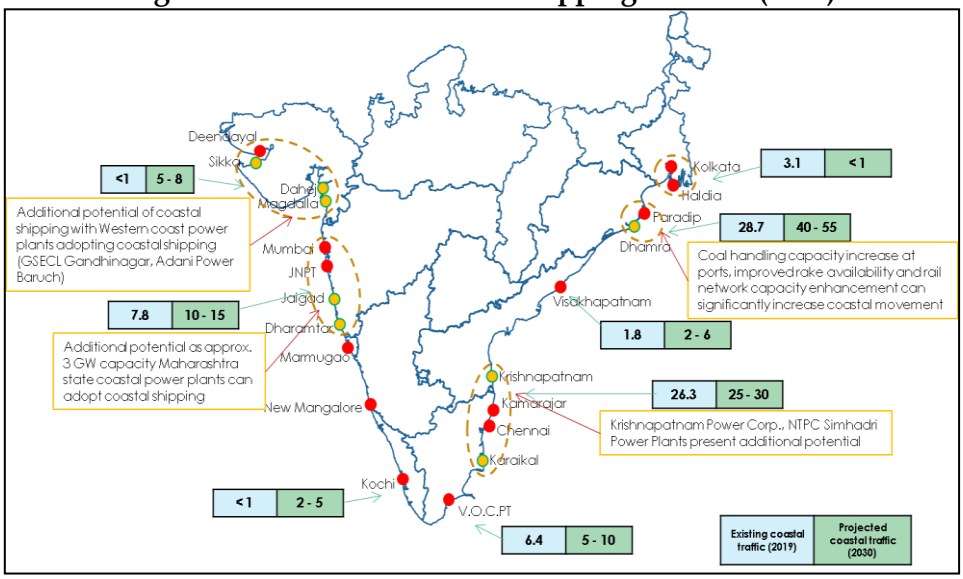
The cost of rail transportation from Talcher, Orissa, to a power plant in Mundra, Gujarat, is INR 2,980 per tonne, whereas the same via rail-supported coastal shipping may be INR 1,320 per tonne (i.e., a potential cost saving of as high as 56 per cent).

The East Coast Railway System includes the Paradip Port Rail Network, which is connected to the Hinterland via Cuttack via a broad-gauge rail link. In terms of cargo volume, Paradip is one of the country's largest main ports, processing more than 70 MTPA. MCL has a berth capacity of around 20 MT at Paradip port to handle coal for Andhra Pradesh and Tamil Nadu electricity boards.

Although the cost economics of coastal shipment may offer it a little advantage in some situations, overall railway congestion suggests that there may still be a rationale for coastal shipment in such plants.

As per the Maritime India Vision 2030 of the Ministry of Ports, Shipping and Waterways, there exists a potential of around 110 – 130 MMTPA coastal coal movement by 2030 to Gujarat, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala, and Andhra Pradesh. In the next section, we analyse the infrastructure constraints for specifically eastern cluster ports (Paradip & Dhamra) as they are projected to handle maximum coal traffic over the next ten years.

Figure 3 Potential for coastal shipping in India (2030)



Source: Ministry of Ports, Shipping and Waterways

Several rail line capacity expansion projects for easing freight movement are under implementation and expected to drive traffic to ports (Paradip, Dhamra & Gopalpur) in the eastern cluster. Some significant port-rail connectivity projects such as the Haridaspur – Paradip railway line have been completed and operationalized (in 2021) and are expected to improve rail connectivity to Paradip Port.

As per the Study conducted by the Asian Development Bank on the "Action Plan for Promotion of Coastal Shipping in India", an expenditure of INR ~60 billion investment in rail infrastructure (for connectivity to ports in the eastern cluster) can result in logistics cost saving of INR ~370 billion from coastal coal movement of 110 MMT from east coast to south and west coast over the next ten years.

The following projects have been identified and planned to improve railway connectivity to the ports in the eastern cluster.

Table 5 Railway Connectivity Projects For Enhancing Connectivity

S. No.	Project	Status	Connecting Port
1.	Haridaspur – Paradip New B.G. Line (82 km)	Operational (2021)	Paradip
2.	New B.G. Line between Sambhalpur - Gopalpur (via Phulbani)	Sanctioned in 2019-20	Gopalpur
3.	3rd & 4th line between Budhapank-Salegaon via Rajathgarh section	Sanctioned in 2015-16. (TDC for Rajathgarh-Salegaon section: 2021-22)	Paradip, Dhamra
4.	3rd & 4th line sanctioned ex-Jarapada to Budhapank with a fly over at Talcher Road	TDC: 2023-24 (TDC of 4th line for sections Talcher Road - Budhapank: 2020-21 & Angul - Talcher Road: 2023-24)	Paradip, Dhamra
5.	Angul-Sukinda Road new B.G. line (98.7 Km.)	Work is under progress; TDC: 2021-22.	Paradip, Dhamra
6.	3rd line between Bhadrak – Vizianagaram (Balance section)	Sanctioned in 2015-16; Work is being executed by M/s RVNL; TDC: Not fixed.	Paradip, Dhamra
7.	Doubling of Bansara-Dhamra Terminal Yard section in first phase proposed	DPR is currently under approval.	Dhamra
8.	Bhadrak – Nergundi: sanctioned in 2012-13 & executed	TDC for Jakhapura-Jajpur Keonjhar Road sections: 2022-23; Rest sections Jajpur Keonjhar Road-Baitarani Road-Kenduapada-Bhadrak: 2023-24.	Paradip, Dhamra
9.	One additional loop line each at Tihiri & Bansara stations	Commissioned in 2019-20.	Paradip, Dhamra
10.	Nergundi-Kapilas Road-Byree section	TDC - 2021-22	Paradip, Dhamra
11.	Byree-Haridaspur section	TDC - 2022-23	Paradip, Dhamra

Source: East Coast Railway Line Capacity Statement (2019-20) and Stakeholder Interactions

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Coal handling capacity augmentation at ports

The projected increase (of around 50-60 MMTPA) in coal coastal movement over the next decade shall require– (a) development of additional coal handling capacities at major and non-major ports in India and (b) efficiency enhancement of existing capacities at ports.

Specifically, at Paradip Port, the key load port for coal coastal movement, the project for mechanization for 3 berths—EQ1, EQ2 and EQ3—is already under implementation and shall add an additional 30 MMTPA of coal handling capacity at the port. An additional 25 MMTPA capacity is planned for addition (across various cargo categories) through the implementation of efficiency enhancement measures at the port. Paradip Port, at present, has a coal handling capacity of 21 MMTPA. Similar capacity additions are planned at other ports along with India's coastline – Kamarajar Port, Vizag Port, JSW Ports, Krishnapatnam Port, Dhamra Port, Deendayal – Tuna Tekra Port etc. The following table provides an overview of the various projects at major and non-major ports for coal handling capacity enhancement.

Mahanadi Riverine Port Project

The Ministry of Port, Shipping, and Waterways and the state government of Odisha shall be jointly developing the riverine port for an investment of around Rs 4,000 crore. This all-weather and multi-user port on river Mahanadi will be set up in public-private-partnership (PPP) mode with a capacity of 54 MTPA. In the first phase, the port will have the capacity to handle 22 MTPA cargo at an investment of Rs. 2,562 crores. While the Paradip Port Trust will be responsible for developing supporting project infrastructures like rail and road connectivity and dredging requirements of the facility, the state government shall provide around 300 hectares of land for the project. The port will come up at Akhadasali village in Kendrapara's Mahakalapada block, 13 km from the river mouth at Paradip.

The Sagarmala Programme and the Maritime India Vision 2030 of the Ministry of Shipping have detailed the future development plans and capacity additions at the major and non-major ports. A significant number of projects are at various stages of planning/implementation and can create additional capacity of around 40-50 MMTPA over the next few years.

Table 6 Details of Mahanadi Riverine Port Project

Parameters	Details
Project Cost	Rs. 2562 crores (for Phase 1). The overall cost is expected to be around Rs. 4,000 crores.
Cargo handling capacity	Phase 1: 13.84 MTPA + 0.03 MTEUs Ultimate capacity: 52.54 MTPA + 0.09 MTEUs
Design Vessel Size	Bulk: 25000 - 80000 DWT Container: 1000 TEU

Source: Commerce & Transport Department, Government of Odisha

Reduction in Logistics Cost via Coastal Shipping

A comparison of total logistics cost via All Rail Route and Rail-Sea-Rail route for existing linkage between Talcher (MCL) and Ennore Thermal Power station shows a cost savings of over INR 600 per tonne via Rail-Sea-Rail route.

As India plans for the '1 Billion Tonne Coal' target and imported coal usage is expected to be substituted, coastal shipping could present a viable and eco-friendly transportation mode for imported coal substitution in coastal thermal power stations on India's west coast (in states of Gujarat, Maharashtra, Karnataka, Goa, and Kerala).

Scenario analysis for such linkage from MCL to Udupi Thermal Power station shows a cost

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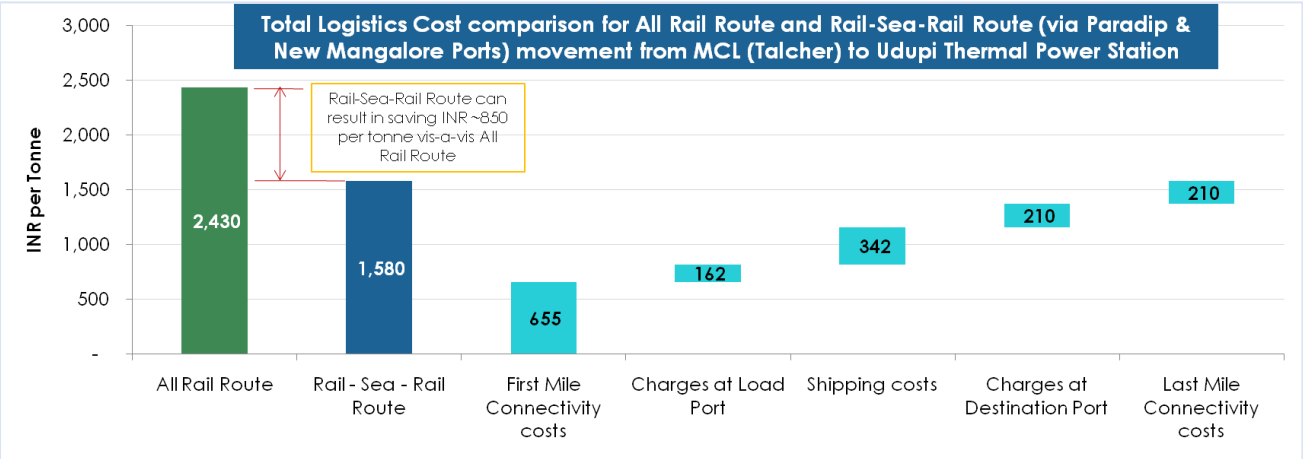
savings of nearly INR 850 per tonne via Rail-Sea-Rail route over the All-Rail Route.

Figure 4 Total logistics costs comparison for All Rail Route vs Rail-Sea-Rail Route



Source: Indian Railways, Scale of Rates - Paradip Port Trust, Scale of Rates - New Mangalore Port Trust, Stakeholder Discussions

Coastal shipping presents a viable transportation mode for imported coal substitution for coastal power stations on the western coast. Imported coal substitution by domestic coal can create opportunities for new linkages and utilisation of coastal shipping for coal movement from the eastern to the western coast of the country. For coastal thermal power plants, movement via coastal shipping can result in significant cost savings, and therefore reduced cost of electricity for consumers.

This reduction in total logistics costs may also enable the establishment of up to 100 MT of coal dumps and/or factories on the western coast, particularly in the states of Karnataka and Gujarat, which have a sizable capacity in coastal thermal power stations. This development can also be accompanied by associated infrastructure such as washeries and mixing plants for preparing appropriate GCV coal grades for supply.

Inland Waterways

A total of 111 waterways have been notified under the National Waterways Act of 2016. The key waterways important for bulk movement are National Waterways 1-5. In coal-bearing areas, however, NW-1, NW-4, and NW-5 are significant as they are near to the coalfields. NW-1 stretches from Allahabad in UP to Sagar Island near Haldia in West Bengal. Raniganj coalfield lies in this area. NW-1 can be used to transport coal to end-use plants, which are near, but due to multiple handlings, the transportation cost is not very competitive in comparison to other modes of transportations.

NW-4 and NW-5 are in the vicinity of Godavari Coalfields, Talcher and IB Valley Coalfields, respectively. Both these waterways are still in a developmental phase and can be considered to transport bulk commodities, including coal, when they are operationalised in the upcoming four to five years' time. For inland waterways to be a feasible coal evacuation route, both the coal mine and the end-use plant must be close to the terminals.

For coal transport along the inland waterway, coal consumers need to enter into a Memorandum of Understanding (MOU) with

the Inland Waterways Authority of India (IWAI). Then IWAI arranges for a tender for the selection of a suitable transporter. The transporter invests capital in the construction of loading and unloading stations and in the transportation vessels, i.e., barges—the transporter charges on a per tonne basis. Coal consumer does not have to make a capital investment. The consumer has to arrange for the first-mile and last-mile connectivity, i.e., from the loading point/railway siding of the coal mine to the waterway loading station and from the waterway unloading station to the power plant. This can be through railways, roads, or belt conveyors, depending upon distance.

Usually, a distance of 0-15 kilometres from the mine to the end-use plant is considered ideal for economical transportation of bulk goods through inland waterways. A lead greater than this using any other mode to reach port/jetty along the waterway adds to the cost. Hence, analysis of each waterway with respect to coal mines and linked power plants along it has to be done accordingly.

Cost Optimization

Common Use Infrastructure

"Common Use" relates to finding ways to leverage infrastructure investments in developing countries for the broader benefit of the relevant sectors and the nation.

Common Use can be considered multi-user, when several mining companies in a region use a particular infrastructure investment, or multi-purpose where non-mining users can also have access. Both models should be promoted, with a possibility of enhanced viability through lower per-unit cost, increased production and evacuation, and higher tax revenues to the government.

The Challenges in Common Use

If the potential of Common Use infrastructure is evaluated at the project design phase, the incremental capital cost on the economy and the environment could be minimised, and the beneficial impacts maximised. The potential of leveraging infrastructure investments in extractive industries for national and regional development is gaining prevalence among policymakers.

Investors and development agencies recognize that private sector involvement is required to meet the vast infrastructure funding gap in developing countries, and Common Use infrastructure is an effective aid in this endeavour.

Common Use for railways, ports and roads is justified if:

Mining Companies willing to share Infrastructure

Marampa-Pepel Corridor

African Minerals (AML) was awarded to mine the Tonkolili iron ore deposit in Sierra Leone in 2009. As part of the agreement, AML was granted a 99-year exclusive infrastructure lease to reconstruct, manage and operate the Marampa – Pepel railway line and Pepel port.

In 2012, AML signed a binding agreement with Cape Lambert, which grants its Marampa Iron Ore subsidiary access to the infrastructure. The agreement foresees that Cape Lambert funds 33% of the costs of the Marampa-Pepel Infrastructure upgrade in return for an equal share in the project. This would guarantee Cape Lambert 2 MTPA capacity allocation on the railway line (excluding rolling stock) and to the unloading, stockpiling and transhipping facilities at Pepel port. Cape Lambert's exposure included a cap of $45 million. It has been reported that the service is to be at a cost plus 20% basis and Cape Lambert must design and construct its own 3 km rail spur line to African Minerals rail line on its own.

Source: Masuma Farooki, "The infrastructure and commodities interface in Africa: Time for cautious optimism" Journal of International Development, 2012.

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there are significant economies of scale or scope so that extra capacity is inexpensive and additional market exists at marginal cost.

There are many reasons why shared-use mining infrastructure is yet to be fully realized:

- Mining firms control of infrastructure to gain competitive advantage
- Public authorities need systems and capacity to integrate proposed mining investments and shared-use infrastructure vehicles
- Investors have been slow to embrace infrastructure sharing since it has a varied risk profile
- Development Finance Institutions have been slow to respond in this area since the projects may not come with sovereign guarantees.

Mining is a competitive business, and fears of Common Use infrastructure should not be minimized. The commodity may have similar characteristics, and the decisions may be a part of corporate-level strategy rather than project-specific discussions, and enclave and single-use infrastructure can enhance the mining companies' monopoly power.

However, if public authorities are determined to implement Common Use, a suitable model of infrastructure concession can be designed to overcome these hurdles and align development to national plans and purposes.

The Case for Common Use

Increasing world demand for mineral resources has created renewed interest in mineral deposits. With the limited financial capacity of governments, mining investors are today ready to fund the infrastructure, with transport costs at times being higher than the commodity cost. The anchor investors (whether leading mining company or a pure infrastructure developer) are willing to invest in the transport infrastructure and build rail and port capacity that will maximize profits. The economies of scale of rail and port infrastructure provide lower incremental cost for additional capacity than the construction of new lines and ports.

From a government perspective, the suboptimal creation of infrastructure by separate users can be conceived as a case of market failure since separate infrastructure assets are usually less than fully utilized. In developing economies, this exacerbates the problem of gaps in infrastructure, with funding directed towards suboptimal investments and higher per-unit costs of production.

A well-designed and efficiently operated Common Use asset that is available to all at a uniform price and service level forces the mining companies to place more emphasis on efficient mining. The ability for market differentiation shifts from the ability to monopolize infrastructure assets to improving both quality and quantity of output in order to gain market advantages and maximize profit. With efficient, economic Common Use infra in place, miners can focus on their internal efficiencies to be competitive and profitable.

Governments' Role

The government has a key role to play to correct the market failure when it arises, and the following steps can be considered to promote Common Use in rail, road, and port infrastructure. Infrastructure developments need to be designed in parallel to provide a viable logistics solution for the mining projects. Furthermore, there are cross-cutting regulatory and operational multi-user and multi-purpose issues, and regulatory and operational frameworks will need to be harmonized.

<u>Step 1:</u>

Prior to deciding on the issue of Common Use for a particular mining area, or railway line and/or port facility, the government should understand how the mining and infrastructure projects align with the country's long-term objectives and priorities. It will also need to document the number of miners, their market interest, mine life, as well as the production and consumption forecasts over the long term. Considering the nature of assets involved, a minimum horizon of 10 years is recommended.

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Step 2:

A detailed cost-benefit analysis is necessary for the government to decide on the importance of negotiating open access in a particular mining-related rail and port project. The analysis can focus on:

- Capital and Operating Costs

The realization of synergies and economies of scale decreases the transport unit cost per unit. This can be the result of decreased cost and/or enhanced production, with higher evacuation now becoming possible. This can increase profit margins, with beneficial impacts on tax revenues to the government.

- Development of "uneconomical" assets

Common use access can allow the development of stranded mining concessions. This also has implications on investment, jobs, and tax revenues.

Step 3:

Define principles of Regulation and open access through stakeholder consultation, review of existing policies and statutory guidelines, and issuing long term policy guidelines.

- Facilitate Right-of-Way: In developing economies, the most difficult part is land acquisition, more so since evacuation assets are likely to be linear in shape, with forest clearances and wildlife clearances.
- Regulate operator fees to recoup the investment, cover operational and maintenance costs, and make a reasonable profit. In case there is a separation of the infrastructure operator from the infrastructure owner, the latter will require access charges for the use of its infrastructure. A reference tariff could be published by the operator, which serves as a baseline for negotiations with users. The mechanisms and standards to calculate the reference tariff should be objective and transparent.
- Determine access rules: The leading mining company and financiers/guarantors of the infrastructure development will require priority access on the agreed upon capacity. However, on the additional capacity, there should be a level playing field as to how this capacity is allocated, be it among the existing infrastructure users or new entrants, with transparent arbitration mechanisms for dispute resolution.
- Standards: The regulatory body should ensure that the safety, environmental and technical regulations are adhered to by all users.

Common Use Operational Models

The operational model for Common Use infrastructure must be determined based on prevailing conditions.

In the India coal sector scenario, the freshly auctioned mines can be mapped to potential scenarios where they can benefit from sharing infrastructure. The second case is also compelling where the use of shared assets lowers cost with increased production and reduces delays for all users, and enhances economic impacts.

The last scenario where the impacts are likely to benefit the whole corridor is not suggested at this stage because such projects are likely to be sanctioned by Railways, National Highways Authority of India (NHAI), or Port authorities themselves as profitable ventures, or as part of national infrastructure pipeline.

Columbia University examined three broad types of structures that are fit for purpose in a study of shared infrastructure in Australia and Sub-Saharan Africa. In India, a similar situation exists, with investment and operational models spanning these three structures. When the initial mining concession is large, the infrastructure is a closed-loop encompassing

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road, rail, and port, with the single firm justifying the cost.

However, public policy may specify that if an asset's utilisation margin falls below a certain threshold, say 75%; the asset is declared Common Use and made available to third party users. Regulations define the asset's use, both in terms of access and tariffs.

Additionally, the study discovered that the most prevalent structure is that of an SPV, which maximises benefits when multiple producers are involved or when stranded assets can be brought online. The table below illustrates three possible infrastructure structures for Common Use.

Table 7 Structures for Common Use Infrastructure

Scenario	Preferred Operating Model	Regulatory Framework/ Government Intervention	Benefits	Risks	Key Regulatory Considerations
1. Single mine, little foreseen economic benefit from openaccess	• Vertically integrated model from mine to the vessel	• Blanket or sector-specific open access regimes • Non-interventionist	• Maximize the efficiency of the mining project and thereby government revenues	• Difficult to guarantee capacity and access to third parties in the future	• **Access holidays with exclusive use of the main user guaranteed** • **Open access guarantee after access holiday** • **Reserve right-of-way**
2. Joint agreed investment by mining companies, foreseen benefit from open access restricted to mine owners	• SPV • Haulage regime	• Blanket or sector-specific open access regimes • Non-interventionist • Government sanctioned rules and guidelines reviewed periodically	• Maximize production and government revenues from the mining sector in the region; smaller mines become viable	• Difficult to guarantee capacity and access to third non-financing parties in the future	• **Access holidays** • **Open access guarantee after access holidays** • **Reserve right-of-way** • **Haulage regime by the miner or third party**

Scenario	Preferred Operating Model	Regulatory Framework/ Government Intervention	Benefits	Risks	Key Regulatory Considerations
3. Potential to increase production, stranded mining assets can restart, larger regional economic impact possible	• **SPV or third party operated infrastructure model (vertically separated)** • **Haulage regime or access regime**	• **Blanket or sector-specific open access regimes** • **Equity or golden share of government** • **Independent regulatory body**	• **Unlocking the mining potential of the region** • **Lower costs, benefits for economic development, higher government revenues, smaller mines become viable**	• **Delay in negotiations with leading mining company** • **Difficulty to negotiate**	• **Reserve right-of-way** • **Cooperation among mining companies** • **Capacity for existing mining projects** • **Capacity for larger economic impacts**

Source: Research & Primus Partners Analysis

During the study, the idea of setting up Common Use infrastructure framework has been discussed with non-CIL mining companies, and they have welcomed the concept. This is particularly seen in the case of those companies that have participated in and been allotted blocks on the recent mining auctions and are beginning to develop coal evacuation plans. The study has revealed that if a Common Use infrastructure framework is established and operationalized early, some of these mining assets may start producing earlier. Firms revealed that they could move quicker on mine development if evacuation infrastructure availability becomes assured.

Amongst others, stakeholders revealed ground reports of the following nature:

<u>Shree Cement plant, Raipur cluster</u>

The plant is 26 km away from Hathband station, which is the nearest serving station. There are other cement plants in the vicinity that are closer to the railway line and have siding and sharing of infrastructure could be one solution. The normative train capacity of a single line rail section is 24 trains each way. Analysis has revealed that the busy sidings handle 6 to 7 trains in a day, and other sidings are handling 2 or 3 trains a day. This indicates that the capacity of the siding and rail line is grossly underutilised. Sharing of siding infrastructure will result in sharing of CAPEX, reduction in the quantum of land acquisition, and operation and maintenance charges for both inward coal and outward cement. During the analysis, it was found that in two cases where the transportation lead is very high, sharing model in an oblique manner was followed.

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Rail siding from Pachwara group of coal mines of Rajmahal coalfield to Pakur railway station on ER

Pachwara Central, Pachwara North, Urma Paharitola, and Panchwara South mining blocks are part of Rajmahal coalfield. The nearest railway station is Pakur, which is 55 km away. It is not possible for the block owners to acquire land individually. Three of the block owners Punjab State Power Corporation, West Bengal Power Development Corporation Limited (WBPDCL), UP Rajya Vidyut Utpadan Nigam Ltd, have joined hands to structure the railway siding under the PPP model of Railways by the creation of SPV. As per the requirement of the model, Rail Vikas Nigam Ltd, a schedule A PSU of the Ministry of Railways will take 26% equity in the SPV. Other block owners are also banking on this project. It will be a common user facility. The structuring and setting up of the SPV is still in progress.

MOC has desired to prepare **a draft list of possible projects** that can benefit. In the first instance, the following criteria are suggested for identification & implementation of shared infrastructure after making initial examination:

- The coal blocks sidings should have a common rail serving station.
- The total quantity of coal to be handled should not exceed 12 MTPA. This is a high-level figure based on 25 train moves per day and will need to be validated with detailed analysis in each case.
- Projects identified should not need the significant acquisition of land

With these broad criteria, the following potential projects can be taken up for analysis in the first instance:

- *Singrauli Coalfield:* Bandha coal block of EMMIL, 5.6 MTPA, serving station Deoragram on WCR. To be combined with Amelia coal block of THDC, 5.6 MTPA, serving station Deoragram on WCR.

- *Talcher Coalfield:* Radhikapur East of EMMIL, 5 MTPA, the serving station is Tentuloi on yet to be commissioned inner corridor. To be combined with Radhikapur West of Vedanta Limited, 6 MTPA, the serving station is Tentuloi on yet to be commissioned inner corridor.

- *North Karanpura coalfield of CCL:* Badam Coal block of NTPC, 3 MTPA, serving station Bes, to be combined with Gondulpara coal block of Adani Enterprise, 4 MTPA, serving station Bes.

- **Additionally, CIL can evaluate the possibility of sharing its existing and upcoming infrastructure with coal blocks that have been allocated or are proposed to be allocated.**

Wagon Turnaround Time

Wagon Turn Round is the amount of time that passes between two subsequent wagon loadings. Wagon turn round refers to the average time it takes for a wagon to complete its typical loaded trip and then become available for loading again.

While analysis reveals the availability of line capacity on the network, there is concern over the availability of adequate wagon supply to cater to the demand.

One factor contributing to the increased turnaround time is oversized coal that does not pass-through bottom discharge underground dumps; additionally, on tipplers, such oversized lumps constitute a significant challenge when handling coal at power plants.

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WAGON TIPPLER SOLUTION AT JSW SALEM, COIMBATORE

Jindal Steel Works Salem, Coimbatore a manufacturer of special-grade steel, imports lumps of iron ore and coal from across the country. The process of manually unloading one rake (58-60 wagons) takes about 5 hours. To make matters more complex, the wagons must be re-joined into a rake and freed from the wagon tippling area in a limited timescale with zero damage to them after being emptied one at a time. Furthermore, keeping the wagons longer than the time limit or causing damage due to inefficient operations results in a significant financial penalty for the corporation in the form of railway demurrages.

Keeping in view of its specific needs, JSW Salem installed the following: wagon tippler, side arm charger, traverser (wagon shifter), ejector (pusher) and apron feeder, which solved the material handling concerns of the company.

The wagon tippler assisted in tipping incoming material from wagons into the apron feeder for easier stacking. Simultaneously, the shifter mechanism was built and installed so that the racks could be switched to an outward line parallel to the inward line after emptying.

The apron feeder, installed 20 meters below the tipping line, enabled JSW to extract and stack the sticky iron-ore lumps with ease - and without any halt in operations. The rake turnaround time has decreased significantly since the wagon tippler was installed, and material handling loss has decreased due to mechanised handling.

Source: Jindal Steel Works, Secondary Research

Oversized coal increases wagon turnaround, resulting in higher freight costs via demurrage. So, coal sizing is crucial and must be done properly.

Automating loading and unloading process detention of trains can be reduced by adopting loading through overhead SILOS and by utilizing RETRACTIBLE OHE, which eliminates the use of diesel locos on the electrified territory. ATLS (automated truck loading system), an automatic truck loading and unloading system, refers to the automatic insertion and removal of minerals into/from a truck with minimal operator intervention. Such technologies can help in wagon turnaround time.

Technology

Smart Coal Logistics

The Smart Coal Logistics initiative upgrades the mining and transport operation to a knowledge-based ecosystem of people, processes, assets, and data – all tracked in real-time for optimization. With the help of this concept, a real-time Coal Supply Chain map can be mapped.

The term "smart" originally comes from the acronym "Self-Monitoring, Analysis and Reporting Technology" but has become widely known as "smart" because of the notion of allowing previously inanimate objects—from wagons to weighbridges to even heaps of loose materials - to talk back and guide actions. It uses data acquisition, artificial intelligence, machine learning, and big data analysis to provide cognitive awareness to objects that were in the past considered inanimate.

Smart Coal Supply Chain (SC2) Digital Platform will be a dedicated system comprising a cloud-based digital platform and physical infrastructure components for data collection. The system shall be custom built to meet the specific digitalisation objectives of the MoC.

The platform shall comprise of the following components for coal data collection at various points along with the segments of the logistics supply chain:

- Integration with Smart weighbridge to collect coal despatch details at entry and exit points
- Integration with Silo weighing device to collect coal despatch details when MGR is the mode of transport
- Volume scanning of coal at exit points
- Volume scanning of coal moving through conveyors
- Volume scanning solution for volume information of coal in stockyards
- Tracking of vehicles wagons carrying coal when the means of transport is roadways
- Integrating with pre-existing vehicle tracking systems to track coal movement through roadways
- Integrating with FOIS of Indian railways to track coal movement through railway
- Integrating with Port Community System (PCS) to track coal movement using shipping lines

The SC2 digital platform shall ingest data from the above sources. Stream analytics shall be performed on the data to enable real-time insights and decision-making. The data shall also be stored in a data warehouse to create dashboards and metrics as required by the MoC.

From extraction to delivery, mining companies use many different transportation modes, with requirements for specialized equipment and expertise. Inbound moves can include a mix of Less than truckload (LTL), full truckloads, flatbeds, and multi-axle trailers. Outbound moves to processing plants and ports can use rail, barge, and trucks. Coordinating and synchronizing these moves is difficult and requires expertise across all modes. This can be achieved by using the Internet of things (IoT).

Coal Consumers will largely be concerned with tracking their inbound quantities. Sensor-based data acquisition, integration of various data stacks, the ability to correlate supply chain events to identify current and potential bottlenecks, and flag them for action has already been brought out.

Tracking Project Progress

The completion of ongoing projects like FMC projects including, Railway lines are very critical for smooth evacuation of expected production. Monitoring their progress is critical for the efficient evacuation of coal. With the help of automation and using various technological interventions, it is feasible to monitor actual field development using smart technologies.

Implementation

A centralized agency will need to play the role of system custodian, who will set standards for the platform, data definitions, as well as modules. The custodian will also be the single point contact for the mining industry to approach procuring modules and integration with the Smart Coal Logistics platform.

The custodian will need a technology partner to define the standards for hardware devices like sensors and drones etc., that will become standard plug and play devices for commencing data acquisition and porting to the national coal logistics platform

It is recommended that:

- Central Mine Planning and Design Institute can be entrusted the role of Smart Coal Logistics platform custodian
- An IIT or CSIR can be the systems and component standards developer
- An appropriate private sector entity can be appointed after observing due procedure to set up and maintain the platform.

While the system is recommended for Coal Logistics, there is a potential that the platform can develop as a national Mineral

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Logistics Platform, serving the entire mining industry and its consumers.

Recommendations

1. Amongst all coal fields, the future potential of Talcher and Ib stands out. While capacity works are in progress, there is a need for a greater thrust on ensuring that work on inner and outer railway corridor. As coalfields have the potential of connection coastal shipping, special attention needs to be given to that as well.

2. Railway Line Capacity is adequately addressed up to FY26, subject to works under execution completed to schedule. Beyond FY26, Railways has identified network upgrades in the National Rail Plan. These works need sanction and inclusion in Works Program, and MoC must actively advocate these projects.

3. In addition, new projects for Rs 6000 crores have been identified for efficient coal logistics, as well as RSR.

4. Rail-Sea-Rail options for south and west coast coal traffic must be taken up to decrease the total landed cost of coal supply to those regions. Investments in port capacity and last leg railway lines are envisaged

5. There is potential for **greater use of coastal shipping** in the movement of domestic coal. The suggested pattern is for moving cool from Mahanadi Coalfields Limited do the ports in Orissa, for supply do sudden and West Coast consumption centres, including, power plants, steel plants, and for use in cement industry go.

6. Wagons remain a constant constraint. Though there is relief in FY25 as turnaround improves because of increasing average speeds, constraints will re-surface in FY 27 onwards. The option to lease wagons to IR as per the scheme can be evaluated.

7. Since wagon supply constraints will remain, RSR also helps by moving a potential 60MTPA of traffic to the coastal route and relieving the stress on wagon supply.

8. The **potential of Common Use infrastructure**, especially in first-mile connectivity to trunk lines, has been favourably viewed by private miners. Arrangements of relevant business models need to be encouraged for the formation of first-mile as well as last-mile connectivity. These include assets like railway lines, roads, loading terminals, silos, and coal handling plants. A common user facility like Railway Siding can be developed in the cases where there are 2-3 mines are close to each other. Various models can be assessed for this.

9. One of the models can be wherein the State Government carries out land acquisitions and the other stakeholders, i.e., the block allocates, would make investments for the development.

10. Investments in conveyor systems and modern coal-capable roads are planned for FMC. These assets can be created under Common User frameworks too.

11. Ministry of Coal can **operationalize a National Database for Common User Facilities in Coal mining geographies**. Existing and planned facilities like railway lines, sidings, roads, berths at ports, CHPs, silos can be mapped to specified mining geographies. This database can use the existing GIS Energy database developed by NITI Aayog.

12. The database will help in developing

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a national view of potential Common Use infrastructure that CIL and other mining companies can offer, as well as identify potential projects where new shared assets can be constructed.

13. In the context of India's coal and mining sector, the most effective mechanism available to the government is an SPV model. Where markets require, **separation of the ownership of the infrastructure from the mining companies can be considered.**

14. To finance the investment, the SPV will have to be backed by long-term take or pay agreements at set tariff rates that the mining companies guarantee topay.

15. In projects where viability can be determined on the basis of the ability to serve multiple users, the government can also explore the opportunity of **tendering and awarding the construction and management of the Common Use infrastructure concession to a third party**. The SPV **structures can be decided on a case-to-case basis**.

16. **Set up a regulator for Common Use infrastructure** for serving all mining sectors, including coal. The Regulator will:
    - Propose railway-related legislative and regulatory measures to be approved by the government
    - Regulate the railway infrastructure construction and ensure that access of operators is non-discriminatory
    - Ensure compliance with regulations
    - Determine the introduction of technical improvements to increase the safety and efficiency of bulk commodity rail transport
    - Regulate the access to rail infrastructure and arbitrate accordingly
    - Guarantee and monitor the rights and interests of railway users

17. There is limited and fragmented visibility for the tracking of coal movement from mine to end-user plant. Smart Coal Corridors need to be put in place to improve the end-to-end logistics supply chain associated with evacuation of coal throughout the country.

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Jharkhand

5. Jharkhand

Jharkhand has nine coalfields with non-Coal India Limited coal blocks. These coalfields in North Karanpura, Auranga, Daltonganj, Rajmahal, West Bokaro, Ramgarh, South Karanpura, Giridh, and Jharia are located in a narrow belt that runs east-west through the state and is among the most significant in India. Some of the coalfields are extended in two or more states like Raniganj, which extend in West Bengal as well, similarly Rajmahal & Birbhum extends in the state of West Bengal Bihar.

We examined the following 24 non-CIL coal blocks in these coalfields in terms of coal production trends and future predictions, as well as connectivity to transportation infrastructure. Also, we have taken into consideration production from CIL mines and infrastructure available and planned in the area.

North Karanpura

Location

North Karanpura Coalfield (NKCF) is located north of Ranchi and south of Hazaribagh in the Jharkhand districts of Ranchi, Hazaribagh, Ramgarh, Chatra, and Latehar. The coalfield is well-known for its large reserves of primarily power-grade coal from the Barakar, Karah bari, and Talchir formations. The field runs 64 kilometres east to west and 32 kilometres north to south, covering an area of 1,230 square kilometres.

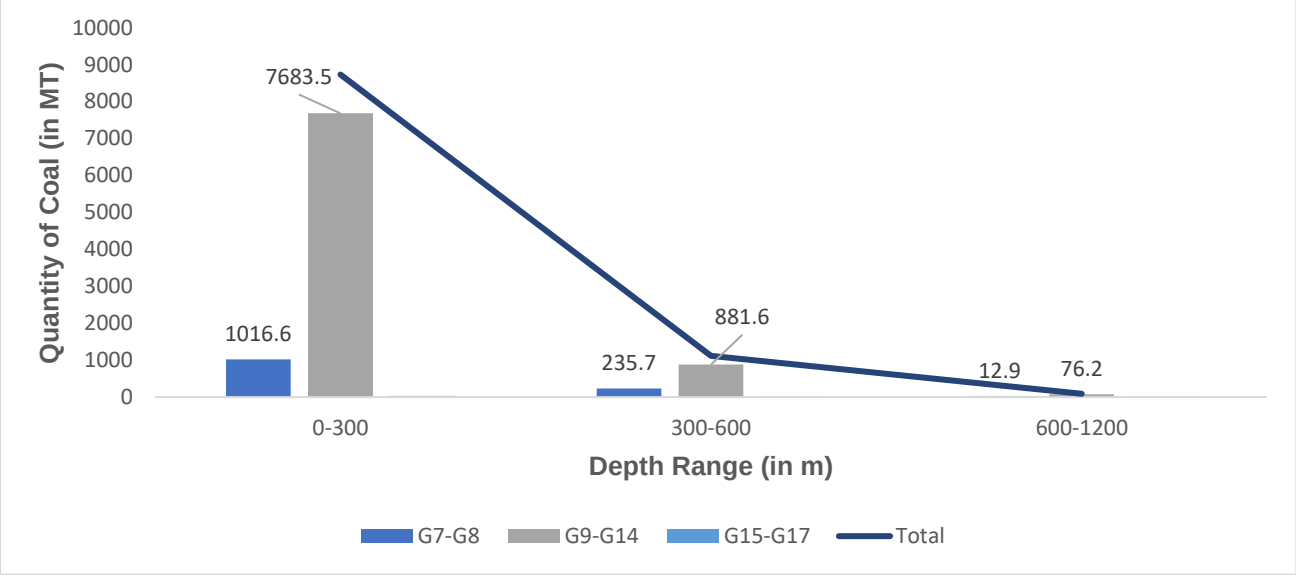
Area: 1230 sq. km.
Latitude: 23°43′41″N
Longitude: 85°30′22″E
Location: Ranchi, Hazaribagh, Chatra and Latehar

The average density of the state highways is 28 kilometres per 1000 square kilometres. Roads connect the eastern and western sides of NKCF to Tandwa. NKCF is accessible from Ranchi on the southern side and from Hazaribagh on the northern side.

Geological Reserve

The North Karanpura coalfield has 18,738 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 10,700 million tonnes are "Proved." A study of the grade and depth of coal resources in the coalfield is depicted in the graph below.

Figure 5 Grade wise Geological Resources of Coal at North Karanpura Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Nine coal mines have been allocated to various parties in the North Karanpura Coalfield. NTPC has been allocated a total of 5 coal blocks by counting Chatti Bariatu & Chatti Bariatu South as two mines. Brinda and Sasai, after relinquishment, have again been listed for allocation during the 2nd trench of commercial coal blocks. In addition to those, two other blocks, namely North Dhadu and Chitarpur, has also been listed for allocation for commercial purpose.

Table 8 List of Non-CIL Coal Blocks in North Karanpura Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Moitra	JSW Steel Limited	1
2	Badam	NTPC Ltd.	3
3	Dumri	Hindalco Industries Ltd.	1
4,5	Chatti Bariatu & Chatti Bariatu South	NTPC Ltd.	7
6	Kerandari	NTPC Ltd.	6
7	Pakri-Barwadih	NTPC Ltd.	18
8	Chakla	Hindalco Industries Limited	5.3
9	Gondulpara	GMR Chhattisgarh Energy Ltd.	4

Source: CMPDIL, Ministry of Coal

Table 9 Coal blocks to be allocated in North Karanpura Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Brinda*	Explored	34.713	0.68
2	Sasai*	Explored	26.34	
3	North Dhadu	Explored	222.437	8.15
4	Chitarpur	Explored	923.94	3.45

* Applied for surrender, and the request has been accepted by the Ministry of Coal.

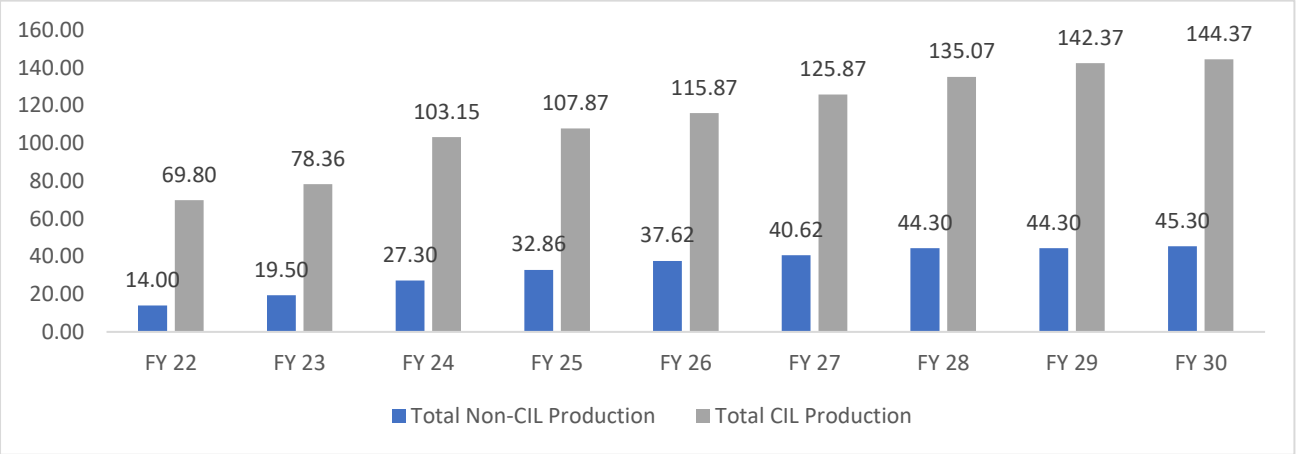
Source: CMPDIL, Ministry of Coal

Production

North Karanpura Coalfield is expected to produce a total of about 190 MT of coal in FY 30, according to current projections. The contribution of non-CIL mines is expected to be

approximately 45 MT. The graph below shows the YoY expected production till FY 30.

Figure 6 Coal Production Potential in North Karanpura Coalfield by FY30 (in MT)



Source: Coal India Limited, Coal Block Allocatee

Infrastructure

Road

The coalfield is surrounded by National and State Highways on all sides. SH 7 runs through the coalfield and provides connectivity to the rest of the highways and railway sidings nearby.

Table 10 Important Roads in the vicinity of North Karanpura coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 20	National Highway	This highway begins in Bihar and ends in Odisha near Satabhaya.
2	National Highway 22	National Highway	This highway connects Bihar's Sonbarsa to Jharkhand's Chandwa.
3	State Highway 7	State Highway	Hazaribagh-Bijupada
4	State Highway 2	State Highway	Ramgarh Cantonment-Ranchi

Source: Primary and Secondary research

In addition to this, the below table provides detail of roads/bridges planned in the coalfield for making the evacuation of minerals efficient.

Table 11 Road/Bridges planned for North Karanpura Coalfield

S No.	Project Name	Status
1	Construction of road from Honhe to Shivpur	Under Construction
2	Construction of road from Bukru to Jari along the toe of Tori-Shivpur Line	Under Construction
3	Construction of coal transportation road from Chopra More to Coal Stock Yard near PO office at Jharkhand OCP, Hazaribagh Area	Under Construction
4	Construction of diversion of Bituminous Road from the weighbridge Quarry No.1 to Saphi Tola under Purnadih Project at NK Area	Under Construction
5	Construction of PQC road from Purnadih OC Quarry-1 junction point to KDH weighbridge via Damodar Bridge at NK Area	Under Construction
6	Road bridge for stretch Honhe to Shivpur Rly Sdg	Under Construction

Source: CMPDI

Railway

Dhanbad Division of East Central Railway is the administrative head of railways in the vicinity of North Karanpura coalfield. KCF is also covered by the Barkakana-Daltonganj branch of the broad-gauge railway line of the East Central Railway connecting Gomoh and Dehri-on-Son via the Barkakana loop. Mahauamilan, McCluskiganj, Khalari, Ray, Kole and Hendegir railway stations fall in NKCF, and Patraru, Bhurkunda, Barkakana and Argada railway stations fall in SKCF. Additional rail evacuation facility has been created by the construction of the Tori Shivpur double rail line. 3rd line on the same alignment is under construction.

Furthermore, Shivpur Kathautia new rail line is being constructed through the formation of project-specific SPV. It joins Barkakana Koderma rail line at Kathautia. It gives another exit to coal trains via Koderma. After completion of ongoing work of railways, the combined capacity of the North Karanpura rail network will be 190 MTPA which is about 115 MTPA currently.

The table below lists the important railway sections. Figure 7 below provides details of rail and road connectivity in the coalfield.

Table 12 Existing Railways lines in the vicinity of North Karanpura Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Biratoli – Shivpur
2	East Central Railway	Tori – Barkakana Jn
3	East Central Railway	Hazaribagh – Barkakana Jn
4	East Central Railway	Kathautia - Hazaribagh

Source: Ministry of Railways

Coastal Movement and Inland Waterway

Coastal shipping and waterways will not be economical for coal evacuation from this coalfield, as nearest port i.e., Haldia is ~ 450 kilometres away. Also, the nearest inland waterway at river Damodar is around 50 kilometres away, and the Inland Waterways Authority of India (IWAI) has no plans to develop inland water transportation facilities in this region now.

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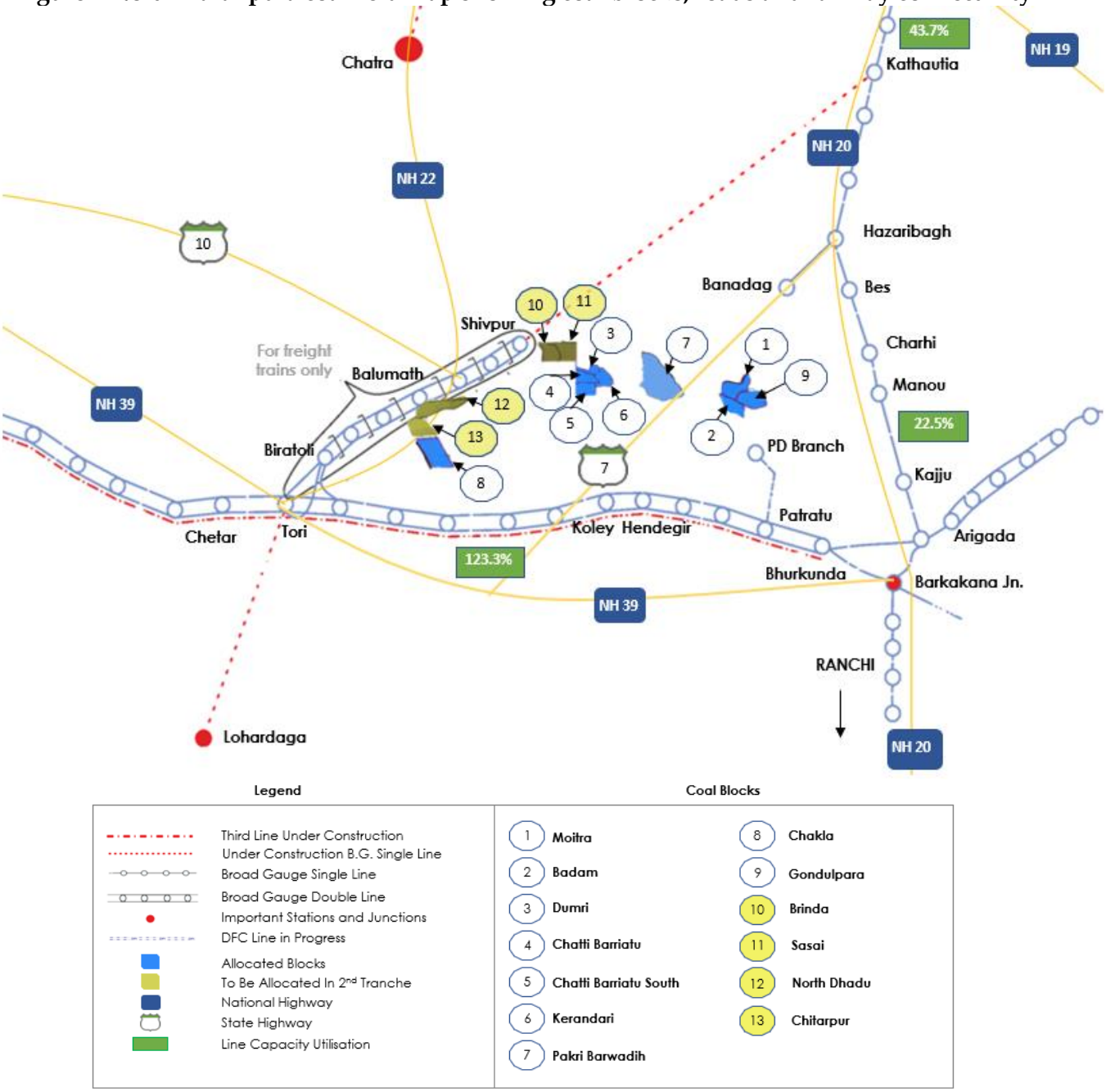
Figure 7 North Karanpura coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Moitra coal block

The Moitra coal block, which is currently non-operational, is owned by JSW Steel Ltd. It is located very close to Hazaribagh Town to Barkakana rail line on Dhanbad Division of East Central Railway. The coal from the block will be utilised by the Salem plant in Tamil Nadu, Vijaynagar Plant in Bellary

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District, Karnataka and Dolvi plant, Raigad district, Maharashtra. The transportation lead using railways for these plants varies from 1866 km to 2074 km.

The coal from the mine will be carried to the washery, which is close to the mine, by road utilising dumpers/tippers. The closest railway station is Bes. At Bes station, a rail loading facility is being built. As the distance between the washery and the train loading facility is short, the coal will be transported by road. Badam Hazaribagh is a rural road that passes through the block and can be taken to reach Bes Railway station. Following that, coal will be transported by rail to the end-use plant as needed.

Since the mine is located 480 kilometres from the nearest port at Haldia, coastal ships and waterways will not be viable options for coal evacuation. Furthermore, the distance between the plant and the port at the receiving end is around 450 kilometres. Also, at the destination end, the distance between the plant and port is about 450 km. Inland Water Transportation Damodar river is located at 50 km. Also, as of now, IWAI doesn't have any plan to develop IWT in this region.

Details			
Name of the Owner	JSW Steel Ltd.	**PRC (MTPA)**	1
Status of the Mine	Non-Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Bes	**Approximate Distance from Railway Station (in Km)**	7
Nearest Road	Badam- Hazaribagh Village Road	**Approximate Distance from Road (in Km)**	0
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	480
End-user Plant Details			
Plant 1	Salem Works	**Plant 2**	Dolvi Works
Location	District of Tamil Nadu	**Location**	Raigarh, Maharashtra
Lead Distance from Mine (in km)	2081	**Lead Distance from Mine (in km)**	1831
Plant 3	Vijaynagar Works		
Location	Bellari District, Karnataka		
Lead Distance from Mine (in km)	1873		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Local roads will be used to reach Bes railway station.		
Trunk infrastructure:	Bes-Hazaribagh railway line can be used to transport coal		
Last-mile connectivity	The plants have their own railway siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

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Coal production (MT)	0.8	1	1	1	1	1	1	1	1

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Badam coal block

The Badam block, which is currently under development stage, is owned by NTPC Ltd. The neighbouring coal blocks are Moitra block, Dipside block and Gondulpara block. It has been planned to act as the feeder block to NTPC's Barauni Stage-II Thermal Power plant via the railway siding nearest to the block.

The coal from this mine will be delivered by road for roughly 8 kilometres to Bes railway station. This will be done till NTPC completes the construction of railway siding at the coal block. The construction of a connecting road is now in the planning stages. NH 20 is the most important highway nearest to the block. After coal is delivered at Bes railway station, it will be transported by rail for a distance of approximately 306 kilometres to the NTPC Plant in Begusarai, Bihar. Bes-Hazaribagh railway line can be utilised.

Currently, the Kiul -Mokama section of the railway route proposed for evacuation of coal is more than 100% utilized. This utilisation is expected to further enhance going forward. To ensure efficient evacuation of coal to Barauni Plant, the capacity enhancement work on the Kiul -Mokama section of this route is required, which could be the third line. Further Expected challenges on the Koderma-Tilaiya and Gaya-Kuil section will be addressed as Koderma- Tilaiya New Line and doubling of Gaya-Kiul line work is already ongoing. These projects need to be monitored.

Details			
Name of the Owner	NTPC Ltd.	**PRC (MTPA)**	3
Status of the Mine	Non - Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Bes	**Approximate Distance from Railway Station (in Km)**	8
Nearest Road	NH 20	**Approximate Distance from Road (in Km)**	15
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	460
End-user Plant Details			
Plant-1	NTPC Barauni: Stage-II (2X250 MW)		

Location	Begusarai District, Bihar								
Lead Distance from Mine (in km)	314								
Connectivity infrastructure for the coal block									
First-mile Connectivity	Roads nearby will be used for evacuation till the allocatee completes the construction of railway siding.								
Trunk infrastructure:	Coal can be transported via the Bes-Hazaribagh railway line.								
Last Mile Connectivity	There is a railway siding at the plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0	1	2	3	3	3	3	3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Dumri coal block

The Dumri Coal block, which is currently under development, is owned by Hindalco Industries Ltd. The neighbouring coal blocks of this block are Chatti Bariatu Block, Chandragupta block, Kerandari Block and Sasai Block.

The coal from the mine has been planned to be feeding Mahan Aluminium Project, Aditya Aluminium Project and Captive Power Plants of Hirakud Complex, which are at a distance of 427 Km, 489 Km and 520 Km with 0.6 MT, 0.3 MT and 0.1 MT, respectively. The closest railway station is at Ray, approximately 40 kilometres away. SH-7 runs 3 kilometres near the coal block and can be utilised to reach the station. From there, the Tori-Barkakana railway line can be used to transport coal to end-use plants. All three plants have their own sidings to receive the coal.

The congestion-related challenges in transportation to identified end-use plants will be addressed as work on doubling of Bondamunda Ranchi section, 3rd lining of Barkakana-Tori-Barwahdih- Garwa Road- Sonenagar section and patch doubling of Singrauli area is already going on. Also, presently there is the utilisation of 128% for movement to Lapanga, Bondamunda-Rourkela Jharsuguda section for which the construction of 3rd linework is in progress. Hence evacuation of coal from the mine to proposed plants is not expected to face challenges due to traffic on the route.

Details			
Name of the Owner	Hindalco Industries Ltd.	**PRC (MTPA)**	1
Status of the Mine	Non-Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Ray	**Approximate Distance from**	40

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		Railway Station (in Km)	
Nearest Road	SH 7	**Approximate Distance from Road (in Km)**	3
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	436
End-User Plant Details			
Plant 1	Captive Power Plant of Aditya Aluminium Project	**Plant 2**	Captive Power Plant of Mahan Aluminium Project
Location	Sambalpur, Odisha	**Location**	Singrauli, Madhya Pradesh
Lead Distance from Mine (in km)	489	**Lead Distance from Mine (in km)**	427
Plant 3	Captive Power Plant of Hirakud Complex		
Location	Sambalpur, Odisha		
Lead Distance from Mine (in km)	520		
Connectivity infrastructure for the coal block			
First-mile Connectivity	SH-7 can be used to take coal from the block to the railway station.		
Trunk infrastructure:	Tori-Barkakana railway line can be used		
Last-mile connectivity	The plants have their own railway sidings.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									1

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Chatti Bariatu & Chatti Bariatu South coal blocks

The coal blocks are owned by NTPC Ltd. and currently are non-operational. The coal from the block is proposed to be utilized at NTPC's Barh Stage-II plant in Bihar.

The coal from the mines will be conveyed to the railway siding through a 17-kilometre pipe conveyor. It is currently under construction. The closest railway station is at Shivpur, approximately 16 kilometres

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away. The coal would be delivered by rail from Shivpur station to the Barh Thermal plant in Bihar, covering a distance of around 478 kilometres. Since Tori Shivpur Line is already commissioned and the Shivpur Kathautia railway line is under construction, no congestion is expected at this route.

Details			
Name of the Owner	NTPC Ltd.	**PRC (MTPA)**	7
Status of the Mine	Non-Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Shivpur	**Approximate Distance from Railway Station (in Km)**	16
Nearest Road	State Highways	**Approximate Distance from Road (in Km)**	3
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	440
End-user Plant Details			
Plant-1	NTPC Barh: Stage-II (2X660 MW)		
Location	Bihar		
Lead Distance from Mine (in km)	494		
Connectivity infrastructure for the coal block			
First-mile Connectivity	A pipe conveyor is currently under construction.		
Trunk infrastructure:	Tori- Shivpur can be used for rail transport.		
Last Mile Connectivity	There is a railway siding at the plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	1	3	5	7	7	7	7	7

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Kerandari coal block

The Kerandari Block of NTPC is currently under development stage. The block shares its boundary with Dumri Block, Chatti Bariatu, Chatti Bariatu South Block.

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The coal will be delivered from the mine to the railway siding via a pipe conveyor that is currently under construction. The coal from the Shivpur station to the NTPC Tanda thermal power station in Uttar Pradesh can be transported across a distance of around 591 kilometres on the Tori- Shivpur railway line. The end-user plant is equipped with its own railway siding. Since Tori Shivpur Line is already commissioned and Tori Sonenagar 3rd line, DFC, Jaunpur Tanda Doubling is under construction, no congestion is expected at this route.

Details			
Name of the Owner	NTPC Ltd	**PRC (MTPA)**	6
Status of the Mine	Non-Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Shivpur	**Approximate Distance from Railway Station (in Km)**	18.5
Nearest Road	State Highways	**Approximate Distance from Road (in Km)**	3
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	442

End-user Plant Details	
Plant-1	NTPC Tanda: Stage-II (2X660 MW)
Location	Uttar Pradesh
Lead Distance from Mine (in km)	591
Connectivity infrastructure for the coal block	
First-mile Connectivity	A pipe conveyor is currently under construction.
Trunk infrastructure:	Tori- Shivpur can be used for rail transport.
Last Mile Connectivity	There is a railway siding at the plant.

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	2	4	6	6	6	6	6	6

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Pakri – Barwadih coal block

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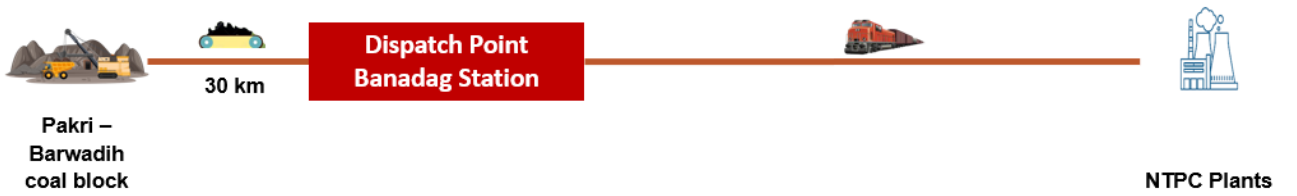
The Pakri-Barwadih Block of NTPC is currently operational. The block shares its boundary with Dumri Block, Chatti Bariatu, Chatti Bariatu South Block.

The closest railway siding is at Banadag, approximately 30 kilometres away. The coal from the mine will be transported to the Banadag railway siding through a 14-kilometre belt conveyor that is currently under construction. Coal is currently carried by trucks for 19.7 kilometres till it reaches the railway siding. SH-7, which is around 11 kilometres away from the block, is used to deliver coal to the siding. The mine's coal can be delivered to any of NTPC's power plants. However, it is currently delivering coal to the Unchahar and Tanda Power Plants, and both plants have railway sidings. From Banadag station, it can be delivered via Koderma or Barkakana to its destination.

For the Tanda plant railway route, the Doubling of Varanasi to Zafrabad and Jafarabad to Jaunpur to Shahganj to Akbarpur to Tanda section is under the advance stage of commissioning. No congestion is expected on the commissioning of ongoing works.

Details									
Name of the Owner	NTPC Ltd.			**PRC (MTPA)**			18		
Status of the Mine	Operational			**Coalfield**			North Karanpura		
Infrastructure Available									
Nearest Railway Station	Banadag			**Approximate Distance from Railway Station (in Km)**			30		
Nearest Road	SH 7			**Approximate Distance from Road (in Km)**			11		
Nearest Port	Kolkata			**Approximate Distance from Port (in Km)**			440		
Connectivity infrastructure for the coal block									
First-mile Connectivity	Currently, coal is transported to railway siding by roads. A 14-kilometre-long belt conveyor is now under development.								
Trunk infrastructure:	The Banadag-Hazaribagh line provides transit access to the rail network.								
Last Mile Connectivity	Railway siding is available at the plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	11	12	13	13	13	15	18	18	18



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Chakla coal block

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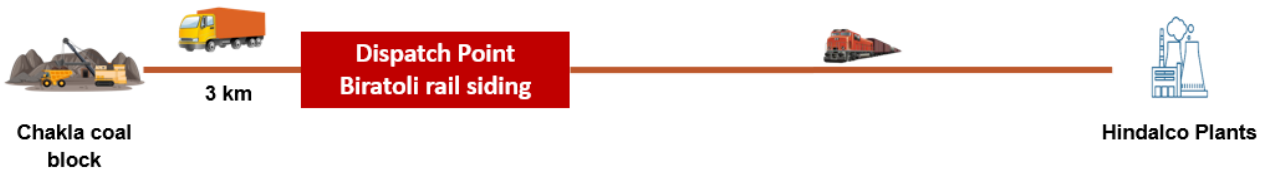
The Chakla Block, which is currently non-operational, is owned by Hindalco Industries Ltd. The neighbouring coal blocks are Chitarpur Block, Dhadhu East Block, Deonad Block and Mahuamilan Block.

Since the coal from this block is designated for commercial use, it can be used by any end-use plant. The block is currently awaiting approvals. The nearest railway siding is at Biratoli, which is approximately 3 kilometres away. Since the National Highway 22 is within its vicinity, coal can be transported to nearby plants using roads and for longer distances by utilising the Tori rail link. It's important to note that only small amounts of coal would be transported via road. HINDALCO has a requirement for its Renukoot plant, as well as two plants in Odisha. These units are expected to consume the majority of the coal.

Details			
Name of the Owner	Hindalco Industries Ltd.	**PRC (MTPA)**	5.3
Status of the Mine	Non-Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Biratoli rail siding	**Approximate Distance from Railway Station (in Km)**	3
Nearest Road	NH 22	**Approximate Distance from Road (in Km)**	1
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	487
Connectivity infrastructure for the coal block			
First-mile Connectivity	Rail siding is available at Biratoli		
Trunk infrastructure:	The Tori-Barkakana railway line can be used to transport coal.		
Last Mile Connectivity	Railway sidings are available at plants.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	2.2	3.5	5.3	5.3	5.3	5.3	5.3	5.3	5.3



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gondulpara coal block

The Gondulpara Block, which is currently non-operational, is owned by Adani Enterprise Ltd. The neighbouring coal blocks are the Moitra Block and the Badam Block.

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The coal from this coal block is allocated for commercial purposes, and hence coal can be utilized by any end-use plant. Since Badam-Hazaribagh Road is within its vicinity, coal can be transported to the nearby plants using the road for shorter distances and for longer distances via the existing railway line towards Barkakana and Sonenagar. The closest station is at Bes, which is approximately 13 kilometres away. If coal is to be transported by trucks, the existing route, which is a rural road, will need to be significantly strengthened.

For movement to West Bengal, the transportation can be done via the Hazaribagh- Koderma railway line. For transportation to Uttar Pradesh, coal trains can take the Tori - Sonenagar route. Both routes have ongoing capacity enhancement works, and transportation by rail should not pose any problem. The owner has recommended the construction of a common user line, which can serve all the blocks in the area.

Details			
Name of the Owner	Adani Enterprise Ltd.	**PRC (MTPA)**	4
Status of the Mine	Non - Operational	**Coalfield**	North Karanpura
Infrastructure Available			
Nearest Railway Station	Bes	**Approximate Distance from Railway Station (in Km)**	13
Nearest Road	Badam-Hazaribagh Road	**Approximate Distance from Road (in Km)**	2.8
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	417
Connectivity infrastructure for the coal block			
First-mile Connectivity	Badam-Hazaribagh road is nearby and can be used to deliver coal to plants nearby and railway stations.		
Trunk infrastructure:	Tori – Sonenagar and Hazaribagh- Koderma railway lines can be used to transport coal.		
Last Mile Connectivity	The potential customer's infrastructure facility would determine the last mile connectivity.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)				0.56	2.32	3.32	4.00	4.00	4.00

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from North Karanpura coalfield was 69.8 MT which is expected to reach 103.15 MT and 144.37 MT in FY 24 and FY 30, respectively. In a significant attempt to boost coal production and reduce reliance on coal imports in the future years, Coal India Limited has developed

and finalised a plan to produce 1 billion tonnes of coal by 2023-24.

The goal to produce 1 billion tonnes of coal would require all enabling conditions to be met, as well as the maximisation of production predictions and the building of optimal evacuation infrastructure. The following mines and CHPs will be linked to the planned infrastructure.

Table 13 Mines in North Karanpura Coalfield

S No.	Name of Projects/ Mines	Status	Expected Production in FY 24 (in MT)
1	Ashoka EPR OC	Completed	6
2	Purnadih OC	Completed	3
3	Piparwar EPR OC	Completed	0
4	KD Hesalong OC	Completed	2
5	Rohini OC	Completed	0
6	Dakra Bukbuka OC	Completed	0
7	Rajhara OC	Completed	0.25
8	Magadh OC	Ongoing	51
9	Amrapali OC	Ongoing	25
10	Tetariakhar OC	Ongoing	2
11	Sanghmitra OC (20.0 MTY)	Future	7
12	Chandragupta OC (15.0 MTY)	Future	6
13	Piparwar UG Ph-I (0.87 MTY)	Future	0.65

Source: Ministry of Coal, CIL

Magadh OC and Amrapali OC will be the major contributors to the production of coal in North Karanpura, with a combined capacity of 76 MT. Magadh OC is planned to be equipped with a pipe conveyor and connected to Balumath, Bukru, Phulbasia, Rajdhar and Magadh siding. From FY 2024-25 onwards, all coal production from Magadh will be dispatched via the Magadh siding. Amprapali OC will be connected to Shivpur and Amrapali sidings. These projects are currently planned to be commissioned from 2023 onwards.

Evacuation of other mines is also planned in advance, considering the customers of CCL. For coal sold through auction road and railway is the preferable mode. To address concerns related to first-mile connectivity lot of initiative has already been taken, as mentioned below.

Table 14 First-mile Infrastructure in North Karanpura Coalfield

S No.	Name of Mine	First-mile Connectivity Infrastructure	Date of Commissioning
1	Magadh OC	Magadh pipe Conveyor	2023-2024
		Balumath, Bukru, Phulbasia, Rajdhar siding, Magadh siding	2023-2024
2	Amrapali OC	Shivpur, Amrapali siding (	2023-2024

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S No.	Name of Mine	First-mile Connectivity Infrastructure	Date of Commissioning
3	Tetariakhar OC	Balumath siding	
4	Chandragupta OC	Chandragupta siding	2023-2024
5	Churi-Benti UGP	Dakra Siding	
6	Dakra Bukbuka OC		
7	Rohini Karkatta OC	Dakra Siding, Rohini Karkatta siding	2026-27
8	KD Hesalong OC	KDH siding	
9	Purnadih OC		
10	Rohini OC		
11	Piparwar EPR OC	RCM siding, Rajdhar, Bachra siding	
12	Piparwar UG Ph-I	RCM siding, Rajdhar, Bachra siding	
13	Ashoka EPR OC	RCM siding, Rajdhar, Bachra siding, New Ashok siding	
14	Sanghmitra OC	Sanghmitra siding	

Source: Ministry of Coal, CIL

Pipe Conveyor is an upcoming mode of transport. Rail dispatch from North Karanpura is expected to significantly increase by 160 percent between 2020-21 and 2029-30. The coalfield will have a strong influence on the increased demand for rakes for evacuation. The graph below illustrates the projected rake requirement figures for CIL production.

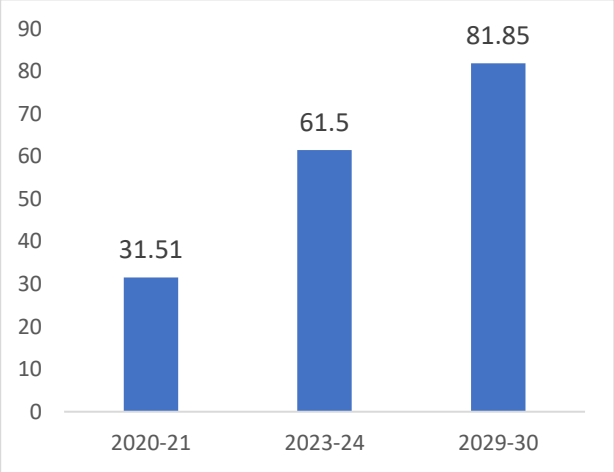
Table 15 Existing Rail Links in North Karanpura Coalfield

S No.	Railway Zone	Section
1	East Central Railway	Barkakana- Daltonganj-Garhwa
2	East Central Railway	Tori-Shivpur-Kathautia-Koderma
3	East Central Railway	Andal – Pandabeswar Line

Source: Ministry of Railways

Pipe Conveyor is an upcoming mode of transport. Rail dispatch from North Karanpura is expected to significantly increase by 160 percent between 2020-21 and 2029-30. The coalfield will have a strong influence on the increased demand for rakes for evacuation. The graph below illustrates the projected rake requirement figures.

Figure 8 Projected Rake Requirements in North Karanpura Coalfield (in Nos.)



Source: CMPDIL, Ministry of Coal

As a result of the expected numbers, Indian Railways has begun planning mainline projects to increase the capacity of railway lines. Tori-Shivpur, measuring 44.37 kilometres in length, was sanctioned in August 2000 by the CCL Board and again in October 2017 by the CIL Board for the purpose of providing a dedicated coal evacuation route to CCL's mega projects.

When CCL's linked projects, namely Magadh (51 MT), Amrapali (25 MT), Sanghamitra (20 MT), Chandragupt (15 MT), and Tetariakhar (2 MT), attain their rated production capacity, the total load on this line is estimated to be 113 MT. The project also includes a road-over-rail (RoR) bridge near Tori station.

The Shivpur-Kathautia Line was intended to connect the Tori-Shivpur Line to Koderma on the Eastern Railway's Grand Chord Line. This would ensure that coal from CCL's North Karanpura coalfield can be evacuated via both routes – west along the Barkakana-Daltonganj-Garhwa Road line and north via the Ramgarh Koderma line. To reinforce the Patratu-Tori-Sonenagar line, Indian Railways is constructing a 291-kilometre-long third line between Patratu and Tori via the Barkakana-Barwadih-Garhwa Road segment and Sonenagar.

This would connect to Railways' Eastern Dedicated Freight Corridor (DFC) in Sonenagar. It will give an additional route from Shivpur to Sonenagar through Tori – Garhwa Road in the event of Shivpur-Kathautia Line delays. Due to the saturation of the Gaya-Sonenagar section, the DFC is proposed to be extended to Koderma to allow coal evacuation through the Shivpur-Khatautia line to flow easily towards the north and west of the country. The table below summarises the significant railway line projects scheduled for the coming years.

Analysis and Recommendations

Coal blocks like Chatti Bariatu, Kerandari and Pakri-Barwadih blocks are already constructing conveyors for first-mile connectivity to the nearest railway sidings and subsequently planning to use rail to transport coal until the end-use plants which have railway sidings.

Other coal blocks like Moitra, Badam, Chakla etc. are planning to use tippers/dumpers up to a railway loading facility for the first-mile connectivity, after which the coal would be transported through railways until the end-use plant. The end-user plant linked to Moitra and Badam block is also having railway siding.

The analysis of coal production from mines of NKC (CIL and non-CIL) and the evacuation capacity predicts that with ongoing capacity addition and proposed infrastructure, there won't be any challenge in coal evacuation from the coalfield.

Only first-mile connectivity arrangements need to be undertaken by 2nd trench coal blocks. Further roads and railway connectivity issues remain the same as highlighted in this part for evacuation of coal from this area.

CIL has also done advance planning considering the upcoming production from their mines and accordingly developing first-mile connectivity projects for large mines.

The North Karanpura Coalfield (NKC) is well connected through the road as well as the railway network. After completion of ongoing work of railways, the combined capacity of the North Karanpura rail network will be 190 MTPA which is about 115 MTPA currently. It permits the movement of coal by rail in all possible directions.

Congestion Capacity Utilization of Railway section, which is used as a feeder route to transport coal from NKCF to end-user plants, is described below.

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Table 16 Congestion Analysis of the railway network in North Karanpura area

S No	Section	Utilisation in percentage	In Progress
1	Hazari Bagh Barkakana SL	30	
2	Muri Barkakana SL	131	
3	Chandil Muri	112	
4	Chandil-Sini	80	
5	Sini- Rajkharsawan	80	3rd Line
6	Rajkharsawan-Chakradharpur	80	3rd Line
7	Chakradharpur- Bondmunda	93	3rd Line
8	Bondamunda-Rourkela	128	3rd Line
9	Rourkela- Jharsuguda	123	3rd line
10	Jharsuguda- Sambalpur	117	Doubling
11	Sambalpur-Titlagarh	134	Doubling
12	Koraput - Singapuram	122	3rd line
13	Singpuram -Vizainagaram	107	3rd line
14	Kottavalasa - Simhachalam	114	Proposed East Coast DFC
15	Simhachalam- Gopalpatnam	108	Proposed East Coast DFC
16	Gopalpatnam-Vishkhapatnam	103	Proposed East Coast DFC
17	Kiul- Rampur Dumra	167	Recommended 3rd line
18	Rampur Dumra-Tal	137	Recommended 3rd line -
19	Tal Mokama	124	Recommended 3rd line -
20	Muri- Barkakana SL	131	DoublingRecommended
21	Chandil Muri	112	Doubling Recommended
22	Bondamunda Ranchi	153	Doubling in progress
23	Bondamunda-Jharsuguda	123	3rd line in progress
24	Barkakana-Tori-Garwa Road-Sonenagar	87	3rd line in progress

Source: Primus Partners Analysis

Since the doubling of feeder routes for Barkakana to Muri and Muri to Chandil is included in National Rail Plan so the evacuation from the mine won't be having congestion challenges in future as well. The planning of the construction of East Coast DFC is at DPR stage.

For evacuation of coal via using Kiul -Mokama section is a concern area as the railway route proposed for the evacuation of coal is more than 100% utilized. This utilisation is expected to further increase going forward.

To ensure efficient evacuation of coal to Barauni Plant, the capacity enhancement work on Kiul -Mokama section of this route is required, which can be achieved by a third line. Further

Expected challenges on the Koderma-Tilaiya and Gaya-Kiul section will be addressed as Koderma- Tilaiya New Line and doubling of Gaya- line work is already ongoing. These projects need to be monitored.

The co-ordination among various agencies is required for the development of pukka/mortar roads connection between mine and nearest village/state or national highway for efficient evacuation of coal.

Shared infrastructure can be created for evacuation of coal from Gondulpara, Moitra and Badam blocks.

Co-ordination with railways is required considering the expected number of wagons from increased production.

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Auranga Coalfield

Location

The Auranga coalfield is located in the eastern portion of the Gondwàna basin's North Koel Valley. It is located around 8 kilometres west of the North Karanpura Coalfield, which is located in the westernmost portion of the Damodar Valley of the Gondwana Basin. Auranga coalfield is 240 square kilometres in size and is located in Jharkhand's Latehar district. The coalfield, which runs east-west, is a narrow Gondwana basin that is broader in the east and narrows in the west.

Area: 240 sq. km.
Latitude: 23° 49' N
Longitude: 84° 37' E
Location: Latehar

The Auranga coalfield's western and eastern portions are accessible via Daltonganj and Balumath, respectively.

Geological Reserve

The Auranga coalfield has 2997 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 352 million tonnes fall under "Proved" category.

Coal Blocks

The production from Auranga coalfield is majorly contributed from Non-CIL mines only. There are 3 coal mines that are allocated to different players and two are identified for allocation in 2nd trench of commercial coal mining. The details of the same are provided below.

Table 17 List of Non-CIL Coal Blocks in Auranga Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Tubed	Damodar Valley Corporation	6
2	Rajbar E&D	Tenughat Vidyut Nigam Limited	10
3	Banhardih	Patratu Vidyut Utpadan Nigam Limited	11

Source: CMPDIL, Ministry of Coal

Table 18 Coal blocks to be allocated in Auranga Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Latehar	Partially Explored	22.04	0.52*
2	Gawa	Partially Explored	51.48	1.23*

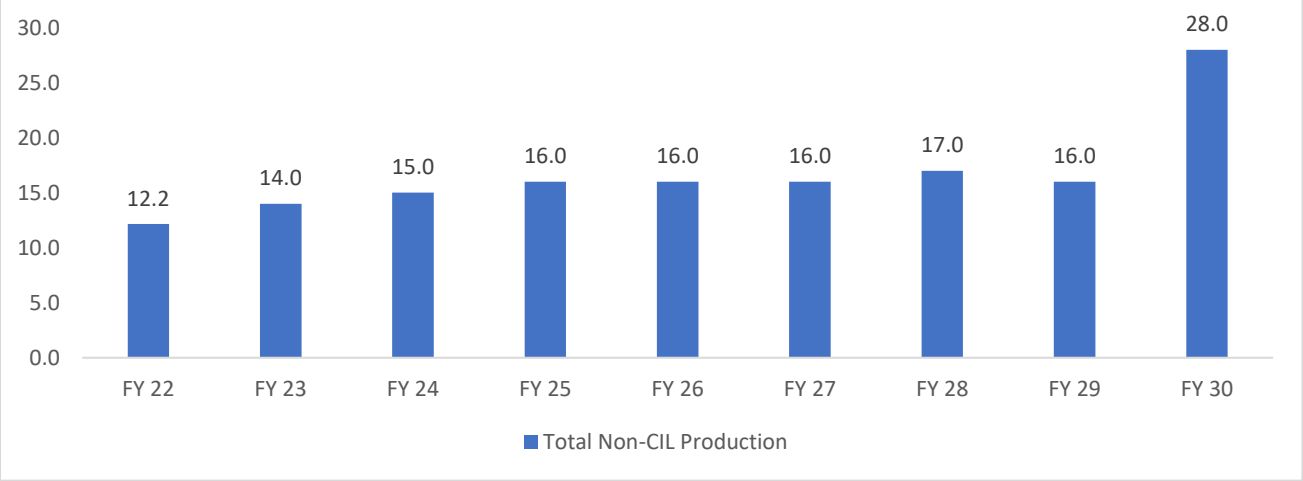
* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

Production

Auranga coalfield is expected to produce approximately 28 MT of coal in FY 30. There are no CIL mines present in the area. The graph below shows the YoY expected production till FY 30.

Figure 9 Coal Production Potential in Auranga Coalfield by FY30 (in MT)



Source: Coal India Limited, Coal Block Allocatee

Infrastructure

Road

Latehar is connected via NH 39. Khalari town is connected to Ranchi with an all-weather metalled road, which also connects Tandwa, Barkagaon, Hazaribagh, and Chatra towns.

Table 19 Important Roads in the vicinity of Auranga coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 39	National Highway	This highway runs across Madhya Pradesh, Uttar Pradesh, and Jharkhand.
2	National Highway 22	National Highway	This highway connects Bihar's Sonbarsa to Jharkhand's Chandwa.
3	State Highway 10	State Highway	Medininagar-Balumath

Source: Primary and Secondary research

Railway

The Tori-Barwadih double electric line runs along the southern edge of the coalfield and crosses it on the western side. The railway line between Barwadih and Tori runs south to the coalfield. The railway stations of Chetar, Richughuta, Demu, Latehar, Bendi, and Kumendi are located on this railway line near the coalfield.

Table 20 Existing Railways lines in the vicinity of Auranga Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Biratoli - Shivpur
2	East Central Railway	Tori - Latehar
3	East Central Railway	Latehar - Barwadih

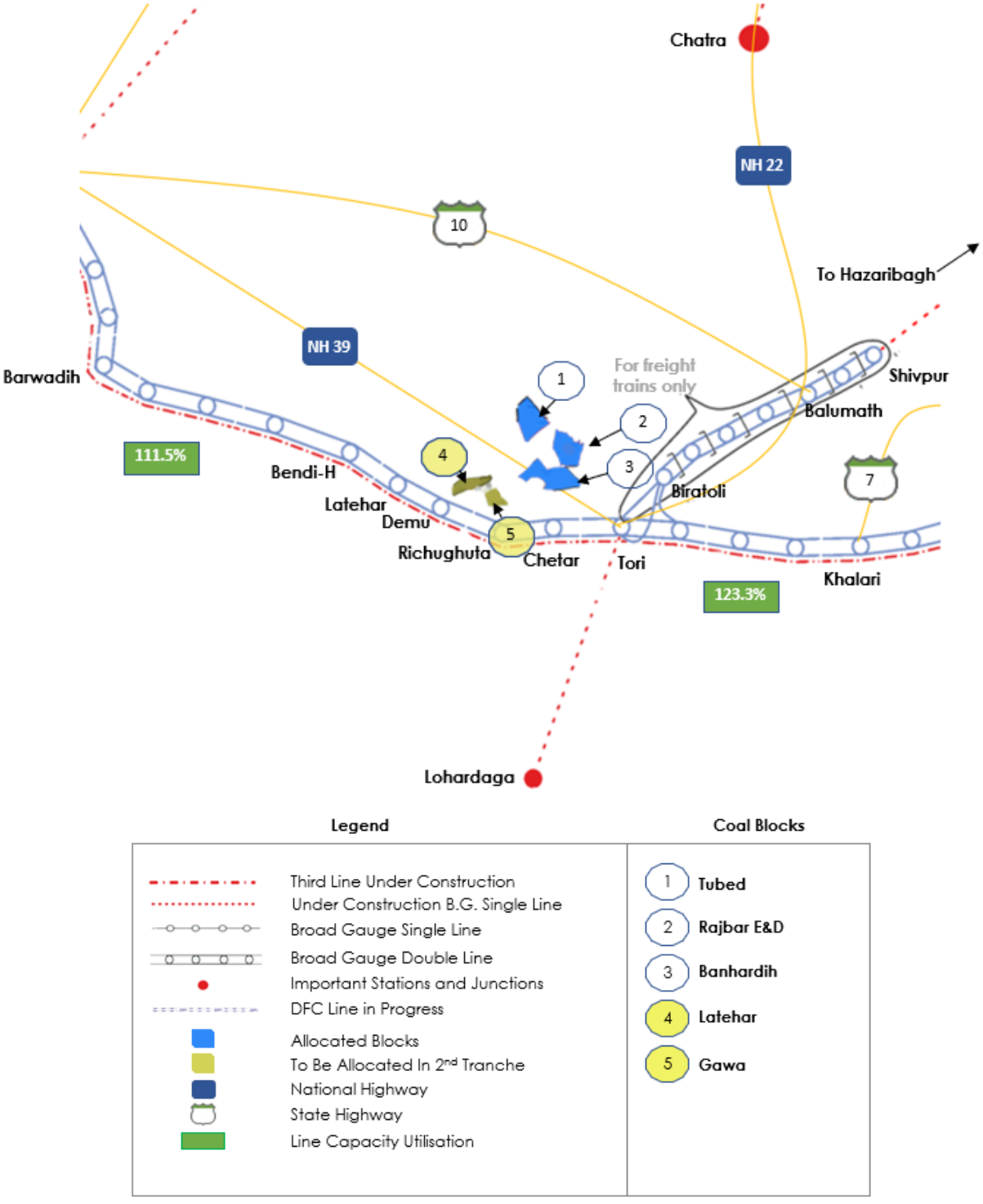
Source: Ministry of Railways

Coastal Movement

Coastal shipping and canals will be unable to transport coal from this coalfield, which is around 470 kilometres from the nearest port at Haldia.

The nearest inland waterway is around 70 kilometres distant at the river Damodar, and the Inland Waterways Authority of India (IWAI) currently has no plans to build inland water transportation facilities in this region.

Figure 10 Auranga coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Tubed coal block

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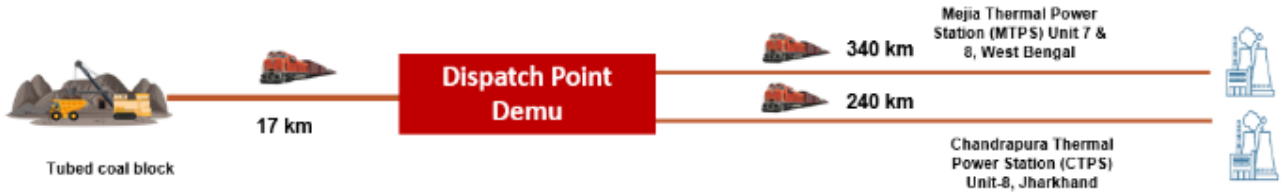
The Tubed Block of Damodar Valley Corporation is currently under development stage. The block shares its boundary with Rajbar ABC Block

East Central Railway has approved a 17-kilometre railway line from the coal block to Demu station, with construction and commissioning estimated to take three years. Land acquisition is the main stumbling block in the development of this railway siding. As a result, coal will be transported by rail to the Mejia and Chandrapura thermal power plants. Coal may be transported to West Bengal via the Tori-Barkakana Jn. railway line. The nearest highway is NH 39, which is around 17 kilometres away. There are railway sidings for each of these thermal power plants.

Details			
Name of the Owner	Damodar Valley Corporation	**PRC (MTPA)**	6
Status of the Mine	Non-Operational	**Coalfield**	Auranga
Infrastructure Available			
Nearest Railway Station	Demu	**Approximate Distance from Railway Station (in Km)**	17
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	20
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	482
End-user Plant Details			
Plant 1	Mejia Thermal Power Station Unit 7 & 8	**Plant 2**	Chandrapura Thermal Power Station Unit-8
Location	West Bengal	**Location**	Jharkhand
Lead Distance from Mine (in km)	340	**Lead Distance from Mine (in km)**	240
Connectivity infrastructure for the coal block			
First-mile Connectivity	A railway siding at the coal block has been proposed for the block		
Trunk infrastructure:	Tori-Barkakana Jn. railway line can be used to transport coal		
Last-mile connectivity	Railway siding is available at the plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	2.15	4	5	6	6	6	6	6	6



Source: Primary Research, Ministry of Coal, Coal block Allocatee

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Rajbar D&E coal block

The Rajbar D&E Block of Tenughat Vidyut Nigam Ltd. is currently under development stage. The block shares its boundary with Rajbar ABC Block. It has been planned to be developed as the feeding block for the Tenughat Thermal Power Station Extension project.

Since the coal block and the end-use facility, Tenughat Thermal Power Station Extension, are both in the same state, the planned evacuation plan comprises transferring coal from the mine via conveyor belt to Chetar railway station, a distance of 13.7 kilometres. Chetar railway station gives access to the Tori-Barkakana Jn. railway line. Following that, the coal would be transported by rail across 160 kilometres. A Merry Go Round for an 8-kilometre journey up to the factory has been planned, with departure from the Dumri Bihar railway station.

The tripling of the feeder route, which is already sectioned for Barkakana to Garwah needs to be expedited.

Details			
Name of the Owner	Tenughat Vidyut Nigam Ltd	**PRC (MTPA)**	10
Status of the Mine	Non-Operational	**Coalfield**	Auranga
Infrastructure Available			
Nearest Railway Station	Chetar	**Approximate Distance from Railway Station (in Km)**	13.7
Nearest Road	NH-39	**Approximate Distance from Road (in Km)**	9.5
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	465
End-user Plant Details			
Plant-1	Tenughat Thermal Power Station Extension (2 x 660 MW)		
Location	Dumri, Jharkhand		
Lead Distance from Mine (in km)	160.		
Connectivity infrastructure for the coal block			
First-mile Connectivity	A conveyor belt has been planned for the railway station.		
Trunk infrastructure:	The Tori-Barkakana Jn. railway line is suitable for coal train transit.		
Last Mile Connectivity	An MGR system has been planned for last-mile connectivity.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	10	10	10	10	10	10	10	10	10

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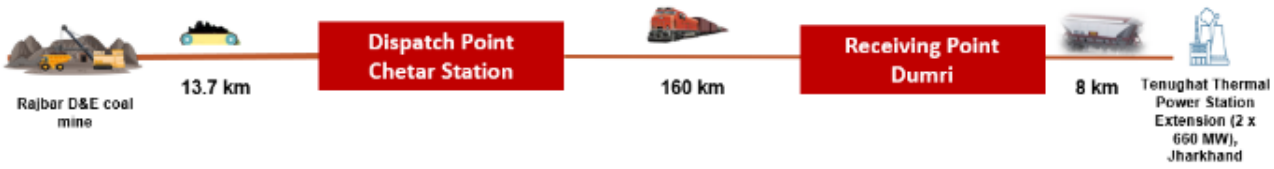


Source: Primary Research, Ministry of Coal, Coal block Allocatee

Banhardih coal block

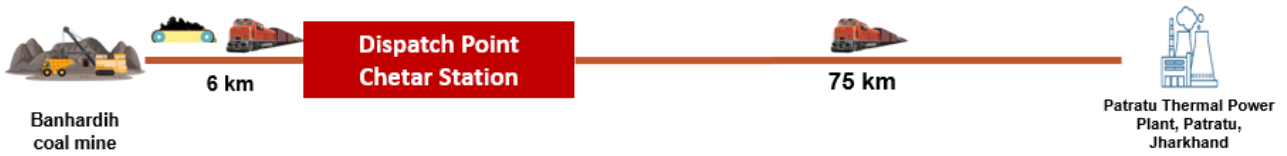
The Banhardih Block owned by NTPC Ltd., is currently under development stage. Patratu Vidyut Utpadan Nigam Ltd. (PUVNL) is the end-use plant, and the present evacuation infrastructure at the mine end consists of a coal handling plant (CHP) and a railway siding. The nearest railway station is at Chetar, approximately 6 kilometres away. From there Patratu, towards the east, can be reached via the railway line.

On commissioning of 3rd line between Barkakana- Patratu, Patratu – Tori, Tori-Barwadih, Barwadih-Garwa Road line capacity will increase by about 17 goods trains. It is recommended that the 3rd line to be constructed with longer loops to accommodate long haul trains. This will double the capacity addition from 25 MTPA to 50 MTPA.

Details			
Name of the Owner	NTPC Ltd	**PRC (MTPA)**	11
Status of the Mine	Non-Operational	**Coalfield**	Auranga
Infrastructure Available			
Nearest Railway Station	Chetar	**Approximate Distance from Railway Station (in Km)**	6
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	2.5
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	485
End-user Plant Details			
Plant-1	Patratu Thermal Power Plant		
Location	Patratu, Jharkhand		
Lead Distance from Mine (in km)	75		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Currently, a conveyor belt towards a coal handling plant and railway siding is present		
Trunk infrastructure:	Patratu can be reached via the Tori-Barkakana Jn. railway line.		
Last Mile Connectivity	There is a railway siding at the plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

Coal production (MT)									11



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Analysis and Recommendations

The Auranga Coalfield is well connected through the road as well as the railway network. Tubed coal block is planning to build a railway siding at the plant, and it is sanctioned by East Central Railway. Rajbar E & D coal block is planning a Merry go round facility for last-mile connectivity.

The following table indicates the congestion on the rail line and capacity enhancement works in the area. On commissioning of 3rd line, line capacity will increase by about 17 goods trains. It is recommended that the 3rd line be constructed with longer loops to accommodate long haul trains. This will double the capacity addition from 25 MTPA to 50 MTPA.

Table 21 Congestion Analysis of the railway network in Auranga area

S. No.	Section	Capacity Utilisation	Works in Progress
1	Barkakana-Patratu	68	3rd line
2	Patratu – Tori	64	3rd line
3	Tori-Barwadih	75	3rd line
4	Barwadih-Garwa Road	87	3rd line

Source: Primus Partners Analysis

The tripling of the feeder route from Barkakana to Garwah, which has already been sanctioned, needs to be expedited. The tripling of feeder route of Barkakana-Patratu, Patratu-Tori and Tori-Barwadih is in progress.

Land acquisition is the main stumbling block in the development of the railway siding. A proper mechanism needs to be put in place for facilitation of land acquisition by co-ordination with local authorities.

Daltonganj Coalfield

Location

The Daltonganj Coalfield is one of three coal fields in Palamu and covers an area of 250 square kilometres. The Coalfield is a long, narrow synclinal basin that is divided into two sub-basins: Rajhara – Lohari – Kathautia – Godariadih in the north and Singra – Meral in the south.

Area: 250 sq. km.
Latitude: 23°48′N
Longitude: 85°45′E
Location: Palamu

The Coalfield is located partially in the Koel river valley and partly in the Amanat river valley, spanning an approximate distance of 80 kilometres east to west.

Geological Reserve

The Daltonganj coalfield has 144 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 83.8 million tonnes are "Proved."

Coal Blocks

Table 22 List of Non-CIL Coal Blocks in Daltonganj Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Kathautia	Hindalco	0.8
2	Lohari*	Aranya Mines Private Ltd.	0.2
3	Meral	Trimula Industries Limited	0.44
4	Rajhara North (Central & Eastern)	Fairmine Carbons Pvt Ltd	0.75

*Lease applied to state and data not available

Source: CMPDIL, Ministry of Coal

Production

Daltonganj is expected to produce 2.16 MT of coal in FY 30.

Infrastructure

Road

Daltonganj is approachable from Aurangabad on the eastern side via National Highway 39.

Table 23 Important Roads in the vicinity of Daltonganj coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 39	National Highway	This highway runs across Madhya Pradesh, Uttar Pradesh, and Jharkhand.
2	National Highway 139	National Highway	Links Rajhara, to Patna and passes through Aurangabad
3	State Highway 10	State Highway	Medininagar-Balumath

Source: Primary and Secondary research

Railways

On the northwest, the Garhwa Road Jn – Daltonganj branch of the Eastern Central Railways lies near the coalfield. Southwest of the blocks lies Kajri Station, which is the nearest railhead.

Table 24 Existing Railways lines in the vicinity of Daltonganj Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Garhwa Road Jn - Daltonganj

2	East Central Railway	Daltonganj - Barwadih

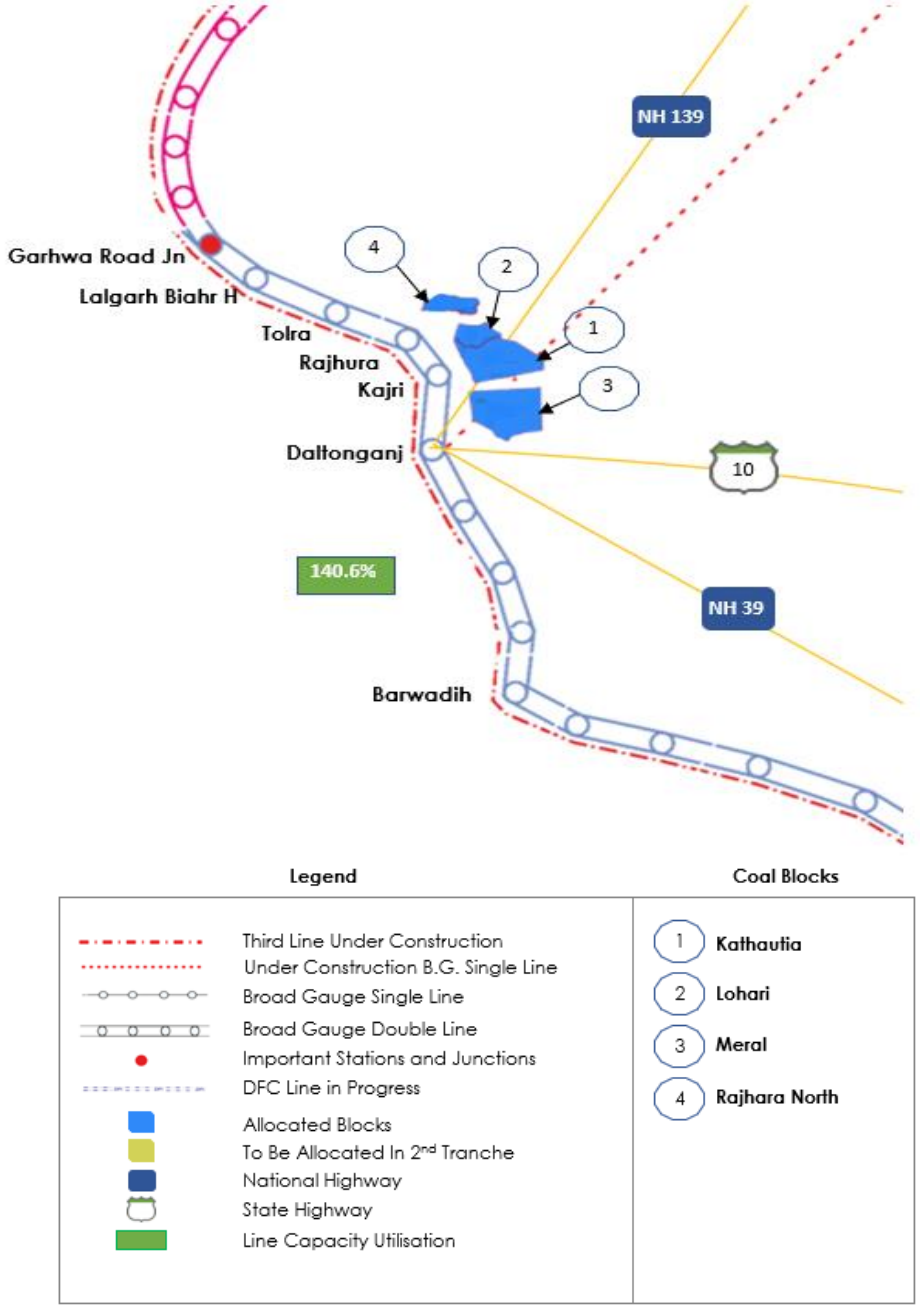
Source: Ministry of Railways

Coastal Movement

Coastal shipping and waterways will be unfeasible for coal evacuation from this coalfield, which is located approximately 600 kilometres from the nearest port at Haldia.

The nearest inland waterway (River Damodar) is around 50 kilometres away, and the Inland Waterways Authority of India (IWAI) has no plans to develop inland water transportation facilities in this region at present.

Figure 11 Daltonganj coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Kathautia coal block

The Kathautia Coal block, which is currently operational, is owned by Hindalco Industries Ltd. The neighbouring coal block is Kohari Coal Block. The end-use plant for this coal block is Mahan Power Plant and Refinery, located at Singrauli.

Coal is currently transported via the Rajhara railway siding. A 3-kilometre-long conveyor belt will be added to the Kajri Railway Rapid Loading System in the future. NH 39 runs close to the coal block, which is approximately 4 kilometres away. Coal is transported by rail to the Mahan Power Plant and Refinery in Madhya Pradesh. Daltonganj-Garhwa Road railway line is used to transport coal towards Madhya Pradesh. There is a railway siding at the Mahan Power Plant.

Details			
Name of the Owner	Hindalco Industries Ltd.	**PRC (MTPA)**	0.8
Status of the Mine	Operational	**Coalfield**	Daltonganj
Infrastructure Available			
Nearest Railway Station	Kajri	**Approximate Distance from Railway Station (in Km)**	7
Nearest Road	NH-39	**Approximate Distance from Road (in Km)**	4
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	602

End-user Plant Details	
Plant-1	Mahan Power Plant and Refinery
Location	Madhya Pradesh
Lead Distance from Mine (in km)	242
Connectivity infrastructure for the coal block	
First-mile Connectivity	A 3-kilometre conveyor belt has been proposed to Kajri railway station.
Trunk infrastructure:	The railway line between Daltonganj and Garhwa Road can be utilised.
Last Mile Connectivity	Railway siding is available at end-use plant

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

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Source: Primary Research, Ministry of Coal, Coal block Allocatee

Meral coal block

The Meral Coal block, which is currently non-operational, is owned by Trimula Industries Ltd. It is currently in the development stage. The coal from this mine is to be transported to a Sponge Iron Plant in Singrauli, Madhya Pradesh.

Initially, the evacuation will take place on the road. According to the allocatee, the viability of rail siding will be investigated during mine operation via the nearest railhead at Kajri, which is roughly 3 kilometres away from the coal block. NH-39 runs through the western part of the coalfield. A Rail link from Garhwa Road can be used to transport coal towards Madhya Pradesh.

Details			
Name of the Owner	Trimula Industries Limited	**PRC (MTPA)**	0.44
Status of the Mine	Non-Operational	**Coalfield**	Daltonganj
Infrastructure Available			
Nearest Railway Station	Kajri	**Approximate Distance from Railway Station (in Km)**	3
Nearest Road	NH-39	**Approximate Distance from Road (in Km)**	0
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	650
End-user Plant Details			
Plant-1	Trimula Industries Limited (Sponge Iron Plant)		
Location	Singrauli, Madhya Pradesh		
Lead Distance from Mine (in km)	200		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Initially, road is planned to be used for the evacuation. Feasibility of siding at Kajri is being examined.		
Trunk infrastructure:	Daltonganj-Garhwa Road railway line can be used to transport coal.		
Last Mile Connectivity	Plant will receive coal via road from railway station.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

Coal production (MT)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Rajhara North (Central and Eastern) coal block

The Rajhaura North (Central & Eastern) Block, which is currently non-operational, is owned by Fairmine Carbons Pvt. Ltd. The neighbouring blocks are North Lohari Block, Lahori block, and Rajhar Colliery Block.

The Rajhaura rail siding, a public siding that departs from Rajhaura railway station, provides the first-mile connectivity for coal evacuation.

The coal will be transported by road from the mine to the nearest railhead head at Rajhaura, which is 1 km away. The coal has been designated for commercial use. As a result, any end-use facility can use coal from this block. Coal would be moved to Singrauli, Ranchi, and Gamharia in the Chakradharpur division, according to existing plans. End-user plants in Jharkhand's Renukut, Gamharia, and Ramgarh, as well as Uttar Pradesh's Renukut and Kashi, will use the coal. The rakes are delivered to the destination plants through railway sidings. Consumers living near the mine can purchase small quantities of coal via E-auction and have it delivered by road. NH 39 runs through the eastern part of the coalfield.

Details			
Name of the Owner	Fairmine Carbons Pvt Ltd	**PRC (MTPA)**	
Status of the Mine	Non-Operational	**Coalfield**	Daltonganj
Infrastructure Available			
Nearest Railway Station	Rajhaura	**Approximate Distance from Railway Station (in Km)**	1
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	0
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	590 and 580
Connectivity infrastructure for the coal block			
First-mile Connectivity	The road will be used from mine to Rajhaura siding.		
Trunk infrastructure:	The railway line between Daltonganj and Garhwa Road can be used.		
Last Mile Connectivity	The potential customer's infrastructure facility would determine the last mile connectivity.		
Coal production up to FY 2030			

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Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

Production from CIL mines in the Daltonganj coalfield was 0.1 MT in 2021-22 and is scheduled to increase to 0.25 MT and 0.17 MT in FY 24 and FY 30, respectively. The Rajhara siding is used to transport coal from the Rajhara Colliery to the rail. The railway line between Barkakana and Daltonganj-Garhwa is utilised to transfer coal to end-use plants.

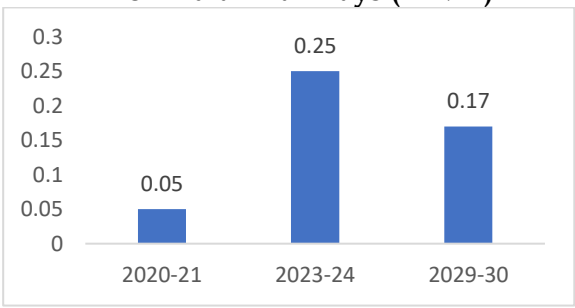
Table 25 Mines in Daltonganj Coalfield

S No.	Name of Mines	Status	Reserves (in MT)
1	North Lohari	Explored	3.6
2	Rajhara Colliery	Explored	22.7

Source: CMPDIL, Ministry of Coal

The projected load on Indian Railways on this coalfield is shown in the figure below.

Figure 12 Coal Evacuation Load Projected for Indian Railways (in MT)



Source: CMPDIL, Ministry of Coal

Analysis and Recommendations

The Daltonganj is well connected through the road as well as the railway network. Kathautia coal block is currently using Rajhara railway siding and has proposed a conveyor belt Kajri Railway Rapid Loading System. Meral coal block is under development and will use road initially; feasibility of rail siding will be examined. Rajhara North (Central & Eastern) is a commercial block and will use road and rail as per the distance of end plants for coal evacuation.

For CIL mines majority of coal is transported using rail mode as per the PPA signed with them. For auctioned coal majority of coal is evacuated using the road mode. Since NH 39 runs through the eastern part of the coalfield, it provides connectivity to all areas.

Rajmahal Coalfield

Location

Rajmahal Coalfield is a collection of independent coalfields, the southernmost being Brahmani, followed by Mahuagarhi, Pachwara, Chuperbhita, and Hura (including Pirpainti Barahat) towards the north.

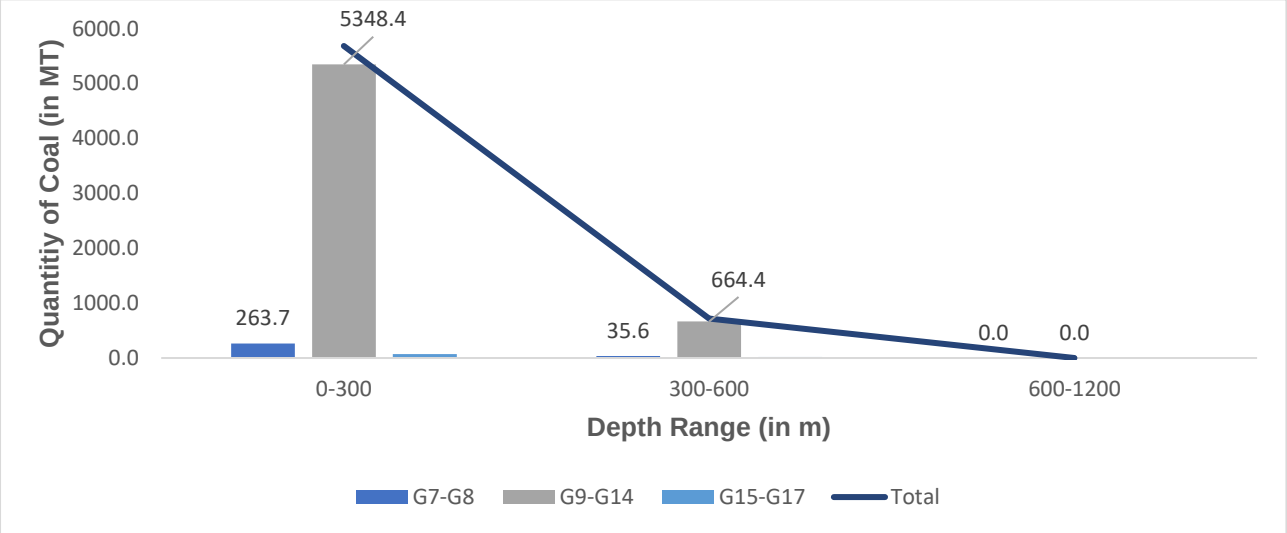
Area: 1878 sq. km.
Latitude: 25°2′35″N
Longitude: 87°20′39″E
Location: Godda

The Rajmahal Coalfield is connected to the north by Bhagalpur and to the south by Dumka. Rampurhat, Pakur, and Murarai are the closest railheads to the coalfield. The Ganga River runs through the Rajmahal coalfield's northern and eastern borders. Farakka and Sahibganj on the NW-1, as well as the important seaports of Haldia and Kolkata on India's east coast, are the closest terminals to the coalfield.

Geological Reserve

The Rajmahal coalfield has 21,218 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 6462 million tonnes are "Proved". A study of the grade and depth of coal resources in the coalfield is depicted in the graph below.

Figure 13 Grade wise Geological Resources of Coal at Rajmahal Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Rajmahal opencast project is one of the largest projects in Rajmahal coalfield. In addition to this, CIL has a few more new mines, which will be contributing significantly in the near future. Details of the same have been provided in the evacuation section of this part of the report below. 5 coal blocks have been allocated to different players in the coalfield, and one block, namely Dhulia North is yet to be allocated.

Table 26 List of Non-CIL Coal Blocks in Rajmahal Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Pachwara Central	Punjab State Power Corp Ltd	5.6
2	Pachwara North	West Bengal Power Development Corporation Limited (WBPDCL)	5
3	Urma Paharitola	Aurobindo Reality and Infrastructure Private Limited	15
4	Saharpur Jamarpani	UP Rajya Vidyut Utpadan Nigam Ltd	1
5	Pachwara South	Neyveli Uttar Pradesh Power Limited	9
6	Jitpur*	Adani Power Ltd	2.5

*Deallocated

Source: CMPDIL, Ministry of Coal

Table 27 Coal blocks to be allocated in Rajmahal Coalfield

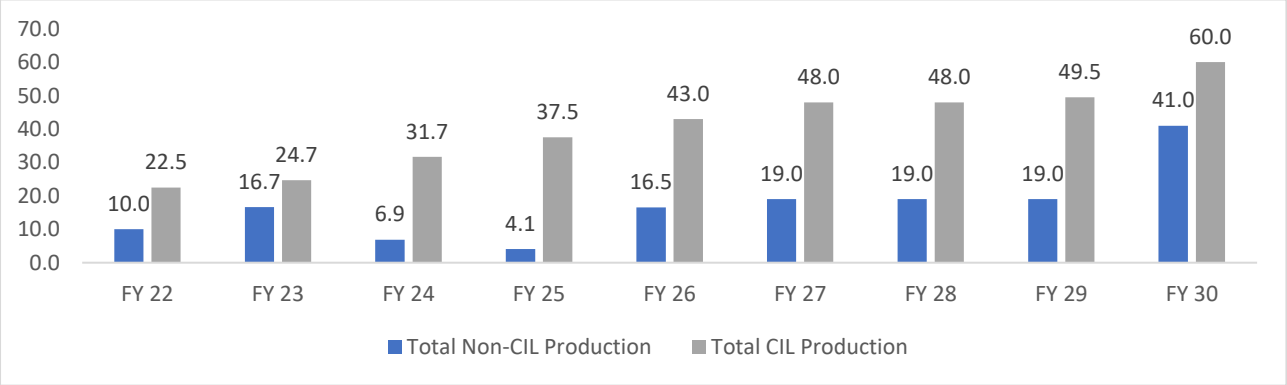
S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Dhulia North	Explored	1181.25	14

Source: CMPDIL, Ministry of Coal

Production

Rajmahal coalfield is expected to produce 101 MT of coal in FY 30. The graph below shows the year-on-year production of the coalfield.

Figure 14 Coal Production Potential in Rajmahal Coalfield by FY30 (in MT)



Source: Coal India Limited, Coal Block Allocatee

Infrastructure

Road

NH 114A and State Highway 7 of Jharkhand links the coalfields to the important railway sidings and stations.

Table 28 Important Roads in the vicinity of Rajmahal coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 33	National Highway	It connects Arwal with Farakka. It is a vital highway that connects Bihar and West Bengal.
2	National Highway 114A	National Highway	It is a spur road from National Highway 14. NH-114A runs through West Bengal and Jharkhand.
3	State Highway 17	State Highway	Bhagalpur-Hansdiha - Dumka - Rampurhat

4	State Highway 18	State Highway	Dumka - Sahebganj
5	State Highway 19 (Bihar)	State Highway	Bhagalpur-Gajar

Source: Primary and Secondary research

Railways

Eastern Railways administers the important railway lines which surround the coalfield. Dumka, Rampurhat, and Pakur are the most significant stations for the coalfield.

Table 29 Existing Railways lines in the vicinity of Rajmahal Coalfield

S no.	Railway Zone	Section
1	Eastern Railway	New Farakka – Malda Town
2	Eastern Railway	Nalhati Jn. - Azimganj Jn Cabin
3	Eastern Railway	New Farakka - Baharwa Jn.
4	Eastern Railway	Bhagalpur Jn - Sahibganj
5	Eastern Railway	Sahibganj - Baharwa Jn.
6	Eastern Railway	Baharwa Jn. - New Farakka
7	Eastern Railway	Dumka - Rampurhat
	Eastern Railway	Bhagalpur Jn - Dumka

Source: Ministry of Railways

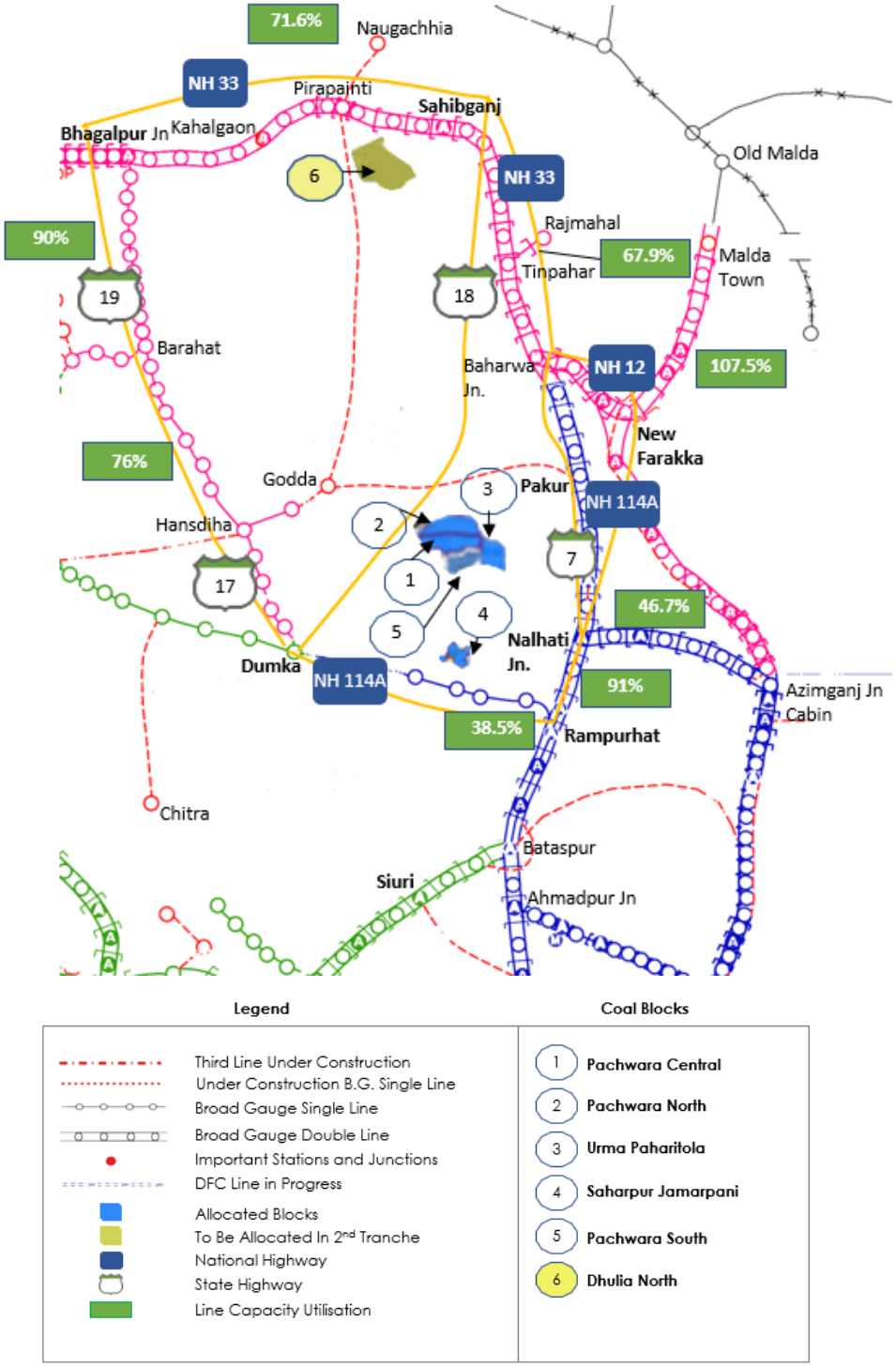
Coastal Movement

The coal blocks discussed in greater detail in this section are consumed internally in West Bengal or are transported to Uttar Pradesh and Punjab through road or rail. This reduces the dependence on shipping freight to offer connection in lieu of roads and trains.

Inland Waterway

NW-1 is the waterway that is nearest to the Raniganj coalfield. On average, the Katwa terminal is 168 kilometres from the coal blocks. The Ganga-Bhagirathi-Hooghly River system is also referred to as NW-1. It runs from Prayagraj in Uttar Pradesh to Haldia in West Bengal, passing via Bihar's Patna and Bhagalpur. Due to the significant distance required to reach the terminals, the inland waterway route is economically unviable, as it adds to the cost of loading and unloading.

Figure 15 Rajmahal coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Pachwara Central Coal Block

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The Pachwara Central Coal block is owned by Punjab State Power Corp Ltd. It is presently non-operational due to pending litigation in the Supreme Court. This block shares its boundaries with Pachwara North block, Pachwara South Block and Urma Paharitola Block. The end-use plants are Guru Gobind Singh Super Thermal Plant, Village: Ghanauli, Distt, Ropar, Punjab and Guru Hargobind Singh Thermal Plant, Village Lehra Mohabbat, Distt. Bathinda, Punjab.

The nearest railhead is Pakur which is located around 55 kilometres away. Local roads such as the Amrapara-Alubera Road and the Durgapur-Silingi Forest Road pass near the block. Other coal blocks, such as Pachwara Central and Pachwara South, require rail siding from Pakur as well and are next to one another. These coal blocks have formed an SPV with equity participation, and this pooling will assist them in lowering their separate logistics costs.

Details			
Name of the Owner	Punjab State Power Corp Ltd.	**PRC (MTPA)**	7
Status of the Mine	Non-Operational	**Coalfield**	Rajmahal
Infrastructure Available			
Nearest Railway Station	Pakur	**Approximate Distance from Railway Station (in Km)**	55
Nearest Road	Amrapara-Alubera road	**Approximate Distance from Road (in Km)**	1
Nearest Port	Sahebganj	**Approximate Distance from Port (in Km)**	120
End-user Plant Details			
Plant 1	Guru Gobind Singh Super Thermal Plant	**Plant 2**	Guru Hargobind Singh Thermal Plant
Location	Ropar, Punjab	**Location**	Bathinda, Punjab
Lead Distance from Mine (in km)	1701	**Lead Distance from Mine (in km)**	1672
Connectivity infrastructure for the coal block			
First-mile Connectivity	This block and neighbouring blocks are using shared infrastructure at Pakur to evacuate coal.		
Trunk infrastructure:	Pakur-Baharwa Jn. line can be used to transport coal to end-use plants		
Last-mile connectivity	The plants have their own railway siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									7

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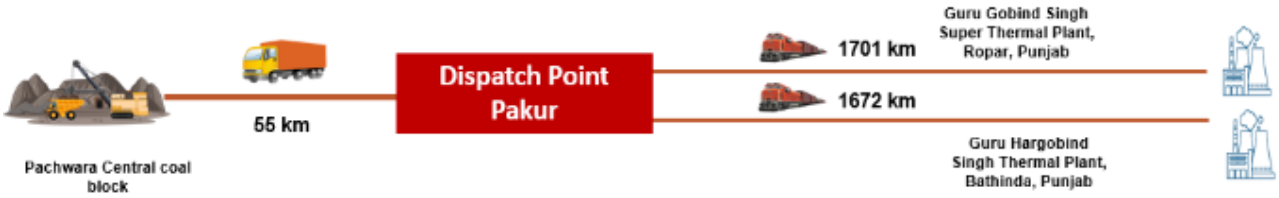


Source: Primary Research, Ministry of Coal, Coal block Allocatee

Pachwara North Coal Block

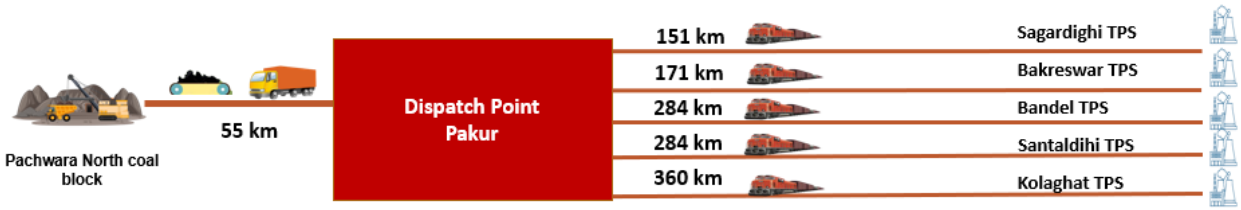
The Pachwara North Coal block, which is an operational coal block, is owned by West Bengal Power Development Corporation Limited (WBPDCL). This block shares its boundaries with Pachwara Central Block. The coal block is located in Jharkhand, and end-use plants are situated in West Bengal.

The nearest rail station for this coal block is Pakur, which is around 55 kilometres away. The coal is currently being transported by road. RITES Ltd. has prepared the DPR for the development of a rail siding for this coal block. The other coal blocks, Pachwara Central and Pachwara South, which also require rail siding from Pakur and is near to each other, have formed an SPV with equity participation, as described in the previous section. Land acquisition is a major stumbling block in the construction of the railway siding. The rail siding, the conveyor belt, the CHP, and the silo will be built after the land acquisition process is completed.

Details			
Name of the Owner	West Bengal Power Development Corporation Limited (WBPDCL)	**PRC (MTPA)**	15
Status of the Mine	Operational	**Coalfield**	Rajmahal
Infrastructure Available			
Nearest Railway Station	Pakur	**Approximate Distance from Railway Station (in Km)**	55
Nearest Road	SH 18	**Approximate Distance from Road (in Km)**	15
Nearest Port	Sahebganj	**Approximate Distance from Port (in Km)**	115
End-user Plant Details			
Plant 1	Sagardighi Thermal Power Station	**Plant 2**	Bakreshwar Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	151	**Lead Distance from Mine (in km)**	171
Plant 3	Bandel Thermal Power Station	**Plant 4**	Santaldih Thermal Power Station
Location	West Bengal	**Location**	West Bengal

Lead Distance from Mine (in km)	284	**Lead Distance from Mine (in km)**	284
Plant 5	Kolaghat Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	360		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Roads are currently used to evacuate coal to the railway station. Construction of a conveyor belt, CHP and silo is proposed.		
Trunk infrastructure:	Pakur-Nalhati Jn. line can be used to transport coal to end-use plants		
Last-mile connectivity	The plants have their own railway siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	10	15	4.9	0	0	0	0	0	0



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Saharpur Jamarpani Coal Block

The Saharpur Jamarpani Coal block, which is currently non-operational, is owned by UP Rajya Vidyut Utpadan Nigam Ltd. This block shares its boundaries with Pokharia-Paharpur Block, Brahmini (including Chichro Patsimal) Block and Haripur-Chaparia Block.

The nearest railway station for this coal block is Rampurhat, which is around 55 kilometres away. The end-use plants are located in Harduaganj extension in Aligarh district, OBRA C Thermal Power Plant, Sonebhadra district, Jawharpur Etah district, ETAH, Panki in Uttar Pradesh. The Dumka-Rampurhat line can be used to transport coal via railways. The geological report of this project is being prepared by CMPDI after which the mining plan will be prepared.

Details			
Name of the Owner	UP Rajya Vidyut Utpadan Nigam Ltd	**PRC (MTPA)**	15
Status of the Mine	Non-Operational	**Coalfield**	Rajmahal
Infrastructure Available			
Nearest Railway Station	Rampurhat	**Approximate Distance from Railway Station (in Km)**	55

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Nearest Road	NH 114 A	**Approximate Distance from Road (in Km)**	0
Nearest Port	Farakka	**Approximate Distance from Port (in Km)**	102
End-user Plant Details			
Plant 1	Harduaganj Extension -II TPS	**Plant 2**	OBRA C Thermal Power Plant
Location	Aligarh, Uttar Pradesh	**Location**	Sonebhadra, Uttar Pradesh
Lead Distance from Mine (in km)	1150	**Lead Distance from Mine (in km)**	500
Plant 3	Jawharpur TPS		
Location	Etah, Uttar Pradesh		
Lead Distance from Mine (in km)	1050		
Connectivity infrastructure for the coal block			
First-mile Connectivity	NH -114A can be used to deliver coal to the railway station.		
Trunk infrastructure:	The railway line between Dumka and Rampurhat can be used to transport coal.		
Last-mile connectivity	Railway siding is available at plants.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Urma Paharitola Coal Block

The Urma Paharitola Block, which is currently non-operational, is owned by Aurobindo Reality and Infrastructure Private Limited. The neighbouring blocks are Pachwara Central Block and Pachwara South Block.

Since the coal from this coal block has been designated for commercial use, it can be used by any end-use plant. Coal can be transported to nearby plants using roads since NH 114A passes very close to the coalfield. Muraraj, some 37 kilometres away, is the nearest railway station. The Murarai-Rampurhat railway line can be utilised to transport coal. For transportation over longer distances, the

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owner will have sharing arrangement with the rail siding being developed jointly by Pachwara North, Pachwara South and Pachwara Central.

Details			
Name of the Owner	Aurobindo Reality and Infrastructure Private Limited	**PRC (MTPA)**	10
Status of the Mine	Non-Operational	**Coalfield**	Rajmahal
Infrastructure Available			
Nearest Railway Station	Murarai	**Approximate Distance from Railway Station (in Km)**	37
Nearest Road	NH 114A	**Approximate Distance from Road (in Km)**	46
Nearest Port	Farakka	**Approximate Distance from Port (in Km)**	102
Connectivity infrastructure for the coal block			
First-mile Connectivity	NH 114A can be used to evacuate coal on roads to plants or railway stations.		
Trunk infrastructure:	Coal can be transported both on road and rail.		
Last Mile Connectivity	Last-mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)					10	10	10	10	10

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Pachwara South Coal Block

Neyveli Uttar Pradesh Power Limited has been assigned Pachwara South. Ghatampur Thermal Power Project is the coal block's end-use plant.

The railway siding that originates from Pakur station is almost 55 kilometres long. Other coal blocks, such as Pachwara Central and Pachwara North, require rail siding from Pakur as well and are next to one another. A siding will be built from Pakur by the joint SPV. The railway line between Sahibganj and Nalhati Jn. can be used to transport coal to end-use plants. The block is about 10 kilometres east of SH 18. A conveyor belt system has been proposed to transport coal from block to siding.

Details

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Name of the Owner	Neyveli Uttar Pradesh Power Limited	**PRC (MTPA)**	9
Status of the Mine	Non-Operational	**Coalfield**	Rajmahal
Infrastructure Available			
Nearest Railway Station	Pakur	**Approximate Distance from Railway Station (in Km)**	54
Nearest Road	SH 18	**Approximate Distance from Road (in Km)**	10
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	385
End-user Plant Details			
Plant-1	Ghatampur Thermal Power Project		
Location	Kanpur, Uttar Pradesh		
Lead Distance from Mine (in km)	978		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Conveyor up till railway siding		
Trunk infrastructure:	Sahibganj-Nalhati Jn. line can be used to transport coal to end-use plant		
Last Mile Connectivity	Railway siding is available at the plant		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	1.68	2	4.11	6.5	9	9	9	9

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from Rajmahal coalfield was 22.5 MT which is expected to reach 31.65 MT and 60 MT in FY 24 and FY 30, respectively. Coal India Limited has developed and finalised a plan to produce 1 billion tonnes of coal by 2023-24. The mines which are linked to existing and will be linked to proposed infrastructure are listed below.

Table 30 Mines in Rajmahal Coalfield

S No.	Name of Projects/ Mines	Status	Expected Production in FY 24 (in MT)
1	Rajmahal OCP	Completed	21.000
2	Hura-C OCP	Ongoing	3.00
3	Chuperbhita	Future	1.50
4	Simlong	Future	1.50

5	Kayada-Chaudhar Gariapani	Future	1.75
6	Madanpur	Future	2.00
7	Ghusick	Future	0.00
8	Lalmatia dip (Rajmahal Expansion Ph-III)	New Block	2.00
9	Brahmani / Chicropastimal*	New Block	
10	Amrakonda Murgadangal	New Block	0.900
11	Gopinathpur	Non-Operational	0.36

Source: Ministry of Coal, CIL

Rajmahal OCP is the largest contributor of coal production in the area and is expected to produce 21 MT in FY 24. The mine is connected to Rajmahal Wharf Wall Siding. From 2023 to 2024, coal will be evacuated via MGR. Details of first-mile evacuation infrastructure currently connected to mines are shown in the table below.

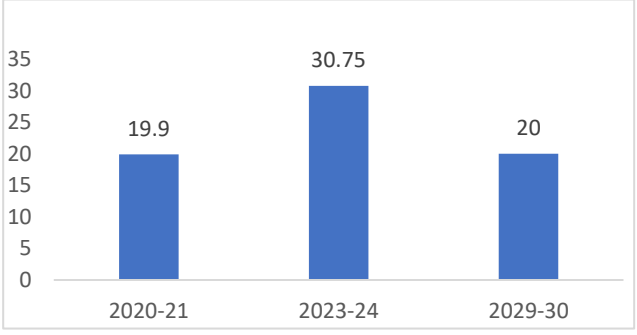
Table 31 First-mile Infrastrucure in Rajmahal Coalfield

S No.	Name of Mine	First-mile Infrastructure	Connectivity	Date of Commissioning
1	Rajmahal OCP	MGR / RJ Wharfwall / Pirpainti		Coal evacuation shall be through MGR from 2023-24
2	Hura-C OCP			
3	Chuperbhita			
4	Simlong			
5	Lalmatia dip (Rajmahal Expansion Ph-III)			
6	Kayada-Chaudhar Gariapani	New Siding		No timeline available for the New Rly. siding
7	Brahmani / Chicropastima			
8	Amrakonda Murgadangal			

Source: Ministry of Coal, CIL

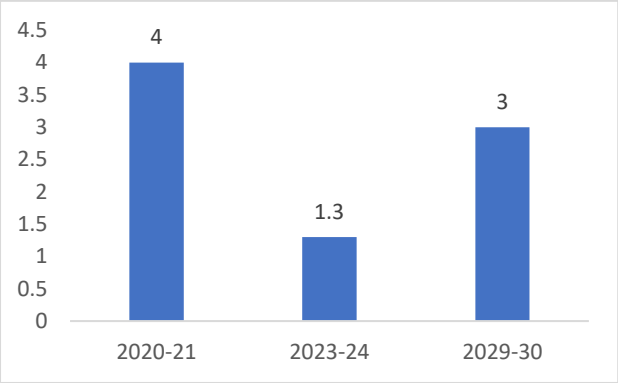
The figure below illustrates the existing and future load on Indian Railways. Load on Indian railways is projected to decrease by 34 % from FY 24 to FY30. Hence significant capacity will be available in future. The following chart illustrates the estimated number of rakes that would be required.

Figure 16 Coal Evacuation Load Projected for Indian Railways (in MT)



Source: CMPDIL, Ministry of Coal

Figure 17 Projected Rake Requirements in Rajmahal Coalfield (in Nos.)



Source: CMPDIL, Ministry of Coal

The following railway line provides connectivity to the CIL mines in the Rajmahal area. A line from Hansdih to Godda has been proposed and is projected to transport coal from 2023 onwards.

Table 32 Existing Rail Links for CIL mines in Rajmahal coalfield

S No.	Railway Zone	Section
1	Eastern Railway	NTPC MGR/ Pirpainti-Kahalgaon Section.

Source: Ministry of Railways

Given the fact that the Rajmahal Coalfield contains several blocks with significant mining potential, numerous railway projects are currently being developed or proposed for the purpose of evacuation coal.

These projects would significantly increase capacity and improve the efficiency of coal transportation. For instance, if the proposed Pirpainti to Jasidih railway line is built, the amount of coal transported by road will be significantly decreased by the construction of a single railway siding adjacent to the proposed railway line. Simlong and Chuperbhita are potential prospective mines that could benefit from the Godda-Pakur railway. The proposed Amrapara-Litipara line will facilitate coal evacuation from all blocks, including Simlong OC and Chuperbhita OC, through Godda or Pakur.

The railway line now connecting Dumka and Rampurhat passes through the Brahmani Central Coal Block's high-potential zone. Therefore, the block's coal reserves will be significantly depleted. As a result, it was proposed that this railway line be redirected through the less promising Brahmani South coal block, located south of NH-133. This rerouted railway line will assist in coal evacuation from the Brahmani – Chichro Patsimal, Amrakonda – Murgadangal, Salaipahar, and Haripur – Chaparia coal blocks. A central silo system connected to the various blocks should be established to provide efficient coal evacuation from the Brahmani and neighbouring blocks.

Table 33 Important Railway Projects Planned in Rajmahal Coalfield

S No.	Project Name	Length (in km)
1	Godda to Pakur line	
2	Amrapara to proposed Litipara station on Godda to Pakur link line (20 Km)	20
4	Dumka and Rampurhat route diversion	-
5	Pirpainti to Jasidih	-
6	Sikaripara/ Ambajora to Amrapara via Gopikandar	40
7	Rampurhat to Murarai Third Line	

Source: Primary Research, Ministry of Railways

The First-mile Connectivity initiative by the Ministry of Coal is aimed to mechanize the coal loading and transport arrangement up to railway lines for projects having a capacity of 4 MTY or higher. CIL's subsidiary operating in the coalfield, CCL, have planned projects for the Rajmahal coalfield, of which some are currently being developed. A CHP and SILO are planned for the Rajmahal OCP, which help in crushing and loading and optimise the first-mile evacuation process.

The FMC Phase II projects are the follow-up to the earlier FMC Phase I. Hura-C is the second largest mine producer in the coalfield, hence an MGR is planned to be constructed, thereby

NTPC Additional projects to automate coal loading and transportation have been identified for CIL's planned mines.

Analysis and Recommendations

The Pachwara South, Pachwara Central and Pachwara North have joined hands and formed an SPV with equity participation. This kind of sharing of assets has helped them in reducing logistics costs. Sahapur Jamarpani will tentatively start its production by FY 2025 and use a **railway line passing over the block.** Urma Paharitola is a commercial mine that will use the road for nearby distances, and rail siding developed Pachwara blocks for longer distances.

For CIL mines, an already significant evacuation plan has been drawn and accordingly, CHP, Silos and MGR are planned. The coal to a far location will be evacuated using a railway network that is already existing in the coalfield, and as per network utilisation, it has the potential to take up new load. Refer map of Rajmahal coalfield provided above to understand network utilisation and connectivity with various mines. For coal consumers in nearby areas, road plays a significant role, which requires further strengthening in the area.

The tripling of the feeder route of Rampur Hat Nalhati is in progress, and Khana Sainthia, Sainthia Rampur Hat and Nalhati Gumani are recommended.

In light of anticipated traffic and congestion, two new projects, the Khana Sainthia 3rd line and the Nalhati Gumani 3rd line, have been proposed in the area to ensure effective evacuation.

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Ramgarh Coalfield

Location

Ramgarh Coalfield lies in the Damodar Valley and is spread in 74 square kilometres. The coalfield's eastern side is adjacent to the Ramgarh Cantonment. The Damodar River runs through the coalfield's eastern and western portions.

Area: 74 sq. km.
Latitude: 23°35′53″N
Longitude: 85°40′34″E
Location: Ramgarh

Geological Reserve

The Ramgarh coalfield has 1906 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 936.6 million tonnes are "Proved."

Coal Blocks

The coalfield has Sugia closed mine, which has already been allocated, and two mines are identified for allocation during 2nd trench of commercial coal mining. Ramgarh OCP project of CIL is another important project in the coalfield.

Table 34 List of Non-CIL Coal Blocks in Ramgarh Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Sugia Closed Mine	Jharkhand State Mineral Development Corporation Ltd.	0.4

Source: CMPDIL, Ministry of Coal

Table 35 Coal blocks to be allocated in Ramgarh Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Burkhap Small Patch	Explored	9.68	0.4
2	Rauta Closed Mine	Partially Explored	7	0.17*

* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

Production

It is projected that the Sugia Closed mine block will reach its peak PRC of 0.4 MTPA by FY30. It is the sole non-CIL block that will contribute to Ramgarh coalfield in the near future.

Infrastructure

Road

Ramgarh is connected to Ranchi and Hazaribagh via NH-20. Ramgarh is the closest settlement, located approximately 20 kilometres from Rajrappa OCP. State Highway 2 connecting Ramgarh cantonment- Ratu Aryapuri Road also plays a significant role. A kuccha road on the Ramgarh-Petarbar route near Chattar Village leads up to the Damodar River.

Railways

The Ranchi Road railway station, Ramgarh Cantt Station, Kuja Station and Barkipona Station are the nearest railheads to this coalfield. NRP has recommended the doubling of the Barkakana Muri section. IR has already

sanctioned 3rd line between the Barkakana-Sonenagar section. The work is in progress and is being executed by RVNL.

Table 36 Existing Railways lines in the vicinity of Ramgarh Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Barkakana Jn - Chainpur
2	East Central Railway	Chainpur – Chandrapur Jn.
3	East Central Railway	Barkakana Jn - Hendegir
4	East Central Railway	Hazaribagh – Ranchi Rd

Source: Ministry of Railways

Coastal Movement and Inland Waterways

Coal evacuation from this coalfield, which is located around 406 kilometres from the nearest port at Haldia, will be unfeasible via coastal shipping and waterways.

The nearest inland waterway is around 75 kilometres distant at the Damodar River, and the Inland Waterways Authority of India (IWAI) currently has no plans to build inland water transportation facilities in this region.

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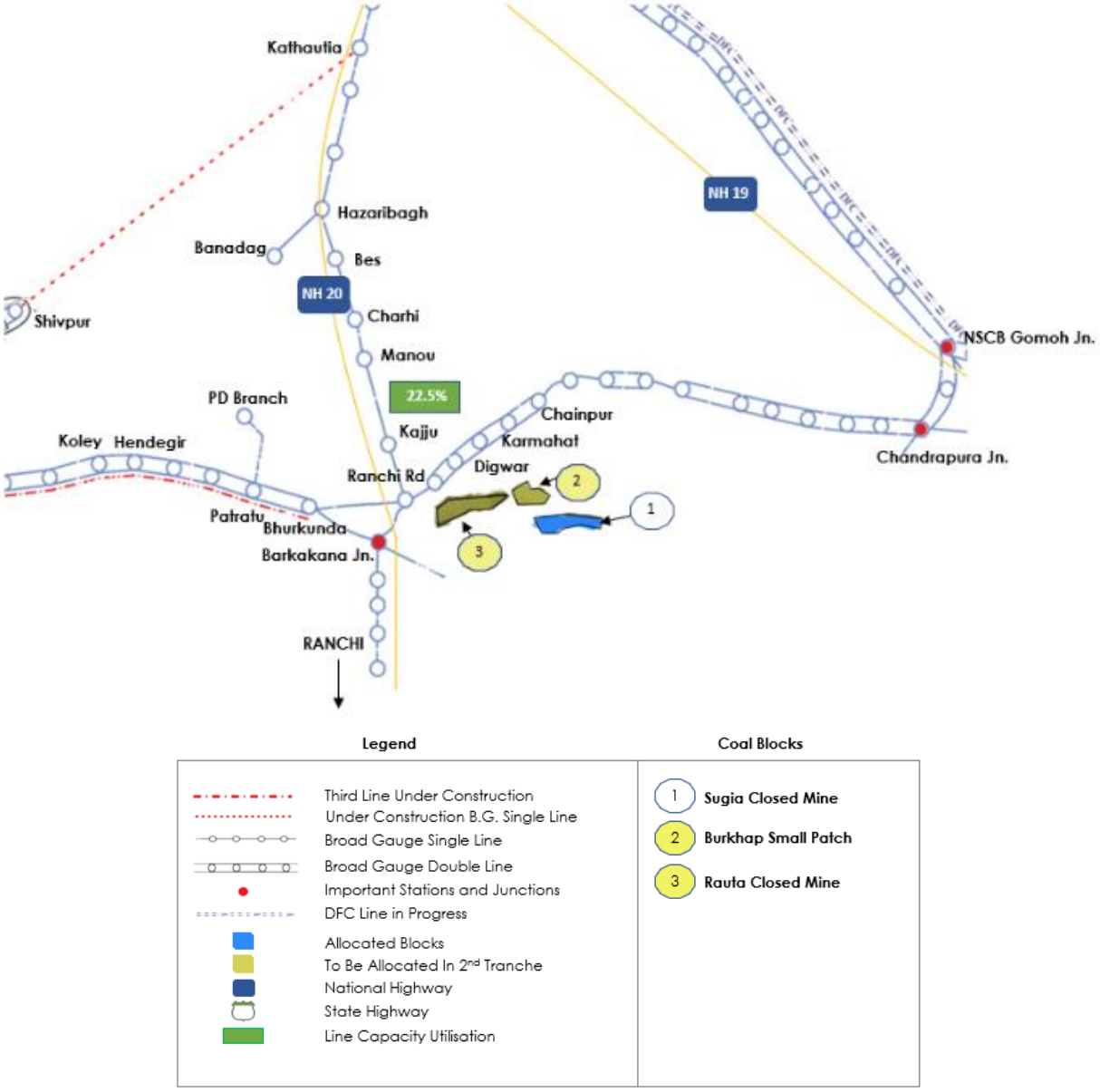
Figure 18 Ramgarh coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Sugia Closed Mine

The Sugia Closed Coal block is currently non-operational and is owned by Jharkhand State Mineral Development Corporation Ltd.

The owner has applied for forest clearance and plans to begin production in the second half of FY 22. Since it is allocated for commercial purposes, coal from the mine can be used in any end-user facility. NH 20 runs near the coal block approximately 18 kilometres away. The nearest railway station is

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Ramgarh Cantt is approximately 14 kilometres away. It gives access to Barkakana Jn.- Ranchi railway line.

Details			
Name of the Owner	Jharkhand State Mineral Development Corporation Ltd.	**PRC (MTPA)**	0.4
Status of the Mine	Non-Operational	**Coalfield**	Ramgarh
Infrastructure Available			
Nearest Railway Station	Ramgarh Cantt	**Approximate Distance from Railway Station (in Km)**	14
Nearest Road	NH 20	**Approximate Distance from Road (in Km)**	18
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	390
Connectivity infrastructure for the coal block			
First-mile Connectivity	Roads can be used for delivering coal to railway stations.		
Trunk infrastructure:	The railway line can be accessed from Ramgarh Cantt station.		
Last Mile Connectivity	Last mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.4

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production from Ramgarh OCP in the Ramgarh coalfield was 1.5 MT which is expected to reach 2 MT and 4.5 MT in FY 24 and FY 30, respectively; accordingly the load on Indian Railways projected from CIL is 4.5 till 2030. This will enhance railway rakes requirement to 4.22 from the area.

Analysis and Recommendations

The Ramgarh Coalfield is well connected through the road as well as the railway network. Sugia Closed mine is a commercial coal mine, and Ramgarh Cantt station is nearest to the coal block located on Barkakana Muri section. The coal traffic can move in either direction using this route. Also, Ramgarh OCP of CIL is well connected through the railway network.

NRP has recommended the doubling of the Barkakana Muri section. IR has already sanctioned 3rd line between the Barkakana-Sonenagar section. The

work is in progress and is being executed by RVNL.

Table 37 Details of Evacuation Capacity of different railway lines in Ramgarh Coalfield

	Year			
Railway Line	**2022**	**2023**	**2024**	**2025**
Barkakana-Chandrapura line	60	60	60	60
Barkakana-Muri Line	**12**	**12**	**12**	**12**

Source: Primus Partners Analysis

Due to the small volume of production, the existing infrastructure should be able to handle it.

South Karanpura Coalfield

Location

The South Karanpura Coalfield is located in Jharkhand's Ramgarh and Hazaribagh districts on the western side of the Damodar valley. The Karanpura coalfields are located around 60 kilometres north of Ranchi and 20 kilometres south of Hazaribagh. They are located in the Jharkhand districts of Ranchi, Hazaribagh, and Palamau.

Area: 1878 sq. km.
Latitude: 23°38′17″N
Longitude: 85°18′22″E
Location: Ramgarh, Hazaribagh

The Ashwa Pahar mountain ranges separate the area into two coalfields: North Karanpura Coalfield (NKCF) and South Karanpura Coalfield (SKCF). SKCF is accessible from both the northern and southern banks of the Damodar river via Ramgarh town on the Hazaribagh-Ranchi National Highway 20 and via Patratu by an all-weather metalled road.

Geological Reserve

The South Karanpura coalfield has 7632 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 5176 million tonnes are "Proved."

Coal Blocks

Table 38 List of Non-CIL Coal Blocks in South Karanpura Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Tokisud North	NMDC Ltd.	2.32
2	Patal East*	Jharkhand State Mineral Development Corporation Limited	-

* Allocatee has submitted a request for surrender of the block, which has been accepted.

Source: CMPDIL, Ministry of Coal

Table 39 Coal blocks to be allocated in South Karanpura Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Jainagar	Partially Explored	77.52	1.86*
2	Binja	Partially Explored	50.00	1.2*
3	Tokisud Block-II	Explored	127.69	1.5

* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

Production

The total potential production from both CIL and non-CIL blocks (analysed in the section) is 27.35 MT for FY 30.

Infrastructure

Road

NH 20 and SH 2 pass very close to the coalfield. NH 20 connects the coalfield to Hazaribagh. SH 2 provides linkage from Patratu to Ranchi.

Table 40 Important Roads in the vicinity of South Karanpura coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 20	National Highway	Highway originates from Bakhtiyarpur in Bihar and terminates at Satabhaya in Odisha
2	State Highway 2	State Highway	Ramgarh Cantt. -

			Barkakana-Ranchi

Source: Primary and Secondary research

Railways

Eastern Central Railway's Tori-Barkakana Jn. railway line runs through some portions of the coalfield. It provides rail connectivity to the coal mined from the blocks Patratu, Bhurkunda, Barkakana, and Arigada are some important railway stations.

Indian Railways, along with the Ministry of Coal is working on mainline projects to increase the capacity of railway lines. At Sonenagar, the third line from Patratu to Tori will connect to Railways' Eastern Dedicated Freight Corridor (DFC). It will serve as a backup route from Shivpur to Sonenagar through Tori – Garhwa Road in the event of delays on the Shivpur Kathautia Line.

Table 41 Existing Railways lines in the vicinity of South Karanpura Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Tori – Barkakana Jn
2	East Central Railway	Hazaribagh – Ranchi Rd
3	East Central Railway	Biratoli - Shivpur
4	East Central Railway	Kathautia - Hazaribagh
5	East Central Railway	Barkakana Jn - Jogeshwar Bihar

Source: Ministry of Railways

Table 42 Important Upcoming Trunkline Projects in South Karanpura Coalfield

S No.	Project Name	Length (in km)	Status
1	Third line from Patratu to Tori to Sonenagar in Barkakana-Barwadih-Garhwa Road section	291	This line is expected to be completed as per following schedule: 2020-21 - 72 km. 2021-22 - 141 km. 2022-23 - 78 km.

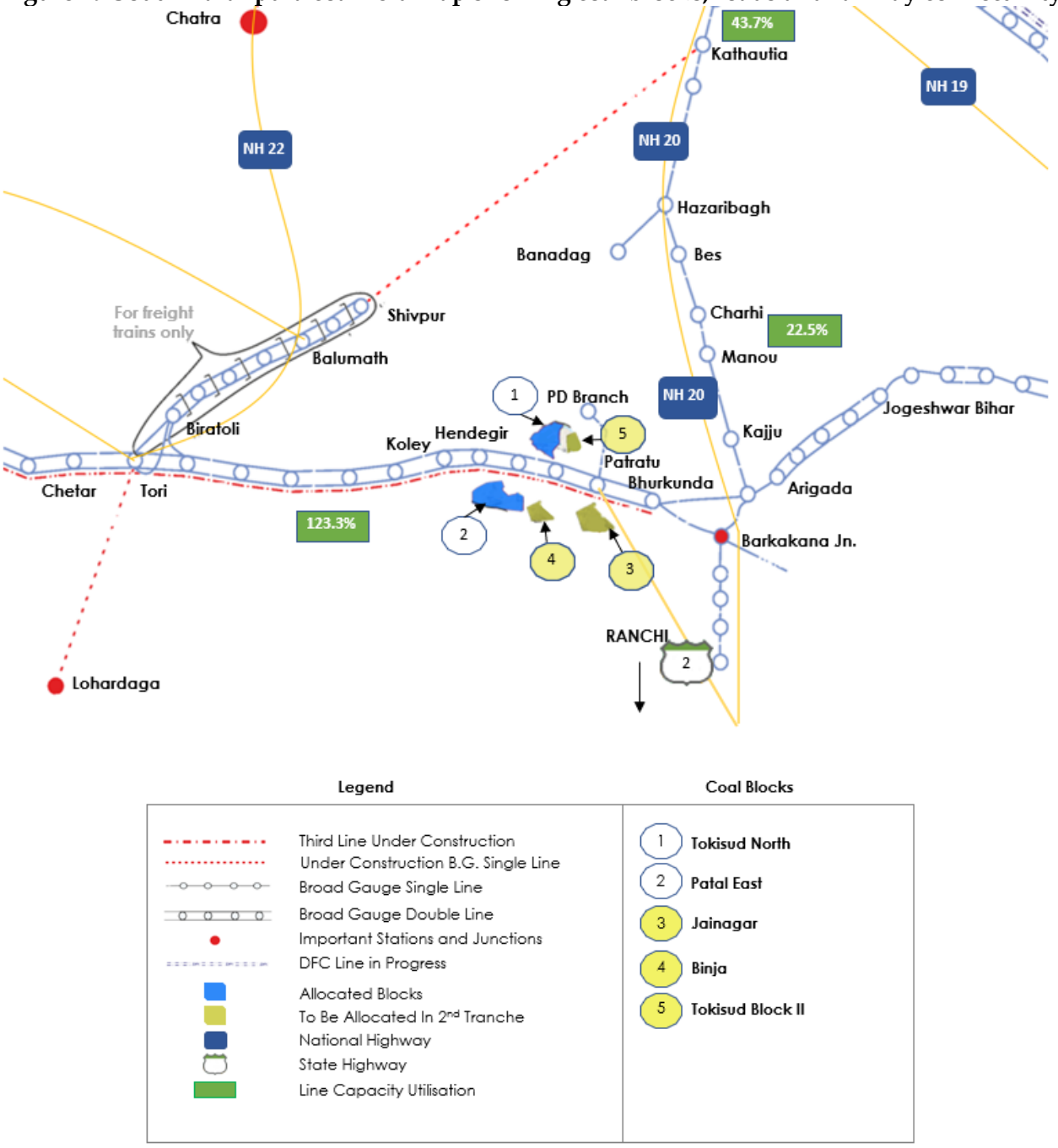
Source: Primary Research, Ministry of Railways

Coastal Movement and Inland Waterways

Coal evacuation from this coalfield, which is located around 429 kilometres from the nearest port at Haldia, will be impossible via coastal shipping and waterways.

The nearest inland waterway is around 102 kilometres distant at the river Damodar, and the Inland Waterways Authority of India (IWAI) currently has no plans to build inland water transportation facilities in this region.

Figure 19 South Karanpura coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Tokisud North coal block

NMDC Ltd owns the Tokisud North Coal block in the South Karanpura Coalfield. Mining in this block is likely to commence in the coming fiscal year since the MDO is currently being selected. This block is surrounded by Tokisud-II, Hendegir, and Patratu East blocks.

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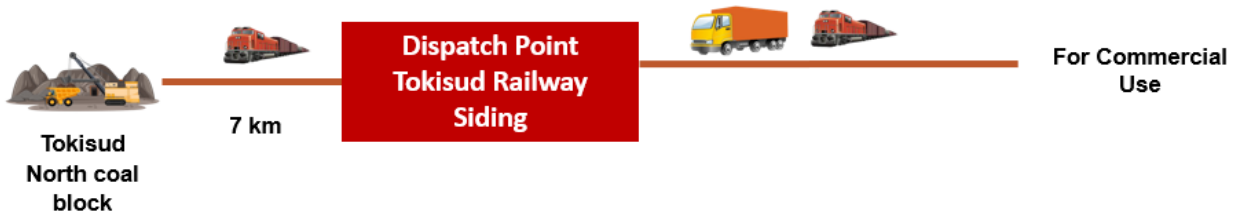
Coal from the mine is proposed to be evacuated using railways. Railways will be used to transport coal from the mine. Tokisud Railway Siding, which is still under construction, is about 2.5 kilometres away from the block, with 70 percent of the siding work finished. Around 4.5 kilometres away, a CHP has been planned. Coal will be transported locally from the pit head to the CHP and railway siding via a road distance of around 7 kilometres. Tori-Barkakana railway line can be accessed from Tokisud station. It is a commercial mine, and the suitable clients have not been identified yet. SH 2 is approximately 10 kilometres away, passing through Patratu.

Details			
Name of the Owner	NMDC Ltd.	**PRC (MTPA)**	2.32
Status of the Mine	Non-Operational	**Coalfield**	South Karanpura
Infrastructure Available			
Nearest Railway Station	Tokisud	**Approximate Distance from Railway Station (in Km)**	4.5
Nearest Road	SH 2	**Approximate Distance from Road (in Km)**	10
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	440
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal can be evacuated using roads.		
Trunk infrastructure:	Tori-Barkakana Jn. railway line can be accessed from Tokisud station.		
Last Mile Connectivity	Last-mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									2.32



Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

In FY 2021-22, CIL mines produced 7.76 MT from the South Karanpura coalfield, which is expected to increase to 10.99 MT and 25.03 MT in FY 24 and FY 30, respectively. Details of mine contributing to the production are provided below.

Table 43 Mines in South Karanpura Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Bhukuranda UG	Existing	0.09
2	Sangam OC	Completed	0.55
3	Religara OC	Completed	0.5
4	New Giddi C OC	Completed	0.4
5	Giddi An OC	Completed	0.23
6	Sirka OC	Completed	0.085
7	North Urimari OC	Ongoing	4.2
8	Urimari UG	Ongoing	
9	Hendegir OC (4.0 MTY)	Future	0.75
10	Argada OC (1.7 MTY)	Future	0.58
11	Jeevan Dhara OC (1.0 MTY)	Future	1
12	Patratu ABC UG (5 MTY)	Future	0.1
13	Sayal 'D'	Non-Operational	0.5

Source: CIL

North Urimari OC will be the major contributor to coal production with 2.3 MT. The mines evacuate coal via rail and road. The sidings linked to the mines are shown in the table below.

CIL's First-mile Connectivity initiative aims to mechanise coal loading and transport arrangements up to railway lines for projects with a capacity of 4 MTY or greater.

CIL's subsidiary operating in the coalfield, CCL, have planned projects for the South Karanpura coalfield of which some are currently being developed. The FMC phase I project at North Urimari is a coal handling plant and a SILO.

Table 44 First-mile Infrastructure in South Karanpura Coalfield

S No.	Name of Mine	First-mile Connectivity Infrastructure
1	Giddi Washery	Giddi W siding
2	Argada OC	Saunda siding, Giddi A siding
3	Giddi A OC	
4	New Giddi C OC	
5	Religara OC	
6	Sirka OC	
7	Bhukuranda UG	Saunda siding, Saunda B second line
8	Jeevan Dhara OC	
9	Urimari EPR OC	
10	Sangam OC	Saunda siding, Saunda B second line, Bhurkunda siding
11	Hendegir OC	Saunda siding, Saunda B second line, New Hendegir siding
12	North Urimari OC	Saunda siding, Saunda B second line, North Urimari siding
13	Patratu ABC UG	Saunda siding, Saunda B second line, Sayal siding (
14	Sayal D OC	Saunda siding, Saunda B second lifestyle siding

Source: Ministry of Coal, CIL

Road and rail are the modes used for evacuation. Currently rail contributes to 79% of the share of evacuation mode. Rest is done via road. Rail share sees an increase of 360% in the South Karanpura coalfield by FY 30 and hence the number of rakes required in FY 30 is projected to be 16 from the current 3.2.

The coalfield has a well-distributed railway network for evacuation. At Sonenagar, the third line from Patratu to Tori will connect to

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Railways' Eastern Dedicated Freight Corridor (DFC). It will serve as a backup route from Shivpur to Sonenagar through Tori – Garhwa Road in the event of delays on the Shivpur Kathautia Line.

Analysis and Recommendations

The South Karanpura is well connected through the road as well as the railway network. Tokisud North coal block is a commercial block and is planning to use railways for coal evacuation. Tokisud railway station is under construction. 70% of the siding work has been completed. Existing rail and road networks along with ongoing work can handle the expected coal traffic from the exiting as well as upcoming mines in the region.

Strengthening of road network along with proper maintenance plan is required in the coalfield as smaller mines use the road for evacuation.

Since the majority of evacuation is planned through the railway and rake requirement will be enhanced, coordination with the Ministry of the railway is required for availability of railways rake for efficient evacuation of coal.

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Giridih Coalfield

Location

Giridih Coalfield is one of India's oldest coalfields. It covers an area of approximately 28.29 square kilometres. The coalfield is located south of Beniadih, in the Giridih block. It is characteristic of the Karhabari formation.

Area: 28 sq. km.
Latitude: 24°9′N
Longitude: 86°18′E
Location: Giridih

Coal Blocks

Brahmadiha mine is allocated to Andhra Pradesh Mineral Development Corporation Ltd. In the coalfield. Apart from that Giridih OCP and Kabribad OC project of CIL are two mines in the coalfield.

Production

It is projected that the coalfield can have the potential to produce 0.86 MT of coal in FY 30 from both CIL and non-CIL mines

Infrastructure

Road and Railway

NH 114A connects Giridih town to Dumri and is the most important road near the coalfield. Coal is transported via rail by loading it onto East Central Railway's Giridih- Koderma railway section.

Table 45 Existing Railways lines in the vicinity of Giridih Coalfield

S no.	Railway Zone	Section
1	East Central Railway	Giridih-Koderma

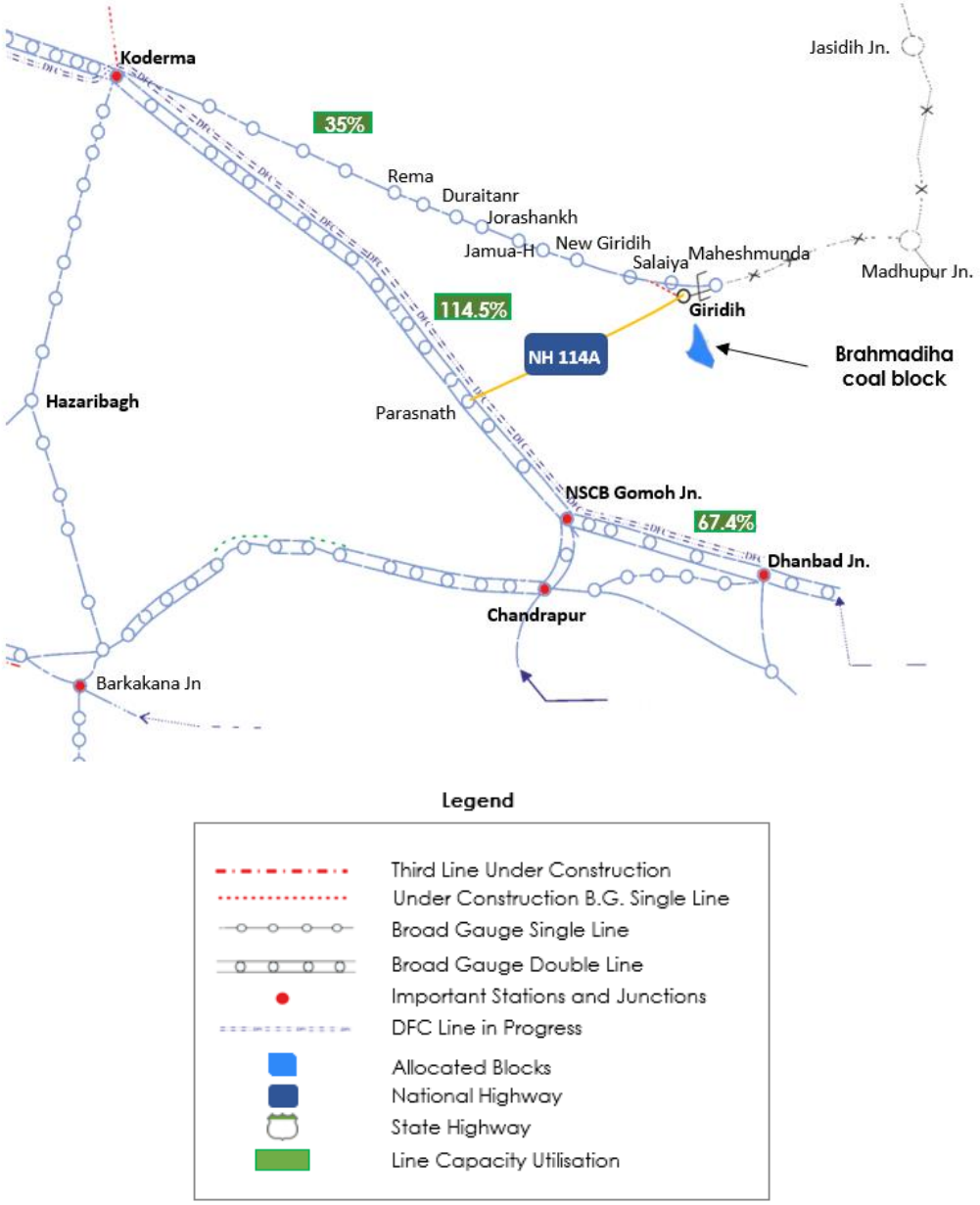
Source: Ministry of Railways

Coastal Movement

Coastal shipping and waterways will be unfeasible for coal evacuation from this coalfield, which is located approximately 320 kilometres from the nearest port at Kolkata.

The nearest inland waterway (River Damodar) is around 80 kilometres away, and the Inland Waterways Authority of India (IWAI) has no plans to develop inland water transportation facilities in this region at the moment.

Figure 20 Giridih coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Brahmadiha coal block

The Brahmadiha coal block, which is currently non-operational, is owned by Andhra Pradesh Mineral Development Corporation Ltd. The neighbouring coal block of this block is Giridh block.

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The coal has been designated for commercial use. Coal extracted from this mine will be used in any nearby end-use plant. Road transportation of coal is proposed. The nearest railway station is Giridih. The Giridih-Koderma line can be used for rail transportation. Given the small amount of coal being moved, road haulage would be preferable. NH 114A is located around a kilometre from the block and links Giridh to the Parasnath railway station.

Details			
Name of the Owner	Andhra Pradesh Mineral Development Corporation Ltd.	**PRC (MTPA)**	0.15
Status of the Mine	Non-Operational	**Coalfield**	Giridh
Infrastructure Available			
Nearest Railway Station	Giridih	**Approximate Distance from Railway Station (in Km)**	6
Nearest Road	NH 114A	**Approximate Distance from Road (in Km)**	1.2
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	320
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal will be evacuated to roads.		
Trunk infrastructure:	It is planned that roads will be used to deliver coal to nearby clients.		
Last Mile Connectivity	The last mile connectivity is contingent upon the potential customer's infrastructure availability.		

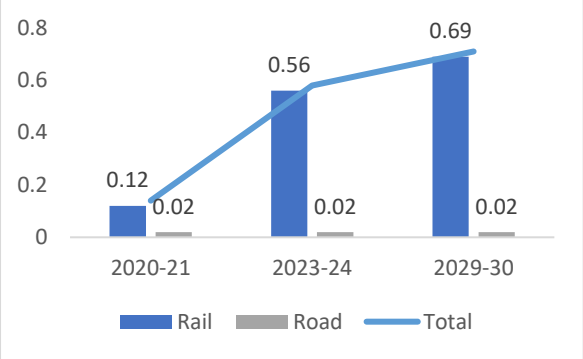
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.05	0.1	0.12	0.15	0.15	0.15	0.15	0.15	0.15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from Giridih coalfield was 0.48 MT which is expected to reach 0.58 MT and 0.71 MT in FY 24 and FY 30 respectively. The mode-wise dispatch projections are shown in the chart below.

Figure 21 Mode-Wise Dispatch Projections of Giridih Coalfield (in MT)



Source: CMPDIL, Ministry of Coal

CCL has the following mines in the Giridih coalfield area.

Table 46 Mines and Projects in Giridih Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Giridih OC	Completed	0.375
2	Kabribad OC	Non-Operational	0.2

Source: CIL

Analysis and Recommendations

Coal will be utilized by end-use plants in the vicinity, coal will be transported to nearby plants using the road. The traffic level is so low (one rake in 10 days) that in all likely hood coal will move by road. In case they require to dispatch a larger volume, then it can be moved by road to Giridih station, which is 6 km away.

A well-established evacuation plan for CIL as well as non-CIL mines in the coalfield is available.

Chhattisgarh

6. Chhattisgarh

Chhattisgarh is a mineral-rich state in India's central region with substantial coal and iron ore deposits, as well as an energy surplus due to coal output.

The state is bordered on the west by Madhya Pradesh and Maharashtra, on the north by Uttar Pradesh, on the east by Odisha and Jharkhand, and on the south by Andhra Pradesh and Telangana. The boundary between Chhattisgarh and Orissa states arbitrarily demarcates the limits of Mand Raigarh coalfield from the IB Valley coalfield.

Central Railway, headquartered in Bilaspur administers all the railway lines around the coalfield in Chhattisgarh. Jharsuguda Rd Jn. which connects the lines in Chhattisgarh to Paradip port in Odisha comes under East Coast Railways. There are multiple ongoing works to augment capacity for cargo which are described further below.

To evacuate proposed production, SECL has taken steps to load coal through Rapid Loading Systems (RLS) into the SILOs through bunker arrangements for dispatching through the rail network.

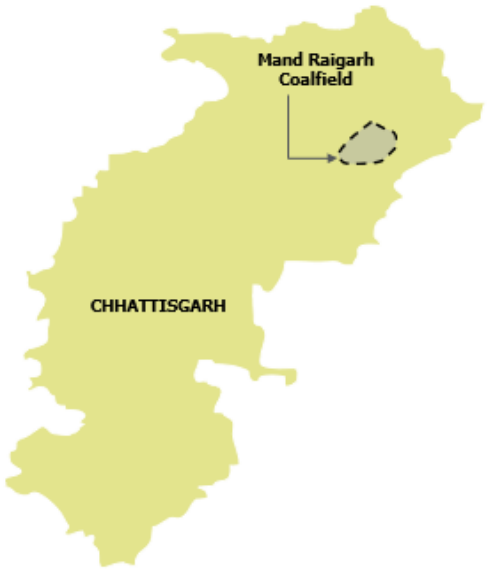
Mand Raigarh

Location

The Mand Raigarh Coalfield falls under the Tamnar Tehsil, Raigarh district in Chhattisgarh. It is located in the Mand River Valley, which is a tributary of the Mahanadi. The coalfield comes under the South Eastern Coalfields Limited command area.

The nearest railway station to the coalfield is Raigarh is about 55 km and is on Howrah – Mumbai route. Raipur is the nearest airport which is situated around 330 km from the mine site and connected by an all-weather road. The newly opened Jharsuguda airport is about 145 km from the mine.

The Coalfield covers an area of about 900 sq. km and is a part of the extensive spread of Gondwana Formations, extending from Hasdeo - Arand Coalfield through Raigarh basin to IB River Coalfield to the south-east in the Sambalpur district of Odisha. The field has a potential for mining power grade coal, much of which can be extracted through open cast mining.



Area: 900 sq. km.
Latitude: 22°16′6″N
Longitude: 83°20′38″E
Location: Tamnar Tehsil, Raigarh District

The nearest city -Raigarh- lies in the southern part of the coalfield which is connected by all-weather roads with Raigarh and Kharsia

Geological Reserve

Mand Raigarh coalfield has the second-highest deposit of coal in India quantitatively. According to estimates from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, the Mand Raigarh coalfield has 41,403 million tonnes of coal reserves as of April 1, 2020, of which 12,818 million tonnes falls under “Proved” category. The graph below

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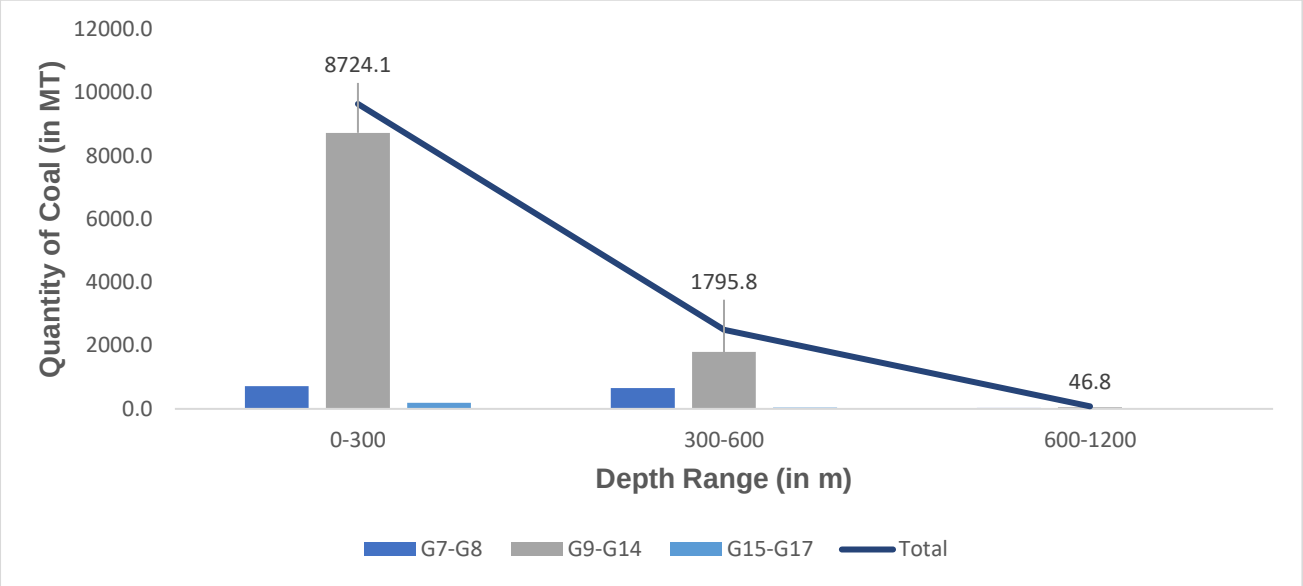
depicts a study of the grade and depth of coal resources in the coalfield.

Figure 22 Grade wise Geological Resources of Coal at Mand Raigarh Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

In addition to coal blocks of SECL in Mand Raigarh coalfield, twelve coal blocks have been allocated to various players under CMSP Act, 2015 and MMDR Act, of which one block, namely Bhalumuda has been applied for surrender.

The CMSP Act of 2015 and the MMDR Act have allowed the allocation of 12 coal blocks to non-CIL owners. The analysis of 11 non-CIL coal blocks is now complete, and each coal block's full analysis will be discussed in the next section of this chapter. Bhalumuda coal blocks have been applied for surrender.

Table 47 List of Non-CIL coal blocks in Mand Raigarh Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Durgapur-II/Taraimar	Karnataka Power Corporation Limited	4.00
2	Durgapur-II/Sarya		2.00
3	Gare Palma Sector-I	Gujarat State Electricity Corporation Limited	15.00
4	Gare Palma Sector-II	Maharashtra State Power Generation Co Ltd.	23.6
5	Gare Palma Sector-III	Chhattisgarh State Power Generation Co Ltd	5.0
6	Gare Palma-IV/1	Jindal Power Ltd.	6.0
7	Gare Palma-IV/4	Hindalco	1.50
8	Gare Palma-IV/5	Hindalco	1.00
9	Gare Palma-IV/7	Sarda Energy and Minerals Limited	1.20
10	Gare Palma-IV/8	Ambuja Cements Ltd.	1.20
11	Talaipalli	NTPC Ltd.	18.75
12	Bhalumuda#	NTPC Ltd.	NA

Source: CMPDIL, Ministry of Coal

On March 25, 2021, the Ministry of Coal announced the second round of coal mine auctions for commercial coal mining, with 67 mines available. They include seven mines from the Mand-Raigarh coalfield; more information may be found in the table below.

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Table 48 Coal blocks to be allocated in Mand Raigarh Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Barra	Partially Explored	900.00	0.25*
2	Dolesara	Explored	622.70	1.74
3	Eastern Part of Gorhi-Mahaloi	Explored	800.90	1.74
4	Jarkela	Explored	610.70	1.74
5	Jharpalam Thangarghat	Explored	788.37	1.74
6	Ramnagar	Partially Explored	600.00	14.4*
7	Western Part of Gorhi-Mahaloi	Explored	585.00	1.74

* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years, and accordingly, the PRC of Barra and Ramnagar is 0.25 MT and 14.4 MT, respectively.

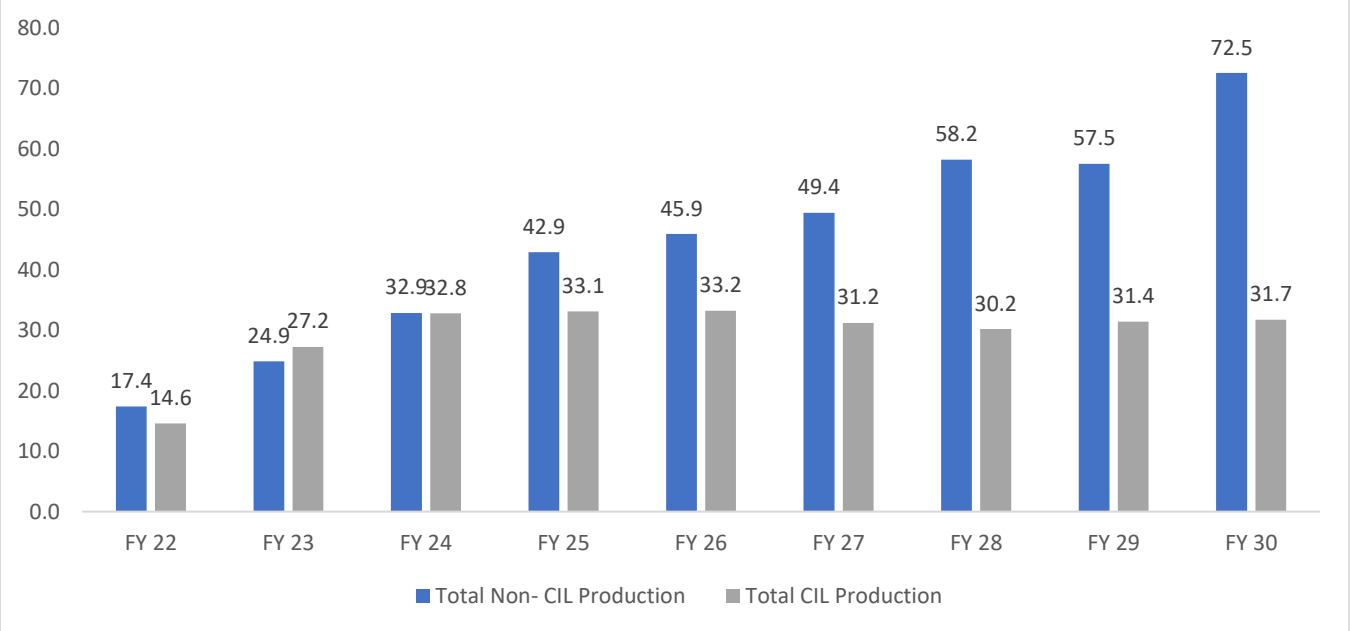
Source: CMPDIL, Ministry of Coal

Production

By 2030, there is a potential of about 148 MT of coal production from the Mand Raigarh field. Non-CIL mines which are allocated in the coalfield have the potential to contribute approximately 72.5 MT of coal. For coal blocks whose YoY production data is not available, their PRC has been considered in FY 30, due to which a sudden increase in production is depicted in Figure below.

Adequate road and rail connectivity are needed to evacuate this much production. Year-on-year output projections are shown in the graph below.

Figure 23 Coal Production Potential in Mand-Raigarh Coalfield by FY30 (in MT)



Source: Coal India Limited, Coal Block Allocatee

Infrastructure

Road

Dharamjaigarh is an important town placed in the north of the coalfield, which is connected by all-weather roads with Raigarh and Kharsia at a distance of 75 km and 60 km, respectively.

National Highway 149B passes through Champa in the south and meets Katghora in the north. National Highway 49 (combination of old NH 6 and NH 200) runs from Bilaspur, Chhattisgarh to Kharagpur in West Bengal.

Starting from NH 130 originates near Bilaspur, it terminates at NH 16 near Kharagpur, West Bengal. National Highway 43 is a primary National Highway in India. It traverses from Gulganj in Madhya Pradesh through Chhattisgarh and terminates at Chaibasa in Jharkhand. State Highway 1 and State Highway 4, Kharsia Road provide North-South connectivity to the coal mines.

The state highways connect the mines to national highways and the important railways stations such as Raigarh and Champa. Details of roads connecting the coalfield are provided below.

Table 49 Important Roads in the vicinity of Mand Raigarh

S no.	Roads	Type of Roads	Description
1	National Highway 49	National Highway	The highway which connects Bilaspur, CH to Kharagpur, WB, and passes through Jharsuguda.
2	National Highway 149B	National Highway	Connects Champa to Katghora
3	National Highway 43	National Highway	Connects Gulganj (MP) to- Chaibasa (Jharkhand)
4	National Highway 130	National Highway	Ambikapur-Bilaspur-Raipur
5	State Highway 4	State Highway	Connects Tapkara to Urga near Korba and passes through Dharamjaigarh
6	State Highway 1	State Highway	Connects Dharamjaigarh to Raigarh
7	Kharsia Road	Local Road	Connects Jogada to Kharsia and Dabhara further south
8	Raigarh-Sundargarh Road	Local Road	Connects Raigarh to Sundargarh in Odisha
9	Milupara-Raigarh Road	Local Road	Connects Jaigarh to Milupara

Source: Primary and Secondary research

Railways

CERL Phase-1: Length 132 Km from Kharsia – Korichhapar - Dharamjaigarh and spur lines from Gharghoda to Gare Pelma and three feeder lines from Chhal, Baroud and Durgapur. This line originates from Kharsia on Howrah Mumbai Main Line and traverses northwards and north-east to Dharamjaigarh, covering a distance of about 74 km

A 44-km long railway link under East Rail Corridor from Kharsia to Korichhapar will become operational in 2019. Further, Korichhapar-Dharamjaigarh, Dharamjaigarh – Korba and East-West corridor rail corridor - Gevra Road-Pendra Road Line are upcoming railway lines in the area. CERL is also constructing a spur line taking off from Gharghoda to Pelma, and it is commissioned up to Bhalumuda.

CERL Phase-2: This line originates from Dharamjaigarh and traverses southeast to Urga station near Korba, a distance of about 62.5 km. Land acquisition is in progress. The expected timeline for completion of this Line is 3 years after financial closure.

The third line between Bilaspur and Jharsuguda has already been commissioned, and construction is ongoing for the fourth line.

South East Central Railway (SECR) has completed the works of laying the third line between Champa and Jharsuguda. SECR also completed electrification of the third line.

Work on the third line between Bilaspur and Raipur, Bilaspur and Raigarh and Jharsuguda and doubling of track between Bilaspur and Katni is already under progress.

Construction is also in progress for the doubling of Bilaspur-Anuppur railway line.

These projects are critical for the decongestion of railway lines and the establishment of new connecting routes to mines for coal evacuation to northern, central, and eastern India.

Table 50 Existing Railways lines in the vicinity of Mand-Raigarh Coalfield

S no.	Railway Zone	Section
1	East Coast Railway-South East Central Railway	Jharsuguda Rd Jn-Champa Jn.
2	South East Central Railway	Champa Jn.-Kharsia
3	South East Central Railway	Kharsia-Raigarh
4	East Central Railway-South East Central Railway	Barwadih Jn.-Ambikapur

Source: Ministry of Railways

The table below summarises the significant railway line projects around the Mand Raigarh Coalfield.

Table 51 Important Upcoming Trunkline Projects in Mand Raigarh Coalfield

S No.	Project Name	Length (in km)	Status
1	Jharsuguda-Barpali-Sardega	52.41	Single line commissioned and declared as Railway Line. OD Study Report and Financial Model for inflated mileage finalized and submitted to MoC.
2	East Corridor (Rail JV CERL) PH-I & II	132	Kharsia-Korichhapar (0-45 Km) section commissioned on 12.10.19; Up line by Mar 2021. Korichhapar-Dharamjaigarh (45- 74): Dec 2020 with diesel power and March 21 with Electric Power. Spur Gharghoda-Gare Pelma (24 km): Sept'2021. 3 Feeder Lines (34 km): Dec 2021. Phase II: Land acquisition in progress. Expected timeline - 3 years after financial closure.
3	East- West Corridor (Rail JV-CEWRL)	135	Financial closure achieved. Expected completion Mar 2023.
4	3rd and 4th Line from Jharsuguda to Bilaspur	206	3rd Line - 152 km completed out of 206 km. Balance 54 km by Mar 2021. 4th line - 13 km commissioned out of 206 km. Balance 5 km in 19-20, 61 km in 20-21, 55 km in 21-22, 72 km in 22-23.

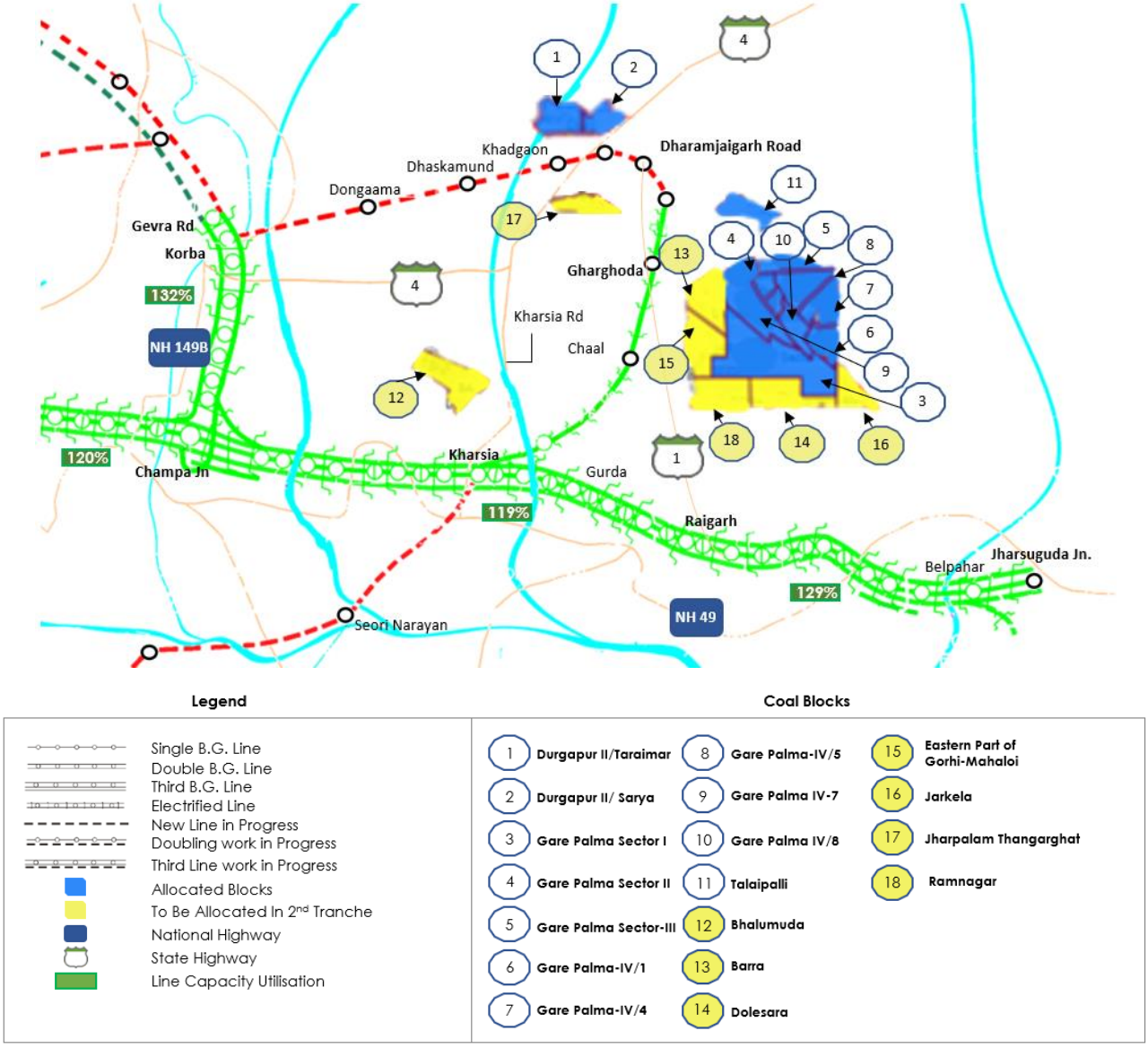
Source: Primary Research, Ministry of Railways

Coastal Shipping

Mand Raigarh coalfield is more than 400 kilometres from Paradip. The trains from Jharsuguda road junction to Sambalpur, and subsequently Cuttack to Paradip port, is a possible route to access Paradip port.

The long railway distance from mines to port impacts viability to use of coastal shipping. Also, most of the coal from the coalfield is consumed by EUP's in Chhattisgarh and Odisha. EUPs in the southern and western parts of India are encouraged to do feasibility studies before engaging on the given route.

Figure 24 Mand Raigarh map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Durgapur II/Taraimar coal block

The Durgapur II/Taraimar Coal block, which is currently non-operational, is owned by Karnataka Power Corporation Limited (KPCL). The neighbouring coal blocks are Baisi, Durgapur-Shahpur, Durgapur-II/Sarya, Fatehpur-East Coal Block. The end-use plant is Godhna Thermal Power Project.

Currently, the mine is non-operational and plans to start production from FY23. The coal will be transported by road and rail. The proposed evacuation plan includes taking up coal from the mining site to the Dharamjaigarh railhead, which is 1 Km from the mining site and then further taking it to Janjgir Naila Railway siding. Lastly, from Naila Railway siding, the coal will be taken to the end-user plant using trucks, and the distance between them is 27 Km. KPCL is planning to have a rail siding

taking off from Naila or from any other upcoming railhead. Since coal is consumed in the nearby district of Janjgir, the coastal route is not a preferable route.

Details			
Name of the Owner	Karnataka Power Corporation Limited	**PRC (MTPA)**	4
Status of the Mine	Non-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Dharamjaigarh	**Approximate Distance from Railway Station (in Km)**	5
Nearest Road	SH 4	**Approximate Distance from Road (in Km)**	5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	More than 300
End-user Plant Details			
Plant	Godhna Thermal Power Project		
Location	Godhna, Janjgir District, Chhattisgarh		
Lead Distance from Mine (in km)	150		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Coal can be transported by trucks on the road to Dharamjaigarh siding.		
Trunk infrastructure:	The Dharamjaigarh-Korba or newly commissioned Dharamjaigarh -Kharsia route can be taken to reach Janjgir siding		
Last-mile connectivity	KPCL plans to use siding at Janjgir Naila Railway station and future sidings on a sharing basis		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	1.0	1.7	4	4	4	4	4	4

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Durgapur II Taraimar mines are located very close to Dharamjaigarh railhead on the newly commissioned Kharsia-Dharamjaigarh rail line of CERL. The evacuation arrangement will be finalized after the survey and assessment of land acquisition requirements. In all likelihood they will develop a loading arrangement at the station itself.

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The main line Kolkata to Mumbai is a diagonal of the Golden Quadrilateral. The capacity utilisation of Kharsia- Champa and Champa- Naila for the FY19 is illustrated in the following table. Construction of 4th line is already being monitored by MOC, as it is a part of 14 rail line projects. Hence evacuation from the blocks can be done smoothly on completion of upcoming works.

Table 52 Congestion Analysis of railway network for Durgapur II coal block

S. No.	Section	Capacity utilisation	Works in Progress
1	Raigarh-Champa	119 %	4th line
2	Champa-Naila	120 %	4th line

Source: Primus Partners Analysis

Durgapur II/Sarya coal block

The Durgapur II/Sarya Coal block, which is currently non-operational, is owned by Karnataka Power Corporation Ltd. The neighbouring coal blocks are Baisi, Durgapur-II/Taraimar, Durgapur-Shahpur and Sherband Coal Blocks. The end-use plant is Godhna Thermal Power Project.

Awaiting operationalization in FY23, the mine is presently under development stage. The coal will be transported by both road and rail. The proposed evacuation plan for Durgapur II/Sarya includes taking up coal from mining site to the Dharamjaigarh (Bilaspur division, South East Central Railway) railhead which is located approximately 5 kilometres away from the mining site.

Further taking it to Janjgir Naila Railway siding. Railway line Dharamjaigarh-Korba can be used to reach Janjgjir Naila siding. From Naila Railway siding, trucks will transport coal to the end-user plant which is approximately 27 km away. KPCL expects to share an existing rail siding with Naila or any other forthcoming railhead. Since coal is consumed in nearby district of Janjgir coastal route is not a viable option.

Details			
Name of the Owner	Karnataka Power Corporation Ltd	**PRC (MTPA)**	2
Status of the Mine	Non-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Dharamjaigarh	**Approximate Distance from Railway Station (in Km)**	1
Nearest Road	SH 1	**Approximate Distance from Road (in Km)**	5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	More than 300
End-user Plant Details			
Plant 1	Godhna Thermal Power Project		
Location	Godhna, Janjgir District, Chhattisgarh		
Lead Distance from Mine (in km)	150		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Coal can be transported by trucks on the road to Dharamjaigarh siding.		

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Trunk infrastructure:	The Dharamjaigarh-Korba route can be taken to reach Janjgir siding								
Last-mile connectivity	KPCL plans to use siding at Janjgir Naila Railway station and future sidings on a sharing basis								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0.5	1.2	2	2	2	2	2	2

Source: Primary Research, Ministry of Coal, Coal block Allocatee

The main line Kolkata to Mumbai is a diagonal of the Golden Quadrilateral. The capacity utilisation of Kharsia- Champa and Champa- Naila for the FY19 is illustrated in the table for Taraimar. Construction of the 4th line is already being monitored by MOC, as it is a part of 14 rail line projects.

Gare Palma Sector I coal block

The Gare Palma Sector I Coal block, which is currently non-operational, is owned by Gujarat State Electricity Corporation Limited. Since year-wise production details are not available it is considered the coal block will achieve its PRC of 15 MTPA by FY30.

It is proposed that SH-1 which originates from Raigarh and terminates north at Dharamjaigarh can be used for coal evacuation. It is the fastest route which can be used to transport coal to Raigarh railway station (Bilaspur division, South East Central Railway). From Raigarh railway station the railway route west leads to Bilaspur, and the route East can be used to transport coal through Jharsuguda-Sambalpur-Cuttack to Paradip port.

Since Paradip port is more than 500 km away from the Gare Palma Sector 1 coal block, a detailed feasibility assessment is required to explore transportation using coastal.

Details			
Name of the Owner	Gujarat State Electricity Corporation Limited	**PRC (MTPA)**	15
Status of the Mine	Non-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh (Gharghoda-Pelma spur line.)	**Approximate Distance from Railway Station (in Km)**	38
Nearest Road	SH-1	**Approximate Distance from Road (in Km)**	3

Nearest Port	Paradip				**Approximate Distance from Port (in Km)**		550		
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gare Palma Sector II coal block

The Gare Palma Sector II Coal block, which is currently non-operational, is owned by Maharashtra State Power Generation Co Ltd. The neighbouring coal blocks are Gare Palma Sector I, Gare Palma Sector III, Gare Palma IV/2, Gare Palma IV/3, Gare Palma IV/6, Gare Palma IV/7, Coal Block.

The proposed end-use plants are Chandrapur Super Thermal Power Station, Koradi Thermal Power Station and Parli Thermal Power Station. Coal is proposed to be evacuated using railways. The quantity consumed by these plants are 4.5 MMTPA, 7.88 MMTPA, and 1.05 MMTPA respectively.

The nearest railway station is Raigarh which is at a distance of 35 km It can be reached by SH 1 on the road. The railway route which can be taken is from Raigarh-Bilaspur then to Bilaspur-Raipur and then enter Maharashtra from east.

Each of the plants has its own railway sidings for last mile connectivity. Since the EUPs are in neighbouring state of Maharashtra it is more feasible to transport them through railways rather than shipping routes. A connection available for future coastal lies through Raigarh-Jharsuguda then through Jharsuguda-Sambalpur-Cuttack to Paradip port.

Details			
Name of the Owner	Maharashtra State Power Generation Co Ltd.	**PRC (MTPA)**	23.6
Status of the Mine	Non-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh (Kharsia to Pelma rail network of CERL)	**Approximate Distance from Railway Station (in Km)**	35
Nearest Road	SH 1	**Approximate Distance from Road (in Km)**	3

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Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	414
End-user Plant Details			
Plant 1	Chandrapur Super Thermal Power Station (2 x 500 MW)	**Plant 2**	Koradi Thermal Power Station (3 x 660 MW)
Location	Chandrapur, Maharashtra	**Location**	Koradi, Maharashtra
Lead Distance from Mine (in km)	790	**Lead Distance from Mine (in km)**	585
Plant 3	Parli Thermal Power Station (1 X 250 MW)		
Location	Beed, Maharashtra		
Lead Distance from Mine (in km)	1136		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal will be taken to Raigarh railway station using SH 1 or local roads.		
Trunk infrastructure:	Coal is proposed to be transported using railways from Raigarh railway station.		
Last-mile connectivity	Plants have their own rail siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0.25	3	3	6	9.5	21.3	23.6	23.6

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gare Palma Sector III coal block

The Gare Palma Sector III Coal block, which is currently operational, is owned by Chhattisgarh State Power Generation Co. Ltd. The neighbouring coal blocks are Gare Palma Sector II, Gare Palma IV/5, Gare Palma IV/7, and Gare Palma IV/8 Coal Block. The end-use plant is ABVTPS, a power plant.

The coal will be evacuated using road and rail. Firstly, it will be transported via SH 1 and then Kharsia road to Robertson Railway Station (Bilaspur division, South East Central Railway) approximately 80 kilometres away. And then from the Robertson railway station it will be taken to the siding at ABVTPS, Tendubhata, Chhattisgarh power plant using the Robertson-Champa Jn. railway line.

Paradip port is approximately 400 km away from the coal block. Since the end-use plant is 155 km away coastal route is not preferable for this block. For other potential EUPs the transportation using

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Robertson-Raigarh-Jharsuguda railway line then through Jharsuguda-Sambalpur-Cuttack to Paradip port can be analysed.

Details			
Name of the Owner	Chhattisgarh State Power Generation Co Ltd	**PRC (MTPA)**	5
Status of the Mine	Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Robertson Railway Station	**Approximate Distance from Railway Station (in Km)**	80
Nearest Road	SH 1	**Approximate Distance from Road (in Km)**	1
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	400
End-user Plant Details			
Plant 1	Atal Bihari Vajpayee Thermal Power Plant		
Location	Tendubhata, Chhattisgarh		
Lead Distance from Mine (in km)	155		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Coal is transported using Lailunga - Tamnar PWD road to Robertson railway station		
Trunk infrastructure:	Coal is transported to plants using Robertson-Champa Jn.-Plant Siding railway line.		
Last-mile connectivity	Railway siding at the plant		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	3	4.2	4.5	5	5	5	5	5	5

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gare Palma IV/1 coal block

The Gare Palma IV/1 Coal block, which is currently non-operational, is owned by Jindal Power Ltd. The neighbouring coal blocks are Gare Palma IV/2 and Gare Palma IV/3 Coal Block. The coal is allocated for commercial purposes and hence coal can be utilized by any end-use plant.

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Since the NH-130 is within the vicinity so coal can be transported to nearby plants using roads, and for longer distances, Raigarh rail link can be utilized.

Raigarh Steel Plant and Tamnar Power Plant are the two end-user plants that have been identified for using coal produced from the block. The coal to Raigarh steel plant will be evacuated by roads using trucks and the distance from the mine to the end-user plant is 60 Km. The coal to Tamnar steel plant will be evacuated using truck or a mix of truck and pipe conveyor i.e., 15 km by road or using road till CHP and then use a 7 km pipe conveyor.

As Paradip port is far (approximately 480 km) from the coal block, coastal shipping might not be a viable option to be considered.

Details			
Name of the Owner	Jindal Power Ltd.	**PRC (MTPA)**	6
Status of the Mine	Non-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh	**Approximate Distance from Railway Station (in Km)**	80
Nearest Road	NH 130	**Approximate Distance from Road (in Km)**	25
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	480
End-user Plant Details			
Plant 1	Raigarh Steel plant	**Plant 2**	Tamnar Power plant
Location	Raigarh, Chhattisgarh	**Location**	Chhattisgarh
Lead Distance from Mine (in km)	60	**Lead Distance from Mine (in km)**	22
Connectivity infrastructure for the coal block			
First-mile connectivity:	Using nearby NH-130 for transportation to plant and railway station		
Trunk infrastructure:	i. Using roadways for Raigarh plant. ii. Using a combination of road and pipe conveyor for Tamnar power plant		
Last-mile connectivity	i. Coal will reach Raigarh plant on road ii. Coal will reach Tamnar plant on the conveyor.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	6	6	6	6	6	6	3	0	0

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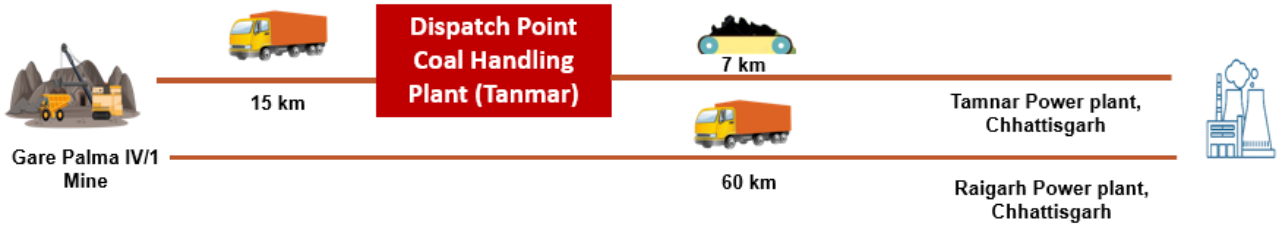


Source: Primary Research, Ministry of Coal, Coal block Allocatee

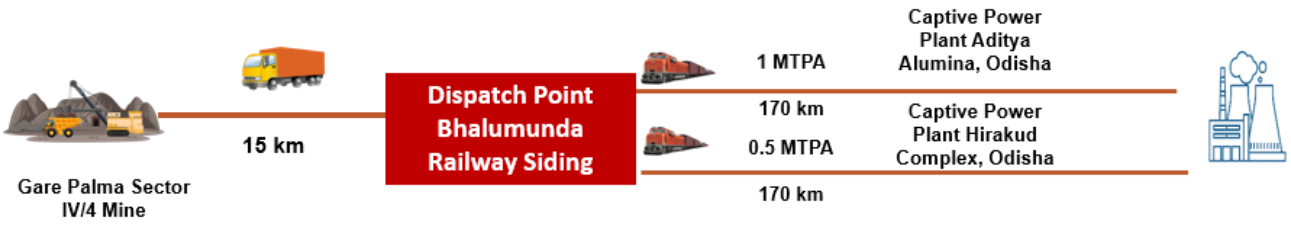
Gare Palma IV/4 coal block

The Gare Palma IV-4 Coal block, which is currently operational, is owned by Hindalco. The neighbouring coal blocks are Gare Palma IV/1 and Gare Palma IV/6 Coal Block. The end-use plants are Captive Power Plant Aditya Alumina and Captive Power Plant Hirakud Complex.

The coal is transported to the end-user plants by road. In the near future, the coal will be transported using a mix of road and rail. The coal will be evacuated to the nearest railway siding, i.e., Bhalumuda/Dolesara by road. The distance between rail siding and mine is of 15 km and further from rail siding it will be evacuated using rail. The distance between Bhalumuda/Dolesara rail siding and end-user plant is 170 km. Both the end-user power plants have their own railway siding. Since the EUP is in the neighbouring state having direct railway connectivity, coastal shipping is not a preferable mode of transportation.

Details			
Name of the Owner	Hindalco	**PRC (MTPA)**	1.5
Status of the Mine	Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh (Existing) Bhalumuda/Dolesara	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	Dongamahua-Milupara-Raigarh road	**Approximate Distance from Road (in Km)**	1
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	480
End-user Plant Details			
Plant 1	Captive Power Plant Aditya Alumina	**Plant 2**	Captive Power Plant Hirakud Complex
Location	Lapanga, Odisha	**Location**	Hirakud, Odisha
Lead Distance from Mine (in km)	144	**Lead Distance from Mine (in km)**	175
Connectivity infrastructure for the coal block			

First-mile Connectivity	It is proposed that coal be taken to nearest railway siding by road.								
Trunk infrastructure:	Currently using road directly up till the end plants. It is proposed that a combination of road and railways will be used to deliver coal to plants in Odisha in the future								
Last Mile Connectivity	Both plants have their own rail siding.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gare Palma IV/5 coal block

The Gare Palma IV/5 Coal block, which is currently under development stage, is owned by Hindalco. The neighbouring coal blocks are Gare-Palma IV/4 and Gare-Palma IV/8 Coal Blocks. The end-use plants are Captive power Plant Aditya Alumina and Captive power Plant Hirakud Complex.

The coal will be evacuated using the road to the end-user plants. In the near future the coal will be transported using mix of road and rail. The coal will be evacuated to the nearest railway siding i.e., Bhalumuda/Dolesara by road. The distance between rail siding and mine is of 15 km and further from rail siding it will be evacuated using rail. The distance between Bhalumuda/Dolesara rail siding and end-user plant is 170 km. Both the end-user power plants have their own railway siding. Since the EUP is in neighbouring state having direct railway connectivity, coastal shipping is not a preferable mode of transportation.

Details			
Name of the Owner	Hindalco	**PRC (MTPA)**	1
Status of the Mine	Under Development-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh (Existing) Bhalumuda/Dolesara	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	Dongamahua-Milupara-Raigarh road	**Approximate Distance from Road (in Km)**	1

Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	480
End-user Plant Details			
Plant 1	Captive Power Plant Aditya Alumina	**Plant 2**	Captive Power plant Hirakud Complex
Location	Lapanga, Odisha	**Location**	Hirakud, Odisha
Lead Distance from Mine (in km)	144	**Lead Distance from Mine (in km)**	175
Connectivity infrastructure for the coal block			
First-mile Connectivity	It is proposed that coal be taken to nearest railway siding by road.		
Trunk infrastructure	Currently using road directly up till the end plants. It is proposed that a combination of road and railways will be used to deliver coal to plants in Odisha in the future		
Last Mile Connectivity	Both end plants have their own rail siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1	1	1	1	1	1	1	1	1

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gare Palma IV/7 coal block

The Gare Palma IV/7 Coal block, which is currently non-operational, is owned by Sarda Energy and Minerals Limited. The neighbouring coal blocks are Gare Palma IV-5 and Gare Palma IV-8 Coal Block. The coal is allocated for commercial purposes; hence coal can be utilized by any end-use plant.

Since the National Highway 130 is with in vicinity so coal can be transported to nearby plants using roads and for longer distances, Raigarh rail link can be utilized. The identified end-user plant is Siltara, Raipur Sponge Iron Plant and Captive power plant and the coal to these is expected to be evacuated using road. The coal is loaded from public siding at Gharghoda. It can move by Gharghoda-Lailunga road from mine to railhead. From Ghargoda, siding coal can move to Raigarh railway station and move east to Jharsuguda, Odisha and west to Bilaspur using the rail line.

Coastal movement can be linked through Raigarh-Jharsuguda then through Jharsuguda-Sambalpur-Cuttack to Paradip port. Paradip port is approximately 480 km away hence the viability of using coastal mode can be a concern.

Details			
Name of the Owner	Hindalco	**PRC (MTPA)**	1.2
Status of the Mine	Under Development-Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh (Existing) Bhalumuda/Dolesara	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	Dongamahua-Milupara-Raigarh road	**Approximate Distance from Road (in Km)**	1
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	480
End-user Plant Details			
Plant 1	Captive Power Plant Aditya Alumina	**Plant 2**	Captive Power plant Hirakud Complex
Location	Lapanga, Odisha	**Location**	Hirakud, Odisha
Lead Distance from Mine (in km)	144	**Lead Distance from Mine (in km)**	175
Connectivity infrastructure for the coal block			
First-mile Connectivity	It is proposed that coal be taken to nearest railway siding by road.		
Trunk infrastructure	Currently using road directly up till the end plants. It is proposed that a combination of road and railways will be used to deliver coal to plants in Odisha in the future		
Last Mile Connectivity	Both end user plants have their own rail siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Source: Primary Research, Ministry of Coal, Coal block Allocatee

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Gare Palma IV/8 coal block

The Gare-Palma Sector-IV/8 Coal block, which is currently operational, is owned by Ambuja Cements Ltd. The neighbouring coal blocks are Gare Palma Sector-III, Gare Palma IV/5, Gare Palma IV/6 and Gare Palma IV/7 Coal Block. The end-use plant is Ambuja Cement Bhatapara. At present, coal is being transported through roads using trucks through Milupara -Raigarh road, NH 43 and then NH53 or NH 130 to plant approximately 222 km away. Ambuja Cements Ltd. has applied for approvals for the construction of a railway siding for efficient connectivity to the plant.

CERL is constructing a spur line taking off from Gharghoda to Pelma, and it is commissioned up to Bhalumuda. The alignment from Bhalumuda to Pelma requires a change as it passes over the coal block. CERL has built good shed for coal loading at Bhalumuda and Gharghoda. There is a need to expedite the construction of spur line so that planning for siding construction takes place. Coastal mode can't be feasible for transportation of coal from mine to proposed plant in this case.

Details			
Name of the Owner	Ambuja Cements Ltd.	**PRC (MTPA)**	1.2
Status of the Mine	Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	Raigarh	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	Milupara-Raigarh Road	**Approximate Distance from Road (in Km)**	0.1
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	464
End-user Plant Details			
Plant-1	Ambuja Cement Bhatapara		
Location	Raipur, Chhattisgarh		
Lead Distance from Mine (in km)	222		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is evacuated using nearby roads such as Milupara -Raigarh road then NH 43.		
Trunk infrastructure:	Using road for direct transportation up till the end plant.		
Last Mile Connectivity	The owner has applied for rail siding at plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

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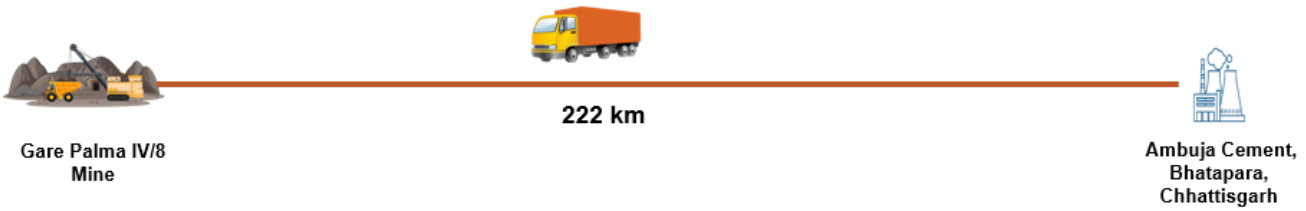


Source: Primary Research, Ministry of Coal, Coal block Allocatee

Talaipalli Coal block

The Talaipalli Coal block, which is currently under development, is owned by NTPC Ltd. The neighbouring coal blocks are Chimtapani and Teram Coal Block. The end-use plant is NTPC Lara, Raigarh, Chhattisgarh.

The Korichhapar station, constructed by Chhattisgarh East Rail Corridor Ltd. (CERL), is approximately 25 km from the mine and is approximately 62 km from the destination plant. The coal was transported from the mine up to Rajhara Railway Siding till the mine's development was completed. The coal was hauled up from this siding to Kotarlia Station, where it was loaded onto trucks and brought to the plant. The coal is now proposed to be evacuated through rail-based dedicated Merry-Go-Round (MGR) of NTPC. The MGR construction connecting NTPC Talaipalli mine & Lara is under progress.

Considering Paradip port at a distance of approximately 550 km away from the coal block, coastal mode can't be preferable.

The mining operation started in November 2019 and the full-scale mining of 18 MTPA is expected to commence by December 2024. NTPC is implementing their own MGR up till NTPC Lara over a length of 65 km. The MGR gets connected with the Indian Railway network at Raigarh and Kotarlia stations. Normally, they will not be using the Indian Railway network. There is no congestion.

Details			
Name of the Owner	NTPC Ltd.	**PRC (MTPA)**	18.75
Status of the Mine	Operational	**Coalfield**	Mand Raigarh
Infrastructure Available			
Nearest Railway Station	a. MGR (Under construction) b. Korichhapar station	**Approximate Distance from Railway Station (in Km)**	a. 0 b. 25
Nearest Road	Gharghoda-Lailunga State Highway	**Approximate Distance from Road (in Km)**	6
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	550
End-user Plant Details			
Plant-1	NTPC Lara: Stage-I 2X800MW, Stage-II 3X800 MW		
Location	Raigarh, Chhattisgarh		

Lead Distance from Mine (in km)	62								
Connectivity infrastructure for the coal block									
First-mile Connectivity	Roads are used to transport coal from mine to Korichhapar Station								
Trunk infrastructure:	Currently, coal is transported using a combination of road and railways to the plant. There is construction going on for a dedicated MGR system which will be switched to as the main mode of evacuation.								
Last Mile Connectivity	From Kotarlia station, coal is delivered to the plant using trucks.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	8	13	18	18	18	18	18	18	18

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

In 2021-22, the production of CIL mines from Mand Raigarh coalfield was 14.58 MT which is estimated to reach 32.8 MT and 31.7 MT in FY 24 and FY 30 correspondingly.

To achieve the aim of producing 1 billion tonnes of coal, it is envisaged to maximise the output of currently operating mines and to plan for future mining activities. The following mines will be linked to the planned infrastructure.

Table 53 Mines and Projects in Mand Raigarh Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Baroud OC Expn	Ongoing	0
2	Bijari	Ongoing	0
3	Chhal OC Seam III	Ongoing	6
4	Durgapur OC	Ongoing	3.5
5	Jampali	Ongoing	3
6	Pelma	Ongoing	3
7	Gare Palma IV/1	Ongoing	2.6
8	Gare Palma IV/2&3	Ongoing	4.5
9	Gare Palma IV 7	Ongoing	1.2
10	Sayang OC	Future	0.5
11	Baroud Expn (3-10 MT)	Future	9

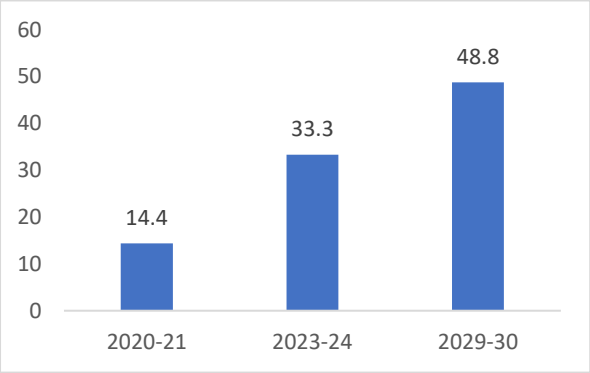
Source: Ministry of Coal, CIL

Coal mines in the Mand Raigarh coalfield use railways as the main mode of evacuation. There is a significant increase in rail dispatch between 2020-21 to 2029-30 by 239%. For SECL after Korba, Mand Raigarh will have a high requirement of rakes by FY 30.

Belt conveyor and pipe conveyor to railway sidings have been proposed at most mines. Robertson siding & Karichaper siding are also used to supply coal to miscellaneous customers.

The projected load on Indian Railways from the coalfield is shown in the figure below. This will enhance significant rakes requirement. CIL only will require 22 rakes per day for Mand Raigarh coalfield from existing requirement of 2 rakes per day.

Figure 25 Projected Dispatch through Indian Railways in Mand Raigarh Coalfield (in MT)



Source: CMPDIL, Ministry of Coal

Kharsia-Raigarh section plays a vital role in evacuation of coal from the coalfield. Chhattisgarh East Rail Corridor (CERL): coal from SECL's projects in the Mand Raigarh

CERL Phases 1 and 2 were designed to ensure the seamless evacuation of coal from the Mand-Raigarh Coalfield projects. CERL Phase-1 132 kilometres long line connecting Kharsia to Dharamjaigarh through Korichhapar along with spur lines from Gharghoda to Gare Pelma, as well as three feeder lines from Chhal, Baroud, and Durgapur will play vital role. This line begins in Kharsia on the Howrah-Mumbai Main Line and runs north and east to Dharamjaigarh. CERL Phase-2 is 62.5 kilometres in length and begins at Dharamjaigarh and continues south-east to Urga station in Korba. Land acquisition is now underway.

Analysis and Recommendations

MCL's Basundhara area, located in Odisha's Sundargarh district, is adjacent to SECL's Mand Raigarh area in Chhattisgarh. Both coalfields are underdeveloped, without rail access, but with considerable coal mining potential. Given the geological continuity and proximity of both coalfields/areas, it will be prudent to connect the Jharsuguda-Barpali-Sardega rail line at Sardega to CERL Phase-I at Pelma via the Gharghoda-Pelma spur line, allowing for the development of an integrated coal evacuation arrangement for both coalfields/areas.

Sardega serves as the buffer end of the MCL rail line, whereas Pelma serves as the buffer end of SECL's CERL PH-I. The distance between the two is approximately 30 to 32 kilometres. Therefore, it has been proposed that these two buffer ends be connected. This would result in a reduction in traffic on the Howrah-Mumbai main line's Jharsuguda-Kharsia section.

Since Chhal OCP and Baroud Exp OCP are the largest contributors to coal production, they are being supported by development of a CHP and SILO for first-mile optimisation. The table below contains further information.

Table 54 FMC Phase I Projects planned in the Mand Raigarh Coalfield Area

S No.	Project Name	Capacity (in MTPA)	Tender Status	Anticipated Commissioning Date
1	Chhal OCP CHP-SILO	6	Awarded	2023
2	Baroud Exp OCP CHPSILO	10	Awarded	2023

Source: Ministry of Coal, CIL

The Mand Raigarh Coalfield is well connected through the road as well as railway network.

The main line Kolkata to Mumbai is a diagonal of the Golden Quadrilateral which connects the coalfield. The capacity utilisation of Raigarh - Champa and Champa- Naila for FY19 is illustrated in the following table.

Table 55 Congestion Analysis of railway network in Mand Raigarh area

S. No.	Section	Capacity utilisation	Works in Progress
1	Raigarh-Champa	119 %	4th line
2	Champa-Naila	120 %	4th line

Source: Primus Partners Analysis

It can be observed that utilisation of Raigarh-Champa, Champa-Naila is more than 100%. Ministry of Railway has identified this challenge and is constructing 4th line, which is already being monitored by MOC, as it is a part of 14 rail line projects. Hence evacuation from the blocks can be done smoothly on completion of identified upcoming railway works in the coalfield in a time bound manner.

A major challenge in coalfield is regarding the first-mile connectivity which mostly involves road connectivity to nearest railhead. The coal blocks are mainly connected through the local road whose width is not appropriate. Another area of concern is the road's condition; the roads connecting the mines must be maintained on a regular basis to ensure efficient evacuation of the coalfield. With the haulage of bulk commodities (iron and coal) on these roads, the road's wear and tear is increased, and the road is also used by locals, raising concerns about safety. **Thus, dedicated roads with increased truck axle load-bearing capacity must be developed, as well as a schedule for regular monitoring and repair.**

Taking learnings from Gare Palma Sector - II case it is recommended that ROW of rail and roads and first-mile evacuation is planned as part of mine allocation process.

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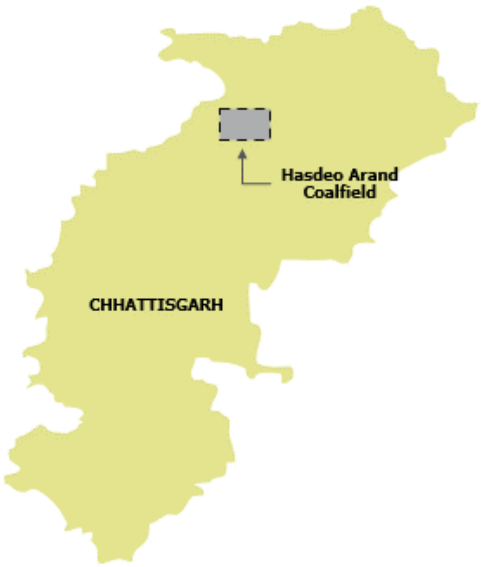
Hasdeo Arand

Location

The Hasdeo Arand Coalfield is distributed over North Korba, south Surguja and Surajpur districts of Chhattisgarh. The coalfield covers a total area of 1878 sq. km. of which 1502 sq. km. has forest cover. The coalfield in its north is surrounded by vast stretch of Talchir rocks, on the east by main Pat Plateau and south eastern edge borders the Mand Raigarh coalfield.



Area: 1878 sq. km.
Latitude: 22° 51 N
Longitude: 82° 18'E
Location: North Korba, South Surguja, Surajpur

The Hasdeo Arand Coalfield is spread over North Korba, south Surguja and Surajpur districts. The coalfield covers a total area of 1878 sq. km. The coalfield lies south to 1502 sq. km of Hasdeo Arand forest.

Geological Reserve

According to estimates by the Geological Survey of India (GSI), the Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, the Hasdeo Arand coalfield holds 5,529 million tonnes of coal reserves as of 1 April 20201, of which 2032 million tonnes fall under "Proved" category. The graph below depicts the Hasdeo Arand coalfield's grade and depth analysis of coal resources. Coal reserves in the coalfield are mainly of G9-G14 grade with mostly at depth of

Coal Blocks

Table 56 List of Non-CIL coal blocks in Hasdeo Arand Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1,2	Gidhmuri, Paturia	Chhattisgarh State Power Generation Co Ltd	5.6
3	Parsa	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)	5
4,5	Parsa East and Kanta Basan	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)	15
6	Chotia	BALCO	1
7	Kente Extension	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)	9
8	Madanpur South	APMDCL	5.4

Source: CMPDIL, Ministry of Coal

Table 57 Coal blocks to be allocated in Hasdeo Arand Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Panchbahani	Partially Explored	11	0.26*

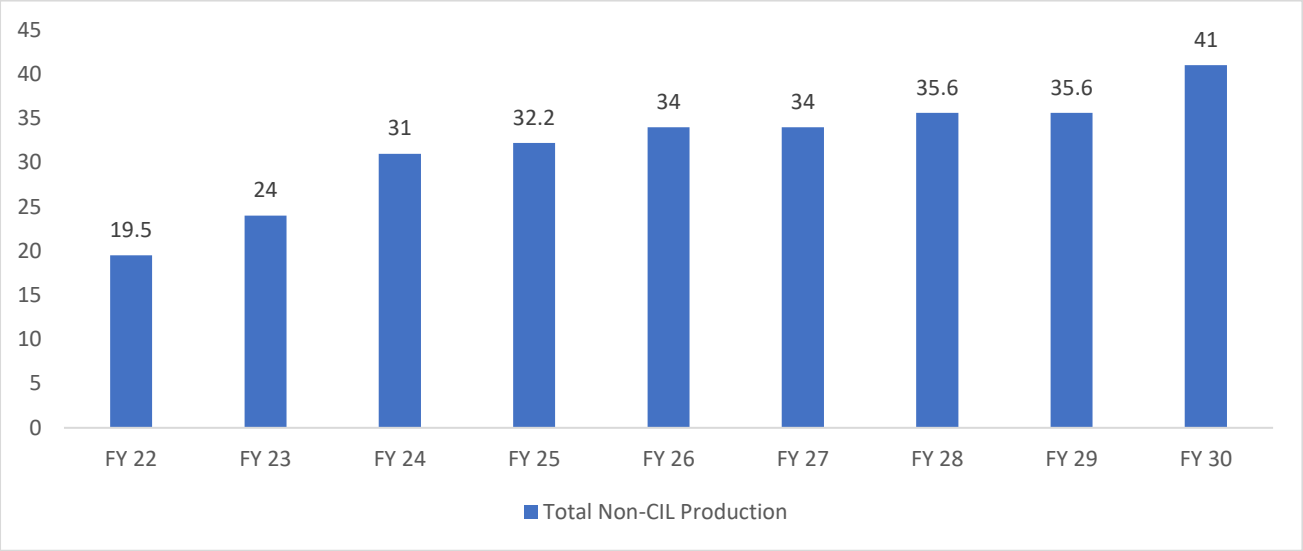
*For unexplored blocks, the extractable reserve is evaluated considering 60% of geological reserve. The mine life is considered 25 years and accordingly the PRC of Panchbahani is 0.26 MT.

Source: CMPDIL, Ministry of Coal

Production

The coalfield has the potential to produce about 41 MT which includes production from Madanpur South with PRC of 5.4 MTPA as well as Panchbahani block which is yet to be allocated. The majority of production from the coalfield is from blocks allocated to Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL). SECL doesn't have plans to have production from the coalfield. The graph below depicts the YoY production from the coalfield till FY 30.

Figure 26 Coal Production Potential in Hasdeo Arand Coalfield by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

NH 130 which originates from Ambikapur and terminates at Raipur is the most important highway for Hasdeo Arand Coalfield. From Chotia in south-west to Prem Nagar in north-west, the highway cuts across the coalfield almost in the middle. This highway is quite close to all coal fields and is used to carry coal to plants nearby or rail sidings. NH 149 and SH 4 are also important highways nearby.

Table 58 Important Roads in the vicinity of Hasdeo Arand coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 130	National Highway	Ambikapur-Bilaspur-Raipur
2	National Highway 149B	National Highway	Connects Champa to Katghora
3	State Highway 4	State Highway	Connects Tapkara to Urga near Korba and passes through Dharamjaigarh

Source: Primary and Secondary research

Railways

South East Central Railway headquartered in Bilaspur administers the railway lines around Hasdeo Arand coalfield. Coal blocks that use rail to evacuate coal use the siding served by Surajpur Road Station to deliver coal to their respective plants in Rajasthan. The railway line from Surajpur Road to Darritola through Boridand Junction and then Anuppur Junction is used to transport coal

Table 59 Existing Railways lines in the vicinity of Hasdeo-Arand Coalfield

S no.	Railway Zone	Section

1	South East Central Railway	Surajpur Road-Darritola
2	South East Central Railway	Darritola-Boridand Jn.
3	South East Central Railway	Boridand Jn-Anuppur Jn.

Source: Ministry of Railways

Coastal Movement

Paradip port is roughly 680 kilometres away from the Hasdeo Arand coalfield. Trains from Anuppur Junction to Champa Junction, then Jharsuguda Ed Jn. to Sambalpur, and then Cuttack to Paradip port are viable options for reaching the port of Paradip.

Exploring the coastal route is not possible for existing users because most coal mines in the coalfield have EUPs in neighbouring Chhattisgarh or Rajasthan. EUPs in India's south and west are urged to conduct feasibility assessments before operating on the given route.

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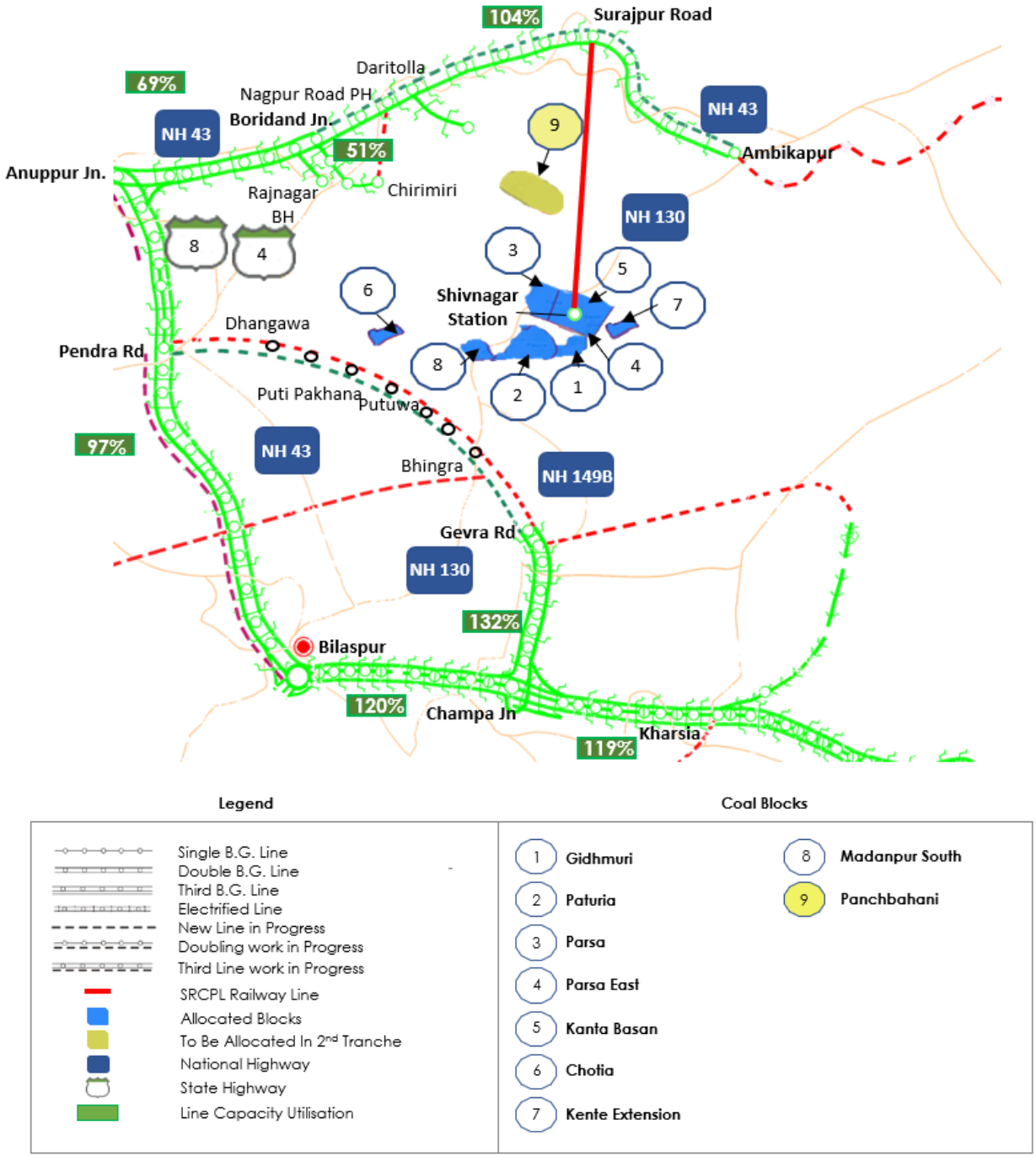
Figure 27 Hasdeo Arand map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Gidhmuri, Paturia coal block

The Gidhmuri, Paturia Coal block, which is currently under development stage, is owned by Chhattisgarh State Power Generation Co Ltd. The end-use plant for this coal block is IFFCO Chhattisgarh Power Limited (ICPL), Premnagar, Surajpur and its development is still in progress.

The neighbouring blocks are Madanpur North and Morga South. NH- 130, which joins Bilaspur to Ambikapur is approx. 0.5 km from the mine. In the initial years, the coal production from the block is proposed to be evacuated using road and later it can be transported using conveyor system, the viability of a 24 km long coal conveyor system up to the end-user facility has been studied.

Since the EUP is within the vicinity, coastal and Inland waterways are not relevant for coal evacuation from the block.

Details									
Name of the Owner	Chhattisgarh State Power Generation Co Ltd			**PRC (MTPA)**			5.6		
Status of the Mine	Non-Operational			**Coalfield**			Hasdeo Arand		
Infrastructure Available									
Nearest Railway Station	Surajpur Road Station			**Approximate Distance from Railway Station (in Km)**			131		
Nearest Road	NH-130			**Approximate Distance from Road (in Km)**			0.5		
Nearest Port	Paradip			**Approximate Distance from Port (in Km)**			690		
End-user Plant Details									
Plant-1	ICPL Premnagar								
Location	Surajpur								
Lead Distance from Mine (in km)	24								
Connectivity infrastructure for the coal block									
First-mile Connectivity	NH 130 is the closest highway where coal can be evacuated.								
Trunk infrastructure:	Coal will be transported through NH 130 to the plant. A conveyor system between the mine and the plant is being investigated.								
Last mile Connectivity	The development of end-use plant is still in progress.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0	1	2.2	4	4	5.6	5.6	5.6

Source: Primary Research, Ministry of Coal, Coal block Allocatee

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Parsa coal block

The Parsa Coal block, which is under development stage, is owned by Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL). The neighbouring coal blocks are Tara and Parsa East & Kanta Basin Coal Block. The end-use plant is Chhabra Thermal Power Plant (Unit 3-6), Baran, Rajasthan; Kalisindh Thermal Power Plant (Unit 1 & 2), Jhalawar, Rajasthan and Suratgarh Supercritical Thermal Power Plant (Unit 7 & 8), Shriganganagar, Rajasthan. The coal block is connected by state highway 2A. The coal block has washery within in the mine area, mined coal is transported to washery using conveyor belt and from their coal is transported to the railway siding.

Surajpur Road Station of Bilaspur division, South East Central Railway is the closest railway station. From Surajpur Road station coal will be transported to Daritolli-Boridand Junction-Anuppur Junction railway line and carry it westwards towards plants in Rajasthan.

The power plants have their own respective railway siding for last-mile connectivity. Coastal and Inland waterways are not relevant for coal evacuation from the block as it has end to end rail connectivity.

Details			
Name of the Owner	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)	**PRC (MTPA)**	5
Status of the Mine	Operational	**Coalfield**	Hasdeo Arand
Infrastructure Available			
Nearest Railway Station	Surajpur Road Station	**Approximate Distance from Railway Station (in Km)**	5 km long siding taking off from Surajpur Road Station
Nearest Road	NH 130	**Approximate Distance from Road (in Km)**	0.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	716
End-user Plant Details			
Plant 1	Chhabra Thermal Power Plant (Unit 3 to 6)	**Plant 2**	Kalisindh Thermal Power Plant Unit (1&2)
Location	Baran, Rajasthan	**Location**	Jhalawar, Rajasthan
Lead Distance from Mine (in km)	797	**Lead Distance from Mine (in km)**	1049
Plant 3	Suratgarh Supercritical Thermal Power Plant		
Location	Shriganganagar, Rajasthan		
Lead Distance from Mine (in km)	1664		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Siding is available at Surajpur road station.		

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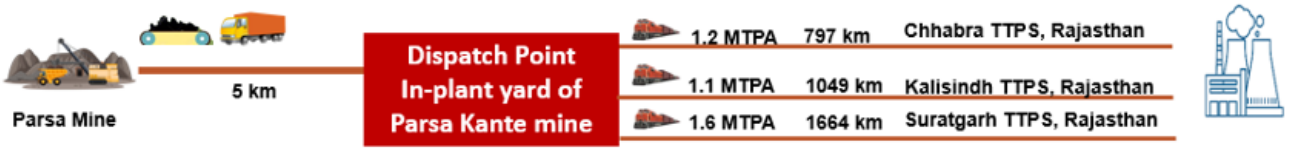
Trunk infrastructure:	Daritolli-Boridand-Anuppur railway line will be used to transport coal on rail.								
Last-mile connectivity	Railway sidings are available at respective plants								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1.5	3	5	5	5	5	5	5	5



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Parsa East & Kanta Basan coal blocks

The Parsa East and Kanta Basan coal blocks, which is currently operational, is owned by RRVUNL. The neighbouring coal blocks are Parsa and Pend Rakhi Coal Block. The end-use plants are Chhabra Thermal Power Plant (Unit 5 & 6) Baran, Rajasthan; Kalisindh Thermal Power Plant (Unit 1&2) Jhalawar, Rajasthan and Suratgarh Supercritical Thermal Power Plant (Unit 7 &8) Shriganganagar, Rajasthan. While the coal blocks are producing coal, clearances are required to ensure future production. The PRC of 15 MTPA has been tentatively assigned in this analysis.

The coal is transported to these end-user plants using rail. Surajpur Road Station (Bilaspur division, South East Central Railway) is the closest railway station. From Surajpur Road station coal is transported to Daritolli-Boridand Jn-Anuppur Jn railway line and carry it westwards towards plants in Rajasthan. The power plants have their own respective railway siding for last mile connectivity. Coastal and Inland waterways are not relevant for coal evacuation from the block as it has end to end rail connectivity.

Details			
Name of the Owner	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)	**PRC (MTPA)**	15
Status of the Mine	Operational	**Coalfield**	Hasdeo Arand
Infrastructure Available			
Nearest Railway Station	Surajpur Road Station	**Approximate Distance from Railway Station (in Km)**	5 km long siding taking off from Surajpur Road Station
Nearest Road	NH-130	**Approximate Distance from Road (in Km)**	0.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	716
End-user Plant Details			

Plant 1	Chhabra Thermal Power Plant (Unit 3 to 6)	**Plant 2**	Kalisindh Thermal Power Plant (Unit 1&2)
Location	Baran, Rajasthan	**Location**	Jhalawar, Rajasthan
Lead Distance from Mine (in km)	797	**Lead Distance from Mine (in km)**	1029
Plant 3	Suratgarh Supercritical Thermal Power Plant (Unit 7&8)		
Location	Shriganganagar, Rajasthan.		
Lead Distance from Mine (in km)	1649		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Siding is available at Surajpur road station.		
Trunk infrastructure:	Daritolli-Boridand-Anuppur railway line is used to transport coal on rail.		
Last-mile connectivity	Railway sidings are available at respective plants		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	15	15	15	15	15	15	15	15	15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Chotia coal block

The Chotia Coal block, which is currently operational, is owned by Bharat Aluminium Company Limited (BALCO). The neighbouring coal blocks are Morga-III and Morga-IV Coal Block. The end-use plant is BALCO CPP Balconagar, Korba, Chhattisgarh.

The coal is transported to the end-user plant by road. NH-130 is the national highway closest to the mine for transportation to BALCO captive Power Plant, which is approximately 70 kilometres away, NH 130 and then NH 149B is being used to transport coal. Since the EUP is within the state, coastal and Inland waterways are not relevant for coal evacuation from the block.

Details			
Name of the Owner	Bharat Aluminium Co. Limited (BALCO).	**PRC (MTPA)**	1
Status of the Mine	Operational	**Coalfield**	Hasdeo Arand
Infrastructure Available			
Nearest Railway Station	Korba	**Approximate Distance from Railway Station (in Km)**	70

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Nearest Road	NH 130	**Approximate Distance from Road (in Km)**	13
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	670
End-user Plant Details			
Plant-1	BALCO Captive Power Plant		
Location	Korba, Chhattisgarh		
Lead Distance from Mine (in km)	70		
Connectivity infrastructure for the coal block			
First-mile Connectivity	NH 130 is the closest highway to the plant to evacuate coal to.		
Trunk infrastructure:	NH 130 then NH149B is used to transport coal to the plant.		
Last Mile Connectivity	Coal will be received by plant on road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1	1	1	1	1	1	1	1	1

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Kente Extension coal block

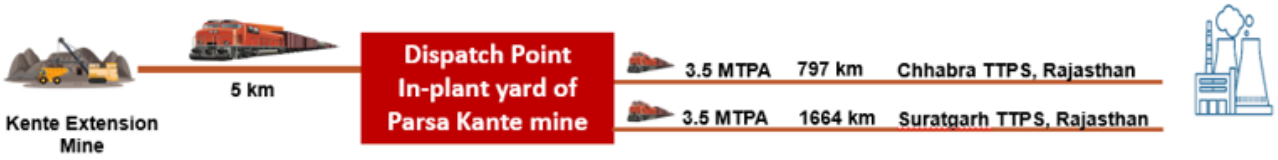
The Kente Extension Coal block, which is under development stage, is owned by Rajasthan Rajya Vidyut Utpadan Nigam Limited. The neighbouring coal block Parsa and Pendrakhi Coal Block. The end-use plant is Chhabra Thermal Power Plant (Unit 5 & 6) Baran, Rajasthan and Suratgarh Supercritical Thermal Power Plant (Unit 7 & 8), Suratgarh, Rajasthan.

Coal is currently evacuated using rail. The closest station is Surajpur Road Railway Station, approximately 5 km away. Coal will be carried from Surajpur Road station through the Daritolli-Boridand Jn-Anuppur Jn railway line, which would transport it westwards to plants in Rajasthan. The destination power plants have their own railway siding for last-mile connectivity.

Details			
Name of the Owner	Rajasthan Rajya Vidyut Utpadan Nigam Limited	**PRC (MTPA)**	9
Status of the Mine	Operational	**Coalfield**	Hasdeo Arand
Infrastructure Available			
Nearest Railway Station	Surajpur Road Railway Station	**Approximate Distance from**	5

		Railway Station (in Km)	
Nearest Road	NH 130	**Approximate Distance from Road (in Km)**	0.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	716
End-user Plant Details			
Plant 1	Chhabra Thermal Power Plant (Unit 5 & 6)	**Plant 2**	Suratgarh Supercritical Thermal Power Plant (Unit 7&8)
Location	Baran, Rajasthan	**Location**	Thukrana, Tehsil, Suratgarh, Rajasthan
Lead Distance from Mine (in km)	797	**Lead Distance from Mine (in km)**	1664
Connectivity infrastructure for the coal block			
First-mile connectivity:	Railway siding is available at Surajpur Road Station		
Trunk infrastructure:	Daritolli-Boridand-Anuppur railway line is used to transport coal on rail.		
Last-mile connectivity	Railway sidings are available at respective plants		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	2	5	9	9	9	9	9	9	9



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Madanpur South coal block

Madanpur South coal block is owned by APMDCL and is currently non-operational. It is projected to reach its PRC of 5.4 MTPA by FY30.

The coal block has been designated as 'sale to coal'. It can sell its coal production to interested customers nearby. The nearest railway siding is at Surajpur Road. NH 130 runs closely to the mine and is the most convenient way to transport coal on the road. The nearest port is at Paradip and is approximately 716 kilometres away. The feasibility of the coastal route is limited.

Details			
Name of the Owner	Andhra Pradesh Mineral Development Corporation (APMDCL)	**PRC (MTPA)**	5.4

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Status of the Mine	Non-Operational	**Coalfield**	Hasdeo Arand
Infrastructure Available			
Nearest Railway Station	Surajpur Road Station, PSRS Railway Siding	**Approximate Distance from Railway Station (in Km)**	5 km long siding taking off from Surajpur Road Station
Nearest Road	NH 130	**Approximate Distance from Road (in Km)**	0.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	716
Connectivity infrastructure for the coal block			
First-mile connectivity:	Siding is available at Surajpur road station.		
Trunk infrastructure:	Daritolli-Boridand-Anuppur railway line is used to transport coal on rail and NH 130 is available for road transportation.		
Last-mile connectivity	Last mile connectivity depends on customers infrastructure.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									5.4

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Analysis and Recommendations

The expected production from the coal field is from the non- CIL coal mines and each mine allocated has made their evacuation plan. These blocks are well connected to road as national and state highways.

For rail connectivity, Sarguja Rail Corridor Pvt. Ltd (SRCPL) has constructed a Railway siding on Bilaspur division to Parsa Kante coal mining block of Rajasthan Rajya Vidyut Utpadan Nigam Limited which has 4 blocks within the region. The railway line starts from Surajpur Road station to Ramanuj Nagar railway Station (~33 Km, Phase -I) and from Ramanuj Nagar Railway Station to PE & KB mine with a distance of ~37 Km (Phase II) Phase I and Phase II of the Project was completed and is operational since October 10, 2014, and April 2018 respectively.

The Rail Corridor is developed by a third party with the role of financing, construction, maintenance & operation. The coal owner has entered into Track Access & Usage Agreement for long term. For land acquisition the Sarguja Rail Corridor Pvt. Ltd approached the state govt and with their assistance land acquisition for railway siding was completed for public purpose.

The Rail Corridor (Sarguja Rail Corridor) developed by Pvt players can be utilized by

other nearby mines (Say Tara and Pendrakhi) to optimize logistic cost. For example, going forward, allocate of Madanpur (North), Morga III and IV would like to utilize Sarguja corridor.

There are cases wherein the new entrant/coal block allocate wants to use the existing siding by taking off from midway of the existing siding or wants to develop a loop on the approach line if traffic level is low. Such sharing has the following benefits.

- The rail capacity created by the siding owner can be optimized. The assets so created have higher utilisation.
- Land acquisition requirement is reduced drastically.

This business model can be used in other areas as well for the efficient evacuation of coal.

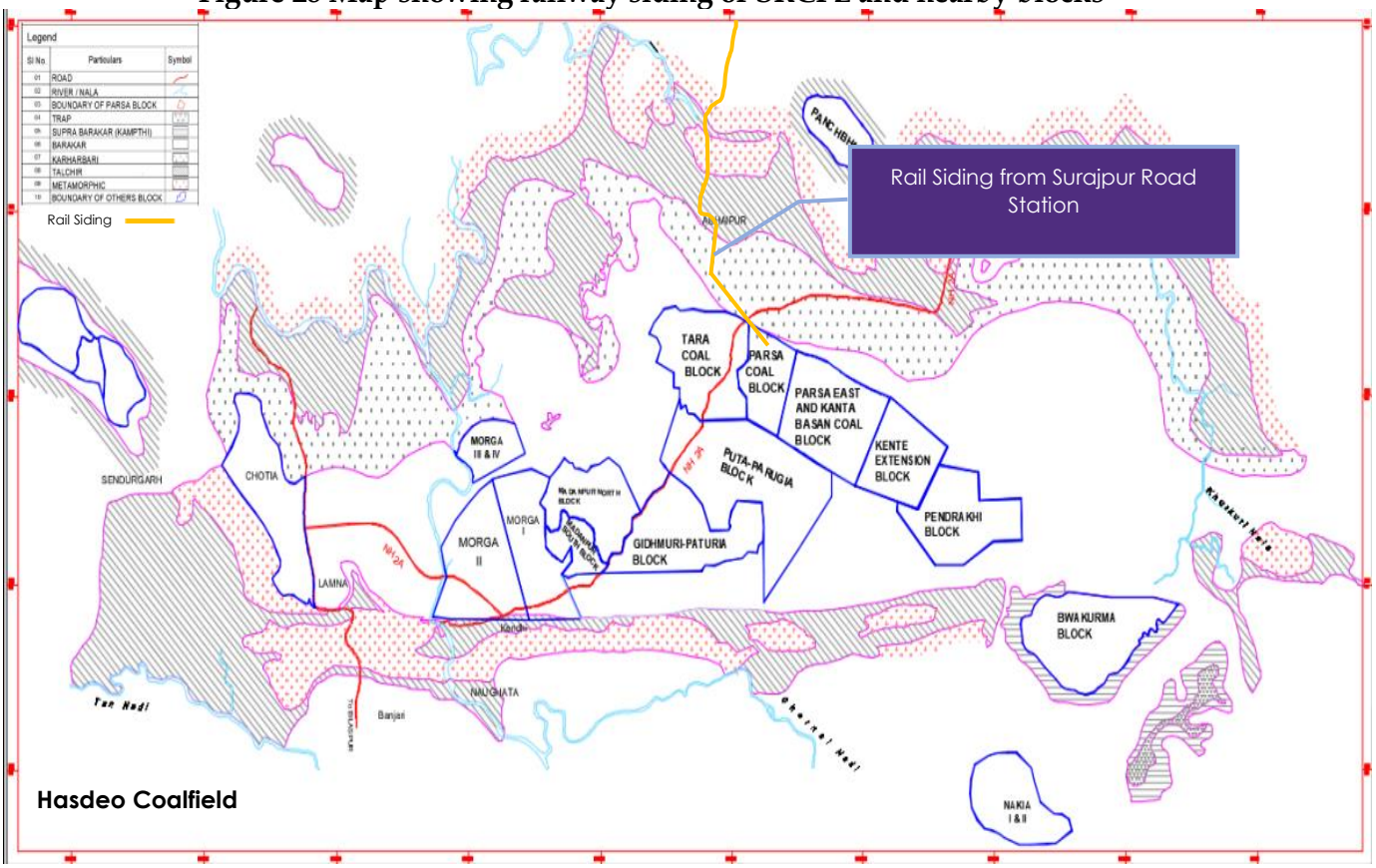
The congestion analysis of the railway connecting the coalfield shows that there is no significant challenge in the evacuation of coal from the coalfield.

Table 60 Congestion Analysis of railway network connecting Hasdeo Arand area

S. No.	Section	Capacity utilisation	Works in Progress
1	Anuppur – Kotma	60%	
2	Boridand Ambikapur	56%	
3	Kotma – Boridand	104%	Splitting of block section

Source: Primus Partners Analysis

Figure 28 Map showing railway siding of SRCPL and nearby blocks



Source: Secondary Research


Sambalpur
Brahmani
Angul
Tel
Mahanadi
Cuttack
ODISHA
Bhubaneshwar
Indravati

Odisha

7. Odisha

Odisha is a state rich in mineral resources, with coal being the most significant mineral. Odisha is bordered on the north by West Bengal and Jharkhand, on the west by Chhattisgarh, and on the south by Andhra Pradesh. Major cities of Odisha are well connected to all the major cities of India by railway lines. In the state of Odisha, there are two coalfields, namely Talcher coalfield and IB Valley coalfield.

Along the Bay of Bengal, the state has a nearly 485-kilometre coastline. Odisha has one major port at Paradip. It is the second-largest major port of India. Other ports in the state are Dhamra and Gopalpur port.

National Highway 53 connects Gujarat to Sambalpur and terminates at Paradip Port. Most of the railway network in Odisha lies under the jurisdiction of the East Coast Railway (ECoR), with headquarters at Bhubaneswar and some parts under South Eastern Railway and South East Central Railway.

Talcher Coalfield

Location

Talcher coalfield is strategically placed to deliver power quality coal to other parts of India, particularly power plants in the southern and western side of the country. A major part of the coalfield falls in Angul district, and the remaining part is spreading over neighbouring districts of Dhenkanal, Deogarh and Sambalpur within the state of Odisha.

It occupies a basin in the south-eastern part of the Mahanadi Valley belt of Gondwana Basin and covers an area of about 1800 sq. km. The coalfield is close to the Cuttack-Sambalpur railway line, which is connected to the Howrah-Chennai and Howrah-Mumbai lines.

Area: 1800 sq. km.
Latitude: 20° 53’00” N
Longitude: 84°20’00” E
Location: Angul, Dhenkanal, Deograh and Sambalpur

Paradip Port is about 192 kilometres east. Talcher and Paradip is connected by railway via Cuttack. Another major port that is connected to Talcher is the Dhamra port. The coalfield is also advantageously positioned for consumers in southern and western India, where coal may be transported by rail or rail-plus-sea.

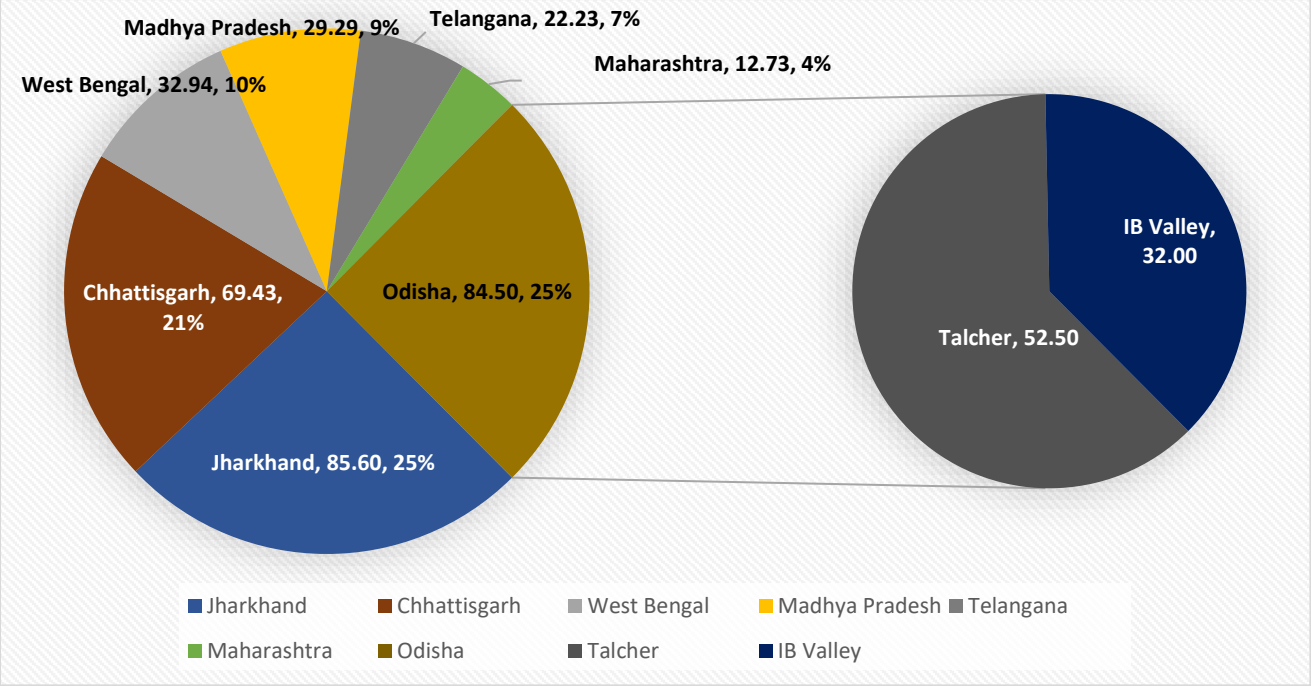
Geological Reserve

According to GSI resources compilation, in situ geological resources of coal as of 1st April 2020 in India up to a depth of 1200 meters is 344.02 Billion Tonnes (BT). This includes proved, indicated, and inferred resources. Of these, about 97.92% of resources, i.e., 336.86 BT is shared by seven states.

Talcher coalfield is known for hosting the largest source of power grade coal in India. As per the exploration carried out by various agencies, viz. Geological Survey of India (GSI), Indian Bureau of Mines, National Coal Development Corporation (NCDC), erstwhile Central Mine Planning & Design Institute Limited (CMPDIL), Directorate of Geology and Mines (DGM), erstwhile Odisha and Mineral Exploration Corporation Limited (MECL),

establishes that Talcher coalfield has the largest reserves of coal in amongst all the coalfields of India.

Figure 29 State-wise Geological Reserves (in BT)

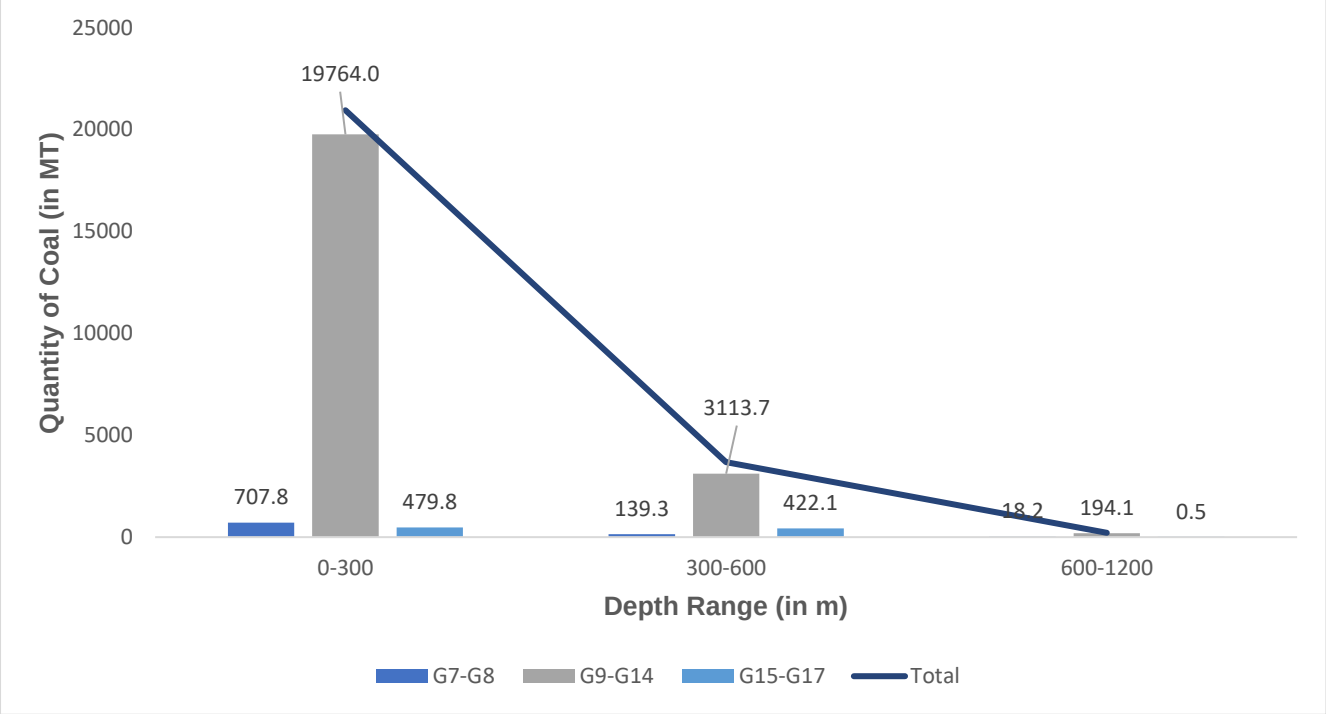


Source: Coal Controller's Organization, Ministry of Coal Publications

The recent assessment of coal reserves by GSI (Inventory of Geological reserves of Indian coal, as on 01.04.20) on the basis of resources estimated reveals that Talcher coalfield alone possesses the coal reserves to the extent of 52.5 BT. Out of this, 25.3 BT fall under "Proved" category occurring within 600 metres depth.

The coalfield assumes importance due to the occurrence of thick coal seams at comparatively shallow depth over large aerial extent with low dip of the strata. Such characteristics have resulted in the good quarriable potentiality of coal over a large area within the coalfield. The below figure provides grade-wise, depth-wise coal resources in Talcher coalfield.

Figure 30 Grade wise Geological Resources of Coal at Talcher Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

In addition to the coal blocks of MCL in Talcher coalfield, eleven coal blocks have been allocated to various other players under CMSP Act, 2015 and MMDR Act. Of this Sarapal-Nuapara block applied an application to surrender it. The details of non-CIL coal blocks have been provided in the table below. These blocks have additional potential to produce around 82 MTPA considering their PRC.

Table 61 List of Non-CIL Coal Blocks in Talcher Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Naini	The Singareni Collieries Co Ltd	10
2,3	Utkal-E, Utkal-D	NALCO	4
4	Baitarni West*	Odisha Mining Corporation	15
5	New Patrapara^	The Singareni Collieries Co Ltd	15
6	Mandakini	Karnataka Power Corporation Ltd.	7.5
7	Radhikapur East^	EMIL Mines And Mineral Resources Limited.	5
8	Radhikapur West	Vedanta Ltd.	6
9	Chandrabila	Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)	10
10	Brahmani$	The Orissa Minerals Development Co. Ltd.	NA
11	Sarapal-Nuapara+	Odisha Mineral Development Co Ltd.	

Source: CMPDIL, Ministry of Coal

*Allocated for sale of Coal

^ Allocated for Commercial Sale of Coal

[+] Requested to surrender of this block vide letter dated 09.11.2020.

$ Block is still under the exploration phase, and the mining plan is not even prepared.

On March 25, 2021, the Ministry of Coal launched 2nd tranche of the auction of coal mines for commercial coal mining, offering 67 mines. Out of the total 67 mines offered, 10 mines are from Talcher coalfield. Details of the same are provided in the table below.

The peak rated capacity of these coal blocks is less 2 MTPA to as large as 30 MTPA. Two blocks, namely Ramchandi Promotion block and Alaknanda are partially explored.

For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years and accordingly, the PRC of Ramchandi Promotion block and Alaknanda is 36 and 12 MT, respectively.

Table 62 Coal blocks to be allocated in Talcher Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Machhakata	Explored	1400.6	30
2	Mahanadi	Explored	1993.5	
3	Nuagaon Telasahi	Explored	904.6	20
4	Ramchandi Promotion block	Partially Explored	1500	36*
5	Alaknanda	Partially Explored	500	12*
6	Kardabahal-Brahmanbil	Explored	1066.6	10
7	Kosala West	Explored	1600	38.4
8	Phuljari East & West	Explored	2210.8	10
9	Saradhpur North	Explored	1116.4	6
10	Tentuloi	Explored	1730.2	2

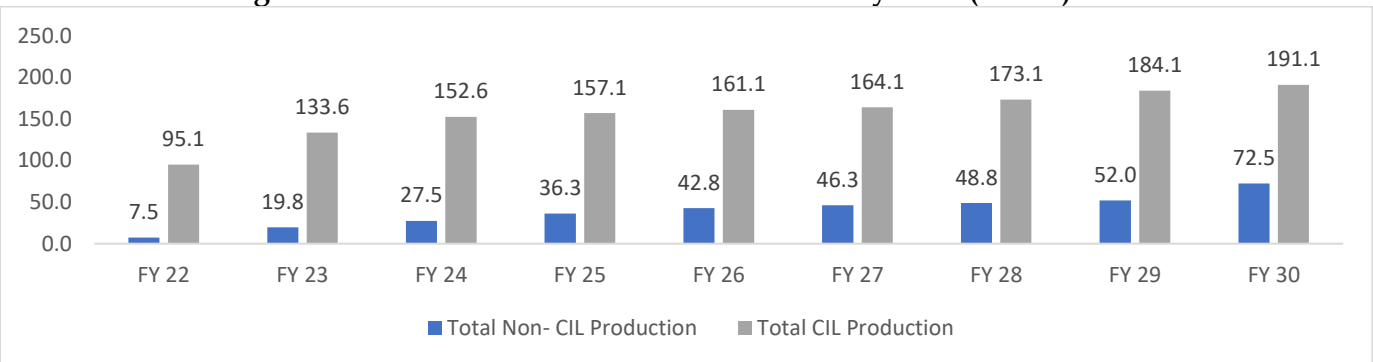
* Estimated PRC

Source: CMPDIL, Ministry of Coal

Production

Talcher coalfield has produced about 78 million Ton coal in the year 2020-21, and as per projections by MCL, there is the potential of going up to 180 MTPA by 2023-24. If we examine the overall progress of rail and road network progress in the Talcher area vis a vis the coal production plan of MCL and non-CIL coal mines, there is a huge gap in supply and demand.

Figure 31 Coal Production Potential in Talcher by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Let us examine the status of capacity augmentation woks being planned or under

execution by Indian Railways, which shall help the Talcher region for coal evacuation to various parts of the country.

Infrastructure

Road

National Highway-6, National Highway-55, National Highway-23, and National Highway-149 pass through the Angul district. National Highway-55 (Previously NH-42) connecting Cuttack-Angul-Sambalpur passes more or less parallel to the southern fringe of the coalfield at about 5 to 7 km. National Highway-23 connecting Talcher-Samal-Pallahara passes through the eastern part of the coalfield.

Another prominent district road is Angul-Chhendipada-Deogarh road passing through the central part of the coalfield. National Highway-53 originating from Chandikhol, also passes through north-eastern part of the coalfield and joins with National Highway-23. Recently a 2-Lane concrete road from Basundhara West Extension Check post to Sardega Railway Siding has been completed.

Paradip is connected to Cuttack, Chandikhole by SH-12 and NH-5A, respectively, which are two of the major cities in Odisha. The following table lists the important roads providing connectivity to Talcher coalfield

Table 63 Important Roads in the vicinity of Talcher.

S No.	Roads	Type of Road	Description
1	National Highway 53 (Previously – NH 6)	National Highway	Connects Surat, Gujarat to Sambalpur then to Paradip port in Odisha
2	National Highway 55 (Previously – NH 42)	National Highway	Highway which connects Angul district to Cuttack
3	National Highway 149	National Highway	Passes through Talcher to Connecting Pallahara and Nuahata near Angul
4	State Highway 63	State Highway	It starts near Budhapal and passed through Chhendipara, Kosala and terminates near Angul
5	State Highway 24	State Highway	SH 24 starts near Reamal and passes through Paikmal, Rendakhol and terminates near Baudhgarh on NH 57
6	State Highway 10	State Highway	It starts near Rourkela and passes through Sundargarh, Jharsuguda and terminates at Sambalpur
7	Angul- Talcher Road	Local Road	Connects Angul to Talcher
8	Angul-Rengali Metalled Road	Local Road	Connects Angul to Rengali
9	Kanihla-Angul Road	Local Road	Connects Angul to Kanihla
10	Chendipada-Jarapada Road	Local Road	Connects Chendipada to Jarapada
11	Kosala-Brahmanbil Road	Local Road	Connects Kosala to Brahmanbil
12	Kosala Road	Local Road	Connects Kosala to Kumunda

Source: Primary and Secondary research

In addition to this following are a few projects which are ongoing:

a) Construction of CT roads with a length of 35 km.

b) Widening of road from 2 lane to 4 lane from Bankibahal to Kanika Railway Siding for 27 km.
c) Construction of separate 4-Lane (modified 2-lane) dedicated coal corridor road from Bankibahal to Bhedabhal (on SH-10) in Sundargarh dist. with a length of 33 km.
d) 4-laning of the Birmitrapur-Barkote section of NH-23 is in progress. This route connects Ranchi to Rourkela, the pre-eminent steel city of Odisha and goes further up to the Angul-Talcher belt, the coal, power, and industrial hub. The corridor crosses NH-6 (New NH No. 49) at Barkote.

As per District Vision Plan 2020, the condition of National Highway-23 is poor and requires immediate attention. In many cases, kuccha road/ Village / Panchayat Road connects the block to State or National highways.

A transport road of length 22 km having at least 7.5meter width through villages has been proposed for movements of coal trucks from mines to State Highways. Accordingly, the strengthening and widening of village road need to be taken up with State Govt. on a priority basis.

Regular maintenance of these roads needs to be taken care as these roads are used by heavy vehicles due to which abrasion of these roads is frequent and thus the road's average life span is low.

Railway

The coalfield is suitably connected by a railway network. The Talcher coal field is surrounded by railway lines, the majority of which are operated by East Coast Railway, headquartered in Bhubaneshwar, Odisha. The south-eastern part of the coalfield where all the coal mining activities are currently taking place is connected by rail to Bhubaneswar (150 km.).

The coalfield is situated near the Cuttack-Sambalpur railway line, which is linked to Howrah-Chennai and Howrah-Mumbai railway lines. Sambalpur-Talcher rail link, the connector to Howrah-Mumbai and Howrah-Chennai main railway lines, runs almost parallel to NH-42.

The rail link carries heavy goods traffic of the region to the main rail network lines, which are accessible at about 100-150 km distance from the Talcher area. Coal mines load their cargo at Angul Junction, Jarapada, Kerejanga, and Talcher stations for transfer to end consumers through railways.

Talcher is approximately 192 km away from a major port in the eastern coast of Odisha, i.e., Paradip port. A Railway link is available between Talcher and Paradip-via-Cuttack. For shipping, railway lines from Talcher through Budhapank connect the mines to Paradip and Dhamra Port on the coast. Talcher coalfield is also favourably located for southern and western India consumers where coal can be transported either by rail or rail cum sea route.

Table 64 Existing Railways lines in the vicinity of Talcher Coalfield

S No.	Railway Zone	Section
1	South East Central Railway	Kharsia - Jharsuguda Rd Jn.
2	South Eastern Railway - East Coast Railway	Jharsuguda Rd Jn. - Sambalpur Jn.
3	East Coast Railway	Sambalpur Jn. – Kerejanga
4	East Coast Railway	Kerejanga – Budhapank
5	East Coast Railway	Budhapank - Talcher-Sunakhani
6	East Coast Railway	Angul- Talcher
7	East Coast Railway	Sunakhani – Bimlapur
8	East Coast Railway	Budhapank - Nergundi Jn.
9	East Coast Railway	Budhapank - Sukinda Road
10	East Coast Railway	Sambalpur Jn. - Bargarh Rd.
11	East Coast Railway	Bargarh Rd. - Barpali

S No.	Railway Zone	Section
12	East Coast Railway	Barpali - Titlagarh Jn.

Source: Ministry of Railways

It is noticed that non-CIL blocks offer about 80 MTPA traffic which will move over long distances. This traffic will require transportation capacity in both directions, i.e., Sambalpur side and Bhubaneswar side. There are various ongoing works which shall improve the rail infrastructure on Indian railways network in all the directions, including north, west, and south.

The Railway Board has sanctioned a new line project from Brahamapur to Rairakhol. which is expected to add ongoing railway capacity in the region. The 3rd & 4th line projects will add significant capacity and need to be expedited.

East Coast Railway has constructed a rail link between Lingaraj SILO and the existing Deulbeda Siding. The track was commissioned in May 2021.

An outer rail corridor is being contemplated for evacuation of coal from mining blocks located in the North and Northwest side. This rail corridor will encircle all the blocks and will facilitate rail connectivity. Landlocked blocks will require the development of road network and ROW for rail sidings. The following table presents the ongoing works for improving connectivity in the region.

Table 65 Ongoing works in Talcher coalfield region

S No.	Railway	Project Name	Type	Length (in km)	Project Cost (INR Crore)	Source of Funding	Target Date of Commissioning
1	East Coast Railway	Jarapada Budhapank 3rd &4th Line	Ongoing	101	810	PB pg. 11.2.3 item 24	
2	East Coast Railway	Budhapank Rajatgarh Salegaon 3rd & 4th Line	Ongoing	86	1172	PB pg. 11.2.3 item 25	
3	East Coast Railway	Sambalpur-Jarapada doubling incl Talcher Angul	Ongoing	174	1539	PB pg. 11.2.2	
4	East Coast Railway	Angul-Jarapada New loop to Line	Ongoing	55	1800	SPV	
5	East Coast Railway	Angul Balram Line	Ongoing	13	145	Deposit Basis	December 21
6	East Coast Railway	3rd & 4th line Talcher to Budhapank and Budhapank to Rajatgarh	Ongoing	134	1178		March 24
7	South East Central Railway	3rd and 4th line between Jharsuguda Bilaspur	Ongoing	206	Jarapada-Budhapank - 810 Budhapank-Salegaon 1178	Railway funded project	March 24

Source: Primus Partners Analysis, Pink Book Ministry of Railway Publications

In addition to that, there is a requirement of additional railway infrastructure. Thus, to summarise, the following new works proposals are suggested for further improving railway connectivity in the region:

a) The outer rail corridor in Talcher non-CIL block area with double line configuration and having alignment encircling the coal blocks is recommended.
b) Four-line configuration from Tentuloi to Jarapada
c) Four-line configuration between Sambalpur-Jarapada.
d) Dedicating 2 lines for freight traffic on the pattern of DFC on Jarapada to Salegaon on 3rd and 4th line

Coastal Shipping

Two key ports i.e., Dhamra and Paradip Port are located near Talcher coalfield on Bay of Bengal. Paradip port is directly connected by rail to the coalfield; however, connectivity to Dhamra port is under development. The coal traffic moving from Talcher via the coastal route is handled at Paradip Port as the main load port.

Paradip Port is one of India's 12 major ports. It is an artificial, deep-water port on India's east coast, located in the Odisha district of Jagatsinghpur. It is located where the Mahanadi River and the Bay of Bengal converge. It's 388 kilometres south of Kolkata and 480 kilometres north of Visakhapatnam.

While rail is now the primary mode of long-distance coal transportation, a study based on research data and industry expert opinions indicates that shifting the modal mix to coastal shipping could result in significant cost savings. As a result, a focus on coastal thermal coal shipments has been designated a vital component of the Sagarmala Project's overall objective.

The cost of rail transportation from Talcher, Orissa, to a power plant in Mundra, Gujarat, is INR 2,980 per tonne. In contrast, the same via rail-supported coastal shipping may be INR 1,320 per tonne (i.e., a potential cost saving of as high as 56 per cent).

The East Coast Railway System includes the Paradip Port Rail Network, connected to the Hinterland via Cuttack via a broad-gauge rail link. In terms of cargo volume, Paradip is one of the country's largest main ports, processing more than 70 MTPA. MCL has a berth capacity of around 20 MT at Paradip port to handle coal for Andhra Pradesh and Tamil Nadu electricity boards.

Although the cost economics of coastal shipment may offer it a little advantage in some situations, overall railway congestion suggests that there may still be a rationale for coastal shipment in such plants.

As per the Maritime India Vision 2030 of the Ministry of Ports, Shipping and Waterways there exists a potential of around 110 – 130 MMTPA coal coastal movement by 2030 to Gujarat, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala, and Andhra Pradesh. In the next section we analyse the infrastructure constraints for specifically eastern cluster ports (Paradip & Dhamra) as they are projected to handle maximum coal traffic over the next ten years.

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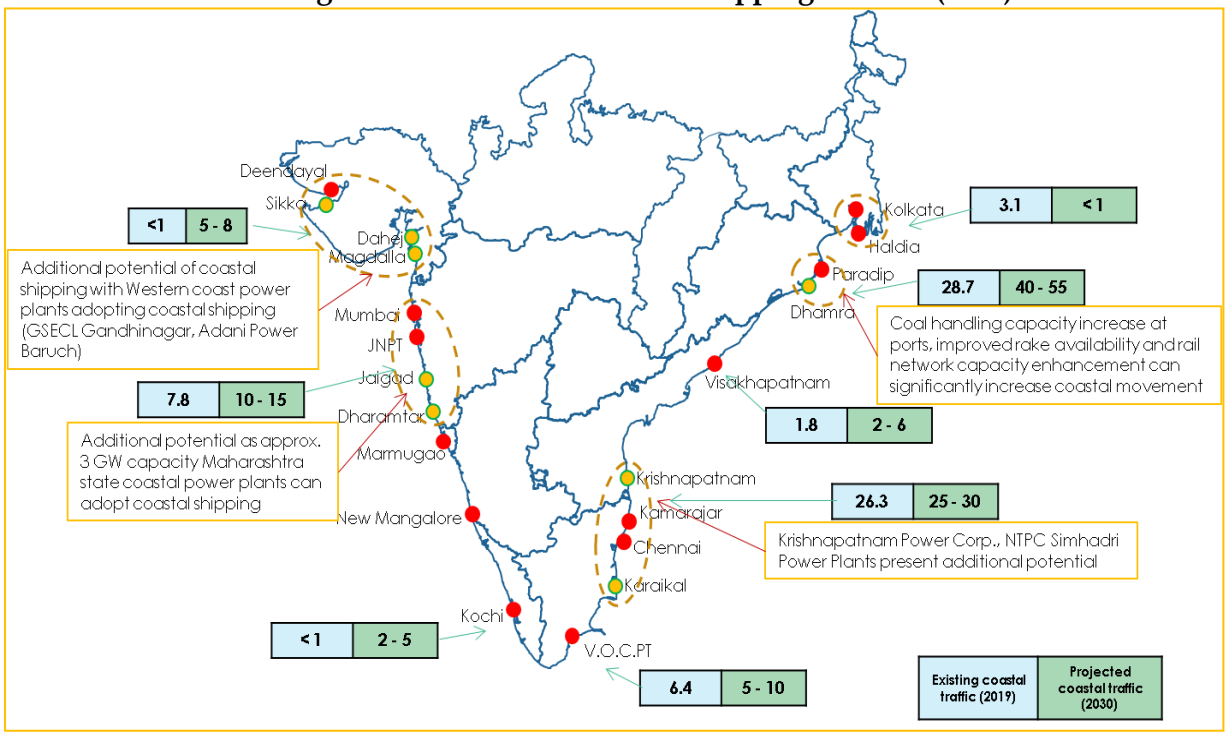
Figure 32 Potential for coastal shipping in India (2030)



Source: Maritime Vision 2030, Ministry of Ports, Shipping and Waterways

Several rail line capacity expansion projects for easing freight movement are under implementation and expected to drive traffic to ports (Paradip, Dhamra & Gopalpur) in the eastern cluster. Some significant port-rail connectivity projects such as the Haridaspur – Paradip railway line have been completed and operationalized (in 2021) and are expected to improve rail connectivity to Paradip Port.

As per the study conducted by the Asian Development Bank on the "Action Plan for Promotion of Coastal Shipping in India", an expenditure of INR ~60 billion investment in rail infrastructure (for connectivity to ports in the eastern cluster) can result in logistics cost saving of INR ~370 billion from coastal coal movement of 110 MMT from east coast to south and west coast over the next ten years.

The following projects have been identified and planned to improve railway connectivity to the ports in the eastern cluster.

Table 66 Significant railway connectivity projects towards the Eastern Coast

S. No.	Project	Status	Connecting Port
1.	Haridaspur – Paradip New B.G. Line (82 km)	Operational (2021)	Paradip
2.	New B.G. Line between Sambhalpur - Gopalpur (via Phulbani)	Sanctioned in 2019-20	Gopalpur
3.	3rd & 4th line between Budhapank-Salegaon via Rajathgarh section	Sanctioned in 2015-16. (TDC for Rajathgarh-Salegaon section: 2021-22)	Paradip, Dhamra
4.	3rd & 4th line sanctioned ex-Jarapada to Budhapank with a fly	TDC: 2023-24 (TDC of 4th line for sections Talcher Road - Budhapank: 2020-21 &	Paradip, Dhamra

	over at Talcher Road	Angul - Talcher Road: 2023-24)	
5.	Angul-Sukinda Road new B.G. line (98.7 Km.)	Work is under progress; TDC: 2021-22.	Paradip, Dhamra
6.	3rd line between Bhadrak – Vizianagaram (Balance section)	Sanctioned in 2015-16; M/s RVNL is executing work; TDC: Not fixed.	Paradip, Dhamra
7.	Doubling of Bansara-Dhamra Terminal Yard section in first phase proposed	DPR is currently under approval.	Dhamra
8.	Bhadrak – Nergundi: sanctioned in 2012-13 & executed	TDC for Jakhapura-Jajpur Keonjhar Road sections: 2022-23; Rest sections Jajpur Keonjhar Road-Baitarani Road-Kenduapada-Bhadrak: 2023-24.	Paradip, Dhamra
9.	One additional loop line each at Tihiri & Bansara stations	Commissioned in 2019-20.	Paradip, Dhamra
10.	Nergundi-Kapilas Road-Byree section	TDC - 2021-22	Paradip, Dhamra
11.	Byree-Haridaspur section	TDC - 2022-23	Paradip, Dhamra

Source: Line Capacity Statement – East Coast Railways, 2020

Coal handling capacity augmentation at ports

The projected increase (of around 50-60 MMTPA) in coal coastal movement over the next decade shall require– (a) development of additional coal handling capacities at major and non-major ports in India and (b) efficiency enhancement of existing capacities at ports. The Sagarmala Programme and the Maritime India Vision 2030 of the Ministry of Shipping have detailed the future development plans and capacity additions at the major and non-major ports. A significant number of projects are at various stages of planning/implementation and can create additional capacity of around 40-50 MMTPA over the next few years.

Specifically, at Paradip Port, the key load port for coal coastal movement, the project for mechanization for 3 berths—EQ1, EQ2 and EQ3—is already under implementation and shall add 30 MMTPA of coal handling capacity at the port. An additional 25 MMTPA capacity is planned for addition (across various cargo categories) by implementing efficiency enhancement measures at the port. Paradip Port, at present, has coal handling capacity of 21 MMTPA. Similar capacity additions are planned at other ports along India's coastline – Kamarajar Port, Vizag Port, JSW Ports, Krishnapatnam Port, Dhamra Port, Deendayal – Tuna Tekra Port etc. The following table provides an overview of the various major and non-major ports projects for coal handling capacity enhancement.

Mahanadi Riverine Port Project

The Ministry of Port, Shipping, and Waterways and the state government of Odisha shall be

jointly developing the riverine port for an investment of around Rs 4,000 crore. This all-weather and multi-user port on river Mahanadi will be set up in public-private-partnership (PPP) mode with a capacity of 54 MTPA. In the first phase, the port will have the capacity to handle 22 MTPA cargo at an investment of Rs. 2,562 crores. While the Paradip Port Trust will be responsible for developing supporting project infrastructures like rail and road connectivity and dredging requirements, the state government shall provide around 300 hectares of land for the project. The port will come up at Akhadasali village in Kendrapara's Mahakalapada block, 13 km from the river mouth at Paradip.

Table 67 Details of Mahanadi Riverine Port Project

Parameters	Details
Project Cost	Rs. 2562 crores (for Phase 1). Overall cost is expected to be around Rs. 4,000 crores.
Cargo handling capacity	Phase 1: 13.84 MTPA + 0.03 MTEUs Ultimate capacity: 52.54 MTPA + 0.09 MTEUs
Design Vessel Size	Bulk: 25000 - 80000 DWT Container: 1000 TEU

Source: Commerce & Transport Department, Government of Odisha

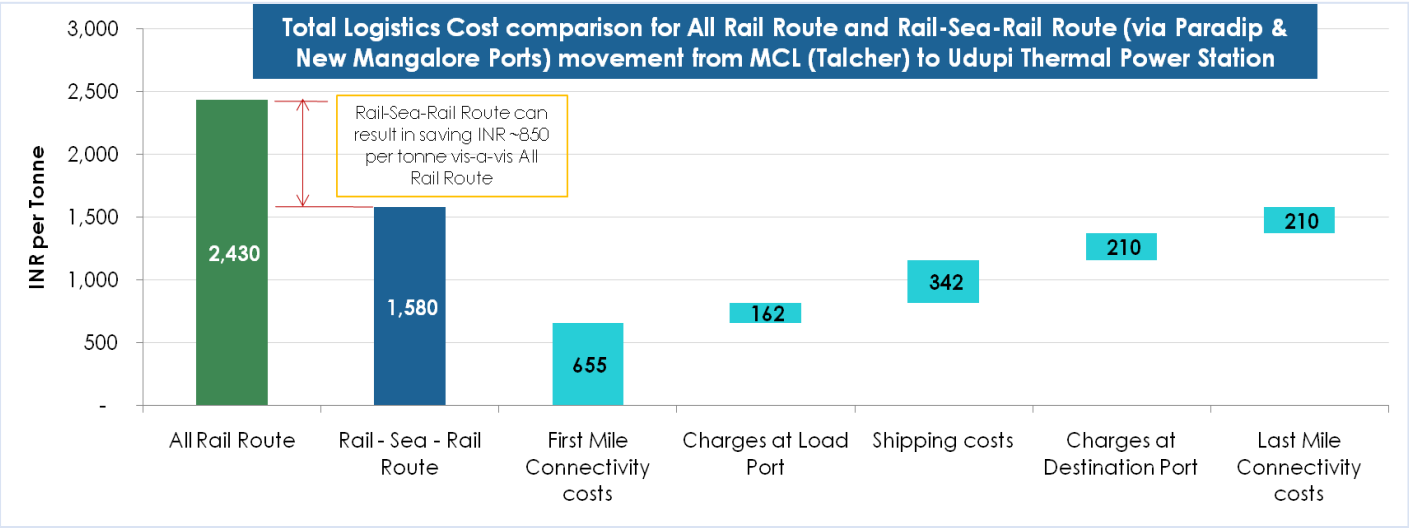
Reduction in Logistics Cost via Coastal Shipping

A comparison of total logistics cost via All Rail Route and Rail-Sea-Rail route for existing linkage between Talcher (MCL), and Ennore Thermal Power station shows a cost savings of over INR 600 per tonne via Rail-Sea-Rail route.

As India plans for the '1 Billion Tonne Coal' target and imported coal usage is expected to be substituted, coastal shipping could present a viable and eco-friendly transportation mode for imported coal substitution in coastal thermal power stations on India's west coast (in states of Gujarat, Maharashtra, Karnataka, Goa, and Kerala).

Scenario analysis for such linkage from MCL to Udupi Thermal Power station shows a cost savings of nearly INR 850 per tonne via Rail-Sea-Rail route over the All-Rail Route

Figure 33 Total logistics Costs Comparison



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coastal shipping presents a viable transportation mode for imported coal substitution for coastal power stations on the western coast. Imported coal substitution by domestic coal can create opportunities for new linkages and utilisation of coastal shipping for coal movement from the eastern to the western coast of the country. For coastal thermal power plants, movement via coastal shipping can result in significant cost savings, and therefore reduced cost of electricity for consumers.

This savings in total logistics costs can also enable the creation of coal dumps and/or coal factories to the tune of upto 100 MT on the western coast, particularly states of Karnataka and Gujarat, that have a sizeable size capacity in coastal thermal power stations. This development can also be accompanied by associated infrastructure such as washeries and mixing plants for preparing appropriate GCV coal grades for supply.

Inland Waterways

Using the stretch on Brahmani River, East Coast Canal, Matai River and Mahanadi River delta, National waterway 5 – Plate 15 connects Odisha to West Bengal. The canal system of 623 km length can handle traffic of cargo such as coal.

It comprises of 2 stretches viz.

a) Talcher to Dhamra port and
b) another connecting Dhamra to Goenkhali near Haldia.

This IWT can transport coal from Talcher coalfield to Dhamra port, which can be further taken south to Tamil Nadu or the western coast along near-sea navigational routes (Sagarmala project). Presently, it is in the development phase and may be completed within the next 4-5 years to transport bulk goods.

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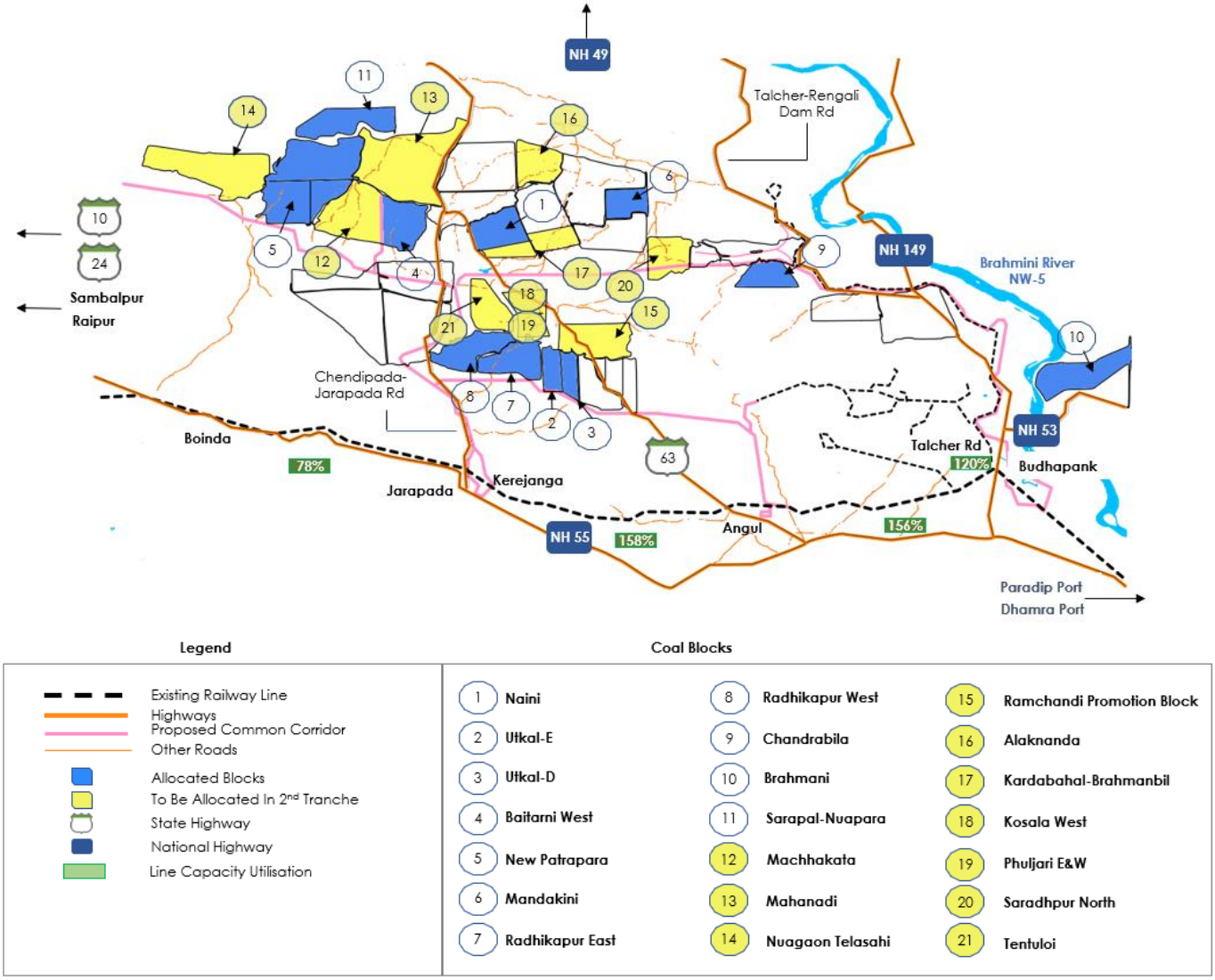
Figure 34 Talcher map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Naini Coal Block:

The Naini coal block, which is currently non-operational, is owned by Singareni Collieries Company Limited (SCCL). The neighbouring coal blocks are Chendipada, Chendipada OCP Exp. (Baitarni East), Bankhui and Kardabahal-Brahmanbil Coal Blocks.The end-use plant is Singareni Thermal Power Plant, Telangana.

In the initial years, the proposed evacuation plan is to transport coal through the Chendipada-Jarapada road to the proposed siding at Jarapada Railway station, part of the East Coast Railway's Sambalpur division, which is approximately 26 km away. It can be taken to the end-user plant at Macheriyal, Telangana through the Jarapada-Sambalpur railway line.The power plant is approximately. 601 km away from Jarapada railway station. Coastal shipping may not be feasible for this plant as it is approximately 620 km away from Vishakapatnam port in Andhra Pradesh.

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A common coal rail corridor project is being implemented for coal evacuation by MCRL (Mahanadi Coal Railway Limited). After finalization of alignment, SCCL will explore the route of coal evacuation to the siding by rail-conveyor/road. First-mile connectivity will be available through pipe conveyor, silo, CHP and rapid loading system.

Details			
Name of the Owner	Singareni Collieries Company Limited (SCCL)	**PRC (MTPA)**	10
Status of the Mine	Non-Operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Jarapada	**Approximate Distance from Railway Station (in Km)**	26
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	0
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	253
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	
End-user Plant Details			
Plant 1	Singareni Thermal Power Plant		
Location	Macheriyal Telangana		
Lead Distance from Mine (in km)	1185		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Coal can be transported to railway station on road through SH-63.		
Trunk infrastructure:	Dispatched from Jarapada Railway Station through rail to plant.		
Last-mile connectivity	Plant has its railway siding.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	7.5	10	10	10	10	10	10	10	10

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Utkal-E, Utkal-D

The Utkal E&D Coal blocks, of which only Utkal-E is currently operational, are owned by NALCO. The end-use plant is Captive Power Plant, NALCO, Angul, Odisha.It is proposed that a conveyor,silo and CHP will be used for first-mile evacuation. SH-63 is 3 km east from the mines. It will be utilized to transport coal via road to the siding at Angul Railway station. Coal can be transported through rail to the plant's railway siding called NALCO Smelter/Capitive Power Plant Siding on the Jarapada-Budhapank line.

The proposal of an Inner Corridor, a joint venture of MCL, IDCO, and Indian Railways, is designed as a loop between Angul and Jarapada railway stations on the Sambalpur to Bhubneswar route. This line will cover Radhikapur East, Radhikapur West, Tentuloi, Utkal A to F & Gopal Prasad coal blocks. This Railway corridor will have the facilities of five silos at the southern boundary of Utkal-E which will cater the requirement of Utkal Coal Blocks A to F, along with a feeder road from SH-63.

Details			
Name of the Owner	NALCO	**PRC (MTPA)**	4
Status of the Mine	Utkal-E Operational, Utkal-D non-operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Angul	**Approximate Distance from Railway Station (in Km)**	22
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	3
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	250
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	
End-user Plant Details			
Plant	Captive Power Plant, NALCO		
Location	Angul, Odisha		
Lead Distance from Mine (in km)	42		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Evacuation to be done through conveyor,silo, CHP and then on road		
Trunk infrastructure:	Transported through rail from siding to plant		
Last-mile connectivity	Rail siding will take off from Utkal station on MCRL line which will act as feeder		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									4

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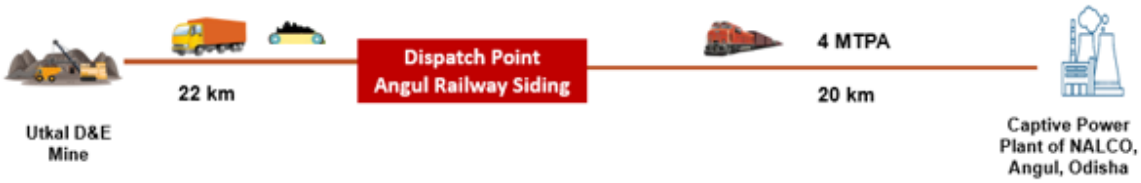

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Baitarni West

The Baitarni West Coal block, which is currently non-operational, is owned by Odisha Mining Corporation. The neighbouring blocks are Chendipada and Machhakuta.The block is under exploration and mine plan hasn't been prepared for it as of now. This coal block will be used for sale of coal. No end-user plant is identified as of now. It is proposed that a conveyor belt-silo-CHP-siding system will be estabilished for first-mile connectivity.

The proposed MCRL corridor will run south to the mine and can be used to transport coal on rail to siding at Angul Railway station. SH-63 is the nearest state highway 15 km east to the coal block. Coastal movement can be accomplished using the Angul-Budhapank-Paradip railway line and then from Paradip port by ship. However, its feasibility will depend on the location of the end-user plant. When proposed NW-5 is operationalised coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	Odisha Mining Corporation	**PRC (MTPA)**	25
Status of the Mine	Non- Operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Angul	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	15
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	268
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	
Connectivity infrastructure for the coal block			
First-mile connectivity:	Evacuation infrastructure would be conveyor belt, silo, CHP and rail siding.		
Last-mile connectivity	EUP not yet decided		
Coal production up to FY 2030			

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Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

New Patrapara

The New Patrapara Coal block, which will be operational in three years, is owned by Singareni Collieries Company Limited (SCCL). The neighbouring block is Macchakuta.

Coal block is allotted for commercial mining. No specific end-use plant is identified as of now. However, more than 25% of coal will be sold to MSME customers, with the remaining coal being sold to others via long-term/short-term linkages and E-auction. It is proposed that a conveyor belt will be used for first-mile evacuation.

The proposed MCRL corridor is south to the coal block and can be used to transport coal on rail to siding at Angul Railway station. Coal can be transported by rail or for shipping through Paradip port by the Angul-Budhapank-Paradip railway line.The feasibility of coastal shipping will depend on the location of the end-user plant. When proposed NW-5 is operationalised coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	Singareni Collieries Company Limited (SCCL)	**PRC (MTPA)**	25
Status of the Mine	Non-Operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Angul	**Approximate Distance from Railway Station (in Km)**	50
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	15
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	268
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	
Connectivity infrastructure for the coal block			
First-mile connectivity:	Evacuation infrastructure would be conveyor.		
Coal production up to FY 2030			

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Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	7.5	11.5	12.5	13.5	15	15	15	15

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Mandakini

The Mandakini Coal block, which is currently non-operational, is owned by Karnataka Power Corporation Ltd. The neighbouring coal block is Kaniha-Neelachal Coal Block.The end-use plant is Bellari Thermal Power Station Unit 3 and Yeramarus Thermal Power Station Unit 1 and 2. The power plants have their railway sidings.It is proposed that a conveyor belt to silo to CHP and railway siding system will be estabilished for evacuation at the source. Railway siding could take off from the proposed MCRL Outer corridor. From there, coal can be taken to the siding at Angul Railway station, approximately 80 km away. Coal can then be transported to plants in Ballari and Raichur, Karnataka through rail on the Angul-Sambalpur railway line.

The plants have their railway sidings for last mile connectivity. Coastal movement can be done from Paradip port using Angul-Budhapank railway line to New Mangalore Port,Karnataka. New Mangalore port is approximately 407 km and 620 km from Ballari and Raichur plant, respectively. The feasibility of coastal shipping route can be studied. When proposed NW-5 is operationalised coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	Karnataka Power Corporation Ltd	**PRC (MTPA)**	7.5
Status of the Mine	Non-Operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Angul	**Approximate Distance from Railway Station (in Km)**	80
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	40
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	240
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	
End-user Plant Details			

Plant 1	Ballari Thermal Power Station Unit 3			Plant 2	Yeramarus Thermal Power Station Unit 1 and 2				
Location	Ballari, Karnataka			**Location**	Raichur, Karnataka				
Lead Distance from Mine (in km)	1477			**Lead Distance from Mine (in km)**	1556				
Connectivity infrastructure for the coal block									
First-mile connectivity:	Evacuation to be done by conveyor and then transported by road.								
Trunk infrastructure:	Coal to be transferred from mine to plant by rail from Angul Railway Siding.								
Last-mile connectivity	Power plants receive coal transported by rail siding at plants itself.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	2.3	4	7.5	7.5	7.5	7.5	7.5	7.5

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Radhikapur East coal block

The Radhikapur East Coal block, which is currently operational, is owned by EMIL Mines And Mineral Resources Limited. The neighbouring blocks are Utkal-E and Radhikapur West.The proposed MCRL Railway Corridor will cover Radhikapur East and adjoining coal blocks.The corridor will have the facility of five silos at the southern boundary of Utkal-E along with a feeder road from SH-63. The corridor will create a loop between Angul and Jarapada railway stations on the Sambalpur-Bhubaneswar railway line.

When a siding is developed at Jarapada/Kejeranga station, it can transport coal through railways to the end-user plant. A coal handling plant for Radhikapur East has been proposed for handling the entire coal production.Coastal movement can be done after transporting coal through Jarapada-Angul-Budhapank-Paradip railway line to Paradip port. Feasibilty of coastal movement will depend on the location of the end-use plant. When proposed NW-5 is operationalised coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	EMIL Mines And Mineral Resources Limited	**PRC (MTPA)**	5
Status of the Mine	Operational	**Coalfield**	Talcher
Infrastructure Available			

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Nearest Railway Station	Jarapada/Kejaranga Station	**Approximate Distance from Railway Station (in Km)**	12
Nearest Road	SH 63	**Approximate Distance from Road (in Km)**	22
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	268
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	

Connectivity infrastructure for the coal block	
First-mile connectivity:	Coal will be transported by road to the railway siding proposed at Jarapada/Kerajang station.
Trunk infrastructure:	Coal will be transported through railways.

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0	0	0	0	0.5	1.5	3.5	5

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Radhikapur West

The Radhikapur West coal block, which is currently non-operational, is owned by Vedanta Limited.The neighbouring blocks are Radhikapur East and Tentuloi. The end-user plant is Vedanta Ltd, Jharsugudha.It is proposed that coal will be evacuated at the source through a conveyor to silo to CHP to rapid loading system.

Then the adjoining Chendipada-Jarapada road can be used to transport coal to proposed siding at Jarapada Railway station. Jarapada-Sambalpur-Jharsuguda railway line can be used to deliver coal at the end-user plant at Jharsuguda. The power plant has its railway siding called the Private Siding of Vedanta Ltd. The proposed MCRL corridor can transport coal from Radhikapur West to proposed siding at Jarapada railway station. Coal will be evacuated using road and rail. First-mile connectivity will be pipe conveyor, Silo, CHP and rapid loading system.

There is a railway siding at the plant. The quantity to be transported is 6 MTPA. The power plant has its railway siding called Private Siding Of M/S Vedanta Limited- MAVB. A 10-kilometre railway line extension from Jarpada to Radhikapur coal block is required for fast and effective coal evacuation.

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Details			
Name of the Owner	Vedanta Limited	**PRC (MTPA)**	0.6
Status of the Mine	Non-Operational	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Jarpada	**Approximate Distance from Railway Station (in Km)**	10
Nearest Road	Chendipada-Jarapada Road	**Approximate Distance from Road (in Km)**	2
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	200
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	
End-user Plant Details			
Plant 1	Vedanta Ltd.		
Location	Jharsugudha		
Lead Distance from Mine (in km)	173		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Evacuation infrastructure would be conveyor and then transported by road.		
Trunk Infrastructure:	Coal will be transported to mine on rail from Jarapada Railway station.		
Last-mile connectivity	Railway siding at the plant		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0.00	0.00	0.30	1.80	3.30	4.80	6.00	6.00

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Chandrabila

The Chandrabila Coal block, currently non-operational, is owned by Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO). The neighbouring coal blocks are Tribira, Rabipur, Chhelia, Jadunathpur North and Jadunathpur Coal Block.

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The current proposal is to transport coal using railways to end-user plants in Tamil Nadu. For first-mile evacuation a conveyor to rapid loading system is proposed. Coal can be transported by road using NH-149 to Talcher Road railway station approximately 20 km away. Then it will be transported southward using Talcher- Budhapank-Khurda Road railway line.

An alternate coastal route is also available using Talcher-Budhapank-Cuttack-Paradip railway line, coal can reach Paradip port for shipping to Chennai and VOC Tuticorin ports, Tamil Nadu. The port in Chennai is approximately 35 km away from ETPS Expansion Supercritical Thermal Power Plant, Ennore, approximately 45 km from Ennore SEZ Supercritical Thermal Power Plant, Tiruvallur and approximately. VOC port, Tuticorin is aproximately 50 km away from Udangudi Stage-I Supercritical Thermal Power Plant. When proposed NW-5 is operationalised coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)	**PRC (MTPA)**	10
Status of the Mine	Explored	**Coalfield**	Talcher
Infrastructure Available			
Nearest Railway Station	Talcher	**Approximate Distance from Railway Station (in Km)**	20
Nearest Road	NH 149	**Approximate Distance from Road (in Km)**	0
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	225
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in km)**	
End-user Plant Details			
Plant 1	ETPS Expansion Supercritical Thermal Power Plant (1 x 660 MW)	**Plant 2**	Ennore SEZ Supercritical Thermal Power Plant (2 x 660 MW)
Location	Ennore, Tamil Nadu	**Location**	Tiruvallur, Tamil Nadu
Lead Distance from Mine (in km)	2087	**Lead Distance from Mine (in km)**	1359
Plant 3	Udangudi Stage-I Supercritical Thermal Power Plant (2 x 660 MW)		
Location	Tuticorin, Tamil Nadu		
Lead Distance from Mine (in km)	3002		
Connectivity infrastructure for the coal block			
First-mile connectivity:	Evacuation infrastructure would be conveyor.		

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Trunk infrastructure:	Coal can be transported through rail.								
Last-mile connectivity	Plants have their sidings.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)			2	6	10	10	10	10	10

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During fiscal years 2021-22, MCL mines produced 93.56 MT, which is predicted to increase to 152.58 MT and 216 MT in fiscal years 24 and 30, respectively. MCL has already planned first-mile projects and railway and road projects to facilitate the evacuation of this amount. The production from MCL mines in Talcher coalfield is summarised in the table below.

Table 68 MCL Mines in Talcher Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Jagannath OCP	Ongoing	7.5
2	Ananta OCP	Ongoing	20
3	Bhubaneswari OCP	Completed	34
4	Lingaraj OCP	Completed	20
5	Bharatpur OCP	Ongoing	20
6	Balaram OCP	Ongoing	8
7	Hingula OCP	Ongoing	15
8	Kaniha OCP	Ongoing	16
9	Subhadra OCP	Future	12
10	Talcher Area	Existing	0.08

Currently, coal is evacuated via rail, road, belt conveyor, and MGR. Railway will play a significant role with around ~160 MT alone to be handle by railway mode.

East Central Railway's Talcher-Angul railway line is utilised to transport coal using trains. This is the railway that connects the mine sidings. The coalfield will have a significant impact on the increased demand for evacuation rakes.

The Common Rail Corridor was designed to simplify coal evacuation from CIL and non-CIL coal blocks in the Talcher Coalfield. It was suggested to be built by a joint venture between MCL, IRCON, and IDCO called Mahanadi Coal Railway Limited (MCRL). The Balram-Angul-Phutagadia-Jarapada segment of the MCRL will be required to transport coal from CIL mines.

MCL proposes to construct the line for CIL mines in two phases. Phase I is a 14-kilometre stretch from Angul to Balram that includes a Y connection to Kerejanga. Phase II establishes a link between Balaram and Jarapada via Putagadia-Tentuloi.

This line will allow rakes to be transported unidirectionally from Angul/Jarapada to Talcher and vice versa. This railway line will assist MCL's Balram (15 MT), Hingula (15 MT), and Subhadra (25 MT) projects, totalling 55 MT.

Railways has taken on two additional railway

line projects to bolster the rail network for coal transportation from Talcher coalfield projects to southern India power plants. These are:

1. 3rd and 4th Line from Talcher to Budhapank
2. 3rd Line from Budhapank to Rajatgarh

Bhubaneswari OCP, Lingaraj OCP and Bharatpur OCP are the highest producing mines in the Talcher coalfield. Accordingly for evacuation of coal from them, FMC is planned the details of all FMC projects planned by MCL in Talcher are provided below.

Table 69 First-mile Infrastructure in Talcher Coalfield

S No.	Name of Mine	First-mile Connectivity Infrastructure
1	Bhubaneswari OCP	MGR
2	Jagannath OCP	SPUR 2
3	Ananta OCP	SPUR 3
		SPUR 4
		SPUR 5
		SPUR 6
4	Bharatpur OCP	Bharatpur Silo
5	Hingula OCP, Balram OCP, Balabhadra OCP & Subhadra OCP	Spur 7
		Spur 8
		Spur 9
		Spur 10
6	Lingaraj OCP & Deulbeda OCP	LMGT 1/MGR Siding I
		LMGT 2/MGR Siding II
		Deulbeda Siding
		Lingaraj Silo 1
		Lingaraj Silo 2c
7	Jagannath OCP	Jagannath Belt Conveyor
8	Bharatpur OCP	Silo/ RLS (Nalco MGR)
9	Kaniha OCP	Kaniha OCP MGR

Source: Ministry of Coal, CIL

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Analysis and Recommendations

Presently, about 100 MT of coal is evacuated from Talcher Coalfield, which is expected to increase to around 200 MT from allocated blocks (MCL and non-CIL). There can be an additional requirement of 75 MT from the 2nd trench of earmarked commercial coal blocks once they are allocated.

To efficiently evacuate so much coal, strengthening of existing infrastructure is required. While mainline rail capacity shall be considerably improved over the years, the big problem lies in the connectivity within Talcher region, where rail infrastructure planning is not happening in line with coal production plan from the region.

MCL in consultation with ECoR and IRCON has proposed the development of a rail corridor connecting various coal mines in the area with that of Indian Railways main line at Angul on the east and Jarapada on the west on Angul-Sambhalpur line which is getting doubled. It was proposed to develop the Inner and Outer Corridor Project for effective evacuation of coal from coal blocks in Talcher, especially around all the Radhikapur region mines.

However, even with the above infrastructure in place, there shall remain a big challenge how to transport product coal to the Indian Railways main lines and first-mile connectivity projects are not taking off despite the creation of an SPV, namely MCRL in 2016, which is a Joint Venture company of MCL (64%), IRCON (26%) and IDCO (10%). Even after a lapse of more than 4 years, shareholders are struggling to close the necessary legal framework, and IRCON did not infuse the requisite equity amount. SPV does not have any full-time MD. Coal evacuation from Talcher will be affected adversely if necessary first-mile rail and road connectivity are not developed.

Since as many as 10 non-CIL miners have been allocated coal blocks in the region and about 10 coal blocks are expected to be allocated in the second tranche, there are multiple users. It shall not be possible for every user to develop its private siding connecting to the Indian railway mainline. Therefore, creating a shared infrastructure is the only solution for both road and rail. The Govt has also made clear that all miners, including non-CIL, have to fund such a common user line or road.

Following are the reasons for MCRL not taking off:

a) Shareholders did not bring equity contribution as committed in shareholders' agreement.
b) MCRL could not tie up debt funding.
c) MCRL could not appoint a CEO of the Company, and there is no independent management. Unless such JV companies have independent management, nothing progresses as we have seen in other such JVs of the railways
d) The land acquisition also could not be completed as there was no managerial support to take possession of the land
e) MCRL could not achieve Financial closure.
f) There is no progress on the execution except on Angul-Balram section where MCL has direct interest

This issue was discussed in the meeting called by MOC at Bhubaneswar on the 14th of Sept. Various options were discussed how to revive the situation to expedite execution of rail and road connectivity assets in Talcher region. It was observed that the present set up in MCRL cannot take the project forward and there is a need for restructuring. In the present set up there is no representation from non-CIL mine allocates who have their coal production plans firmed up and they will produce more than 22 MTPA coal in 2021-22, which will go up to 42MTPA in 2023-24.

Since it is increasingly difficult for a single party to cover the high costs of new infrastructure, the only option is to choose for a shared infrastructure where costs are shared, and debt may be raised from the market based on bankability to make the project self-sustainable.

Instead of paying upfront costs, mining companies shall pay as they go, and the operating costs will follow. Both the risks and

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the profits would be shared. Such projects can be carried out depending on the local conditions. On a shared basis, either through a JV route, an SPV route, an NGR route, or a private siding route, and such entities could be administered by independent management.

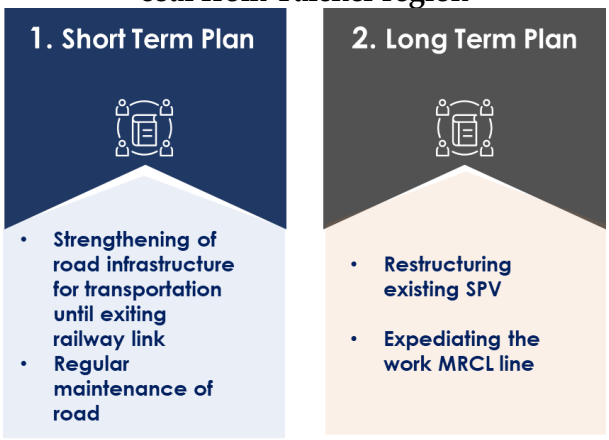
The government can play an important role in facilitating the creation of the Common Use Infrastructure scheme. With governments' limited financial capacity, mining investors are now willing to construct infrastructure, even if transportation costs are sometimes greater than the cost of the commodity; however, they want government assistance.

A well-designed and well-managed Common Use asset, available to everybody at a uniform price and service level, drives mining companies to focus more on efficient mining. The ability to differentiate in the market goes from being able to monopoly infrastructure assets to improving both the quality and quantity of output. Rail and port infrastructure economies of scale give cheaper incremental costs for expanding capacity than building new lines and terminals.

As a result, the government is required to enact policies that facilitate the construction, operation, and maintenance of Common Use assets, as well as to establish standards and enable developers to obtain the required return on investment through the collection of user fees under 'Take or Pay' directly from users, in addition to payment of terminal charges and a share of apportioned earnings by Indian Railways.

In the absence of any likelihood of any connectivity evacuation of coal is likely to see various roadblocks. Therefore we must work on the two-way strategy to address the issue, which is as follows:

Figure 35 Strategy for efficient evacuation of coal from Talcher region



Short Term Plan:

Since the development of a greenfield Rail line connectivity to the IR mainline network will take time, it is proposed to augment road infrastructure in stage one, which can be done fairly in a shorter time. It is suggested that entire road network of about 70 km from Angul to Chendipada to Jarapada be developed, including strengthening of:

i) State Highway no 63; and
ii) Other District Roads in the region.

MoC can request Orissa State PWD to develop the above road infra by creating the necessary organisation like an SPV and preparing plans and assessing the capital investment required. The SPV can raise funds from the users mines and undertake project execution in a time bound manner. Upon completion, a cost recovery model may be adopted for toll collection till capital cost with interest is collected from users who do not contribute to the initial funding.

Also, it would require augmentation of terminal loading facilities at Angul and Jarapada stations for onward loading coal into railway wagons. This would require close coordination with East Coast railway.

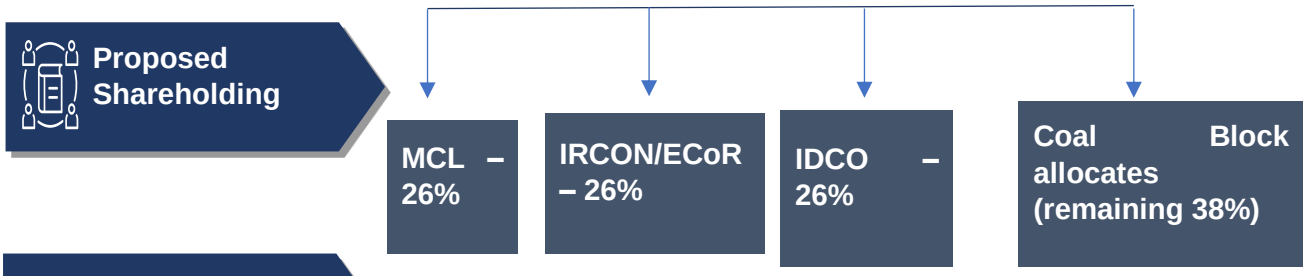
A special design of such road with higher truck axle load bearing capacity is required, as well as a special plan for regular maintenance of these roads. A committee with representation from CIL and other mine owners, as well as a

state representative, should be formed to monitor the situation on a regular basis.

Long term Plan

In the long term, it is required to develop the inner as well as outer rail corridor. This can either be develop either by Restructuring of existing SPV or expediate the work of existing one. A detailed action plan for both the option is described below:

Restructuring of existing SPV can be done as per below shareholding pattern



Updating Detailed Project Report (DPR)

The exiting DPR need to be updated considering the inflation and present cost figures and traffic assessment from the users.

Land Acquisition

IRCON or ECoR to assist LA under the Indian Railway Act, as this is a JV company and all assets will be vested in Indian Railways once the concession period expires, which will be approximately 25 years.

Management structure

For the management structure each shareholder should have at-least one Director on the Board of MCRL and Company should have an independent and professional Managing Director

Agreement

SPV should enter Take or Pay agreements with all possible users and decide on the access fee based on the cost of capital and O&M and the committed tonnage and the recovery of access fee. This will be in addition to the apportioned earning on the project line, which Indian railway is going to pass on to the SPV.

Project Financing

Project can be executed through debt (70%) and equity (30%) route.

Outer Corridor

A pre-feasibility report for the Outer Rail Corridor should be prepared to ascertain capital costs, anticipated traffic, as well as timelines and financials, among other things. Consequently, work must be planned accordingly.

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Action plan for Restructuring

MCRL should have arm's length distance from the promoters and take independent decisions in the interest of the company and the shareholders. An action plan is required to be prepared, including on the following lines:

a) Restructuring of existing SPV:

Restructuring of the existing SPV for development of rail corridor in order to bring all interested parties on board for quicky funding with commitment of volume post-commissioning.

Following Re-Structuring is suggested in the figure below:

i) Revised capital cost.
ii) Land Acquisition and the mechanism thereof'
iii) Forest and other environmental clearance.
iv) Engineering Scale Plans, Signalling and LOP drawings for the OHE.
v) Assessment of traffic and execution of traffic guarantee agreements with various users under Take or Pay with timelines
vi) Access fee assessment needs to be collected from all users for every ton of coal moved on rail. This is in line with Indian railways levying an Inflated Tariff on the JV railway lines in order to recover the project cost. This is in addition to passing on the apportioned earning from the railway receipts by IR for the projected railway.
vii) Based on updated DPR, including the Capital cost, O&M cost, Revenue stream, interest cost, etc., the company should work on Financial Close.
viii) Parallelly, MCRL shall float tenders for project execution, appoint suitable EPC agencies for the project execution, and appoint a Project Management Control agency.
ix) Expediating work of existing SPV.

Another way is to expedite the work on the existing SPV formed. This can be done by preparing the execution plan with defined timelines and a responsibility matrix. This can be achieved by taking the following steps

Independent Management	An independent management structure needs to be developed with a full time CEO who can take quick decisions, Director – Finance to resolve a matter related to project financing, Director – Project for defining and tracking the timelines, Director – Operations to track fieldwork development and resolve concerns for timely execution of the project.
Remuneration Structure	The remuneration of the independent management needs to be as per the industry benchmark position to be well motivated.
Headquarter	The headquarter of the SPV company needs to be shifted to Angul, which has better connectivity and east to access various government department of Odisha and industry representative.
Detailed Project Report	The exiting DPR needs to be updated considering the inflation and present cost figures and traffic assessment from the users.
Information Memorandum	An information memorandum needs to be developed providing all details related to project financing and action

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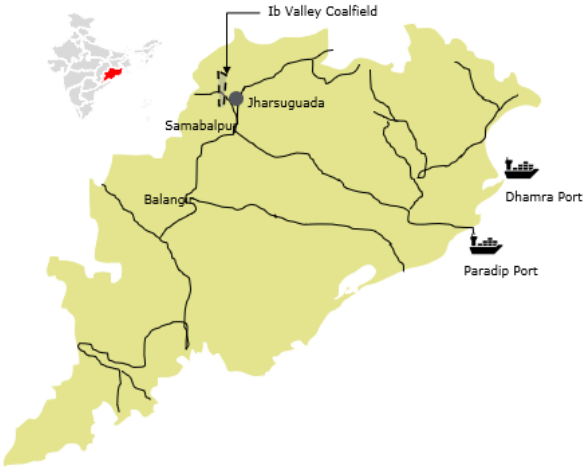
	required in time-bound manner to achieve the same
Equity Contribution	Making cash call to the stakeholders for timely equity contribution
Land Related concern	The land-related concern like acquisition or start of fieldwork on the acquired land need to be resolved with the help of state government and concerned government department

Monitoring Plan	A well-defined project plan clearly defining the required actions, timeline, responsibility matrix, as well as mechanism to flag challenges on a timely basis, address the concern so that project execution happens as per the defined milestone

IB Valley Coalfield

Location

The IB Valley coalfield is named after the river IB, a tributary of the Mahanadi that runs through the coalfield's eastern edge. The coalfield spans the districts of Sundargarh, Jharsuguda, and Sambalpur in Orissa and is shaped like a half-ellipse. It is closed in the southeast and open in the north. This coalfield forms part of the large Gondwana basin that extends across several districts in adjoining Chhattisgarh. The coalfield is contiguous to the Mand-Raigarh coalfield in Chhattisgarh.



Area: 1460 sq. km.
Latitude: 21°51′N
Longitude: 83°56′E
Location: Jharsuguda District

The administrative border between Orissa and Chhattisgarh states runs through the Mand-Raigarh and IB Valley coalfields. The two possible coal-bearing formations in the coalfield are Barakar and Karhabari. The Barakar formation is where the majority of coal seams are stored. The potential coal-bearing region is around 300 square kilometres and stretches along the south, east, and northern edges. The coal seams have been extensively investigated in the southern half of the coalfield and the eastern part, and a large portion of the basin's northern edge.

IB Valley coalfield is approximately 400 km away from Odisha's coastline. The major ports connected through the Indian Railways system are Dhamra port through Bhadrak Jn. and Paradip port through Cuttack Jn. The closest inland waterway is the proposed NW-5 on the Brahmini river.

The closest terminal will be at Samal Barrage, which is approximately 270 km from the coalfield. The main national highway connecting it to Chhattisgarh in the west and the Odisha coastline in the east is NH-49. State Highway 10 connects the north and south, running from Sambalpur in the south to Sundargarh in the north.

Geological Reserve

According to an assessment by GSI (Inventory of Geological reserves of Indian coal) IB Valley coalfield contains 32,101 million tonnes of coal reserves as on 01/04/20/. Out of these 15,335 million tonnes of coal is of "Proved" category. It is home to India's third-largest coal deposit.

The below figure provides grade-wise, depth-wise coal resources in IB Valley coalfield.

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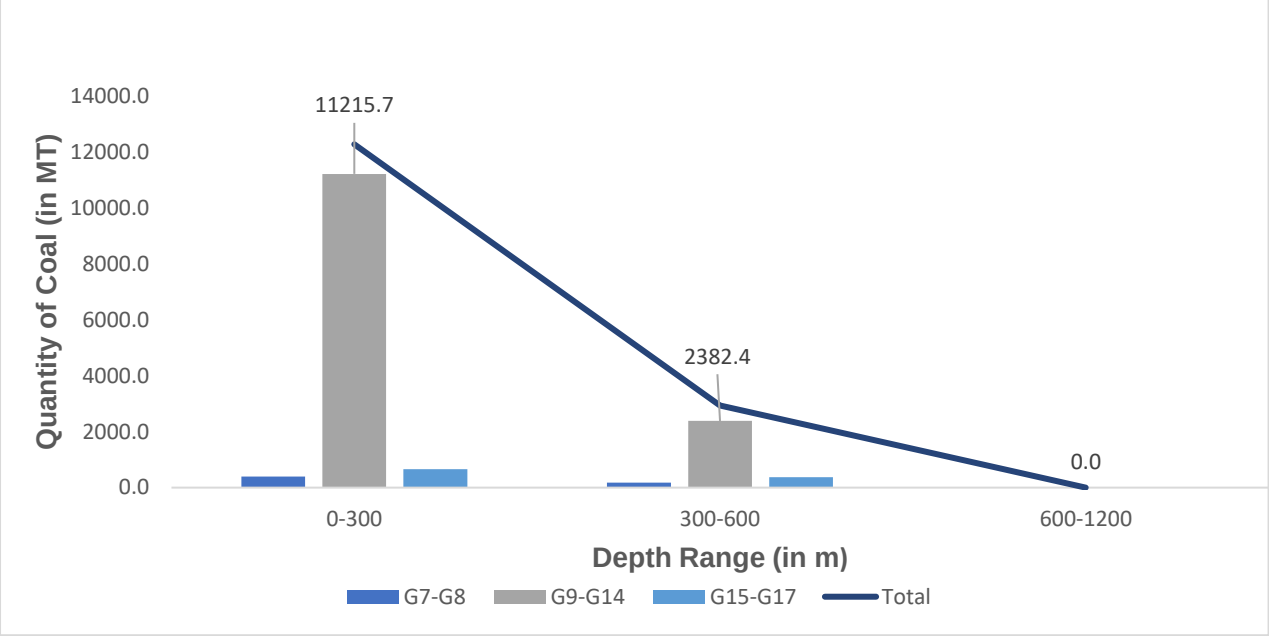
Figure 36 Grade wise Geological Resources of Coal at IB Valley Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Under the CMSP Act of 2015 and the MMDR Act, six coal blocks have been allocated to non-CIL owners. Due to a legal dispute, no information about Talabira I could be obtained. Given their PRC, these blocks have the potential to produce 81 MTPA of coal.

Table 70 List of Non-CIL Coal Blocks in IB Valley Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Dulanga	NTPC Ltd.	7
2	Manoharpur	Odisha Coal & Power Limited.	8
3	Manoharpur Dip side	Odisha Coal & Power Limited.	8
4	Talabira-II & III	NLC	20
5	Talabira I*	GMR Chhattisgarh Energy Ltd.	3
6	Jamkhani^	Vedanta Ltd.	2.6
7	Kuraloi A North	Vedanta Ltd.	8

* Legal dispute. Data not received
^ Data not received
Source: CMPDIL, Ministry of Coal

The Ministry of Coal opened the second tranche of coal mine auctions for commercial coal mining on March 25, 2021, with 67 mines available. Four mines from the IB Valley coalfield are among them; details are provided in the table below:

Table 71 Coal blocks to be allocated in IB Valley Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Bartap	Partially Explored	2500	60*
2	Burpahar	Explored	548	10
3	Dip Extn of Belpahar	Partially Explored	2500	60*
4	Dip side of Chatabar	Partially Explored	2500	60*

* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years and accordingly, the PRC

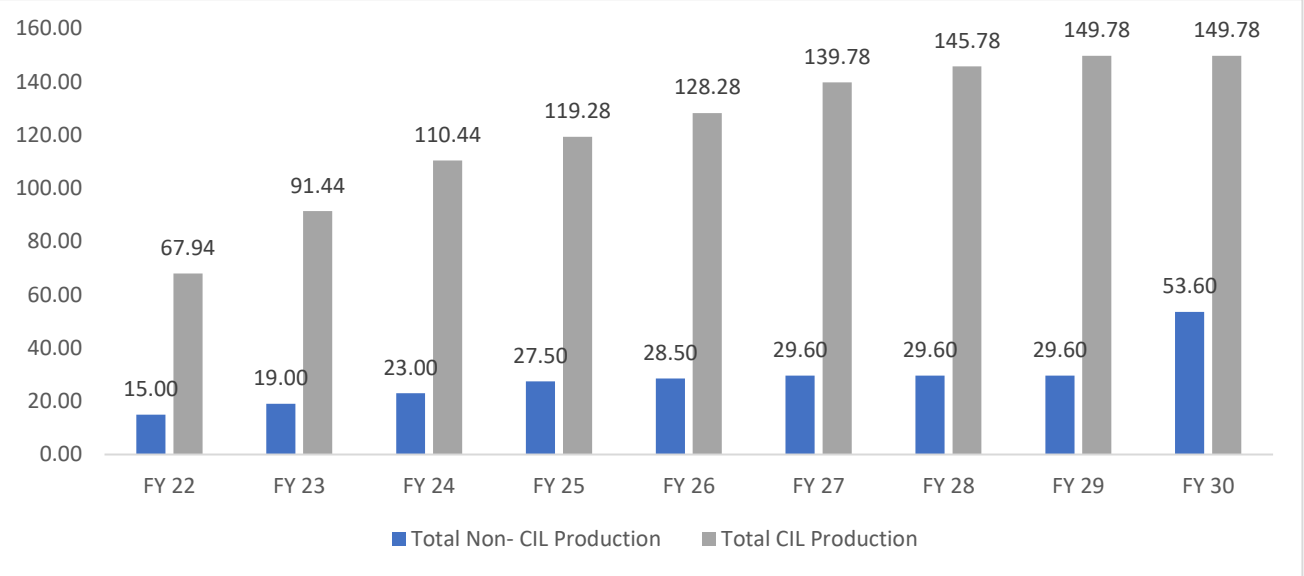
of Bartap, dip extn of Belapahar and Dip side of Chatabar is 60 each

Source: CMPDIL, Ministry of Coal

Production

The chart below graphically shows how coal production will increase year on year. It is predicted that 203 MTPA of coal will be produced by FY 30. This raises the importance of sound rail and road infrastructure around the coalfield for efficient evacuation.

Figure 37 Coal Production Potential in IB Valley by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

National Highway 49 (a merger of the old NH 6 and the new NH 200) is a major highway. This highway runs from Bilaspur in the Indian state of Chhattisgarh to Kharagpur in West Bengal. It runs from NH 130 near Bilaspur to NH 16 near Kharagpur in West Bengal. It provides East-West connectivity to coal blocks in IB Valley and is, on average, only a kilometre away from the mines.

State Highway 10 runs from Rourkela to Sambalpur. It is part of Biju Expressway (a 650 km dual carriageway route from Chandili, Koraput to Rourkela).

Hemgir road and Sundargarh-Garjanbahal--Hemgir road (also known as Sundargarh - Raigarh road) are important district roads which give the coal blocks route towards the state and national highways. These roads must be in excellent condition because they may become bottlenecks in evacuation before reaching highways and railway stations.

Table 72 Important Roads in the vicinity of IB Valley Coalfield

S No.	Roads	Type of Road	Description
1	National Highway 53 (Previously – NH 6)	National Highway	Connects Surat, Gujarat to Sambalpur then to Paradip port in Odisha
2	National Highway 49 (combination of old NH 6 and NH 200)	National Highway	The highway which connects Bilaspur, CH to Kharagpur, WB. It passes

			through Jharsuguda.
3	State Highway 10	State Highway	It starts near Budhapal and passed through Chhendipara, Kosala and terminates near Angul
4	Hemgir Road	Local Road	Connects Hemgir to Kanika
5	Sundargarh Garjanbahal-Hemgir Road	Local Road	Connects Sundargarh to Hemgir

Source: Primary and Secondary research

Railway

Since IB Valley coalfield is located on the administrative border between Chhattisgarh and Odisha, the important Railway sections around it are operated by two zonal railways, namely South East Central Railway in Chhattisgarh and East Coast Railway in Odisha. Jharsuguda Road Jn. is the most important railway station/node for the coalfield. Through it the coalfield is connected to Paradip/Dhamra port in Odisha using the Jharsuguda-Sambalpur-Budhapank-Cuttack route. Towards the south, one can take the - Jharsuguda-Sambalpur-Bargarh railway line to reach Titlagarh. Eastern connectivity to Raipur/Bilaspur is provided by the Jharsuguda-Kharsia railway line.

Table 73 Existing Railways lines in the vicinity of IB Valley Coalfield

S No.	Railway Zone	Section
1	South East Central Railway	Kharsia - Jharsuguda Rd Jn.
2	South Eastern Railway - East Coast Railway	Jharsuguda Rd Jn. - Sambalpur Jn.
3	East Coast Railway	Bargarh Rd. - Barpali
4	East Coast Railway	Barpali - Titlagarh Jn.

Source: Ministry of Railways

Coastal Shipping

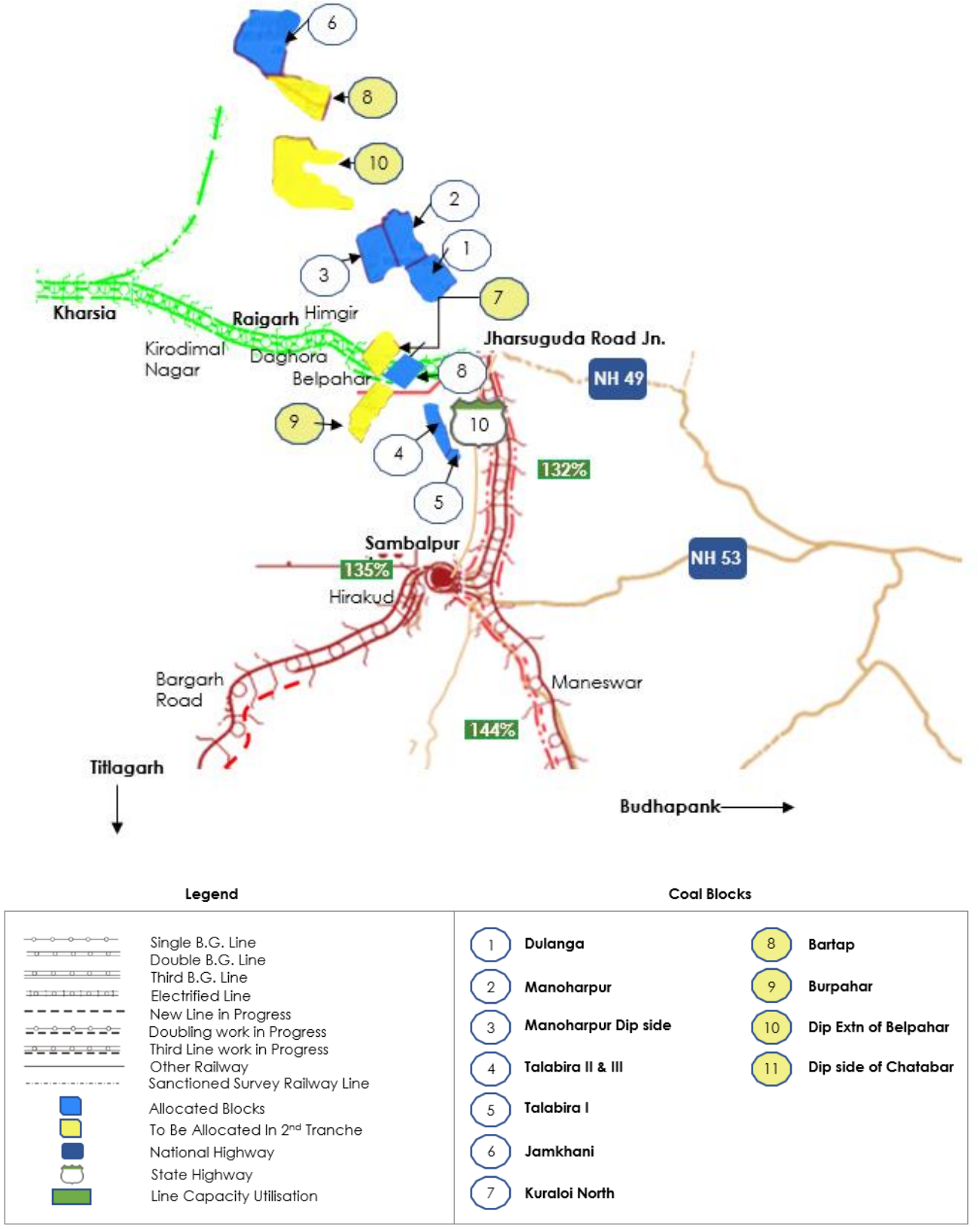
The coastal connectivity for Ib valley coalfield is of similar situation to that of Talcher coalfield. Coal will have to travel approximately 200 km more than that from Talcher to reach Paradip and Dhamra port.

Inland Waterways

The proposed NW-5 can transport coal to Paradip and Dhamra port in Odisha for shipping purposes. Using the stretch on Brahmani River which is approximately 240 km away coal can be transported to West Bengal in East and further south through sea.

It is now in the development phase and is expected to be operationalised in the next 4-5 years.

Figure 38 Map showing connectivity of IB Valley Coalfield



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Dulanga Coal Block:

The Dulanga Coal block, which is currently operational, is owned by NTPC Ltd. The neighbouring coal blocks are Manoharpur and Manoharpur Dipside. The end-use plant is Darlipali Super Thermal power station in Darlipalli Village of Sundargarh, Odisha.

Presently coal is transported using road as an interim arrangement for two years i.e., till completion of construction of permanent coal evacuation system by MGR. Coal is consumed by plant which is 32 km away. Potentially there is a possibility to transport coal from Himgir-Jharsuguda railway line and then through Jharsuguda-Sambalpur-Budhapank-Cuttack railway line to deliver coal to Paradip port. Feasibility of such transportation will depend on the location of future EUP. Once operational, the NW-5 may also be used to transport coal to the ports.

Details									
Name of the Owner	NTPC Ltd.			**PRC (MTPA)**		7			
Status of the Mine	Operational			**Coalfield**		IB Valley			
Infrastructure Available									
Nearest Railway Station	Himgir Railway Station			**Approximate Distance from Railway Station (in Km)**		10			
Nearest Road	Sundargarh Garjanbahal-Himgir Road			**Approximate Distance from Road (in Km)**		55			
Nearest Port	Paradip			**Approximate Distance from Port (in Km)**		432			
Nearest Waterway	NW-5			**Approximate Distance from Waterway (in Km)**					
End-user Plant Details									
Plant 1	Darlipali Super Thermal Power Station								
Location	Sundargarh district, Odisha								
Lead Distance from Mine (in km)	32								
Connectivity infrastructure for the coal block									
Trunk infrastructure:	Coal will be transported to mine on road till completion of MGR line.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	7	7	7	7	7	7	7	7	7

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Source: Primary Research, Ministry of Coal, Coal block Allocatee

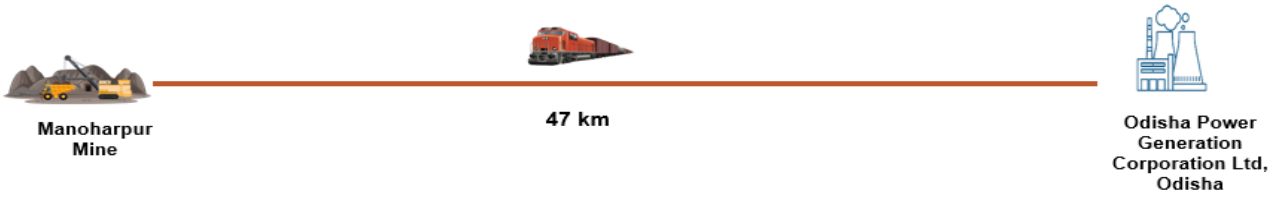
Manoharpur Coal Block:

Odisha Coal & Power Limited owns the Manoharpur Coal Block, which is now operational. Manoharpur Dipside is a neighbouring coal block. The end-use plant is Odisha Power Generation Corporation Ltd, at Banharpali, Jharsuguda Odisha.

NH-49 is the highway that is closest to the block. As of now railway line from Himgir station is used for evacuation. It has a dedicated railway line that runs 47 kilometres from mine to plant. There is a railway siding at plant for last mile connectivity. There is a possibility of transporting coal from Himgir to Jharsuguda and then delivering it to Paradip port via the Jharsuguda-Sambalpur-Budhapank-Cuttack railway line. The future EUP's location will determine the feasibility of such transit. NW-5, once operationalised can also be used to transport coal to the ports.

Details			
Name of the Owner	Odisha Coal & Power Limited	**PRC (MTPA)**	8
Status of the Mine	Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Himgir Railway Station	**Approximate Distance from Railway Station (in Km)**	20
Nearest Road	SH 10 & NH 49	**Approximate Distance from Road (in Km)**	
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	600
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	
End-user Plant Details			
Plant 1	Odisha Power Generation Corporation Ltd		
Location	Banharpali, Jharsuguda Odisha		
Lead Distance from Mine (in km)	47		
Connectivity infrastructure for the coal block			
Trunk infrastructure:	Coal is transported by rail from Himgir Railway Station to EUP		

Last Mile Connectivity	There is a rail siding at plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									8



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Manoharpur Dip Side Coal Block

Details			
Name of the Owner	Odisha Coal & Power Limited	**PRC (MTPA)**	8
Status of the Mine	Non-Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Himgir Railway Station	**Approximate Distance from Railway Station (in Km)**	20
Nearest Road	SH 10 & NH 49	**Approximate Distance from Road (in Km)**	
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	600
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									8

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Talabira II & III Coal Block

The Talabira II & III Coal block, is owned by NLC and started production in April 2020. The neighbouring coal block is Talabira I Coal Block. The end-use plant is NLC Tamil Nadu Thermal Power Plant at Thoothukudi, Tamil Nadu and LC Talabira TPP Kumbhari & Tharaikela Jharsuguda, Odisha.

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SH 10 is the state highway closest to the coal block. Coal is presently being transported to the power plant in Jharsuguda, Odisha using road. There is also a plan for a conveyor system. Coal for the Tamil Nadu plant will be carried by road to a nearby railway siding in Lapanga Railways station (Sambalpur division, East Coast Railways), then transported by Sambalpur-Angul-Budhapank-Cuttack railway line to Paradip port, where it would be shipped to Tuticorin port. The NLC Tamil Nadu Thermal Power Plant is situated right at the port. When proposed NW-5 is operationalised, coal can also be transported to Paradip or Dhamra port using the waterway.

Details			
Name of the Owner	NLC	**PRC (MTPA)**	20
Status of the Mine	Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Lapanga	**Approximate Distance from Railway Station (in Km)**	40
Nearest Road	SH 10	**Approximate Distance from Road (in Km)**	2.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	350
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	
End-user Plant Details			
Plant 1	NLC Tamil Nadu Thermal Power Plant	**Plant 2**	NLC Talabira TPP Kumbhari & Tharaikela
Location	Thoothukudi, Tamil Nadu	**Location**	Jharsuguda, Odisha
Lead Distance from Mine (in km)	1571	**Lead Distance from Mine (in km)**	5
Connectivity infrastructure for the coal block			
Trunk infrastructure:	i. Coal is transported to Jharsuguda plant on road. ii. Coal is currently shipped to Tamil Nadu from Paradip port to Tuticorin port		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	8	12	16	20	20	20	20	20	20

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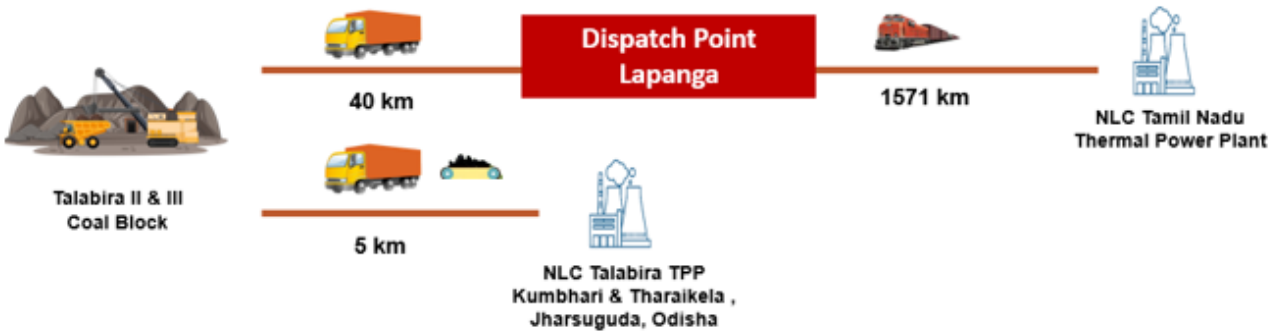

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Talabira I Coal Block

The Talabira-I coal block is under legal dispute and no data has been provided for the coal block.

Details			
Name of the Owner	GMR Chhattisgarh Energy Ltd	**PRC (MTPA)**	8
Status of the Mine	Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Lapanga	**Approximate Distance from Railway Station (in Km)**	40
Nearest Road	SH 10	**Approximate Distance from Road (in Km)**	2.5
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	350
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	

Coal production up to FY 2030										
Financial Year	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)										

Jamkhani Coal Block

Vedanta Ltd owns the Jamkhani coal block. The neighbouring mines are Bijahan and Burapahar. The proposed mode of coal evacuation is through road and railways. Hemgir road and then NH 49 can be used to deliver coal to EUP in Jharsuguda which is approximately 57 km away from the coal block. There is also rail siding at the plant. Coal can be transported to the plant using Himgir-Jharsuguda Rd railway line. A rail or road extension from the block to Himgir railway station to a coal

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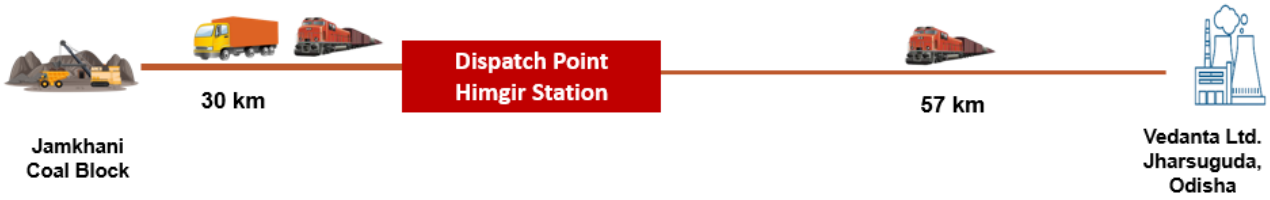
block of approximately 30 km would benefit evacuation. Potentially there is a possibility to transport coal from Himgir-Jharsuguda railway line and then through Jharsuguda-Sambalpur-Budhapank-Cuttack railway line to deliver coal to Paradip port. The feasibility of such transportation will depend on the location of future EUP.NW-5, once operationalised, can also be used to transport coal to the ports.

Details			
Name of the Owner	Vedanta Ltd.	**PRC (MTPA)**	2.6
Status of the Mine	Non-Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Himgir Railway Station	**Approximate Distance from Railway Station (in Km)**	30
Nearest Road	Hemgir Road	**Approximate Distance from Road (in Km)**	30
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	600
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	
End-use Plant Details			
Plant	Vedanta Ltd.		
Location	Jharsuguda, Odisha		
Lead Distance from mine (in km)	57		
Connectivity infrastructure for the coal block			
First-mile Connectivity	A road/rail extension from coal block to Himgir railway station is proposed for efficient evactuation.		
Trunk infrastructure:	Coal can be transported by rail from Himgir Railway Station to EUP		
Last Mile Connectivity	There is a rail siding at plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)				0.5	1.5	2.6	2.6	2.6	2.6



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Kuraloi A North Coal Block:

Kuraloi A North Coal Mines has been designated as a commercial block, meaning coal mined from this block can be used elsewhere. Currently, the proposed end-use plant identified is Vedanta Power Plant in Jharsuguda, Odisha, approximately 35 km away.

The neighbouring mine Samleswari Kudopali is currently non-operational. The other neighbouring mines Bartap, Dip Extn. of Belpahar and Tangardih East are currently unallocated.

The nearest railway station is Belpahar (Bilaspur Division, South East Central Railway), which is approximately a kilometre away from the coal block. The nearest major highway is NH 49, which runs through the block and connects it to Jharsuguda. Belpahar-Jharsuguda Rd. railway line can be used to deliver coal to EUP via rail. There is a rail siding at plant for last mile connectivity.
Coal can also be shipped through Paradip port to future EUPs due to the commercial nature of the coal block. Belpahar-Jharsuguda Road and later the Jharsuguda-Sambalpur-Cuttack railway line can deliver coal to the nearly 600-kilometre-away Paradip port. NW-5, once operationalised can also be used to transport coal to the ports. The nearest terminal is at Samal Barrage, which is approximately 225 km away.

Details			
Name of the Owner	Vedanta Ltd.	**PRC (MTPA)**	2.6
Status of the Mine	Non-Operational	**Coalfield**	IB Valley
Infrastructure Available			
Nearest Railway Station	Belpahar Railway Station	**Approximate Distance from Railway Station (in Km)**	1
Nearest Road	NH-49	**Approximate Distance from Road (in Km)**	24
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	600
Nearest Waterway	NW-5	**Approximate Distance from Waterway (in Km)**	225
End-use Plant Details			
Plant	Vedanta Ltd.		
Location	Jharsuguda, Odisha		
Lead Distance from mine (in km)	35		
Connectivity infrastructure for the coal block			
Trunk infrastructure:	Coal can be transported by rail from Belpahar Railway Station to EUP		
Last Mile Connectivity	There is a rail siding at plant.		
Coal production up to FY 2030			

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Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									8

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

MCL mines produced 67.94 MT of coal from the IB Valley coalfield in fiscal year 2021-22, which is predicted to increase to 110.4 MT and 147.8 MT in fiscal years 24 and 30, respectively. Going forward mines contributing to coal production from MCL in IB valley are provided below

Table 74 CIL Mines in IB Valley Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Samaleswari OCP	Completed	15
2	Lajkura OCP	Completed	4.5
3	Lakhanpur OCP	Completed	32
4	Belpahar OCP	Completed	
5	Kulda OCP	Ongoing	
6	Garjanbahal OCP	Ongoing	
7	Kulda - Garjalbahal Exp. OCP	Future	31
8	Basundhara (W) Extn.	Ongoing	7.35
9	Siarmal OCP	Ongoing	20
10	Orient Area	Existing	0.78

By FY 24, the Lakhanpur OCP, the Kulda - Garjalbahal Exp. OCP, and the Siarmal OCP are predicted to be the three major contributors to coal output. Rail, road and MGR systems are currently and planned to be used. Dispatch via railways is projected to increase by 186% from FY 21 to FY30. Jharsuguda- Bilaspur railway line of South East Central Railway is used to deliver coal via railways. This line is used from the sidings at the mines. The coalfield will have a strong influence on the increased demand for rakes for evacuation.

With this increase in production the requirement of rakes will significantly increase to 81 rakes per day for MCL only.

For FMC, a combined CHP and SILO serving both Lakhanpur and Belpahar mines will be developed by 2022. Rail sidings are also proposed for Lajkura and Sardega. The mines and their associated FMC are shown in the table below.

Table 75 First-mile Infrastrucure in IB Valley Coalfield

S No.	Name of Mine	First-mile Connectivity Infrastructure
1	Samaleshwari & Lajkura	LOCM I Siding
		LOCM II Siding
		LOCM III Siding
2	Lakhanpur & Belpahar	BOCM I
		BOCM II
		BOCM III
		BOCM VI
		BOCM VII
3	Kulda, Garjanbahal & Basundhara West	Kanika Siding
		Sardega Siding
4	Lakhanpur OCP	MGR

Source: Ministry of Coal, CIL

Analysis and Recommendations

There is significant production capacity enhancement expected in the area. MCL is a major contributor with a share of about 147.8 MT during fiscal year 30.

For smooth evacuation of this production already MCL has identified the need for enhancement and infrastructure and with co-ordination with railways, The second phase of Jharsuguda railway station and Sardega via Barpali station project involving doubling of the line given projected coal production from Siarmal – 50 MTPA; Kulda-Garjanbahal-40 MTPA; and Basundhara West-7 MTPA.

Monitoring the progress of these project is critical for efficient evacuation of coal. With the help of automation and various technological interventions it is feasible to monitor actual field development using smart technologies.

Co-ordination with railways is required considering the expected of wagons from enhanced production.

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Maharashtra

8. Maharashtra

Maharashtra is one of the major industrial states of the country. The state is in the western peninsular region of India , occupying a substantial portion of the Deccan Plateau. It is well-connected by roadways, railways, waterways, and airways. The power supply in the State is one of the most stable and reliable in the country.

The total length of roads in the State is 2.29 lakh km, consisting of 4,367 km of National Highways; 33,406 km of State Highways; 48,824 km of major district roads, etc. Five national highways connect the State with Delhi, Calcutta, Allahabad, Hyderabad, and Bangalore. The State has an extensive road network, including a six-lane dual carriage expressway linking the cities of Mumbai and Pune. The Western, Central and Harbour railway lines connect the Mumbai city to distant suburbs and destinations across India.

There are two major, and 48 notified minor ports in the State. Mumbai port and the Jawaharlal Nehru Port Trust (JNPT) are the two major ports that provide the largest port facilities in the country. They handle a major proportion of the country's incoming and outgoing cargo traffic.

Wardha valley is one major coalfield in the state.12 non-CIL coal blocks have been allocated, and 1 block is planned to be allocated in the 2nd trench. Kamptee is another important coalfield in the area but no non-CIL coal block stand is allocated in the area.

Wardha Valley Coalfield

Location

Wardha Valley Coalfield is in Maharashtra's Yavatmal and Chandrapur districts and covers an area of approximately 4130 square kilometres. It is situated in India's central region. This coalfield is unique in India since it has a significant reserve of thermal grades non-coking coal to meet the demand for coal in the western part of the country. The coalfields in Wardha Valley are well connected by rail and road.

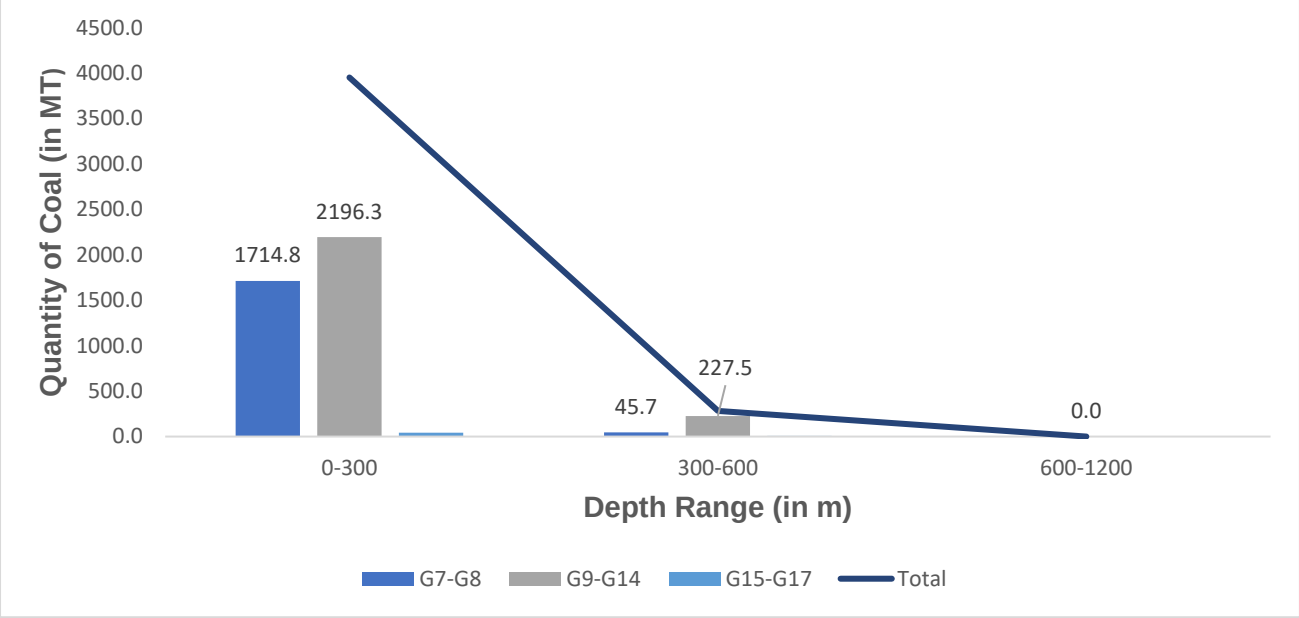
Area: 4130 sq. km.
Latitude: 19º58'34'' N
Longitude: 79º05'17''E
Location: Yavatmal, Chandrapur Districts

Chandrapur is the coalfield's main town, with Nagpur having 19 km to the north, Wardha (120 km) to the west, and Kazipet (250 km) to the south. Chandrapur is also connected by rail to Nagpur in the north and Kazipet in the south, via the Central Railways' mainline that runs through the coalfield.

Geological Reserve

According to estimates by the Geological Survey of India (GSI), the Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, the Wardha Valley coalfield holds 7,732 million tonnes of coal reserves as of 1 April 2020, of which 4567 million tonnes fall under "Proved" category. The graph below depicts the Wardha Valley coalfield's grade and depth analysis of coal resources.

Figure 39 Grade wise Geological Resources of Coal at Wardha Valley Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

The CMSP Act of 2015 and the MMDR Act have paved the way for the allocation of 13 coal blocks to non-CIL owners in Wardha Valley. The full analysis of each coal block will be discussed in the next portion of this chapter. The table below lists the mines and their allocatees.

Table 76 List of Non-CIL coal blocks in Wardha Valley Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1-6	Baranj I, Baranj II, Baranj III, Baranj IV, Manora Deep & Kiloni	Karnataka Power Corporation Ltd	2.5
7	Belgaon	Sunflag Iron and Steel Company Limited	0.27
8	Marki Mangli-III	B.S. Ispat Limited	0.3
9	Marki Mangli-I	Topworth Urja and Metals Ltd	0.38
10	Marki Mangli-II	Yazdani International Private Limited	0.3
11,12	Takli-Jena-Bellora (North & South)	Aurobindo Reality and Infrastructure Private Limited	1.5
13	Nerad Malegaon	Indrajit Power Private Ltd	0.36

Source: CMPDIL, Ministry of Coal

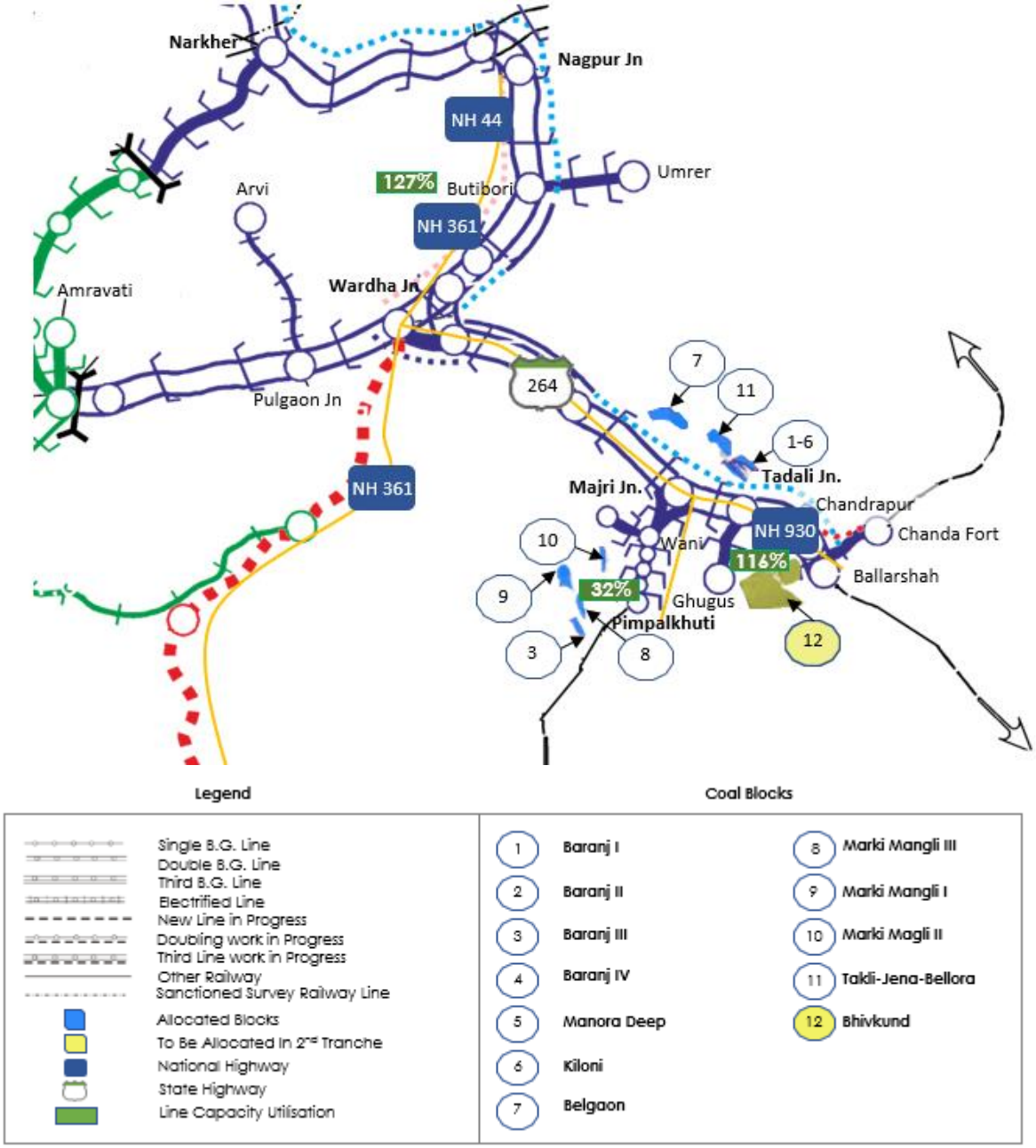
Bhivkund coal block having proposed PRC of 0.72 MTPA is listed to be auctioned during 2nd Tranche of the commercial block.

Table 77 Coal block to be allocated in Wardha Valley Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Bhivkund	Explored	102.3	0.72

Source: CMPDIL, Ministry of Coal

Figure 40 Wardha Valley map showing coal blocks, roads and railway connectivity

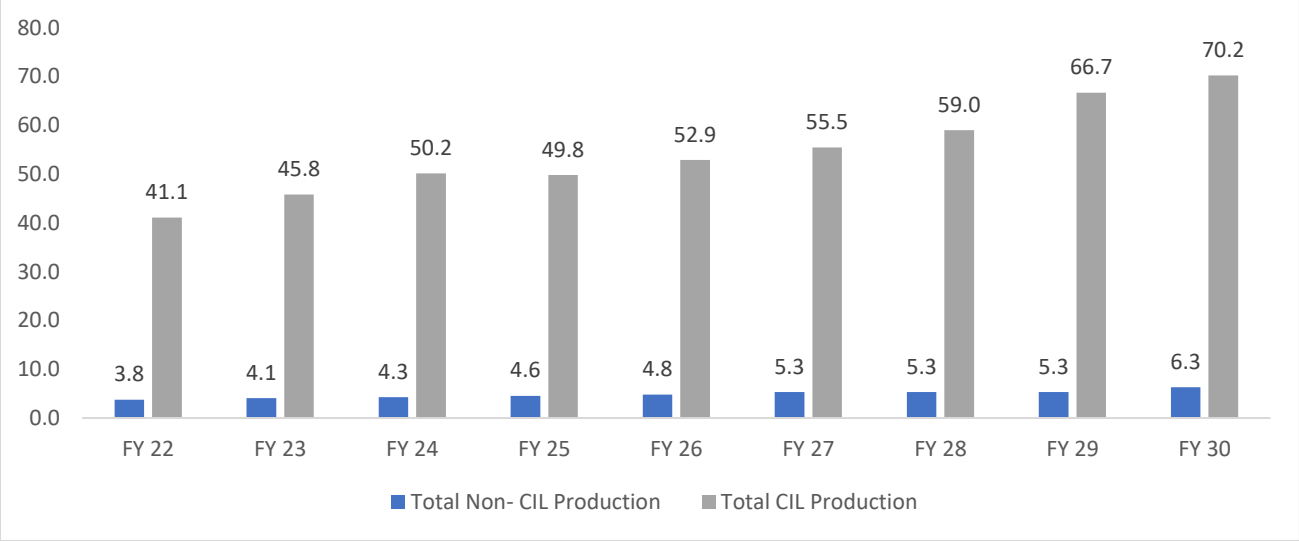


Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Production

By 2030, there is a potential for 76.5 MT of coal production. Non-CIL mines would contribute approximately 6.3 MT of coal. The graph below depicts output projections from year to year till the financial year 2029-30.

Figure 41 Coal Production Potential in Wardha Valley Coalfield by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

NH 930 is the national highway is the most important highway around Wardha Valley coalfield. It passes from Chandrapur through Warora, Wani and finally Karanji. State Highways 264 and 233 pass through the coalfield and are used to transport coal from mines to sidings and railway stations. Wani-Mukutban Road connects Nerad and Kayar from SH 234 to Wani in the North.

Table 78 Important Roads in the vicinity of Wardha Valley coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 930	National Highway	It is a spur road of National Highway 30. Passes through Chandrapur, Warora, Wani and Karanji
2	State Highway 234	State Highway	Passes through Kayar and Mukutban
3	State Highway 233	State Highway	Passes through Kayar, Wani, Pandharkawada
4	State Highway 236	State Highway	Passes through Babulgaon, Wani, Ralegaon
5	MSH 6	State Highway	It starts from Maharashtra - Madhya Pradesh border and Passes through Paratwada - Amravati - Yavatmal Up to Chandrapur.
6	State Highway 264	State Highway	Passes through Durgapur, Bhandak, Majri, Warora
7	Wani Mukutban Road	Local Road	Connects Mukutban to Wani
8	Wani Patanbori	Local Road	Road originating from Wani towards Patanbori

Source: Primary and Secondary research

Railways

The administrative headquarter of the railways around Wardha Coalfield is in Nagpur. It is the division headquarters of Central Railway. The route from Pimpalkuti to Majri Jn. is the most important railway route since it connects the coalfield to the main railway line from Chandrapur- Majri Jn.-Wani.

Table 79 Existing Railways lines in vicinity of Wardha valley Coalfield

S no.	Railway Zone	Section
1	Central Railway	Pimpalkuti-Majri Jn.
2	Central Railway	Majri Jn.-Chandrapur
3	Central Railway	Majri Jn.-Wardha Jn
4	Central Railway	Wardha Jn.-Nagpur Jn.

Source: Ministry of Railways

Wardha Valley coalfield is located in Central India, south of Nagpur in Maharashtra

The location of Wardha Valley is such that it's almost equidistant from both the eastern and western coastlines of India. Visakhapatnam port is approximately 750 km from the coalfield. Mumbai port is approximately 800 km away. Due to the central location of the coalfield, shipping coal from Wardha Valley by sea is not feasible; instead, road and rail are preferred.

Coastal Movement

Coal Evacuation Plan

Non-CIL Mines

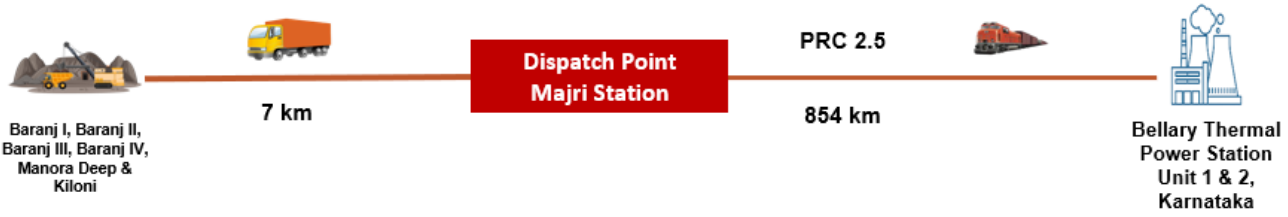
Baranj I, Baranj II, Baranj III, Baranj IV, Manora Deep & Kiloni coal blocks

The Baranj I, Baranj II, Baranj III, Baranj IV, Manora Deep & Kiloni Coal blocks are currently non-operational and owned by Karnataka Power Corporation Limited. The neighbouring coal blocks are Takli-Jena-Bellori and West of Kiloni. The end-use plant is Bellary Thermal Power Project in Karnataka.

According to the planned proposal, coal will be transported from the mine pit to the coal handling plant by haul trucks. It will be carried to Majri Junction Railway Station (Nagpur Division, Central Railway), which is approximately 7 kilometres away, by dumpers from the coal handling plant. Majri Jn-Pimpalkutti railway line can transport coal to end-use plant southwards in Bellary, Karnataka approximately 861 km away.

Details			
Name of the Owner	Karnataka Power Corporation	**PRC (MTPA)**	2.5
Status of the Mine	Non-Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Majri Junction	**Approximate Distance from Railway Station (in Km)**	7
Nearest Road	SH 264	**Approximate Distance from Road (in Km)**	0.1
Nearest Port	Mumbai	**Approximate Distance from Port (in Km)**	849
End-user Plant Details			

Plant-1	Bellary Thermal Power Station Unit 1 and 2								
Location	Karnataka								
Lead Distance from Mine (in km)	861								
Connectivity infrastructure for the coal block									
First-mile Connectivity	Roadways will be used to deliver coal to Majri Junction by haul trucks.								
Trunk infrastructure:	Coal will be transported to the plant by train using the Majri-Pimpalkutti railway line.								
Last Mile Connectivity	There is a railway siding at plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Belgaon coal block

The Belgaon Coal block, which is currently operational, is owned by Sunflag Iron and Steel Company Limited. The neighbouring coal blocks are Majra, Pawanchora West. The end-use plant is 500 TPD KILN DRI/ 10MW Combuster, 350 TPD KILN DRI and 15MW Captive power plant (Bhandara, Maharashtra).

The Chikni Road Station (Nagpur Division, Central Railway) is about 4.5 kilometres away, and coal is brought there by road. Coal is transported to end-use plants in Bhandara, Maharashtra, via the Chikni-Wardha-Nagpur Jn. railway line. The plants are 150 km and 207 km away from Chikni Road station respectively.

Details			
Name of the Owner	Sunflag Iron and Steel Company Limited	**PRC (MTPA)**	0.27
Status of the Mine	Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Chikni Road Station	**Approximate Distance from Railway Station (in Km)**	4.5
Nearest Road	SH 264	**Approximate Distance from Road (in Km)**	7

Nearest Port	Kakinda Port	**Approximate Distance from Port (in Km)**	683
End-user Plant Details			
Plant 1	500 TPD KILN DRI/ 10MW Combustor, 350 TPD KILN DRI	**Plant 2**	15 MW Captive Power Plant
Location	Bhandara, Maharashtra	**Location**	Bhandara, Maharashtra
Lead Distance from Mine (in km)	150	**Lead Distance from Mine (in km)**	207
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is brought to Chikni Station by road.		
Trunk infrastructure:	Chikni-Wardha-Nagpur Jn railway line is used to transport coal on rail.		
Last Mile Connectivity	Plants receive coal on rail.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Marki Mangli-III coal block

The Marki Mangli-III coal block, which is currently non-operational, is owned by B.S. ISPAT Limited. The neighbouring coal blocks are Makri Mangli–II and IV Coal Block. The end-use plant is BS ISPAT Ltd, in Nagpur, Maharashtra

The coal will be evacuated using Road network. The transportation volume is very low.

Details			
Name of the Owner	B.S. Ispat Limited	**PRC (MTPA)**	0.3
Status of the Mine	Non-Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Kayar station	**Approximate Distance from Railway Station (in Km)**	to be checked
Nearest Road	Wani-Mukutban road	**Approximate Distance from Road (in Km)**	500

Nearest Port	Nagpur	**Approximate Distance from Port (in Km)**	142
End-user Plant Details			
Plant-1	B.S. ISPAT LTD		
Location	Nagpur, Maharashtra		
Lead Distance from Mine (in km)	198		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal will be evacuated using roads.		
Trunk infrastructure:	Coal will be transported through NH 130 to plant. A conveyor system between the mine and the plant is being investigated.		
Last Mile Connectivity	Plant will receive coal on road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Marki Mangli-I coal block

The Marki Mangli I Coal block, which is currently operational, is owned by Topworth Urja and Metals Ltd. The neighbouring coal blocks are Ghonsa Parodha, Makri-Zari-Jamani-Adkoli. The end-use plants of this mine are (2x100) Sponge Iron Plant situated at Umred road, Nagpur and (2x13 MW) Captive Power Plant situated at Umred road, Nagpur.

Road networks will be used to transport the coal. Coal is transported to plants at Umred, Nagpur, through SH 234 (about 7 km distant), Nerad, Wani, and Warora.

Details			
Name of the Owner	Topworth Urja and Metals Ltd	**PRC (MTPA)**	0.38
Status of the Mine	Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Kayar	**Approximate Distance from Railway Station (in Km)**	24
Nearest Road	SH 264	**Approximate Distance from Road (in Km)**	6

Nearest Port	Nagpur	**Approximate Distance from Port (in Km)**	142
End-user Plant Details			
Plant 1	2 X 100 TPD Sponge iron plant	**Plant 2**	2 X 13 MW Captive power plant
Location	Umred Road, Nagpur	**Location**	Umred Road, Nagpur
Lead Distance from Mine (in km)	200	**Lead Distance from Mine (in km)**	158
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal will be transported via road.		
Trunk infrastructure:	SH 234 is used for transporting coal to EUPs through road.		
Last Mile Connectivity	Plants will receive coal on road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Marki Mangli- II coal block

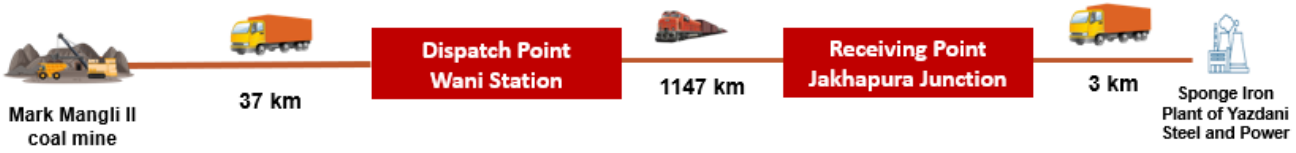
The Marki Mangli- II Coal block, which is currently operational, is owned by Yazdani International Private Limited. The neighbouring coal blocks are Makri Mangli- I and III. The identified end-user plant is Sponge Iron Plant of Yazdani Steel and Power, Kalinga Nagar, Jajpur, Odisha.

SH 234 is used to transport coal to Wani Railway Station (Nagpur Division, Central Railway). After that, travel northwards on the Wani-Nagpur railway line to Bilaspur and eventually Jakhapura Junction in Odisha. Jakhapura Jn. is approximately 2.5 km from the end plant. The plant does not have a railway siding.

Details			
Name of the Owner	Yazdani International Private Limited	**PRC (MTPA)**	0.3
Status of the Mine	Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Wani Railway Station	**Approximate Distance from Railway Station (in Km)**	37

Nearest Road	Wani Patanbori Road	**Approximate Distance from Road (in Km)**	1.5
Nearest Port	Mumbai	**Approximate Distance from Port (in Km)**	700
End-user Plant Details			
Plant-1	Sponge Iron Plant of Yazdani Steel and Power		
Location	Jajpur, Odisha		
Lead Distance from Mine (in km)	1147		
Connectivity infrastructure for the coal block			
First-mile Connectivity	SH 234 is used to take coal from mine to Wani railway station.		
Trunk infrastructure:	Coal is transported to Jakhapura station in Odisha via the Wani-Nagpur Railway line.		
Last Mile Connectivity	There is no railway siding at plant. Coal is transported on road from Jakhapura station to plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Takli-Jena-Bellora (North & South) coal block

The Tali-Jena-Bellora (North & South) coal block, which is currently operational, is owned by Jindal Power Ltd. The neighbouring coal blocks are Dip extension of Baranj, Manora Takli and Baranj I, Baranj II, Baranj III, Baranj IV, Manora Deep & Kiloni coal block.

Coal from Takli Jena Bellora (North & South) is expected to be sold to neighbouring consumers, with road transit being the most likely means of distribution. Presently coal transportation is happening via SH 264 and other state highways nearby. It is possible to use surrounding evacuation infrastructure, such as the existing road at Baranj OCP and other nearby mines.

Details			
Name of the Owner	Aurobindo Reality and Infrastructure Private Limited	**PRC (MTPA)**	1.5
Status of the Mine	Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Bhandak station	**Approximate Distance from**	7

		Railway Station (in Km)	
Nearest Road	SH 264	**Approximate Distance from Road (in Km)**	2
Nearest Port	Mumbai	**Approximate Distance from Port (in Km)**	400
Connectivity infrastructure for the coal block			
First-mile Connectivity	Roadways will be used to evacuate coal		
Trunk infrastructure:	Coal is currently transported using SH 264 to nearby consumers.		
Last Mile Connectivity	Last mile connectivity will depend on end consumers.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.25	0.25	0.50	0.75	1.00	1.50	1.50	1.50	1.50

Takli-Jena-Bellora (North & South) coal block

For Commercial Use

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Nerad Malegaon coal block

The Nerad Malegaon Coal block, which is currently operational, is owned by Indrajit Power Private Ltd. The neighbouring coal block are Makri-Zari-Jamani-Adkoli and Makri Mangli II. The end-user plant of this mine is Indrajit Power Private Limited (IPPL) Bhugaon Link Road, Wardha district of Maharashtra

Wani Mukutban Road is used initially to reach Kayar Railway Station (Nagpur Division, Central Railway). After that, the Kayar siding can be utilised to deliver coal to the MLSW Captive siding, which is around 127 kilometres away. End-use plant is 1 km away from this siding. The railway route passing through Kayar-Wani and finally Wardha, is used.

Details			
Name of the Owner	Indrajit Power Private Ltd	**PRC (MTPA)**	0.36
Status of the Mine	Operational	**Coalfield**	Wardha Valley
Infrastructure Available			
Nearest Railway Station	Kayar Railway Station	**Approximate Distance from**	5

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		Railway Station (in Km)	
Nearest Road	Wani-Mukutban Road	**Approximate Distance from Road (in Km)**	2
Nearest Port	Nagpur	**Approximate Distance from Port (in Km)**	142

End-user Plant Details									
Plant-1	Indrajit Power Private Limited (IPPL)								
Location	Wardha, Maharashtra								
Lead Distance from Mine (in km)	127								
Connectivity infrastructure for the coal block									
First-mile Connectivity	Wani-Mukutban road is used to deliver coal at Kayar Railway station.								
Trunk infrastructure:	Coal is transported using Kayar-Wani-Wardha railway line.								
Last Mile Connectivity	There is a rail siding at plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from Wardha Valley coalfield was 37.71 MT which is expected to reach 49.46 MT and 52.55 MT in FY 24 and FY 30 respectively. The following are the mines which are operational in the Wardha Valley coalfield operated by WCL. They are relatively small mines having PRC 0.10- 3.00 MTPA. Only three mines are producing more than 3 MTPA ones namely Penganga, Mungoli Nirguda Deep Extn and Pauni-II after expansion.

Table 80 WCL mines in Wadha Valley Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Mahakali	Existing	0.1
2	Ballarpur RO	Completed	0.15
3	Sasti RO	Completed	
4	Durgapur Rayatwari RPR	Completed	0.16
5	Hindusthan Lalpeth	Completed	0.11

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
	(Mana & Nandgaon)		
6	Rajur (Incl. RO)	Completed	0.11
7	Gauri I & II Expn. Scheme	Completed	
8	Pauni (OC SCHEME)	Completed	
9	Kolgaon RPR	Completed	
10	Explo.of Patch Pench (Shivpuri, Sethia, Barkui, Bhajipani))	Completed	
11	Scheme for Ballarpur OC	Completed	
12	Gauri Deep	Ongoing	0.6
13	Sasti Expn.	Ongoing	
14	Pauni-II Expansion OC	Ongoing	3.25
15	Durgapur Expn. Deep	Ongoing	3
16	Padmapur Deep Extension	Ongoing	1
17	New Majri Sector IA & II A Extn.	Ongoing	2
18	Mungoli Nirguda Deep Extn. OC	Ongoing	4.37
19	Bellora/ Naigaon Deep	Ongoing	1
20	Niljai Expansion (Deep)	Ongoing	4.5
21	Ghonsa RPR	Ongoing	0.6
22	Junad Extn.	Ongoing	
23	Kolar Pimpri Extn.	Ongoing	1.5
24	Ukni Deep	Ongoing	1.7
25	Hindustan Lalpeth Expn	Ongoing	1
26	Penganga	Ongoing	6.3
27	Amalgamated Yekona I & II OC (Incr.)	Ongoing	2.75
28	Bhatadih Expn. (including NW)	Ongoing	2
29	New Majri Expn UG to OC (Incr)	Ongoing	3
30	Narayani Expn OC	Ongoing	1
31	Dhuptala Sasti UG to OCP	Ongoing	1.7
32	Gauri-Pauni Expn	Future	1
33	Sasti Expn	Future	1
34	Gauti Central	Future	2
35	Konda Hardola	Future	2
36	Kumbharkhani UG to OC	Future	0.5
37	Chinchala-Pisgaon	Future	0.5
38	Pimpalgaon Deep	Future	1

Source: Ministry of Coal, CIL

Rail & Road Weighbridges in all Areas of WCL are duly calibrated. Also, RFID based weighment integration of all the Road weighbridges is happening.

Railway is a preferable mode of transportation for long distances. Due to smaller production from the mines, road is a prevalent mode of transportation for supplying coal to nearby end-use plants. The expected rake requirement from WCL production is expected to reach 39

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rakes per day by FY 30 from 21 rakes per day in FY21.

Analysis and Recommendations

The Wardha Valley Coalfield is well connected through the road as well as the railway network. The coal evacuation plan for 7 upcoming mines of WCL mines is already planned. Coal blocks Baranj I to IV, Manora Deep and Kiloni will shift their coal to CHP by trucks and from there to Majri railway siding, which will take it to the end plant using railways. End plant has a railway siding. Marki Mangli-II and Belgaon use the railway to transport their coal.

The production from the mines in this area is relatively small; hence dependency on the road is substantial. **The coordination among various agencies is required for the development of pukka/mortar roads connection between mine and nearest village/state or national highway for efficient evacuation of coal.**

WCL need to coordinate with Railway officials for the availability of rakes going forward.

Rail & Road Weighbridges in all Areas of WCL are duly calibrated. Also, RFID based weighment integration of all the Road weighbridges is happening.

Railway is a preferable mode of transportation for long distances whereas due to smaller production from the mines. The road is the prevalent mode of transportation for supplying coal to the nearby end-use plant. The expected rake requirement from WCL production is expected to reach 39 rakes per day by FY 30 from 21 rakes per day in FY21.

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Madhya Pradesh

9. Madhya Pradesh

Madhya Pradesh, which means "Central Province," is in India's geographic centre. The Narmada River, which runs east-west between the Vindhya and Satpura hills, runs through the state. The Singrauli region in Madhya Pradesh's eastern part is a major energy generating enclave for the state. Northern Coalfields Limited, a subsidiary of Coal India Limited, excavates enormous coal reserves in the region, which are then utilised in local power plants operated by NTPC, Sasan Power, and Hindalco.

The state is crossed by a 4,948-kilometre rail network, with Jabalpur serving as the headquarters for the Indian Railways' West Central Railway Zone. Bhopal, Ratlam, Khandwa, and Katni are all key railway junctions in the state.

Despite being served by multiple national highways, Madhya Pradesh has a low road density, particularly in rural areas. However, the development of all-weather traffic routes has been substantially aided by the construction of bridges across the Narmada and other rivers. There is no coastline in the state. The state is home to four significant coalfields. Apart from that, Umaria, Korar, and Johilla are additional coalfields, though they lack non-CIL blocks.

Singrauli Coalfield

Location

Singrauli Coalfield covers 2202 square kilometres and is divided into two basins: Moher Sub-basin and Singrauli Main basin. The Moher sub-basin is mostly in Madhya Pradesh's Singrauli district, with a minor portion in Uttar Pradesh's Sonebhadra district. The Singrauli main basin is largely undiscovered in the western half of the coalfield.

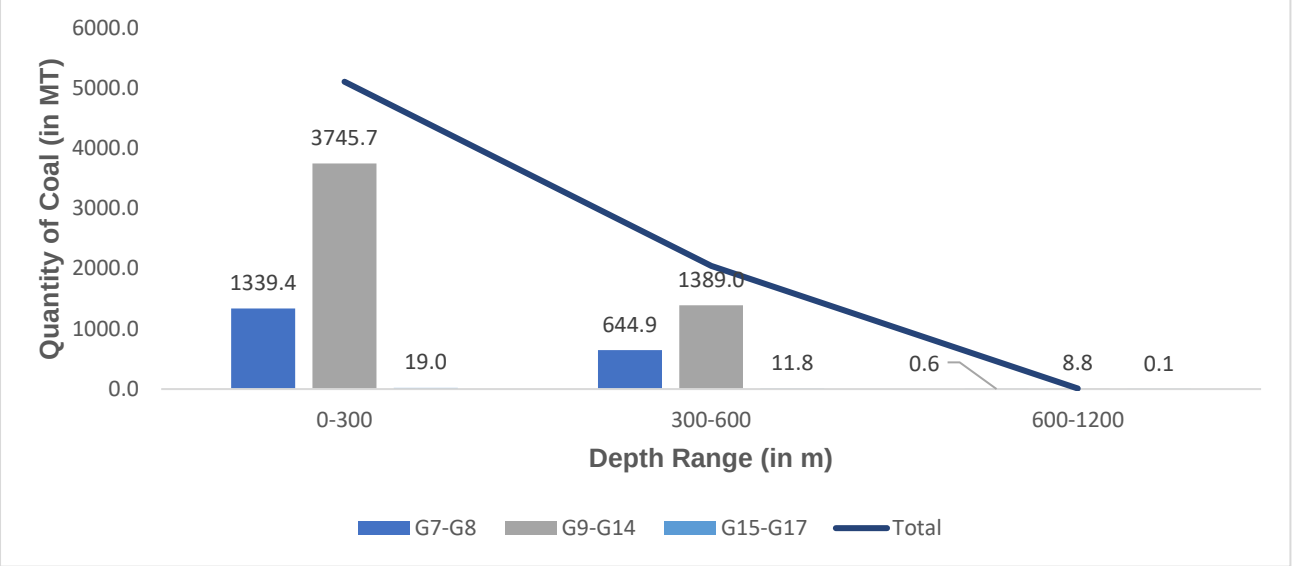
Area: 2202 sq. km.
Latitude: 24°10′30″N
Longitude: 82°45′18″E
Location: Singrauli and Sonebhadra

Varanasi and Singrauli are connected by road (220 Km). Singrauli is the nearest railway station located on the Katni-Chopan branch line, which runs parallel to the coalfield's northern edge.

Geological Reserve

The Singrauli coalfield has 16,411 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 8,270 million tonnes are "Proved." A study of the grade and depth of coal resources in the coalfield is depicted in the graph below.

Figure 42 Grade wise Geological Resources of Coal at Singrauli Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Singrauli coalfield has 7 blocks allocated to various organisations and 3 coal blocks are proposed to be allocated in the area. Dudichia, Jayant and Nigahi are three major coal projects of CIL in the area. They are all operational. 2 new mines are expected to contribute to NCL production going forward.

Table 81 List of Non-CIL Coal Blocks in Singrauli Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Amelia	THDC India Ltd.	5.6
2	Amelia North	Jaiprakash Power Ventures Limited	2.8
3	Suliayri	Andhra Pradesh Mineral Development Corporation	6
4	Bandha	EMIL Mines and Mineral Resources Limited	3
5	Dhirauli	Stratatech Mineral Resources Private Limited	5
6,7	Moher & Moher-Amlohri Ext.	Sasan Power Ltd.	20

Source: CMPDIL, Ministry of Coal

Table 82 Coal blocks to be allocated in Singrauli Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Barimahuli	Partially Explored	116.22	2.7*
2	Gondbahera Ujheni	Explored	672.87	4.12
3	Gondbahera Ujheni East	Partially Explored	250.00	6*

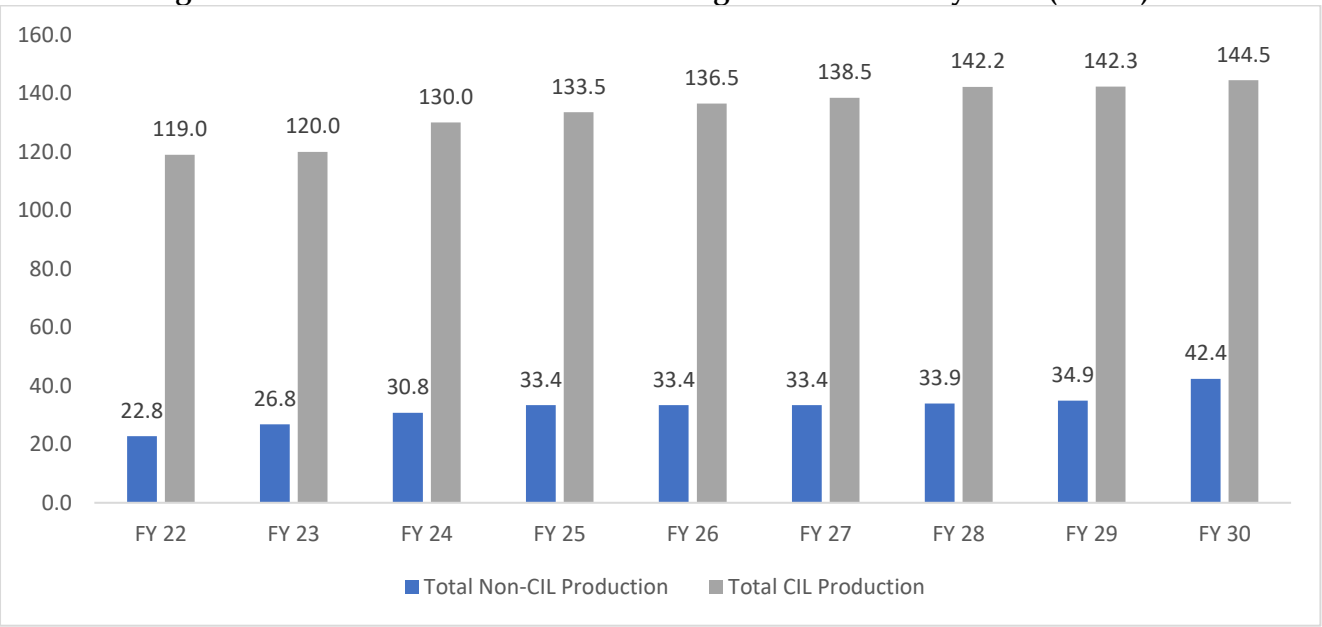
* For unexplored blocks, the extractable reserve is evaluated considering 60% of geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

Production

There is potential of production of 186.9 MT of coal by FY 30.

Figure 43 Coal Production Potential in Singrauli Coalfield by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

NH 39 connects Singrauli to Rewa. There it can meet NH 30 and NH 135 to traverse further. These highways connect the coalfield to Maihar and Satna.

Table 83 Important Roads in the vicinity of Singrauli coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 39	National Highway	It connects NH 44 near Jhansi, Chhatarpur, Khajuraho, Panna, Satna, Rewa, Sidhi, Singrauli, Dudhinagar, Garhwa, Daltonganj, Latehar, Chandwa and terminates at NH 20 near Ranchi
2	National Highway 30	National Highway	NH 30 connects Sitarganj in Uttarakhand with Ibrahimpatnam, Vijayawada in Andhra Pradesh.
3	State Highway 9	State Highway	It starts from Dabhaura and passes through Rewa, Govindgarh, Sariya, Beohari, Jaisinghnagar, Shahdol, Gadasarai and terminates at Chanda.
4	Sidhi Renukut Road	Local Road	Rural Roads
5	Parsauna Road	Local Road	Rural Roads

Source: Primary and Secondary research

Road/ Bridges planned for providing road connectivity to the coalfield are detailed in table below.

Table 84 Road/Bridges planned for Singrauli Coalfield

S No.	Project Name	Status
1	Khadia Mine approach	Under Construction

2	Jayant to Singrauli Road Diversion	Approved-to be Constructed

Source: CMPDIL, Ministry of Coal

Railways

The coalfield is centred around the Singrauli area. The important stations nearby are Deoragram, Majauli and Gajrabahra. These stations lie on the Singrauli – New Katni Jn. railway section. It is part of the Jabalpur Division of the West Central Railway. The line goes east towards Katni and west towards Ranchi in Jharkhand.

The Shaktinagar-Karaila Rd-Chopan railway line transports coal in the Singrauli-Moher Basin, whereas the Katni-Singrauli-Karaila Rd-Chopan railway line evacuates coal from the main basin.

Table 85 Existing Railways lines in the vicinity of Singrauli Coalfield

S no.	Railway Zone	Section
1	East Central Railway - West Central Railway	Singrauli – New Katni Jn.

Source: Ministry of Railways

Table 86 Important Upcoming Trunkline Projects in Singrauli Coalfield

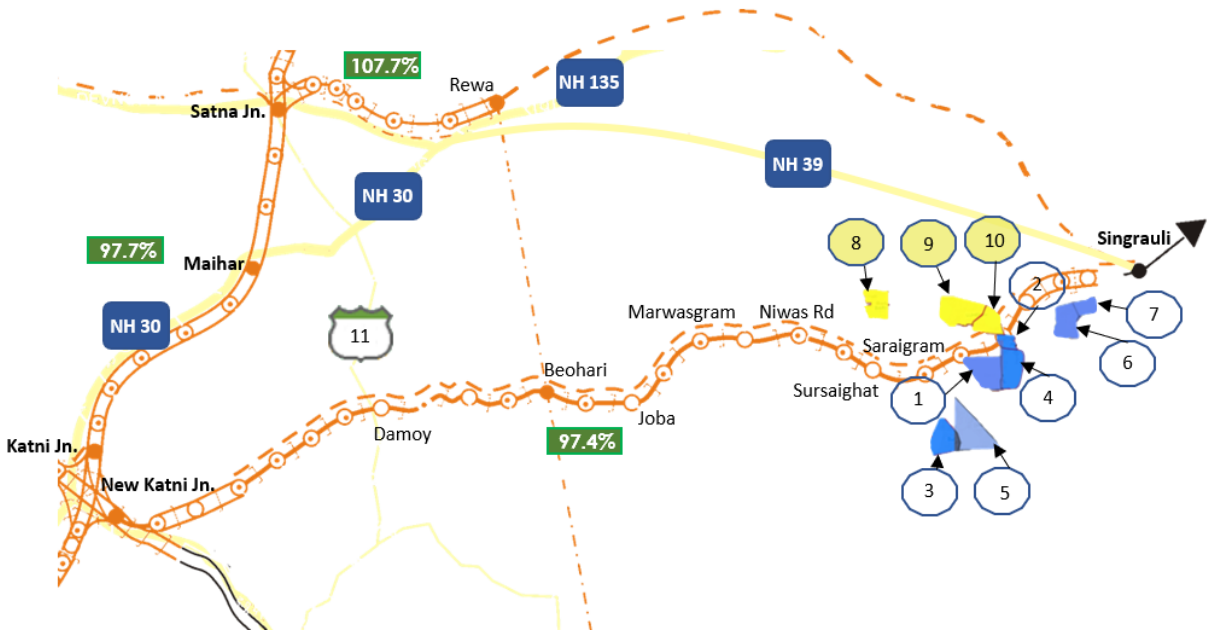
S No.	Project Name	Length (in km)	
1	Doubling of Singrauli to Shaktinagar via Karaila Road and Doubling of Singrauli to Mahadivya and Mahadivya to Katni section	32	Karaila- Bina-Shaktinagar Section
		13	Karaila Road-Singrauli Section
		45	Singrauli-Mahadivya
			Mahadivya-Katni

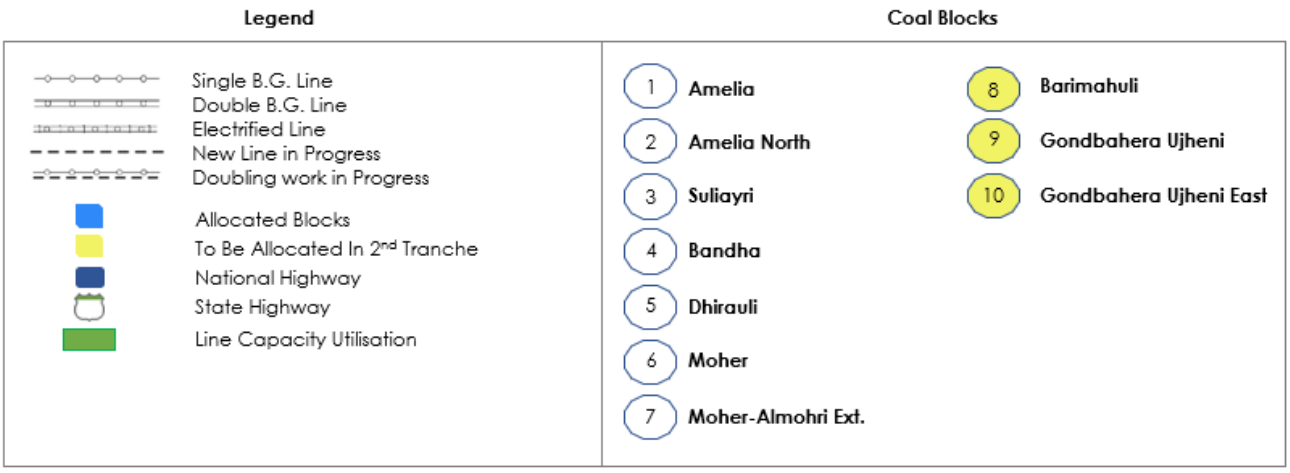
Source: Primary Research, Ministry of Railways

Coastal Movement

The coalfield lies in central India. The ports close in the east are Paradip in Odisha, Haldia and Diamond Harbour in West Bengal, approximately 800 kilometres and 740 kilometres away. Due to the coalfield's central location, moving coal from Singrauli by sea is not an option; instead, road and rail are viable.

Figure 44 Singrauli Coalfield map showing coal blocks, roads and railway connectivity





Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Amelia coal block

The Amelia coal block, which is currently non-operational, is owned by THDC India Ltd. The neighbouring blocks are Chhatrasal, Bandha and Amelia North. The end-user plant is Khurja STPP, Bulandshahar, UP. To be discussed. It is expected to produce 4 MT in FY 24 and 5.6 MT in FY30 and is expected to achieve a PRC of 5.6 MT by FY 25. The quantity of coal evacuated to the plant is 5.6 MTPA.

It is proposed that coal will be evacuated using a conveyor and then used the rail network thereafter. The closest station is Deoragram (Jabalpur Division, West Central Railway), approximately 5 kilometres away. On the Deoragram-New Katni line, coal can be transported westwards, and the same line can be used to transport coal eastwards via Singrauli. A railway siding is in development at the end-use plant.

Details			
Name of the Owner	THDC India Ltd.	**PRC (MTPA)**	5.6
Status of the Mine	Non - Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Deoragram	**Approximate Distance from Railway Station (in Km)**	5
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	17

Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	849
End-user Plant Details			
Plant-1	Khurja STPP		
Location	Bulandshahar, U. P.		
Lead Distance from Mine (in km)	856		
Connectivity infrastructure for the coal block			
First-mile Connectivity	It is proposed that coal will be evacuated using conveyor belt.		
Trunk infrastructure:	Coal will be transported to the plant by train using the Singrauli-New Katni railway line.		
Last Mile Connectivity	Work is in progress for railway siding at plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	2	4	5.6	5.6	5.6	5.6	5.6	5.6

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Amelia North coal block

The Amelia North coal block, which is currently operational, is owned by Jaiprakash Power Ventures Limited. The neighbouring blocks are Amelia and Bandha. The end-user plant of this mine is Jaypee Nigrie Super Thermal Power Plant and the quantity of coal evacuated to the plant is 2.8 MTPA.

The closest station is Majauli which is approximately 3.7 kilometres away. Singrauli-New Katni railway is used to transport coal to end-use plant in Singrauli. There is a railway siding at the plant.

Details			
Name of the Owner	Jaiprakash Power Ventures Limited	**PRC (MTPA)**	2.8
Status of the Mine	Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Majauli	**Approximate Distance from Railway Station (in Km)**	3.7
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	12

Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	849
End-user Plant Details			
Plant-1	Jaypee Nigrie Super Thermal Power Plant		
Location	Nigrie, Singrauli		
Lead Distance from Mine (in km)	37		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is evacuated on rail.		
Trunk infrastructure:	Coal is transported to the plant by train using the Singrauli-Katni railway line.		
Last Mile Connectivity	There is a railway siding at plant.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Suliayri coal block

The Suliayri coal block, which is currently non-operational, is owned by Andhra Pradesh Mineral Development Cooperation. The neighbouring block is Dhirauli and Dongrital.

The coal block has been allotted for commercial coal sale. There are currently no end-user plants identified. The Singrauli-New Katni railway line can be accessed by using Gajrabahra railway station. The station is approximately 12 kilometres away. The closest highway to the coal mine is NH 39, which is around 25 kilometres away.

Details			
Name of the Owner	Andhra Pradesh Mineral Development Corporation	**PRC (MTPA)**	6
Status of the Mine	Non-Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Gajrabahra	**Approximate Distance from Railway Station (in Km)**	12

Nearest Road	NH 39			**Approximate Distance from Road (in Km)**		25			
Nearest Port	Varanasi			**Approximate Distance from Port (in Km)**		295			
Connectivity infrastructure for the coal block									
First-mile Connectivity	Local roads can be taken to transport coal to Gajrabahra station.								
Trunk infrastructure:	Coal can be transported to the plant by train using the Singrauli-New Katni railway line.								
Last Mile Connectivity	Last mile connection depends on the infrastructure facility available with the potential customer								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									6

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Bandha coal block

The Bandha coal block, which is currently non-operational, is owned by EMIL Mines and Minerals. The neighbouring blocks are Amelia, Amelia North and Chhatrasal. This block has been designated as a commercial block. It is proposed to carry coal by road to the nearest railway siding, roughly 1.7 kilometres away, at Deoragram station on the Singrauli – Katni railway line. A Coal Handling Plant (CHP) has been proposed for Bandha Coal block to handle the entire coal production.

Some of the coal would also be transported along an existing village road to the NH-39 (Rewa-Ranchi), which is around 25 kilometres from the Block. Within the coal block near the north-western boundary, railway sidings may be created at a later stage of operation. A portion of the coal from Bandha will be delivered via the proposed RLS system, which includes a 2000 MT Silo. Near the Deoragram Railway station, a new railway siding has been proposed. The majority of the coal will be used in the Raipur cluster's cement plants.

Details			
Name of the Owner	EMIL Mines and Mineral Resources Limited	**PRC (MTPA)**	5.6
Status of the Mine	Non-Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Deoragram	**Approximate Distance from Railway Station (in Km)**	1.7

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Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	25
Nearest Port	Paradip	**Approximate Distance from Port (in Km)**	849
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal will be evacuated via road to Deoragram railway station. A railway siding has been proposed for the coal block.		
Trunk infrastructure:	Singrauli-New Katni railway line can be used to transport using railways		
Last Mile Connectivity	Last mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0	0	0	0	0	0.5	1.5	3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Dhirauli coal block

The Dhirauli coal block, which is currently non-operational, is owned by Stratatech mineral resources Pvt. Ltd. The neighbouring blocks are Mahan, Dongrital and Dongeri Tal-II.

Because the coal is designated for commercial use, it can be used by any end-use facility. Currently, coal will be transported to the plant, which is located near to the coal mine. The coal will be transported by pipe conveyor belt and road. The Singrauli – New Katni railway line can be used from Gajrabahra station, which is closest to the coal block. Power lines are currently hanging down over the coal block, and there are technical challenges with the conveyor belt line's alignment.

Details			
Name of the Owner	Stratatech Mineral Resources Private Limited	**PRC (MTPA)**	5
Status of the Mine	Non - Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Gajrabahra	**Approximate Distance from Railway Station (in Km)**	12
Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	20

Nearest Port	Hardul Nala	**Approximate Distance from Port (in Km)**	849
End-user Plant Details			
Plant-1	Essar Power MP Limited		
Location	Singrauli, Madhya Pradesh		
Lead Distance from Mine (in km)	35		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Closest road is NH 39, and a conveyor system is proposed for evacuation		
Trunk infrastructure:	Coal will be transported to the plant by road		
Last Mile Connectivity	Plant will receive coal via road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	2	4	5	5	5	5	5	5

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Moher & Moher Amlohri Ext coal block

The Moher & Moher Amlohri Ext. coal block, which is currently operational, is owned by Sasan Private Ltd. The neighbouring blocks are Semaria and Amlohri. The end-user plant is Sasan UMPP, Singrauli, Madhya Pradesh.

The coal is transported by road to the plant approximately 109 kilometres away. NH-39 is 7 kilometres away from the block The proposed evacuation system within the coal mine includes a 9-kilometre conveyor belt and a 14.2-kilometre Overland Conveyor (OLC).

Details			
Name of the Owner	Sasan Power Ltd.	**PRC (MTPA)**	20
Status of the Mine	Operational	**Coalfield**	Singrauli
Infrastructure Available			
Nearest Railway Station	Bargawan	**Approximate Distance from Railway Station (in Km)**	22

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Nearest Road	NH 39	**Approximate Distance from Road (in Km)**	7
Nearest Port	Haldia	**Approximate Distance from Port (in Km)**	795

End-user Plant Details									
Plant-1	Sasan UMPP								
Location	Singrauli, Madhya Pradesh								
Lead Distance from Mine (in km)	109								
Connectivity infrastructure for the coal block									
First-mile Connectivity	A conveyor belt and overland conveyor has been proposed								
Trunk infrastructure:	Coal is transported to plant on road.								
Last Mile Connectivity	There is a railway siding at plant.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	20	20	20	20	20	20	20	20	20

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

The production of CIL mines from the Singrauli coalfield was 119 MT in 2021-22 and is predicted to increase to 130 MT and 144.5 MT in FY 24 and FY 30. The mines which are going to contribute significantly to coal production are listed below.

Table 87 NCL Mines in Singrauli Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Amlohri	Completed	14
2	Bina/Bina-KKR	Completed	12
3	Block-B	Completed	8
4	Dudhichua	Ongoing	23
5	Jayant	Ongoing	25
6	Jhingurdah T/B	Existing	1
7	Kakri	Completed	
8	Khadia	Ongoing	14
9	Krishnashila	Completed	6
10	Nigahi	Completed	21
11	Semaria	Future	1
12	New Block	New Block	5

Dudichia, Jayant and Nigahi are the blocks with the highest production in the coalfield with combined production of 69 MT in FY24. Krishnashila and Bina Kakri use pipe conveyors. Almost all mines have their own rail sidings and also utilise road transportation to evacuate coal. MGR is used to evacuate coal from the first-mile level at Jayant Nigahi, Bina,

Pipe Conveyor is an upcoming mode of transport. Rail dispatch from Singrauli is expected to increase by 81 percent between 2020-21 and 2029-30. The coalfield will have a strong influence on the increased demand for rakes for evacuation.

The existing rail network of Indian Railways needs to be strengthened to handle this increase in coal evacuation. The following four projects have been proposed to double existing lines:

The Ministry of Coal's First-mile Connectivity initiative aims to mechanise coal loading and transport arrangements up to railway lines for projects with 4 MTY or greater capacity. NCL, CIL's coalfield subsidiary, has planned and is developing projects in the Singrauli coalfield. FMC's projects include the development of coal handling plants and SILOs at high-production mines and railway sidings at Amlohri and Dudhichua.

Table 88 FMC Phase I Projects planned in the Singrauli Coalfield Area

S No.	Project Name	Capacity (in MTPA)
1	Amlohri OCP RLS Siding	5
2	Krishnashila OCP CHP- SILO	4
3	Nigahi OCP CHP-SILO	10
4	Jayant OCP CHP-SILO	15
5	Bina-Kakri Amalgamation OCP CHP-SILO	9.5
6	Dudhichua OCP CHP-SILO	10
7	Dudhichua OCP RLS Siding	5
8	Block-B OCP CHP-SILO	4.5
9	Block-B OCP Rail connectivity	-

Source: Ministry of Coal, CIL

Analysis and Recommendations

Dhirauli coal block is facing issues as EHT power lines are crossing over the coal block. **Connectivity and challenges within the coal blocks boundary need to be analysed and addressed before allocation of coal blocks.**

Mechanism to establish a shared infrastructure for EMMIL's Bandha and THDC's Amelia coal blocks can be taken up and supported.

For CIL, majority of production is expected to come from producing blocks for which evacuation plan is already in place. For first-mile connectivity, several projects have already been identified and are underway. For Bina and Nigahi retendering is happening which is delaying the project progress.

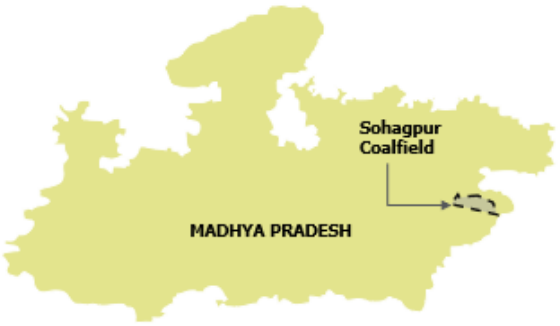
Progress of FMC projects need to be monitored regularly to have efficient evacuation from the coalfield.

NCL needs to co-ordinate with Railway officials for availability of rakes going forward.

Sohagpur Coalfield

Location

The Sohagpur Coalfield covers around 3,100 square kilometres. It is situated in the Son River basin in Madhya Pradesh's Shahdol district.



Area: 3100 sq. km.
Latitude: 23°14′N
Longitude: 81°30′E
Location: Shahdol

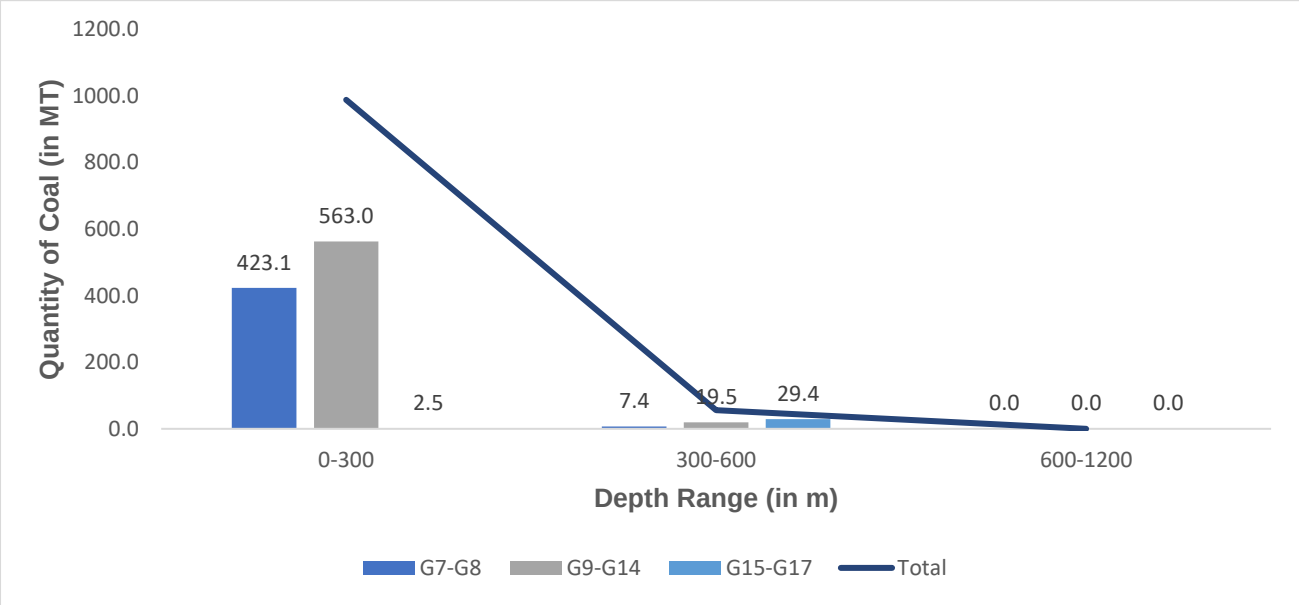
The coalfield is divided in two parts. Coal found on the north fault is different characteristically (Coking coal) from the coal occurring south of the fault

Geological Reserve

The Sohagpur coalfield has 8082 million tonnes of coal reserves as of April 1, 2020, according to estimations from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, of which 2129 million tonnes are "Proved".

The coal lies at a depth of 0-300 m and has G7-G8 grade in the coalfield. An analysis of the grade and depth of coal resources in the coalfield is depicted in the graph below.

Figure 45 Grade wise Geological Resources of Coal at Sohagpur Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Six coal blocks have been allocated in the Sohagpur coalfield and four are identified for further allocation. Most of the production in the coalfield is planned from SECL mines.

Table 89 List of Non-CIL Coal Blocks in Sohagpur Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Bicharpur	UltraTech Cement Limited	0.75

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2	Bikram	Birla Corporation Ltd	0.36
3	Sahapur West	Sarda Energy and Minerals Limited	0.6
4	Sahapur East	Chowgule And Company Private Limited	0.7
5	Urtan North	JMS Mining Private Limited	0.6
6	Urtan	JMS Mining Private Limited	0.65

2	Jamui	Explored	208.47	1
3	Maiki South	Partially Explored	88.18	2.12*
4	Merkhi West	Partially Explored	100.00	2.4*

* For unexplored blocks, the extractable reserve is evaluated considering 60% of the geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

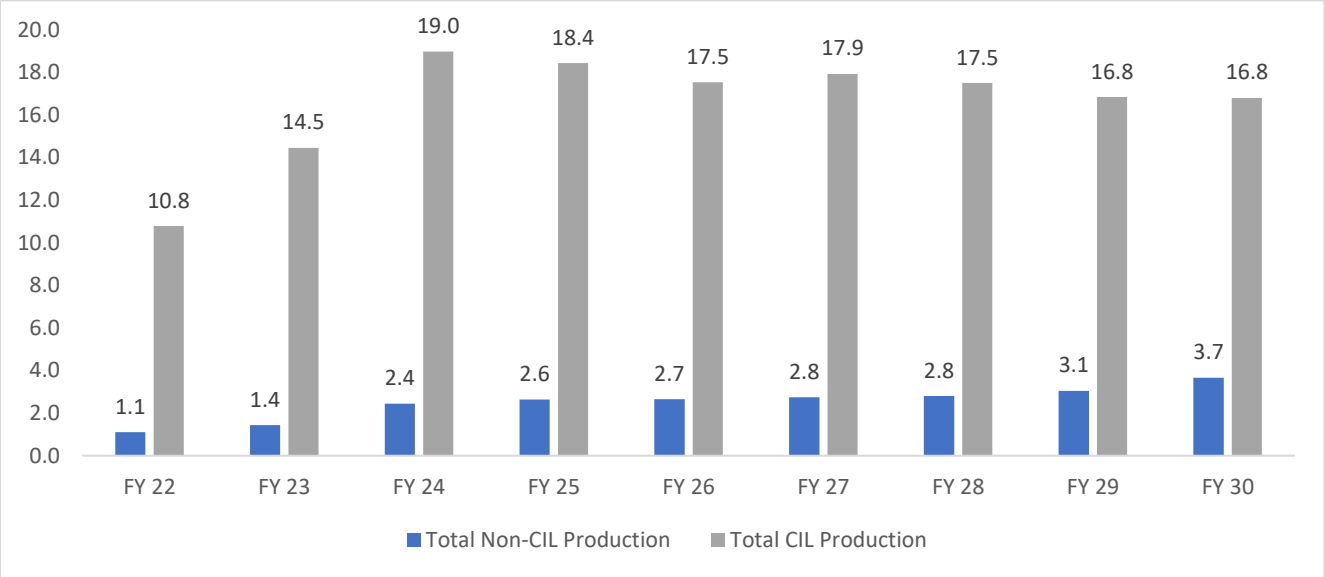
Production

There is a potential of production of 20.46 MT of coal by FY 30

Table 90 Coal blocks to be allocated in Sohagpur Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Beheraband North Extn	Partially Explored	170.00	4.08*

Figure 46 Coal Production Potential in Sohagpur Coalfield by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

NH 43 runs very near to the coalfield. It connects Shahdol to Ambikapur. State Highway 9 connects Shahdol to NH-45 in the south. NH 43 is utilised by coal blocks to deliver to end-use plants by road. Most of the coal blocks use the road network to deliver coal to plants.

Table 91 Important Roads in the vicinity of Sohagpur coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 43	National Highway	Highway which connects

			Bilaspur, CH to Kharagpur, WB. It passes through Jharsuguda.
2	State Highway 9	State Highway	Connects Champa to Katghora
3	State Highway 8	State Highway	Connects Gulganj (MP) to- Chaibasa (Jharkhand)
4	State Highway 9A	State Highway	Ambikapur-Bilaspur-Raipur
5	State Highway 10	State Highway	Connects Tapkara to Urga near Korba and passes through Dharamjaigarh
6	Jaisinghnagar Bharatpur Road	State Highway	Connects Dharamjaigarh to Raigarh
7	Shahdol Jaisinghnagar Road	Local Road	Rural Roads
8	Anuppur Shahpur Road	Local Road	Rural Roads
9	Shahdol Umaria Road	Local Road	Rural Roads
10	Amarkantak Road	Local Road	Rural Roads
11	Shahpur Road	Local Road	Rural Roads

Source: Primary and Secondary research

Railways

Shahdol is the most important railway station around the coalfield area. The stations are administered by South East Central railway.

Table 92 Existing Railways lines in vicinity of Sohagpur Coalfield

S no.	Railway Zone	Section
1	South East Central Railway	Shahdol – Anuppur Jn.
2	South East Central Railway	Anuppur Jn. – Pendra Road
3	South East Central Railway	Anuppur Jn. – Kotma
4	South East Central Railway	Kotma – Boridand Jn.
5	South East Central Railway	Boridand Jn. - Chirimiri
6	South East Central Railway	Boridand Jn. - Darritola

Source: Ministry of Railways

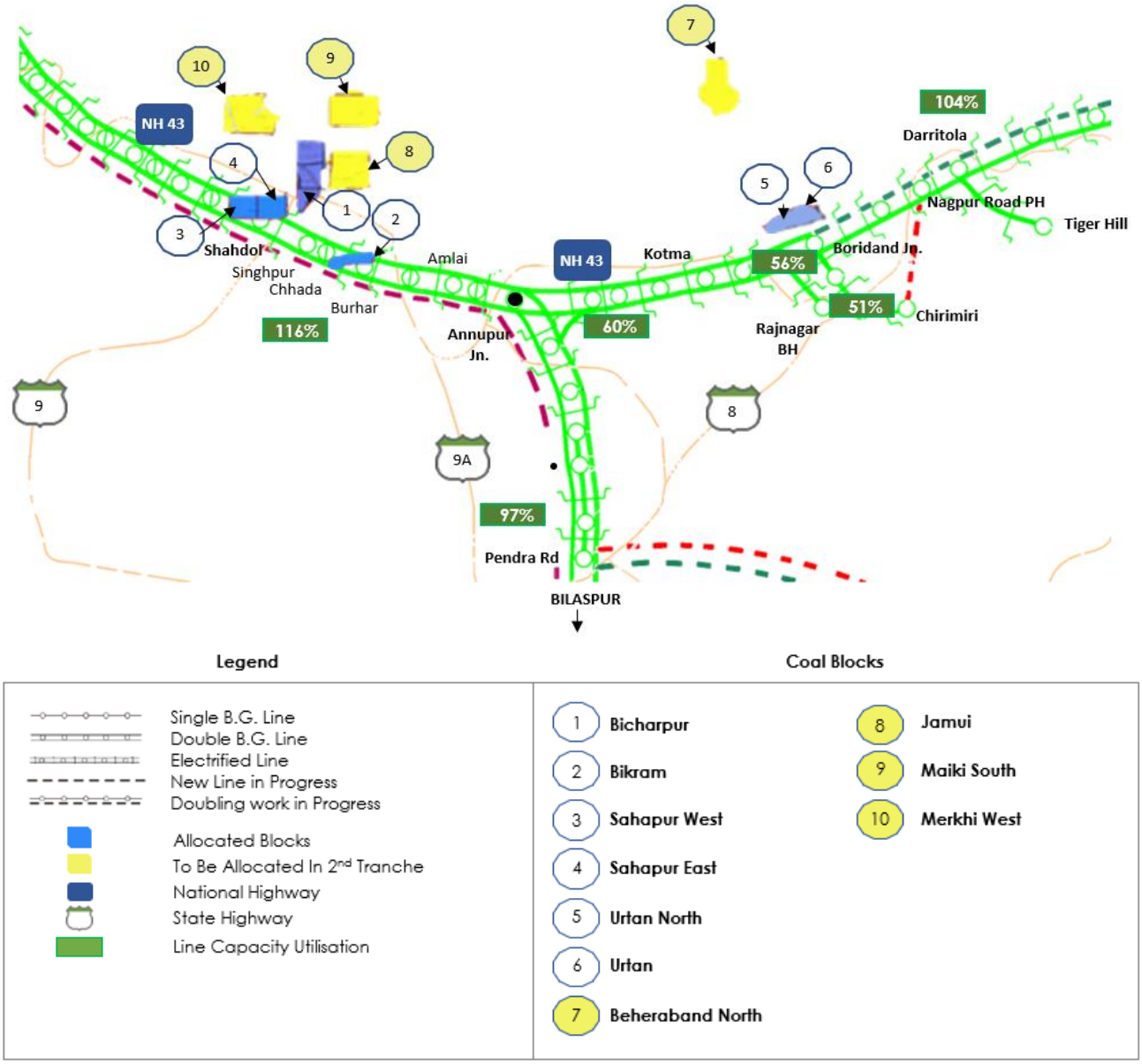
Indian Railways along with Ministry of Coal is working on mainline projects to increase the capacity of railway lines.

Table 93 Important Upcoming Trunkline Projects in Sohagpur Coalfield

S No.	Project Name	Length (in km)
1	Construction Of 3rd Line Between Pendra Road and Anuppur in Bilaspur Division	50.1

Source: CMPDIL, Ministry of Coal

Figure 47 Sohagpur coalfield map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Bicharpur coal block

The Bicharpur coal block, which is currently operational, is owned by UltraTech Cement Ltd. The end-user plant is Sidhi cement works, Bela cement works and Maihar cement works. The neighbouring blocks are Senduri and Bandhwa Bara.

The coal will be evacuated utilising a 10-kilometre new road built by the owner and local roads to reach NH 43, where it will be delivered to the end-use plants.

Details			
Name of the Owner	UltraTech Cement Limited	**PRC (MTPA)**	0.75
Status of the Mine	Non-Operational	**Coalfield**	Sohagpur
Infrastructure Available			
Nearest Railway Station	Shahdol	**Approximate Distance from Railway Station (in Km)**	7
Nearest Road	NH-43	**Approximate Distance from Road (in Km)**	10
Nearest Port	Diamond Harbour	**Approximate Distance from Port (in Km)**	600
End-user Plant Details			
Plant 1	Sidhi Cement Works	**Plant 2**	Bela Cement Works
Location	Sidhi, Madhya Pradesh	**Location**	District- Rewa
Lead Distance from Mine (in km)	355	**Lead Distance from Mine (in km)**	393
Plant 3	Maihar Cement Works		
Location	District-Satna		
Lead Distance from Mine (in km)	83		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Local roads are road to reach NH 43 from the block.		
Trunk infrastructure:	Coal is transported via NH 43		
Last-mile connectivity	Plant receive coal on road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.5	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

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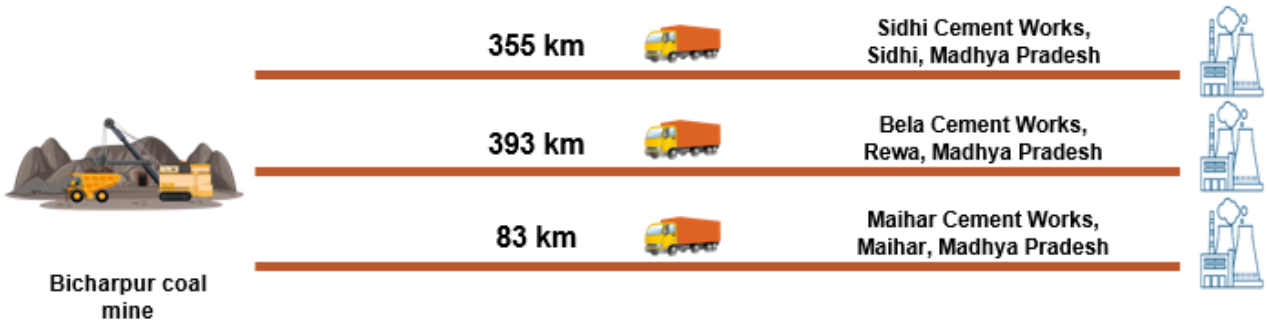

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Bikram coal block

The Bikram coal block, which is currently operational, is owned by Birla Corporation. The end-user plant is Sector III, Madhav Nagar, Rajasthan, Birla Vikas Satna, and Madhya Pradesh. The neighbouring blocks are Dhanpura, Khairaha.

The coal is currently transported on road. The closest highway is NH 43 which is around a kilometre away. It can be used to transport coal towards end-use plant in Satna, Madhya Pradesh. The same can be used to traverse towards plant in Rajasthan. The nearest railway station Burhar is 2.6 kilometres away.

Details			
Name of the Owner	Birla Corporation Ltd.	**PRC (MTPA)**	0.36
Status of the Mine	Operational	**Coalfield**	Sohagpur
Infrastructure Available			
Nearest Railway Station	Burhar	**Approximate Distance from Railway Station (in Km)**	2.6
Nearest Road	NH 43	**Approximate Distance from Road (in Km)**	1
Nearest Port	Jabalpur	**Approximate Distance from Port (in Km)**	244
End-user Plant Details			
Plant 1	Sector III, Madhav Nagar	**Plant 2**	Birla Vikas Satna
Location	Chanderia Rajasthan	**Location**	Satna, Madhya Pradesh
Lead Distance from Mine (in km)	1020	**Lead Distance from Mine (in km)**	230
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is evacuated on road.		
Trunk infrastructure:	Coal is transported on road using NH 43		

Last-mile connectivity	Plants receive coal on road.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.36

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Sahapur West coal block

The Sahapur west coal block, which is currently operational, is owned by Sarda Energy and Minerals Ltd. The neighbouring blocks are Sendhuri and Sahapur East. As this is a commercial block, all coal mined here will be sold to private customers. Shahdol, the nearest railway station, is around 12 kilometres away. The railway line between Shahdol and Anuppur Jn can be used to transport coal by rail. The closest highway, NH-43, is about 15 kilometres away and can be used to transport coal by road.

Details			
Name of the Owner	Sarda Energy and Minerals Limited	**PRC (MTPA)**	0.6
Status of the Mine	Operational	**Coalfield**	Sohagpur
Infrastructure Available			
Nearest Railway Station	Shahdol	**Approximate Distance from Railway Station (in Km)**	12
Nearest Road	NH-43	**Approximate Distance from Road (in Km)**	15
Nearest Port	Diamond Harbour	**Approximate Distance from Port (in Km)**	605
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal can be taken to NH 43 to transport via road.		
Trunk infrastructure:	Coal can be transported on road as quantity to be transported is low.		
Last-mile connectivity	Last mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

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Coal production (MT)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Sahapur East coal block

The Sahapur East coal block, which is currently operational, is owned by Chowgule Company Pvt. Ltd. No end-user plant is specified. The neighbouring blocks are Sahapur West, Singhpur. It is a commercial block. All of the coal produced here is sold to buyers. The nearest railway station is Shahdol, which is around 12 kilometres away. Coal may be transported by rail using the railway line between Shahdol and Anuppur Jn. The nearest highway, NH-43, is about 15 kilometres away and can be used for coal transportation.

Details									
Name of the Owner	Chowgule And Company Private Limited			**PRC (MTPA)**				0.7	
Status of the Mine	Operational			**Coalfield**				Sohagpur	
Infrastructure Available									
Nearest Railway Station	Shahdol			**Approximate Distance from Railway Station (in Km)**				12	
Nearest Road	NH-43			**Approximate Distance from Road (in Km)**				15	
Nearest Port	Diamond Harbour			**Approximate Distance from Port (in Km)**				605	
Connectivity infrastructure for the coal block									
First-mile Connectivity	Coal can be transported by road via NH 43.								
Trunk infrastructure:	Coal will probably be transported on road as quantity to be transported is low.								
Last-mile connectivity	Last mile connection depends on the infrastructure facility available with the potential customer								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

Coal production (MT)	0	0.05	0.49	0.70	0.70	0.70	0.70	0.70	0.70

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Urtan North coal block

The Urtan North coal block, which is currently non-operational, is owned by JMS Mining Pvt. Ltd. The neighbouring block is Beheraband and Beheraband North Extn. It is a commercial block. All coal production is to be sold. As of present, no evacuation infrastructure or end plant has been identified. As the volume is low, the transportation is likely to take place by road

Details									
Name of the Owner	JMS Mining Pvt. Ltd			**PRC (MTPA)**				0.6	
Status of the Mine	Operational			**Coalfield**				Sohagpur	
Infrastructure Available									
Nearest Railway Station	Kotma			**Approximate Distance from Railway Station (in Km)**				5	
Nearest Road	NH 43			**Approximate Distance from Road (in Km)**				13	
Nearest Port	Diamond Harbour			**Approximate Distance from Port (in Km)**				855	
Connectivity infrastructure for the coal block									
First-mile Connectivity	Coal can be transported by road via NH 43.								
Trunk infrastructure:	Coal will probably be transported on road as quantity to be transported is low.								
Last-mile connectivity	Last mile connection depends on the infrastructure facility available with the potential customer								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.00	0.03	0.60	0.60	0.60	0.60	0.60	0.60	0.60

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Urtan coal block

The Urtan coal block, which is currently non-operational, is owned by Sarda energy and minerals Ltd. The neighbouring block is Beheraband and Beheraband North Extn. No end-user plant is specified. It is a commercial block. All coal production is to be sold to private customers. No evacuation infrastructure and end plant identified as of now. The nearest station is at Kotma, which is around 5 kilometres away. Coal may be transported by rail on the Anuppur Jn.-Darritola railway line.

Details			
Name of the Owner	Rajasthan Rajya Vidyut Utpadan Nigam Limited	**PRC (MTPA)**	0.65
Status of the Mine	Non-Operational	**Coalfield**	Sohagpur
Infrastructure Available			
Nearest Railway Station	Kotma	**Approximate Distance from Railway Station (in Km)**	5
Nearest Road	NH 43	**Approximate Distance from Road (in Km)**	13
Nearest Port	Diamond Harbour	**Approximate Distance from Port (in Km)**	862
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal can be transported by road via NH 43. Local Roads can be taken to transport coal to Kotma station		
Trunk infrastructure:	Anuppur Jn.-Darritola railway line can be used to transport coal on rail.		
Last-mile connectivity	Last mile connection depends on the infrastructure facility available with the potential customer		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0	0	0	0	0	0.1	0.15	0.4	0.65

Urtan coal block

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from Sohagpur coalfield was 10.78 MT which is expected to reach 18.97 MT and 16.8 MT in FY 24 and FY 30 respectively.

In future below mention projects of CIL are expected to contribute to the production of Sohagpur coalfield significantly.

Table 94 Mines in Sohagpur Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Amlai	Existing	2
2	Beheraband	Completed	0.6
3	Bangwar	Completed	0.65
4	Bartarai	Completed	0.3
5	Bhadra 7&8	Completed	0.15
6	Damini	Completed	0
7	Dhanpuri	Completed	0
8	Haldibari	Completed	0.66
9	Jamuna 1&2/5&6	Completed	0.18
10	Jamuna 9&10	Completed	0
11	Jhiria UG	Completed	0.33
12	Jhiria West	Completed	0.35
13	Khairaha UG	Completed	0.8
14	Kapildhara	Completed	0
15	Kurja-Sheetaldhar	Completed	0.64
16	Rajendra	Completed	0.3
17	Sharda HW	Completed	0.85
18	West JKD	Completed	0.17
19	Amadand RPR	Ongoing	4
20	Amritdhara OC	Ongoing	0.5
21	Batura HW	Ongoing	0.14
22	Rampur Batura	Ongoing	3
23	Bincara	Ongoing	0.05
24	Batura West	Future	0.18

Source: Ministry of Coal, CIL

Rail sidings, belt conveyors to railway siding, wharf walls are used to evacuate coal in the coalfield. Rail share sees an increase of 57% in the Sohagpur coalfield from FY 21 to FY 24. Following Mand-Raigarh, Sohagpur Coalfield sees a rise in the number of rakes required for SECL.

The Ministry of Coal's First-mile Connectivity initiative aims to mechanise coal loading and transport arrangements up to railway lines for projects with 4 MTY or greater capacity. Though SECL is building FMC Phase I projects, most of them are in Korba and Raigarh. Rampur Batura project is being developed in Sohagpur under Phase II of the scheme.

Analysis and Recommendations

In Singrauli Coalfield, road and railways are the most prevalent mode of transportation since coalfield is well connected through the road as well as a railway network. The majority of CIL blocks are producing and have a well-defined evacuation plan.

Whereas most of the non-CIL blocks are commercial blocks, and end-users for them are not defined yet. Depending on the location as well as quantity sold to different customer road or railway mode will be preferred.

Most of the roads connecting the coalfields are Rural Roads. Some of the roads are developed under Pradhan Mantri Gram Sadak Yojana (PMGSY). These roads have been used by locals as well as for transportation of other bulk commodities, including coal.

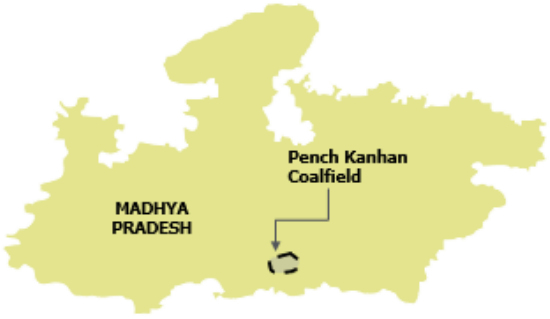
The width of these roads varies from 10-12 ft which is not sufficient for the movement of coal trucks.

A well-defined program to strengthen the first-mile roads needs to be developed in consultation with various stakeholders.

Pench-Kanhan Coalfield

Location

Pench-Kanhan-Tawa Valley Coalfield covers an area of about 907.90 sq. Km. lies in the Chhindwara and Betul district of Madhya Pradesh. It forms the 2 southern fringes of Satpura basin.



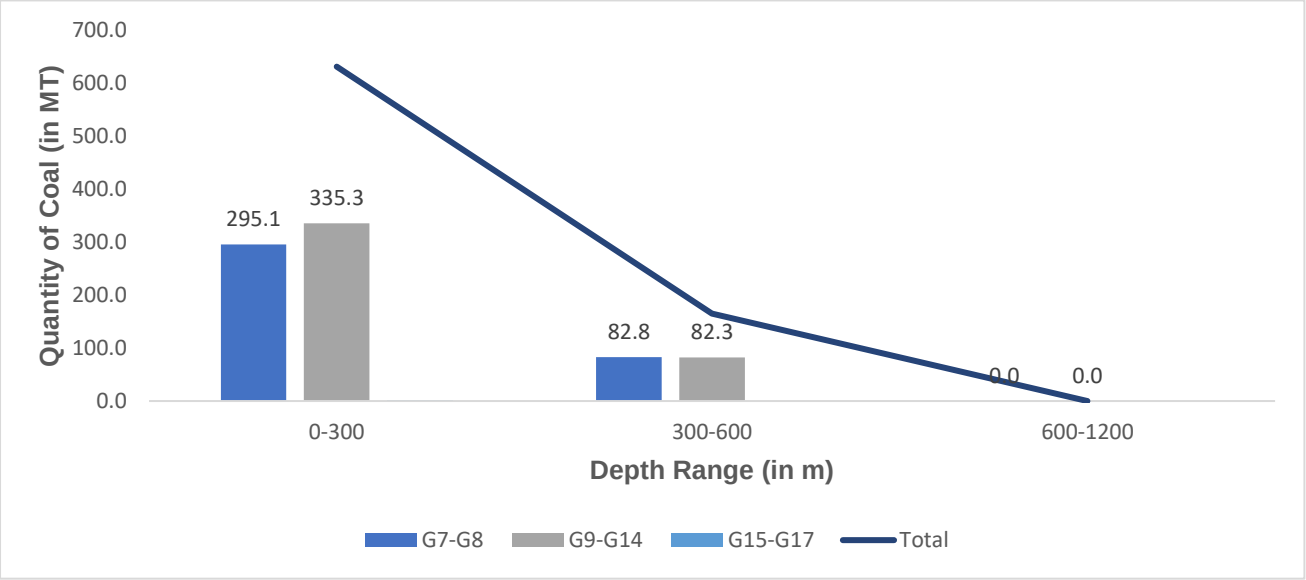
Area: 907 sq. km.
Latitude: 22°12′50″N
Longitude: 78°44′49″E
Location: Chhindwara and Betul

This coalfield has been divided into three parts: Pench, Kanhan and Tawa. This coalfield bounds it holds a premier position in India for having a considerable share of reserve of thermal grades of non-coking coal.

Geological Reserve

The Pench-Kanhan coalfield has 3695 million tonnes of coal reserves as of April 1, 2020, according to estimates from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, with 1536.8 million tonnes falling under the "Proved" category. A study of the grade and depth of coal resources in the coalfield is depicted in the graph below.

Figure 48 Grade wise Geological Resources of Coal at Pench-Kanhan Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Presently 2 coal blocks namely Sial Ghoghri and Brahmpuri have been allocated to non-CIL players and 3 blocks are identified for allocation.

Table 95 List of Non-CIL Coal Blocks in Pench Kanhan Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)

1	Sial Ghoghri	Reliance Cement Company Private Ltd.	0.3
2	Brahmpuri	Birla Corporation Ltd	0.36

Source: CMPDIL, Ministry of Coal

Table 96 Coal blocks to be allocated in Pench Kanhan Coalfield

S No.	Name of Coal Block	Status	Geological Reserves (MT)	PRC (MTPA)
1	Rawanwara North	Explored	170.00	1.26
2	Chopna Shaktigarh	Partially Explored	208.47	10.56*
3	Rajathari South	Partially Explored	88.18	4.72*

* For unexplored blocks, the extractable reserve is evaluated considering 60% of geological reserve. The mine life is considered 25 years.

Source: CMPDIL, Ministry of Coal

Production

There is a potential of production of 5.8 MT of coal by FY 30 from CIL as well non-CIL mines with a majority (5.10 MTPA) of contribution from CIL mines.

Infrastructure

Road

From Itarsi, NH 46 continues north to south and west to coalfield. From north to south, NH 547 runs east to the coalfield. Parasia Road is a local road that runs through the coalfield's south end. The coalfield is bisected by SH 19, which goes through the heart of it.

Table 97 Important Roads in the vicinity of Pench-Kanhan coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 547	National Highway	Highway which connects Bilaspur, CH to Kharagpur, WB. It passes through Jharsuguda.
2	National Highway 46	National Highway	Connects Champa to Katghora
3	State Highway 19	State Highway	Connects Gulganj (MP) to- Chaibasa (Jharkhand)
4	State Highway 19 A	State Highway	Ambikapur-Bilaspur-Raipur
5	State Highway 19 B	State Highway	Connects Tapkara to Urga near Korba and passes through Dharamjaigarh
6	State Highway 47	State Highway	Connects Dharamjaigarh to Raigarh
7	Parasia Road	Local Road	Connects Jogada to Kharsia and Dabhara further south
8	Guraiya Road	Local Road	Connects Raigarh to Sundargarh in Odisha
9	Nagpur Road	Local Road	Connects Raigarh to Milupara
10	Chhindwara Road	Local Road	Rural Roads
11	Khirsadoh	Local Road	Rural Roads

Source: Primary and Secondary research

Railways

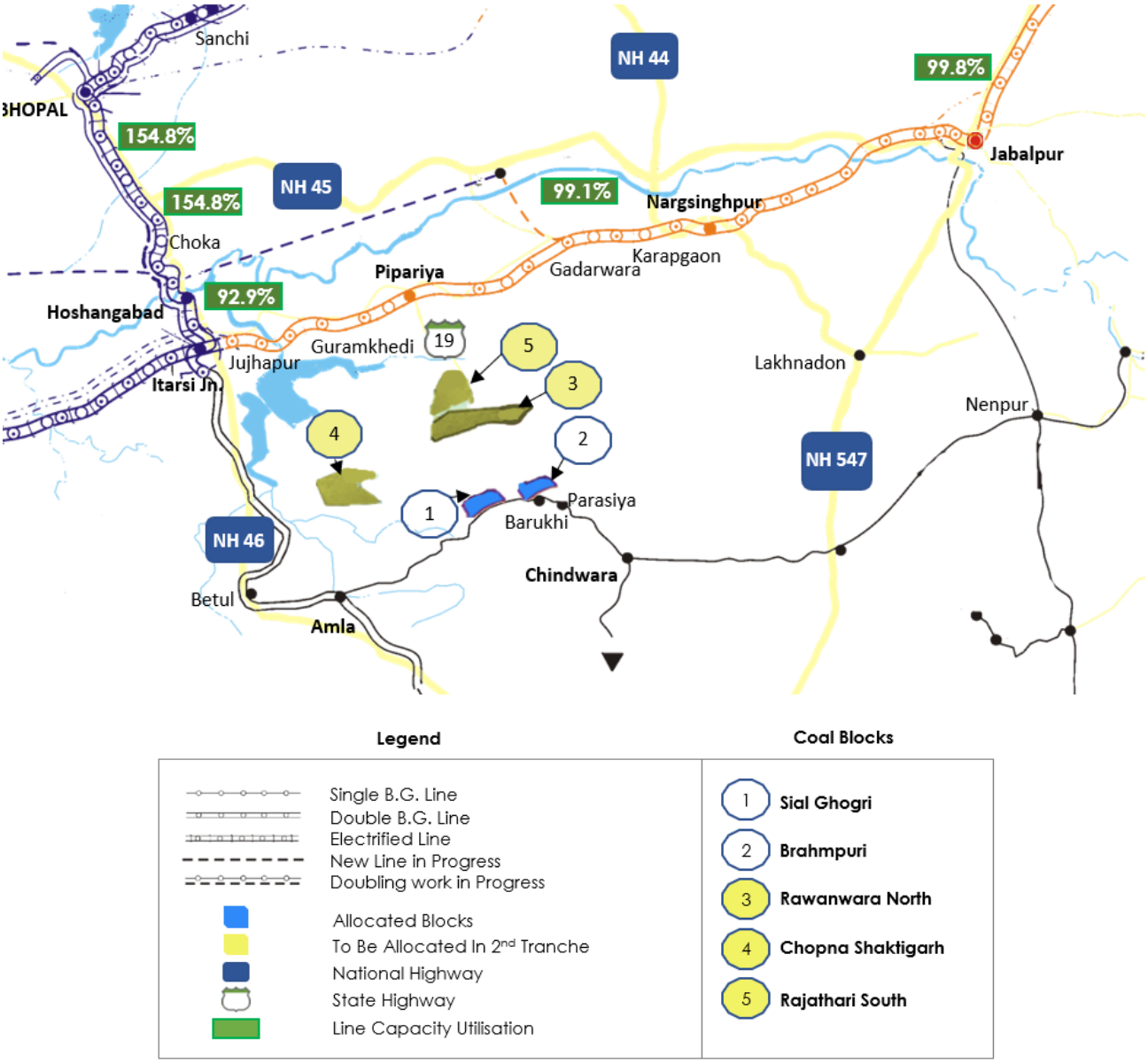
The Amla Jn.- Chhindwara railway section of Nagpur Division of Central Railway is the line closest the coal blocks. Parasia station is the closest station on railway line.

Table 98 Existing Railways lines in vicinity of Pench-Kanhan Coalfield

S no.	Railway Zone	Section
1	Central Railway	Amla Jn.- Chhindwara

Source: Ministry of Railways

Figure 49 Pench Kanhan map showing coal blocks, roads and railway connectivity



Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Sial Ghoghri coal block

The Sial Ghoghri Coal block, which is currently operational, is owned by Reliance Cement Company Private Ltd. The end-user plant is Maihar Cement Plant which is owned by the coal block allocatee. The neighbouring blocks are Maori, Mahadeopuri.

Coal is currently transported by dumpers/trucks from the pit head bunker to the Maihar Cement Plant. Transportation of coal is not suitable on rail as quantity to be transported is low. SH 19 is closest to the block and is used to deliver coal to plant, approximately 422 kilometres away, located north to Katni.

Details			
Name of the Owner	Reliance Cement Company Private Ltd	**PRC (MTPA)**	0.3
Status of the Mine	Operational	**Coalfield**	Pench Kanhan
Infrastructure Available			
Nearest Railway Station	Parasia	**Approximate Distance from Railway Station (in Km)**	3
Nearest Road	SH 19	**Approximate Distance from Road (in Km)**	13
Nearest Port	Nagpur	**Approximate Distance from Port (in Km)**	160
End-user Plant Details			
Plant-1	Maihar Cement Plant		
Location	Maihar, Madhya Pradesh		
Lead Distance from Mine (in km)	422		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is evacuated to SH 19 for delivery.		
Trunk infrastructure:	Coal is transported on trucks/dumpers via road.		
Last Mile Connectivity	Plant receives coal via road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Brahmpuri coal block

The Brahmpuri Coal block, which is currently operational, is owned by Birla Corporation Ltd. The end-use plants of this mine are Sector III, Madhav Nagar, Chanderia, Rajasthan and. Birla Vikas Satna, Satna, Madhya Pradesh.

The coal will be evacuated using a road network. The nearest railway station is Parasia, which is around 18 kilometres away. Since the amount of coal to be moved is small, rail transportation is not a likely option. SH 19 is closest to the block and can be used to transport coal towards Satna, Madhya Pradesh. SH-19 and then NH 45 is used to deliver coal towards Chanderia, Rajasthan.

Details									
Name of the Owner	Birla Corporation Ltd			**PRC (MTPA)**			0.36		
Status of the Mine	Operational			**Coalfield**			Pench Kanhan		
Infrastructure Available									
Nearest Railway Station	Parasia			**Approximate Distance from Railway Station (in Km)**			18		
Nearest Road	SH 19			**Approximate Distance from Road (in Km)**			2		
Nearest Port	Nagpur			**Approximate Distance from Port (in Km)**			182		
End-user Plant Details									
Plant 1	Sector III, Madhav Nagar			**Plant 2**			Birla Vikas Satna		
Location	Chanderia Rajasthan			**Location**			Satna, Madhya Pradesh		
Lead Distance from Mine (in km)	372			**Lead Distance from Mine (in km)**			560		
Connectivity infrastructure for the coal block									
First-mile Connectivity	Coal is evacuated to SH 19 for delivery.								
Trunk infrastructure:	Road transport is used to move coal.								
Last-mile connectivity	Plants receive coal through roadways.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.36

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Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

Pench Kanhan coalfield produced 1.7 MT of coal between 2021-22 from its CIL mines. It is expected to reach 2.57 MT and 5.13 MT in FY 24 and FY 30 respectively. These projects will be instrumental in meeting the Ministry of Coal's goal of 1BT of coal production by FY 24.

Table 99 Mines in Pench Kanhan Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Mahadeopuri	Completed	0.18
2	Mathani	Completed	0.115
3	Naharia	Completed	0.33
4	Vishnupuri II	Completed	
5	Jharna	Completed	
6	Mauri Scheme RCE	Completed	
7	Tandsi Expan. (Incl. Tandsi RPR)	Completed	0.3
8	Ambara & other Quarry Patches (Kalyani, Vaibhabhi, Mohan, Bharat, Narayani)	Completed	
9	Urdhan	Ongoing	0.45
10	Vishnupuri UG to OC	Ongoing	0.98

Source: Ministry of Coal, CIL

Both rail and road are used to transport coal from the coalfield to end-use plants. Chhindwara-Amla railway line which is part of the Delhi-Mumbai mainline passes near the Pench Kanhan Coalfield.

Due to small quantities, the coal from the coalfield is majorly consumed locally, and in these cases, road is the most preferable mode of transportation. Due to multiple users, conveyors are not preferable as it affects the economics of delivered cost to end-users.

Analysis and Recommendations

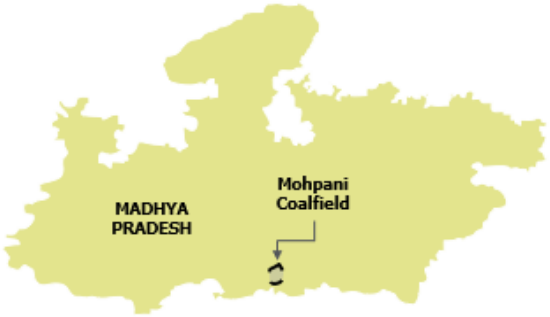
Roads connecting mining to the railway network or national or state highways are kaccha/ Rural Roads. Some of the roads are developed under Pradhan Mantri Gram Sadak Yojana (PMGSY). These roads are not capable enough to transport coal due to their strength as well as width.

A well-defined program to strengthen the roads needs to be developed in consultation with various stakeholders.

Mohpani Coalfield

Location

The Mohpani Coalfield is located in Narsinghpur District. The colliery is 23 kilometres from Gadarwara Station on the Indian Railways.



Area: 5225 sq. km.
Latitude: 20º29' to 20º48'
Longitude: 79º09' to 79º26'
Location: Yavatmal, Chandrapur Districts

Geological Reserve

According to estimates from the Geological Survey of India (GSI), Central Mine Planning and Design Institute Ltd (CMPDIL), and other private agencies, the Mohpani coalfield has 7.83 million tonnes of coal which falls under "Proved" category The coal reserves have been classified as G9-G14 grade coal.

Coal Blocks

Gotitoria (East) & Gotitoria (West) coal block has been allocated in the coalfield and no block is identified for allocation.

Table 100 List of Non-CIL Coal Blocks in Mohpani Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1,2	Gotitoria (East) & Gotitoria (West)	Boulder Stone Mart Private Limited	0.3

Source: CMPDIL, Ministry of Coal

Production

There is a potential of production of 0.3 MT of non-CIL production of coal by FY 30.

Infrastructure

Road

State Highway 22 is the nearest highway to the coalfield, and it connects it to the rest of the state.

Table 101 Important Roads in the vicinity of Mohpani coalfield

S no.	Roads	Type of Roads	Description
1	State Highway 22	State Highway	Starts from Hoshangabad, runs through Narsinghpur, and connects with NH 45 at Bhamki

Source: Primary and Secondary research

Railways

The Jabalpur-Itarsi Jn. railway section of the Jabalpur Division, West Central Railway provides rail connectivity to the coalfield. Gadarwara railway station is nearest to it.

Table 102 Existing Railways lines in the vicinity of Mohpani Coalfield

S no.	Railway Zone	Section
1	West Central Railway	Jabalpur - Narsinghpur
2	West Central Railway	Narsinghpur - Pipariya
3	West Central Railway	Pipariya – Itarsi Jn.
4	West Central Railway	Itarsi Jn. - Bhopal

Source: Ministry of Railways

Figure 50 Mohpani map showing coal blocks, roads and railway connectivity

Legend	Coal Blocks
Single B.G. Line Double B.G. Line Electrified Line New Line in Progress Doubling work in Progress Allocated Blocks To Be Allocated In 2nd Tranche National Highway State Highway Line Capacity Utilisation	1 Gotitoria East 2 Gotitoria West

Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Gotitoria (East) & Gotitoria (West)

The Gotitoria (East) & Gotitoria (West)Coal block, which is currently operational, is owned by Boulder Stone Mart Private Limited. Commercial use has been assigned to the blocks. All of the coal produced will be sold to individual customers. There is no identification of an end-use plant. Gadarwara, which is around 23 kilometres away, is the closest railway station. Coal can be transported over the Jabalpur-Itarsi Jn. railway line. The closest highway is SH 22 is also at the same distance from the coal block and can be used for road transportation.

Details									
Name of the Owner	Boulder Stone Mart Private Limited			**PRC (MTPA)**			0.3		
Status of the Mine	Operational			**Coalfield**			Mohpani		
Infrastructure Available									
Nearest Railway Station	Gadarwara			**Approximate Distance from Railway Station (in Km)**			23		
Nearest Road	SH 22			**Approximate Distance from Road (in Km)**			23		
Nearest Port	Jabalpur			**Approximate Distance from Port (in Km)**			200		
Connectivity infrastructure for the coal block									
First-mile Connectivity	SH 22 and Gadarwara station can be used road and rail transportation of coal respectively.								
Trunk infrastructure:	Itarsi Jn.- Jabalpur railway line can be used for coal transportation.								
Last Mile Connectivity	The potential customer's infrastructure facility determines the last mile connectivity.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Analysis and Recommendations

The coalfield has a reasonably good road and railways network. There is no challenge in the evacuation of coal from the coalfield.

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Siliguri
Alipur Duar
Koch Bihar
Raiganj
Ingraj Bazar
Farakka
Ganges
Asansol
Krishnanagar
Barddhaman
WEST BENGAL
Bhatpara
Kolkata
Medinipur

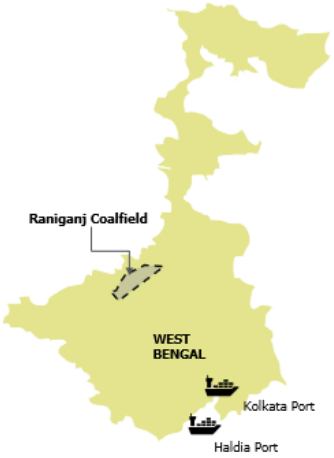
West Bengal

10. West Bengal

West Bengal is a state in India's east coast, bordering the Bay of Bengal. Kolkata is the headquarters of three Indian Railways zones: Eastern Railway, South Eastern Railway, and Kolkata Metro, which is the Indian Railways' recently constituted 17th zone. The Northeast Frontier Railway (NFR) connects the state's northern regions.

In eastern India, Kolkata is a large river port. The Kolkata Port Trust oversees the Haldia and Kolkata docks. The Shipping Corporation of India runs a cargo ship service to ports in India and internationally.

Raniganj Coalfield



Area: 171 sq. km.
Latitude: 23°37′44″N
Longitude: 87°06′54″E
Location: Asansol and Durgapur

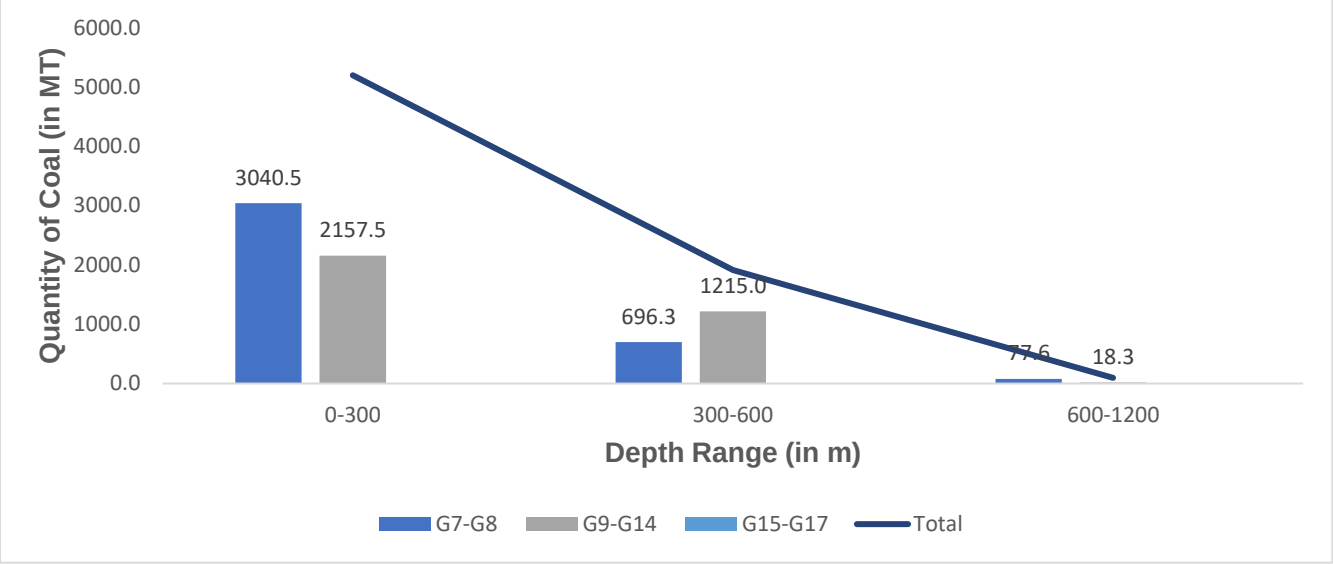
Location

The Asansol and Durgapur subdivisions of West Bengal's Paschim Bardhaman district are home to the Raniganj Coalfield. It extends into the surrounding districts of Birbhum, Bankura, Purulia, and Jharkhand's Dhanbad district. The Raniganj Coalfield is 443.50 km^2 in size (171.24 sq. Mi.)

Geological Reserve

Estimates made by Geological Survey of India (GSI), and Central Mine Planning and Design Institute Ltd (CMPDIL) and other private agencies have assessed that Raniganj coalfield contains 27,608 million tonnes of coal reserves as on 1 April 2020[1]. 14,770 million tonnes are of “Proved” category. It has the fourth highest deposit in India. The graph below shows the grade and depth analysis of coal resources in the Raniganj coalfield.

Figure 51 Grade wise Geological Resources of Coal at Raniganj Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

Thirteen coal blocks have been granted to non-CIL owners under the CMSP Act of 2015 and the MMDR Act. The analysis of 10 non-CIL coal blocks has been completed, and the detailed analysis of each coal block will be discussed in the subsequent portion of this chapter. No information on Trans Damodar could be gathered due to a lack of questionnaire data. Furthermore, no data for Kasta East block was obtained because the mine owner filed a surrender application.

Table 103 List of Non-CIL coal blocks in Raniganj Coalfield

S No.	Name of Coal Block	Allocated To	PRC (MTPA)
1	Ardhagam	OCL Iron and Steel Ltd.	0.4
2	Bajora	West Bengal Power Development Corporation	0.5
3	Bajora (North)	West Bengal Power Development Corporation	3
4,5	Gangaramchak, Gangaramchak Bhadulia	West Bengal Power Development Corporation	1
6	Khagra Joydev	Damodar Valley Corporation	3
7	Sarisatolli	CESC Limited	1.2
8,9	Tarsa East & West	West Bengal Mineral Development Corporation Limited	4
10	Trans Damodar*	Durgapur Projects Ltd.	1
11	Jaganathpur B	Powerplus Traders Private Ltd.	1.5
12	Gourangdhih ABC	West Bengal Mineral Development Corporation Limited	2.5
13	Kasta East*	West Bengal Power Development Corporation	2

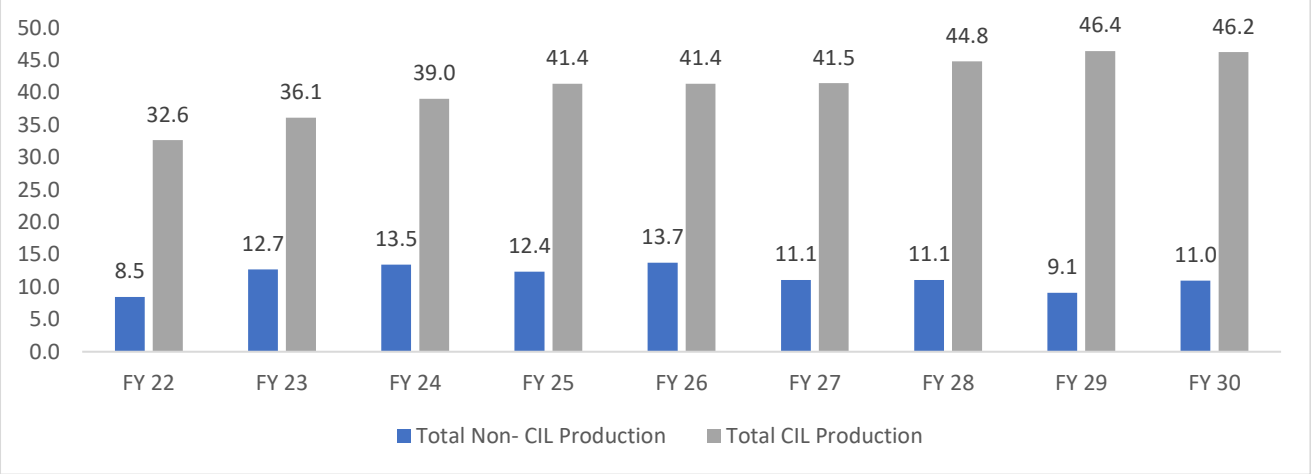
* Planning for surrender.No data received

Source: CMPDIL, Ministry of Coal

Production

It is projected that the total production of both CIL and Non-CIL mines will reach 57.2 MT by the year 2030

Figure 52 Coal Production Potential in Raniganj Coalfield by FY30 (in MT)



Source: Ministry of Coal, Coal India Limited, Coal Block Allocatee

Infrastructure

Road

National Highway 14 (NH 14) runs from Morgram to Kharagpur in West Bengal. Starting from Morgram from east it cuts through Raniganj and goes southwest towards Kharagpur. National Highway 19 runs as a main artery parallel to Raniganj coalfield. It was previously referred to as Delhi–Kolkata Road and was part of the Grand Trunk Road. It connects Asansol to Kolkata, where it terminates.

There are various state highways which crisscross around the coalfield to connect them to national highways. Some of them are SH-8, SH-9, SH-14. Khairasole- Babuijore Road and Bhadulia Road are local roads that connect Bajora and Gangramchak areas to state highways.

Table 104 Important Roads in the vicinity of Raniganj coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 14	National Highway	It runs from Morgram to Kharagpur in West Bengal
2	National Highway 19	National Highway	Connects Agra to Kolkata
3	State Highway 14	State Highway	Originates from junction with NH 14 at Dubrajpur. Passes through Birbhum and Bardhaman district
4	State Highway 9	State Highway	Originates from Durgapur and passes through Paschim Bardhaman, Bankura, Jhargram districts
5	State Highway 8	State Highway	Originates from Santaldih terminating at Majhdia
6	Khairasole-Babuijore Road	Local Road	Connects Khairasole to Babuijore
5		Local Road	Local road originating

			from Bhadulia

Source: Primary and Secondary research

Railways

The Eastern Railway Main Line borders the southern boundary of the coalfield with the nearest railway stations being Raniganj & Bara Bani. The important stations on this line are Asansol Jn., Andal Jn., Khana Jn. and Sainthia Jn. The Asansol-Andal-Khana line runs parallel to Raniganj coalfield. The line connects the coal blocks to Haldia and Kolkata port. The various junctions provide linkages to thermal plants located east to the coal field in Odisha and other inner parts of India.

Table 105 Existing Railways lines in vicinity of Raniganj Coalfield

S No.	Railway Zone	Section
1	Eastern Railways	Andal – Asansol
2	Eastern Railways	Andal – Asansol / Tapasi – Baraboni Sections
3	Eastern Railways	Andal – Pandabeswar Line
4	Eastern Railways	Andal – Sonachara Line
5	Eastern Railways	Andal – Tapasi Line
6	Eastern Railways	Andal-Ukhra-Jhanjra Section (Proposed)
7	Eastern Railways	Damodar - Radhanagar of SER
8	Eastern Railways	Asansol - Jasidih
9	Eastern Railways	Dhanbad-Asansol

Source: Ministry of Railways

Coastal Shipping

The Port of Kolkata is the main port in the eastern Indian state of West Bengal. The Kolkata Port Trust is in charge of this port. The port of West Bengal handles almost 50 million tonnes of cargo per year. The port of Kolkata receives over 45 million tonnes of cargo per year (including Haldia port). The coal blocks analysed further in the chapter have the coal consumed internally in West Bengal or travels by road to Odisha. This minimizes the usage of shipping to provide connectivity as an alternative to roadways and railways.

Inland Waterway

The waterway closest to Raniganj coalfield is NW-1. The Katwa terminal is on average 130 km away from the coal blocks. NW-1 is also known as the Ganga-Bhagirathi-Hooghly River system. It stretches from Prayagraj in Uttar Pradesh to Haldia in West Bengal, via Patna and Bhagalpur in Bihar.

It can be used to transport coal to Haldia port for shipping purposes. Coal would first need to travel to Katwa terminal through road or rail. Katwa Jn. may be reached through the and from Bardhaman station from Andal Jn.-Bardhaman railway line near the coalfield.

Similarly, NH-19 and then SH-14 can be used to transport coal to the waterway terminal via road.

Because shipping is not an option for the plants used by the coal blocks studied, as the current EUPs are in West Bengal and Odisha, waterways as a route are not being actively pursued. If there are EUPs that could benefit from a coastal route in the future, NW-1 could play a key role in carrying coal to Haldia port.

Figure 53 Map showing the connectivity of Raniganj Coalfield

Source: CMPDIL, Ministry of Railways, Ministry of Road Transport & Highways

Coal Evacuation Plan

Non-CIL Mines

Ardhagram coal block

The Ardhagram coal block, which is currently operational, is owned by OCL Iron and Steel Ltd. The neighbouring coal block is Kalidaspur and Kalikapur. The end-user plant is in Rajgangpur Odisha. NH-14 is approximately 9 km away from the coal block.

The coal is transported to the plant in Odisha on road via tarpaulin covered trucks. Road transportation can be done via NH-320 cutting through Ranchi. Howrah port is closest to the coal, approximately 120 km away. Coal can be transported on the Raniganj-Khana-Howrah railway line and then shipped to Odisha and other potential EUPs. Currently, Rajgangpur plant is 407 km away from Paradip port so shipping may not be a feasible solution. NW-1 can also be used to transport coal to Howrah port.

Details			
Name of the Owner	OCL Iron and Steel Ltd	**PRC (MTPA)**	0.4
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Raniganj	**Approximate Distance from Railway Station (in Km)**	5.8
Nearest Road	NH 14	**Approximate Distance from Road (in Km)**	9
Nearest Port	Howrah	**Approximate Distance from Port (in Km)**	120
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	138
End-user Plant Details			
Plant 1	Rajgangpur		
Location	Odisha		
Lead Distance from Mine (in km)	419		
Connectivity infrastructure for the coal block			
Trunk infrastructure:	Coal will be transported by road from mine to EUP		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									0.4

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Bajora coal block

The Bajora coal block, currently operational, is owned by West Bengal Power Development Corporation Limited (WBPDCL). The neighbouring coal block is Nabasan Tamra. The end-user plants are Sagardighi Thermal Power Plant, Bakreswar Thermal Power Plant, Bandel Thermal Power Plant, Santaldihi Thermal Power Planta and Kolaghat Thermal Power Plant.

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The coal is transported by road to Hazratpur Railway station, approximately 7.5 km away from the block. From their railway lines are used to deliver coal to their respective plants. The plants have their rail sidings. Coastal movement can be used through Kolkata port which is approximately 221 km away. The Durgapur-Khana railway line can transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it after that.

Details			
Name of the Owner	WBPDCL	**PRC (MTPA)**	0.5
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Hazratpur	**Approximate Distance from Railway Station (in Km)**	7.5
Nearest Road	Khairasole-Babuijore Road	**Approximate Distance from Road (in Km)**	10
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	221
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	170
End-user Plant Details			
Plant 1	Sagardighi Thermal Power Station	**Plant 2**	Bakreswar Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	176.5	**Lead Distance from Mine (in km)**	44.5
Plant 3	Bandel Thermal Power Station	**Plant 4**	Santaldihi Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	178	**Lead Distance from Mine (in km)**	123
Plant 5	Kolaghat Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	254		
Connectivity infrastructure for the coal block			
Trunk infrastructure:	Coal is transported through road.		
Last-mile connectivity	End-use plants have their own railway sidings.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30

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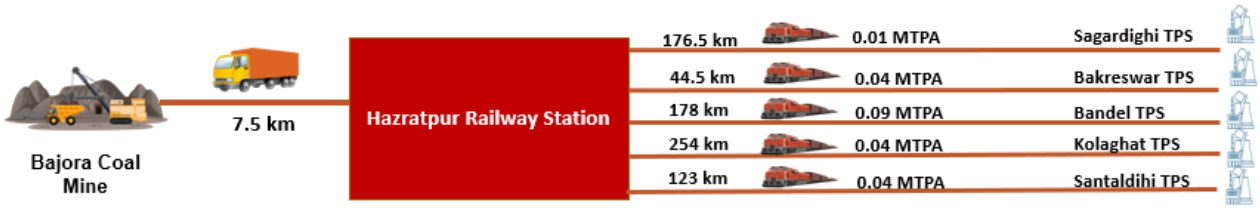
Coal production (MT)									0.5



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Bajora North coal block

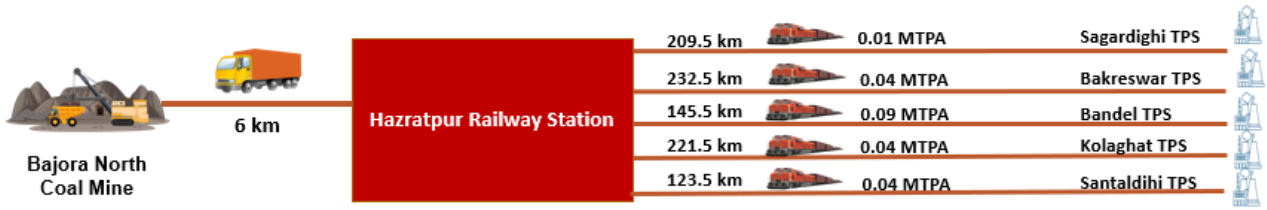
The Bajora (North) coal block, which is currently operational, is owned by WBDPCL. The neighbouring coal block is Bajora South. The end-user plants are Sagardighi Thermal Power Plant, Bakreswar Thermal Power Plant, Bandel Thermal Power Plant, Santaldihi Thermal Power Plant, Kolaghat Thermal Power Plant.

The coal is currently transported using SH-9 to Durgapur Railway station (part of Asansol Division, Eastern Railway). From there it is transported to the respective railway sidings of the plants. The Durgapur-Khana railway line can be used to transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it thereafter.

Details			
Name of the Owner	WBPDCL	**PRC (MTPA)**	3
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Durgapur	**Approximate Distance from Railway Station (in Km)**	16.5
Nearest Road	SH-9 (Durgapur-Bankura Road)	**Approximate Distance from Road (in Km)**	6
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	183
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	120
End-user Plant Details			
Plant 1	Sagardighi Thermal Power Station	**Plant 2**	Bakreswar Thermal Power Station
Location	West Bengal	**Location**	West Bengal

Lead Distance from Mine (in km)	209.5	**Lead Distance from Mine (in km)**	232.5
Plant 3	Bandel Thermal Power Station	**Plant 4**	Santaldihi Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	145.5	**Lead Distance from Mine (in km)**	123.5
Plant 5	Kolaghat Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	221.5		
Connectivity infrastructure for the coal block			
First-mile connectivity	Transported to Durgapur Railway Station using SH-9		
Trunk infrastructure	Transported to plants using railways		
Last-mile connectivity	Plants have their own railway sidings.		

Coal production up to FY 2030										
Financial Year	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1.5	2.2	3	2.3	1.2	0.6				



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Gangaramchak, Gangaramchak Bhadulia coal block

The Gangramchak and Gangaramchak Bhadulia coal blocks, which are currently operational, are owned by WBDPCL. The neighbouring coal block is Kasta. The end-user plants are Sagardighi Thermal Power Plant, Bakreswar Thermal Power Plant, Bandel Thermal Power Plant, Santaldihi Thermal Power Plant, Kolaghat Thermal Power Plant. Firstly, coal is transported on-road using Bhadulia Road to Hazratpur Railway siding, which is approximately 10 km away. Coal is transported to the plants, with their own railway sidings, via the railway line. The Durgapur-Khana railway line can be used to transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it thereafter.

Details			
Name of the Owner	WBPDCL	**PRC (MTPA)**	1

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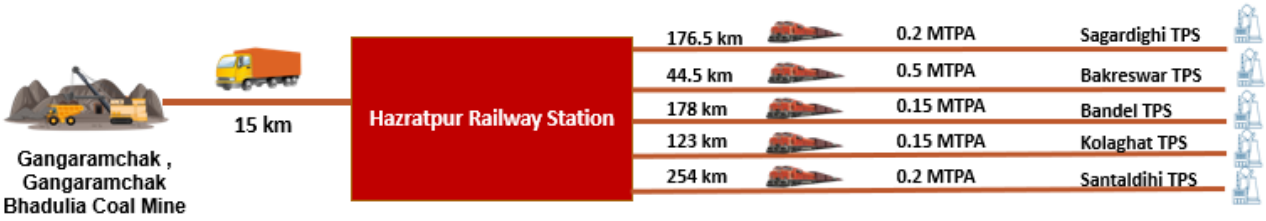
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Hazratpur	**Approximate Distance from Railway Station (in Km)**	15
Nearest Road	Bhadulia Road	**Approximate Distance from Road (in Km)**	10
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	218
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	140
End-user Plant Details			
Plant 1	Sagardighi Thermal Power Station	**Plant 2**	Bakreswar Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	176.5	**Lead Distance from Mine (in km)**	44.5
Plant 3	Bandel Thermal Power Station	**Plant 4**	Santaldihi Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	178	**Lead Distance from Mine (in km)**	123
Plant 5	Kolaghat Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	254		
Connectivity infrastructure for the coal block			
First-mile connectivity	Bhadulia Road to take coal from mine to Hazratpur siding.		
Trunk infrastructure:	Railway lines are used to deliver coal to respective plants.		
Last-mile connectivity	Plants have their own railway sidings.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.5	0.76	1	1	1	1	1	1	1



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Khagra Joydev coal block

The Khagra Joydev coal block, which is currently operational, is owned by Damodar Valley corporation. The neighbouring coal block is Pandabeswar, Dalurbandh, Kotadih, Samla. The end-user plant is Mejia Thermal power Station, West Bengal.

Coal is transported via road using SH-14 and then NH-14 to reach Panchra Railway station (part of Asansol Division, Eastern Railway), approximately 20 km away from the block. Panchra-Andal Jn. Line is used to deliver coal to plant. A 7.7 km of railway line from Panchra railway station and a private railway siding near the coal block would make the evacuation process more effective. Kolkata port which is the closest port is approximately 221 km away. The Panchra-Raniganj then Durgapur-Khana railway line can transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it after that.

Details			
Name of the Owner	Damodar Valley Corporation	**PRC (MTPA)**	3
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Panchra	**Approximate Distance from Railway Station (in Km)**	20
Nearest Road	SH 14, NH 14	**Approximate Distance from Road (in Km)**	2.5 & 8
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	196
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	
End-user Plant Details			
Plant 1	Mejia Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	78		

Connectivity infrastructure for the coal block									
First-mile Connectivity	Coal is transported to Panchra railway station using SH-14 and NH-14								
Trunk infrastructure	Coal is transported by railways.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1	2	3	3	3	3	3	3	3

Source: Primary Research, Ministry of Coal, Coal block Allocatee

Sarisatolli coal block

The Sarisatolli coal block, which is currently operational, is owned by CESC Limited. The neighbouring coal blocks are Tara West and Tara East. The end-user plant is Budge Budge Generating Station (Unit- I & II), West Bengal.

Nazrul Sarani Road and Churulia Road transport coal to Asansol Junction (part of Asansol Division, Eastern Railway). The station is approximately 25 km away from the block. Thereafter, Asansol-Raniganj-Durgapur railway line is be used to deliver coal to the plant. The end-use plant at 24 Parganas has its own rail siding. The Asansol Jn.-Durgapur-Khana railway line can be used to transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it thereafter.

Details			
Name of the Owner	CESC Limited	**PRC (MTPA)**	3.5
Status of the Mine	Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Asansol	**Approximate Distance from Railway Station (in Km)**	25
Nearest Road	NH 19	**Approximate Distance from Road (in Km)**	23
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	240
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	140

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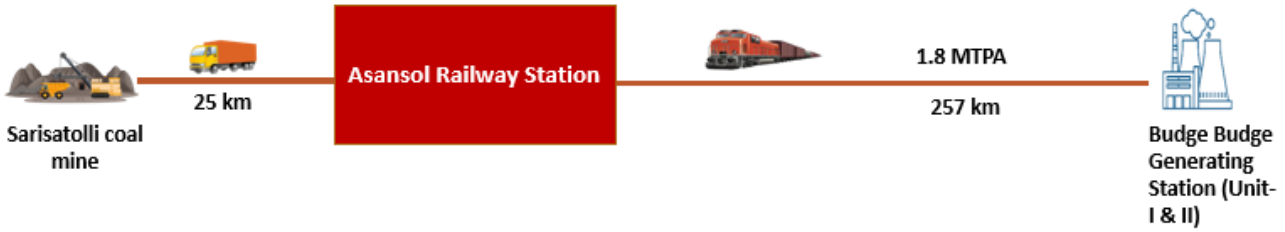
End-user Plant Details									
Plant 1	Budge Budge Generating Station (Unit- I & II)								
Location	24 Parganas, West Bengal								
Lead Distance from Mine (in km)	257								
Connectivity infrastructure for the coal block									
First-mile Connectivity	Local roads are used to transport coal to Asansol Junction.								
Trunk infrastructure:	Railway line is used to deliver coal to plant								
Last Mile Connectivity	Plant has its own railway siding.								
Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	1	1	1	1	1	1	1	1	1



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Tara East and West coal block

The Tara East & West coal blocks, which are currently non-operational, are owned by WBDPCL. The neighbouring coal block is Kasta. The end-user plants are Sagardighi Thermal Power Plant, Bakreswar Thermal Power Plant, Bandel Thermal Power Plant, Santaldihi Thermal Power Plant and Kolaghat Thermal Power Plant. Coal will be transported by Churulia Road to Bara Bani Station, approximately 14 km away, and from there to the railway sidings at plants.

Bara-Bani- Asansol then the Durgapur-Khana railway line can be used to transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it thereafter.

Details			
Name of the Owner	WBPDCL	**PRC (MTPA)**	4
Status of the Mine	Non-operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Bara Bani	**Approximate Distance from Railway Station (in Km)**	14

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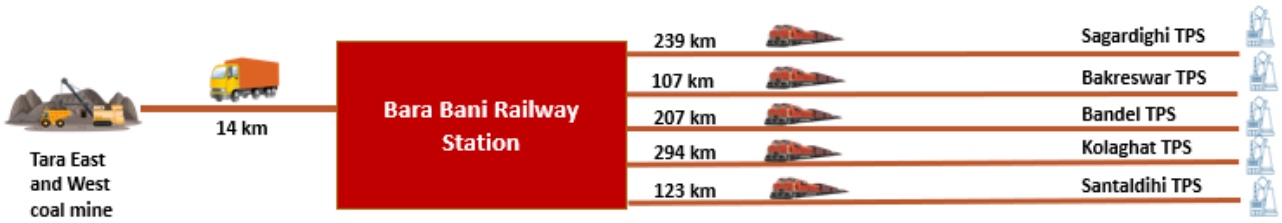
Nearest Road	NH 19	**Approximate Distance from Road (in Km)**	23
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	240
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	140
End-user Plant Details			
Plant 1	Sagardighi Thermal Power Station	**Plant 2**	Bakreswar Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	239	**Lead Distance from Mine (in km)**	107
Plant 3	Bandel Thermal Power Station	**Plant 4**	Santaldihi Thermal Power Station
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	207	**Lead Distance from Mine (in km)**	123
Plant 5	Kolaghat Thermal Power Station		
Location	West Bengal		
Lead Distance from Mine (in km)	294		
Connectivity infrastructure for the coal block			
First-mile connectivity	Churulia Road can be used to transport coal to railway station		
Trunk infrastructure:	Railway line can be used to transport coal		
Last-mile connectivity	Plants have their own rail sidings.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.5	2	2	2	4	2	2		



Source: Primary Research, Ministry of Coal, Coal block Allocatee

Jaganathpur B coal block

The Jaganathpur B, which is currently non-operational, is owned by Powerplus Traders Private Ltd. The neighbouring coal block is Jaganathpur A. The end-user plants are Orissa Metaliks Pvt. Ltd., Rashmi Cement Ltd. And Shyam Steel Manufacturing Ltd.

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Coal will be transported via Madhai Gunj Road to Ukhra railway station (Asansol Division, Eastern Railway) and from railway sidings at the Orissa Metaliks Pvt. Ltd. and Rashmi Cement Ltd. For Shyam Steel Manufacturing Ltd, coal will be transported via road.

The Ukhra-Andal then Andal-Khana railway line can be used to transport coal to Kolkata port and shipped to potential EUPs in other parts of India. NW-1 can also be used to transport coal to Haldia port and ship it thereafter.

Details			
Name of the Owner	Powerplus Traders Private Ltd.	**PRC (MTPA)**	1.5
Status of the Mine	Non-Operational	**Coalfield**	Raniganj
Infrastructure Available			
Nearest Railway Station	Ukhra	**Approximate Distance from Railway Station (in Km)**	19
Nearest Road	NH 19	**Approximate Distance from Road (in Km)**	20
Nearest Port	Kolkata	**Approximate Distance from Port (in Km)**	195
Nearest Waterway	NW-1	**Approximate Distance from Waterway (in Km)**	140
End-user Plant Details			
Plant 1	Orissa Metaliks Pvt. Ltd.	**Plant 2**	Rashmi Cement Ltd.
Location	West Bengal	**Location**	West Bengal
Lead Distance from Mine (in km)	285	**Lead Distance from Mine (in km)**	331
Plant 3	Shyam Steel Manufacturing Ltd		
Location	West Bengal		
Lead Distance from Mine (in km)	27		
Connectivity infrastructure for the coal block			
Trunk infrastructure:	i. Railway for Orissa Metaliks Pvt. Ltd. And Rashmi Cement Ltd. ii. Road for Shyam Steel Manufacturing Ltd		
Last-mile connectivity	Railway sidings available at Orissa Metaliks Pvt. Ltd. And Rashmi Cement Ltd		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)	0.5	1.25	1.5	1.5	1.5	1.5	1.5	1.5	1.5

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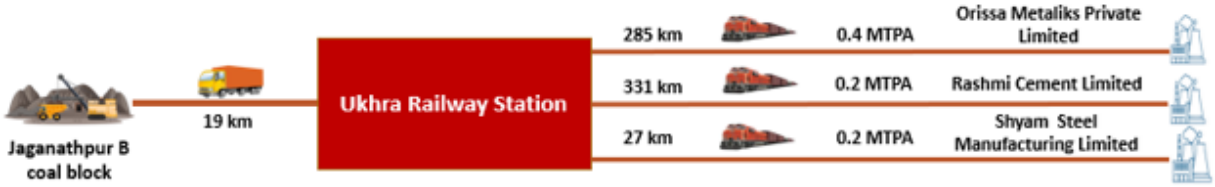

Source: Primary Research, Ministry of Coal, Coal block Allocatee

CIL Mines

During 2021-22, The production of CIL mines from Raniganj coalfield was 32.64 MT which is expected to reach 39.04 MT and 46.24 MT in FY 24 and FY 30, respectively.

ECL does the majority of the mining in Raniganj, a small portion is done by BCCL. The following mines and CHPs will be linked to the planned infrastructure. Currently, work on 14 mines is ongoing and 13 expansion/new projects are planned.

Table 106 Mines and Projects in Raniganj Coalfield

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
1	Badjna	Existing	0.060
2	Bejdih	Existing	0.030
3	Chapuikhas	Existing	0.025
4	Chora 7 & 9 pit	Existing	0.080
5	Khandra	Existing	0.065
6	Khas Kajora	Existing	0.180
7	Kumardhubi	Existing	0.050
8	Kumardihi A	Existing	0.085
9	Lakhimata	Existing	0.050
10	Madhaipur	Existing	0.050
11	Manderboni & South Samla	Existing	0.075
12	Methani	Existing	0.020
13	Nimcha	Existing	0.170
14	Ningha	Existing	0.010
15	*Parascole (East andWest)	Existing	0.060
16	Parbelia	Existing	0.050
17	Pure Searsole	Existing	0.040

S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
18	Shampur B	Existing	0.070
19	Chapapur 10 quarry OC	Existing	0.400
20	Kapasara OC	Existing	0.550
21	Kalidaspur OC	Existing	0.500
22	North Searsole OC	Existing	1.000
23	Nirsha	Existing	0.400
24	New Kenda Quarry III	Existing	0.100
25	Muslia/ Ghusick OC	Existing	0.200
26	Gourangdih Begunia OC	Existing	1.500
27	Gourandih OC	Existing	1.000
28	Nimcha OCP	Existing	0.350
29	CL Jambad	Existing	0.400
30	Shampur B Sangmahal	Existing	0.750
31	Amritnagar	Completed	0.100
32	Bahula incl. Lower Kenda	Completed	0.200
33	Bankola	Completed	0.150
34	Bansra	Completed	0.170
35	Bhanora West Block	Completed	0.040
36	Central Kajora	Completed	0.070
37	Chapapur-II	Completed	0.070
38	Chinakuri III	Completed	0.060
39	Chora 10 Pit	Completed	0.040
40	Chora Block Incline	Completed	0.050
41	Dhemomain (Pit & Incline)	Completed	0.030
42	Dubeswari	Completed	0.040
43	Hariazam	Completed	0.070

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S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
44	J K Nagar	Completed	0.125
45	Kalidaspur	Completed	0.100
46	Khoodia	Completed	0.030
47	Kunustoria	Completed	0.110
48	Narsamuda	Completed	0.070
49	Satgram Pit & Incline)	Completed	0.080
50	Shankarpur	Completed	0.130
51	Jambad	Completed	0.500
52	Shankarpur OC	Completed	0.500
53	Jhanjra Combined Project	Ongoing	2.93
54	Kumardih B CM	Ongoing	0.87
55	Siduli	Ongoing	0.09
56	Khottadih UGP	Ongoing	1.00
57	Tilaboni	Ongoing	0.36
58	Parasea Belbaid	Ongoing	0.36
59	Khottadih OCP	Ongoing	0.80
60	Siduli	Ongoing	1.20
61	Mohanpur Expansion OCP	Ongoing	1.00
62	Sonepur Bazari (Comb) OCP	Ongoing	10.00
63	New Kenda OCP	Ongoing	1.20
64	Nakrakonda - Kumardih B	Ongoing	1.50
65	Nimcha/Narainkuri HW	Ongoing	0.500
66	Jhanjra Expansion	Future	1.23
67	Sarpi Expansion including Shaymsundarpur	Future	1.59
68	Nabakajora / Madhabpur	Future	0.05
69	Prascole Jambad	Future	0.47

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S No.	Name of Mines	Status	Expected Production in FY 24 (in MT)
70	Pandaveswar-Dalurband	Future	0.12
71	Mohanpur (Ph-II)	Future	1.50
72	Sonepur Bazari Expansion	Future	2.00
73	Bonjemehari	Future	1.00
74	Nabakajora / Madhabpur	Future	0.80
75	Itapara	Future	2.00
76	Pandebeswar Dalurband (Mixed)	Future	0.50

Source: Ministry of Coal, CIL

Rail and road are the main modes of evacuation. ECL mines evacuate almost all of their coal via rail while a very small part is transported by road by BCCL. The railway is major mode of transportation and going forward also going to play significant role going forward.

The coalfield will have a strong influence on the increased demand for rakes for evacuation. The graph below illustrates the projected rake requirement figures. Since both BCCL and ECL operate in the area, the combined figure is shown below.

Figure 54 Projected Rake Requirements in Raniganj Coalfield (in Nos.)

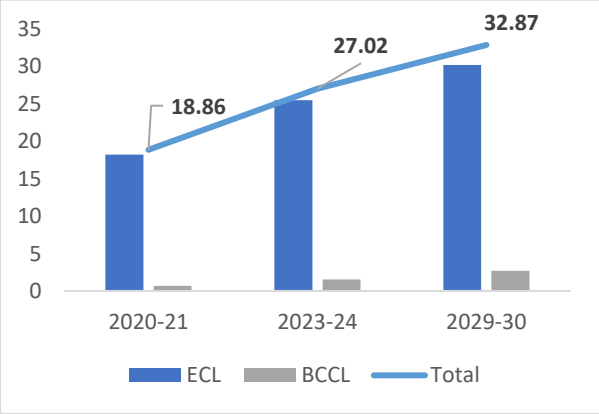


Table 107 Existing Rail Links for CIL mines in Raniganj

S No.	Railway Zone	Section
1	Eastern Railways	Andal – Asansol
2	Eastern Railways	Andal – Asansol / Tapasi – Baraboni Sections
3	Eastern Railways	Andal – Pandabeswar Line
4	Eastern Railways	Andal – Sonachara Line
5	Eastern Railways	Andal – Tapasi Line
6	Eastern Railways	Andal-Ukhra-Jhanjra Section (Proposed)
7	Eastern Railways	Damodar - Radhanagar of SER
8	Eastern Railways	Asansol - Jasidih
9	Eastern Railways	Dhanbad-Asansol

Source: Ministry of Railways

CIL's subsidiary operating in the coalfield, ECL, has planned projects for the Raniganj coalfield of which some are currently being developed. The details are given in the table below.

Additional details of all projects planned in the FMC scheme can be found in the annexures.

Table 108 FMC Phase I Projects planned in the Raniganj Coalfield Area

S No.	Project Name	Capacity (in MTPA)	Tender Status	Anticipated Commissioning Date
1	Sonepur Bazari OCP CHP SILO	12	Awarded	2021
2	Jhanjra Expansion UG CHP-SILO	5	Awarded	2023

Source: Ministry of Coal, CIL

The sequel to FMC initiative is the FMC Phase II projects. Additional projects for the mechanisation of coal loading and transportation procedures have been identified for upcoming mines of CIL The details are given in the table below.

Table 109 FMC Phase II Projects in Raniganj Coalfield

S No.	Project Name	Capacity (in MTPA)	Anticipate Finish Date
1	Parasea-Belbaid	2	2024
2	Tilaboni UG	2	2023
3	Kumardih-B CM UG	1	2022
4	Nabakajora-Madhabpur Mixed	2	
5	Mohanpur	2.5	2025
6	Sarpi Expan. Surface Belt	1.5	2025

Source: Ministry of Coal, CIL

Analysis and Recommendations

The coal produced from the Raniganj coalfield is majorly consumed in the state or transported to a neighbouring state like Odisha. 5 Non-CIL blocks have been awarded to West Bengal Power Development Corporation and coal from them is consumed it power plants existing within the state itself.

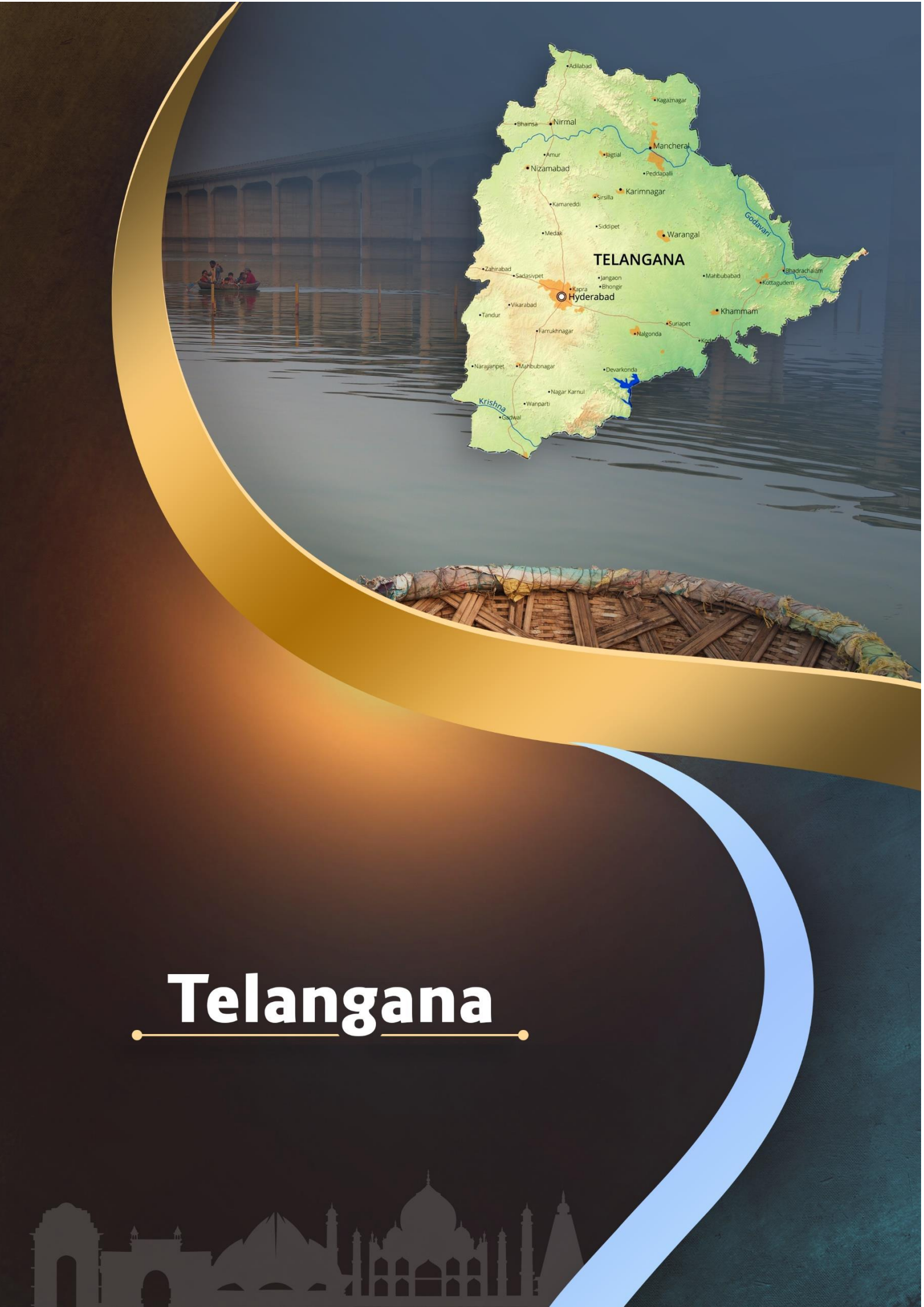
The mine life of these mines is nearing and hence the production from the other mine will preferably be consumed by these power plants considering the cost economics of coal.

These plants have well established evacuation infrastructure in place and good connectivity with mines as well. Coal is delivered to the ECL customers from the dispatch points through rail, road, or dedicated rail MGR system.

Wherever possible, the existing infrastructure available after mine life or where mine production starts downward curve can be planned to be offered to be utilize by other nearby mines or other bulk commodities in the area. This is applicable for CIL as well as Non-CIL infrastructure.

Ministry of Coal can operationalize a National Database for Common User Facilities in Coal mining geographies. Existing and planned facilities like railway lines, sidings, roads, berths at ports, CHPs, silos can be mapped to specified mining geographies.

Since majority of evacuation is planned through railway and rake requirement will be enhanced, co-ordination with Ministry of railway is required for availability of railways rake for efficient evacuation of coal.


Adilabad
Kagaznagar
Bhainsa
Nirmal
Mancheral
Amur
Jagtial
Nizamabad
Peddapalli
Karimnagar
Sirsilla
Kamareddi
Siddipet
Medak
Warangal
Godavari
TELANGANA
Zahirabad
Sadasivpet
Jangaon
Mahbubabad
Bhadrachalam
Kottagudem
Kapra
Bhongir
Hyderabad
Vikarabad
Khammam
Tandur
Suriapet
Farrukhnagar
Nalgonda
Narayanpet
Mahbubnagar
Devarkonda
Nagar Karnul
Krishna
Wanparti
Gadwal

Telangana

11. Telangana

Telangana is a state in South India, located on the high Deccan Plateau in the south-central part of the Indian peninsula. By road, rail, and air, the state is well connected to the rest of the country. There are 16 national highways in the state, with a total length of 2,690 kilometres. The South-Central Railway is responsible for the majority of Telangana's railway network.

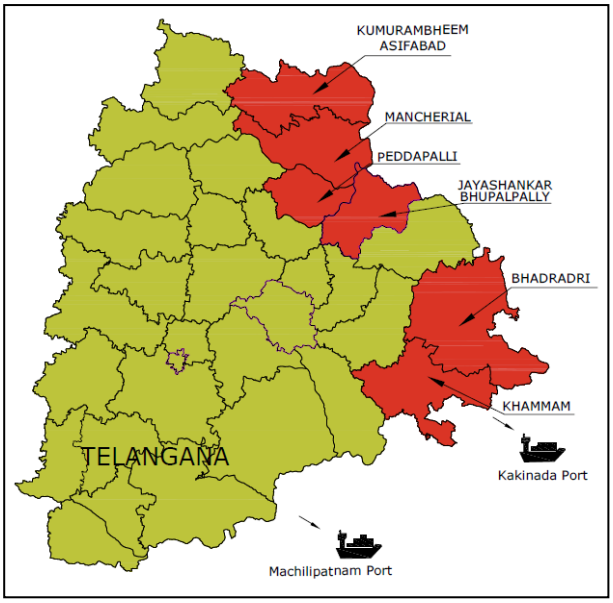
The Singareni Collieries Company Ltd. (SCCL) is a major coal contributor to the state and is the second largest coal producing company. SCCL is a Government-owned public sector company jointly owned by the Government of Telangana and India, having 51 and 49 contributions, respectively. The Union Government's administration of the company is through the Ministry of Coal.

Godavari Valley Coalfield

Location

In the Indian state of Telangana, the Godavari Valley Coalfield is located in the districts of Kumurambheem Asifabad, Mancherial, Peddapalli, Jayashankar Bhupalpally, Bhadradri and Khammam. It is South India's lone coalfield. It is located in the Godavari River's basin.

The government has tasked Singareni Collieries with exploring and exploiting coal reserves in the Godavari valley coalfield. The corporation carries out mining throughout Telangana's four coal-bearing districts. The cumulative basin area of Godavari Valley Coalfield is 17,400 km^2. The coal bearing area is 11,000 km^2.



Area: 10,000 sq. km.
Latitude: 18°38′42″ N
Longitude: 79°33′50″ E
Location: Asifabad, Mancheriyal, Peddapalli, Bhupalpally, Bhadradri and Khammam.

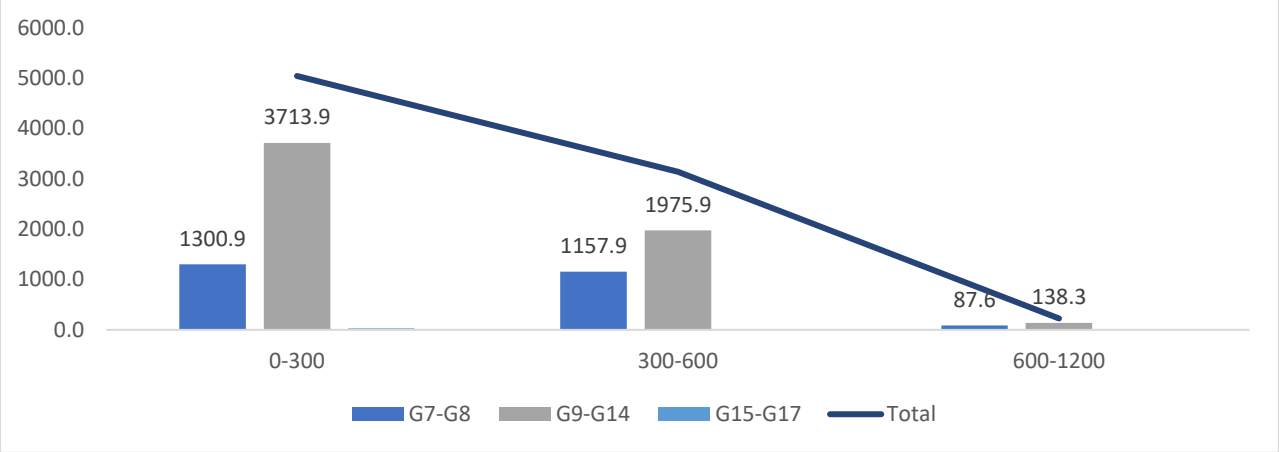
However, 1,700 km^2 is considered prospective for regional exploration. The Godavari Valley Coalfield is an extension of the Wardha Valley Coalfield, also known as Pranhita-Godavari Valley Coalfield. It covers an area of 9,000 km^2. The Talchir, Barakar, and Kamthi measures of Lower Gondwana rocks are well developed in the area. There are twelve coal belts in the Godavari Valley Coalfield. Important coalfields of the area are: Tandur; North Godavari, South Godavari, Karlapalli or Kamaram and Ramagundam.

Geological Reserve

According to GSI (Inventory of Geological Reserves of Indian Coal), Godavari Valley coalfield has 23,832 million tonnes of coal reserves as of 01/04/20. 10,938 million tonnes of coal fall under the "Proved" category. The fifth-largest coal deposit in India is found here.

Below figure provides grade-wise, depth-wise coal resources in Godavari Valley coalfield.

Figure 55 Grade wise Geological Resources of Coal at Godavari Valley Coalfield



Source: Coal Controller's Organization, Ministry of Coal Publications

Coal Blocks

There are 54 coal blocks in Telangana (46 operational, 7 upcoming), 52 of which are operated by SCCL and one by Telangana State Power Generation Corporation Limited.

Coal blocks of SCCL are linked to different Coal Handling Plants (CHP) based on CHP location and coal from these CHP is provided to SCCL customers based on the basket linkage. The coal blocks' specifications and the CHP to which they were assigned are listed in the tables below.

Table 110 Operational Coal Blocks in Godavari Valley Coalfield

S No.	Name of the Block	Name of CHP	Allocatee	PRC (MT)
1	Tadicherala-I	-	Telangana State Power Generation Corporation Limited	2.5
2	KK 1 Incline	Ravindrakhani CHP	SCCL	0.2
3	KK 5 Incline	Ravindrakhani CHP	SCCL	0.16
4	RK 1A INC	Ravindrakhani CHP	SCCL	0.12
5	Kasipet 1	Ravindrakhani CHP	SCCL	0.24
6	Kasipet 2	Ravindrakhani CHP	SCCL	0.3
7	RKP OC	Ravindrakhani CHP	SCCL	2
8	KK OCP	Ravindrakhani CHP	SCCL	2.2
9	SK	Ravindrakhani CHP	SCCL	0.27
10	Khairagura Opencast	Goleti CHP	SCCL	3.5

11	BPA OC II	Goleti CHP	SCCL	0.05
12	GK OC	Rudrampur CHP	SCCL	3.1
13	VK-7 Incline	Rudrampur CHP	SCCL	0
14	PVK-5 Incline	Rudrampur CHP	SCCL	0.7
15	JVR OC(I&II)	Rudrampur CHP	SCCL	11.1
16	Kistaram OC	Rudrampur CHP	SCCL	2.3
17	JK OC	Yellandu CHP	SCCL	1.6
18	KOC-II	Yellandu CHP	SCCL	3
19	GDK 11 Incline	GDK-1 CSP	SCCL	1
20	GDK 1 & 3 Incline	GDK-1 CSP	SCCL	0.4
21	GDK 2 & 2An Incline	GDK-1 CSP	SCCL	0.3
22	MOCP	GDK-1 CSP	SCCL	1.1
23	GDK 7 LEP	OC3 CHP	SCCL	0.14
24	RG OC III Exp	OC3 CHP	SCCL	8.3
25	Vakilpalli Mine	OC3 CHP	SCCL	0.35
26	RG OC I Exp	RG OC-1 SILO	SCCL	3.2
27	RG OC II Ext	RG OC-1 SILO	SCCL	4.5
28	Adriyala LWP	RG OC-1 SILO	SCCL	2.7
29	KTK-1&1A Inc	KTK OC-II CHP	SCCL	0.4
30	KTK-5 Inc	KTK OC-II CHP	SCCL	0.4
31	KTK-6 Inc	KTK OC-II CHP	SCCL	0.3
32	KTK- OC II	KTK OC-II CHP	SCCL	1.5
33	Kakatiya Longwall Project	KTK OC-II CHP	SCCL	0.4
34	KTK OC III	KTK OC-II CHP	SCCL	3.4
35	RK-5 Inc	Srirampur CHP	SCCL	0.3
36	RK-6 Inc	Srirampur CHP	SCCL	0.3
37	RK-7Inc	Srirampur CHP	SCCL	0.4
38	RK NT	Srirampur CHP	SCCL	0.3
39	SRP 1 Inc	Srirampur CHP	SCCL	0.15
40	SRP 3&3A	Srirampur CHP	SCCL	0.28
41	SRP OC II	Srirampur CHP	SCCL	3.9
42	IK OC	Srirampur CHP	SCCL	2.1
43	IK 1A	Srirampur CHP	SCCL	0.6
44	Kondapuram	Kondapuram CHP	SCCL	0.7
45	PK OC	Kondapuram CHP	SCCL	9.1
46	Manuguru	Kondapuram CHP	SCCL	1.8

Source: Singareni Collieries Company

Table 111 Upcoming Coal Blocks in Godavari Valley Coalfield

S No.	Name of the Block	Name of CHP	Allocatee	PRC (MT)
1	Penagadapa Coal Block	Rudrampur CHP	SCCL	1.5
2	Goleti OC	Goleti CHP	SCCL	2.4
3	VK Coal Mine	Rudrampur CHP	SCCL	5.9
4	GDK 5 OC	GDK-1 CSP	SCCL	3.6
5	Ramagundam Coal Mine (RG Coal Mine)	RG OC-1 SILO	SCCL	6.7
6	PVNR OC (Venkatapur OC)	KTK-OC-II	SCCL	2.8
7	Mahaveer Kahni OC		SCCL	0.9

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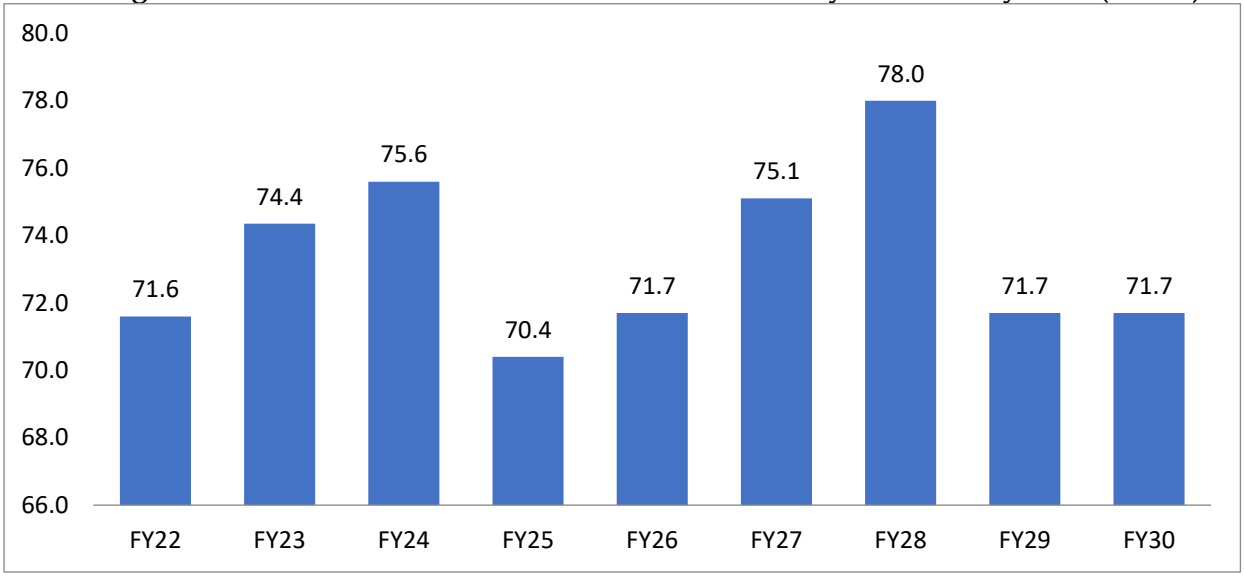
Source: Singareni Collieries Company

Production

The Godavari Valley can produce 71.7 MT by 2029-30, according to SCCL estimates. The graph below depicts how coal production will vary year after year. Few of operational mines achieve their mine life hence there is a decrease in production in year upcoming years. Subsequently, contribution from new mines new mines leads to increase in production.

Production details for Tadicherala-I mine is not available accordingly, production details in below chart are for SCCL only. Additionally, 2.5 MTPA can be added taking into consideration PRC of Tadicherala-I mine.

Figure 56 Coal Production Potential in Godavari Valley Coalfield by FY30 (in MT)



Source: Singareni Collieries Company

Infrastructure

Road

National Highway 363, commonly referred to as NH 363 is a national highway in India It is a spur road of National Highway 63. The highway is closest to the CHPs which are in the Mancherial district. It connects Mancherial to Asifabad.

NH 30 which originates from Vijayawada and stretches till Uttarakhand is an important highway which provides connectivity in the Khammam district. State Highway 1 runs south to Mancherial and is closest to CHPs in the Ramagundam region. The important roads which are found around the coalfield are listed in the table below.

Table 112 Important Roads in the vicinity of Godavari Valley Coalfield

S no.	Roads	Type of Roads	Description
1	National Highway 363	National Highway	It connects NH 63 near Mancherial, Ramagundam, Peddapalli, Karimnagar, Huzurabad, Warangal, Mated and terminates at NH 365A near Khammam

S no.	Roads	Type of Roads	Description
2	National Highway 30	National Highway	
3	National Highway 365B	National Highway	It connects NH 65/NH 365 near Suryapet, Jangaon Siddipet and terminates near Siricilla
4	National Highway 63	National Highway	It connects NH 548C near Barshi, Yedshi, Dhoki, Murud, Latur, Renapur, Nalegaon, Dighoi, Udgir, Deglur, Adampur, Khatgoan, Sagroli, Bodhan, Nizamabad, Metpalli, Jagtial, Mancherial, Chennur, Sironcha, Bijapur, Jagdalpur, Kotapad and terminates at NH 26 near Boriguma
5	State Highway 1	State Highway	It starts near Indaram on NH 63 and passes through Gollapalli, Bommakal, Karimnagar, Alugunur, Ponnal, Duddeda, Ramachandrapur, Pragnapur, Shamirpet, Secunderabad and terminates near Jeera on NH 44
5	State Highway 42	State Highway	It starts at border of Telangana at Aswaraopeta and passes through Jangareddygudem, Koyyalagudem, Tadepalligudem, Pippara and ends at Palakollu

Source: Primary and Secondary research

Railway

South Central Railway administers the railways around the Godavari Coalfield. Some of the important stations are Mancherial, Ramagundam, Bhadrachalam Road, Mandamarri and Belampalli.

The important railway lines are listed in the table below.

Table 113 Existing Railways lines in vicinity of Godavari Valley Coalfield

S no.	Railway Zone	Section
1	South Central Railway	Manchiryal - Bellampalli
2	South Central Railway	Peddapalli - Manchiryal
3	South Central Railway	Bellampalli - Tandur
4	South Central Railway	Ramagundam - Peddapalli
5	South Central Railway	Karepalli - Kothagudem
6	South Central Railway	Kothagudem - Manuguru

Source: Ministry of Railways

In addition to this Bhadrachalam Road - Sattupalli new rail line project is one of the most important ongoing projects on South Central Railway (SCR). SCR and M/S are jointly developing this new line. Singareni Collieries Limited (SCCL) for transporting coal from the nearby mines of SCCL located at Sattupalli area. This project also involves the construction of about 10 major bridges along the route covering the Bhadradri-Kothagudem and Khammam districts.

Coastal Shipping

The closest ports to Godavari Valley coalfield are Kakinada Port and Vishakhapatnam Port which are approximately 498 km and 600 km away, respectively. The long-distance between

the coalfield and the ports limits the viability of coastal shipping.

Inland Waterways

National Waterway 4 (NW-4) is a 1,095-kilometre-long waterway. Telangana, Andhra Pradesh, Tamil Nadu, and the union territory of Puducherry are all connected by it. In South India, the NW-4 goes along the Coromandel Coast, passing via the Kakinada, Eluru, Commanur, and Buckingham Canals and a portion of the Krishna and Godavari rivers. The section between Bhadrachalam and Rajahmundry can transport coal due to its nearness to SCCL mines.

Coal can be transported using the portion of waterway which is on the Godavari River. The Godavari River system flows through the Bhadrachalam forests and coal deposits. The waterway is currently in the development stage and, once operational, might be utilised to move bulk goods including coal.

Transportation to Customers

SCCL has entered into a dual supply arrangement with its clients. Coal from CHPs is distributed to individual clients. Multiple coal blocks feed coal to CHPs. The coal is then supplied to end consumers by conveyor, road, rail, or a combination of the two. Clients are distributed over various states in India, and their information is mentioned in the table below.

Table 114 List of Customers of SCCL

S No.	Power House	Name of Owner	Location	
			District	State
1	Kothagudem TPP	Telangana State GENCO	Bhadradri	Telangana
2	Ramagundam B Ph	Telangana State GENCO	Peddapalli	Telangana
3	Kakatiya TPP Stage-I	Telangana State GENCO	Bhupalpally	Telangana
4	Bhadradri TPS	Telangana State GENCO	Bhadradri Kothagudem	Telangana
5	Rayalaseema TPP	Andhra Pradesh GENCO	Kadapa	Andhra Pradesh
6	NTPC, Ramagundam	NTPC	Peddapalli	Telangana
7	Parli Old Unit	Maharashtra GENCO	Parli	Maharashtra
8	Raichur TPS	Karnataka Power Corp. Ltd	Raichur	Karnataka
9	Bellary TPS	Karnataka Power Corp. Ltd	Bellary	Karnataka
10	Yermarus TPP	Raichur Power Corporation Ltd.	Raichur	Karnataka
11	North Chennai TPP St-III & Uppur TPP	Tamil Nadu Genco	Tiruvallur	Tamil Nadu
12	Kakatiya TPP- Stage-II	Telangana State GENCO	Bhupalpally	Telangana
13	Koradi TPS	Maharashtra GENCO	Nagpur	Maharashtra
14	Parli (Unit -8)	Maharashtra GENCO	Beed	Maharashtra
15	NTPC Kudgi	NTPC	Kudgi	Karnataka

16	Singareni T P Project	SINGARENI	Mancherial	Telangana
17	Mettur TPS (I & II)	Tamil Nadu Genco	Salem	Tamil Nadu
18	Aravally TPS	JV of NTPC & Indira Gandhi STPP	Jhajjar	Haryana
19	NTPC Mouda	NTPC	Nagpur	Maharashtra
20	NTPC (Simhadri)	NTPC	Visakhapatnam	
21	NSPCL (NTPC & SAIL)	JV of NTPC & SAIL	Purena, Bhilai (East)	Chhattisgarh
22	NTPC Vallur	JV of NTPC & TANGEDCO	Ponneri Taluk	Tamil Nadu
23	NTPC Korba	NTPC	Jamnipali Korba	Chhattisgarh
24	NTPC Sipat	NTPC	Ujwalnagar Bilaspur	Chhattisgarh
25	Chendrapur (CSTPS)	Maharashtra GENCO	Chandrapur	Maharashtra
26	NTPC Solapur	NTPC	Hotgi	Maharashtra
27	M S E B Bhusawal	Maharashtra GENCO	Bhusawal	Maharashtra
28	Khaperkheda TPP	Maharashtra GENCO	Nagpur	Maharashtra
29	Sri Damodaram STPP	Andhra Pradesh Power Development Company Ltd	Nellore	Andhra Pradesh
30	Paras TPS	Maharashtra GENCO	Balapur	Maharashtra
31	Dr. Narla Tata Rao TPS	Andhra Pradesh GENCO	Ibrahimpatnam Krishna	Andhra Pradesh
32	NTPC Gadarwara STPP	NTPC	Thana- Chichli	Madhya Pradesh
33	NTPC Lara	NTPC	Raigarh	Chhattisgarh
34	NTPC Talcher	NTPC	Angul	Odisha
35	NTPC Meja Urja Nigam Pvt Ltd	NTPC	Prayagraj	Uttar Pradesh
36	NTPC Khargone	NTPC	Taluka - Sonawad	Madhya Pradesh

Source: Singareni Collieries Company

Coal Evacuation Plan

Coal Block-wise Analysis

Tadicherala-I coal block

The Tadicherala-I Coal block, which is currently operational, is owned by Telangana State Power Generation Corporation Limited. The end-user plant is Kakatiya Thermal Power Project (1X600) MW, Chelpur, Telangana. The end-use plant is approximately 54 kilometres away from the block.

The coal is currently transported on road via trucks. Manthani Road is 30 kilometres to the west and NH 353C lies 30 kilometres to east. The end-use plant lies south and is reached using NH 353C. A conveyor belt of 17.2 kilometres in length has been proposed as an evacuation method.

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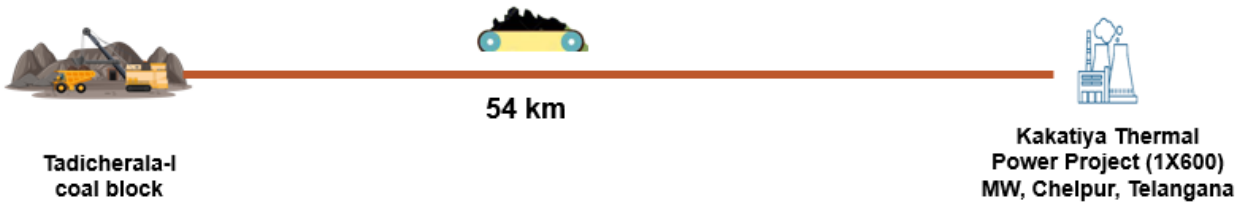
Peddapalli station (Secunderabad Division, South Central Railway) is closest to the block approximately 85 km away. Coastal coal transportation is not an option because the end-use plant is close to the block and easily accessible by road. There is also limited possibility of transporting coal to the coast because the nearest port, Kakinada Port, is 450 kilometres away.

Details			
Name of the Owner	Telangana State Power Generation Corporation Limited	**PRC (MTPA)**	2.5
Status of the Mine	Operational	**Coalfield**	Godavari Valley
Infrastructure Available			
Nearest Railway Station	Peddapalli	**Approximate Distance from Railway Station (in Km)**	85
Nearest Road	NH 353C & Manthani-Road	**Approximate Distance from Road (in Km)**	a. 30 b. 30
Nearest Port	Kakinada Port	**Approximate Distance from Port (in Km)**	450
Nearest Waterway	NW-4	**Approximate Distance from Waterway (in Km)**	214
End-user Plant Details			
Plant 1	Kakatiya Thermal Power Project (1X600) MW		
Location	Chelpur, Telangana		
Lead Distance from Mine (in km)	54		
Connectivity infrastructure for the coal block			
First-mile Connectivity	Coal is currently evacuated by road		
Trunk infrastructure:	Coal is delivered to plant by via trucks.		
Last Mile Connectivity	The plant receives coal through road.		

Coal production up to FY 2030									
Financial Year	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal production (MT)									



Source: Primary Research, Ministry of Coal, Coal block Allocatee

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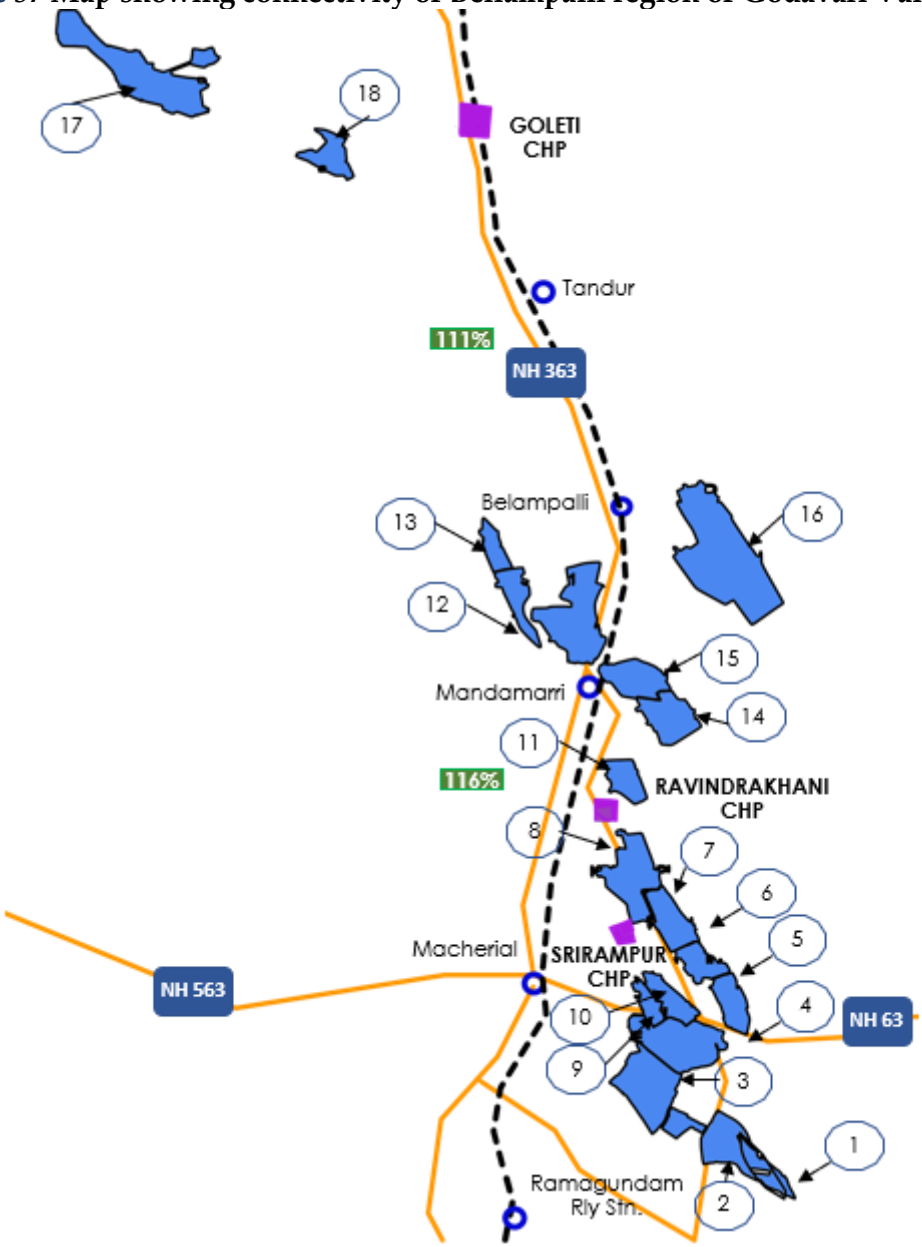
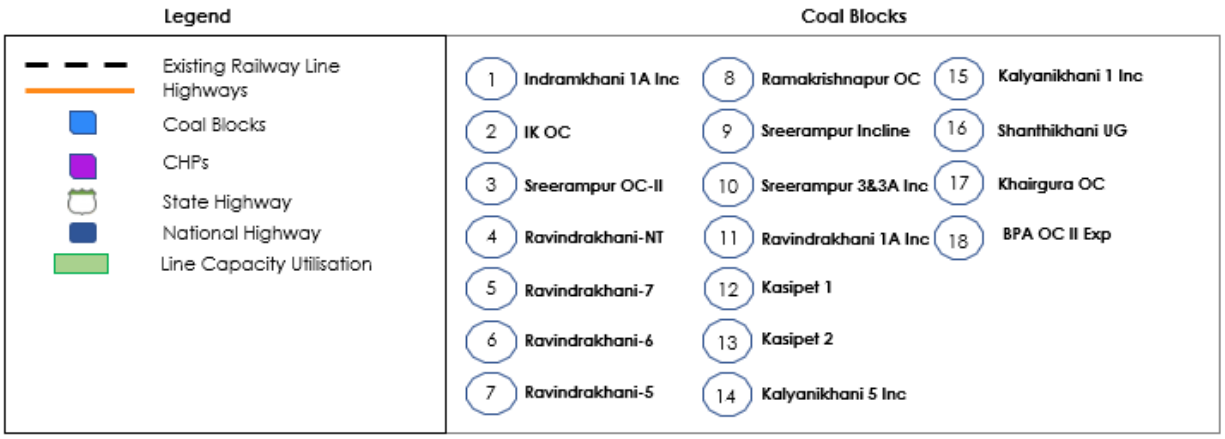
CHP - wise Analysis

CHPs in Bellampalli Region

The following CHPs are located in Bellampalli region of Godavari Valley Coalfield. The map below shows the connectivity in the region. Following that, CHPs located in this area have been analysed.

Figure 57 Map showing connectivity of Bellampalli region of Godavari Valley coalfield





Source: Singareni Collieries Company

Ravindrakhani CHP

Coal is processed here before being sold to the customers as per the basket linkage. All the blocks feeding to this CHP are operational. KK 1 Incline is expected to cease production after FY 24. Kasipet 1 and RKP OC are projected to discontinue production post FY 22. The closest road to Ravindrakhani CHP is NH – 363, which is approximately 9.7 km away and can be reached through Mandamarri - Godavarikhani Road. The highway is used to transport coal to clients nearby in Telangana and other close states.

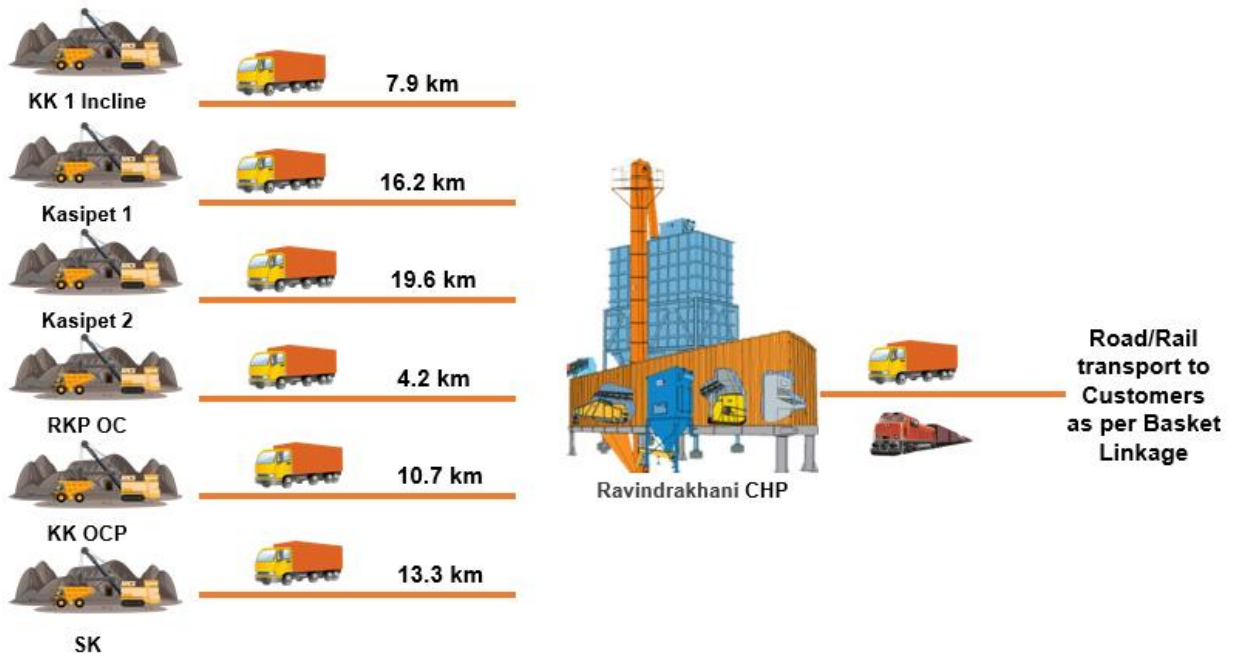
The railway stations in close proximity are Ravindrakhani, Mandamarri and Bellampalli. They are part of Secunderabad Division, South Central Railway. Mandamarri-Belampalli railway line is used to transport coal northwards towards clients in Maharashtra and further. Coal is transported southwards to consumers in Karnataka, Andhra Pradesh, and Tamil Nadu via the Mandamarri-Mancherial-Peddapalli railway lines.

The closest port is Kakinada Port, which is about 500 kilometres away in Andhra Pradesh. Coal can be carried along the Mancherial-Peddapalli railway line to Warangal, from where it can be transported to Vijayawada Jn. in Andhra Pradesh, and then to Kakinada Port. The long distance makes such a route economically unviable. It is advised that a feasibility study be conducted. When fully operational, the NW-4 can be used to transport coal. The closest terminal to the CHP is in Bhadrachalam, which is approximately 270 kilometres away. A map of rail and road connectivity around Ravindrakhani CHP can be found in Figure 44.

Details				
Name of the mine blocks	1. KK 1 Incline 2. Kasipet 1 3. Kasipet 2 4. RKP OC 5. KK OCP 6. SK		**PRC (MTPA)**	a. 0.2 b. 0.2 c. 0.3 d. 2.0 e. 3.3 f. 0.2
Status of the CHP	KK 1 Incline	Operational	**Coalfield**	Godavari Valley
	Kasipet 1	Operational		
	Kasipet 2	Operational		
	RKP OC	Operational		

	KK OCP	Operational		
	SK	Operational		
Infrastructure Available				
Nearest Railway Station	Ravindrakhani		**Approximate Distance from Railway Station (in Km)**	2.4
Nearest Road	NH-363		**Approximate Distance from Road (in Km)**	9.7
Nearest Port	Kakinada Port		**Approximate Distance from Port (in Km)**	500
Nearest Waterway	NW-4		**Approximate Distance from Waterway (in Km)**	270

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
KK 1 Incline	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Kasipet 1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kasipet 2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
RKP OC	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KK OCP	1.4	1.5	1.7	2.2	2.2	2.2	2.2	2.2	2.2
SK	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2



Source: Singareni Collieries Company

Goleti CHP

Goleti CHP has 3 mine blocks connected with it. Two are operational and one is upcoming. BPA OC II is projected to have no production FY 21 onwards, while Khairagura OC is expected to reach its mine life in FY 26.

The CHP is adjacent to NH 363, making it convenient for road transportation for coal to nearby customers. The closest railway station is Asifabad Road part of Secunderabad Division of South-Central Railway. Clients in the south are reached via Asifabad Rd-Tandur-Belampalli railway line towards Warangal. Clients in the north receive their coal via Asifabad Rd- Sirpur Kaghaznagar railway line. A map of rail and road connectivity around Goleti CHP can be found in Figure 44.

The closest port is Kakinada Port, which is approximately 540 kilometres away in Andhra Pradesh. The railway line from Tandur-Mancherial towards Warangal and then Vijayawada can be taken to deliver coal to the port. Bhadrachalam terminal of NW 4 inland waterway is approximately 311 kilometres away. These long distances make the coastal and waterway route uneconomical for most customers. But a feasibility study is suggested for clients who want to utilise this route.

Details				
Name of the mine blocks	1. Khairagura OC 2. BPA OC II 3. Goleti OC		**PRC (MTPA)**	a. 3.5 b. 0.05 c. 2.4
Status of the Blocks	Khairagura OC	Operational	**Coalfield**	Godavari Valley
	BPA OC II	Operational		
	Goleti OC	Upcoming		
Infrastructure Available				
Nearest Railway Station	Asifabad Road		**Approximate Distance from Railway Station (in Km)**	2.8
Nearest Road	NH-363		**Approximate Distance from Road (in Km)**	0
Nearest Port	Kakinada Port		**Approximate Distance from Port (in Km)**	540
Nearest Waterway	NW-4		**Approximate Distance from Waterway (in Km)**	311

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
Khairagura OC	3.5	3.4	3.4	3.1	2.1	0.0	0.0	0.0	0.0
BPA OC II	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goleti OC	1.0	1.2	2.2	2.4	2.4	2.4	2.4	2.4	2.4

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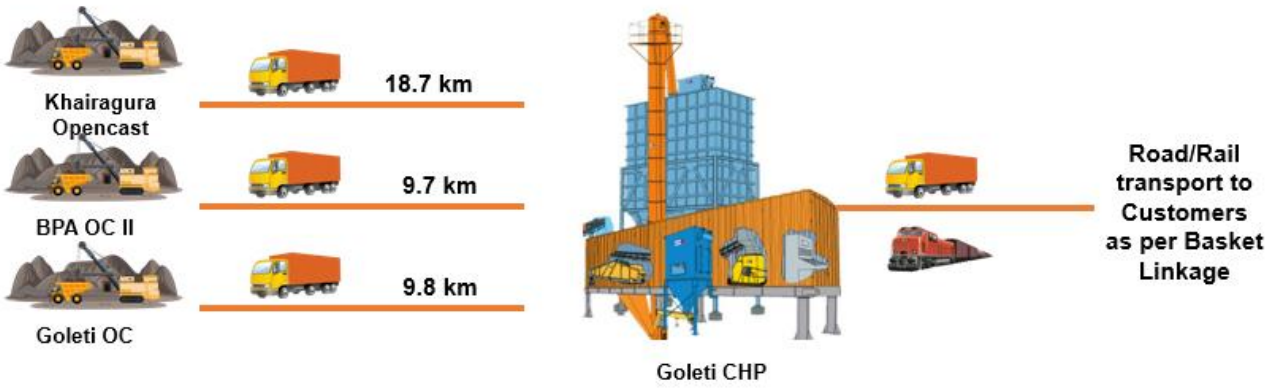

Source: Singareni Collieries Company

Srirampur CHP

Six active coal blocks are allotted to the Srirampur CHP. After FY 22, the RK-5 inclines, RK-6 incline, and RK-7 incline are projected to end. After FY 26, IK 1A is projected to be depleted.

The most important highway closest to the CHP is NH-63. The nearest station is Mancherial, which is about 11.8 kilometres away on NH-63. Coal is transported to south and north India via the Mancherial-Peddapalli and Mancherial-Bellampalli lines, respectively.

The port is approximately 417 kilometres away. The NW 4 inland waterway terminal at Bhadrachalam is around 267 kilometres away. For most clients, the coastal and waterway routes are uneconomical due to the long distances involved. Clients that want to take this route should do a feasibility study first. Figure 44 shows a map of rail and road connectivity around Goleti CHP.

Details				
Name of the mine blocks	1. RK-5 Inc 2. RK-6 Inc 3. RK-7 Inc 4. SRP OC II 5. IK OC 6. IK 1A		**PRC (MTPA)**	a. 0.3 b. 0.3 c. 0.4 d. 3.9 e. 2.1 f. 0.6
Status of the Blocks	RK-5 Inc	Operational	**Coalfield**	Godavari Valley
	RK-6 Inc	Operational		
	RK-7 Inc	Operational		
	SRP OC II	Operational		
	IK OC	Operational		
	IK 1A	Operational		
Infrastructure Available				
Nearest Railway Station	Mancherial		**Approximate Distance from Railway Station (in Km)**	11.8

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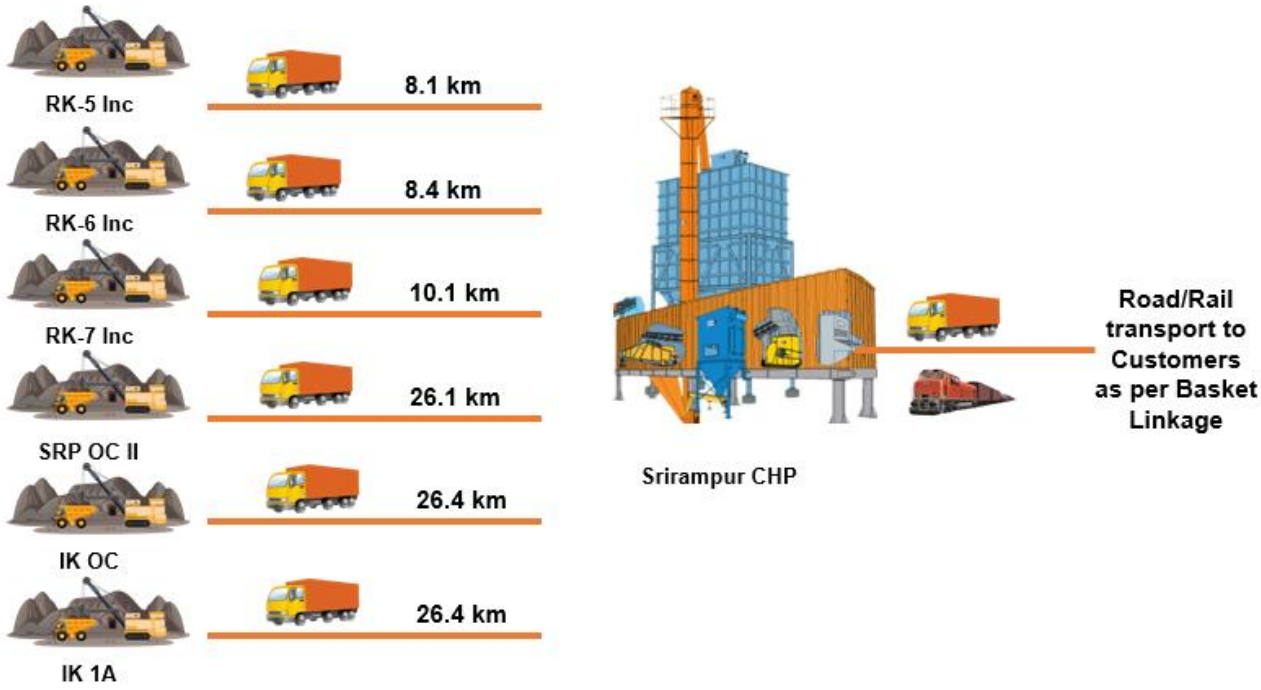
Nearest Road	NH 63	**Approximate Distance from Road (in Km)**	7.3
Nearest Port	Kakinada Port	**Approximate Distance from Port (in Km)**	417
Nearest Waterway	NW-4	**Approximate Distance from Waterway (in Km)**	267

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
RK-5 Inc	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RK-6 Inc	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RK-7 Inc	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SRP OC II	3.3	3.2	3.3	2.9	2.9	3.5	3.5	3.9	3.9
IK OC	1.6	2.1	2.1	1.9	1.9	2.1	2.1	2.1	2.1
IK 1A	0.6	0.6	0.6	0.5	0.5	0.0	0.0	0.0	0.0

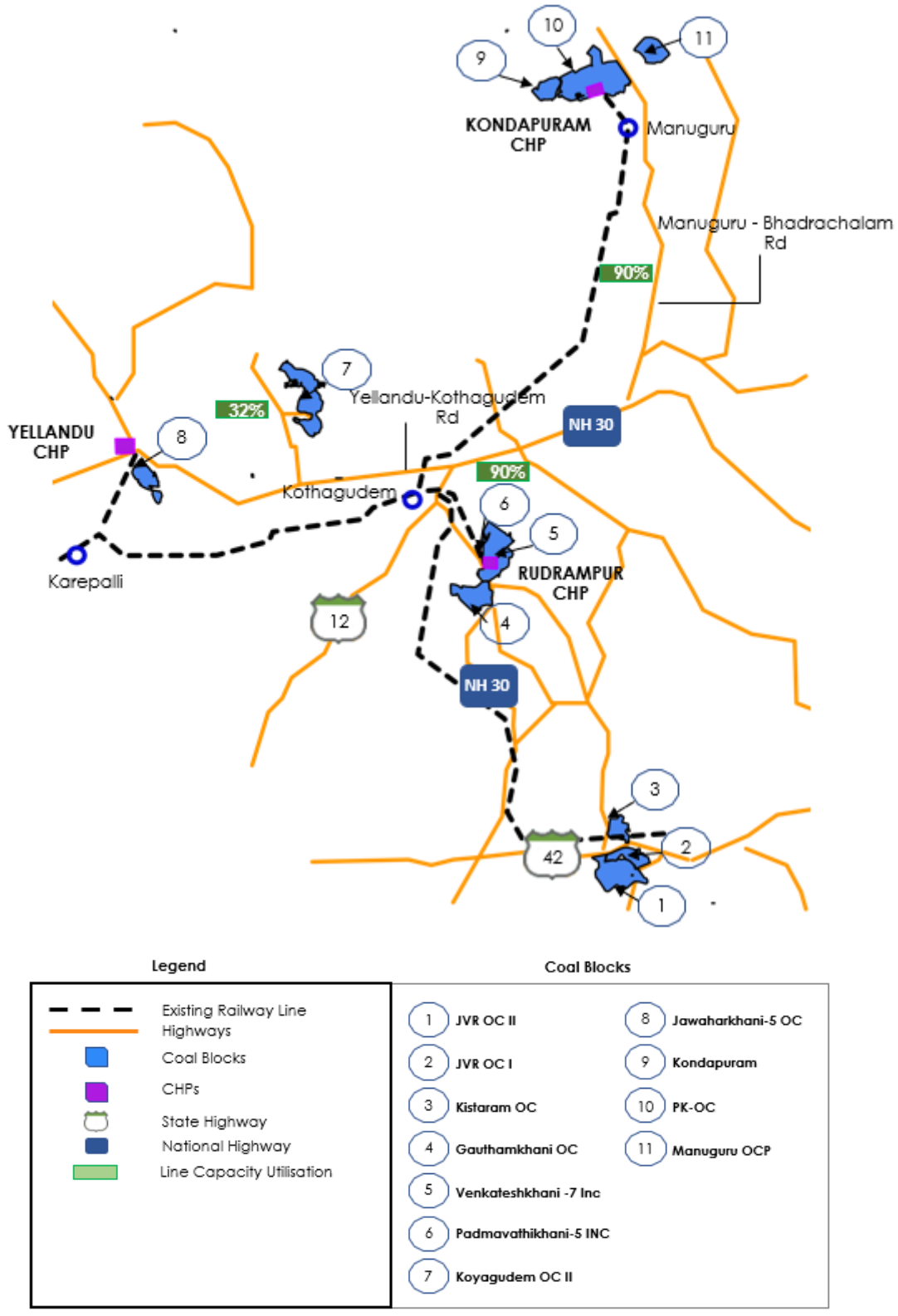


Source: Singareni Collieries Company

CHPs in Kothagudem Region

The following CHPs are located in the Godavari Valley Coalfield's Kothagudem region. The map below depicts the region's connectivity.

Figure 58 Map showing connectivity of Kothagudem region of Godavari Valley coalfield



Source: Singareni Collieries Company

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Rudrampur CHP

Rudrampur CHP is served by three existing coal blocks and two upcoming coal blocks. The CHP is located near NH-30. The nearest railway station is Kothagudem, which is around 10.8 kilometres away. To get to the railway station NH-30 is used.

Coal is transported to western or northern consumers via the Kothagudem-Karepalli railway line to Warangal and then to Peddapalli and Hyderabad. Kakinada Port is around 227 kilometres away. The Kothagudem-Karepalli Jn. railway line in Andhra Pradesh can be utilised to transport coal to Kakinada port via Vijayawada.

The Bhadrachalam waterway terminal is around 51 kilometres away. It can be used to carry coal to clients along the waterway's course to the Bay of Bengal once it is operationalized. A map for reference showing rail and road connectivity around Rudrampur CHP may be found in Figure 45.

Details				
Name of the mine blocks	1. PVK-5 Incline 2. JVR OC (I&II) 3. Kistaram OC 4. Penagadapa Coal Block 5. VK Coal Mine		**PRC (MTPA)**	a. 0.7 b. 11.1 c. 2.3 d. 1.5 e. 5.9
Status of the Blocks	PVK-5 Incline	Operational	**Coalfield**	Godavari Valley
	JVR OC(I&II)	Operational		
	Kistaram OC	Operational		
	Penagadapa Coal Block	Upcoming		
	VK Coal Mine	Upcoming		
Infrastructure Available				
Nearest Railway Station	Kothagudem		**Approximate Distance from Railway Station (in Km)**	10.8
Nearest Road	NH-30		**Approximate Distance from Road (in Km)**	0
Nearest Port	Kakinada Port		**Approximate Distance from Port (in Km)**	227
Nearest Waterway	NW-4		**Approximate Distance from Waterway (in Km)**	51

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
PVK-5 Incline	0.4	0.5	0.5	0.4	0.7	0.7	0.7	0.7	0.7
JVR OC (I&II)	9.0	9.7	9.8	8.6	10.0	10.0	11.1	11.1	11.1
Kistaram OC	1.9	1.9	1.9	1.7	1.8	2.3	2.3	2.3	2.3
Penagadapa Coal Block	0.5	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5
VK Coal Mine	3.7	4.6	4.7	4.5	4.5	5.9	5.9	5.9	5.9

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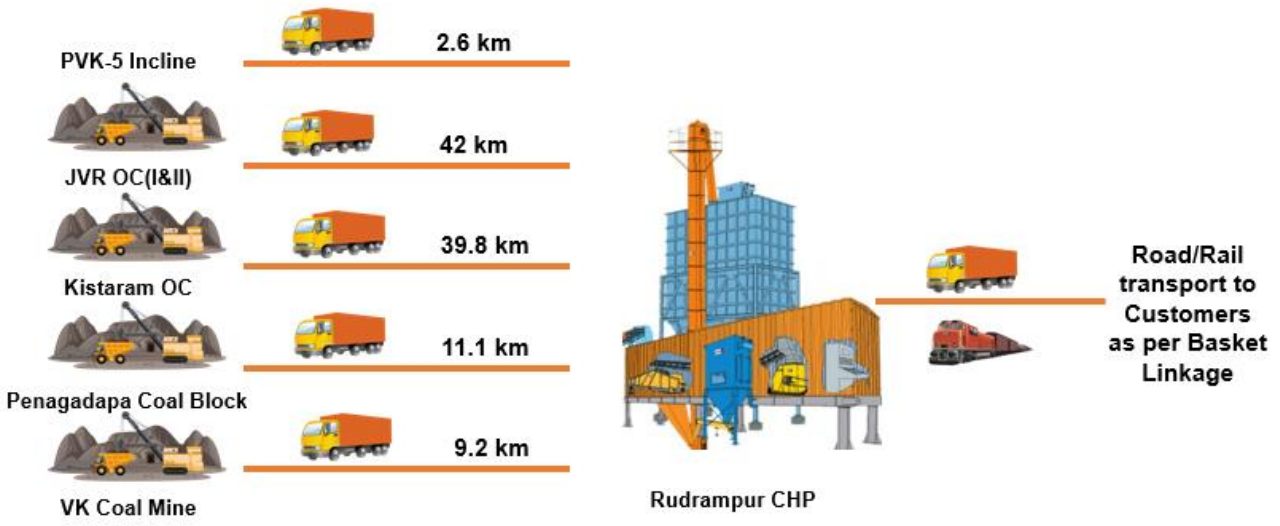

Source: Singareni Collieries Company

Yellandu CHP

The KOC-II is an operational coal block assigned to Yellandu CHP. The KOC II coal block is expected to stop producing coal after FY 28. It is adjacent to Yellandu-Pakhal-Warangal Road. Yellandu Railway station is approximately a kilometre away, it connects the CHP to Karepalli station. Karepalli-Warangal line is used to move the coal towards west and Karepalli-Khammam line is connected to transport coal southwards. Figure 45 shows a map of rail and road links around Yellandu CHP for reference.

The Kakinada port is approximately 270 km away. The terminal for NW-4 is around 74 kilometres distant in Bhadrachalam. It can transport coal to customers along the waterway's path once it is developed.

Details			
Name of the mine blocks	KOC-II	**PRC (MTPA)**	3
Status of the Blocks	Operational	**Coalfield**	Godavari Valley
Infrastructure Available			
Nearest Railway Station	Yellandu	**Approximate Distance from Railway Station (in km)**	1
Nearest Road	Yellandu- Pakhal - Warangal Road	**Approximate Distance from Road (in km)**	0
Nearest Port	Kakinada Port	**Approximate Distance from Port (in km)**	270
Nearest Waterway	NW-4	**Approximate Distance from Waterway (in km)**	74

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Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
KOC-II	2.8	2.9	2.9	2.6	3.0	3.0	3.0	0.0	0.0

Source: Singareni Collieries Company

Kondapuram CHP

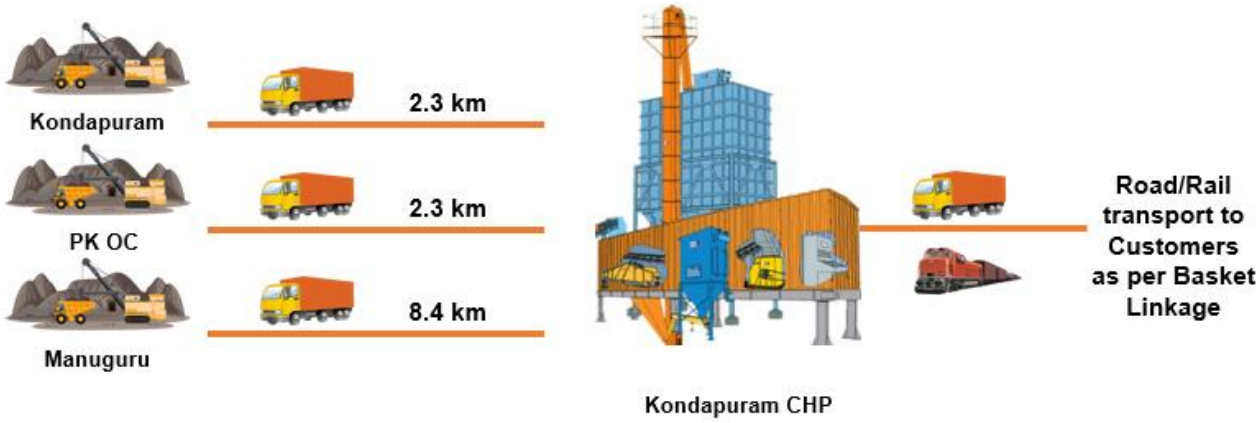
Kondapuram CHP receives coal from three operating coal blocks. After FY 25, the Manuguru coal block is projected to discontinue any production. The closest road is NH 30.

The nearest railway station is Manuguru part of Secunderabad division of South-Central Railway. Manuguru is a terminal station. Coal is transported southwards to Dornakal Jn. via Karepalli station. Kakinada port is approximately 277 kilometres away. It is reached using Karepalli-Dornakal Jn.-Motumari via Vijayawada in Andhra Pradesh.

The waterway terminal in Bhadrachalam is around 44 kilometres away. Once operational, it can be considered to be utilised to transport coal to clients along the waterway's route. Figure 22 shows a map of rail and road links around Kondapuram CHP for reference.

Details				
Name of the mine blocks	1. Kondapuram 2. PK OC 3. Manuguru		**PRC (MTPA)**	a. 0.7 b. 9.1 c. 1.8
Status of the Blocks	Kondapuram	Operational	**Coalfield**	Godavari Valley
	PK OC	Operational		
	Manuguru	Operational		
Infrastructure Available				
Nearest Railway Station	Manuguru		**Approximate Distance from Railway Station (in Km)**	7.5
Nearest Road	NH - 30		**Approximate Distance from Road (in Km)**	33.6
Nearest Port	Kakinada Port		**Approximate Distance from Port (in Km)**	277

Nearest Waterway	NW-4				Approximate Distance from Waterway (in Km)			44	
Z									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
Kondapuram	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7
PK OC	8.8	9.0	9.1	8.2	8.2	9.0	9.0	3.3	3.3
Manuguru	1.8	1.8	1.8	1.4	0.0	0.0	0.0	0.0	0.0

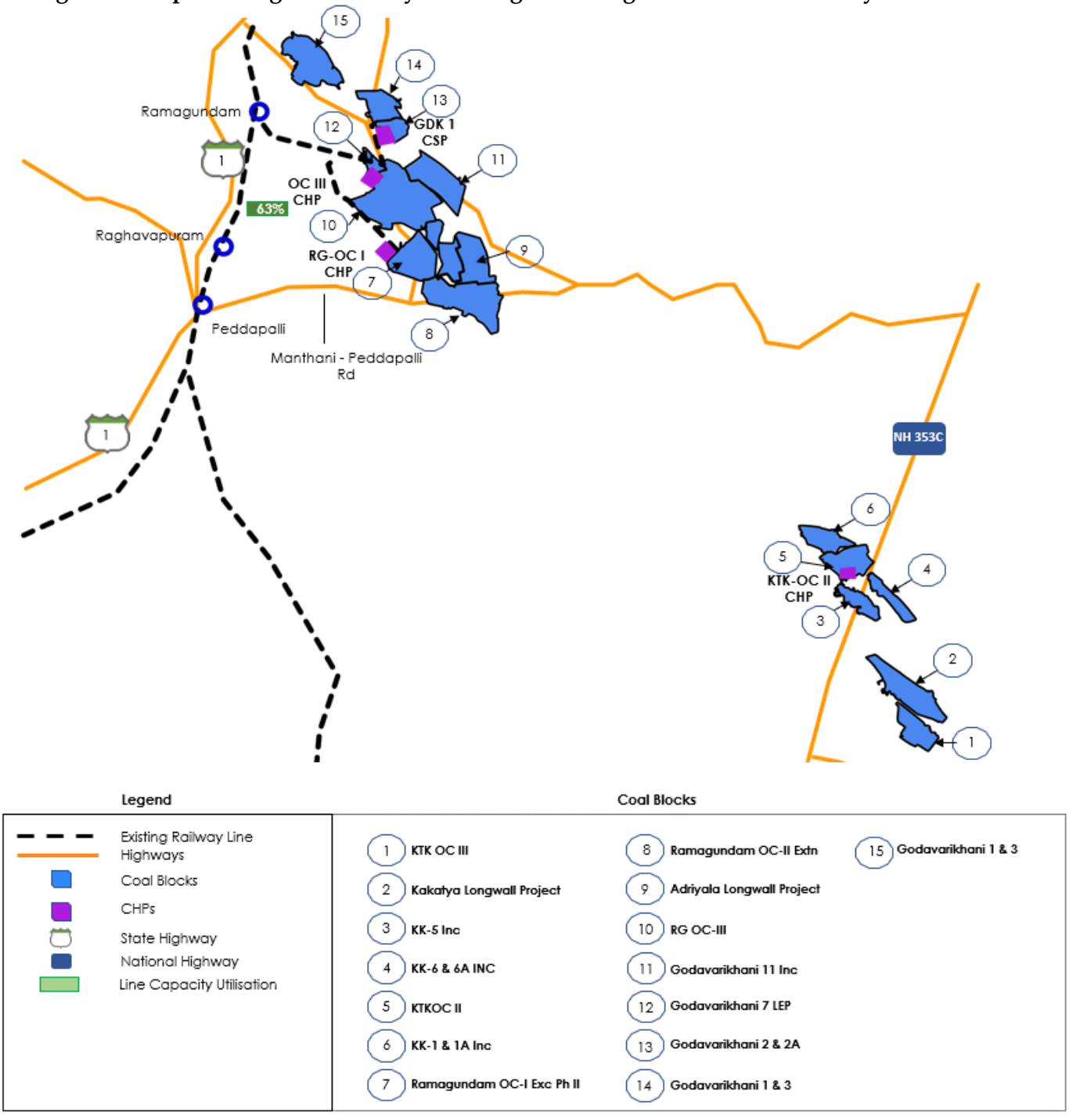


Source: Singareni Collieries Company

CHPs in Ramagundam Region

The following CHPs are located in the Godavari Valley Coalfield's Ramagundam region. The map below shows the region's rail and road connectivity.

Figure 59 Map showing connectivity of Ramagundam region of Godavari Valley coalfield



Source: Singareni Collieries Company

GDK-1 CSP

GDK-1 CSP is served by three existing coal blocks and one upcoming coal block. SH-1 is 2.4 kilometres away and is accessible through a local road. The nearest road is the Ramagundam-Peddapalli railway line, which is used to carry coal south. Ramagundam railway station, approximately 12 kilometres away provides access to the Ramagundam-Bellampalli railway line to deliver coal to clients in the north.

Coal can be carried to Vijayawada Jn. and then to Kakinada port via the Peddapalli-Warangal line. The distance between the port and the city is roughly 479 kilometres. The inland waterway terminal on the NW 4 is around 247 kilometres away in Bhadrachalam. Due to the large distances involved, the coastal and waterway routes are uneconomical for most clients. Clients that want to go this route should first do a feasibility assessment. A map of rail and road connectivity around GDK-1 CSP can be found in Figure 46.

Details									
Name of the mine blocks	1. GDK 11 Incline 2. GDK 1 & 3 Incline 3. GDK 2 & 2A Incline 4. GDK 5 OC				**PRC (MTPA)**	a. 1 b. 0.4 c. 0.3 d. 3.6			
Status of the Blocks	GDK 11 Incline	Operational			**Coalfield**	Godavari Valley			
	GDK 1 & 3 Incline	Operational							
	GDK 2 & 2A Incline	Operational							
	GDK 5 OC	Upcoming							
Infrastructure Available									
Nearest Railway Station	Ramagundam				**Approximate Distance from Railway Station (in Km)**	12.1			
Nearest Road	SH-1				**Approximate Distance from Road (in Km)**	2.4			
Nearest Port	Kakinada Port				**Approximate Distance from Port (in Km)**	479			
Nearest Waterway	NW-4				**Approximate Distance from Waterway (in Km)**	247			
Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
GDK 11 Incline	0.8	0.8	0.8	0.7	0.7	0.9	1.0	1.0	1.0
GDK 1 & 3 Incline	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
GDK 2 & 2A Incline	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
GDK 5 OC	2.5	3.6	2.6	2.3	2.5	3.0	3.0	2.8	2.8

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Source: Singareni Collieries Company

OC3 CHP

OC3 CHP is fed two operational coal blocks. Vakilpalli mine will be exhausted after FY 28. The closest road is SH-1 which is approximately 14.2 kilometres away. The closest railway station is Ramagundam which is approximately 20.2 kilometres away.

Ramagundam-Peddapalli railway line connects southwards and Ramagundam-Bellampalli railway line connects to deliver coal to clients in the north. Using Peddapalli-Warangal line coal can be transported to Vijayawada Jn. to Kakinada port.

The port is approximately 452 kilometres away. The NW 4 inland waterway terminal at Bhadrachalam is around 245 kilometres away. For most clients, the coastal and waterway routes are uneconomical due to the long distances involved. Clients that want to take this route should do a feasibility study first. Figure 46 shows a map of rail and road connectivity surrounding the OC3 CHP.

<table>
<tr><th colspan="5">Details</th></tr>
<tr><td>Name of the mine blocks</td><td colspan="2">1. RG OC III Exp
2. Vakilpalli Mine</td><td>PRC (MTPA)</td><td>a. 8.3
b. 0.35</td></tr>
<tr><td rowspan="2">Status of the Blocks</td><td>RG OC III Exp</td><td>Operational</td><td rowspan="2">Coalfield</td><td rowspan="2">Godavari Valley</td></tr>
<tr><td>Vakilpalli Mine</td><td>Operational</td></tr>
<tr><th colspan="5">Infrastructure Available</th></tr>
<tr><td>Nearest Railway Station</td><td colspan="2">Ramagundam</td><td>Approximate Distance from Railway Station (in Km)</td><td>20.2</td></tr>
<tr><td>Nearest Road</td><td colspan="2">SH-1</td><td>Approximate Distance from Road (in Km)</td><td>14.2</td></tr>
<tr><td>Nearest Port</td><td colspan="2">Kakinada Port</td><td>Approximate Distance from Port (in Km)</td><td>452</td></tr>
</table>

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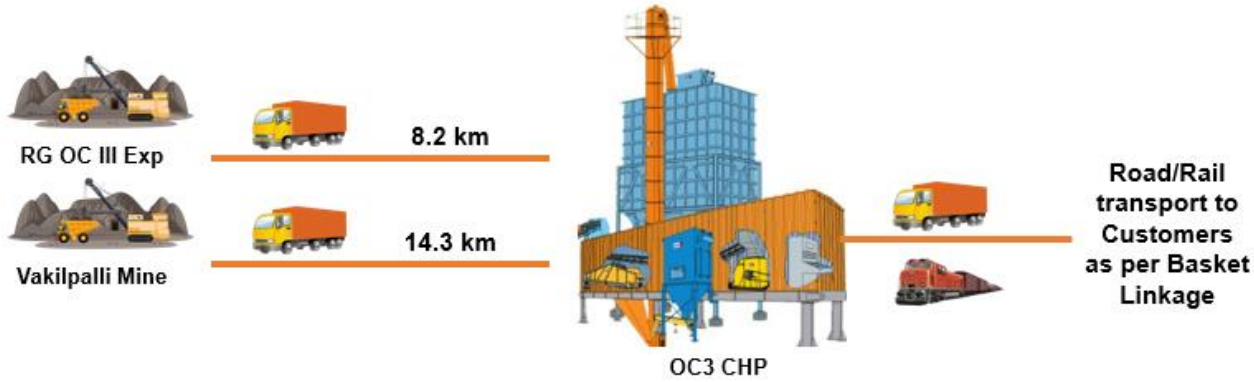
Nearest Waterway	NW-4	**Approximate Distance from Waterway (in Km)**	245

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
RG OC III Exp	6.60	6.70	6.80	6.10	6.10	7.00	7.50	8.30	8.30
Vakilpalli Mine	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.00	0.00



Source: Singareni Collieries Company

RG OC-1 SILO CHP

RG OC-1 SILO CHP is located in Peddapalli District of Telangana. There are three operational coal blocks and one upcoming coal block assigned to the CHP. RG OC I Exp has discontinued production after FY21 and is exhausted.

The CHP supplies coal to NTPC, Ramagundam. It is done using an MGR (Merry Go Round) rail system. The hopper wagons arriving on this route deliver coal to the plant and return for coal collection on another route. Figure 46 shows a map of rail and road connectivity surrounding the RG OC-1 SILO CHP.

Details				
Name of the mine blocks	1. RG OC I Exp 2. RG OC II Ext 3. Adriyala LWP 4. Ramagundam Coal Mine (RG Coal Mine)		**PRC (MTPA)**	a. 3.2 b. 4.5 c. 2.7 d. 6.7
Status of the Blocks	RG OC I Exp	Operational	**Coalfield**	Godavari Valley
	RG OC II Ext	Operational		
	Adriyala LWP	Operational		
	Ramagundam Coal Mine (RG Coal Mine)	Upcoming		
Infrastructure Available				
Nearest Railway Station	Ramagundam		**Approximate Distance from**	21.6

		Railway Station (in Km)	
Nearest Road	SH-1	**Approximate Distance from Road (in Km)**	20.2
Nearest Port	Kakinada Port	**Approximate Distance from Port (in Km)**	469
Nearest Waterway	NW-4	**Approximate Distance from Waterway (in Km)**	240

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
RG OC I Exp	0	0	0	0	0	0	0	0	0
RG OC II Ext	3.9	4	4	3.6	3.6	4	4	4.5	4.5
Adriyala LWP	2.3	2.4	2.4	2.2	2.2	2.4	2.7	2.7	2.7
Ramagundam Coal Mine (RG Coal Mine)	4.7	4.7	4.8	5.3	5.3	5.3	6	6.7	6.7

Source: Singareni Collieries Company

KTK OC-II CHP

KTK OC-II CHP is located in Jayashankar-Bhupalpally district of Telangana. Six operational coal blocks and one upcoming coal block serve it. After FY26, the KTK-6 Incline coal block is projected to stop producing coal. Kakatiya Longwall Project is expected to discontinue production after FY 27. The closest railway station is Uppal.

The Uppal-Warangal line is used to transport coal to southeast. Uppal-Kazipet railway line is used to transport coal towards Secunderabad and westwards. The CHP is adjacent to NH 353C. Kakinada Port is approximately 417 kilometres away and Bhadrachalam terminal of inland waterway

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NW-4 is approximately 185 kilometres away. The coastline and waterway routes are uneconomical for most clients due to the considerable distances required to traverse via rail or road. Figure 46 shows a map of rail and road links around KTK OC-II CHP for reference.

Details				
Name of the mine blocks	1. KTK-1&1A Inc 2. KTK-5 Inc 3. KTK-6 Inc 4. KTK- OC II 5. Kakatiya Longwall Project 6. KTK OC III 7. PVNR OC (Venkatapur OC)		**PRC (MTPA)**	a. 0.4 b. 0.4 c. 0.3 d. 1.5 e. 0.4 f. 3.4 g. 2.8
Status of the Blocks	KTK-1 & 1A Inc	Operational	**Coalfield**	Godavari Valley
	KTK-5 Inc	Operational		
	KTK-6 Inc	Operational		
	KTK- OC II	Operational		
	Kakatiya Longwall Project	Operational		
	KTK OC III	Operational		
	PVNR OC (Venkatapur OC)	Upcoming		
Infrastructure Available				
Nearest Railway Station	Uppal		**Approximate Distance from Railway Station (in Km)**	58
Nearest Road	NH 353C		**Approximate Distance from Road (in Km)**	0
Nearest Port	Kakinada Port		**Approximate Distance from Port (in Km)**	417
Nearest Waterway	NW-4		**Approximate Distance from Waterway (in Km)**	185

Coal production up to FY 2030 (in MT)									
Name of the Block	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
KTK-1 & 1A Inc	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
KTK-5 Inc	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
KTK-6 Inc	0.3	0.3	0.3	0.3	0.2	0.0	0.0	0.0	0.0
KTK- OC II	1.2	1.2	1.2	1.1	1.2	1.2	1.2	0.6	0.6
Kakatiya Longwall Project	0.3	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0
KTK OC III	2.2	2.3	2.3	2.1	2.7	3.0	3.0	3.4	3.4
PVNR OC (Venkatapur OC)	1.0	1.7	1.7	1.4	2.0	2.0	2.5	2.8	2.8

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Source: Singareni Collieries Company

Analysis and Recommendations

The roads in the state are well connected to the mines as well as CHP. Since the mines and CHPs are operational, the road infrastructure is well placed. SCCL and State PWDs are regularly putting out tenders for minor repair works coal transport roads.

With the completion of Bhadrachalam Road – Sattupalli railway line, upcoming mines will gain access to rail linkage. The railway line will facilitate moving up to nine million tonnes of coal to Bhadrachalam for feeding power plants like Kothagudem thermal power station and Kondapalli thermal power station.

Currently constructing greenfield four-lane national highways between Karimnagar-Warangal, Jagtial-Karimnagar, Armoor-Jagtial-Ramagundam, Karimnagar-Gadchiroli, Khammam-Devarapalli, Mancherial-Warangal, Khammam-Vijayawada, Warangal-Khammam, Hyderabad-Manneguda, Devsagar-Marikal-Jadcherla and Kodad-Khammam is at various stages of pre-approval or approval. Expediting construction of these projects is recommended.

Widening of existing NH 365BB, which connects Khammam to Suryapet, to four lanes was notified in 2017. However, currently the work is stalled as state government is awaiting release of funds from Centre. Widening would make connectivity of CHPs in Kothagudem region towards eastern coast and south India. It is recommended that special attention is given to this project and is completed at the earliest.

- A dedicated program focusing on maintaining roads connecting mines can further help in efficient evacuation of coal.
- Considering upcoming coal traffic, we proposed doubling of Karepalli-

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Bhadrachalam Road having 40 MTPA capacity

- Additionally, monitoring the progress of below-mentioned railway line projects are critical considering upcoming coal production. These projects are listed in Pink Book of railways and work on them is ongoing
  - Bhadrachalam –Sattupalli NL
    - Balharshah Belampalli 3rd line
    - Belampalli Kazipeth 3rd line
  - A detailed feasibility study is recommended to determine whether transporting coal over the NW-4 Inland Waterway is economically viable.

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12. Annexure

Annexure 1 Details of FMC Phase I Projects

S. No	Project Name	Subsidiary	Capacity (MTPA)	Date of Completion (Expected)	Baseline Cost (INR Cr.) (Awarded Cost)
1.	AMLOHRI RLS SIDING	NCL	5.00	FY 2023	140.83
2.	Bina-Kakri CHP	NCL	9.50	FY 2024	0.00
3.	BLOCK-B CHP	NCL	4.50	FY 2023	150.22
4.	Block-B Rail Connectivity	NCL		FY 2022	70.97
5.	DUDHICHUA CHP SILO	NCL	10.00	FY 2023	646.00
6.	DUDHICHUA RLS SIDING	NCL	5.00	FY 2023	62.34
7.	JAYANT CHP SILO	NCL	15.00	FY 2022	698.00
8.	KRISHNASHILA CHP SILO	NCL	4.00	FY 2021	175.95
9.	Nigahi CHP	NCL	10.00	FY 2024	0.00
10.	ANANTA CHP RLS	MCL	20.00	FY 2024	278.48
11.	BHUBANESWARI CHP SILO (PH-I)	MCL	10.00	FY 2022	334.81
12.	BHUBANESWARI CHP SILO (PH-II)	MCL	15.00	FY 2023	247.69
13.	HINGULA CHP SILO	MCL	10.00	FY 2022	168.95
14.	KANIHA CHP RLS	MCL	10.00	FY 2023	268.05
15.	LAJKURA CHP RLS	MCL	15.00	FY 2023	285.05
16.	LINGARAJ CHP SILO	MCL	16.00	FY 2020	373.00
17.	LKP-BEL-LIL CHP SILO (PH-I)	MCL	10.00	FY 2023	309.00
18.	SARDEGA CHP RLS	MCL	20.00	FY 2023	311.69
19.	AMRAPALI CHP SILO PH I	CCL	12.00	FY 2024	299.81
20.	KONAR CHP	CCL	5.00	FY 2024	0.00

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S. No	Project Name	Subsidiary	Capacity (MTPA)	Date of Completion (Expected)	Baseline Cost (INR Cr.) (Awarded Cost)
21.	MAGADH CHP SILO PH	CCL	20.00	FY 2024	527.12
22.	NORTH URIMARI CHP SILO	CCL	7.50	FY 2023	280.91
23.	DINESH (MKD III) CHP SILO FMC PROJECT	WCL	8.00	FY 2023	441.00
24.	Baroud CHP	SECL	10.00	FY 2024	216.53
25.	CHHAL OCP SEAM-III CHP	SECL	6.00	FY 2023	173.46
26.	Dipka Mechanised Siding with Silo	SECL	25.00	FY 2023	211.22
27.	GEVRA CHP SILO 5&6	SECL	30.00	FY 2023	615.07
28.	GEVRA RLS	SECL	20.00	FY 2023	222.19
29.	Kusmunda CHP Phase-I	SECL	10.00	FY 2020	92.20
30.	KUSMUNDA CHP PHASE-III CENTRAL INPIT CONVEYOR	SECL		FY 2023	544.59
31.	Kusmunda CHP Ph-II	SECL	40.00	FY 2022	262.75
32.	Manikpur CHP	SECL	5.00	FY 2023	170.51
33.	JHANJRA CHP	ECL	5.00	FY 2023	185.95
34.	RAJMAHAL CHP SILO*$	ECL	10.00	FY 2024	195.64
35.	SONEPUR BAZARI CHP	ECL	12.00	FY 2022	213.42

Source: Ministry of Coal, CIL

Annexure 2 Details of FMC Phase II Projects

S. No	Project Name	Subsidiary	Capacity (MTPA)	Anticipated Finish Date	Estimated Cost (INR Cr.)
1.	LAKHANPUR BELPAHAR LILARI CHP SILO (PH-II) with Rail Connectivity	MCL	20.00	31/07/2024	500.00
2.	AMRAPALI CHP SILO PH II	CCL	8.00	06/03/2024	401.00

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S. No	Project Name	Subsidiary	Capacity (MTPA)	Anticipated Finish Date	Estimated Cost (INR Cr.)
3.	KARO CHP	CCL	11.00	01/07/2024	622.00
4.	KDH CHP	CCL	4.50	30/04/2024	250.00
5.	MAGADH CHP SILO PH II	CCL	31.00	10/03/2024	405.00
6.	Rampur Batura CHP	SECL	4.00	31/03/2025	350.00
7.	HURA C OC CHP	ECL	3.00	31/03/2023	110.20
8.	KUMARDIHI B CM CHP	ECL	1.00	31/03/2022	9.95
9.	MOHANPUR OC CHP	ECL	2.50	31/03/2025	171.61
10.	NABAKAJORA MADHABPUR CHP	ECL	2.00	31/03/2025	100.73
11.	PARASEA BELBAID UG CHP	ECL	2.00	31/03/2025	196.33
12.	SARPI SURFACE BELT	ECL	1.50	31/03/2025	109.56
13.	TILABONI UG CHP	ECL	2.00	31/03/2025	46.30
14.	MUNGOLI NIRGUDA CHP SILO*	WCL	8.00	15/09/2023	170.90

Source: Ministry of Coal, CIL

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Annexure 3 Key Trunkline railway projects important for coal evacuation

	Railway line Section	Length	Configuration	Capacity		Total Train	% Utilisation		Ongoing work	Pink Book	NRP 26	NRP 31
					WMB		WMB	WOMB				
Jharkhand	Sini-Rajkharswan	15.3	DL	138	115	92.3	66.88	80	TL	3rd Line with Normal Signalling	3rd Line with ABS+TCAS +CTC Signalling	3rd Line with ABS+TCAS +CTC Signalling
Jharkhand	Rajkharswan-Chakradharpur	20.3	DL	75	62	59.4	79.20	95	TL	3rd Line with Normal Signalling	3rd Line with ABS+TCAS +CTC Signalling	3rd Line with ABS+TCAS +CTC Signalling
Jharkhand	Chakradharpur- Bondmunda	92.9	DL	67	56	51.1	76.27	91.6	Tripling	3rd Line with Normal Signalling	3rd Line with ABS+TCAS +CTC Signalling	3rd Line with ABS+TCAS +CTC Signalling
Odisha	Bondamunda-Rourkela	8.5	TL	67	56	68.7	102.5	123.1	4th_Line	4th Line with Normal Signalling	4th Line with ABS+TCAS +CTC Signalling	4th Line with ABS+TCAS +CTC Signalling
Odisha	Rourkela-Jharsuguda	101	DL	70	58	72.4	103.43	124.2	Tripling	4th Line with Normal Signalling	4th Line with ABS+TCAS +CTC Signalling	4th Line with ABS+TCAS +CTC Signalling

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Odisha	Jharsuguda Road-Sambalpur	47	DL	51	48	52.15	102.3	108.6	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Bihar	Kiul-Rampur Dumra	22	DL	54	46	77	142.6	167.8	DL_EL	2nd Line with Normal Signalling	2nd Line with TCAS Signalling	2nd Line with TCAS Signalling
Bihar	Rampur Dumra-Tall	7	DL	48	41	53	110.4	129.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Bihar	Tall-Mokama	5	DL	54	46	65	120.37	141.6	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Chhattisgarh	Champa - Gevra Road	47	DL	50	45	54.9	109.8	122	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Telangana	Balharshah - Bellampalli	108	DL	63	55	63	111	114.3	Tripling	3rd Line with Normal Signalling	3rd Line with ABS+TCAS +CTC Signalling	3rd Line with ABS+TCAS +CTC Signalling

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Madhya Pradesh	Anuppur – Kotma	31.6	DL	65	58	33.2	51.08	57.24	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Madhya Pradesh	Kotma – Boridand	25.4	DL	65	58	31.9	49.08	55	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
Chhattisgarh	Boridand - Ambikapur	118.8	SL	25	22	20.2	80.8	91.8	SL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling
West Bengal	Khana-Andal	66.53	QL	123	131	133.5	108.5	101.9	ML	4th Line with Normal Signalling	4th Line with ABS+TCAS +CTC Signalling	4th Line with ABS+TCAS +CTC Signalling
West Bengal	Andal-Asansol	25.71	QL	117	123	138.5	118.4	112.6	ML	4th Line with Normal Signalling	4th Line with ABS+TCAS +CTC Signalling	4th Line with ABS+TCAS +CTC Signalling
Jharkhand	Sini-Kandra	12.9	DL	91	76	32.5	35.71	42.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling

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Jharkhand	Kandra-Chandil	15.6	DL	84	70	64.3	76.55	91.9	DL_EL	2nd Line with Normal Signalling	2nd Line with Normal Signalling	2nd Line with Normal Signalling

Source: Primus Partners Analysis, Pink Book, National Rail Plan 2026, National Rail Plan 2031, Ministry of Railway Publications

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