ENVIRONMENTAL STATEMENT

(In compliance with Rule 14 of E (P) Rules,1986 under Environment (Protection) Act)

OF

KHAIRAGURA OPENCAST
EXPANSION COAL MINE PROJECT,
BELLAMPALLI AREA

(For financial year ending 31st March, 2024)

THE SINGARENI COLLIERIES COMPANY LIMITED
(A GOVERNMENT COMPANY)
BELLAMPALLI AREA
(P.O.: GOLETI)

Project Officer,
Khairagura OC Expan. Project,
C/O:GM's Office,SCCL,
Goleti Township-Village &Post
Rebbanna- Mandal
Kumram Bheem (Asifabad)-district,
T.S-504292.
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THE SINGARENI COLLIERIES COMPANY LIMITED

(A Government Company)

BELLAMPALLI AREA

KHAIRAGURA OPENCAST EXPANSION PROJECT

ENVIRONMENTAL STATEMENT FOR THE FINANCIAL YEAR ENDING 31st MARCH, 2024

(In compliance of Rule No 14 of E (P) Rules under E (P) Act 1986)

1. Introduction:

The Singareni Collieries Company Limited is a public sector coal mining company producing coal for catering the industrial energy requirement of the entire south India. Coal is available in the valley of river Godavari, named as Godavari Valley Coalfield covering Khammam, Bhadradri (Kothagudem), Kumram Bheem (Asifabad), Professor Jayanshanker (Bhupalapalli), Manchiryal and Peddapalli Districts of Telangana state. The total estimated reserves in the Godavari valley is of the order of 10, 770 million tones, which constitutes about 7% share of nation reserves.

For administrative reasons, the area of mining activity is divided into three regions viz. Ramagundam, Bellampalli and Kothagudem.

2. About Khairagura Expansion opencast project:

2.1 Location:

Khairagura opencast expansion project is located in the northwestern extremity of the Godavary Valley Coalfields. The project area covered in Survey of India Topo sheet no. 56 M/7 and 56 M/8 and is bounded by North Lattitudes 19° 14’ 10’’ to 19° 15’ 20’’ and Longitudes 79° 16’ 00’’ to 79° 18’ 15’’. It is 12 Km away from Goleti Township. The mining block falls in Chopri Reserved Forest in Thiryani Mandal of Kumram Bheem (Asifabad) District, Telangana State. The mine is covered under the Tandur mining lease of the Singareni Collieries Company Limited.

2.2 Physiography:

Khairagura block forms part of small valley surrounded by rugged country with hill ranges on all sides of the block. The topography of the northern side of the block is flat to undulatory. The average elevation of the plain is around 266 m above MSL.

2.3 Environmental Clearance:

The project has been accorded Environmental Clearance vide Ltr. No.J-11015/28/2013-IA-II (M), dated: 06th February, 2015 & dt. 20.01.2016 corrigendum to EC respectively.

A brief note on different process involved in opencast mining and allied activities.

Opencast mine involved exposing the coal seam by removing the overlying strata, extraction of the exposed coal seam and filling up of the voids crated by extraction of coal with overburden material.

The Sequences are

i. Drilling of holes in overburden/Coal benches.
ii. Charging of holes with explosives,
iii. Blasting of overburden (OB) material/ coal.
iv. Lifting of broken OB material/coal by the shovel and dumpers.
v. Transport of OB materials up to dump yards (de-coaled areas).
vi. Reclamation of OB dumps, backfilled areas by leveling, top-soil spreading and finally by Plantation /vegetation.
vii. Dumping of coal at a central place/CHP from where it is loaded into trucks by mechanical loaders.

SALIENT FEATURES OF THE PROJECT:

1.	Name of the project	:	Khairagura Opencast Expansion Coal Mining Project
2.	Organization	:	The Singareni Collieries Company Limited
3.	Coalfield.	:	Godavari valley coal field
4.	Type of mine	:	Opencast
5.	Technology	:	Shovel –Dumper combination
6.	Environmental Clearance:		
	A. Letter no. & date	:	J-11015/28/2013-IA.II (M), dt: 06th February, 2015 & dt. 20.01.2016 corrigendum to EC respectively.
	B. Sanctioned capacity	:	3.75 MTPA
	C. Mining lease area	:	1217.50 Ha.
	D. Date of Public Hearing	:	09.03.2007
7.	Location of the project		
	A. Village	:	Devayiguda
	B. Tehasil	:	Tiryani
	C. District	:	Kumram Bheem Asifabad
	D. State	:	Telangana state
	E. Latitude	:	North: 19^0 14' 10" to 19^0 15' 20"
	F. Longitude	:	East : 79^0 16' 00" to 79^0 18' 15"
	G. Topo sheet	:	56 $\frac{M}{7}$ & 56 $\frac{M}{8}$
	H. Nearest railway station	:	Asifabad Road (14 KM)
	I. Nearest airport	:	Hyderabad (306 KM)
	J. Nearest town	:	Goleti (15KM)
8.	Address for correspondence		
	Name	:	Matchagiri Narendar
	A. Designation	:	Project Officer
	B. Address	:	Project Officer, KHA OCP, C/o. GM's Office, SCCL, Bellampalli Area, PO's Cell No. 9491144342
	C. Pin Code	:	Goleti-504292
	D. E-mail ID	:	po_khg@scclmines.com
	E. Telephone No.	:	08735-231100
	F. Fax No.	:	08735-231662
9.	Life of the project		
	A. Date of opening	:	01.07.2005
	B. Date of expansion of project	:	01.06.2015

10.	Seams		
	A. No. of seams present	:	3
	B. Seams being worked	:	3
11.	Depth		
	A. Minimum depth (m)	:	25
	B. Maximum depth (m)	:	222
	C. Present working depth (m)	:	200mtrs (960-760)
12.	Reserves		
	A. Total geological reserves	:	74.31 MT
	B. Total extractable reserves	:	66.87 MT
	C. Reserves already extracted	:	46.30 MT
	D. Balance reserves	:	20.57 MT
	E. Coal production during 2023-24	:	3.75 MT
13.	Overburden		
	A. Total hard OB (excluding topsoil)	:	573.910 MBCM
	B. Hard OB extracted since inception (excluding topsoil)	:	355.088 MBCM
	C. Hard OB removed in the year 2023-24 (excluding topsoil)	:	32.342 MBCM
	D. Avg.stripping ratio (2023-24)	:	1 : 8
14.	Topsoil		
	A. Total topsoil	:	10.86 M.m^3
	B. Topsoil extracted since inception	:	4.152 M m^3
	C. Topsoil removed in the year 2023-24	:	0.338 M m^3
15.	Land requirement		
	A. Total requirement	:	1217.50 Ha.
	B. Forestland involved	:	296.86 Ha.
	C. Non-forestland	:	920.64 Ha.
16.	Activity wise land requirement in Ha.		As per EMP
	A. Quarry area	:	542.91 Ha.
	B. External OB dumps	:	388.57 Ha.
	C. Infrastructures	:	9.80 Ha.
	D. Other	:	276.22 Ha.
	E. Total	:	1217.50 Ha.
17.	Statutory clearances		
	A. Mining plan approval	:	Revised mining plan was approved by MoC vide .Lr.No. 13016 /2 /2006 -CA-II, dt:17th October, 2014.
	B. Ground Water Clearance	:	Ltr.No.441/T/2007, dt:02.07.2007.

	C. Consent For Establishment	:	**No.02/TSPCB/CFE/RO-NZM/HO/2015/693, dt:04.11.2015.**
	D. Consent For Operation	:	CFO Lr. No 220523658766 Dated:12.11.2022 & valid up to 30.09.2027
	E. Forest Clearance	:	**The forestland required is 296.86 Ha. and non forestland required is 920.64 Ha. There is no change in total land requirement of the project. Forest clearance was obtained for 296.86 Ha. and details are furnished below.** 1. Ltr. No F.No.8-28/94-FC, Dt: 28th September, 2000 for 29.85Ha. 2. Ltr. No.F.No.8-102/2000-FC, dt:10th September, 2003 for 140.30Ha. 3. Ltr. No. F.No.8-28/94-FC, dt:1st July 2011 for 126.71Ha.
	F. Mining lease	:	Tandur Mining Lease
18.	Men on roll (As on 31.03.2024)	:	554 Employees

FORM – V

ENVIRONMENTAL STATEMENT FOR THE YEAR ENDING 31st MARCH, 2024

PART – A

Sl. No.	DISCRIPTION	
01	Name and address of the owner /occupier of the industry operation or process	Matchagiri Narendar ,Project officer, Khairagura opencast expansion project, C/o. GM's office, Goleti-village& post, Rebbana- Mandal,KB Asifabad-TS-504292
02	Industry category primary - (STC Code) Secondary – (SIC Code)	--
03	Production capacity Units	3.75 MTPA
04	Year of establishment	October, 2005
05	Date of last environmental statement submitted	30th Sep.2023

PART – B

i) Water consumption m^3/d (Process, Cooling, Domestic):

Name of products	Process Water Consumption per unit of product output	
	During the Previous Financial year	During the Current Financial year
	(1)	(2)
(1)	Enclosed as annexure – I	

ii) Raw material consumption:

*Name of raw Materials	Name of products	Consumption of raw material per Unit of output	
		During the previous Financial year	During the current Financial year
	Coal	Enclosed as annexure – II	

* Industry may use codes it disclosing details of raw material would violate contractual obligations, otherwise all industries have to name the raw materials used.

PART – C

Pollution discharged to environment/unit of output
(Parameter as specified in the consent issued)

(1) Pollutants	Quantity of pollutants discharged (mass / day)	Concentrations of pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Water	Unlike other industries no chemical process is involved in mining operations. Only mine seepage water is pumped out continuously for extending working places. Water quality monitoring data is enclosed as annexure-III.		
(b) Air	Dust is only the common pollutant generated in mines and allied activities. Dust emission due to plying of vehicles, coal and OB loading and unloading operations and blasting operations. Air quality monitoring data is enclosed as annexure-IV.		

Note: Pollution sources and control measures are enclosed as annexure-VI.

PART – D

HAZARDOUS WASTES

(As specified under Hazardous Wastes Management and Handling Rules,1989)

Sl.	Hazardous Wastes	Total Quantity in Ton	
		During the previous financial year	During the Current Financial year
1	From process	In opencast mining no chemical or manufacturing process is involved. Only the overburden i.e. rock/soil above the coal layer is removed and dumped in external dumps or de-coaled area for coal extraction.	
2	From pollution control facilities.	Quantity of hazardous waste such as drained oil, condemned batteries & empty oil barrels is being generated and these are being collected and disposed off from area stores to authorized agencies/recyclers at regular intervals.	

FORM – E

SOLID WASTES

Sl.	Solid Wastes	Total Quantity	
		During the Previous Financial year(2022-23)	During the Current Financial year(2023-24)
(a)	From process	27.238 $M.m^3$	32.68 $M.m^3$
(b)	From pollution control facility	nil	nil
(c)	(1) Quantity recycled or reutilized within the unit	nil	nil
	(2) Sold	nil	nil
	(3) Disposed	27.238 $M.m^3$ (Over burden) is dumped in internal dump yard within mining lease area as per approved EMP.	30.8 $M.m^3$ (Over burden) is dumped in internal dump yard within mining lease area as per approved EMP.

Note: In opencast mining no chemical or manufacturing process involved only the rock/soil above the coal layer is removed and dumped in external dumps or de-coaled area to facilitate extraction of coal.

PART – F

Please specify the characterizations (in terms of composition of quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories.

Characterization of solid waste and disposal practice:

The overburden (solid waste) is the soil or rock present over the coal seam which has to be removed to extract the coal. The removed overburden is being transported and dumped at external dumping areas or de-coaled area as per approved EMP.

The characteristic of overburden is topsoil or blasted rock The overburden dumps after attaining final shape, top soil is being spread on final dumps and plantation is being taken up with native species as per reclamation plan. Overburden management details are enclosed as annexure-VII.

PART – G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production.

The pollution abatement measures being taken are enclosed as annexure-VI. The post project env. monitoring is being carried out as per the guidelines of MoEF&CC for coal mines. The post project water and air quality data is enclosed as annexure-III& IV respectively.

Expenditure towards the environmental protection for the year, **2023-24** (in **Lakh Rs.**) is furnished below.

Sl.	**Description**	**Revenue Expenditure**
1	Air Pollution (Prevention and control)	2,31,17,634.00
2	Water Pollution (prevention and control)	3,20,55,960.00
3	Noise Pollution (prevention and control)	1,23,64,000.00
4	Plantation	19,34,831.00
5	1)Plant & Machinery & Maintenance of Machinery 2)Wage cost of water sprinklers and dozer operations	2,32,32,836.00
6	Environmental Awareness	3600.00
7	OB reclamation(back filling cost)	---
8	Topsoil spreading cost	4,32,20,060.00
9	Consultancy Payments (EPTRI)	641760.00
	Total	**13,65,70,681.00**

PART – H

Additional measures / investment proposal for environmental protection including abatement of pollution and prevention of pollution.

1. Provision of L.P. Gas cylinders to company employees on free of cost.
2. Construction of community latrines (Sulabh toilets) to work persons who are residing outside the company quarters.
3. Green belt development is being taken up in mine premises, in large blocks of stabilized subsidized areas, townships, CHP, Workshops, along colony roads
4. Black topping of entire colony roads, coal transport road and CC internal roads within mine premises was done to reduce dust generation.
5. Proper care is being taken for reducing noise levels by lubrication of machinery, preventive maintenance, engine tuning, restricting height of fall of coal at CHP, lining the chutes and green belt development around noise generating sources.

PART – I

Any other particulars for improving the quality of the environment.

1. Oil & Grease trap is functioning well.
2. Colony development committees are being formed to educate the people towards clean & Green.
3. Park was developed in Goleti Township.
4. Nursery developed in Goleti Township.
5. plantation details enclosed as annexure-IX

Socio-economic measures:

The following socio-economic measures are taken at Bellampalli Area.

- R & R is implemented and facilities like roads, water, electricity, community hall, residential facility, etc., are provided at R&R centers as per R&R scheme.
- Fruit bearing and shady plants are being issued every year to State Forest dept., surrounding villagers, Schools, etc., at free of cost from SCCL's Goleti nursery.
- Free medical camps are being organized in surrounding villages of the projects and at R&R centers by SCCL every year.
- Free Mobile Medical Van "SANJEEVANI" is being provided daily with qualified doctor , medical staff and medical facilities such as X-Ray, E.C.G. Spiro analyzer, blood test, urine test, etc. for medical checkup & treatment of people of surrounding villages & people of R&R centers in Bellampalli area.
- Several vocational training programmes are being organized every year to un-employed youth, PAFs, PDFs & for surrounding villagers by Singareni Seva Samithi.
- The SCCL deposited an amount of Rs.9.90 crores in the a/c of PO/ITDA for the development of Tiryani Mandal i.e. for Roads, Drains, Bore wells , Community Health Centers, etc. .
- The SCCL deposited an amount of Rs.229 crores in the a/c of DMFT in Asifabad Dist

Project officer,
Khairagura Opencast project
Bellampalli area

THE SINGARENI COLLIERIES COMPANY LIMITED
(A Govt. Company)
Khairagura OC Expan. Project, Bellampalli Area

Post project environmental monitoring and other data of Khairagura OC Expan. Project for the financial year 2023-2024

List of annexures

Sl.No	Description	Annexure No.
1	Water consumption details	Annexure-I
2	Production and Raw material consumption details	Annexure-II
3	Surface water (SW) quality monitoring data	Annexure-III(a)
4	Ground water (GW) quality monitoring data	Annexure-III(b)
5	Effluents quality monitoring data	Annexure-III(c)
6	Piezometric & Phreatic wells monitoring data	Annexure-III(d)
7	Meteorological monitoring data	Annexure-IV(a)
8	Air quality (AAQ) monitoring data	Annexure-IV(b)
9	Vehicular emissions monitoring data	Annexure-IV(c)
10	Noise levels monitoring data	Annexure-V
11	Air & water pollution control measures	Annexure-VI
12	Solid waste management details	Annexure-VII
13	Land Use Land Cover data	Annexure-VIII
14	Plantation details	Annexure- IX
15	CSR Details	Annexure- X

Annexure-I

Water balance statement

As a result of mining operations water is being pumped out continuously for extending working places. The mine discharge water is used for different purposes like drinking, washing, dust suppression and plantation after treating the water by passing through settling tanks and slow sand filter beds. The excess treated let out water from the filter bed reaches to the nearly nallahs.

Water consumption statement of Khairagura OC Expn. Project

Sl.	Description	Quantity in KLD	
		2022-23	**2023-24**
1)	Average quantity of water pumped out of the mine	3017.5	3167.785
2)	Water used for dust suppression	595	624.75
3)	Water used for domestic	80	84
4)	Water used for washing of HEMM	90	92

Annexure-II

Coal production & overburden remove details

Sl.	Year	Coal (in MT)	Overburden (OB in $M.m^3$)
1	2022-23	2.92	28.96
2	2023-24	3.75	32.68

Raw material consumption

No chemical process involved in the process of coal mining as in cases of other industries like chemicals, metals, alloys, etc., however, the following important materials are used in the process of coal mining, transportation, handling, running and maintenance of various plants and machinery

Raw material consumption Details

Sl.	Description	Unit	Consumption	
			2022-23	**2023-24**
1.	HSD oil	Ltr.	2644827	2730000
2.	Engine oil	Ltr.	32000	32920
3.	Hyd.Oil	Ltr.	31240	33080
4.	Gear Oil	Ltr.	1050	1680
5.	Cement	bags	60	120
6.	Iron& Steel used	tons	22.3	42.7
7.	Grease	kg	1050	2002
8	Timber	tons	-	
9	Explosives			
a)	SME	tons	9037160	9046538
b)	Booster	tons	24540.4	26830
c)	LD Explosives	tons	610260	610832
d)	Nonels	Nos.	3034177	3034832
e)	Cord relays	Nos.	1892	1896
f)	Electric detonators	Nos.	1620	1640
g)	Detonating fuse	Mtr’s	250950	255320

Annexure-III(a)

Physico-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

Sampling period: once in 3 months Samples collected on : **29.04.2023 & 01.08.2023**

Sl.No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT			
									SW-1 (Vatti Vagu U/S)		SW-2 (Vatti Vagu D/S)	
				Class A	Class B	Class C	Class D	Class E	1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
1	pH	-	4500-H^+B	6.5-8.5	6.5-8.5	6.0 – 9.0	6.5-8.5	6.0-8.5	7.6	7.7	7.5	7.9
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	533	630	960	608
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	6.2	5.2	5.9	5.8
4	Bio chemical Oxygen Demand (3 days 27°C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	2.4	2.0	2.9	2.6
5	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	-	-	220	140	280	170
6	Free Ammonia (as N)	mg/L	4500-NH_3 –F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.15	0.06	0.09	0.08
8	SAR	-	-	-	-	-	-	Less than 26	0.86	0.59	1.18	0.80

Physico-Chemical Characteristics of Surface Water at Selected Locations in the Study Area

S. No	Parameters	Unit	Test Method	SW-1 (Vatti Vagu U/S)		SW-2 (Vatti Vagu D/S)	
				1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
1	Colour	Pt-co	2120. B	5	5	10	5
2	Odour	TON	2150. B	No odour observed	No odour observed	No odour observed	No odour observed
3	Temperature	ºC	2550. B	25.1	25.2	25.0	25.1
4	Turbidity	NTU	2130. B	0.43	12.4	1.06	11.1
5	Total Dissolved Solids at 180º C	mg/L	2540.C	312	372	577	363
6	Total Suspended Solids at 105º C	mg/L	2540. D	13	37	17	27
7	Chemical Oxygen Demand	mg/L	5220. D	12	16	20	12
8	Chlorides as Cl^-	mg/L	4500-Cl^-.B	17	52	72	41
9	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} E	28	42	74	38
10	Fluoride as F^-	mg/L	4500-F^-.C	0.11	0.61	0.32	0.58
11	Calcium as Ca	mg/L	3500-Ca.B	21	58	74	54
12	Magnesium as Mg	mg/L	3500-Mg.B	43	40	87	37
13	Sodium as Na	mg/L	3500-Na.B	30	24	63	31
14	Potassium as K	mg/L	3500-K.B	2.4	3.1	6.9	4.9
15	Nitrites as NO_2	mg/L	4500-NO_2^- .B	0.77	BDL	0.33	BDL
16	Nitrates as NO_3	mg/L	4500-NO_3^- .B	11	5.1	12	6.1
17	Total Phosphates	mg/L	4500-P-D	BDL	0.065	0.005	0.1
18	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3 - C	BDL	BDL	BDL	BDL
19	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1
20	Carbonates as CO_3	mg/L	2320. B	nil	nil	nil	Nil
21	Bi-carbonates as HCO_3	mg/L	2320. B	245	230	300	235
22	Fecal Coliforms	MPN/100mL	9221 E	21	14	33	13
23	Zinc as Zn	mg/L	3120. B	0.11	0.09	0.19	0.04

S. No	Parameters	Unit	Test Method	SW-1 (Vatti Vagu U/S)		SW-2 (Vatti Vagu D/S)	
				1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
24	Iron as Fe	mg/L	3120. B	0.61	0.37	0.43	0.89
25	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL
27	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL
28	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL
29	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL
30	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL
31	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL

Physico-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

Sampling period: once in 3 months Samples collected on : **07.11.2023** & **30.12.2023**

Sl. No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT			
				Class A	Class B	Class C	Class D	Class E	SW-1 (Vatti Vagu U/S)		SW-2 (Vatti Vagu D/S)	
									3rd Qrt	4th Qrt	3rd Qrt	4th Qrt
1	pH	-	4500-H^+B	6.5-8.5	6.5-8.5	6.0 – 9.0	6.5-8.5	6.0-8.5	8.4	8.5	8.3	8.5
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	540	558	385	400
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	5.2	5.2	5.5	5.4
4	Bio chemical Oxygen Demand (3 days 27° C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	2.6	3.0	2.4	1.2
5	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	-	-	140	220	130	70

6	Free Ammonia (as N)	mg/L	4500-NH_3 –F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.13	0.13	0.09	0.15
8	SAR	-	-	-	-	-	-	Less than 26	0.68	0.76	0.52	0.59

Physico-Chemical Characteristics of Surface Water at Selected Locations in the Study

Sampling period: once in 3 months Samples collected on : **07.11.2023** & **30.12.2023**

S. No	Parameters	Unit	Test Method	SW-1 Vatti Vagu U/S		SW-2 Vatti Vagu D/S	
				3rd quarter	4th quarter	3rd quarter	4th quarter
1	Colour	Haze n	2120. B	5	5	5	5
2	Odour	TON	2150. B	No odour observe d	No odour observed	No odour observed	No odour observed
3	Temperature	ºC	2550. B	24.9	25.1	24.7	25
4	Turbidity	NTU	2130. B	2.4	4.3	1.6	3.7
5	Total Dissolved Solids at 180º C	mg/L	2540.C	322	330	225	234
6	Total Suspended Solids at 105º C	mg/L	2540. D	16	11	8	10
7	Chemical Oxygen Demand	mg/L	5220. D	12	12	12	4
8	Chlorides as Cl^-	mg/L	4500-Cl^- .B	44	42	34	35
9	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	22	29	17	21
10	Fluoride as F^-	mg/L	4500-F^- .C	22	26	15	18
11	Calcium as Ca	mg/L	3500-Ca.B	1.9	1.72	2.2	2.03
12	Magnesium as Mg	mg/L	3500-Mg.B	30	34	22	27
13	Sodium as Na	mg/L	3500-Na.B	48	35	42	30
14	Potassium as K	mg/L	3500-K.B	0.8	0.51	0.8	0.7
15	Nitrites as NO_2	mg/L	4500-NO_2^-.B	6.89	8.7	1.34	0.64
16	Nitrates as NO_3	mg/L	4500-NO_3^-.B	0.04	0.05	BDL	BDL
17	Total Phosphates	mg/L	4500-P-D	BDL	0.11	0.02	0.36
18	Ammonical Nitrogen as NH_3-N	mg/L	4500-NH_3 -C	BDL	BDL	BDL	BDL
19	Phenolic compounds as C_6H_5OH	mg/L	5530-D	BDL	BDL	BDL	BDL
20	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1
21	Carbonates as CO_3	mg/L	2320. B	Nil	Nil	Nil	Nil
22	Bi-carbonates as HCO_3	mg/L	2320. B	225	230	135	150
23	Fecal Coliforms	MPN /100 mL	9221 E	13	4.5	11	4.5
24	Zinc as Zn	mg/L	3120. B	0.1	0.05	0.24	0.08
25	Iron as Fe	mg/L	3120. B	0.66	0.72	0.57	0.31
26	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL
27	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL
28	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL

S. No	Parameters	Unit	Test Method	SW-1 Vatti Vagu U/S		SW-2 Vatti Vagu D/S	
				3rd quarter	4th quarter	3rd quarter	4th quarter
29	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL
30	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL
31	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL
32	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL

Annexure-III (b)

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Sampling period: once in 3 months Samples collected on: 29.04.2023 & 01.08.2023

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-1 (Gouriguda Village)		GW-2 (Pathibanda Village)	
						1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
1.	Colour	Pt-co-	2120. B	5	15	<5	5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
3.	pH	--	4500-H+B	6.5 to 8.5	No relaxation	6.8	7.3	7.0	7.5
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
5.	Turbidity	NTU	2130. B	1	5	0.42	0.38	0.28	0.37
6.	Total Dissolved Solids at 180o C	mg/L	2540.C	500	2000	475	650	470	569

General Parameters Concerning Substances Undesirable in Excessive Amounts

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-1 (Gouriguda Village)		**GW-2** (Pathibanda Village)	
						1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
1.	Calcium as Ca	mg/L	3500-Ca.B	75	200	49	91	52	88
2.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	67	74	70	65
3.	Chlorides as Cl^-	mg/L	4500-Cl^-.B	250	1000	19	58	23	45
4.	Sulphates as SO_4^{2-}	mg/L	4500-SO_4^{2-} .E	200	400	82	73	86	64
5.	Fluoride as F^-	mg/L	4500-F^-.C	1.0	1.5	0.41	0.91	0.33	0.82
6.	Nitrates as NO_3	mg/L	4500-NO_3^-.B	45	No relaxation	11	32	13	30
7.	Residual free chlorine	mg/L	4500-Cl^-.B	0.2	1.0	BDL	BDL	BDL	BDL
8.	Phenolic compounds as C_6H_5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL
9.	Total Alkalinity as $CaCO_3$	mg/L	2320. B	200	600	365	475	350	410
10.	Total Hardness as $CaCO_3$	mg/L	2340. C	200	600	**398**	532	**393**	487
11.	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	0.04	0.05	BDL
12.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.38	0.10	0.05	BDL
13.	Boron as B	mg/L	3120-B	0.5	2.4	0.13	BDL	0.27	0.04
14.	Iron as Fe	mg/L	3120-B	1.0	No relaxation	0.76	0.25	0.17	1.0
15.	Zinc as Zn	mg/L	3120-B	5	15	0.17	0.72	0.63	0.20
16.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	0.23	BDL
17.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL
18.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
19.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL

Parameters Concerning Toxic Substances

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-1 (Gouriguda Village)		GW-2 (Pathibanda Village)	
						1st Qrt	2nd Qrt	1st Qrt	2nd Qrt
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
4	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL
5	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL
6	Total Arsenic as As	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
7	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL
8	Pesticides: α–BHC, β-BHC, γ-BHC, δ-BHC, o, p-DDT, p, p' –DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND
	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND
9	Polyaromatic Hydrocarbons (PAH's): Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	-	-	ND	ND	ND	ND

10	Total Coliforms	MPN/100 mL	9221A & B	-	-	<1.8	<1.8	<1.8	<1.8
11	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area

Sampling period: once in 3 months Samples collected on: **07.11.2023 & 30.12.2023**

Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-1 Ullipitta Dorli Village		GW-2 Pathibanda Village	
						3rd quarter	4th quarter	3rd quarter	4th quarter
1	Colour	Haz en	2120. B	5	15	<5	<5	<5	<5
2	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
3	Ph	--	4500-H^+B	6.5 to 8.5	No relaxation	7.8	7.7	7.7	7.6
4	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
5	Turbidity	NTU	2130. B	1	5	0.42	0.72	0.63	1.11
6	Total Dissolved Solids at 180^o C	mg/L	2540.C	500	2000	418	325	485	598
7	Calcium as Ca	mg/L	3500-Ca.B	75	200	46	38	52	64
8	Magnesium as Mg	mg/L	3500-Mg.B	30	100	39	33	48	60
9	Chlorides as Cl-	mg/L	4500-Cl-.B	250	1000	22	20	32	57
10	Sulphates as SO42-	mg/L	4500-SO42- .E	200	400	50	44	44	38
11	Fluoride as F-	mg/L	4500-F-.C	1.0	1.5	0.9	0.67	1.2	1.24
12	Nitrates as NO3	mg/L	4500-NO3-.B	45	No relaxation	19	26	50	44
13	Total Alkalinity as CaCO3	mg/L	2320. B	200	600	350	228	366	460
14	Total Hardness as CaCO3	mg/L	2340. C	200	600	275	232	328	407
15	Sulphide as H_2S	mg/L	4500-S2-F&D	0.05	No relaxation	BDL	BDL	BDL	BDL
16	Total Ammonia-N	mg/L	IS 3025 (Part 34)	0.5	No relaxation	BDL	BDL	BDL	BDL
17	Phenolic compounds as C6H5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL
18	Residual free chlorine	mg/L	4500-Cl-.B	0.2	1.0	BDL	BDL	BDL	BDL

19	Mineral oil	mg/L	IS:3025 (part 39)	0.5	No relaxation	absent	absent	absent	absent
20	Anionic Detergents (as MBAS)	mg/L	IS:13428:2005K	0.2	1.0	<0.2	<0.2	<0.2	<0.2
21	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	0.07	BDL
22	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.32	0.14	0.19	0.22
23	Boron as B	mg/L	3120-B	0.5	2.4	0.17	0.08	0.12	0.26
24	Iron as Fe	mg/L	3120-B	1.0	No relaxation	0.68	0.44	0.42	0.38
25	Zinc as Zn	mg/L	3120-B	5	15	0.12	0.13	0.18	0.09
26	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL
27	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL
28	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
29	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL
30	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL
31	Cyanide as CN-	mg/L	4500-CN^-.F	0.05	No relaxation	BDL	BDL	BDL	BDL
32	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
33	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL
34	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL
35	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL
36	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL
37	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL
38	**Pesticides :** α–BHC, β-BHC, γ-BHC, δ-BHC, o, p-DDT, p, p' – DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND
39	2,4-D, Carboryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND
40	**Polyaromatic Hydrocarbons (PAH's):** Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h)	µg/L	6440.C	-	-	ND	ND	ND	ND

	anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene								
41	Total Coliforms	MPN/100 Ml	9221 B	-	-	<1.8	<1.8	<1.8	<1.8
42	Fecal Coliforms	MPN/100 Ml	9221 E	-	-	<1.8	<1.8	<1.8	<1.8

Annexure-III(c)

Characteristics of effluents

Sampling interval: Once in fortnight

Characteristics of effluents – KHA OCP. mine discharge							
Sl.No.	Date of Sampling	pH (at 25˚C)	TSS at 105 ºC	TDS at 180ºC	COD	BOD	Oil & Grease
Unit		--	mg/L	mg/L	mg/L	mg/L	mg/L
Test Method		4500-H^+B	2540-D	2540-C	5220-D	IS3025	5520-B
MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines		5.5 to 9.0	100	--	250	30	10
1.	15.04.2023	7.8	27	946	24	2.6	1
2.	27.04.2023	7.9	20	852	20	2.6	1.2
3.	15.05.2023	7.6	24	994	19	2.1	1
4.	31.05.2023	8	16	776	12	1.8	<1
5.	14.06.2023	8.1	19	958	16	1.7	<1
6.	29.06.2023	7.4	29	898	24	2.6	1
7.	15.07.2023	7.4	31	791	27	3.6	1
8.	31.07.2023	8.2	29	988	27	2.5	1
9.	14.08.2023	7.7	31	855	31	4.1	1
10.	25.08.2023	7.4	43	933	36	5.1	1.2
11.	12.09.2023	7.2	24	719	23	2.6	1
12.	27.09.2023	7.7	33	896	28	4.6	1.2
13.	09.10.2023	7.9	20	795	35	6.5	1.2
14.	31.10.2023	8.2	37	958	20	3.2	<1
15.	15.11.2023	7.8	39	810	39	5.2	1
16.	30.11.2023	7.5	28	748	32	6.4	1.4
17.	15.12.2023	7.3	33	894	36	5.6	1.2
18.	30.12.2023	7.7	24	941	23	3.6	1
19.	13.01.2024	7.8	35	1014	31	6.2	1.6
20.	31.01.2024	7.6	29	997	27	4.2	1.2
21.	15.02.2024	7.3	38	1025	35	3.6	1
22.	26.02.2024	7.5	24	897	24	4.8	1.4
23.	15.03.2024	7.1	30	815	28	3.2	<1
24.	30.03.2024	7.3	22	934	31	3.2	<1
MIN		**7.100**	**16.000**	**719.000**	**12.000**	**1.700**	**1.000**
MAX		**8.200**	**43.000**	**1025.000**	**39.000**	**6.500**	**1.600**
Avg		**7.642**	**28.542**	**893.083**	**27.000**	**3.817**	**1.137**
98% TILE		**8.200**	**41.160**	**1019.940**	**37.620**	**6.454**	**1.528**
- *No standard is specified for TDS.*							

Characteristics of effluents – KHA OCP BWS ETP OUTLET							
Sl.No.	Date of Sampling	pH (at 25˚C)	TSS at 105 ºC	TDS at 180ºC	COD	BOD	Oil & Grease
Unit		--	mg/L	mg/L	mg/L	mg/L	mg/L
Test Method		4500-H^+B	2540-D	2540-C	5220-D	IS3025	5520-B
MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines		5.5 to 9.0	100	--	250	30	10
1.	15.04.2023	7.9	64	1115	56	12.2	3.2
2.	27.04.2023	7.5	51	994	52	13.2	2.6
3.	15.05.2023	7.8	71	1296	71	18.2	3
4.	31.05.2023	7.6	43	1052	51	10.6	2.2
5.	14.06.2023	7.7	51	879	35	7.2	1.8
6.	29.06.2023	7.9	69	1071	56	16.2	3.2
7.	15.07.2023	7.6	71	1141	51	14.2	3.6
8.	31.07.2023	7.6	69	1271	51	14	3
9.	14.08.2023	7.9	80	1023	47	12.2	3.8
10.	25.08.2023	7.7	73	1336	40	11.6	2.8
11.	12.09.2023	7.3	65	1183	35	9.6	3.2
12.	27.09.2023	7.5	77	1014	52	13.4	4.4
13.	09.10.2023	7.3	58	989	60	12.4	3.8
14.	31.10.2023	7.9	66	1091	48	8.6	2.6
15.	15.11.2023	7.6	69	1247	55	12.6	4.8
16.	30.11.2023	7.5	54	1061	48	10.8	3.2
17.	15.12.2023	7.9	74	994	64	12.6	4.2
18.	30.12.2023	7.8	52	1141	51	10.6	3.8
19.	13.01.2024	7.9	76	1233	59	11.8	5.4
20.	31.01.2024	7.8	68	1098	63	13.4	4.8
21.	15.02.2024	7.6	59	1175	47	9.3	3.2
22.	26.02.2024	7.9	60	1014	60	12.4	3.6
23.	15.03.2024	7.2	54	1142	56	11.6	2.4
24.	30.03.2024	7.6	47	1058	67	14.4	<1
MIN		**7.200**	**43.000**	**879.000**	**35.000**	**7.200**	**1.800**
MAX		**7.900**	**80.000**	**1336.000**	**71.000**	**18.200**	**5.400**
Avg		**7.667**	**63.375**	**1109.083**	**53.125**	**12.213**	**3.417**
98% TILE		**7.900**	**78.620**	**1317.600**	**69.160**	**17.280**	**5.136**
- *No standard is specified for TDS.*							

Characteristics of effluents – KHA OCP CHP ETP OUTLET							
Sl.No.	Date of Sampling	pH (at 25˚C)	TSS at 105 ºC	TDS at 180ºC	COD	BOD	Oil & Grease
Unit		--	mg/L	mg/L	mg/L	mg/L	mg/L
Test Method		4500-H^+B	2540-D	2540-C	5220-D	IS3025	5520-B
MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines		5.5 to 9.0	100	--	250	30	10
1.	15.04.2023	7.8	44	961	24	2.6	<1
2.	27.04.2023	7.8	28	877	16	2.1	<1
3.	15.05.2023	7.6	53	1005	23	2.6	<1
4.	31.05.2023	7.3	26	1180	27	4.2	1
5.	14.06.2023	7.3	38	991	16	1.7	<1
6.	29.06.2023	7.9	41	797	28	3.1	1
7.	15.07.2023	8.1	35	881	23	2.6	1
8.	31.07.2023	7.2	41	987	23	3	1
9.	14.08.2023	7.9	30	881	27	3.6	<1
10.	25.08.2023	8.2	59	1096	31	2.6	<1
11.	12.09.2023	7.7	47	936	23	4.1	1.2
12.	27.09.2023	7.9	38	794	20	3.4	1
13.	09.10.2023	8.1	29	894	35	4.3	<1
14.	31.10.2023	7.4	35	975	32	4.2	1.2
15.	15.11.2023	7.2	41	833	39	4.1	1
16.	30.11.2023	7.4	31	914	28	3.2	<1
17.	15.12.2023	7.8	28	892	36	4.8	1
18.	30.12.2023	7.6	37	788	31	5.1	1.4
19.	13.01.2024	7.8	33	881	23	4.2	1
20.	31.01.2024	7.4	28	957	19	2.8	<1
21.	15.02.2024	7.3	36	810	27	3.1	<1
22.	26.02.2024	7.6	32	996	32	6.1	<1
23.	15.03.2024	7.4	19	783	24	4.4	<1
24.	30.03.2024	7.2	26	882	19	2.2	<1
MIN		**7.200**	**19.000**	**783.000**	**16.000**	**1.700**	**1.000**
MAX		**8.200**	**59.000**	**1180.000**	**39.000**	**6.100**	**1.400**
Avg		**7.621**	**35.625**	**916.292**	**26.083**	**3.504**	**1.073**
98% TILE		**8.154**	**56.240**	**1141.360**	**37.620**	**5.640**	**1.360**
- *No standard is specified for TDS.*							

Annexure-III(d)

Piezometric wells monitoring data
Khairagura OC Expansion Project Area Bellampalli

Piezometric wells monitoring data Khairagura OC Expansion Project Area Bellampalli											
Piezometric well No	Location	Depth(m)	Dia(m)	MP(m)	Period	Depth To Water (m).					
						2019	**2020**	**2021**	**2022**	**2023**	**2024**
KRGOCP PW6	19^{0}15'4.79"N,79^{0}16' 52.05"E 150 m from Dip side of quarry edge road to dump-1ie Susi camp	50	0.1	0.3	Winter	7.51	7.31	7.22	4.63	6.18	4.67
					Pre monsoon	7.86	7.88	7.96	7.27	6.50	
					Monsoon	6.53	5.64	2.84	5.41	NR	
					Post Monsoon	7.28	7.15	23.32	5.68	4.53	
KRGOCP PW8	19^{0}14'08.649"N, 79^{0}17'59.958"E Near Check post atKHGOC (East side strike direction)	50	0.1	0.2	Winter	23.44	23.24	23.32	22.77	22.33	22.20
					Pre monsoon	23.97	23.72	23.88	23.27	22.50	
					Monsoon	19.62	21.56	20.78	21.88	14.10	
					Post Monsoon	23.00	23.12	22.07	22.08	19.00	
KRGOCP PW9	19^{0}14'11.146"N, 79^{0}16'00.684"E Near Iron bridge atKHGOC (Rise side)	50	0.1	0.2	Winter	9.47	9.1	9.08	7.62	9.52	8.10
					Pre monsoon	9.57	9.63	9.58	9.68	9.86	
					Monsoon	5.56	8.14	5.22	6.17	7.0	
					Post Monsoon	8.28	8.56	7.57	8.90	7.85	
KRGOCP PW10	19^{0}15'02.264"N, 79^{0}16'52.05"E Near coal haulage road at BGR Camp Office	50	0.1	0.2	Winter	11.73	11.61	11.01	8.04	7.50	10.08
					Pre monsoon	12.38	12.04	12.16	10.57	9.80	
					Monsoon	6.41	7.82	7.48	5.98	9.12	
					Post Monsoon	9.88	9.83	7.96	6.18	9.61	
KRGOCP PW11	19^{0}15'03.785"N, 79^{0}15'48.362"E In the Premises of II-Seam Coal Yard.	50	0.1	0.2	Winter	13.08	12.94	12.68	11.28	11.18	11.22
					Pre monsoon	16.54	16.34	16.41	14.42	11.30	
					Monsoon	11.70	11.29	7.84	9.08	3.96	
					Post Monsoon	NA	12.03	11.18	10.87	11.07	

Phreatic wells monitoring data Excisting wells of BPA area

Well No.	Name of village	Location	Depth (m)	Period	2019	2020	2021	2022	2023	2024	Nearest mine/ Distance in Km)	Remarks
1.	Goleti	Near bus stand	9.0	Winter	6.71	6.66	6.74	6.86	6.28	6.59	Glt-12.5Km	Domestic
				Pre-monsoon	6.98	6.89	7.27	7.84	8.20			
				Monsoon	4.51	4.72	4.32	4.22	5.37			
				Post-monsoon	6.53	6.11	4.83	5.55	6.48			
2.	Durgapur	On way towards Goleti	10.5	Winter	7.36	7.48	7.68	4.26	4.32	5.30	Glt-14.0 Km	Domestic
				Pre-monsoon	7.49	7.57	7.76	6.37	5.72			
				Monsoon	4.28	4.52	3.20	3.07	3.68			
				Post-monsoon	7.41	9.61	3.64	4.04	4.32			
3.	Madaram	Opp. MVK-3 Inc.	9.5	Winter	5.51	6.13	5.11	3.80	3.68	4.18	MVK-3	Domestic
				Pre-monsoon	6.23	7.04	6.83	6.53	4.15			
				Monsoon	4.83	3.86	2.10	2.83	3.18			
				Post-monsoon	6.11	4.02	3.42	3.15	4.00			
4.	Madaram	Near over head tank	16.0	Winter	12.03	11.91	12.04	5.00	4.17	5.80	MVK-13.0 KM	Domestic
				Pre-monsoon	12.50	Dry	12.23	8.97	5.68			
				Monsoon	7.97	10.56	3.28	3.41	4.08			
				Post-monsoon	11.13	11.07	3.69	3.27	4.78			
5.	Madaram	Temple compound	6.7	Winter	4.58	5.28	4.42	3.15	3.22	3.43	MVK-13.25 km	Domestic
				Pre-monsoon	5.73	5.41	5.67	4.09	3.45			
				Monsoon	2.03	2.66	1.10	1.51	1.63			
				Post-monsoon	5.24	3.52	2.35	3.10	3.14			
6.	Tandur	Near Rly.Gate	11.0	Winter	3.44	3.37	3.74	3.69	3.99	4.28	MVK-10.9 Km	Domestic
				Pre-monsoon	4.28	4.45	4.92	5.21	4.40			
				Monsoon	1.45	2.41	3.10	2.52	3.20			
				Post-monsoon	3.18	3.15	3.21	3.78	3.96			
7.	Rechni	Village entrance	7.5	Winter	8.34	8.48	7.94	5.60	5.96	5.56	MVK-13.0 Km	Agriculture
				Pre-monsoon	8.57	8.61	8.46	7.85	7.75			
				Monsoon	2.43	2.65	2.65	2.13	3.56			
				Post-monsoon	8.44	4.08	3.25	4.10	4.00			
8.	Pedda boodha	Sai Temple	8.0	Winter	4.18	3.21	4.28	2.53	3.17	3.52	68 Dip4.0 Km	Domest ic
				Pre-monsoon	5.63	5.31	5.59	5.11	4.67			
				Monsoon	1.55	2.65	1.27	1.23	1.28			

				Post-monsoon	3.21	2.79	2.01	1.90	1.83			
9.	Bejjal	In the centre of the village	7.5	Winter	6.41	6.45	6.08	4.95	4.72	5.42	BPA OC-0.3 Km	Domestic
				Pre-monsoon	7.57	7.26	7.48	6.25	5.79			
				Monsoon	3.55	4.67	3.43	2.35	2.34			
				Post-monsoon	6.41	5.03	3.57	3.18	3.68			
10.	Narsapur	Near X road in village	8.0	Winter	4.98	5.34	6.11	2.50	2.47	2.32	BPA OC-0.6 Km	Agriculture
				Pre-monsoon	5.48	5.62	7.58	5.30	4.97			
				Monsoon	6.12	2.28	1.10	0.88	1.55			
				Post-monsoon	5.31	5.31	1.22	1.90	2.14			
11.	Sonapur	OLD VILLAGE	8.10	Winter	Newly established			--	3.02	4.87		Agriculture
				Pre-monsoon				6.00	5.63			
				Monsoon				0.80	3.30			
				Post-monsoon				1.74	3.90			
12.	Goleti	Near Singareni school	6.30	Winter	Newly established			--	3.18	4.30		Domestic
				Pre-monsoon				5.15	4.21			
				Monsoon				2.08	3.07			
				Post-monsoon				2.78	4.11			
13.	Goleti	Goutham nagar	8.0	Winter	Newly established			--	4.08	4.11		Agriculture
				Pre-monsoon				5.70	5.89			
				Monsoon				3.02	4.57			
				Post-monsoon				3.45	5.18			
14.	Patha pulikunta	Village centre	7.80	Winter	Newly established			--	4.07	6.00		Govt. Well
				Pre-monsoon				6.21	6.33			
				Monsoon				3.35	5.08			
				Post-monsoon				3.91	5.73			
15.	Rebbana	End of the village	6.50	Winter	Newly established			--	2.73	2.80		Domestic
				Pre-monsoon				3.78	3.32			
				Monsoon				1.10	1.43			
				Post-monsoon				1.86	2.25			
16.	Gangapur	End of the village		Winter	New established observation wells			--	4.40	4.49		
				Pre-monsoon				--	4.55			
				Monsoon				--	3.90			
				Post-monsoon				4.18	4.30			
17.	Nambala	Bhakta Hanuman		Winter	New established observation wells			--	3.87	5.08		
				Pre-monsoon				--	6.75			

		Temple		Monsoon		--	4.10			
				Post-monsoon		3.59	4.87			
18.	Thakkallapalli	Road to Kothagudem		Winter	New established observation wells	--	2.96			
				Pre-monsoon		--	3.27			
				Monsoon		--	1.83			
				Post-monsoon		2.62	2.68			

Annexure-IV (a)

Month wise rainfall data at project during year 2023-2024		
Month	**Total rainfall in mm**	**Total rainy days**
APRIL-2023	53	8
MAY-2023	31	6
JUNE-2023	73	10
JULY-2023	537	22
AUGUST-2023	104	10
SEPTEMBER-2023	242	19
OCTOBER-2023	10	1
NOVEMBER-2023	24	2
DECEMBER-2023	7	1
JANUARY-2024	0	0
FEBRUARY-2024	0	0
MARCH-2024	5	1
Total	1070	76

Annexure-IV(b)

Khairagura OC Ambient air quality monitoring data

Sampling interval: Once in fortnight

sampling duration: 24 hours

Ambient Air Quality at KHA OCP Project Office(CZ)					
Sl. No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
Coal mine standards,GSR 742(E), dt.25.09.2000		250.0	-	120.0	120.0
1.	11.04.2023	189	78.7	18	21.1
2.	26.04.2023	183	76.3	17.6	20.9
3.	11.05.2023	187	79.3	17.1	20.1
4.	25.05.2023	193	80.7	18.2	21.1
5.	10.06.2023	198	84.3	18.8	21.6
6.	26.06.2023	190	81.3	17.6	20.8
7.	11.07.2023	186	75.0	17.0	20.1
8.	27.07.2023	173	66.7	15.9	18.7
9.	10.08.2023	177	68.8	16.4	19.0
10.	25.08.2023	181	76.3	16.8	19.7
11.	11.09.2023	174	73.8	16.1	19.2
12.	25.09.2023	178	75.6	17.1	20.2
13.	11.10.2023	183	78.7	17.6	20.8
14.	26.10.2023	172	70.6	18.0	21.2
15.	10.11.2023	175	69.4	17.4	20.4
16.	25.11.2023	169	64.4	16.9	19.6
17.	11.12.2023	165	61.5	16.2	19.1
18.	26.12.2023	171	70.0	15.8	18.9
19.	10.01.2024	176	75.0	16.3	19.3
20.	25.01.2024	182	79.3	15.5	18.4
21.	10.02.2024	176	71.2	16.0	19.8
22.	26.02.2024	179	74.4	16.5	19.4
23.	11.03.2024	187	81.3	17.1	20.3
24.	26.03.2024	190	83.6	17.5	20.7
Min		**165.00**	**61.50**	**15.50**	**18.40**
Max		**198.00**	**84.30**	**18.80**	**21.60**
Avg		**180.58**	**74.84**	**16.98**	**20.02**
98 Percentile		**195.70**	**83.98**	**18.52**	**21.42**
- *No standard was specified for $PM_{2.5}$ in core zone.*					

Ambient Air Quality at KHA OC BWS/Weighbridge(CZ)					
Sl. No.	Date of Sampling	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)
Coal mine standards,GSR 742(E), dt.25.09.2000		250	-	120	120
1.	11.04.2023	201	83.6	19.1	22.2
2.	26.04.2023	195	80	18.7	21.6
3.	11.05.2023	199	87.8	18	21
4.	25.05.2023	205	91.2	18.5	22
5.	10.06.2023	202	92.7	19.1	22.5
6.	26.06.2023	198	86.4	18.5	21.6
7.	11.07.2023	191	79.3	17.7	20.5
8.	27.07.2023	176	70.6	16.6	19.5
9.	10.08.2023	184	74.4	17.1	20.1
10.	25.08.2023	188	80.0	17.9	20.8
11.	11.09.2023	181	78.7	17.0	20.2
12.	25.09.2023	189	80.7	17.7	20.9
13.	11.10.2023	192	84.3	18.0	21.2
14.	26.10.2023	180	78.0	18.5	21.8
15.	10.11.2023	183	75.6	19.1	22.0
16.	25.11.2023	179	73.8	18.3	21.4
17.	11.12.2023	185	81.3	17.8	20.7
18.	26.12.2023	190	82.0	17.2	20.0
19.	10.01.2024	195	85.7	17.6	21.0
20.	25.01.2024	201	89.2	16.9	19.9
21.	10.02.2024	193	82.7	17.4	20.3
22.	26.02.2024	198	85.0	17.9	20.6
23.	11.03.2024	203	94.2	18.2	21.5
24.	26.03.2024	199	87.1	18.8	22.1
Min		**176.00**	**70.60**	**16.60**	**19.50**
Max		**205.00**	**94.20**	**19.10**	**22.50**
Avg		**191.96**	**82.68**	**17.98**	**21.06**
98 Percentile		**204.08**	**93.51**	**19.10**	**22.36**
- *No standard was specified for $PM_{2.5}$ in core zone.*					

Ambient Air Quality at Gouriguda village (BZ)					
Sl. No.	Date of Sampling	PM_{10} (µg/m^3)	$PM_{2.5}$(µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)
NAAQ Standards		100	60	80	80
1.	15.04.2023	67	31.9	11.8	14.7
2.	29.04.2023	62	31.3	10.9	13.8
3.	15.05.2023	68	33.6	10.4	13.2
4.	29.05.2023	69	34	11	14.2
5.	14.06.2023	72	35.3	11.7	14.8
6.	29.06.2023	67	33.6	10.9	13.6
7.	14.07.2023	61	28.0	10.2	13.0
8.	31.07.2023	53	26.8	9.8	12.4
9.	14.08.2023	59	28.0	10.1	13.1
10.	29.08.2023	63	31.3	10.6	13.8
11.	14.09.2023	57	27.8	9.9	12.8
12.	29.09.2023	60	30.8	10.4	13.5
13.	14.10.2023	65	32.7	10.9	14.0
14.	30.10.2023	58	28.6	11.1	14.5
15.	14.11.2023	54	27.5	11.6	14.2
16.	29.11.2023	50	24.2	10.8	13.1
17.	14.12.2023	47	22.4	10.3	13.7
18.	29.12.2023	51	26.5	9.7	12.9
19.	13.01.2024	56	28.3	10.5	13.4
20.	30.01.2024	62	31.6	9.8	12.3
21.	14.02.2024	56	26.3	10.0	13.3
22.	29.02.2024	63	29.4	10.7	13.9
23.	14.03.2024	67	33.6	11.0	14.3
24.	30.03.2024	69	33.0	11.5	14.8
Min		**47.00**	**22.40**	**9.70**	**12.30**
Max		**72.00**	**35.30**	**11.80**	**14.80**
Avg		**60.67**	**29.85**	**10.65**	**13.64**
98 Percentile		**70.62**	**34.70**	**11.75**	**14.80**

Ambient Air Quality at Pathibanda village(BZ)					
Sl. No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards CPCB,dt:18.11.2009		100	60	80	80
1.	13.04.2023	53	26.8	9.6	12.9
2.	28.04.2023	55	28	8.8	12.3
3.	13.05.2023	58	28.6	8.3	11.8
4.	27.05.2023	61	29.7	9.2	12.7
5.	13.06.2023	59	28	9.9	13
6.	28.06.2023	51	22	8.9	12
7.	13.07.2023	49	23.3	8.1	11.6
8.	29.07.2023	44	21.4	7.9	11.0
9.	12.08.2023	51	23.5	8.4	11.8
10.	28.08.2023	55	27.8	8.9	12.2
11.	13.09.2023	48	25.9	7.8	10.8
12.	27.09.2023	50	26.5	8.6	11.7
13.	13.10.2023	56	28.3	9.1	12.0
14.	28.10.2023	47	23.8	9.7	12.5
15.	13.11.2023	43	22.4	8.8	11.9
16.	28.11.2023	39	18.0	8.2	11.3
17.	13.12.2023	35	17.3	7.8	10.7
18.	28.12.2023	40	21.8	7.3	10.2
19.	12.01.2024	45	22.6	8.0	11.1
20.	29.01.2024	52	24.0	7.9	10.5
21.	13.02.2024	49	23.1	8.3	11.2
22.	28.02.2024	54	26.3	8.7	11.8
23.	13.03.2024	59	28.8	9.0	12.4
24.	28.03.2024	62	31.6	9.5	12.9
Min		**35.00**	**17.30**	**7.30**	**10.20**
Max		**62.00**	**31.60**	**9.90**	**13.00**
Avg		**50.63**	**24.98**	**8.61**	**11.76**
98 Percentile		**61.54**	**30.73**	**9.81**	**12.95**

Ambient Air Quality at Thoyagudem (Ullipitta Dorli) village (BZ)					
Sl. No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO2 (µg/m3)
NAAQ Standards, CPCB,dt:18.11.2009		100	60	80	80
1.	13.04.2023	61	29.1	10	13.1
2.	28.04.2023	59	27.3	9.6	12.9
3.	13.05.2023	63	31.3	9.1	12
4.	27.05.2023	67	32.7	10	13.3
5.	13.06.2023	64	33	10.8	13.9
6.	28.06.2023	59	28	9.7	12.9
7.	13.07.2023	53	23.8	9.0	12.1
8.	29.07.2023	49	22.9	8.6	11.8
9.	12.08.2023	55	27.5	9.4	12.2
10.	28.08.2023	59	28.3	9.9	12.9
11.	13.09.2023	52	26.8	8.9	11.9
12.	28.08.2023	59	28.3	9.9	12.9
13.	13.10.2023	60	28.8	9.8	12.9
14.	28.10.2023	51	24.0	10.0	13.2
15.	13.11.2023	48	23.3	10.8	13.7
16.	28.11.2023	45	22.6	9.7	12.7
17.	13.12.2023	41	21.4	9.2	12.1
18.	28.12.2023	47	22.9	8.8	11.7
19.	12.01.2024	50	24.0	9.1	12.3
20.	29.01.2024	58	27.8	8.6	11.6
21.	13.02.2024	54	27.5	9.5	12.0
22.	28.02.2024	57	28.6	10.0	13.0
23.	13.03.2024	62	30.0	10.6	13.9
24.	28.03.2024	67	34.3	10.9	14.1
Min		**41.00**	**21.40**	**8.60**	**11.60**
Max		**67.00**	**34.30**	**10.90**	**14.10**
Avg		**55.83**	**27.26**	**9.66**	**12.71**
98 Percentile		**67.00**	**33.70**	**10.85**	**14.01**

Ambient Air Quality at Rehabilitated Dorli Village (BZ)					
Sl. No.	Date of Sampling	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)
NAAQ Standards CPCB, dt:18.11.2009		100	60	80	80
1.	11.04.2023	50	23.3	10.1	13.2
2.	26.04.2023	53	24.0	9.6	12.6
3.	11.05.2023	57	27.5	9.2	13.0
4.	25.05.2023	59	29.1	10.4	13.7
5.	10.06.2023	55	27.8	10.7	14.2
6.	26.06.2023	50	25.9	9.9	13.0
7.	11.07.2023	47	23.5	9.3	12.2
8.	27.07.2023	43	22.2	8.5	11.9
9.	10.08.2023	48	24.8	8.9	11.3
10.	25.08.2023	52	25.6	9.1	12.3
11.	11.09.2023	46	23.8	8.6	11.7
12.	25.09.2023	49	24.0	9.4	12.5
13.	11.10.2023	54	27.3	9.7	13.0
14.	26.10.2023	45	23.1	10.2	13.5
15.	10.11.2023	42	21.6	9.9	12.8
16.	25.11.2023	37	18.9	9.2	12.1
17.	11.12.2023	33	17.1	8.8	11.8
18.	26.12.2023	38	18.0	8.1	11.2
19.	10.01.2024	49	22.4	8.7	11.6
20.	25.01.2024	55	27.5	8.0	10.9
21.	10.02.2024	50	24.5	8.9	11.4
22.	26.02.2024	53	26.8	9.4	12.0
23.	11.03.2024	58	28.6	10.0	13.1
24.	26.03.2024	60	28.8	10.6	13.9
Min		**33.0**	**17.1**	**8.0**	**10.9**
Max		**60.0**	**29.1**	**10.7**	**14.2**
Avg		**49.3**	**24.4**	**9.4**	**12.5**
98 Percentile		**59.5**	**29.0**	**10.7**	**14.1**

Heavy Metals in Particulate Matter (PM)

Sampling interval: once in 3 months.

Heavy Metals in Particulate Matter (PM)							
Sl. No.	Parameters	Unit	Test method	Result			
				1st Qrt	**2nd Qrt**	**3rd Qrt**	**4th Qrt**
1	Chromium as Cr	ng/m^3	IO - 3 EPA	15	10	17	19
2	Cadmium as Cd	ng/m^3	IO - 3 EPA	BDL	BDL	BDL	BDL
3	Lead as Pb	ng/m^3	IO - 3 EPA	16	8	12	15
4	Zinc as Zn	ng/m^3	IO - 3 EPA	255	20	189	196
5	Iron as Fe	ng/m^3	IO - 3 EPA	720	502	635	545
6	Cobalt as Co	ng/m^3	IO - 3 EPA	BDL	9	7	BDL
7	Manganese as Mn	ng/m^3	IO - 3 EPA	18	28	35	29
8	Copper as Cu	ng/m^3	IO - 3 EPA	9	10	8	5
9	Molybdenum as Mo	ng/m^3	IO - 3 EPA	BDL	BDL	BDL	BDL
10	Nickel as Ni	ng/m^3	IO - 3 EPA	BDL	15	11	BDL
11	Vanadium as V	ng/m^3	IO - 3 EPA	18	18	21	25
12	Silver as Ag	ng/m^3	IO - 3 EPA	BDL	BDL	BDL	BDL
13	Aluminium as Al	ng/m^3	IO - 3 EPA	845	62	218	116
14	Arsenic as As	ng/m^3	IO - 3 EPA	BDL	BDL	BDL	BDL
15	Selenium as Se	ng/m^3	IO - 3 EPA	BDL	BDL	BDL	BDL
16	Mercury	ng/m^3	IO - 3 EPA	15	10	BDL	BDL
BDL: Below Detection Limit. Cd – 1.4 ng/m^3*; Co – 2* ng/m^3*; Ag – 2* ng/m^3*, As – 2* ng/m^3*; Se – 2* ng/m^3*.*							

Annexure-IV(c)

Vehicular emissions monitoring data

Sampling interval: Once in six months.

Sl. No	Eqpt. Type/capacity	Eqpt. Name	Make	D.O.C	HMR	Tested Date	HSU % 65	K m-1 2.45	Test Status
1	SHOVELL	KGS-10	BEML	22.08.2018	10140	28.08.2023	40.2	1.05	PASS
2	DUMPER 35T	KGB-28	BEML	10.10.2015	12200	,,	34.0	0.42	PASS
3	DUMPER 35T	KGB-29	BEML	10.10.2015	14286	,,	40.2	0.14	PASS
4	DUMPER35T	KGB-38	BEML	20.11.2015	15855	,,	24.7	0.15	PASS
5	DUMPER 35T	KGB-39	BEML	20.11.2015	12327	,,	24.3	0.12	PASS
6	DUMPER 35T	C-6	BEML	08.04.2013	13832	,,	45.5	0.23	PASS
7	DUMPER 60T	KGcat-41	CAT	22.08.2016	25866		42.0	1.14	PASS
8	DUMPER 60T	KGcat-42	CAT	22.08.2016	27286	,,	35.1	1.01	PASS
9	DUMPER 60T	KGcat-43	CAT	22.08.2016	24830	29.08.2023	23.2	0.17	PASS
10	DUMPER 60T	KGcat-44	CAT	01.01.2017	24343	,,	26.4	0.45	PASS
11	DUMPER 60T	KGcat-46	CAT	01.01.2017	25023	,,	25.2	0.23	PASS
12	DUMPER 60T	KGcat-47	CAT	01.01.2017	23651	,,	34.5	0.72	PASS
13	DUMPER 60T	KGcat-45	CAT	01.01.2017	26016	,,	25.2	0.51	PASS
14	DUMPER 60T	KGcat-40	CAT	22.08.2016	23876	,,	29.3	0.31	PASS
15	SHOVEL	KGS-9	TATA	07.02.2018	24166	,,	40.5	1.05	PASS
16	SHOVEL	KGS-8	TATA	01.04.2016	13027	,,	24.4	0.31	PASS
17	SHOVEL	SRI DURGA	L&T KOMAT	23.10.2015	32515	30.08.2023	52.1	1.02	PASS
18	MOTOR GRADER	KGG-4	BEML	12.01.2016	15194	,,	25.4	0.28	PASS
19	MOTOR GRADER	KGG-5	BEML	11.04.2022	3066	,,	34.0	0.52	PASS
20	DUMPER	KGB-50	BEML	17.05.2019	9766	31.08.2023	24.2	0.17	PASS
21	DUMPER	KGB-51	BEML	17.05.2019	9108	,,	26.2	0.12	PASS
22	WATER SPRINKLER	KGT-4	HM	01.12.2017	8445	,,	54.2	1.05	PASS
23	WATER SPRINKLER	KGT-5	BEML	01.12.2017	8938	,,	50.5	1.24	PASS
24	WATER SPRINKLER	KGT-3	BEML	05.07.2013	12796	,,	68.2	2.46	FAIL
25	LOADER	KGL-2	CAT	25.03.2016	15924	,,	35.2	1.07	PASS
26	DUMPER	BEML-1	BEML	17.12.2014	14760	26.08.2023	40.4	0.64	PASS
27	DUMPER-35-2	BEML-5	BEML	21.11.2015	13679	,,	32.3	1.05	PASS
28	MOTOR GRADER	BMG-2	BEML	09.12.2015	12840	,,	43.4	0.18	PASS
29	DOZER	KGD-7	KOMAT	26.10.2016	18672	,,	43.2	1.03	PASS
30	DOZER	KGD-8	L&T	10.07.2017	15822	,,	41.5	1.20	PASS
31	DOZER	KGD-9	L&T	28.06.2017	15586	28.08.2023	37.4	0.71	PASS
32	DOZER	KGD-5	L&T	26.11.2016	15723	,,	42.4	0.19	PASS
33	TYRE HANDLER	TH-1	BEML	18.04.2011	988	,,	692	2.47	FAIL
	SHOVEL	TH-2	TH	01.01.2018	22351	,,	45.4	O.74	PASS

Sl. No	**Eqpt. Type/capacity**	**Eqpt. Name**	**Make**	**D.O.C**	**HMR**	**Tested Date**	**HSU % 65**	**K m-1 2.45**	**Test** Status
34	CRANE 40T	KGC-2	ACE	03.05.2011	5236	29.08.2023	-	-	BD
35	CRANE 40T	KGC-4	TIL	24.11.2016	1328	,,	29.5	0.51	PASS
36	SHOVEL	KGS-4	LT	30.11.2012	39449	,,	42.1	0.56	PASS
37	DUMPER-60	B-308	BEML	14.12.2016	13744	,,	34.2	0.42	PASS
38	DUMPER-60	B-309	BEML	14.12.2016	11019	,,	28.5	0.14	PASS
39	DUMPER-60	B-634	BEML	11.05.2019	4951	,,	34.2	0.18	PASS
40	DUMPER-60	B-60584	BEML	12.02.2019	9995	,,	29.5	0.45	PASS
41	DUMPER-60	B-60586	BEML	12.02.2019	7215	,,	34.1	0.16	PASS
42	DUMPER-60	B-60592	BEML	01.03.2019	9893	,,	32.1	0.24	PASS
43	DOZER	D-4	LT	27.04.2017	9016	,,	29.8	0.12	PASS
44	SHOVEL	KGS-6	TH	08.08.2018	6527	,,	30.4	0.15	PASS
45	CRANE	KGC-5	ESCORT	02.08.2018	435	,,	19.4	0.18	PASS
50	CRANE	KGC-6	ACE	13.09.2018	224	,,	21.4	0.84	PASS

Annexure-V

NOISE

Sampling interval: Once in fortnight Sampling duration: 24 hours

Month	Fort night	KHA OC Project Office.(CZ)			Pathibanda village(BZ)			Thoyagudem (Ullipitta Dorli) village		
		Sample collected	L_{day}	L_{night}	Sample collected	L_{day}	L_{night}	Sample collected	L_{day}	L_{night}
	Stnd.		75	70		55	45		55	45
APR 2023	1st	11.04.2023	62.3	50.5	13.04.2023	49	38.3	13.04.2023	50	40.2
	2nd	26.04.2023	62.7	50.9	28.04.2023	49.6	38.8	28.04.2023	50.6	40.5
May 2023	1st	11.05.2023	60.9	49.6	13.05.2023	48.9	38.5	13.05.2023	50	39.8
	2nd	25.05.2023	61.4	50.9	27.05.2023	49.4	37.9	27.05.2023	50.9	40.3
JUNE 2023	1st	10.06.2023	61.9	50.1	13.06.2023	49.8	38.4	13.06.2023	51.3	40.7
	2nd	26.06.2023	60.8	49.5	28.06.2023	48.7	37.7	28.06.2023	50.1	40
JULY 2023	1st	11.07.2023	60.0	48.7	13.07.2023	47.8	37.2	13.07.2023	49.5	39.7
	2nd	27.07.2023	59.6	48.3	27.07.2023	60.7	50.5	27.07.2023	59.6	48.3
AUG 2023	1st	10.08.2023	60.1	49.4	12.08.2023	48.1	37.7	12.08.2023	49.3	39.2
	2nd	25.08.2023	59.8	49.0	28.08.2023	48.8	38.1	28.08.2023	49.8	39.8
SEP-2023	1st	11.09.2023	59.1	48.5	13.09.2023	47.9	37.8	13.09.2023	48.6	38.8
	2nd	25.09.2023	60.3	49.5	27.09.2023	48.3	37.4	27.09.2023	48.0	38.2
oct-2023	1st	11.10.2023	61.2	50.0	13.10.2023	48.9	38.3	13.10.2023	49.4	39.3
	2nd	26.10.2023	60.4	50.7	28.10.2023	49.1	38.9	28.10.2023	49.9	39.7
Nov-2023	1st	10.11.2023	59.9	49.7	13.11.2023	48.6	38.5	13.11.2023	48.8	39.0
	2nd	25.11.2023	59.3	49.2	28.11.2023	48.0	37.6	28.11.2023	48.4	38.7
Dec-2023	1st	11.12.2023	58.7	48.8	13.12.2023	47.7	37.1	13.12.2023	47.9	38.1
	2nd	26.12.2023	60.1	49.1	28.12.2023	48.4	38.0	28.12.2023	49.0	39.1
Jan-2024	1st	10.01.2024	60.7	49.8	12.01.2024	48.7	38.6	12.01.2024	49.8	39.6
	2nd	25.01.2024	58.9	48.5	29.01.2024	47.2	37.5	29.01.2024	48.5	38.7
Feb-2024	1st	10.02.2024	59.4	48.9	13.02.2024	47.8	37.9	13.02.2024	49.1	39.3
	2nd	26.02.2024	60.3	49.4	28.02.2024	48.2	38.2	28.02.2024	49.6	39.9
Mar-2024	1st	11.03.2024	60.9	50.5	13.03.2024	48.9	38.7	13.03.2024	50.1	40.2
	2nd	26.03.2024	61.3	50.9	28.03.2024	49.1	39.0	28.03.2024	50.6	40.7
Min.			**58.700**	**48.300**		**47.700**	**37.100**		**47.900**	**38.100**
Max.			**62.700**	**50.900**		**60.700**	**50.500**		**59.600**	**48.300**
Avg			**60.472**	**49.578**		**49.317**	**38.706**		**50.061**	**39.967**
98%tile			**62.564**	**50.900**		**56.994**	**46.556**		**56.778**	**45.716**

Annexure-VI

Air pollution control measures:

- 5 nos. of 28 KL & 12 no of 10KL capacity mobile water sprinklers are being deployed in every shift for dust suppression on haul roads and approach roads, dumps, coal transport road, etc.
- Portable Fog Cannon deployed at the KHA OC for fogging water along the Coal transport road.
- Vehicular emissions are being monitored for HEMM at a frequency of once in six months. Maintenance & engine tuning of the vehicles is being carried out at regular intervals to control fuel exhaust emissions.
- Sensor operated dust suppression is provided at crusher of pit head coal handling plant. The crusher house, conveyors, transfer points, discharge hoppers, etc, are closed with G.I. sheets to the extent possible to control the dust generation.
- A mist sprayer is provided at crusher of pit head coal handling plant.
- A sensor operated wetting point is provided to wet coal loaded dumpers.
- Fixed point water sprinkling arrangement is provided along permanent haul roads.
- Plantation is being done with native species to maintain sustainability.
  - ✓ So far 15,63,294 nos. of plants were planted in an area of 427.45 Ha. up to 31.03.2023
  - ✓ dump area- 372.45 Ha. (Including 29 Ha internal dump)
  - ✓ avenue & greenbelt area: 54.28Ha.
- Coal transporting trucks are being covered with tarpaulin and same is being ensured at SCCL's check posts by security personnel.
- Pre-weigh bin truck dispatch system is provided at this project to reduce dust during loading of trucks.
- The wet drilling is being adopted.
- Controlled blasting technique with NONELs is being practiced for effective blasting and to control the generation of dust, ground vibrations, fly rock, etc., during blasting operation.

Noise pollution control measures:

- Sound proof cabins are provided in the HEMM.
- Monitoring of noise level is being done regularly and record is being maintained.
- Plantation is being carried out every year on dumps, in the vacant places, avenue and around boundary to reduce the noise levels.
- Planned preventive maintenance of HEEM & other vehicles is being done at regular intervals to control noise.
- Speed limits are fixed for HEMM/vehicles to control the noise.
- Regular fine tuning of engines is being done to reduce the noise.
- In order to control noise due to impact, some coal is being left in coal bunkers & the height of fall of coal is kept minimum to reduce noise.
- Controlled blasting technique with NONELs is being practiced to control noise also

Water pollution control measures:

- A washing plat form is constructed near base workshop for washing of HEMM and other vehicles.
- ETP (60KL capacity) constructed near base workshop & pit head CHP.

- The washing effluents generated from washing platform of the workshop are being treated in Effluent Treatment Plant (ETP) provided for the purpose. Treated water used for dust suppression, washing of HEMM.
- Excess mine discharge water after necessary treatment in slow sand filter bed/sedimentation tank treated water used for domestic purpose.
- Garland drains (dim: base width 3m, top width 10m, depth 3m) around the quarry and OB dumps are provided with settling ponds followed by check dams to settle the run off soil during rains.
- Six nos. of CC check dams are constructed for dumps to arrest silt.
- Earthen bunds (base width 5m, top width 3m, height 3m) are made all around OB dumps to check runoff into the natural drains.
- Cleaning of drains, settling tanks, culverts, etc., are being done at regular intervals.

Annexure-VII

Solid waste management

Topsoil Management:

1	Total topsoil	10.86 M.m^3
2	Topsoil removed so far	4.152 M.m^3
3	Topsoil stored in temporary stockyard	0.360 M.m^3
4	Topsoil spread on dumps	3.792 M.m^3

Overburden Management :

External dumping						
1	Total hard overburden	573.910 M.m^3				
2	Total hard OB removed since inception	355.088 M.m^3 (Including top soil)				
3	Details of OB dumps	Area in Ha.	Qty in LBCM	Height (m)	Overall slope	Perimeter of Dump (m)
a	Dump-I (external including topsoil spreading)	82.75	278.790	90	28^0	3275
b	Dump-II(external including topsoil spreading)	60.92	276.990	75	28^0	3326
c	Dump-III (external including topsoil spreading)	217.03	1224.060	120	28^0	6092

Internal dumping (backfilling) in de-coaled void area:

1	Details of internal dump (backfilling) since inception	Area (in Ha.)	Quantity in (M.m^3)
		262.944	162.468

Land management:

Sl.	Description		As per EC in Ha	Present status in Ha
1	Quarry Area	:	542.91	435.33
2	External OB Dumps (Including Top soil storage)	:	392.62	366.52
3	Infrastructures	:	9.80	9.80
4	Others	:	276.22	276.22
	Total	:	1217.50	1087.87

Annexure-VIII

Land Use/ Land Cover Study of Core Mine Area

(carried out during the year, 2022-23)

The extents of various land use land cover classes pertaining to the core zone area is given below.

Land Use Land Cover Class		**Area of Sub Class**		**Area of Class**	
		Area in Ha	**Percentage of Usage**	**Area in Ha**	**Percentage of Usage**
Active mining				310.52	25.50
	Quarry Area	170.41	14.00		
	Coal dump	3.83	0.31		
	Quarry sump	9.98	0.82		
	Roads	116.53	9.57		
	Service buildings	9.78	0.80		
	Over Burden Dump	183.74	15.09	183.74	15.09
Under Reclamation				135.42	11.12
	Back filling Under reclamation	135.42	11.12		
	Back filling Plantation	0.00	0.00		
Plantation				447.94	36.79
	Green Belt	48.52	3.99		
	Scrubs	161.72	13.28		
	OB dump	237.70	19.52		
	Back filled area		0.00		
Agriculture				24.08	1.98
	Crop Land	13.45	1.10		
	Fallow Land	0.25	0.02		
Waste Land	Barren Land	10.38	0.85		
Forest cover				70.51	5.79
	Dense Forest	32.32	2.65		
	Open Forest	38.19	3.14		

Water Body		45.29	3.72	45.29	3.72
Settlements		0.00	0.00	0.00	0.00
Total		**1217.50**	**100.00**	**1217.50**	**100.00**

Annexure-IX

Plantation details of Khairagura OCP since inception

YEAR	LOCATION	AREA Ha
2005	Vattivagu dump slopes pragathi vanam	12.50
	Along Goleti Road Arch to 5 Km length	3.50
2009	1st Deck slopes at Dump – 1 (Aregudem)	16.60
	Bund cum Roads(Aregudem dump)	3.40
2010	2nd Deck slopes Dump – 1 (Aregudem)	20.00
2011	3rd Deck slopes Dump – 1 (Aregudem)	20.00
	1st Deck slopes Dump-1(Aregudem)	12.50
	Open Area near dump -1 (Aregudem)	13.60
2012	D-3 Dump deck slopes (Sushee)	6.00
	Road cum bund adjacent to Vattivagu	7.00
	Road cum Bund adjacent to D-2 dump	8.00
	Between rise side road and drain	6.00
	1st Deck of D-2 Dump	9.00
	Near Sushee Bridge	2.00
	Top soil dump near 2 seam Coal Yard	1.00
2013	Top soil dump near Sushee D-3 dump	4.00
	Pit office surroundings	3.00
2014	BC Soil dump near 2 seam coal yard	14.00
2015	D-2 Dump 1st deck slopes and BGR D-3 1st Deck	7.00
	Along east side and dip side boundary	4.00
	BC soil dump near 2 seam coal yard	1.00
	Between Lingiguda road and BGR dump yard	3.00
2016	Between Lingiguda Road and rise side of boundary	19.34
	BGR dump-3 Asifabad road side decks	13.68
	Sushee D-3 dump decks Asifabad road side	10.44
2017	Between Asifabad road and D-3 dump yard and dump deck slopes	14.00
2018	D-2 Dump 30 m and 60 m Deck West side	21.00
2019	D-3 Dump near 60 m Deck	42.00
2020	D-3 Dump	10.00
2021	D-3 Dump, Internal dump, Between D-3 to D-2 dumps & proposed quarry edge to D-2 dump	85.67
2022	D-2 Dump ,D-3 Dump and Internal Dump	34.00
2023	Internal Dump	35.00
	TOTAL	**427.23**

Annexure-X

CSR DETAILS AS ON 31.03.2024

Name of the Activity	Amount Spent (Rs. Lakhs)
Civil Works	2369
Skill Training	1411
Mega Medical Camps	18.65
Daily mobile Van (SANJEEVANI)	296.68
Medical referral for PDF	36.85
Total	**4132.18**

Project Officer,
Khairagura Opencast Project,
Bellampalli Area.